"If print is not dead,
who's keeping it alive?"
- *Ellis Tree*

Impresso — Open Shapes of Print

A movement that aims to restore the value of analogue printing, through the Open Design approach, which takes shape in the design of Impresso, a contemporary printing press.

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1859

Open Shapes of Print

A movement that aims to restore the value of analogue printing, through the Open Design approach, which takes shape in the design of Impresso, a contemporary printing press.

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Abstract

Analogue printing is a process that originated from the encounter between art and technology, and its purpose lies in the impression and reproduction of images and words. At a time when paper is increasingly being marginalised in favour of digital media, it is necessary to shine a light on a medium characterised by a rich history and sensitivity. Only by making printing accessible to everyone is it possible to pass on tradition and know-how and transform them into a shared heritage for future generations. Open Shapes of Print was born in response to the perception that analogue printing is disappearing and aims to redesign existing machinery in the sector, which is often imposing and expensive, through the Open Design approach. The movement's mission is to bring attention back to analogue printing, enhancing its cultural significance while making it more accessible. Through the combination of digital and traditional technologies, the aim is to design devices that can be open and close to people, thus fostering the growth of a widespread community that begins in homes, consolidates in laboratories and reaches the school environment. This perspective inevitably leads to reflection on the role of the community, which requires systemic design capable of shifting the focus towards distributed value creation. This is the context for Impresso, a contemporary printing press that combines the main features of intaglio presses and proof presses. It was developed during the "Product Components" course at the Politecnico di Torino as an application of the Design by Components methodology developed by Luigi Bistagnino. The unique feature of the device is that it can perform different printing techniques with a single tool: from engraving to relief printing and typography. Impresso is designed both as a self-build device for experts and amateurs and as a kit for schools, with the aim of reintegrating the value of manual experience into the educational process. The press is therefore a pedagogical tool capable of conveying concepts such as the assembly and functioning of complex artefacts. A second version of Impresso takes shape in the thesis project, developed thanks to participation in national and international events and various educational workshops. The device has been implemented following feedback and functional requirements that improve the user experience, while the range of techniques that can be achieved has been expanded through experiments that demonstrate its extreme versatility. The Open Shapes of Print community has also been enriched with new contacts and collaborations, confirming the project as an evolving process rather than a point of arrival.

Today, analogue printing has almost become an act of resistance.
Open Shapes of Print, as a movement, and Impresso, as a device, aim to reduce the distance between the creative result and those who produce it, preserving and passing on the slow and imperfect material knowledge that defines analogue printing.

ITA Abstract

La stampa analogica è un processo che ha origine dall'incontro tra arte e tecnica e la sua finalità risiede nell'impressione e riproduzione di immagini e parole. In un momento in cui il supporto cartaceo tende ad essere progressivamente marginalizzato a favore del digitale, occorre riportare la luce su un mezzo caratterizzato da una profonda storia e sensibilità. Solo rendendo la stampa alla portata di tutti è possibile tramandare tradizione e know-how e trasformarli in un patrimonio condiviso per le generazioni future. Open Shapes of Print nasce come reazione alla percezione che la stampa analogica stia scomparendo e mira a riprogettare, attraverso l'approccio dell'Open Design, macchinari già esistenti nel settore, spesso imponenti e costosi. La missione del movimento è riportare l'attenzione sulla stampa analogica, valorizzandone il significato culturale e rendendola al contempo più accessibile. Attraverso la combinazione di tecnologie digitali e tradizionali, si aspira a progettare dispositivi che possano essere aperti e vicini alle persone, favorendo così la crescita di una comunità diffusa che inizia nelle case, si consolida nei laboratori e raggiunge l'ambiente scolastico. Questa prospettiva porta inevitabilmente a riflettere sul ruolo della community che richiede una progettazione sistemica capace di spostare l'attenzione verso una creazione di valore distribuita. In questo scenario si inserisce Impresso, un torchio contemporaneo per la stampa che combina le principali caratteristiche dei torchi calcografici e dei tirabozze. Esso nasce nel corso "Product Components" del Politecnico di Torino come applicazione della metodologia del Design by Components sviluppata da Luigi Bistagnino. La particolarità del dispositivo è quella di poter eseguire con un unico strumento diverse tecniche di stampa: dall'incisione alla rilievografia fino alla tipografia. Impresso è concepito sia come dispositivo autocostruibile, indirizzato a esperti e amatori, sia come kit per le scuole, con l'obiettivo di reintegrare il valore dell'esperienza manuale nel percorso educativo. Il torchio si configura quindi come uno strumento pedagogico capace di veicolare concetti come l'assemblaggio e il funzionamento di artefatti complessi. Nel progetto di tesi prende forma una seconda versione di Impresso, sviluppata grazie alla partecipazione a eventi di rilievo nazionale ed internazionale e a diversi workshop didattici. Il dispositivo è stato implementato seguendo feedback e requisiti funzionali che ne migliorano l'esperienza d'uso, mentre il ventaglio delle tecniche realizzabili è stato ampliato attraverso sperimentazioni che ne testimoniano l'estrema versatilità. Anche la community di Open Shapes of Print si è arricchita di nuovi contatti e collaborazioni, confermando il progetto come processo in evoluzione piuttosto che a un punto di arrivo.

Stampare in modo analogico, oggi, diventa quasi un gesto di resistenza. Open Shapes of Print, come movimento, e Impresso, come dispositivo, mirano a ridurre la distanza tra il risultato creativo e chi lo produce, preservando e tramandando l’insieme di saperi materiali, lenti e imperfetti che definiscono la stampa analogica.

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OPEN
SHAPES OF
PRINT

Introduction

The thesis project is a continuation of an idea that originated in the "Design by Components" module of the "Product Components" course in the academic year 2024/25, which aimed to redesign a printing press by applying the Design by Components approach and adhering to Open Design guidelines. These assumptions gave rise to Impresso: a hybrid device that combines the main features of intaglio presses and proof presses. Impresso is part of the broader movement called Open Shapes of Print, as the first of many open-source devices for analogue printing. This second volume recounts the second part of the Impresso - Open Shapes of Print project, as a natural prosecution of what is narrated in the first volume, detailing the implementation of the device following user testing. All five authors - Maria Paula Aponte, Sara Bruno, Fabiana Gentili, Arianna Signetti and Chiara Toso - continue to contribute to the project with enthusiasm and dedication, with the sole exception that the present volume will be written and the subject of the master's thesis of only four of them.

Moving on to the contents of the following pages, the book is structured into five macro-sections that present the steps followed for the implementation of the project in a continuous and natural chronological order. The research phase (phase 1) aims to provide an in-depth analysis of the history and state of the art of the scenario in which the project is set, namely that of traditional printing (chapter 1.1), open design and maker culture (chapter 1.2) and some case studies (chapter 1.3) to analyse what has already been done in the field of investigation. The user research phase (phase 2) consists of two parts. The first part presents the insights gathered through interviews with various personalities close to the world of printing (chapter 2.1). The second part involves the profiling of personas (chapter 2.2), which is preparatory to the development of interaction flows with the device. These are subsequently verified in the testing and validation part (phase 3). The latter begins with a brief recap of the prototype developed by the end of the "Product Components" course in February 2025 (chapter 3.1) and is enriched with various events in which the project took part. It concludes with the implementation of Impresso (chapter 3.2), which is the focal point of this paper. The final section of the volume (phase 4) presents at the current stage of writing, the Impresso device (chapter 4.1), the Open Shapes of Print community (chapter 4.2) and the communication strategy connected to them (chapter 4.3). The conclusions (phase 5) emphasise the desire of all five authors to continue the project beyond academic purposes and, hopefully, evolve it into something bigger.

DESK RESE

ARCH

I.I Traditional Printing

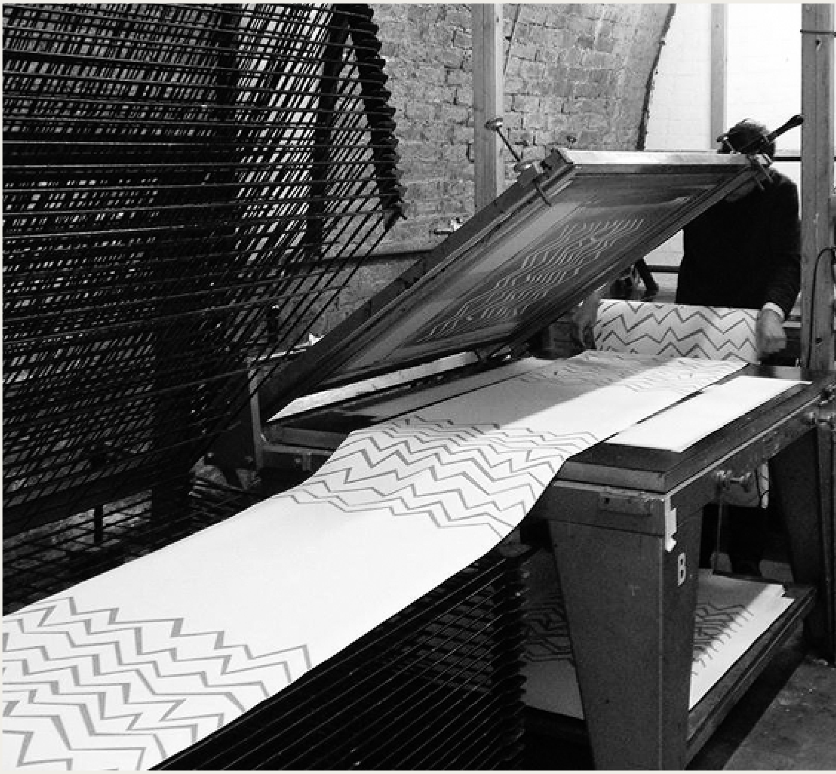



Fig. 2 Typographic printing


Fig. 1 Screen printing

The world of printing is rich in history, artistic value, and complementary knowledge. This chapter provides an overview of the subject, through both general and specific readings, in order to obtain a multi-level description.(Fig.1)

After an initial introduction to the history of printing, with a focus on the role that women have played in printing houses and artistic workshops, the chapter provides a brief overview of the main printing machines, briefly presenting their evolution. It then continues with a brief discussion of the main printing techniques, with related processes, tools and media, before going on to explore the link between printing and education, and how it can enhance learning and convey know-how to future generations.(Fig.2)

1.1.1 History of Printing and Typography

Printmaking represents a singular case within the visual arts, as it inherently involves a relationship between two surfaces: one that bears the image and another onto which it is transferred. Across centuries, this duality has remained an essential principle of the process, despite the diversity of techniques and materials employed. The surface bearing the image can be made of stone, metal, wood, clay, or other natural materials, depending on the technique and historical context. The earliest manifestations of printing, broadly understood, can be traced back to the hand imprints of prehistoric groups who, by leaving pigmented marks on cave walls, revealed the primordial impulse to create a lasting visual trace. In a more contemporary sense, children's handprints symbolically preserve this same direct relationship between body and surface. At the other end of the spectrum, modern printing processes, driven by technological innovation, embody the conceptual complexity and imaginative freedom that are characteristic of contemporary art.

In the fifteenth century, the growing desire to reproduce and disseminate images culminated in the invention of movable type printing. This innovation not only enabled the mass reproduction of high-quality engravings but also fostered the emergence of an autonomous aesthetic sensibility. Printing did not merely democratise the written word but it inaugurated a new visual sensibility. Artists such as Rembrandt exploited the tonal and material potential of printmaking to achieve effects of light and depth never before seen, thereby elevating the medium from a technical craft to a fully developed artistic language.[1]

Over time, printmaking evolved from a means of mechanical reproduction into an autonomous form of aesthetic expression. During the Industrial Revolution, rising literacy rates and increased social mobility allowed broader access to art and culture, consolidating printmaking as a primary vehicle for the dissemination of knowledge and visual imagery. Its influence spread beyond the scientific sphere into commercial illustration and advertising, establishing the printed image as a key medium of modern communication.

The historical roots of printmaking, however, are far older. The earliest evidence dates back to the cylinder seals used by the Assyrian and Mesopotamian civilisations to impress symbols onto clay. In classical antiquity, the Greeks and Romans employed engraved gemstone seals to authenticate documents and assert authority, setting an early precedent for modern official stamps. By the thirteenth century, Europe had adopted the practice of hand-printing textiles with wooden blocks imported from China, where the technique had been known since the ninth century. The oldest known print is a Buddhist illustration from 828 CE,(Fig.3) reflecting the medium's deep cultural and technological heritage. In Europe, the production of prints became more widespread after papermaking processes were perfected in the fourteenth century.

The invention of movable type printing by Johannes Gutenberg around 1450 marked a decisive turning point in the history of visual communication. The reproduction of a book which had previously required months of manual labor could now be completed in a matter of days. This innovation coincided with a period of intense scientific and philosophical progress, stimulating a growing demand for texts and enabling knowledge and ideas to spread throughout Europe.

The role of women in printing history

Within this historical framework, it is crucial to acknowledge the contributions of women to printmaking, a field that has long been obscured by gender bias and the hierarchies of artistic production. The traditionally subordinate status of printmaking in relation to painting and sculpture has further compounded the marginalisation of women working in this medium. Examining female participation in printmaking and print commerce provides valuablein-sight into the structures of power and systems of artistic training that shaped early modern production.

Scholarly research, including that of Paris A. Spies-Gans, Heather McPherson, and F. Carlo Schmid, has been instrumental in uncovering the stories of women who used engraving to assert themselves professionally and increase their commercial visibility. These studies reveal that women were not peripheral figures but active agents in the formation of modern visual and material culture.[3]

In her chapter "Show-Offs: Women's Self-Portrait Prints c.1700" Madeleine C. Viljoen,[4] provides a paradigmatic example of how self-presentation and self-promotion operated as strategies of visibility and identity within the sphere of printmaking. From the establishment of print workshops in the sixteenth century, women were often responsible for reproducing historical and allegorical subjects conceived by male artists, including nude depictions, a subject from which they were traditionally excluded in academic study. Such conditions reveal a distinct set of aesthetic and symbolic criteria that governed how women approached printmaking and determined the themes they considered appropriate for representation.

During the early modern period, many women acquired technical proficiency in printmaking under the guidance of husbands, fathers, or other male relatives, contributing both artistically and economically to the operation of family workshops. Despite the restrictions imposed by educational systems and artistic hierarchies, female engravers and printers succeeded in establishing a meaningful and enduring presence within the history of printmaking, leaving a legacy that is only now being fully acknowledged by contemporary scholarship. Together, the historical evolution of printmaking and the rediscovery of women's contributions to its development demonstrate that this medium has served not only as a technical tool, but also as a means of aesthetic expression and symbolic emancipation. Its study illuminates the complex interrelations among art, gender, and technology, revealing the vital yet long-silenced role that women have played in shaping the visual history of printmaking.

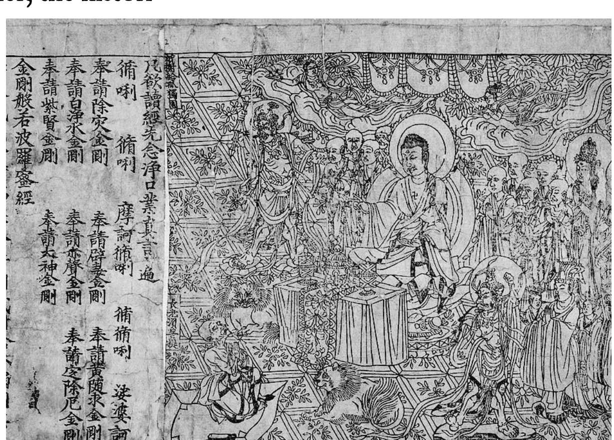


Fig. 3 The Diamond Sutra

1. Dawson, J. (1996). *Guía completa de grabado e impresión. Hermann Blume Ediciones.*

2. Dawson, J. (1996). *Ibid.*

3. Spies-Gans, P. A. (2018). *Gendered Labour in Print: Women, Work, and Material Culture. London: Routledge.*

4. Martinez, C. S., & Roman, C. E. (2025). *Female Printmakers, Printsellers, and Print Publishers in the Eighteenth Century. Cambridge University Press.*

The participation of women in letterpress printing throughout the twentieth century and earlier represents a critical intersection of gendered labour, technical expertise, and cultural production. Unlike other artistic disciplines, printing combines both manual skill and conceptual authorship, requiring practitioners to operate presses, manage type, and make deliberate compositional and textual decisions. The work "Let Her Press", which was printed in the Massey College Bibliography Room by Elisa Tersigni and photographed by Tim Perry, exemplifies these dimensions by portraying a female practitioner actively engaging with the press. The image highlights both the physicality and precision required for printing, as well as the symbolic assertion of agency within a historically male-dominated field.[5]

The critical history of women in printing is extensive yet dispersed, intersecting multiple disciplines, including graphic design history, literary studies,[6] book history, labour history, and gender studies. Scholarly research has illuminated the participation of women in various printing societies and presses, revealing intricate networks of social, technical, and commercial engagement.

In 1983, Barb Wieser of the Iowa City Women's Press compiled a catalogue of women involved in the printing industry. While it is easy to identify a publishing house or press, it is much harder to discern the gender of those involved in producing the books we know. "Women in Book History Bibliography" by Cait Coker and Kate Ozment,[7] and "Alphabettes", a collective of women, have continued along this line of research.

Elis Ing and Lauren Williams are currently investigating the work of women printers in the Special Collections of McGill Library, and one of their research techniques has been to search for the words "veuve" or "widow." Before the twentieth century, it was common for women's printing work within family businesses to be acknowledged only after their husbands had died.

For the twentieth and twenty-first centuries, such a search would be less fruitful, since a much broader range of women, non-binary, and gender-diverse people are now engaged in printing practices.[8]

Women who participated in letterpress printing needed to possess a deep understanding of the technical aspects of the process. Practitioners mastered a variety of printmaking techniques, including relief printing, intaglio, lithography, and typographic composition. Relief techniques, such as woodcuts and linocuts, demanded precision in both carving and inking, while intaglio processes, like engraving and etching, required knowledge of metal plates, acid baths, and pressure calibration. Lithography involved the chemical manipulation of stones and grease-based inks, requiring both manual dexterity and chemical understanding. Women's ability to excel in these complex processes challenges historical narratives that have marginalised their professional expertise. Moreover, women had to contend with material constraints when producing works for publication, exhibition, or sale. They made decisions about paper quality, ink formulation, and press calibration, balancing aesthetic intent with practical limitations. Their contributions extended beyond the mechanical act of printing to encompass the entire production process from design conception and typesetting to binding and distribution. This holistic involvement establishes women as being integral to the technical and artistic aspects of printmaking.[9]

5. Battershill, C. (2022). *Women and Letterpress Printing 1920-2020. Cambridge University Press*

6. McPherson, H. (2019). *Women in Print: Labour, Craft, and Visibility in the Twentieth Century. Cambridge: Cambridge University Press.*

7. Ozment, K. (2020). *Rationale for Feminist Bibliography.* Textual Cultures, 13(1), 149–178.

8. Battershill, C. (2022). *Women and Letterpress Printing 1920-2020. Cambridge University Press*

9. Battershill, C. (2022). *Ibid.*

A critical aspect of women's engagement in printing lies in the reflexive relationship between authorship and labor. The practice of self-reflection extended to the writings and diaries of women printers, who frequently articulated the intellectual significance of their technical work. These texts reveal a sophisticated understanding of print as both medium and message, linking the embodied act of pressing type to broader cultural, literary, and social discourses. Women's reflective engagement thus situates the practice of printing as a space for critical inquiry and personal expression. Furthermore, the networks women forged through collectives, apprenticeships, and collaborative workshops facilitated the transmission of skills, knowledge, and professional authority. These networks enabled women's participation in both domestic and commercial spheres, ensuring the continuity of their contributions across generations. Such practices demonstrate how gendered labor in printing functioned simultaneously as cultural production and social strategy, bridging economic, artistic, and intellectual domains.

However, women's participation in printing must also be understood in contrast to other forms of feminised labor within the publishing industry. Unlike editorial or secretarial work, which historically (and often invisibly) fell to women, particularly as the industry became increasingly "feminised" throughout the nineteenth century, as Sarah Lubelski[10] demonstrates in her study of Bentley, the physical operation of printing presses remained largely coded as masculine. Although women could manage the feed station of a steam press, they were rarely allowed to operate the machinery themselves. As J. A. Stein argues[11], the act of printing, and particularly the role of the press machinist, continued well into the 1980s to evoke associations with "male artisanal identities." Even with the rise of offset lithography in commercial printing, gender divisions persisted, reinforcing a "masculine embodiment attuned to and shaped by the materiality and aesthetics of printing technologies".[12]

In the early stages of printing, women learned the craft through books, instructional manuals, or even informal guidance from friends and colleagues. The first printing guides were not comprehensive educational tools but rather brief reference notes intended for individuals already engaged in the trade reminders of resources, best practices, and efficient habits, rather than introductions to the art of printing itself.[13] Manuals such as The Printer's Helper,[14] published by Excelsior to promote their Kelsey presses, illustrate this tendency. These texts consistently used masculine pronouns when describing each stage of the printing process, implicitly assuming a male readership and practitioner. Such linguistic choices reinforced the exclusion of women and non-binary individuals from the professional identity of the printer, reminding readers that they were not the intended audience. Nonetheless, these manuals documented a wide range of printing techniques and operational methods, providing valuable insights into the machinery and practices that shaped the development of printing throughout the nineteenth century.[15]

10. Lubelski, S. (2024). *A "Gentlemen's Profession": the Historical Masculinisation of British Publishing.* Library of the Written Word, 128, 113–132.

11. Stein, J. A. (2016). *Hot metal : material culture and tangible labour.* Manchester University Press

12. Battershill, C. (2022). *Women and Letterpress Printing 1920-2020.* Cambridge University Press

13. The Printer's Guide Book. (1929). *The Kelsey Company, Excelsior Printing Company.*

14. The Printer's Helper. (1963). *The Kelsey Company, Excelsior Printing Company.*

15. Battershill, C. (2022). *Women and Letterpress Printing 1920-2020.* Cambridge University Press

1.1.2 Printing Machinery Evolution

Machinery is fundamental to the discussion of printing, as it enabled its evolution and spread. A printing press is a mechanical device that applies pressure to an inked surface onto which a printing medium, usually paper, is placed. As a result of this pressure, the ink is transferred from what is called the matrix or typeset to the paper medium. The advent of machinery in the printing industry marked a significant improvement over the commonly used methods of brushing or rubbing the medium repeatedly to transfer the ink. Typically used for typefaces, the invention of the printing press was one of the most important events in history.

Around 1450, the goldsmith Johannes Gutenberg of Mainz was busy printing his first book with movable type (Fig.4) thanks to an innovative printing press. It is impossible to imagine a simpler printing method than the one he invented, unless you use a pad or brush, which is the method used by the Chinese to print engraved wooden blocks. The printing press designed by Gutenberg consisted of two vertical beams, with wooden crossbars to hold them together at the top and bottom. There were also intermediate crossbeams, one of which supported the flat "bed" on which the type was placed, and through the other ran a wooden screw, the lower tip of which rested on the centre of a wooden "platen", which was thus screwed to the type. After inking the form with a leather ball stuffed with wool, the printer spread the paper over it and placed a blanket on top to remove any unevenness that might occur when pressure was applied.[16] The mechanical principle behind Gutenberg's machine was inspired by the old cheese and flax presses commonly found in medieval homes. In Europe, however, the wooden presses used for wine and olive oil production were adapted for printing.[17]

The Blaew Press

The simple wooden press, operated by a screw through a movable bar, remained in use for about 150 years, until the early 17th century, (Fig.5) without any substantial changes.

The first improvements were made around 1620 by William Jensen Blaew, a printer from Amsterdam. Blaew thought of passing the pin of the screw through a square block guided in the wooden frame, and suspending the plate from this block by means of wires or ropes; the block, or box, prevented any twisting of the plate and ensured a more uniform movement of the screw. He also installed a device on the press to slide the printing bed in and out of the frame and added a new form of iron hand lever to turn the screw. Blaew's press was introduced to England and was used there as well as on the rest of the continent.

Stanhope Press

Few improvements were made to the printing press before 1798, when the Earl of Stanhope had one built whose frame, instead of being made of wood, was made of a single piece of cast iron. There was a need for greater printing power, especially in woodcut printing, and the trend was towards larger type sizes, which required greater effort on the part of the printer. To provide a comparison, the effort required to operate one of the old screw presses was roughly equivalent to that of a ploughman in the fields. Thus, the Earl of Stanhope (Fig.6) retained the screw, but added a combination of levers to achieve greater printing power with less energy expenditure on the part of the printer. It must be said, however, that these machines were very heavy and extremely cumbersome.

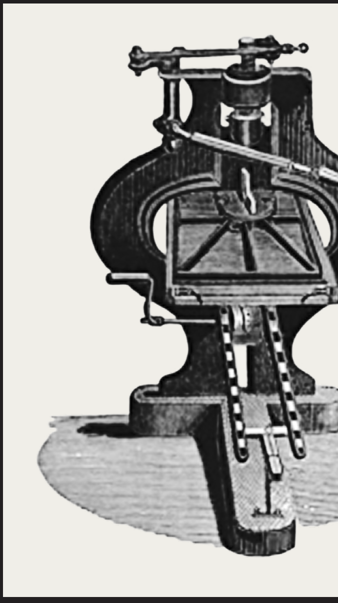


Fig. 6 Stanhope Press

Fig. 5 The Blaew Press

16. Hoe, R. (1902). *A short history of the printing press and of the improvements in printing machinery from the time of Gutenberg up to the present day.*

17. Clough, J., & Bracco, A. (2007). *Museo Civico della Stampa di Mondovì. Guida Scientifica. Città di Mondovì.*

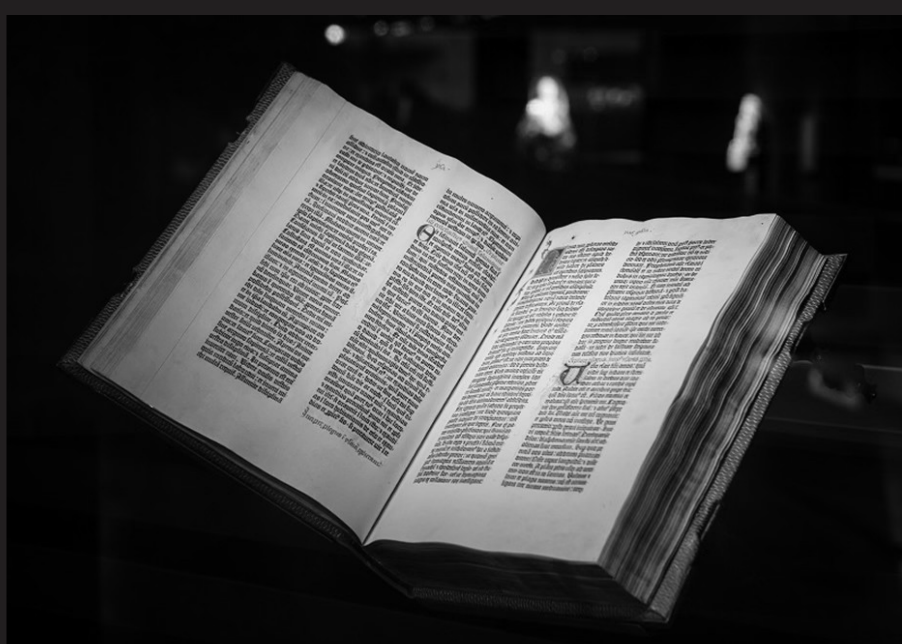


Fig. 4 Gutenberg Bible

Clymer's Columbian Press

Around 1816, George Clymer, a native of Philadelphia, devised an iron machine that eliminated the use of the screw. A long, heavy cast iron lever was placed above the printing bed, with one end fixed to one of the cast iron frame uprights and the other end raised and lowered by a combination of smaller levers, operated by the presser as in a common manual press. (Fig.7) Printing was carried out, and the printing bed was raised and lowered by means of a spindle, or pin, fixed to the centre of the large transverse lever at the top. Clymer later took his invention to England, where it was partially introduced and became known as the "Colombian" press.

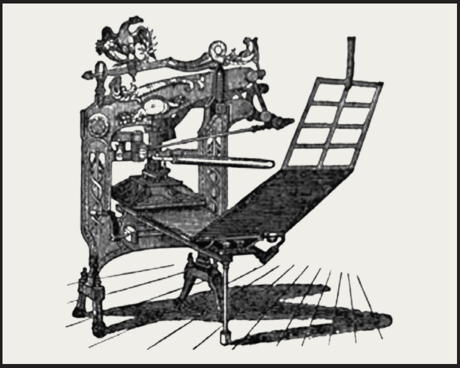


Fig. 7 Clymer's Columbian Press

Peter Smith Hand Press

In 1822, Peter Smith, an American associated with the printing press manufacturer R. Hoe & Co. in New York, designed a machine that was superior in many ways to any other up to that point. The frame was made of cast iron and, instead of a screw with levers, he replaced it with a toggle joint, which was both simple and effective. (Fig.8)

Fig. 8 Peter Smith Hand Press

Washington Hand Press

In 1827, Samuel Rust, born in New York, perfected the Smith press, introducing a significant improvement. Instead of being made entirely of cast iron, the frame had side posts hollowed out for the insertion of wrought iron bars, which were firmly riveted to the top and bottom of the casting.(Fig.9) This not only provided greater strength, but also significantly reduced the amount of metal used in construction. This patent was purchased by R. Hoe & Co., who improved it and proceeded to manufacture the presses, although the "Smith" continued to be used to some extent. The invention was known as the "Washington" press.

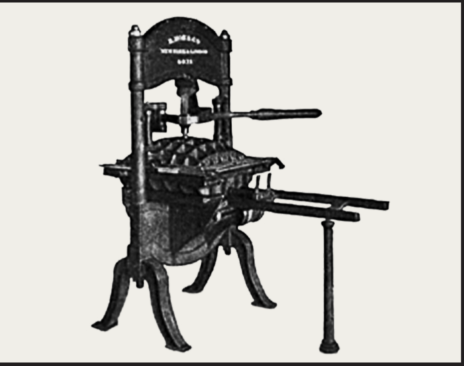


Fig. 9 Washington Hand Press

Treadwell's Wooden-Frame Bed and Platen Press

Until the mid-19th century, the bed and platen printing system was the preferred method for printing books and fine engravings. The first "motorised" or steam-powered press based on this principle was built by Daniel Treadwell in 1822. The frames were made of wood, and it appears that no more than three or four were ever built.(Fig.10) The best machines of this type were those designed and patented by Isaac Adams of Boston in 1830 and 1836, and by Otis Tufts of the same city in 1834.

They were first made with wooden frames and then with iron frames. In 1858, Adams' company became the property of Hoe & Co., which continued to produce the machines with further improvements. One thousand sheets per hour was the maximum speed of the largest formats of the Adams press. Although many experienced printers believed that printing books and high-quality cutting work could only be achieved with flat pressure, this printing system gave way to the cylinder press.[18]

18. Hoe, R. (1902). *A short history of the printing press and of the improvements in printing machinery from the time of Gutenberg up to the present day.*

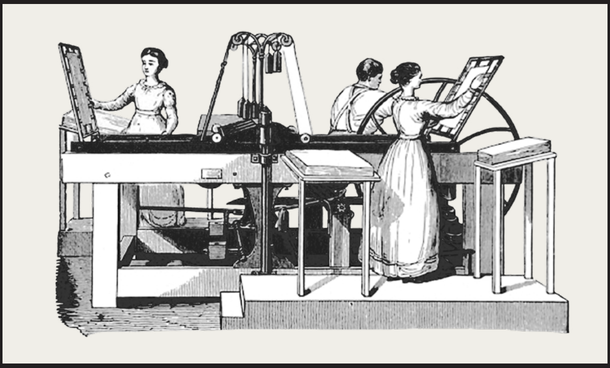


Fig. 10 Treadwell Power Press

The introduction of the cylinder press concept allows to investigate another aspect of printing machinery, linked to the need to check typographic compositions through proofs or drafts before final printing. This type of machinery is called a proofing press, from the combination of the two words "proof" and "press".[19]

19. *Tirabòzze - Significato ed etimologia - Vocabolario - Treccani.* (2023). Treccani.

Proof printing was a necessary control phase in every typesetting room because it allowed, for example, the checking of the composition for typos, duplicates, upside-down characters or damaged letters. However, for many years, the operation did not receive the attention it deserved due to the attitude of many printers who considered it an unproductive process and, as a result, investing in a proofing machine was considered unprofitable.

Gradually, however, attitudes changed, especially in the most advanced laboratories, because it became clear that producing proofs accurately and methodically, with a device suitable for clean and rapid work, had a significant economic impact on the final product of the printing house.

> *"A proof made with a careful impression saves wear on the printing face. A proof with the right amount of ink — neither too much nor too little — makes accurate proofreading easier and enables the proofreader to detect minor defects in the composition before it goes to the pressroom, where corrections are always more expensive than in the composing room. Proofs which show approximately the printing face as it will appear in the final result are required now more than ever."* [20]

20. Stewart, A. A. (1918). *Proof Presses. A Primer of Information About The Customary Methods And Machines For Taking Printers' Proofs*: Vol. Part 1, n. 5 (Typographic Technical Series for Apprentices). The Committee on Education United Typothetae of America

When type is first set on a galley (and when engravings or other printing surfaces are first produced), their correctness must be verified before they are ready for final printing. For this purpose, a test impression is made so that the work can be examined and any necessary corrections made. This test impression is called the printer's proof. To be useful, the means of producing these proofs must be as simple as possible and usable with minimal loss of time, since usually only one copy is printed.

The first step, after the type has been set so that it rests firmly on the surface, is to distribute the ink over the surface of the type; then a sheet of paper is placed on top and pressed down so that the ink is transferred to it. This impression can be obtained using one of the following three methods: by striking a sheet of paper placed on the inked type with a cloth-covered block called a "proof planer" and a mallet; by placing the galley of type on a proofing machine, where the impression is made by passing a heavy iron roller covered with thick cloth or felt over it; placing the type or plate on a manual flatbed press.

Until the early 20th century, the three methods mentioned above were the only ones used to proof typefaces and relief printing plates. Starting in 1915, several new machines were introduced that became popular due to their ability to do a better job in less time. The main examples are listed below.[21]

21. Stewart, A. A. (1918). *Ibid.*

The roller proof press

The roller proof press is the device used to print galley proofs after the first composition and for revision proofs before the material is laid out. This type of machine (Fig.11) has an iron frame on which an oblong flat surface, also made of iron, is mounted. On two sides of this surface there are guides on which an iron roller, with a surface covered with thick, resistant cloth or felt, can be rolled back and forth. When the galley proof is placed on the surface and the surface of the type is inked with a hand roller, a strip of paper is placed on top and passed over the iron roller to obtain the impression. The simplest model of these roller presses is designed to be placed on a table and consists simply of the base plate and the felt-covered impression cylinder. The most popular model, produced by several manufacturers, is equipped with a support.

Fig. 11 Galley Roller Proof Press

The hand press

When the faster cylinder press and the work press gradually replaced the old hand press for the production of large quantities of printed material, the hand press was nevertheless retained for the purpose of proofing. For many years, it was manufactured in sizes suitable for proofing and for printing posters and flyers in small runs.(Fig.12)

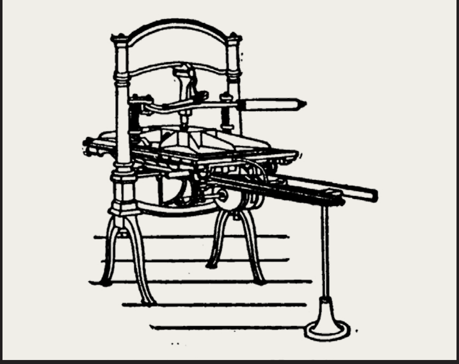


Fig. 12 Washington Hand Press

The Rocker Proof Press

A type of proof press consisting of a frame supporting a very rigid, heavily ribbed bed, on which a heavy iron rocker is mounted for impression.(Fig.13) The rocker is part of a cylinder with a smooth curved surface covered with a thick sheet of rubber, cardboard, sturdy canvas, manila paper or other material suitable for forming a good impression surface. It is held in place by the side frame and is meshed with the bed so that the pitch line of the racks and pinions coincides with the printing line of the press. A handle on the rocker is used to rotate it over the form and, consequently, to make the impression. The

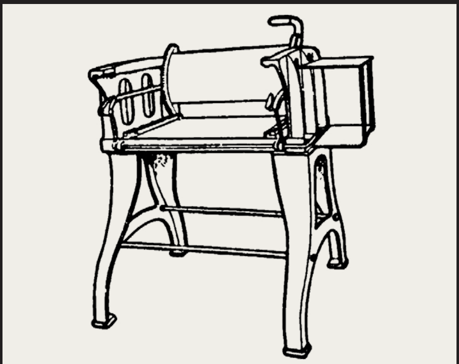


Fig. 13 The Rocker Proof Press

rocker, being held firmly at a uniform level across the entire platen, ensures that the position of the form does not affect the uniformity of the impression, as is the case with a manual press. The uniform movement of the rocker prevents any deviation during impression and produces a sharp print.

Cylinder Proof Presses

There are several models of cylinder proof presses, which are divided into two main categories: the first includes machines in which the impression cylinder runs over a fixed bed, while the second includes those with a movable bed that passes under a rotating impression cylinder.

Stationary-Bed Cylinder Proof Presses

The category of proof presses with a fixed bed is represented by the well-known Vandercook series, (Fig.14) produced in three or four models and in different sizes. In each of these, the plate is inked by rollers and distributors carried above the bed inside a frame. The simplest of these presses is an improved version of the familiar roller galley press. The impression cylinder is geared to move on racks on the sides of the bed and is kept in contact with the guide pins by rollers that run on the underside of protruding lips on the side frame. The circumference of the impression cylinder is longer than the bed, so that the entire surface is not necessary for an impression of any shape that the bed can contain. Therefore, it is not a complete cylinder, as part of its surface has been cut away. It is connected to the bed in such a way that the cut-away part is underneath when the roller is at either end of the bed.

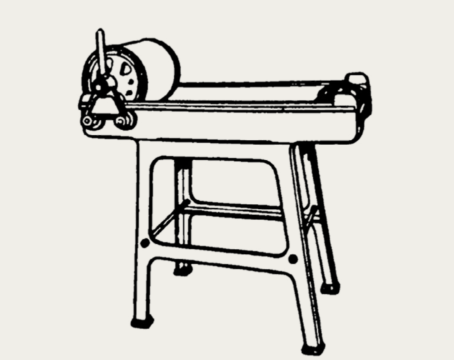


Fig. 14 Vandercook Roller Galley Press

Cylinder Press with Moving Bed

This most recent category of proof presses with a moving bed is represented by the Potter or Hacker series (Fig.15) and the Brower press. These are simplified forms of common cylinder and flatbed printing presses. In its simplest form, the model is designed to rest on a solid bench or any other ground surface. It consists of a frame on which a bed is moved back and forth by a set of rollers.

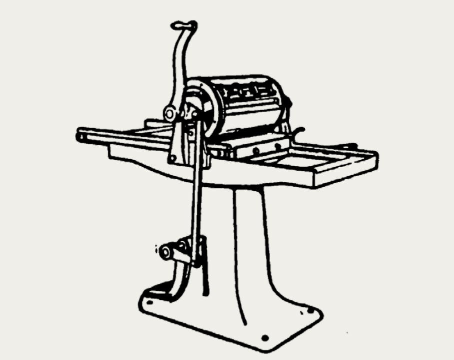


Fig. 15 Potter Proof Press

A cylinder is mounted on top of the bed, supported at both ends by bearings, which is operated by a hand lever. A gear on one end of the cylinder and a rack on the side of the platen are adjusted to mesh with each other and keep the movement of the cylinder and platen perfectly synchronised. The rotation of the cylinder via the lever therefore always moves the platen in unison with it. Inking is carried out with a manual roller[22].

22. Stewart, A. A. (1918). *Proof Presses. A Primer of Information About The Customary Methods And Machines For Taking Printers' Proofs*: Vol. Part 1, n. 5 (Typographic Technical Series for Apprentices). The Committee on Education United Typothetae of America

Fig. 16 Printing workshop

1.1.3 Printing Techniques

Contemporary research in the field of traditional printing is currently generating significant interest. Significant development is expected in related activities that address the current need to create opportunities for detachment from constant internet connections and the widespread use of digital tools in favor of artistic, creative and analogue expressions. Computer graphics, which was initially considered a threat to traditional printing techniques, is now recognized as a valuable complement to them.

It has significantly influenced the development of methodologies such as screen printing, polyester lithography and photogravure, leading to technical advances and evolutions.[23]

23. D'Arcy Hughes, A., & Vernon-Morris, H. (2008). *The printmaking bible: The complete guide to materials and techniques. Chronicle Books.*

This research aims to provide an in-depth understanding of the main printing techniques and tools, and to underline that traditional printing is a living, constantly evolving art.

The Main Printing Techniques

Traditional printing techniques are divided into five main categories, each characterised by its own distinctive methodologies and tools.

Intaglio
Relief
Lithography
Silkscreen

These categories represent the pillars on which contemporary and historical printmaking is based.

Intaglio: The Etched Print

The term "intaglio," which originates from the Italian "incidere" or "tagliare", describes a technique based on the direct working of a metal matrix, usually copper or zinc. In this process,(Fig.17) the image is progressively created by incising lines and areas into the surface of the plate. These marks, whether made manually with tools, such as a burin or obtained through the chemical action of acids, form cavities designed to retain ink during the printing process. Once the incision is complete, the matrix is inked and cleaned so that only the hollowed areas retain the pigment. Then, using controlled pressure, the plate is impressed onto damp paper, transferring the deep marks with great precision and giving the image a characteristic tactile relief and rich tonal range.

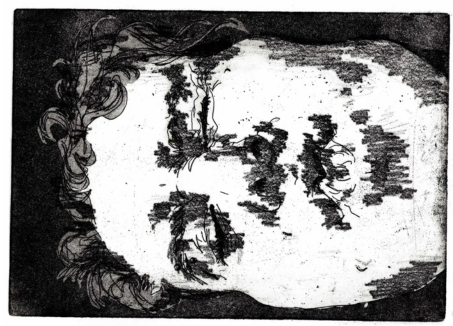


Fig. 17 Intaglio Printing Technique

This technique allows for levels of detail and depth that are difficult to achieve with other traditional printing techniques, giving it a central role in the history of fine art printing and the production of fine works.[24]

24. Monday Merch. (2024, February 21). *Intaglio: Printing Techniques Explained: Process, Applications, and Pros and Cons.*

The history of intaglio represents a fascinating journey through the history of art. The introduction of paper in the 15th century led to the development of intaglio printing as an independent art form. Before then, although there was a well-established tradition of metal engraving, the focus was primarily on the decoration of three-dimensional objects rather than the transfer of images to paper.

According to historians, the first prints arose from the practical need of medieval artisans to preserve their drawings for future use or to document work in progress. Although the prints originally derived from these works served practical purposes, they represent the first steps toward the recognition of engraved works and engravings as autonomous artistic objects.[25]

25. D'Arcy Hughes, A., & Vernon-Morris, H. (2008). *The printmaking bible: The complete guide to materials and techniques.* Chronicle Books.

The introduction of the roller press in the 15th century marked a crucial turning point in the history of printing. Until then, prints had been transferred from the plate by hand burnishing, a laborious process in which the paper was placed on the plate and pressed from the back with uniform circular motions. The mechanical press proved to be a vastly faster and more efficient method, greatly increasing the popularity of the printed image and enabling production on a scale never before seen.

With the development of intaglio engraving methods, this technique was adopted for reproductive purposes: initially for religious images, playing cards, copies of master paintings, and portraits, gradually extending to the printing of books, newspapers, political literature, and maps. Although engravers were highly skilled craftsmen, intaglio as a creative medium suffered during this period of predominantly reproductive use.

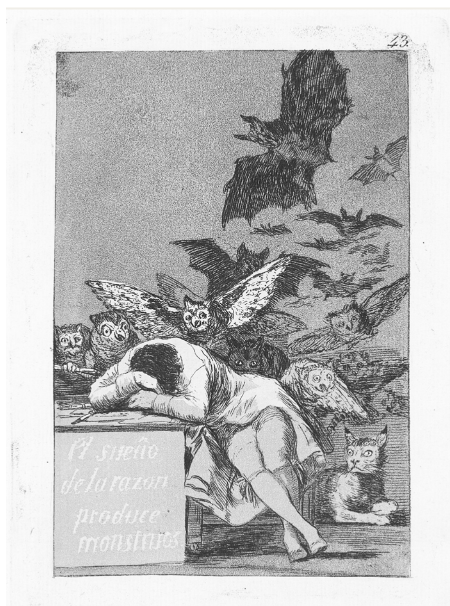


Fig. 18 Goya F., The Sleep of Reason Produces Monsters

Artists like Francisco Goya (1746-1828) provided temporary relief during the decline of this medium as an independent form of expression. (Fig.18) It was not until the 20th century, however, that movements such as Expressionism, Modernism, and Surrealism encouraged a new approach to woodcut. Stanley William Hayter (1901-1988) (Fig.19), through his workshops at Atelier 17 in Paris and later in the United States, inspired a generation of European and North American artists and printmakers, catalysing a true creative renaissance in the technique. Institutions such as the Pratt Graphic Center and the Universal Limited Art Editions studio in the United States, as well as schools such as the Slade in London, were actively engaged in reviving the creative approach to intaglio printmaking.

As demonstrated by numerous contemporary works, intaglio continues to thrive as a medium of artistic printmaking even today, maintaining its extraordinary relevance in the international art scene.

Intaglio is divided into two main subgroups: etching and engraving, also known as burin engraving. Within these two categories, there is a further subdivision into numerous specific processes, each with their own distinctive technical and historical characteristics.

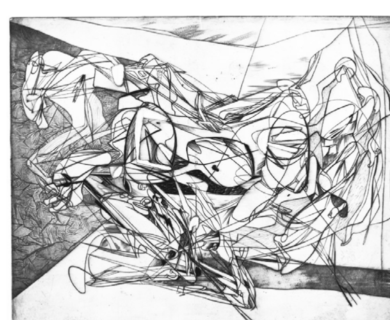


Fig. 19Hayter S.W., Combat

ETCHING The etching technique (Fig.20) originated in the 16th century as an evolution of the goldsmith's craft. In this technique, acid is used as the primary agent to etch lines into the metal surface. The plate is initially covered with an acid-resistant surface called the "primer," on which a line is drawn with a needle or other sharp instrument, exposing the underlying metal. It is the acid that actually creates the depth of the line by reacting chemically with the exposed metal areas. The longer the metal is exposed to the acid, the deeper the etched line becomes. [26]

Etching Processes: numerous processes are grouped under the category of etching, each producing specific visual and tactile effects:

- Hardground Etching: the most classic form of etching, in which the ground is resistant to acids, allowing for clean, defined lines;
- Soft Ground Etching: allows for more spontaneous and suggestive effects;
- Aquatint: produces areas of shaded tone instead of simple lines;
- Sugar Lift: allows printers to create areas of particular transparency;
- Marbling: Creates variegated patterns and textures;
- Spit Bite: offers direct control of acid exposure;
- Photo Etching: integrates photographic methods with traditional etching.

Etching Tools
The tools used in etching represent the result of centuries of technical refinement:

- Files: used to smooth the edges of the slab, essential to avoid injuries during handling;
- Acids: Nitric acid, ferric chloride and hydrochloric acid are the main corrosive agents used to etch the plate;
- Primer: The acid-resistant material, composed of resin, bitumen powders and beeswax, which protects the plate in the areas not to be engraved;
- Engraving needles and tips: essential tools for tracing lines on the background, available in different sizes and stiffnesses;
- Scraper: A blade-shaped tool used to smooth filed edges, remove unwanted marks, and work on the tones of aquatint;
- Ball Burnisher: Used to smooth and polish areas that have been scraped, restoring a reflective quality to the surface;
- Roller and brush: for applying the primer to the slab;
- Stop-out paint: An acid-resistant liquid used to paint edges and areas that are not to be etched;
- Cones and tongs: for smoking a hard-bottomed plate and handling metals without risk of contamination;
- Magnifying glass: an essential tool for checking the depth of an engraved line during the working process;
- Cleaning materials: denatured alcohol, mineral spirits, or vegetable oil for cleaning the plate; rags and newspaper for removing ink;
- Ink and Pigments: Powdered ink etching pigments, mixed with copper oils to achieve the desired consistency;
- Rollers: pin and hand rollers for applying ink to the surface.

The choice of metal influences the chemical, economic, and aesthetic characteristics of the final result. The three most commonly used metals for carving are copper, zinc, and steel, each with thicknesses ranging from 1 to 1.6 mm (18 to 22 gauge).

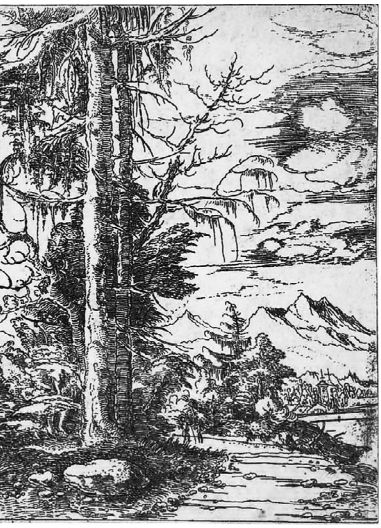
26. D'Arcy Hughes, A., & Vernon-Morris, H. (2008). *The printmaking bible: The complete guide to materials and techniques.* Chronicle Books.

BURIN ENGRAVIN Burin engraving (Fig.21) has ancient roots in medieval history. It derives from the practice of 15th-century German goldsmiths and silversmiths. Unlike etching, which uses chemical agents to create the mark, burin engraving is a purely mechanical process that requires extraordinary manual control and a deep understanding of the material. An image engraved on metal is generally produced on copper using a burin, a precision instrument that is slid across the surface of the plate with light pressure and a controlled rhythm. As the line is engraved, a characteristic metal spiral called a "curl" will appear, which is removed before the print is taken from the engraved line. The resulting line character is crisp, clean, smooth, and fluid.

Burin Engraving Tools: the fundamental requirement for a metal engraver is a carefully adjusted and sharpened tool. The burin, or engraver, is a customised object, made for the user, so each tool has unique characteristics and response differently to metal. Varying the angle at which the burin is held produces a wide range of marks: short cuts and dots, cross-hatches, and parallel lines create different visual and tactile effects. Some lines can be finished simply by stopping the cut and gently lifting the tool. For others, the tool can be gently removed, ending the line with a single, thin scratch.

Fig. 20 Altdorfer A., Landscape with a Double Spruce

Fig. 21 Schongauer M., Christ Carrying the Cross



COLLAGRAPH represents a special category of relief printing.(Fig.22) Despite the absence of a burin or the use of acid, it is generally placed in the context of intaglio because the engraved mark can serve as a vehicle for holding the ink. Collagraph images can be printed using the intaglio process, although contemporary blocks often also incorporate the relief method, creating a hybrid and experimental form..

Collagraph uses a wide range of materials and tools: Cardboard and paper of various thicknesses: they form the compositional basis;

- Cutter and scissors: for cutting and shaping materials;
- Pencil and tracing paper: for transferring the drawing;
- Shellac and glue: for gluing and fixing materials;
- Brush: for applying stickers;
Gauze, fabric, mesh and wool: for creating complex textures;
- Paper handkerchief: for delicate effects;
- Carborundum grit: generally used to granulate lithographic stones; it can be applied to a plate or block to create rich, intense tones within intaglio images.

Collagraph processes allow for printing with multiple colors using a single plate or block, with the possibility of inking in relief over the intaglio, creating highly complex visual effects.

Fig. 22 MacKenzie S., Roofscape, Richmond

Relief: The Raised Surface Print

Relief printing is one of the oldest and most readily available printing techniques for image transfer. It is based on a fundamental principle diametrically opposed to intaglio printing: while in intaglio printing the image resides in the engraved cavities of the matrix, in relief printing the image is made up of the raised, uncut areas of the surface. (Fig.23)

A relief print is made by applying ink exclusively to the raised surface of the matrix, while the depressed areas remain uninked. This principle allows for the creation of an image through an essentially subtractive process: starting from a uniform flat surface, the artist systematically removes material from the areas not intended for printing, leaving intact the areas intended to receive the ink and transfer the image to the paper. A relief print can be made from any material with a raised surface that is sufficiently stable, uniform, and capable of holding the ink, while also resisting the pressure required to transfer the image to the receiving surface.[29]

Unlike carving, which generally requires a specialized mechanical press and considerable pressure, relief is distinguished by its operational simplicity and accessibility: the image can be transferred to paper through simple manual rubbing, using rudimentary tools such as a wooden spoon, a spatula, or a specialized barèn, making this technique particularly democratic and widespread.

The origins of relief printing date back to antiquity and are highly varied. The earliest evidence of sculpted reliefs dates back to the Sumerian civilization around 4000 BC. Between 1000 and 800 BC, the Olmec Indians in Mexico used fired clay tubes decorated with relief motifs to create repeating patterns, an early example of serial printing.

Early societies developed a long tradition of using stamps and seals made of wood, brick, clay, metal, and, later, wax, to convey information. These tools had many applications, including marking criminals with symbols identifying the nature of the crime committed, branding animals to indicate ownership, and using seals on clothing and buildings to demonstrate social status.[30] Historians believe that the ability to print multiple images, first on textile materials such as silk and then on paper, originated in China. The use of a carved seal, dipped in color and transferred to silk, is considered the first example of relief printing. Immediately after the invention of paper in China, in the 2nd century AD, wooden blocks were designed and used to print images and religious teachings. This technique represented a revolution in the dissemination of knowledge.[31]

The relief printing process developed much more slowly outside of China. In fact, paper was not produced in Europe until the 12th century. Woodcut was initially the primary printing technique for European books and literature, until the invention of the photographic printing process in 1820. Historically, the first uses of relief printing were for religious and social purposes, like spreading the teachings of Buddhism in the East and Christianity in the West. During the 15th century, artists such as Albrecht Dürer (1471-1528),(Fig.24) Hans Holbein (1497/8-1543), and Lucas Cranach (1472-1553) elevated relief printing from an industrial activity to a legitimate art form, producing an enormous quantity of works of extraordinary artistic and technical quality.[32]

In Europe, after the 16th century, intaglio printing replaced relief printing. Meanwhile, in Japan between the 17th and 19th centuries, Ukiyo-e artists, a style of painting and printmaking from the Edo period (the name of the present-day city of Tokyo, 1603-1868), distinguished themselves brilliantly in their use of relief methods.

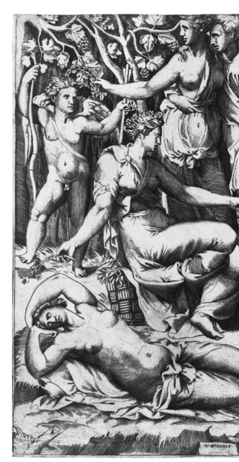
29. printededitions_admin. (2021, June 7). *Relief Printing - Printed Editions.* Printed Editions.

30. D'Arcy Hughes, A., & Vernon-Morris, H. (2008). *The printmaking bible: The complete guide to materials and techniques.* Chronicle Books.

31. D'Arcy Hughes, A., & Vernon-Morris, H. (2008). *Ibid.*

31. D'Arcy Hughes, A., & Vernon-Morris, H. (2008). *Ibid.*

33. D'Arcy Hughes, A., & Vernon-Morris, H. (2008). *Ibid.*



Figures such as Hokusai and Hiroshige created works of extraordinary technical complexity and aesthetic beauty, known as images of the floating world. Their influence subsequently spread to America and Europe. By the end of the 19th century, the European avant-garde, with its Expressionist movement, repurposed the relief printing process as a means of creative and aesthetic expression. In the United States, the Works Progress Administration of the 1930s, a New Deal program created by F. Roosevelt in 1935 to combat unemployment during the Great Depression, contributed to a renewed interest in the technique. The WPA had a specific support program for the visual arts that revolutionized billboard printing techniques, increasing companies' productivity. After the two world wars, still in Europe, the focus on the next generation and the attempt to rebuild the present for the future, encouraged a new wave of personal expression through relief.[33] In the mid-20th century, there was a growing interest in color in the relief process, driven by the innovations of artists such as Picasso (1881-1973). The Op Art and Pop Art movements in America sought to further push the boundaries of color in printmaking.


Fig. 24 Dürer, A., La resurrezione

More recent developments, such as contemporary linocut, have encouraged a persistent interest in the technique, championed by exponents such as Michael Rothenstein (1908-1993),(Fig.25) Maggie Hambling (born 1945) and Angel Botello (1913-1986), whose images demonstrate the extraordinary versatility of this technique.


Fig. 23 Bonasone, G., Flora with her Nymphs

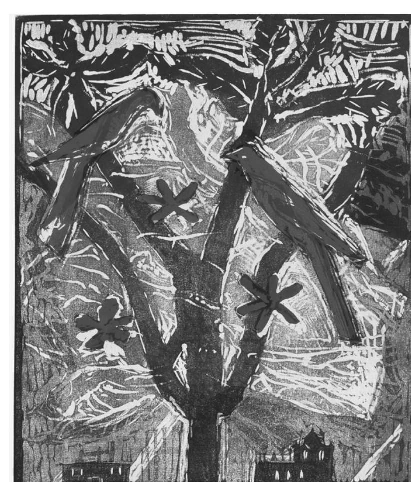


Fig. 25 Rothenstein, M., Red Birds

WOODCUT: Fundamental distinction between woodcut and wood engraving: Woodcut (or xylography) and wood engraving have a precise distinction based on two critical aspects: the type and orientation of the wood used for the block and the tools employed in the process.(Fig.26)

Technical Characteristics of Woodcut: woodcuts use the end grain, or cross grain, of a tree trunk cut perpendicular to the direction of growth. This orientation produces a significantly harder wood with a denser, smoother, and more compact surface. The grain is denser, so the natural texture of the wood doesn't affect the surface of the design, allowing for finer, more delicate results within a design that relies entirely on the lines and marks carved into the surface. The most commonly used woods for woodcuts are boxwood, applewood, and cherrywood.

Woodcut Tools: a significant aesthetic result is achieved with good quality tools that can have straight or mushroom-shaped handles and are essentially the same as those used for linocutting, although they have specific variations.

V-Gouges: available from 1mm, they produce a clean, defined line and are convenient for hatching and drawing parallel lines of various widths;
U-shaped chisels: also available in 1mm, these create a wider, curved line; the larger sizes are useful for cleaning large areas;
Knife: it has a 45-degree angle on one side, with a sharp edge and a point; it has countless uses, including cleaning and cutting lines, while the point is used for small, delicate areas.

Block Processing: a block of wood is initially sanded with three types of sandpaper, progressing from coarse to fine. This process can take about two hours, resulting in a mirror-like finish where every mark is imprinted with clarity. A marker can be rubbed across the surface of the block so that, once engraved, the marks are easily visible. A design can be made or traced onto the block as a design guide.

LINOCUT was originally used for flooring. It is made on a hessian, jute, or hemp backing, composed of a variety of ingredients, including linseed oil and cork powder.(Fig.27) In the early 20th century, artists adopted the thicker and more practical variety known as "battleship lino" (so called because it was originally used to floor warships) as a material for contemporary art prints. This represented a democratisation of printmaking, as it was significantly cheaper than traditional woodcuts.[34]

Linocut Tools: traditional linocut tools generally have mushroom-shaped handles. U- and V-shaped gouges are the essential elements for this technique. Japanese woodcarving tools are an excellent option for linoleum. A large graphite stick is useful for rubbing the surface after each section is cut, providing a preview of how the print will look, since the image will be mirrored to the block.

Linocut Processes include the "reduction method," in which the block is progressively reduced during successive printings of different colours, ensuring that the final print has an extraordinarily complex composition, and "etched lino," which allows for more delicate and decorative effects.

34. D'Arcy Hughes, A., & Vernon-Morris, H. (2008). *The printmaking bible: The complete guide to materials and techniques.* Chronicle Books.

Fig. 26 Woodcut block

Fig. 27 Linocut printing

Fig. 28 Chine collé

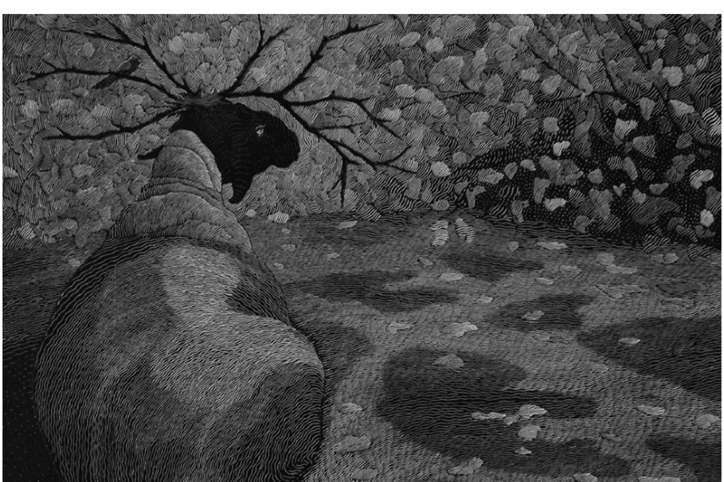


Fig. 29 Wood Engraving

CHINE COLLÉ, the term "Chine collé" originates from France: "Chine" can roughly be translated as "fabric" or "thin paper," while "collé" comes from the verb "coller," meaning "to glue."

The process known as Chine Collé refers to the application of thin printing paper mounted on a sturdier backing paper, creating a visual effect of delicacy and transparency. (Fig.28)

Chine Collé Tools and Materials required for this technique include:

- Sheets of thin colored paper: as the basis of the visual project;
- Spray glue or stick glue: for gluing;
- Scissors: for precise cutting;
- Soft pencil: for notes;
- Brush: if needed for applying glue;
- Tweezers: for delicate handling;
- Sharp cutter: for clean cutting;
- Cutting mat: to protect surfaces.

WOOD ENGRAVING uses the lateral grain or long side of the wood (long grain), cut parallel to the length of the trunk, following the direction of the grain and sap. Significantly softer woods, such as pine, fir, pear, or sycamore are used, as opposed to the hardwoods preferred for woodcuts. These softer woods are less likely to maintain an intricate and highly detailed line, but they are considerably easier to work with and naturally lend themselves to a more spontaneous and free-flowing mark.(Fig.29)

The grain and roughness of the surface texture require careful consideration, as the natural pattern of the wood can significantly influence the resulting image. Contemporary practice has led to the use of less "pure" alternative woods, such as plywood, driftwood, seasoned, charred, and aged wood. This aspect was exploited for aesthetic purposes by artists such as Paul Gauguin (1848-1903) and Edvard Munch (1863-1944), who consciously incorporated the textured surface of their woodblocks into the body of the overall image. Wood engraving is made with larger, sturdier knives and gouges rather than ultra-precise engraving tools, resulting in a less linear approach, characterized by broader marks and more open, expressive cutting areas.

Wood Engraving Tools: the small hand tools used by the engraver are kept perfectly sharp to cut clean, thin lines on hard surfaces. The basic burin, historically derived from the burin used in copper engraving, is a fundamental tool in practice. The shaft is made of tempered steel and is square or diamond-shaped.

The shaft can be straight or slightly curved, which reduces the risk of the wood being damaged by the handle when cutting. A full range of other specialized tools are available:

- Spitsticker: an elliptical tool used exclusively in woodcutting, with convex undersides, used for thin, curved lines;
- Scorpers: gouges that produce wider lines and can be used to clean up white areas, available in flat or rounded versions;
- Painting tools: featuring narrow blades and flat sides, they are used to cut lines of uniform width, available in six different sizes;
- Multi-tools: with serrated rectangular blade, they feature a series of evenly spaced grooves that allow the user to achieve smooth parallel lines;
- Engraver chisels: available in various sizes, they are used to clean uneven areas.

Lithography: The Planographic Print

The term lithography, which originates from the Ancient Greek ”lithos” (stone) and ”graphía” (writing), describes a planographic technique, a printing method that differs radically from relief and intaglio techniques because it works from a geometrically flat surface. In this technique, both the printing and non-printing areas are on the same plane of the matrix, without any incisions or removal of material.(Fig.30) The fundamental principle underlying lithography lies in a basic yet revolutionary chemical-physical property: the mutual incompatibility and repulsion between fatty substances, such as oils, waxes, and resins, and water. This phenomenon, scientifically perfected by Alois Senefelder in 1798, allows for a clear differentiation between printable and non-printable areas through a chemical rather than mechanical process.

The artist traces the image onto the lithographic matrix, traditionally a finely carbonated limestone slab or, more recently, a zinc or aluminum plate, using high-fat materials such as lithographic pastels, oily tusche, or oily inks. The undrawn areas remain free of oil and retain their natural affinity for water, while the drawn areas acquire hydrophobic properties. During the printing process, the controlled alternating application of water and oily ink ensures that the ink adheres exclusively to the oily areas of the drawing, while being repelled by the moistened areas of the matrix.

This inversion of the mechanical principle gives lithography an expressive versatility and tonal capacity unmatched by other traditional techniques. [36]

The origins of lithography tell the story of a scientific discovery accidentally applied to art. This technique was originally named ”chemical printing” by its inventor, Alois Senefelder, who began his research into a fast and economical printing process in the late 1790s.[36] Following this fundamental discovery, the process rapidly developed to include transfer methods and direct drawing on the stone. By 1816, Senefelder was already capable of printing from several stones simultaneously. This number increased significantly, reaching twelve to fifteen colours by the 1830s, opening up extraordinary creative possibilities for artists of the time.[37]

35. *Lithography: definition, process, procedure | print24.* (2025). Print24 IT; print24 | Better print online!

36. D'Arcy Hughes, A., & Vernon-Morris, H. (2008). *The printmaking bible: The complete guide to materials and techniques.* Chronicle Books.

37. D'Arcy Hughes, A., & Vernon-Morris, H. (2008). *Ibid.*

38. D'Arcy Hughes, A., & Vernon-Morris, H. (2008). *Ibid.*

THE LITHOGRAPHIC LIMESTONE is the most valuable stone extracted from the Solnhofen and Pappenheim quarries in Bavaria. This stone is recognized as superior because it has a fine, uniform molecular structure and is slightly porous.(Fig.31) This porosity allows for balanced absorption of both fat and water, ensuring essential stability throughout the marking, machining, and printing processes.[38]

Drawing Materials: all materials used to produce a positive printable sign must have a high fat content. Suitable materials include:

- Lithographic pastels: available in five grades from hard to soft, they allow for a variety of tonal effects;
- Tusche: a slab of solid fat diluted in water or mineral spirits, which offers great fluidity;
- Water-based drawing ink: although paradoxically it requires greasy agents to work properly in lithography;
- Chinagraph Pencil: versatile drawing tool;
- Asphalt: a solid fat solution that produces rich tonal effects.

Additionally, scalpel blades and sharp carving tools can be scraped into dark areas to achieve subtle highlight effects.

The process of working with lithographic stone requires a careful sequence of steps:

- Resin Application: initial stone protection;
- Applying French Plaster: creating the base for the drawing;
- Application of Nitric Acid: fixing the design on the stone;
- Washing the Drawing Medium: with mineral spirits;
- Asphalt Polishing: creating a durable surface;
- Sponging with Water: preparing the stone for inking;
- Ink Rolling: applying ink;
- Second Engraving: repeating the process for multiple effects;
- Print Proof: final quality check.

Quality lithographic inks are refined, oil-based, single-pigment inks. They achieve exceptional color blending results and remain lightfast for decades. The quality of the ink directly correlates to the final print quality. Rollers were traditionally made from natural leather naps. However, today composite rollers are commonly used, either as pin rollers on a central shaft or as small rollers with handles. These offer greater durability and consistency in ink application.

Fig. 30 Lithography

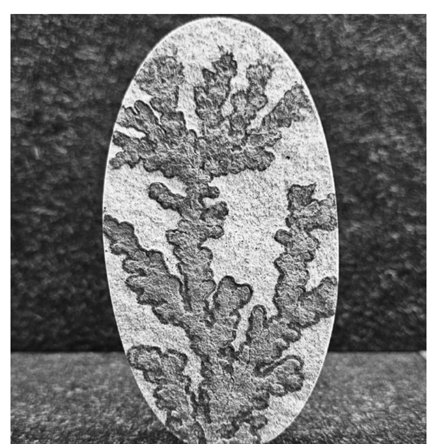


Fig. 31 Lithographic limestone

THE LITHOGRAPHY ON METAL PLATE: Zinc plates were used in lithography as early as 1818, representing a major economic advance.(Fig.32) The commercial printing industry introduced aluminum plates in 1891, revolutionizing industrial practice. Unlike porous limestone, zinc and aluminum plates are not naturally porous, so both undergo a specialized graining process to create a serrated surface, essential for grease adhesion.

POLYESTER PLATE LITHOGRAPHY: Polyester plates appear to have originated in India as a cost-effective and accessible alternative to lithography on stone or metal plates. They have a non-porous yet rough surface that accommodates both hand-drawn and computer-generated images, representing a bridge between traditional methods and contemporary digital technologies. The process does not require the plate to undergo the traditional rubber etching step or the use of resin powder. It is also not necessary to granulate the surface, which eliminates the need for potentially toxic chemicals such as Preposal and Erazol.[39]

39. D'Arcy Hughes, A., & Vernon-Morris, H. (2008). *The printmaking bible: The complete guide to materials and techniques.* Chronicle Books.

40. *Screen printing - Heritage Crafts.* (2025, January 28). Heritage Crafts.

41. *The Evolution of Screen Printing: From Ancient Techniques to Modern Innovations.* (2024, April 4). Jeff, the T-Shirt Guy.

42. D'Arcy Hughes, A., & Vernon-Morris, H. (2008). *The printmaking bible: The complete guide to materials and techniques.* Chronicle Books.

Fig. 32 The Lithography on Metal Plate

Screen Printing: Stencil Printing

Silkscreen printing, whose name derives from the Latin "sericum" (silk) and the Greek "graphy" (writing), is a permeographic printing process characterized by the controlled passage of ink through a matrix made of a fine mesh fabric, traditionally silk but now commonly polyester, aluminum, or nylon, mounted on a specialized frame. In this method, the open areas of the mesh provide the areas through which the ink can permeate, while the blocked or stenciled areas prevent the color from passing through, allowing the creation of complex images through precise control of which areas receive and which do not. The ink is transferred to the receiving surface using a squeegee, a tool with a flexible rubber or polyester blade, which applies controlled pressure to the fabric in a uniform linear motion, allowing the color to permeate through the open areas of the mesh and deposit onto the paper, fabric, glass, plastic, or other underlying surface with precision and uniformity.[40]

The versatility of screen printing lies in its ability to adapt to multiple surfaces and formats, as well as in the possibility of obtaining ink deposits of considerable thickness and opacity, characteristics that make it particularly effective for polychromatic printing and for the creation of complex tactile and visual effects.[41]

The first patent on the silkscreen printing process was filed in Michigan in 1887. Rapid and significant technical improvements occurred in the first half of the 20th century. Silk gradually gave way to polyester mesh, which was much stronger and more durable. Indirect-cut stencils were then replaced by indirect-photo stencils, which paved the way for sophisticated images of extraordinary complexity. Ink technology also evolved, moving from traditional varnish to specialised inks.[42] Screen printing has quickly become one of the leading commercial printing processes used in the textile, packaging, and advertising industries, finding widespread applications in industrial manufacturing.

It was only in the early 1960s that the expressive potential of silkscreen printing as a legitimate and sophisticated artistic medium was fully revealed. The credit for this discovery must be attributed to Eduardo Paolozzi (Fig.33) (1924-2005), thanks to his innovative collaboration with master printer Chris Prater at the Kelpra Studio in London, as early as 1961. In April 1962, in New York, Andy Warhol (1928-1987) first used silkscreen printing in one of his largest paintings on the theme of money, "200 One-dollar Bills" (Fig.34), ushering in a new era in the history of art. In April 1964, Paolozzi and Kelpra embarked on a series of 12 prints entitled "As is When" (Fig.35), freely inspired by the texts of the Austrian philosopher Ludwig Wittgenstein, which was published in 1965. At the same time, R. B. Kitaj and J. Tilson were publishing silkscreens of extraordinary quality through the Marlborough New London Gallery. It was clearly evident that this new medium for artists had taken hold in a decisive way and that the beginning of a creative explosion of collaborations was taking place.

Artists such as R. B. Kitaj (born 1932), Eduardo Paolozzi, and Joe Tilson (born 1928), as well as Peter Phillips (born 1939), Colin Self (born 1941), and Derek Boshier (born 1937), enthusiastically embraced the medium's extraordinary potential to represent images of contemporary popular culture and to challenge deeply held preconceptions of what constituted legitimate art. Furthermore, thanks to the symbiotic relationship they enjoyed with their professional printers, these artists opened a deeply controversial debate about the notion of originality in the context of printmaking. At the same time, artists in the Op Art movement quickly realized that silkscreening was an ideal process for exploring sophisticated ideas and publishing images in multiple copies at a relatively affordable cost. Bridget Riley (born 1931) and Victor Vasarely (1908-1997) were strong exponents of this revolutionary movement, exploiting the juxtaposition of strong and often complementary colours, both flat and nuanced, that silkscreen uniquely allowed. The medium became the vehicle through which a generation of artists consciously appropriated the language of a commercial printing process for artistic and expressive purposes.

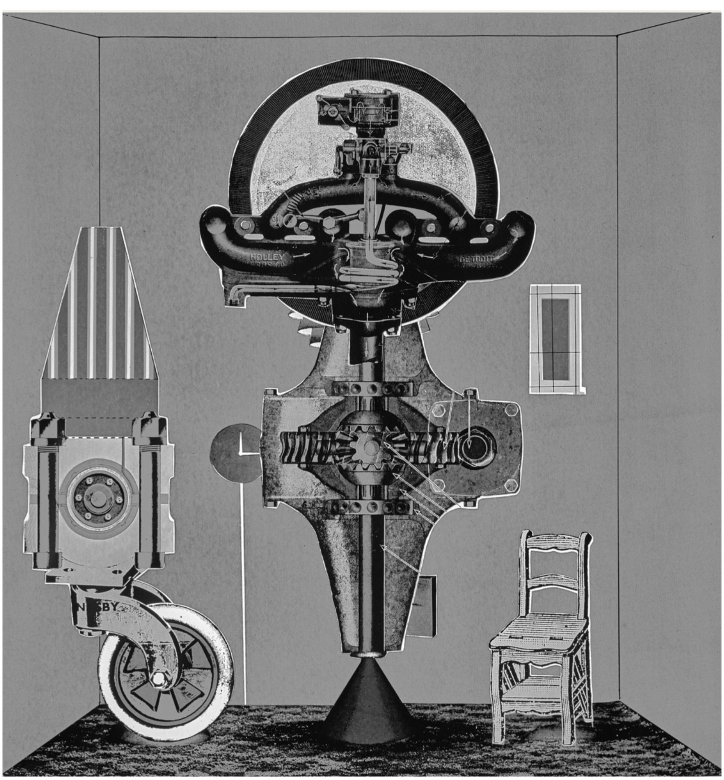


Fig. 33 Paolozzi, E., Metalization of a Dream

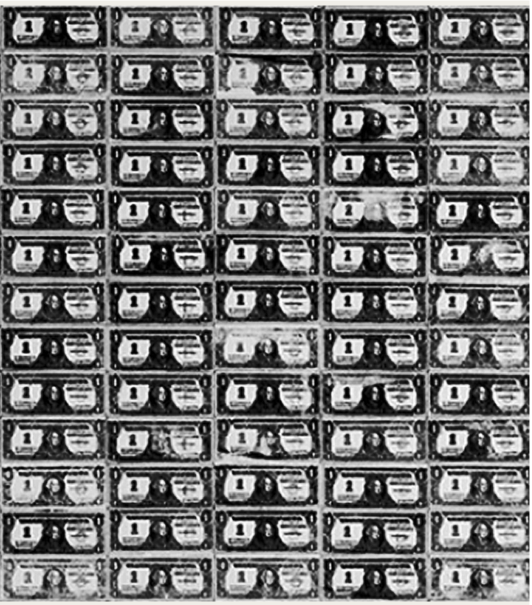


Fig. 34 Warhol, A., 200 One Dollar Bills

Fig. 35 Paolozzi, E., As Is When

Screen Printing Tools and Equipment

- The Squeegee: a squeegee is a flexible blade mounted on a wooden handle that pulls ink across the screen, forcing it to penetrate the mesh and deposit on the paper or other surfaces. As with screens, aluminum is gradually replacing traditional wood. Squeegees for textile printing are often made of rubber, but polyester squeegees are the standard for printing on paper, cardboard, canvas, glass, plastic, and metal.

- Screen Printing Inks: there are two main ink systems used in contemporary screen printing: oil-based inks and water-based inks, each with specific characteristics and applications.

- Oil-Based Inks: this was the universal system for screen printing until the early 1980s. It had both significant advantages and disadvantages. The colours were generally more vibrant, with some excellent metallic finishes and specialised varnishes.[43]

- The harsh solvents needed to clean the screens and delay ink drying during continuous printing made this a rather toxic and potentially harmful experience for the printers' health.

- Water-Based Inks have largely replaced oil-based inks in universities and schools for stringent health and safety reasons. The main advantage of this system, besides its ease of use (the screens are washed with water rather than a harsh solvent), is the extraordinary ease with which fine details and delicate lines can be printed. Compared to oil-based systems, printing is much less rushed, and any problems that arise can be resolved without the fear of the ink drying quickly into the shirt fabric.[44] Disadvantages of this system include the need for finer, more specialised screens, which are significantly more expensive; the tendency of the ink to crease the paper, necessitating the use of considerably thicker paper; and the ink's inability to completely cover the preceding colours. The latter issue is the most serious, but it can be effectively mitigated by carefully planning the printing order of the colours and matrices in advance. Printing the light colours first can significantly reduce unwanted overprinting.[45]

- Exposure Unit: since the most flexible and effective way to prepare screens is to use coated photosensitive emulsions, an exposure system is essential for the screen printing laboratory. The light source is usually ultraviolet, with lamps ranging in power from 25 to 3000 watts depending on the specific application. A more sophisticated setup is the print frame used as an exposure chamber. This is likely the combination that will produce the sharpest, most defined halftones or details. The print frame is a large hinged glass plate with a rubber backing. The positive is placed on the glass with the screen facing up. Air is then drawn through this device, pressing the positive firmly against the screen. The frame is rotated toward the lamp and the exposure is performed. Because the lamp can be positioned some distance from the screen, trimming of the positive is minimal, and an extremely precise screen matrix is always produced. To avoid hot spots in the center and ensure uniform exposure across the entire screen, the lamp should be positioned at least the length of the diagonal of the largest screen to be displayed.

- Autonomous display unit: this is the most space efficient and fastest exposure unit, making it ideal for laboratories with a large workload. Similar to the print frame, it is recessed with the lamp beneath the glass. Being completely light-tight, it does not need to be housed in a separate, isolated space. Since it usually features two light sources, a mercury vapor lamp and fluorescent tubes or bulbs, it can also be used as a lightbox for identifying positives.[46] While washing stencils and removing ink can be handled using regular water pressure, a pressure washer is essential to effectively remove stubborn stencils and ink residue.

- Drying Racks: the rack is used for the controlled drying of wet prints. The simplest ball racks are wooden boards with cut-out shapes to support a glass ball held in place by a system of wires. After printing, each sheet is pressed against two balls. The weight of the paper holds the balls in place and, as a result, the sheet dries while hanging vertically, without contamination from other prints.

- Frames are available in a fairly wide range of standardized sizes, from 46x60.5 cm (18x24 inches) to 81x122 cm (32x48 inches), 84x109 cm (33x43 inches), and 89x127 cm (35x50 inches).

- Creating the Stencil: the print quality vocabulary available in screen printing depends largely on the choices made during the stencil creation process. There are four main options, each with its own distinctive language.

- Stencil processes include cut stenciling, direct stenciling, and other sophisticated methods that achieve different visual results.

43. D'Arcy Hughes, A., & Vernon-Morris, H. (2008). *The printmaking bible: The complete guide to materials and techniques.* Chronicle Books.

44. D'Arcy Hughes, A., & Vernon-Morris, H. (2008). *Ibid.*

45. D'Arcy Hughes, A., & Vernon-Morris, H. (2008). *Ibid.*

46. D'Arcy Hughes, A., & Vernon-Morris, H. (2008). *Ibid.*

Collectively, fine art printmaking techniques represent a rich heritage of methodologies that combine technical expertise, creative intuition, and a profound understanding of materials. From meticulous copper engraving to the free expressiveness of woodcuts, from the planographic sophistication of lithography to the democratic accessibility of contemporary silkscreen printing, each technique offers distinct expressive possibilities.

The research presented demonstrates that, despite the rise of digital technologies, these traditional methods still maintain a vitality. These are living, constantly evolving techniques that absorb technological innovations while preserving the essence of their manual practice. The choice of which technique to explore and develop remains a deeply personal decision, guided by one's aesthetic inclinations, technical skills, and artistic vision. However, a solid and conscious training in all these methodologies provides practitioners with a comprehensive visual grammar, enabling them to communicate complex concepts and achieve aesthetic effects that would be impossible with a single technique.

The ABCs of Printing

Aquatint

etching technique in which a resin dust is added to a plate by heating it onto the surface. The acid only bites the plate in the areas between the dust particles, thus creating a tonal value on the plate. The length of time the plate is left in the acid determines the depth/darkness of the tones.

Baren

Japanese tool, usually large, circular or oval shaped and covered in bamboo, used for hand burnishing.

Bite

term used to describe the etching, or incising, of the image on the paper from a form.

Block

printing surface referred to in relief print such as the lino block or wood block.

Burin

tool used for engraving.

Burnisher

smooth, curved tip tool used on metal plates to polish an area that has been removed by a scraper. A burnisher can be used to highlight an area within an area or to lighten an area that is too dark.

Chine collé

technique where additional paper of a different colour, texture or shape to the supporting paper is bonded to the surface of the supporting paper using a suitable adhesive. An inked plate is then printed onto these additional papers to complete the image.

Collagraph

print made from a block or matrix on which collaged materials with varying textures have been glued. The matrix is then sealed with shellac and dried before printing.

Drypoint

the technique where only a needle with a sharp tip or roulettes is used to make marks in the surface of a metal plate. No acids are used when making a drypoint.

Embossing

works by raising the surface of a material. The reverse of debossing, which pushes the surface of a material inward.

Etching

intaglio process in which an image is created on a metal plate using acid. The plate is first covered with an acid-resistant ground or varnish. Lines or textures are then drawn into the ground, exposing the plate.

Extender

a carrier for ink that is transparent and has no colour pigment. It creates a less intense version of the full-strength ink colour. It does not change the density of the ink.

Gouge

a hand-held carving tool that is used to remove materials from a matrix, such as a wood or linoleum block, when making a relief print.

Ground

used to protect the surface of etching plates and to cover the surface of a plate so that an image can be drawn or impressed onto it. They are wax based or bitumen based and can be hard, soft or liquid.

Hand burnish

printing without a press with a baren or wooden or metal spoon, using the pressure of your hand.

Intaglio

a printing process that involves using metal, plastic or card plates; printing inks; cutting tools; grounds and varnishes; mordants; and a printing press. The image is printed from a recessed design incised or etched into the surface of a plate. The ink lies below the surface of the plate and is transferred to the paper under pressure.

Linocut

a matrix on which the image made is cut into a linoleum tile block.

Matrix

printing without a press with a baren or wooden or metal spoon, using the pressure of your hand.

Monotype

a unique, one-off print made by printing on an unmarked surface of metal, acetate or thin Perspex.

Monoprint

commonly acknowledged to be a unique print taken from a printing matrix that has a marked surface that remains unchanged though each inking of the plate is done to deliberately to create a unique variant.

Offset

an image printed from a key plate then offset via a roller onto a second printing matrix. This makes it possible to print the drawn image the same way round as when it was drawn and not in reverse.

Planography

another name for lithography.

Platen press

in a platen press, a flat surface bearing the paper is pressed against a flat, inked printing plate; the two surfaces come together and part with a jaw-like motion. Most small hand-presses are platen presses.

Plate

general term for the matrix in a printmaking process.

Proof

the trial or working impressions taken in the process of making a plate.

Registration

the means by which the paper and printing block are accurately aligned for the precise fitting of all shapes and colours in the image.

Serigraph

term created during the 1920s to distinguish the creative art in silkscreen from the commercial or reproductive uses of the process. Derives from the Latin for “silk”, seri, and the Greek for “to draw”, graphein.

Serigraph

term created during the 1920s to distinguish the creative art in silkscreen from the commercial or reproductive uses of the process. Derives from the Latin for "silk", seri, and the Greek for "to draw", graphein.

Silkscreen

often used to refer to screenprinting. Now technically incorrect due to the mesh of the screens no longer being made of silk. Commonly they are now instead made of nylon or polyester.

Shellac

varnish used to seal the surfaces of card or wood. It is also used as a coating in lift gounds/sugarlifts and as a protective coating on metal plates in the etching process.

Tusche

ink supplied in stick form, as a paste, or ready-mixed for use in lithography.

Typeset

the process of typesetting uses lead cast or wooden type composed together in order to make a form for printing text in letterpress.

Vandercook

American manufacturer of letterpress presses between 1909 and 1969. Created a range of popular flatbed proofing presses.

Woodcut

print made from wood that has been cut as plank length, for example plywood or composite board, such as MDF, or hardboard. The surface is cut and it is commonly printed using the relief printing process.

Wood engraving

a print made from the end grain or cross grain of a hardwood such as apple or boxwood.

Zinc

metal used for intaglio processes. It is usually highly polished and is suitable for clean, sharp images. It is ideal for aquatint as the biting times for zinc are extremely short compared to copper.

1.1.4 The role of Printmaking in Contemporary Education

In an increasingly digital world, where software and digital manufacturing techniques reign supreme, some suspect that the prophecy that print is dead is slowly coming true. This is because the gap between creative results and those who produce them is growing ever wider, and the physical knowledge required for the process is becoming increasingly rare. However, this “unfortunate rumour” and “self-fulfilling prophecy of the decline of print”, as writer Steve Watson.(Fig.36) calls it in his essay The Real Death of Print, may be precisely what prompts us to take a closer look at the printing industry as a whole. If print is not dead, who is keeping it alive? And what will the next generation of printers be like, if there is one?[47]

Today’s designers are becoming increasingly unaware of the skills and work involved in printing and producing paper artefacts. This is not just in reference to bookbinding and art printing, but to print production in general. This is undoubtedly because the younger generations are giving up on bridging the gap between themselves and analogue printing because they are too busy keeping up with innovative digital tools and AI. Furthermore, all the invaluable information about printing and paper production is no longer taught in most art or graphic design courses, either in compulsory education or at university. As knowledge of basic skills gradually disappears, there is much less emphasis on the slow and deliberate processes that are part of the creative world, and much more attention is given to quick or immediate results. In contrast, the printing sector celebrates both the process and the final product.

According to Julia Schimautz, an Austrian graphic designer and printmaker, printing “invites people to stop and appreciate the process as well as the results” and “physical printed objects have a different value; a value that is more about connection, craftsmanship and tangibility than simply conveying information”.[48] One possible response to this lack, as well as the loss of information transmission about printing among the younger generations, is education. Much research and academic study has been conducted with this goal in mind: to reintroduce printing-related concepts into school curricula, both in the arts and as an experiment in interdisciplinary approaches, for example in the learning of STEM subjects. This applies to both young students and more mature and aware students, right up to university level.

The importance of arts education has been recognised as fundamental by the scientific and professional community for the acquisition of sensory experiences, the development of perception and the construction of an objective relationship with work and the results obtained.[49] In the field of art education, one discipline that offers many possibilities is printmaking. It involves a multi-stage process that covers all the steps from start to finish, from the initial concept to the creation of the matrices and the final print. Added to this is the fact that printmaking is a language made up of shapes, lines, textures and reliefs, combining a wealth of materials and processes, making it unique in the field of art and design.

47. Tree, E. (2025, October 14). *If print is not dead, who’s keeping it alive?* Itsnicethat.com.

48. Tree, E. (2025, October 14). *Ibid.*

49. Vojvodić, M.; Sredanović, J. (2020) *Methodological aspects of the implementation of Printmaking in Pre-school, Primary and Secondary education.* Arte, Individuo y Sociedad 32(2), 451-466.

In the school environment, the fundamental role of printing is to integrate the value of manual experience as part of the learning process. However, technological advances, particularly in the printing industry, have led to the gradual disappearance of materials, printing equipment and expert know-how.(Fig.37) Fortunately, in recent years, traditional printing techniques have been experiencing a lively revival. They are appreciated not only for their beauty as manual techniques, but also for their artistic value, which is on a par with other artistic disciplines. Analogue printing has an important pedagogical value, offering multiple benefits not only for art and design education, but also for anyone interested in developing creative thinking. For this reason, schools and teachers play a key role in preserving, promoting and passing on these ancient techniques.[50]

If we follow a chronological order and start with primary and secondary school, it is essential to include printing in the art education programme for a variety of reasons. Specifically:[51]

It contributes to cognitive development in children, as creating prints involves several interconnected stages that require both convergent and divergent thinking. It contributes to the development of observation and perception, as the creation of a print allows for direct tactile experience of the material and development of the senses. It fosters perseverance and consistency by requiring the completion of the entire process from start to finish. It enhances concentration by necessitating focus on both the creative process and manual work. It cultivates teamwork and cooperation by enabling children to work in groups when applying colour, positioning paper, and during the printing process itself. They can also create collective prints by printing individual matrices on a larger surface.

Despite the proven benefits of printing as a means of developing artistic expression, it is often neglected in current educational practice due to certain preconceptions. As well as the complexity of the mechanical processes, another preconception is that expensive and impractical equipment is required to create a print, and that teachers lack sufficient knowledge in this area.52

Three printing techniques have been studied to be adapted as part of workshops for children of all ages. These techniques meet safety requirements and do not require expensive equipment, enabling an exploratory approach to solving various artistic problems in a school environment. They can also be carried out without a printing workshop, and the process can be performed manually with a spoon or ladle. The first technique is white-line printing, which is a substitute for the linocut and can be used primarily as a relief printing method. The second is printing on cardboard, known as collagraphy, and the third is kitchen lithography. Through these three techniques, children can easily learn concepts such as printing, imprinting and matrices, and they can verbalise the process involved.[52]

50. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Impresso. Open Shapes of Print (Vol. 1).* Politecnico di Torino - Dipartimento di Architettura e Design, Laurea Magistrale in Design Sistemico.

51. Vojvodić, M.; Sredanović, J. (2020) *Methodological aspects of the implementation of Printmaking in Pre-school, Primary and Secondary education.* Arte, Individuo y Sociedad 32(2), 451-466.

52. Andrews, M. F. (1964). *The Art of Creative Printmaking,* Art Education, 17:4, 23- 25.

51. Vojvodić, M.; Sredanović, J. (2020) *Methodological aspects of the implementation of Printmaking in Pre-school, Primary and Secondary education.* Arte, Individuo y Sociedad 32(2), 451-466.

Another approach, aimed at older students, is to use printing techniques as a support for learning scientific subjects, or more commonly referred to as STEM subjects.(Fig.38) This concerns middle school and, in particular, high school students. In this context, a new type of education called STEAM education has gained ground in recent years. STEAM education is a new approach to teaching STEM subjects. The acronym, which stands for Science, Technology, Engineering and Maths, has the letter A added to it, which stands for Art. STEAM programmes aim to teach students to think critically, encouraging them to connect engineering and technology with artistic practices, design elements and principles in order to provide a deeper understanding of complex concepts.[54] An effective STEAM education requires an interdisciplinary approach that combines theoretical knowledge with practical application. However, traditional methods often separate mathematics, science and engineering from artistic creativity, thereby limiting opportunities for holistic learning. A recent study by Aleyna Çelik and Kishore Dutta, published in 2025, presents a design exploration of linocut printing as an innovative STEAM teaching tool. It relates several disciplines: mathematics (geometry, symmetry, fractals and tessellations), science (material properties and the application of forces), technology (digital design tools), engineering (precision engraving, tool mechanics and printing techniques) and art (creative composition and cultural expression).[55]

In addition to its artistic value, linocut printing is a dynamic educational tool that effectively connects multiple disciplines within STEAM education. In mathematics and science, for example, it can reinforce geometric principles such as symmetry, transformations, tessellations, fractals, and optical illusions. Furthermore, the physical properties of linoleum and the viscosity of ink facilitate scientific experimentation and the study of materials, as students analyse how these influence the quality and precision of the print. The study also proposes combining analogue printing with digital tools, such as open-source software and digital fabrication techniques.

This would enable students to experiment with mathematical patterns before proceeding to print. Integrating modern manufacturing techniques, such as CNC engraving and 3D printing, presents new opportunities to broaden the educational scope of


Fig. 37 Frankie Shop campaign, 2024

Fig. 36 Punk = Dead t-shirt

linocut printing. Combining traditional craftsmanship with contemporary digital manufacturing, could improve the precision, efficiency and reproducibility of future implementations while maintaining the manual involvement that is fundamental to learning. Furthermore, this integration connects digital exploration with physical realisation, facilitating a seamless transition from abstract modelling to tangible results.[55]

A final example of how traditional printing can benefit the educational process is the introduction of a traditional printing course into a graphic design programme at a communications university in Australia (School of Communication and Creative Industries, University of the Sunshine Coast Maroochydore DC, Queensland, Australia). As discussed in the opening paragraphs of this subchapter, the rapid growth of digital evolution has led graphic design students to become increasingly dependent on digital software as the only means of designing and producing the result.[56] However, this reliance on digital platforms to the exclusion of other image production techniques in graphic design, limits emerging "design thinking" due to a lack of skills in compositional analysis, drawing and other manual and printing techniques.[57]

It should be emphasised that today's graphic design students rely heavily on computers as part of their creative process. Many of them are unfamiliar with working with print, as the practice of print is more manual. However, it is precisely these practical elements that allow for a more holistic approach to design and learning processes, enabling teachers to provide historical references and explain terms derived from traditional practice.[58] The advent of software and the increasing computerisation of graphic design has led to a reliance on digital production, in which designers can easily eliminate any imperfections. But imperfections, mainly due to uneven pressure and "errors" in the application of ink, become part of the charm and added value of analogue printing.[59]

54. Riley, S. (2020). *What is STEAM education? A comprehensive guide for K-12 schools.* The Institute for Arts Integration and STEAM.

55. Çelik, A., & Dutta, K. (2025). *Innovative STEAM teaching through linocut printmaking. Thinking Skills and Creativity, 58,* Article 101894.

56. Çelik, A., & Dutta, K. (2025). *Ibid.*

57. Livingston, D. (2018). *Printmaking for Graphic Design Students in the Age of the Digital Screen: An art, a craft or a creative intersection.* Arts and Design Studies, 66(), 16–25.

58. Hamilton, P. (2003). *Research in Progress: The printmaking studio of the future in higher education*, Art Design & Communication in Higher Education 2, Intellect Ltd, 67–81

59. Livingston, D. (2018). *Printmaking for Graphic Design Students in the Age of the Digital Screen: An art, a craft or a creative intersection.* Arts and Design Studies, 66(), 16–25.

The printing process encourages students to explore texture, line, tone and layering and to experiment with different materials such as paper, fabrics, plastics and natural objects like plants, flowers and leaves, in order to create original works. This hands-on approach fosters a more holistic design and learning processes, including the teaching of historical references and terms derived from traditional practices. For a graphic designer, it is essential to be aware of different printing methods, as this knowledge encourages them to diversify their work, leading to hybrid designs that integrate analogue craftsmanship and digital software.[60]

Teaching units dedicated to analogue printing are therefore useful and enriching for students of all school levels. In this way, it is possible to reintroduce the younger generations, in an increasingly digital and "artificial" world, to manual practices that would otherwise gradually disappear from culture and widespread know-how. This does not mean that analogue printing should be taught as if the technological process had never existed over the centuries. On the contrary, bringing such an ancient art, deeply rooted in history, into the present day and hybridising it with cutting-edge digital technologies and software gives students the opportunity to gain valuable experience, engaging them in critical thinking and innovative creative processes. This is one of the possible ways to educate and train the next generations of printers, who will hopefully delay the prophecy of the inevitable death of printing for a few more decades or even centuries. This approach ensures that printing not only survives, but also evolves, becoming a bridge between analogue production and digital innovation in the training of new generations: "Building bridges between people in learning spaces by encouraging dialogue, sharing knowledge, and enabling learning."

As noted in the previous discussion, the role of digital manufacturing technologies is central when it comes to the hybridisation of traditional printing techniques with recent technologies. In this regard, the following pages will address the theme of the maker and their tools, investigating the methods and processes in more detail.

60. Livingston, D. (2018). *Printmaking for Graphic Design Students in the Age of the Digital Screen: An art, a craft or a creative intersection.* Arts and Design Studies, 66(), 16–25.

Fig. 38 Hands-on printing activities

I.2 Maker and Open Design

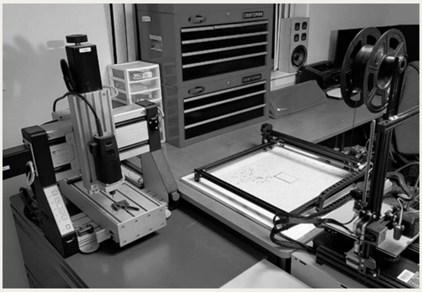


Fig. 40 3d Printer

The Maker movement and the Open Design approach represent two closely interconnected phenomena that are redefining contemporary paradigms of design, production and innovation. In an era pushing towards the decentralization of systems, these two concepts emerge as references for systemic change, shifting the focus from centralized mass production to distributed and accessible value creation.

This chapter will analyze the impact of this "revolution" on design practice. However, the choice to adopt an open model is not merely a technical or logistical decision; it is, first of all, a profound ethical and political stance. As Alex Kimber points out in his essay *Embracing openness; Why cede access to design?* (2023), the very act of designing is a political act and the choice to open design is a form of activism.

Kimber prompts us to question why we should "cede access" to our work. The answer lies in a moral obligation to share knowledge and actively contribute to the "digital commons". This approach transcends the logic of profit, embracing instead the principles of mutualism and social justice to favor a more equitable distribution of resources and the construction of collective knowledge.(Fig.39)

Fig. 39 Co-working space

Starting from this philosophical premise, this chapter will explore the different facets of this paradigm. The first part defines the founding principles of Open Design (chapter 1.2.1). It will then continue with the analysis of the central figure of this movement, the maker (chapter 1.2.2), and the events that define its culture. Next, the chapter will map the infrastructure of this network, looking at physical and virtual locations (chapter 1.2.3), such as Fab Labs and online platforms, that serve as nodes for the community. Finally, the chapter will conclude with an analysis of the maker tools (chapter 1.2.4), like the digital fabrication technologies that make this distributed revolution technically possible.(Fig.40)

1.2.1 Open Design Principles

In recent years, the concept of Open Design has established itself as one of the most interesting evolutions in the panorama of contemporary design. It represents, in short, the transposition of the principles of Open Source (born in software) to the world of objects, physical products and tangible technologies. As Van Abel, Evers and Klaassen define it, Open Design is:

> *"a design whose creators have allowed free distribution and allowed modifications and derivations".*

At the center are two strong ideas: on the one hand, the "power of the crowd", meaning the belief that the sum of individual contributions can generate progress more quickly; on the other, the need to "stand on the shoulders of giants", focusing on improving existing solutions instead of starting from scratch every time.[61]

The Historical and Theoretical Roots

The origin of the open approach lies in the political movement started by Stallman in the seventies, in reaction to the ownership of the source code of the software. The Free Software Foundation, founded by Richard Stallman, laid the ethical foundation for the open approach, codifying the "four freedoms" of the user: use, deepen, modify, and redistribute software without constraints.[62]

Since 1998, with the Open Source Initiative, the approach has gradually become more pragmatic and less ideological, opening the door to the "open-x" phenomenon: open data, open hardware, open science, and open education. In design, this convergence has had a breakthrough thanks to the increasing democratization of digital manufacturing: such as laser cutting, 3D printing, CNC technologies that have made personal fabrication much more accessible, even for those without advanced technical skills. In addition, the spread of Fab labs, makerspaces and digital platforms (such as Thingiverse) has allowed the formation of new collaborative communities, making online sharing of projects a daily practice.

A fundamental contribution of Boisseau, Omhover and Bouchard's research is the analysis of the different degrees of openness in design projects. In particular, projects are not simply *open* or *closed*, but are placed along a continuum that separately considers the openness of the process, such as the involvement of different actors in the design, and that of the plan, meaning the availability and modifiability of project data. This reflection is visually embodied in the graph (Fig.41) reported in Boisseau et al. which relates the two axes, "process" and "plan", and distributes various design approaches according to their degree of openness. In the less open zone we find traditional design, user-centered design and participatory design, in which users are involved only as a source of input or as participants, but rarely access design data or can modify it. As the process progresses openly, we observe crowdsourcing and open (user) innovation, where ideas multiply and the community has a more active part.

The end point of the continuum is open design, where both the process and the plan are entirely accessible and reusable by anyone. In this area you can also meet phenomena such as open-source innovation. The chart also highlights the location of the downloadable open design, where the plan is open but the process remains closed, and vice versa.[63]

61. Boisseau, É., Omhover, J.-F., & Bouchard, C. (2018). *Open-design: A state of the art review*. Design Science, 4.

62. Boisseau, É., Omhover, J.-F., & Bouchard, C. (2018). *Ibid.*

63. Boisseau, É., Omhover, J.-F., & Bouchard, C. (2018). *Ibid.*

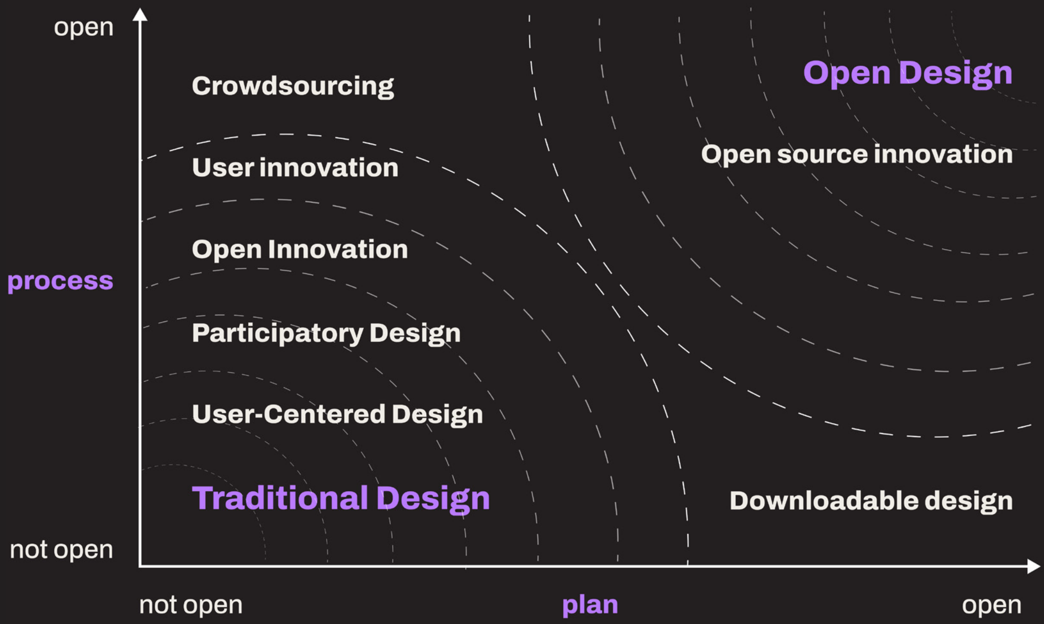


Fig. 41 Open-design and related concepts

Boisseau Omhover and Bouchard identify three main families of open design for physical artifacts, which correspond to C2C (consumer-to-consumer), B2C (business-to-consumer), and B2B (business-to-business) relationships, respectively.

1. DO-IT-YOURSELF (C2C) This is the most intuitive family, characterized by bottom-up initiatives of users who share their projects, both for the desire to share their achievements and to enable joint work with peers. The digitization of the design process allows experts to connect and work together on shared projects. A case in point is RepRap, a 3D printer whose documentation is freely available online (CAD files, assembly instructions, version registers), which has resulted in 400 custom derivatives.

2. META-DESIGN (B2C) In this approach, designers create design generators or platforms that allow end users to design their own products. Rather than freezing offers early, companies enable customers to co-design offers in real time. Arduino represents a paradigmatic example: an open-source microcontroller with an integrated development environment that facilitates the construction and control of electronic systems, with interfaces for external shields that enable specific functions.[64] Meta-design also includes modular systems and construction kits. LEGO Mindstorms has been down this road since 1998, and after an initial attempt to crack down on user hacking, the company reversed the trend, inserting a "right to hack" in the license clauses and developing the NXT version in collaboration with a Mindstorm Users Panel made up of lead-users.[65]

3. INDUSTRIAL ECOSYSTEM (B2B) In this model, various stakeholders along the value chain agree to open up processes and products. Private companies or public bodies open up their designs and processes to develop an efficient and equitable ecosystem, sharing development costs and risks, increasing the speed of processes, transforming solutions into standards and reducing dependence on monopolistic suppliers. In the photovoltaic sector several companies have shared intellectual property to accelerate the development of new techniques.[66]

Motivations and Benefits of Open Design

The use of Open Design has shown several benefits, below the positive aspects brought from several points of view will be analyzed. First of all for companies, open design proves useful for adaptivity, meaning the ability to adapt to specific subjective needs and for particular contexts. It also improves the speed of development by reducing development time and costs. And finally, thanks to the efficiency of design activities, Open Design gives access to innovations developed by users, bringing greater satisfaction to niche needs, such as the ability to respond to specific needs that are difficult to intercept.

For users, on the other hand, Open Design allows for a greater expression of individuality with the possibility of getting exactly what they want. The user has the opportunity to increase the acquisition of control over the technology and the ability to adapt it to their needs. Finally, thanks to this approach, learning and the development of skills through doing increases. For the Company, open design brings distributed innovation and is no longer limited to the R&D laboratories of large companies. Sustainability is emphasized by this approach through the promotion of greener and recycling production models. And finally, accessibility: there is a greater democratization of access to production tools.[67]

Open Design, therefore, is much more than just a framework for design. Its principles, which have their roots in free software and are now made tangible by digital manufacturing, trace the course towards a potentially fairer and more sustainable socio-technical system. But these principles do not live in a vacuum: they need people who put them into practice and places to do so. This is precisely where the central figure of the maker comes into play, the protagonist of the next chapter.

64. Boisseau, É., Omhover, J.-F., & Bouchard, C. (2018). *Ibid.*

65. Ciuccarelli, P. (2008). *Open source design: From participation to collective design on the network.* Pitagora Editrice.

66. Boisseau, É., Omhover, J.-F., & Bouchard, C. (2018). *Open-design: A state of the art review*. Design Science, 4.

67. Boisseau, É., Omhover, J.-F., & Bouchard, C. (2018). *Ibid.*

1.2.2 The Figure of the Maker

Digital makers represent a community of modern artisans united by a shared passion for creation. This creative spirit opens the door to a world of revolutionary innovation, where the main tool is Open Design, a framework based on collaboration, co-creation, and the continuous improvement of inventions. The work of digital makers is driven by the aim of enhancing quality of life. Numerous projects illustrate this goal, including BEEing,[68] which simplifies the work of beekeepers; Behaviour Labs,[69] which supports users with cognitive impairments or conditions such as autism and ADHD; and In3,[70] an innovative incubator for newborns designed to be accessible to those in need (Fig.42).

68. Beeing. (2025). *Aiutiamo il mondo delle api – Apicoltura urbana, arnie da balcone, programma di adozione e tanto altro.* Beeing.it.

69. Behaviour Labs. (2025). *Robotica cognitiva terapeutica.* Behaviour Labs.

70. In3. (2025). *Medical Open World*. Medicalopenworld.org.

In addition to sharing ideas, makers also share resources both within physical spaces such as Fab labs, and virtually through online platforms. Maker culture is characterised by iteration: testing, refinement, and improvement are part of everyday practice.

The maker movement places great emphasis on accessibility, ensuring that projects can reach a wider audience and allowing creativity and innovation to benefit a broader segment of society. As expressed in the *We Are Makers Talk* (Fig.43):

> *"[...] makers love what they do, even if they do not always know why."*

The maker mindset is defined by curiosity, a desire to understand how things work, direct engagement with materials and processes, and a sense of control over technological and creative tools.[71]

71. Ghiara, S. (2018, October 5). *I "maker", gli artigiani digitali che creano il futuro con le loro mani.* Qabiria.

Through this approach, the world is assembled, shaped, and moulded into something consciously designed rather than passively inherited. The maker movement therefore seeks not only to explore what technology can achieve, but also to reveal the vast potential of human creativity and capability.

Dale Dougherty

We are makers

Posted Feb 2011

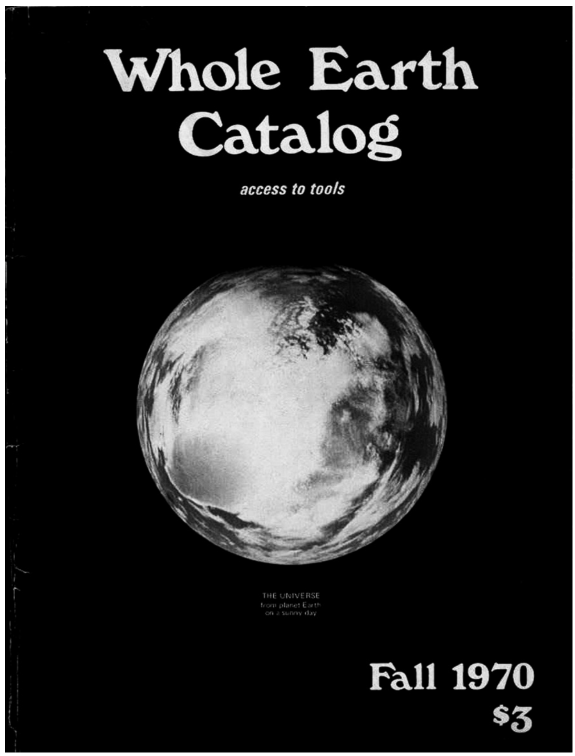
Fig. 43 We Are Makers Talk

Fig. 42 IncuNest Project

The new industrial revolution

The new industrial revolution we are currently experiencing places the maker movement in a similar position to that of the personal computer revolution in 1985: a grassroots, garage-born phenomenon capable of challenging dominant models of production and innovation.

Today, the Maker Movement represents, just as the personal computing revolution once did, a challenge to the established order. The sudden liberation of technological and productive potential has fuelled the collective imagination, sparking enthusiasm and bold predictions reminiscent of those surrounding the rise of personal computing in the 1970s. The leaders of the maker movement carry forward the visionary spirit of Steve Jobs, who saw in the personal computer not merely the opportunity to start a company, but a force capable of transforming the world and history has proven him right. Jobs himself was formed within a culture that could be described as maker-like. As Steven Levy recounts in Wired, young Steve grew up in an environment that valued craftsmanship and technical understanding. His father, Paul Jobs, a mechanic who had not completed secondary school, set up a workspace for his son, teaching him how to build, dismantle, and reassemble objects. Through contact with neighbours employed in the emerging electronics industry of Silicon Valley, Jobs realised that seemingly "magical" objects such as televisions were, in fact, the result of human design, intelligence, and effort. That experience gave him profound self-confidence, the belief that through exploration and learning, one could understand even the most complex systems.[72]



During the same period, another key figure in the technological counterculture, Stewart Brand, was developing a related vision. After founding the *Whole Earth Truck Store*, a travelling van that sold tools and educational materials, Brand expanded the idea in 1968 through the Whole Earth Catalog.[73] Its cover, featuring the now-iconic photograph of the Earth from space, bore the subtitle "Access to Tools", a phrase that encapsulated a revolutionary philosophy: technology could be humanity's ally (Fig.44). In the first edition, Brand wrote: "A realm of personal and intimate power is developing: the individual's power to conduct his own education, find his own inspiration, shape his environment, and share his adventure with anyone interested. The tools that aid this process are sought and promoted by the Whole Earth Catalog." The volume opened with a poem by Buckminster Fuller, which began, "I see God in the instruments and mechanisms that work reliably."

From these principles emerged the Homebrew Computer Club, a meeting place for electronics and computer enthusiasts, where Steve Jobs and Steve Wozniak began designing the first Apple computer. These experimental spaces embodied the idea that technology could be taken out of the hands of large institutions and returned to individual creativity. Today, that same spirit lives on in the hundreds of makerspaces around the world. With twenty-first-century tools from microcontrollers to 3D printers modern makers continue to pursue that same utopian vision: promoting, through practice and collaboration, a new form of social and economic revolution based on autonomy, shared access to knowledge, and confidence in human creative ability.[74]

From Hobby to Enterprise

What begins as a hobby in the maker world can often grow into a small business or even a mini-empire. A notable example is BrickArms, founded by

William Chapman. Chapman, a CAD designer and hobby machinist, had three sons who loved playing with LEGO bricks. One day, one of them wanted to recreate a Second World War scene using LEGO but was disappointed because the company's weapons were mostly futuristic and could not accurately represent historical models. Instead of dismissing the idea, Chapman decided to make it a reality. Using his CAD skills and a small CNC milling machine, he designed and produced miniature WWII-style toy weapons laying the foundation for BrickArms, which today manufactures highly detailed custom accessories resembling those from video games such as *Halo*.

Chapman still prototypes his models in his own workshop, sending final designs to local manufacturers. Although questioned about why he does not outsource to China, he prefers to keep production local, avoiding mass-market dilution and maintaining close control over quality.[75]

Interestingly, LEGO has not regarded BrickArms as a threat, but rather as a complement to its ecosystem. BrickArms helps LEGO meet the needs of more demanding fans and extends its appeal beyond the typical eight-year-old audience attracting users up to around twelve years old and even into adulthood. BrickArms exemplifies how maker enterprises can successfully target market niches often overlooked by mass production, and how, thanks to DIY manufacturing, accessible fabrication tools, and the Internet, small projects can grow into globally recognised brands.

In the world of product development, makers shift the balance towards cultures with better models of innovation, rather than those relying solely on cheaper labour.[76] Their work embodies a new paradigm in which creativity, collaboration, and technological empowerment redefine how and by whom the world's most meaningful innovations are made.

72. Anderson, C. (2012). *Makers : the new industrial revolution*. Crown Business.

73. Brand, S. (1968). *Whole earth catalog: access to tools.*

74. Anderson, C. (2012). *Makers : the new industrial revolution*. Crown Business.

75. Anderson, C. (2017). *Makers. Il ritorno dei produttori. Per una nuova rivoluzione industriale.* Rizzoli Etas. (Original work published 2012)

76. Anderson, C. (2017). *Ibid.*

Fig. 44 Brand S., Whole Earth Catalog

1.2.3 Physical and Virtual Spaces

There are many shared spaces managed and frequented by makers, a figure presented in detail in the previous chapter, which offer direct access to digital manufacturing techniques (see chapter 1.2.4). The term "spaces" refers to both physical places, such as laboratories and small workshops, and online platforms, which foster the creation of huge open digital communities. These environments are not only infrastructures dedicated to technology and 'doing', but also act as true collaborative ecosystems, within which knowledge sharing, experimentation and mutual learning practices are intertwined. Thanks to them, collaborative networks are created and developed that transcend geographical and institutional boundaries, contributing to the creation of a widespread and participatory culture of innovation.

The following pages will present the different types of spaces, always referring to the distinction between physical and virtual, their peculiarities, the role they play for makers and their positioning within the current landscape.

Physical Spaces

There are several terms that identify manufacturing and technology laboratories, such as Hackerspace, Makerspace, TechShop (or Service) and Fab lab. However, they are often confused with each other, as the nuances that distinguish them are not well understood.

It should be noted that the term "Fab lab" (Fabrication Laboratory) has been particularly successful in Italy, becoming a generic synonym for "laboratory" for the general public. Yet not everything is a Fab lab: there are many types of laboratories, and Fab labs are just one of many categories.

HACKERSPACE Hackerspaces come from a relatively old technological cultural tradition, that of the hacker movement, and are closely linked to information technology, telematics, open source and digital technology. In information technology, a "hacker" is a person who is an expert in computer systems and is able to acquire in-depth knowledge of the system they are working on, in order to then be able to access it or adapt it to their own needs.[77]

Over time, hackerspace has also embraced CNC technologies and moved closer to physical objects. (Fig.45) However, the hardware activities of a hackerspace are historically linked to the recycling of old computers or electronic devices or the creation of electronic circuits; in fact, electronics is the main element it has in common with the maker movement.[78]

MAKERSPACE The maker movement is younger than the hacker movement. The term makerspace was coined to refer to a space more oriented towards the creation of objects (make) and not just their modification (hack), welcoming above all technologies that are not necessarily electronic or computer related. A makerspace is a shared workshop, equipped with workspaces, tools and machinery, both digital and non-digital. It is an environment where courses for adults and children are held, and is often found within schools, as it constitutes the definition of a "laboratory" par excellence.(Fig.46)

TECHSHOP OR SERVICE Another category is that of TechShops, a term that is not widely used in Italy, where it is often replaced by the generic term "service". These are laboratories that offer prototyping services on behalf of users. They are real businesses, often organised as franchises like the American TechShops, equipped with high-level machinery and staff able to guide users step by step in the realisation of their projects. These services share the digital manufacturing technologies mentioned above, but here the concepts of sharing, community and research are lost.[79]

Fig. 45 Hackerspace laboratory

77. Cavalcanti, G. (2013, May 22). *Is it a Hackerspace, Makerspace, TechShop, or Fab lab?* Make: DIY Projects and Ideas for Makers.

78. Marostica, S. (2015). *PrintMAKERS - Stampa tradizionale e fabbricazione digitale, nuovi scenari applicativi.* Politecnico di Milano. Scuola del Design, Laurea Magistrale in Design della Comunicazione.

79. Marostica, S. (2015). *Ibid.*

Fig. 46 Makerspace laboratory

Fig. 47 Fab Lab

“A small-scale workshop with the ability to fabricate almost everything”’ - Neil Gershenfeld

FAB LABS Fab labs are a special category of makerspaces: they share all aspects of the latter, from space to activities to equipment, but they also have some intangible characteristics, or values, that reflect their academic origins. Fab labs favour digital technologies over manual craft techniques, with the aim of seeking a one-to-one correspondence between bits and atoms, for example between digital representation and the manufacture of a complex object. Unlike makerspaces, which are individual laboratories that are not linked to each other and are often organised as commercial enterprises, Fab labs are a network that shares a set of tools and processes.(Figg.47-49)

A Fab Lab (Fabrication Laboratory) is a workshop open to the public and equipped with digital fabrication machines. It is a place where individuals and businesses have access to equipment, processes and people who can transform ideas into prototypes and products. The idea for Fab Labs was born in 2001 at MIT (Massachusetts Institute of Technology), where Neil Gershenfeld, professor of the course ‘How to make (almost) anything,’ obtained funding to open the Centre for Bits and Atoms. The name of the laboratory clearly indicates Gershenfeld’s vision: a place where physical objects are created from their digital representations thanks to machines capable of transforming matter.[80]

The first Fab Lab was established in 2003 at the South End Technology Centre in Boston, followed by others in India, Costa Rica and Norway. The basic equipment for each of these had an initial value of approximately $20,000.[81]

In the following years, these experiences were replicated in many other countries around the world and so, to facilitate and support the growth of the international Fab Lab network, the Fab Foundation was established in 2009. It is a US non-profit organisation whose mission is to:

“[...] provide access to the tools, knowledge and financial means to educate, innovate and invent using technology and digital fabrication to enable anyone to make (almost) anything, thereby creating opportunities to improve lives and livelihoods around the world. Our main beneficiaries are community organisations, educational institutions and non-profit organisations.” [82]

80. Gershenfeld, N. (2007). *Fab. The Coming Revolution on Your Desktop - from Personal Computers to Personal Fabrication.* Basic Books.

81. Manzo, C., & Ramella, F. (2015). *Fab Labs in Italy: Collective Goods in the Sharing Economy.* Stato E Mercato, 3, 379–418.

82. *About.* (2025). Fabfoundation.org. Retrieved November 2025

Fig. 48 Fablab Torino

The Four Criteria that define a Fab Lab [83]

Four main requirements have been defined that every Fab Lab must meet in order to become part of the community:

1. Public access is essential.

2. Every Fab Lab must support and subscribe to the Fab Charter (see next paragraph), the manifesto written by founder Neil Gershenfeld.

3. Every Fab Lab must share a set of common tools and processes. A prototyping workshop is not the same as a Fab Lab. A 3D printer is not a Fab Lab. The idea is that all labs can share knowledge, projects and collaborate across national borders.

Fab Labs typically include:

- A laser cutter that makes 2D and 3D structures;
- A 3D printer;
- A high-resolution CNC milling machine that makes circuit boards, precision parts, and moulds for casting;
- A large wood router for building furniture and housing;
- A suite of electronic components and programming tools for low-cost, high-speed microcontrollers and on-site rapid circuit prototyping.

4. There is no possibility of isolation; every Fab Lab must actively participate in global community events.

Fig. 49 Workbench with various tools

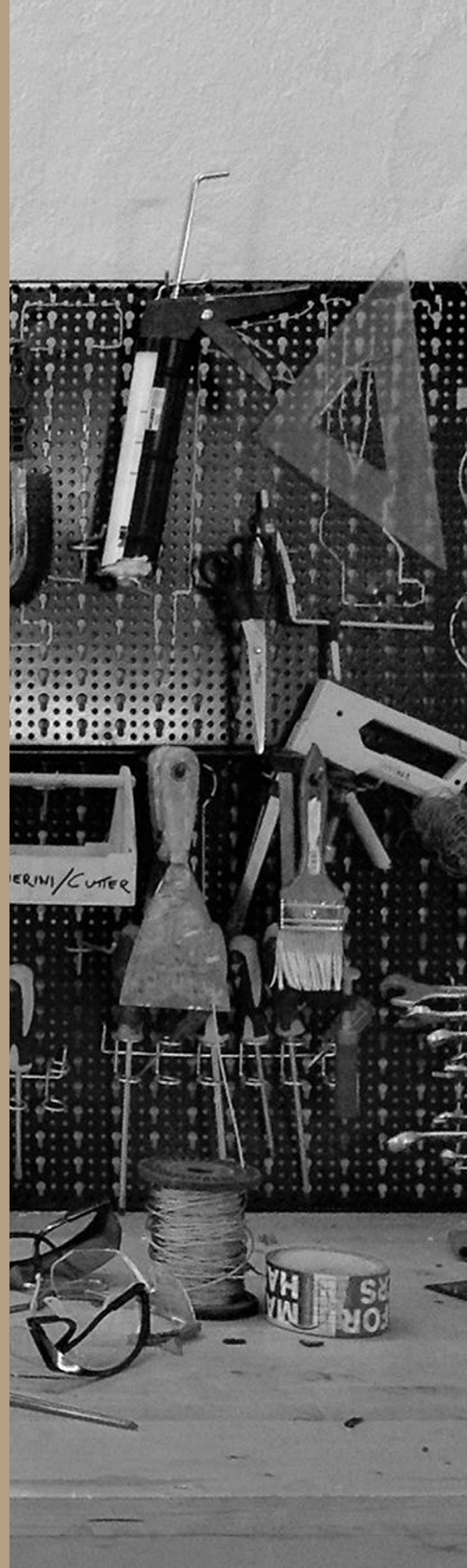
The Fab Charter [84]

What is a Fab lab?
Fab labs are a global network of local labs, enabling invention by providing access to tools for digital fabrication.

What's in a Fab lab?
Fab labs share an evolving inventory of core capabilities to make (almost) anything, allowing people and projects to be shared.

What does the Fab lab network provide?
Operational, educational, technical, financial, and logistical assistance beyond what's available within one lab.

Who can use a Fab lab?
Fab labs are available as a community resource, offering open access for individuals as well as scheduled access for programs.



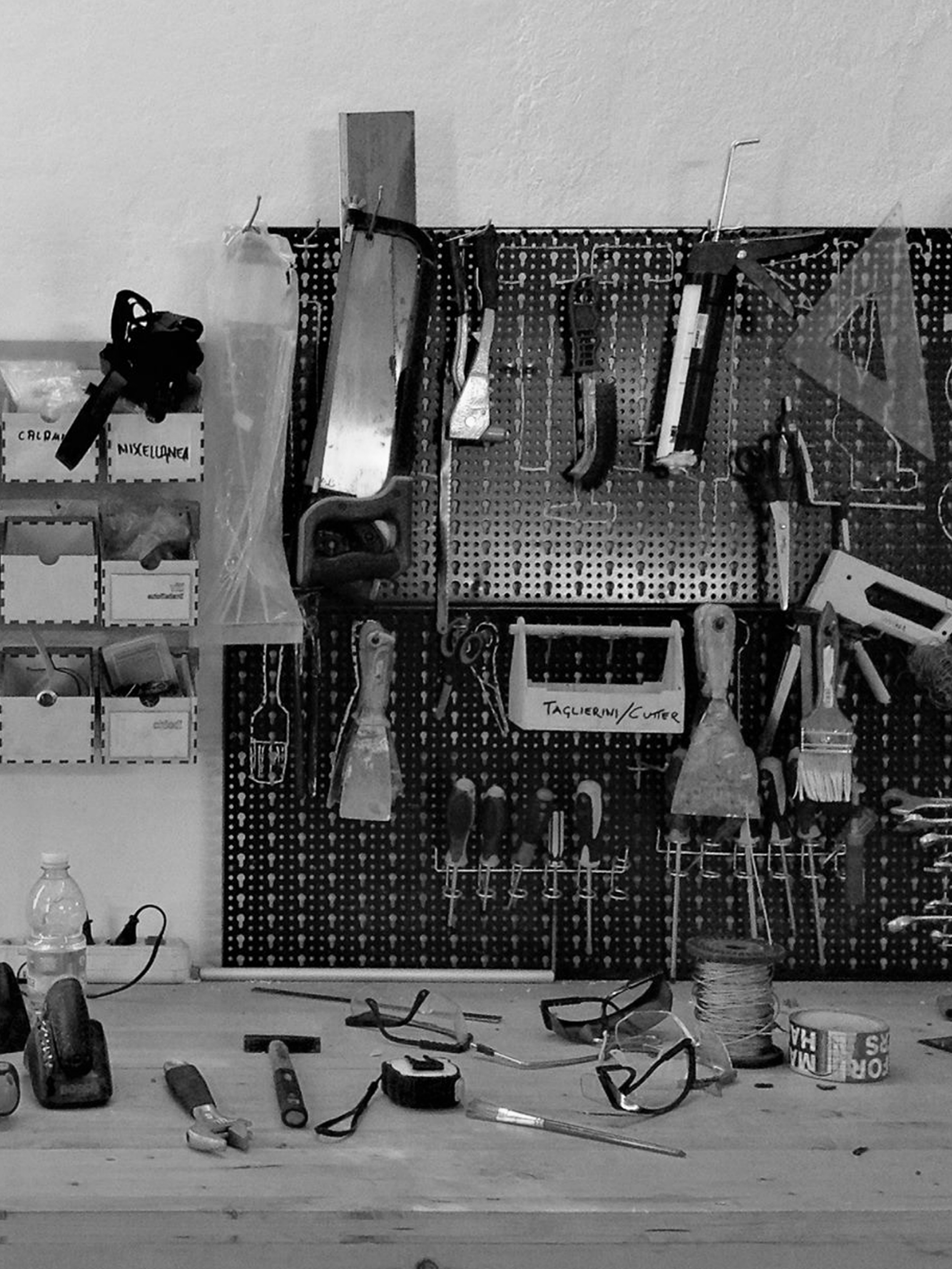
What are your responsibilities?
Safety: Not hurting people or machines.
Operations: Assisting with cleaning, maintaining, and improving the lab.
Knowledge: Contributing to documentation and instruction.

Who owns Fab lab inventions?
Designs and processes developed in Fab labs can be protected and sold however an inventor chooses, but should remain available for individuals to use and learn from.

How can businesses use a Fab lab?
Commercial activities can be prototyped and incubated in a Fab lab, but they must not conflict with other uses, they should grow beyond rather than within the lab, and they are expected to benefit the inventors, labs, and networks that contribute to their success.

83. The Fab Foundation. (2025). *Getting Started with Fab Labs.*

84. The Fab Foundation. (2025). *Ibid.*


TAGLIERINI/CUTTER

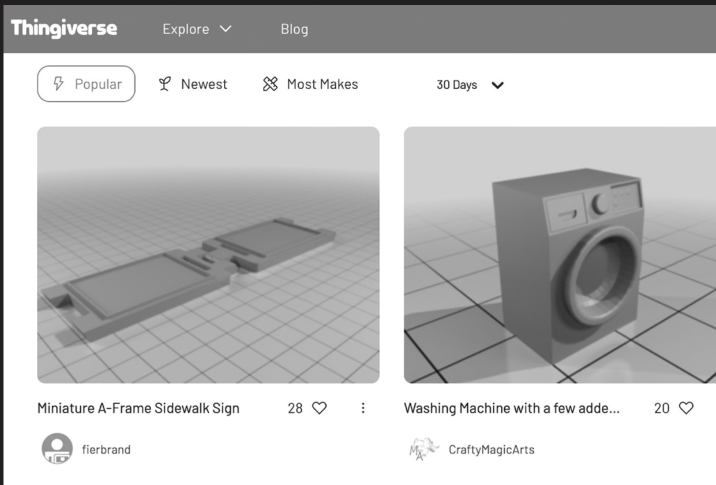


Fig. 50 Thingiverse website

To give an idea of the rapid development of the community, suffice it to say that in 2015 there were 547 Fab Labs reported in the FabFoundation mapping, while today, ten years later, there are more than 2,300. There are several reasons behind this great success and spread of Fab labs. On the one hand, these spaces respond to society's growing need for expression, as people increasingly identify with what they create and less with what they consume. On the other hand, Fab Labs are fertile ground for everything related to prototyping, at various levels: from students to engineers, designers to artists, and even hobbyists. Beyond access to pure technology, Fab labs conceptually differ from prototyping laboratories, which in themselves are nothing new: universities, research centres and businesses have been full of them for years. The Fab lab model is based on the awareness that "technological capital" and "creative capital" only become added value at a territorial level when they reach a socially widespread and recognised form.[85]

Virtual Spaces

As can be seen from the previous paragraphs, digital manufacturing technologies are at the heart of the maker movement. They have been described as "disruptive" because they help to break down the traditional boundaries between designers and users and enable a "product development model that can be designed and implemented anywhere".[86] Closely linked to the open design approach, the maker movement is one in which everyone is encouraged to share their designs and to use and improve on those of others. As a result, several platforms have emerged to serve the ever-growing network of makers and designers, providing content, infrastructure or production capabilities as services. On the one hand, there are cloud manufacturing platforms such as Shapeways,[87] iMaterialise[88] (Fig.51) and Ponoko,[89] which provide public access to a range of additive manufacturing technologies and offer designers an online marketplace and infrastructure to sell their designs without worrying about the actual manufacturing process.[90] On the other hand, there are online sharing platforms created by hardware companies, such as Thingiverse (Fig.50) and YouMagine,[91] or software companies, such as Autodesk 123D, to encourage users to share their designs while supporting small business ideas.

Digital spaces, or these collective design platforms, now attract a large number of users, and the underlying digital manufacturing technologies are becoming increasingly available.

THINGIVERSE One of the most popular collective design platforms in terms of number of shared projects and registered users is Thingiverse. Founded in 2008 by MakerBot Industries (a manufacturer of DIY 3D printers) and now owned by Ultimaker, it was created in response to the fact that designing for 3D printing required specialised training and expensive CAD programmes. When it became clear that (3D) content was as important as hardware for growth, Thingiverse was created as a file-sharing platform so that inexperienced users could easily access community-generated content and MakerBot 3D printers could be marketed to a wider audience.[92]

The designs published on Thingiverse represent real, physical objects that can be made using digital fabrication tools, primarily 3D printers. With a few exceptions, such as explicit content or weapons,[93] the platform allows users to upload digital representations of any physical object. New projects can be created in three different ways: by uploading a new design to the repository; by uploading a derivative, like a modified or improved version of an object already in the public repository; or by uploading a mash-up or hybrid, meaning a combination of two or more objects brought together in a single project. A typical project includes one or more STL files used for 3D printing, the related source files (CAD), basic project information, printing or assembly instructions, the sharing licence, images and videos of the physical product, as well as references to the original projects (in the case of derivatives or hybrids). There is a strong culture of attribution within the community, and users encourage each other to cite the projects and designers that inspire them.[94]

85. *Che cos'è un Fab lab?* (2025). MUSE Fab lab.

86. Rosen, D. (2014). *Design for Additive Manufacturing: Past, Present, and Future Directions. Journal of Mechanical Design,* 136(9), 090301.

87. SHAPEWAYS. (2010). *3D Printing Service | Shapeways*. Shapeways.com.

88. i.materialise. (2025). *Online 3D Printing Service | i.materialise*. Materialise.com.

89. Ponoko. (2017). *Precision metal & plastic custom laser cutting, engraving, bending & finishing*. Ponoko.com.

90. Özkil, A. G. (2017). *Collective design in 3D printing: A large scale empirical study of designs, designers and evolution.* Design Studies, 51, 66–89.

91. YouMagine. (2025). *YouMagine - A Community for RC Creators & Makers*. Youmagine.com.

92. Thingiverse.com. (2019). *Thingiverse - Digital Designs for Physical Objects.* Thingiverse.

93. Pedrani, M. (2025, July 21). Stop alle armi in 3D: Thingiverse rimuoverà tutti i modelli. Tom's Hardware.

94. Özkil, A. G. (2017). *Collective design in 3D printing: A large scale empirical study of designs, designers and evolution.* Design Studies, 51, 66–89.

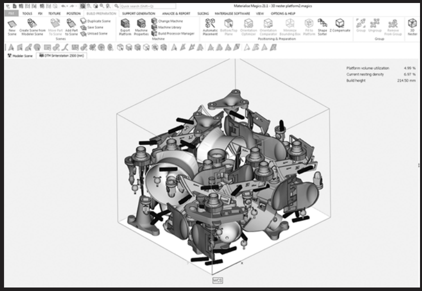


Fig. 51 iMaterialise software

1.2.4 Maker's Tool

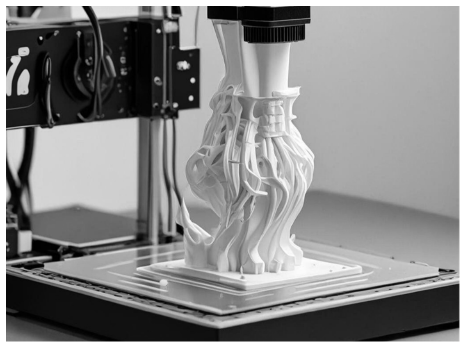


Fig.52 3D printer in operation

The role the makers play can be as simple as crafting something on a kitchen table, or as complex as running a mechanical workshop. For makers, CAD represents a kind of word processing for fabrication; it serves primarily as a way to translate ideas onto the screen, making them easier to refine and modify. If one wishes to use more advanced tools such as a 3D printer (Fig.52) or a CNC milling machine, it becomes necessary to work with software capable of creating three-dimensional designs. Here, the level of complexity increases, since in order to sculpt what will become a 3D object, one must be able to think three-dimensionally while working within a two-dimensional space in this case, the computer screen.

These kinds of programmes are often used for video game design, but makers employ them to produce specific objects from particular raw materials. Makers face an additional challenge: they must project this three-dimensionality in such a way that the 3D printer or CNC machine can perfectly interpret the commands being given. The parts produced must fit together with great precision. When designing in 3D, one usually begins with basic geometric shapes, which are then modified and refined to achieve the desired three-dimensional form. There are free software options available, such as Google SketchUp or Tinkercad, as well as paid alternatives like SolidWorks. So far, the 3D printer remains the most advanced invention in the field of prototyping, following the principle that "if you can imagine it, you can create it".[95] The printer effectively allows people to transform something digital into a fully tangible object within a relatively short time. Its cost makes it an accessible tool for schools, makerspaces, and even private homes, as many models are now available for under €1,000.

95. Anderson, C. (2017). *Makers. Il ritorno dei produttori. Per una nuova rivoluzione industriale.* Rizzoli Etas. (Original work published 2012)

An important issue to highlight is that starting a 3D design from scratch can be highly complex. However, today scanners make it possible to capture existing objects, which can then be translated and modified within CAD software. Professional scanners, however, remain costly and largely inaccessible, although satisfactory results can often be achieved with more affordable, low-cost alternatives. In fact, even a simple digital camera, when used effectively with proper lighting, can serve as a viable and economical solution.

The key is to take photographs from multiple angles and upload them to software such as Autodesk 123D Catch, where the images are combined and reconstructed into a point cloud. Nevertheless, this process still requires a certain level of skill and technical understanding to obtain high-quality results.

Another tool commonly used by makers is the laser cutter. However, it is not a machine that can easily be purchased for personal or domestic use. While it allows for two-dimensional cutting in various materials to build three-dimensional objects, it does produce strong odours, which can be problematic. For this reason, it is always recommended to operate it in a well-ventilated space. With prices generally starting from around €2,000, it is often more convenient to rely on an external provider who can complete the process efficiently within a few days.A more economical alternative to the laser cutter is the CNC machine,(Fig.53) which tends to be more intuitive in its operation. Whereas 3D printers employ an additive technology, which, for low-cost use, generally requires plastic materials, CNC machines use a subtractive method. This means they shape an object by removing material rather than adding it. The simplest CNC models can move along the X, Y, and Z axes, and unlike laser cutters, CNC milling machines are capable of producing complex three-dimensional forms through successive cutting passes.[96]

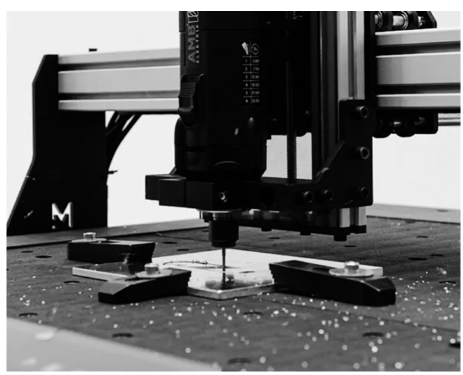


Fig.53 CNC Machine

In conclusion, the evolution of digital fabrication tools ranging from 3D scanners to CNC machines demonstrates that accessibility, creativity, and technical skill are now deeply interconnected. Makers today have unprecedented opportunities to transform ideas into reality, provided they can master the balance between technology, precision, and imagination.

96. Anderson, C. (2017). *Ibid.*

1.3 Case Studies

After outlining the historical and technical context of traditional printing (see chapter 1.1) and defining the technological and cultural principles of the Maker movement and Open Design (see chapter 1.2), the present research now shifts the analysis to the practical level. To develop an informed design proposal, it is in fact essential to map and critically analyze the existing solutions that are located at the intersection of these two worlds.

This chapter is therefore dedicated to the in-depth analysis of the case studies, an investigation already started in the first volume and resumed here with a more analytical approach and aimed at the thesis objectives. The intention is not to draw up a compilation list, but to break down existing experiences to understand recurring strategies, identify critical issues and clear spaces for opportunities.

Each case study was then broken down and evaluated according to five key parameters: strengths and weaknesses, to identify the positive aspects and successful innovations, but also the limitations and compromises of each solution. Added to these were materials, to assess the accessibility and sustainability of the construction choices, and price, to determine the actual accessibility of the project for the target audience. Finally, interaction was analysed to understand usability and user engagement.(Fig.54)

Fig. 54 Workshop

To conduct this mapping in a structured way, the analysis is divided into three distinct thematic strands, which reflect the main axes of the project:

OPEN DESIGN (1.3.1): First, several Open Design projects are examined in a broad sense, to explore the most effective sharing strategies, community models and development frameworks already validated internationally.

PRESS (1.3.2): Subsequently, the investigation focuses vertically on the specific field of printing presses. It analyzes how other designers and makers have already faced the challenge of making these tools accessible, what technical compromises have emerged (in terms of materials, cost, performance) and what results have been obtained.

EDUCATIONAL ACTIVITY (1.3.3): Finally, since the project is primarily aimed at a training context, several educational activities and workshops will be studied that use printing and DIY as teaching tools, in order to understand the dynamics, needs and specific requirements of this target.

This three-pronged benchmarking was central to the design process. It made it possible to avoid the simple reinvention of existing solutions and provided the necessary criteria to consciously position the project, filling a specific gap that emerged from this same research.

1.3.1 Open Design

In the first instance, the case studies are analysed according to the Open Design methodology, as revisited in Volume 1 of the book "Open Shapes Of Print".[97] One of the first case studies examined is "PAPER.O", developed by master's students in Systemic Design at the Politecnico di Torino. This project aimed to give paper a second life through a recycling process within a domestic environment, capable of operating either manually or automatically, and allowing users to personalise the recycled paper. However, as an open project, it did not consider the possibility of adapting the machine to other contexts with high paper consumption, such as schools.[98] This aspect was taken into account in the development of the press presented in this study, with particular attention given to versatility and portability, enabling adaptation to diverse environments and surfaces.

Another case study, "Felfil", serves as a clear example of the application of Open Design principles. The project is founded on three fundamental pillars: it can be self-produced, its licences are openly available, and it can be developed through a crowdfunding campaign.[99] No significant weaknesses were identified in this project, which therefore served as a strong source of inspiration for the development of the current proposal.

On the other hand, there is the "EASEL" project, which allows users to explore and build a DIY automatic drawing machine capable of reproducing any CAD file on paper.[100] The system incorporates a grid that improves the positioning of the sheet, together with the use of guide pieces that function as stops and clamps depending on the paper's orientation, thus allowing adaptation to different print sizes.

However, the predominant use of digital renderings over real photographs reduces the credibility and tangible character of the project. This aspect was taken into account in the development of Impresso, where the team chose to work exclusively with original photographs of the process and the final product. This decision aims to encourage users to create, demonstrating that, like the design team, they too have the ability to build their own version of the object through the principles of open design. Another relevant aspect of "EASEL" is the use of magnets and interchangeable 3D-printed components, which served as formal inspiration for the design of the printing press "impresso".

Through the analysis of these projects, it becomes clear that open design fosters not only technical accessibility but also a new cultural approach to making. In the next section, this perspective is extended to the realm of presses, examining how these machines can embody open principles while supporting experimentation, repairability, and shared production and finally, in the third section, it will discuss a hybrid between education and open design.(Fig.55)

97. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Impresso. Open Shapes of Print (Vol. 1).* Politecnico di Torino - Dipartimento di Architettura e Design, Laurea Magistrale in Design Sistemico.

98. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Ibid.*

99. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Ibid.*

100. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Ibid.*

Paper.o
Felfil
Easel
Gamelon Pad
Infini
Pet Furniture
Air-it-yourself
Open Source Furniture

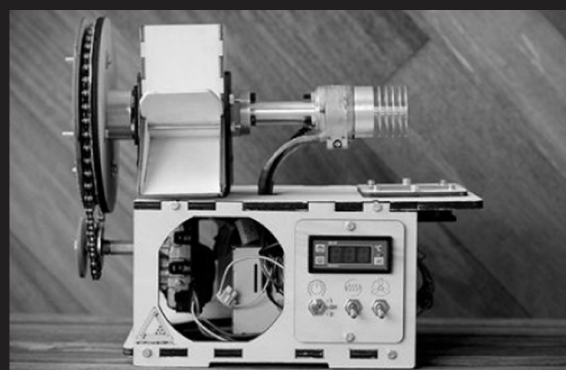
Fig. 55 Building on Binzstrasse in Zurich

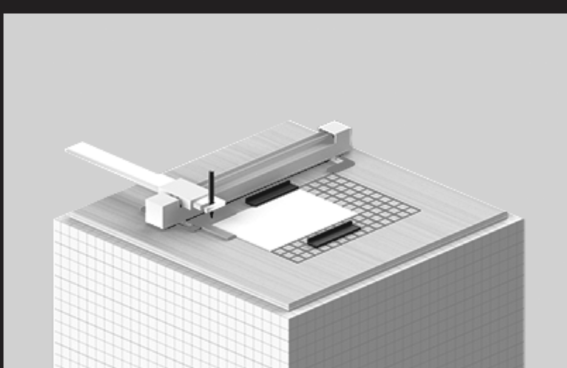
Paper.o

author(s): V. Bertaccini, R. Guadalupi
place & year: Italy, 2018

Felfil

author(s): G. Cravino, F. Mesiano, P. Fabrizio, S. Alessandro
place & year: Italy, 2014





Easel

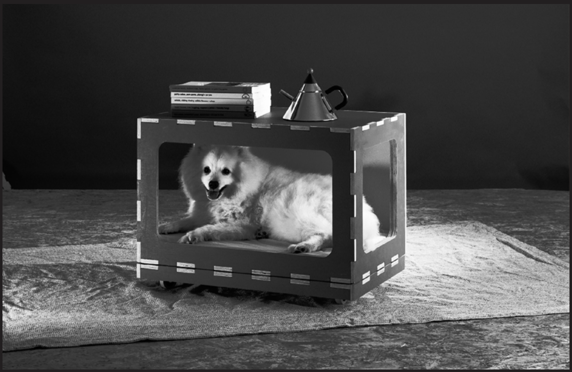
author(s): M. Gannon, C. Ference
place & year: Italy, 2014

Gamelon Pad

author(s): Nicola Scalzotto
place & year: Italy, 2024

Infini

author(s): Eli Li, Uijun Park & Song Lee
place & year: USA, 2016



Pet Furniture

author(s): Never Too Small
place & year: Australia, 2024

Air-it-yourself

author(s): Jihee Moon
place & year: UK, 2021

Open Source Furniture

author(s): Christophe Guerin
place & year: France, 2014

1.3.2 Press

To embark on the design path, it was essential to analyze the "state of the art" of printing machines, in particular those born outside industrial production circuits. The analysis of the case studies already presented in Volume 1[101] is an investigation aimed at understanding the drivers, limitations and opportunities in the field of "open" and self-produced printing presses.

What emerged strongly is that almost all open print projects arise from a primary need: to make craft printing accessible. Professional machines, such as those analyzed in a previous chapter (see chapter 1.1.2), are bulky, heavy and, above all, economically inaccessible for students, hobbyists or small collectives.

The case studies analyzed represent the direct, creative and often "hacker" response of the maker and DIY world to this problem. Some recurring trends emerged from this analysis. First of all, a strong push towards technological hybridization: almost no project is purely "traditional". Classic mechanics are combined with new digital fabrication technologies. Components such as joints, supports, flanges and even entire bodies are made by 3D printing or laser cutting, while structural elements (such as the frame or rollers) are often made of wood or reclaimed materials, as is the case with the "Home Made Letterpress" which reuses parts from old printers.[102] Another interesting trend is that of creative hacking, or the ingenuity in adapting common objects: the "Mini Printing Press", for example, transforms a common pasta machine into a press, while the Format Press builds the roller using a PVC pipe filled with cement. This approach, combined with the trend towards portability (many projects are tabletop and compact, such as "Stampomatica" or "Open Press Project"), perfectly meets the need for use in domestic spaces, schools or during temporary workshops.[103] The only case study that demonstrates an entirely different approach to all the others is "Trilobite Gráfico". This is a handheld manual press. Printing is enabled by applying pressure through rollers positioned underneath and supported by a wooden structure. This type of tool is probably inspired by the "baren" (see chapter 1.1.3), which were used in ancient times for relief printing. However, this mapping also revealed a clear and recurring trade-off: while convenience and portability are gained, performance is partially sacrificed. Many of the more accessible projects, such as "Stampomatica" and "The Open Press Project", are in fact micro-presses limited to very small, business card-like print formats. The main problem, however, lies in stability and pressure. The lightness of the chosen materials (e.g. entirely 3D printed structures or lightweight wooden frames) struggles to handle the mechanical forces required for a quality print. "The Open Press Project", for example, is at risk of breaking if subjected to too much pressure; the "Mini Printing Press" suffers from limited pressure and poor stability; the "F-Press" is not very stable and the matrix does not remain fixed.

Finally, the analysis highlighted a further criticality, almost a paradox: the "myth of the open". Although many projects call themselves open, their replicability is not always guaranteed for a non-expert user. Some require complex skills or uncommon machinery, such as CNC on metal machining, defeating the principle of accessibility. In other cases, such as "Format Press" or "F-Press", the online documentation required for DIY was incomplete or no longer available. This made the design team understand that declaring a project open is not enough if it is not supported by clear, accessible and maintained documentation. This mapping confirmed the existence of a real and shared need and, at the same time, defined a precise space of opportunity: the need for a press that finds a new balance between the accessibility (cost and assembly) of open projects and the print quality of traditional machines. (Fig.56)

101. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Impresso. Open Shapes of Print (Vol. 1).* Politecnico di Torino - Dipartimento di Architettura e Design, Laurea Magistrale in Design Sistemico.

102. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Ibid.*

103. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Ibid.*

Stampomatica
Mini printing press
Alphaset
Prixel
F-press
DIY printing press
Format Press
Open Press Project
Provisional Press
Home made letterpress
Letterpress
Trilobite Gráfico

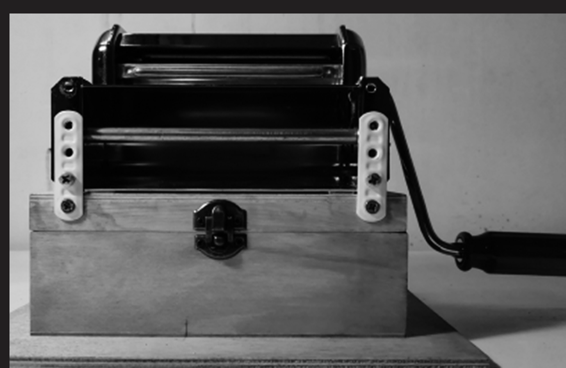
Fig.56 Drying trolley for prints

Stampomatica

author(s): Tecnificio and Lino’s Type
place & year: Italy, 2013

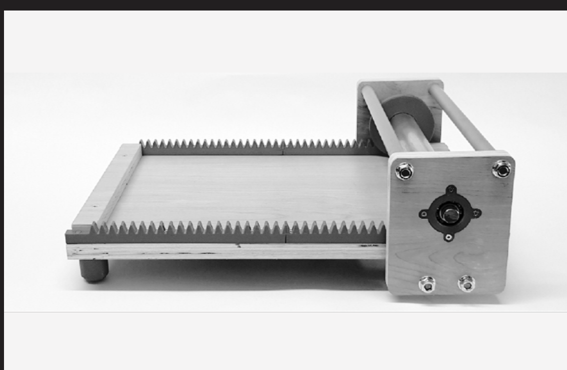
Mini printing press

author(s): Ilaria Massa
place & year: Italy, 2014



Alphaset

author(s): Will Mower
place & year: UK, 2021

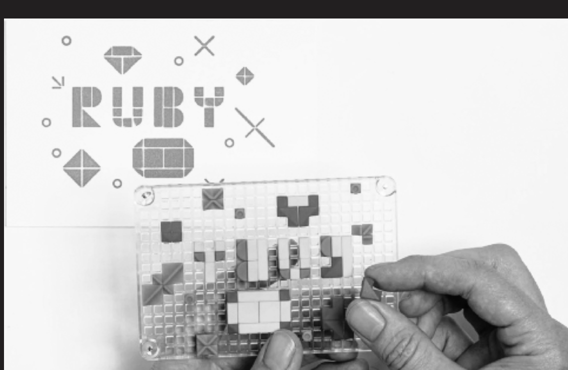


F-press

author(s): Tom Boulton
place & year: UK, 2020

DIY printing press

author(s): Never Too Small
place & year: Australia, 2024



Prixel

author(s): Brandon Gamm
place & year: USA, 2011

Provisional Press

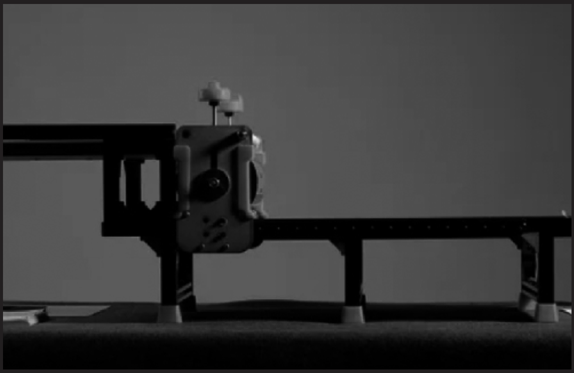
author(s): Steve and Liz Garst
place & year: USA, 2017

Format Press

author(s): Format XYZ
place & year: UK, 2022

Open Press Project

author(s): Martin Schneider, Dominik Schmitz
place & year: Germany, 2018



Home made letterpress

author(s): Rob Roach
place & year: UK, 2017

Letterpress

author(s): Jim Poelstra
place & year: USA, 2013

Trilobite Gráfico

author(s): Buentiempo
place & year: Argentina, 2020

1.3.3 Educational Activity

Exploring the range of educational activities focused on open design, printing, or both,[104] has been useful in triggering a discussion on the possible link between the printing press and the school environment. As demonstrated in the chapter "The role of printmaking in contemporary education" (see chapter 1.1.4), analogue printing can have enormous benefits when introduced into the school curriculum, both for younger children and older students.

The first case, "Design for physics", carried out by a design university (which also coincides with the Open Shapes of Print project), involves the construction of teaching tools for teaching physics in high school. This project fits well within the school environment as it allows for the self-construction of tools and their use in small groups of students and encourages not so much technical testing as the discovery of how they work and, consequently, the learning of concepts. The project goes against the traditional model whereby schools invest a large part of their funds in the purchase of expensive equipment, limited in quantity, to be shared by the whole class or even the whole school. However, this could result in waiting times and "dead" moments that do not encourage constant attention and active learning on the part of students. One drawback of this project is that no teaching unit has been designed to accompany the tool: it is essential to consider how each tool will be used to create bespoke activities based on the concept being explored and the class it is being used with.

As an example of activities dedicated to the world of printing, the range of proposals offered by the "Museo Civico della Stampa" in Mondovì was analysed. Each experience is characterised by a specific theme and, unlike "Design for Physics", varies according to the level of the audience, both in terms of difficulty and duration. An interesting aspect, which was taken into strong consideration by the authors for the subsequent design of Impresso, is the possibility offered by the museum to carry out these activities directly in schools, allowing even those who were unable to visit the museum to take part in the activity. The workshop proposals are not limited to schools and children but extend to anyone interested in the world of printing.

Unfortunately, none of the activities focus on the operation of printing machinery but are all "limited" to a manual approach to printing different matrices. The cost of the activities is very low, but it certainly takes into account the materials used and the staff required; this estimate of the costs of the workshops will be considered when planning activities related to Impresso (see chapter 4.2.3).

The only case study that combined educational activities, open design (albeit indirectly) and printing is "Questioni di carattere". It is also the only one that focuses on experimentation and hybridisation between analogue printing and 3D printing. Designed as a workshop for the creation and customisation of a set of movable typefaces using additive manufacturing techniques, "Questioni di carattere" allows participants to follow and perform all the preparatory steps for the creation of typefaces. The activity includes an introductory part to contextualise the history of typography, after which each participant introduces their own sensibility to personalise the experience. Although the use of digital manufacturing technologies is very positive, there is a lack of more "traditional" machinery, such as a printing press, which would have allowed for true hybridisation between digital and analogue.

The spontaneous consideration that emerges from the analysis of this specific category of case studies is that it is essential to know exactly the age and level of experience of the users to whom an activity is proposed. Only in this way, in fact, is it possible to adequately select both the language for expressing theoretical concepts and the type of manual experience to be proposed, in particular its organisation and the necessary materials. Consequently, this also requires an estimate of the cost to each participant. Whether inside or outside the school walls, it is important to supplement students' education with hands-on activities that broaden their learning horizons through more practical experiences.(Fig.57)

104. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Impresso. Open Shapes of Print (Vol. 1).* Politecnico di Torino - Dipartimento di Architettura e Design, Laurea Magistrale in Design Sistemico.

Design for physics Printing museum

Questioni di carattere

Fig.57 Carved matrices

Design for physics

author(s): IED Rome, product design students
place & year: Italy, 2023

Printing museum

author(s): Museo Civico della Stampa di Mondovì
place & year: Italy, 2024

Questioni di carattere

author(s): Opendot
place & year: Italy, 2015

USER RESE

ARCH

2.1 Interviews

Fig. 58 People's voices

Moving on to the user research phase, the authors felt the need to immerse themselves in real-life contexts of use, listen to the voices of the protagonists and map the wealth of knowledge, frustrations and desires that only direct experience can provide.(Fig.58) For this reason, between October and December 2024, the project entered a phase of qualitative field research. This resulted in ten interviews, which became ten voices, ten valuable testimonies. Although the structure of the interviews followed a common pattern (available in full in Volume 1 in the different original languages), the real added value lies in what is not foreseen: a two-way dialogue between the interviewer and the interviewee, in which unpublished questions and unexpected topics enriched the conversation, taking us far beyond the initial outline.

To obtain an overview, it was looked for a cross-sectional comparison: on the one hand, students and former students of graphic design (Hassna, Marco, Sabina), and on the other, teachers (Federico Nota, Marcelo Diaz) and institutions (Museo Civico della Stampa). These were joined by the expert views of those who work in printing every day, such as the professionals at Archivio Tipografico, Inchiostro Puro, associations and amateur groups such as Il Torchio di Via Agliè and the Ocho collective.

This initial body of research was supplemented by a final, crucial validation meeting held on 5 February 2025: a test of the first "final" prototype with Luisella Cresto, co-founder of Printclub Torino, whose feedback is analysed at the end of this chapter.

The following pages will not report the transcripts, but will explore the valuable testimonies and key insights: the confirmations, criticisms and inspirations that first validated our design intuition and then guided, step by step, the development and improvement of the project (also to ensure the fluidity of reading, direct quotations have been translated and presented in English).

2.1.1 Insights

A cross-sectional analysis of the interviews revealed four main topics that defined the project requirements:

THE NEED FOR ACCESSIBILITY The first insight that emerged was unanimous confirmation of the existence of a "gap in the market" for an accessible printing press. All interviewees, from experts to amateurs, highlighted the polarisation of the current offering. On the one hand, professional presses, while guaranteeing excellent performance, are perceived as totally inaccessible. Quoting Riccardo Cecati, "they cost a fortune" and "weigh an indecent amount". Gabriele Fumero (Archivio Tipografico) confirmed that these are antiques with unpredictable prices, which can "cost from €1,000 to €5,000".[105]

This inaccessibility has generated a proliferation of DIY and "hack" solutions, which, however, force users to make significant compromises. Riccardo Cecati mentioned the use of a pasta machine, but this "crushes" and "flattens" the matrix. Nella Caffarati (Il Torchio di Via Agliè) confirmed that small proofing presses, although lightweight, are unstable: "the problem is that they move".[106] A clear need therefore emerged for a product that strikes a new balance between performance and affordability, as Gabriele Fumero perfectly summarises:

> *"We feel that there is a real lack of this type of machine, but one that is accessible, affordable and perhaps made with slightly lighter materials".* [107]

THE EDUCATIONAL CONTEXT Interviews in schools (artistic high schools and technical institutes) revealed a paradox. On the one hand, students show great enthusiasm for practical and analogue activities. The experience of linocut printing was described as "very beautiful, very fun" (Marco Liguori) and "very fascinating" (Alessia Pelissero). Sabina Finiguerra expressed her desire to have done more tangible activities, such as creating models.

On the other hand, school logistics make these activities complex and sporadic. Prof. Federico Nota (Liceo Artistico Primo) explained that, despite having a professional Bendini printing press, the workshop is small and can only accommodate "small groups of students, eight or nine". Alessia Pelissero (Museo della Stampa) confirmed this "bottleneck": printing is a slow activity and with only one press, "there are delays at the moment of printing". This critical issue strongly validated the design intuition: rather than a single, heavy and expensive centralised press, a classroom needs a system of multiple, lightweight and inexpensive presses that allow the class to work in parallel, avoiding long waits.

105. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Impresso. Open Shapes of Print* (Vol. 1, pp. 108–191). Politecnico di Torino - Dipartimento di Architettura e Design, Laurea Magistrale in Design Sistemico

106. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Ibid.*

PRACTICAL HACKS AND TECHNICAL NEEDS The students' experiences have given rise to ingenious hacks that denote a need and great creativity. The most striking example is that of Marco Liguori, who said he printed at high school using "two desks: a desk under the matrix sheet and a desk above where we sat on it and pressed it down". This "extreme" hack is the clearest evidence of the lack of a dedicated tool and the students' willingness to obtain one even with the tools available.[97] From a technical point of view, clear requirements emerged:

- Precision: for an amateur, the priority is not speed but "guaranteed good results". The press must ensure uniform pressure, which manual printing (for instance with a spoon) does not allow, preventing the ink from smudging the unengraved parts.
- Height adjustment: all experts emphasised the critical nature of adjustment. Prof. Marcelo Diaz highlighted the need for a force reduction mechanism and the versatility of being able to print matrices of different thicknesses. The idea of adjusting the height of the matrix holder rather than the roller (as in our prototype) was validated by Prof. Nota as "extremely intelligent". [108]
- Stability and Safety: prof. Diaz emphasised "safety is a fundamental issue", pointing out that a manual mechanism is inherently safer than an electric one in a school setting and that the design must take into account the strength of young users.

FEEDBACK AND DEVELOPMENTS Following the development of the final prototype, a crucial validation meeting was held at the Printclub Torino headquarters with co-founder Luisella Cresto. This test provided valuable professional feedback on the finished product. Although initially sceptical about a "press that looked a little light", Luisella Cresto quickly understood that the lightness was a "real design choice" and recognised its actual functionality. The key points that emerged from this meeting were:

- Value Validation: the "compact, portable and lightweight" aspect was identified as a key advantage in the context of workshops, leading her to say that "she would like one too".
- Critical Issues (cleaning): a long-term practical problem was raised: "the wood gets dirty every time you make a print". It was therefore recommended to study a way to make the printing plate holder "easy to clean".
- Future implementations: the hybrid nature of the press (both proofing and intaglio press thanks to its height adjustment) was appreciated. To improve the proofing press function, it was suggested that a system for "marginatura" (registration) be implemented and that testing with more complex matrices, such as zinc, be continued.
- Concrete Opportunity: the meeting concluded with an important proposal for public validation, that is the possibility of testing the printing press during Graphic Days 2025. This occasion represented a fundamental testing phase for the project and also the first concrete opportunity to present it to a wide and varied audience, confirming the "experimental" approach of the product.

107. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Ibid.*

108. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Ibid.*

List of interviews conducted

Ocho Collective

“The spirit in which we started is the desire to interface with analogue printing, illustrations and artistic research [...] What we want to do and what we set out to do is to limit, if not eliminate, digital printing, because analogue printing is just more interesting and gives that added value. On the level of storytelling of how we did it, because it involved you in choosing so many details. And then because it enhances the final output.”

Interview by Chiara Toso with Riccardo Cecati, co-founder of Ocho Collective. Thursday 24th October 2024

Marcelo Diaz

"The key is the relationship between the movement established with the crank and the pressure applied to the roller, which is achieved by means of gears that can apply up to half a ton of pressure evenly. This force-reducing mechanism allows the roller to be driven without excessive effort. It is important to consider the force required to operate the press in relation to the age of the students who will be using it."

Interview by Maria Aponte with Marcelo Diaz, teacher at Ponteficia Universidad of Bogotá. Thursday 24th October 2024

Marco Liguori

“There is a lot of fun to be had in analogue printing. In my opinion in digital printing you completely lose the whole part of touch, feeling and maybe even a bit of pride in what you have printed. That is, the pride is then more about ‘I did this’ rather than ‘I printed this’. [...] They both have their pros, their cons, I like both [referring to digital and analogue printing]. It depends on what I have to do.”

Interview by Chiara Toso with Marco Liguori, student of Systemic Design. Tuesday 29th October 2024

Sabina Finiguerra

"In the centre was this roller, which you raised and lowered, and you placed the linoleum, inked, and the sheet. Then, you would put sheets on top of the sheet to get pressure. And then you would lower the roller to a certain height and turn it manually. We didn't do that because it was too heavy, but the professor did [...]. It was a very big press, very old and very heavy because you couldn't move it.

Interview by Sara Bruno with Sabina Finiguerra. Tuesday 29th October 2024

Archivio Tipografico

"This is something that we also feel, let's say, as a necessity, we feel that there is a real lack of a machine of this type, but one that is accessible, affordable, perhaps made with materials that are a little lighter where possible, and that can be used in a slightly simpler way."

Interview by Arianna Signetti with Gabriele Fumero, co-founder of 23.56 Studio and printer at Archivio Tipografico. Wednesday 30th October 2024

Hassna Bendaoud

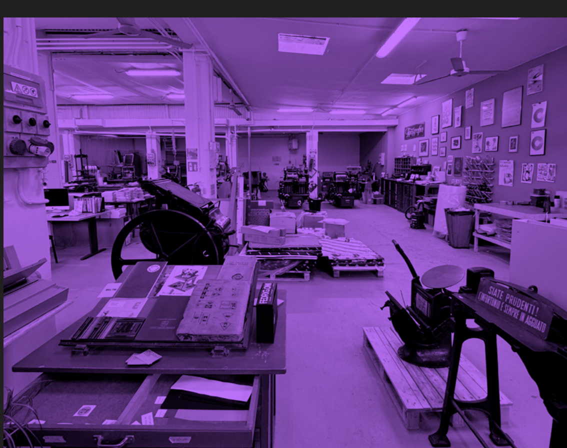
“They only mentioned the press a little bit, but they never explained it well, we just know what the shape is. I mean, we talked about the press, but I don't really know how it works and all its characteristics. [...] Last year they explained to us the different printing techniques, this year we are going to go into it in depth, but this aspect is practically all theory."

Interview by Sara Bruno with Hassna Bendaoud, student at a technical graphic institute. Wednesday 30th October 2024

Museo della Stampa di Mondovì

“Because printing is something that can be easily taught to everyone and it is something that excites everyone and goes down well with both a lower age group and the higher age group, so from primary to high school. However, this discourse ties in a little bit with the logistical discourse, so that printing is a slow activity, it is a time-consuming activity, even though it may seem repetitive and fast.”

Interview by Fabiana Gentili with Alessia Pelissero, responsible for museum educational activities. Wednesday 6th November 2024



Inchiostro Puro

“Typography isn’t dead, it’s just a little less commercial. But I think it’s an interesting project you’re doing, if only to get something printed again in schools. In my opinion, even the idea of making a ten-year-old understand how printing came about is sorely lacking. It’s fundamental to know where you’ve come from in order to move forward. Nowadays people think you just come here, press a button and that’s it.”

Interview by Chiara Toso with Marco Caffaro, founder of Inchiostro Puro. Tuesday 12th November 2024

Il Torchio di Via Agliè

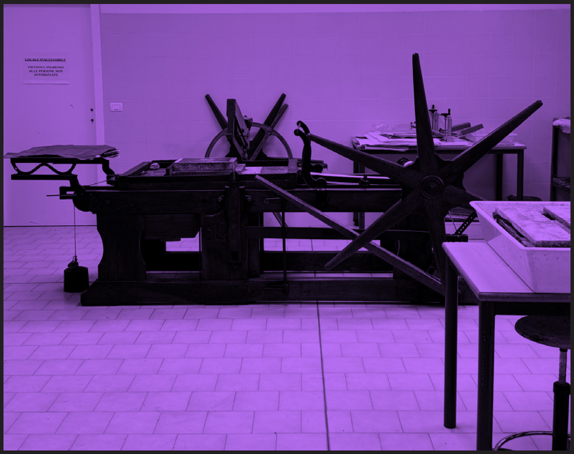
“In my opinion, the sense of self-production should be developed a lot. To stimulate each person’s creativity, even at home or even not using a studio like this. I mean, this stuff here makes sense to me. Because I find that we lack basic culture, so the fact that you can express yourself with what you are doing is important. That is a good way to incentivise culture a little bit [...] You have to create a cultural."

Interview by Fabiana Gentili with Nella Caffarati, founder of Il Torchio di Via Agliè. Wednesday 27th November 2024

Liceo Artistico Primo

“The workshop is small but very well equipped. Because we can do all the engraving techniques, a tool like this is only available at the Accademia Albertina, it is impossible to find in a high school, but the art school here was one with the Accademia. Then in the 1970s they split off and we took some things with us. Small groups of students came down to this workshop.”

Interview by Sara Bruno with Federico Nota, graphics teacher at the Primo art high school in Turin. Thursday 19th December 2024



2.2 Personas

Fig. 60 Personas identification

Fig. 59 Target audience

Building on the work of extracting key insights from the interviews, the personas and journey maps in Volume 1 of the project have been updated and expanded to offer a broader representation of users. Open Shapes of Print is aimed at a wide range of users, including children, students, teachers, freelancers, print experts, beginners, individual makers and entire Fab Labs, as well as anyone who wants to learn about the world of printing and open design (Figg.59-60).

Based on this, five personas have been created, each with an identity card containing personal details, and a brief biography highlighting the perspective of each user. Added to this are their needs, objectives, and pain points. Together, these provide a clear picture of the category of people to be represented, which will be kept in mind for the subsequent design of Impresso and its touchpoints.

Each persona is associated with a journey map representing a hypothetical scenario in which the user interacts with the project. For each of the five steps (awareness, consideration, adoption and usage, support and loyalty, and the feedback loop), the activities performed by the user, the touchpoints related to that specific action and the associated insights and emotions are listed. Overall, the experience is visually represented by a line graph that illustrates the progress of the journey at a glance.

2.2.1 Journey Map

Creative Learner

IDENTITY CARD

Name: Michele
Age: 16 years old
Residence: Treviso, Veneto
Job: Student at the Technical Institute of Graphics

Biography “Maths, chemistry and physics: no thanks. That was one of the main reasons why I chose the Technical Institute of Graphics, even though my parents wanted me to go to high school. I was never very good at school but now that I’m at the end of my third year, I have to say that I don’t mind. I really enjoy my subjects, especially graphic design subjects, both computer and hand. I prefer to work in a group rather than alone, but there aren’t many activities at my school that allow me to do that. I don’t know if this is the way I want to go when I grow up, but I would definitely like to do something more manual and less sedentary. When I’m at home I like to use my sister’s 3D printer, but she can’t know about it or she’ll get angry. At first I didn’t really understand how it worked, it seemed unbelievable to me that a technology could physically realise what I saw on a screen, but now I can’t wait to print the latest model and finally complete my collection of Star Wars characters.”

NEEDS
- To use his passion for 3D printing to make something useful.
- Something that can get other people to work together.

GOALS
- Understand what his career path could be.
- Improve his manual skills.

PAINS
- Feels constrained by the sedentary nature of school activities.
- Faces challenges in exploring his interest in 3D printing.

JOURNEY STEPS	AWARENESS	CONSIDERATION	ADOPTION AND USAGE	SUPPORT AND LOYALTY	FEEDBACK LOOP
User activities	Introduction of the possibility of being part of an new activity	The teacher presents the objectives of the project	The school purchases the kit after considering the educational impact	Taking part in group activities with the printing press	Decides to build one press at home too
Touchpoint	**Address course teacher**	**Address course teacher, Classmates, Social media**	**School lab, Packaging**	**Address course teacher, Instruction book, Classmates**	**Website resources, How to assembly & How to print videos**

Experience

Insights	“I hope they finally make us work as a real team.”	“It does not seem to be the usual theoretical lecture, because the manual contribution is crucial. I think I can learn something new.”	“It’s all very cool. I didn’t know printing worked like this before. Awsome.”	“I can’t believe my eyes, we really did it! I can’t wait for my turn to print. I have to prepare my printing matrix.”	“I should be able to build it myself, but it would be more fun with my family. First of all, I am going to customise some components in 3D...”
EMOTIONS	HOPE, MISTRUST	CURIOSITY, TRUST	AMAZEMENT, SERENITY	SATISFACTION, HAPPINESS	WORRY, DETERMINATION

Enthusiastic Professor

IDENTITY CARD

Name: Susanna
Age: 53 years old
Residence: Alba, Piemonte
Job: Teacher of printmaking at the Art High School

Biography "Teaching is not an easy job, it requires a lot of dedication, patience and a pinch of creativity. In every lesson, I hope to pass on to my students a little of my passion for painting, sculpture and art in general. I always try to stimulate them through creative activities, group work and class trips. In my opinion, experiencing phenomena, touching them, seeing them live is worth a thousand times more than seeing them depicted in a picture in a textbook. In fact, I firmly believe that doing things with students is much more formative than just explaining theoretical concepts from morning to night. In my spare time, the little I have left after correcting homework and preparing lesson materials, I like to sit and read a good book with a cup of tea: biographies and documentaries are my favourite genres. I have always been fascinated by the history of things, because we often learn details that have the power to amaze us: the story behind a famous work of art, an important historical event or even a small everyday object."

NEEDS
- Something physical to put theory into practice.
- New activities for her students to do in groups.

GOALS
- Stimulate interest in traditional printing techniques.
- Make people understand the possibility of hybridisation.

PAINS
- Feels constrained by a system that prioritizes theoretical teaching over hands-on learning.
- Struggles to find spare time for herself.

JOURNEY STEPS	AWARENESS	CONSIDERATION	ADOPTION AND USAGE	SUPPORT AND LOYALTY	FEEDBACK LOOP
User activities	Becomes aware of the project	It could enhance her teaching method	Receives the kit ready to assemble for the activity	The activity is included in the teaching load of the course class	Share the experience and recommend it
Touchpoint	**School addressbook**	**Book (volume 1), Website**	**Website, Packaging**	**Website community, Social media**	**Colleagues**
Experience					
Insights	“I find it very interesting and challenging for the students. I need to go deeper.”	“Material culture plays a key role in helping students learn theoretical concepts and mechanical processes. This project confirms this.”	“I hope the activity is well designed and that the assembly does not require too many manual skills.”	“I am satisfied that the activity is very successful with all the students.”	“I need to share this educational and innovative experience. I would like to see more, on other topics as well.”
EMOTIONS	CURIOSITY, UNCERTAINTY	DETERMINATION, TRUST	HOPE, WORRY	SERENITY, DETERMINATION	SATISFACTION, HAPPINESS

Professional Printmaker

IDENTITY CARD

Name: Davide
Age: 34 years old
Residence: Milano, Lombardia
Job: Co-founder of a small print lab

Biography "I agree with those who say that if you make your passion your job, you'll never work a day in your life. Two years ago, my partner and I set up a small print shop on the outskirts of Milan. It was a real gamble, but one that paid off. I didn't know much about printing until I met Franco, an old retired typographer, who showed me the ropes. Since that meeting, my life has taken a different turn and I now see everything in four colours. Nowadays, digital printing is all the rage and brings us as much work as income, but my dream in the drawer would be to dust off the dots, stripes and composites and let people know the true value of traditional printing, of slow printing that does not follow the rhythms of consumption. When I am not working, I like to dedicate myself to my daughter, taking her to workshops, events and museums to do things together and slowly grow in her curiosity about the world, which has brought me so much luck."

NEEDS
- Something that reflects his interests and creativity.
- An activity to do with his daughter.

GOALS
- Promote the value of traditional printing techniques.
- Buying machines to organise workshops in his lab.

PAINS
- Faces ongoing pressure to maintain the profitability of a small print shop in a competitive market.
- Struggles to reconcile the demand for fast digital printing with a personal passion for traditional printing.

JOURNEY STEPS	AWARENESS	CONSIDERATION	ADOPTION AND USAGE	SUPPORT AND LOYALTY	FEEDBACK LOOP
User activities	Discover an activity to do with his daughter	Think about whether it would be better to build it or buy it	Do-it-yourself construction begins	This activity has become like a weekly family ritual	A workshop in the print lab would be cool and interesting
Touchpoint	**Website, Social media**	**Website, Building resources, Reviews**	**Instruction book, Fablab, How to assembly video**	**Website community, Social media**	**Neighbours, Website collaborations, Print experts or amateurs**
Experience					
Insights	"This project touches on aspects that are close to my heart and that I would like to pass on."	"It would be nice to build something from scratch with my daughter. But I am afraid it would take too long and be a bit difficult."	"I don't own a 3D printer so I think I will go to Fablab."	"It is phenomenal how easy it is to get great prints. Analogue printing has never been more accessible."	"I want to start promoting the value of traditional printing in my print lab. I feel the workshop will be a success!"
EMOTIONS	HAPPINESS, DETERMINATION	CONFUSION, WORRY	UNCERTAINTY, HOPE	AMAZEMENT, SATISFACTION	TRUST, HOPE

Passionate Designer

IDENTITY CARD

Name: Luz
Age: 27 years old
Residence: Viterbo, Lazio
Job: Full-time graphic designer and illustrator

Biography "I have always loved to draw since I was a child, but I saw it as a pastime, something that helped me express what was inside me and at the same time amused me, I never thought that one day it would become my job. Being a Colombian transplanted in Italy has not been easy, I admit, but with a lot of courage and willpower I have now found my stability. I work in a design studio as an illustrator and graphic designer: fonts, colours, textures and line weights are my daily bread. I live in a small flat with my partner, who has a degree in architecture but is a designer in life. In short, we are a very creative couple, with many common interests and just as many differences, one of which is music: I am indie, she is electronic. Over the last few years I have become very involved in the world of vintage and second-hand, because it reflects many of the principles I believe in. In fact, when I can, I like to wander around the stalls, chat to the sellers who have become my friends, and I never leave empty-handed."

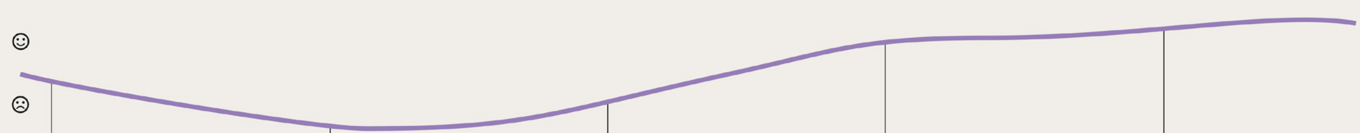
NEEDS
- Print drafts independently to check her graphics.
- Do some personal projects outside working hours.

GOALS
- Turning personal artistic passion into professional work.
- Building a sense of belonging and community in a foreign country.

PAINS
- Find a recognisable and personal illustration style.
- Have more awareness when printing her work.

JOURNEY STEPS	AWARENESS	CONSIDERATION	ADOPTION AND USAGE	SUPPORT AND LOYALTY	FEEDBACK LOOP
User activities	Looking for a solution to print her illustrations	Have to consider many factors to make a choice	Buy and receive the kit directly at home	Start buying papers, inks and books too	Become an active part of the community of the project
Touchpoint	**Social media, Design magazines**	**Website, Reviews, Colleagues**	**Website, Packaging**	**Website, Tips and tricks book**	**Website community, Social media**

Experience



Insights	“It sounds very interesting as a project but I am sceptical that it works.”	“I am worried about the price-performance ratio, but everyone has good things to say about it. It could be very helpful for me.”	“Every component is beautifully designed. I can’t wait to use it to print my own draws!”	“I want to improve print output with every extra.”	“I think I will upload the 3D model of this sheet support I have designed. I would be happy to help other users and makers.”
EMOTIONS	SUSPICION, MISTRUST	CONFUSION, UNCERTAINTY	AMAZEMENT, CURIOSITY	DETERMINATION, TRUST	SATISFACTION, HAPPINESS

Novice Maker

IDENTITY CARD

Name: Stefano
Age: 42 years old
Residence: Firenze, Toscana
Job: Half-day software engineer and half-day maker

Biography "Don't get me wrong, I love my job, but it can get really stressful. After spending all day looking at lines of code, I can't wait to get home and give my son Mattia a hug. He's almost twelve now, but he'll always be my little boy. Mattia is a very special child because, unlike other children his age, he never asks to watch tv or play video games. He loves spending time with me in the little workshop I built with some wooden beams at the bottom of the garden. At first it was a bit empty, but now I already have three woodworking machines and various tools. Mattia and I are always experimenting with something new, such as chopping boards, frames and cabinets, and I recently bought my first 3D printer. I just need to figure out how to use it. However, I would like to find something different to make, perhaps something that actually works, like a small machine, and that Mattia can help with without risking injury. "

NEEDS
- Find some DIY projects to do in his home lab.
- Spend quality time with his son.

GOALS
- Create a machine that actually works.
- Become familiar with 3D printing

PAINS
- Feels trapped by his own work.
- Fears that his son may hurt himself helping him with his projects.

JOURNEY STEPS	AWARENESS	CONSIDERATION	ADOPTION AND USAGE	SUPPORT AND LOYALTY	FEEDBACK LOOP
User activities	Searching for a device to build with his son	Ensure that it does not require too much equipment and skills	Do-it-yourself construction and assembly begins	A great father-son activity to do together	Share possible variants of certain components
Touchpoint	**Website, Social media**	**Website, Building resources, How to assembly video**	**Building resources, Instruction book**	**Social media, Neighbours, Reviews**	**Website community, Social media**
Experience					
Insights	"I really can't find anything interesting to build that isn't too complex at the same time."	"I need to understand exactly what equipment is required. I would prefer not to have to rely on an external laboratory, such as Fab Lab."	"My son and I are having a lot of fun building the printing press. It's much easier than I imagined!"	"I absolutely must share the photos of the result and the first test prints."	"I was wondering if we could work on the shape of the handle. I'll give it a go, then we'll see what happens."
EMOTIONS	MISTRUST, UNCERTAINTY	CURIOSITY, WORRY	SERENITY, TRUST	AMAZEMENT, SATISFACTION	CURIOSITY, HOPE

PRO

JECT

4.1 Impresso

Fig. 158 Impresso in use

Fig. 159 Final prototype of Impresso

The previous chapter 3 described the evolution process of Impresso. The transition from the first prototype to the final project was achieved through the insights gained during the testing phases and the resulting improvements made to the press. The final project, in which Impresso was optimised to improve the user experience, is now described.

This chapter illustrates the final project through technical drawings and storyboards, the former clarifying its features, while the latter showing how it works. Next, the explanation of the possible printing techniques that can be achieved with Impresso is provided, highlighting the variety of options available to users. Finally, due to its educational nature, Impresso is designed as either a DIY device, with instructions provided, or as a kit to be used by schools. Lastly, the production costs are detailed. (Figg.158-159)

4.1.1 Description & Configuration

The new version of Impresso retains many of the features of the first prototype, described in chapter 4 of volume 1. The division into three sub-assemblies, cart, frame and matrix holder, remains consistent.

The new and improved components are incorporated within the sub-assemblies. The cart features the handle that has been made more ergonomic and intuitive, with its shape mirroring that of the joints, making it more consistent with the overall shape of the press.(Fig.160) The frame has been optimised by reducing the length of the longest laths, as these components are the longest in the press and therefore affect both its portability and its fit inside the packaging. The joints(Fig.161) in the frame are also more resistant, as they are 3D printed with different print settings, but they do not change shape. The biggest difference with the first prototype is the matrix holder (Fig.162), which now allows movable type to be printed. In general, this sub-assembly has not been radically changed, but rather, through the addition of new components, such as corner joints and new sliders, it has been adapted for typographic printing. Another component designed for the type holder is the registration pins, conceived for multi-colour printing and allowing the sheet to be placed in register.

As regards the Impresso fixing system, there are two solutions: either suction cups can be placed under the joints, or, if working on rough surfaces, the suction cup solution can be integrated with a clamp.

In addition, the wooden components have been coated with both a water-based impregnating agent and wax to ensure durability and cleanliness.

Finally, the press is available in two versions: one with a steel roller and the other with a PVC roller (filled with sand). The two options allow users to choose the one best suited to their needs, for example, keeping in mind that the PVC pipe costs less but offers the same printing performance as the steel one. This option is designed for printing enthusiasts and schools, where students can demonstrate the value of using waste or unusual materials to create objects with different functions. The steel roller, on the other hand, is designed for printing experts or makers, as it is more durable and easy to maintain.

It can be said that the requirement not to intervene on the press as a whole has been fulfilled, as specific improvements have been made to certain components. In fact, referring back to some of the needs described in volume 1,[132] it can be seen that these are still being satisfied and, in detail, the device has retained the same materials overall, adding only a few 3D-printed parts, so it is still affordable. As previously mentioned, the requirement for "intuitive and safe use in relation to the printing material" has been met by redesigning the handle. "Ensure lightness and compactness without compromising functionality" has been respected, for example, by reducing the length of the wooden laths. Overall, Impresso is therefore easy to transport, which is an important feature in view of the workshops. 'Self-manufacturing through simple materials and processing techniques' is fundamental to the open design press project, so the new components have been designed to be manufactured using 3D printing.

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The press works in the same way as a proofing press, in which the cart is moved manually by the user. First of all, the height of the matrix holder must be adjusted according to the matrix to be printed. Furthermore, if one wants to print a composition with movable type, the matrix holder must be equipped by inserting the corner joints. In this case, the resulting height is already correct, as it is determined by the height of these joints.

Ink is applied to a matrix, which is then placed on the matrix holder. The sheet of paper to be printed is placed on top, followed by a sheet of felt to distribute the pressure. Finally, the cart is pulled, transferring the ink from the matrix to the paper through the pressure of the roller.

132. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Impresso. Open Shapes of Print (Vol. 1).* Politecnico di Torino - Dipartimento di Architettura e Design, Laurea Magistrale in Design Sistemico.

133. *Le licenze* – Italia. (n.d.). Creative Commons.

134. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Ibid.*

Fig. 160 Detail on the handle

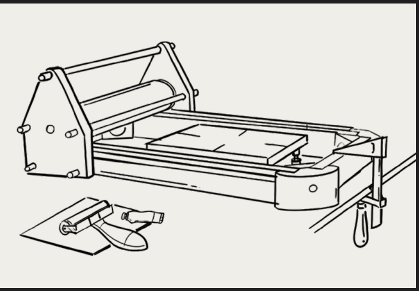
Fig. 161 Detail on the handle

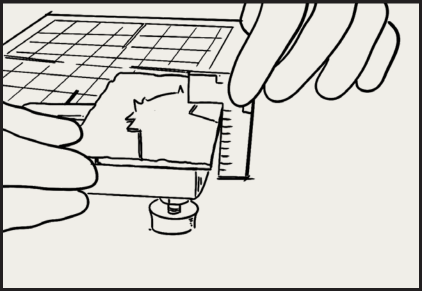
Fig. 162 Two versions of the matrix holder

Usage Storyboard

1

The printing materials should be prepared, and the printing press is secured on the table with the clamp/suction cups



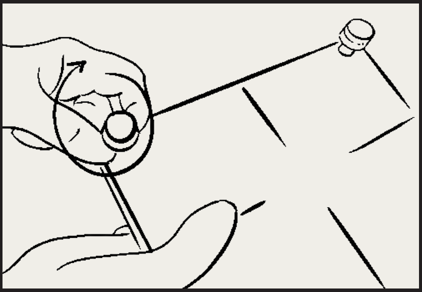


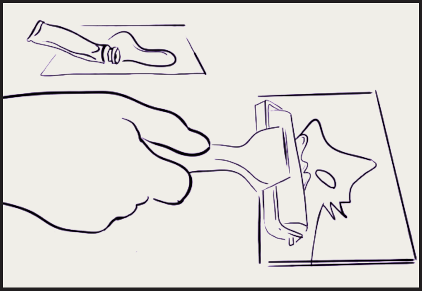
2

It is necessary to check if the matrix is at the right height, with the measuring tool and a bubble level

3

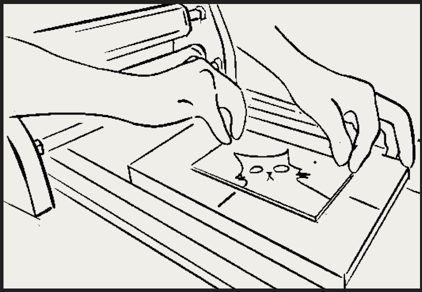
It is possible to adjust the matrix holder by means of adjustable supports





4

Ink is applied to the matrix (separately)

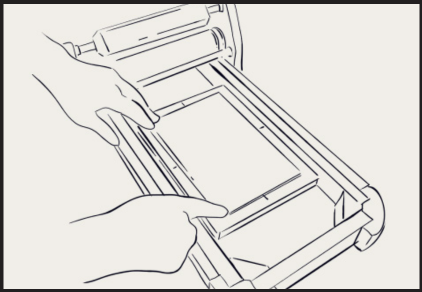


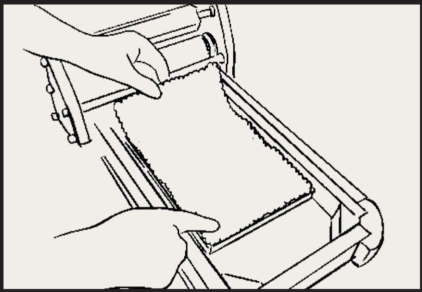
5

Then the matrix is placed
on its holder

6

It is now the moment
to put the sheet of paper
to be printed on



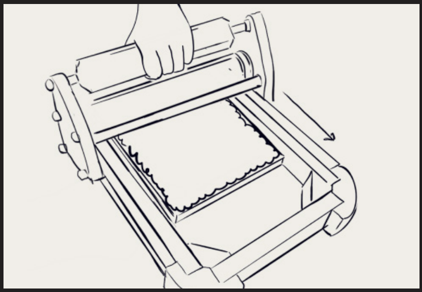


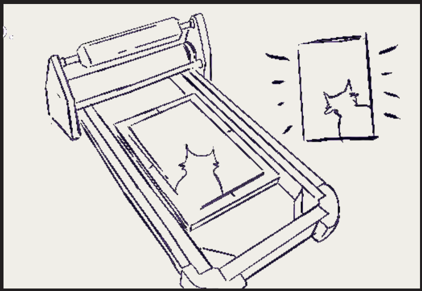
7

In order to distribute the pressure
it is possible to put subsequent
layers of paper and felt

8

Now the user can pull the
cart that applies pressure
on the matrix with roller





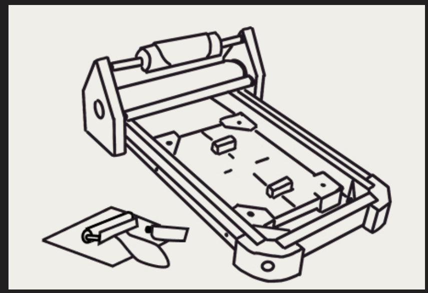
9

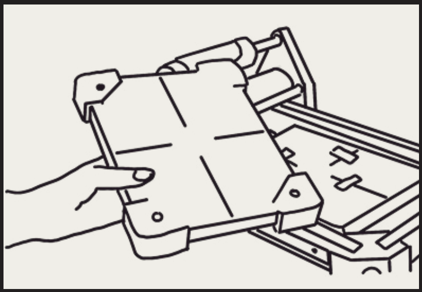
Here is the finished print

Usage Storyboard for movable type

1

The printing materials should be prepared, and the printing press is secured on the table with the clamp/suction cups



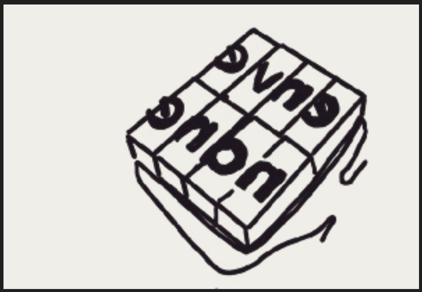


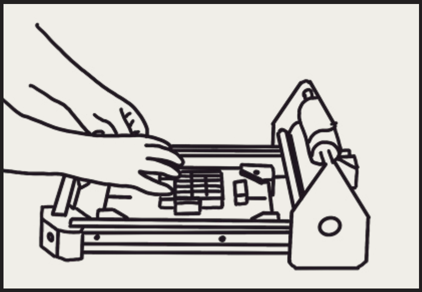
2

The matrix holder should be used in the version for movable types, with the corner joints fitted.

3

The composition is created with movable type and secured with a wire.



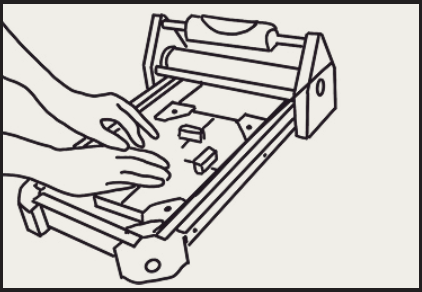


4

The composition is arranged on the matrix holder

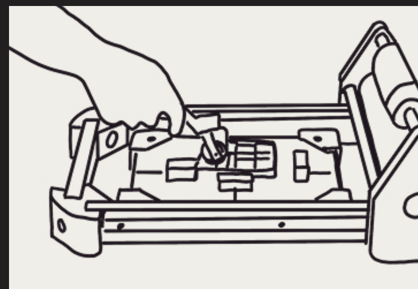
53

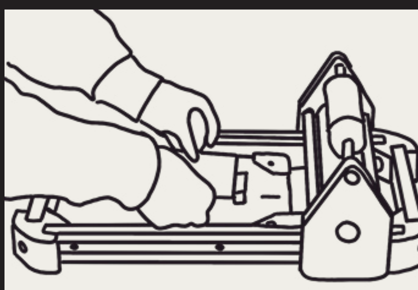
Next, sliders and magnets are adjusted to lock the composition in place



6

Ink is distributed over the types



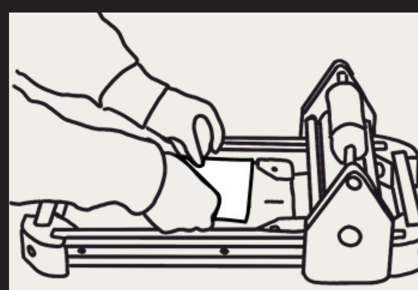


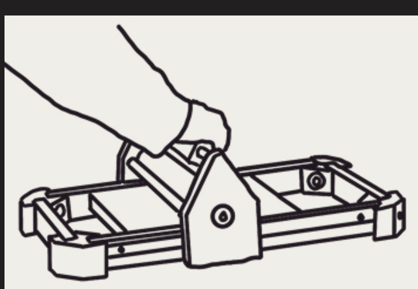
7

It is now the moment to
put the sheet of paper
to be printed on

8

In order to distribute the pressure it is possible to put subsequent layers of paper and felt



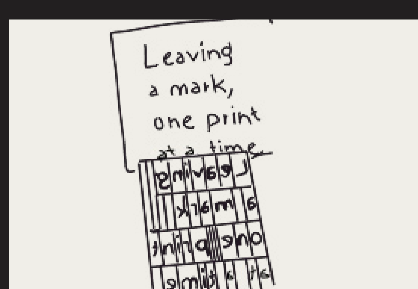


9

Now the user can pull the
cart that applies pressure on
the matrix with roller

3

Here is the finished print



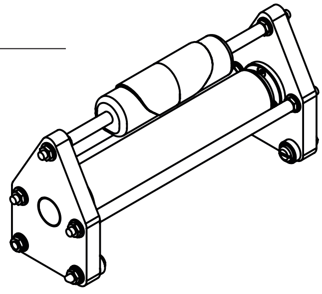
4.1.2 Technical Drawings

The technical drawings of the Impresso press are now shown. The same codes as in Volume 1 have been used for the assembly, sub-assembly and components, which facilitates identification, especially during the assembly phase. For example, when the printing press assembly is named IM-00-0-00, the first number indicates the sub-assembly, the second is a letter and indicates a sub-assembly, while the last number is for the component.[135]

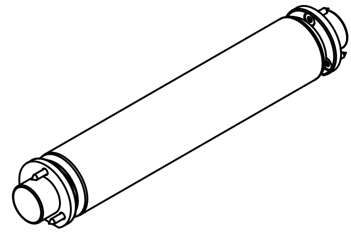
In detail, IM-00-0-00 indicates the press assembly, IM-01-0-00 is the cart, IM-02-0-00 is the frame, and the matrix holder is IM-03-0-00. In addition, there are IM-01-A-00 for the steel roller and IM-01-B-00 for the PVC roller. Since the possibility of adapting the matrix holder to movable type has been added, this has been identified as IM-03-0-00_A, where the letter indicates the revision and update of that component. It would not be correct to indicate that this is a new subassembly because, unlike the rollers, we do not change all the components between one and the other, but, for example, the wooden plate is common to IM-03-0-00 and IM-03-0-00_A.

135. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Impresso. Open Shapes of Print (Vol. 1).* Politecnico di Torino - Dipartimento di Architettura e Design, Laurea Magistrale in Design Sistemico.

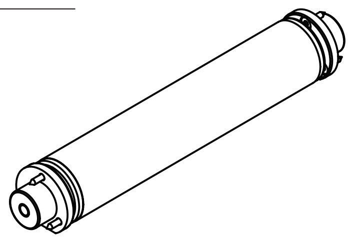
IM-01-0-00
Cart



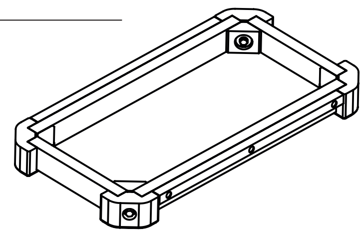
IM-01-A-01
Steel roller



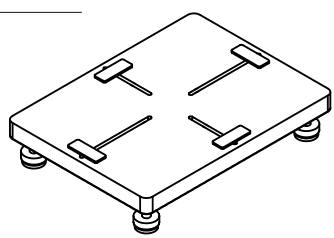
IM-01-B-00
PVC roller



IM-02-0-00
Frame



IM-03-0-00
Matrix holder

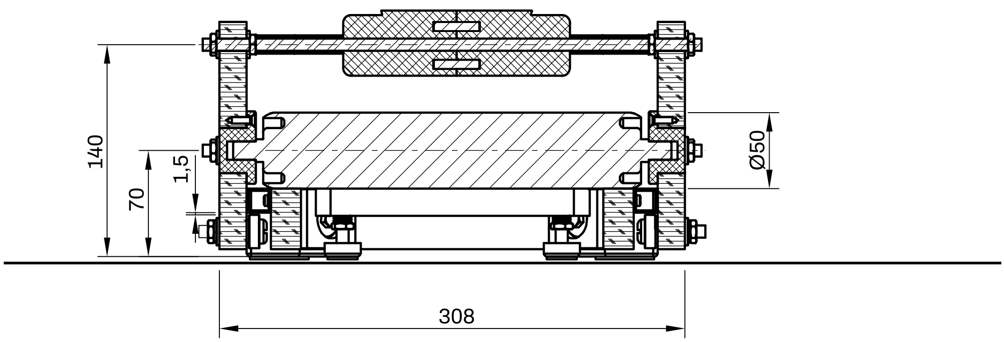


IMPRESSO ID (alphanumerical)
GROUP SUB-ASSEMBLY (numerical)
GROUP VARIANT ID (alphabetical)
COMPONENT ID (numerical)
REVISION (alphabetical)

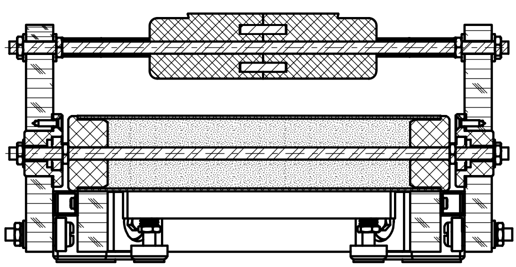
IM – 00 – 0 – 00 – 0

IM-00-0-00 - PRINTING PRESS

SECTION A-A
STAINLESS STEEL ROLLER VERSION

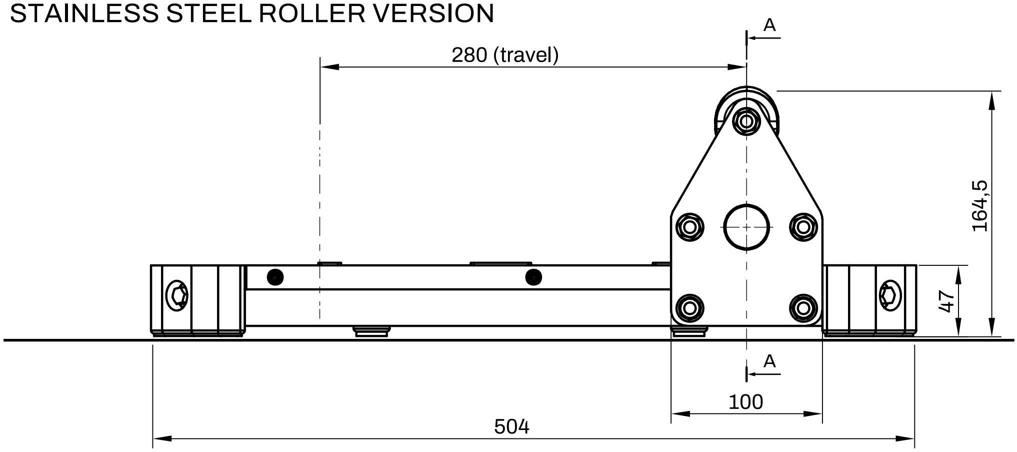


SECTION A-A
PVC ROLLER VERSION

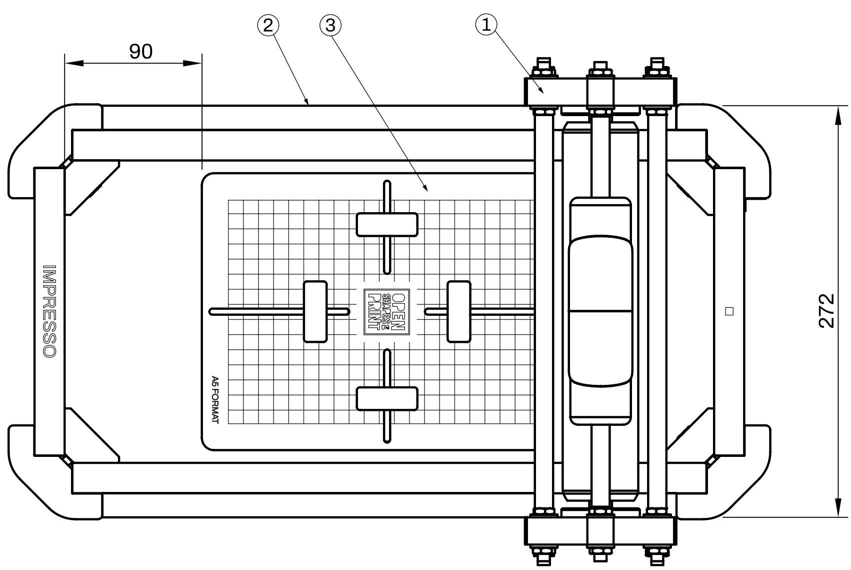


SCALE 1:5
measures in mm

FRONT VIEW
STAINLESS STEEL ROLLER VERSION



TOP VIEW
STAINLESS STEEL ROLLER VERSION

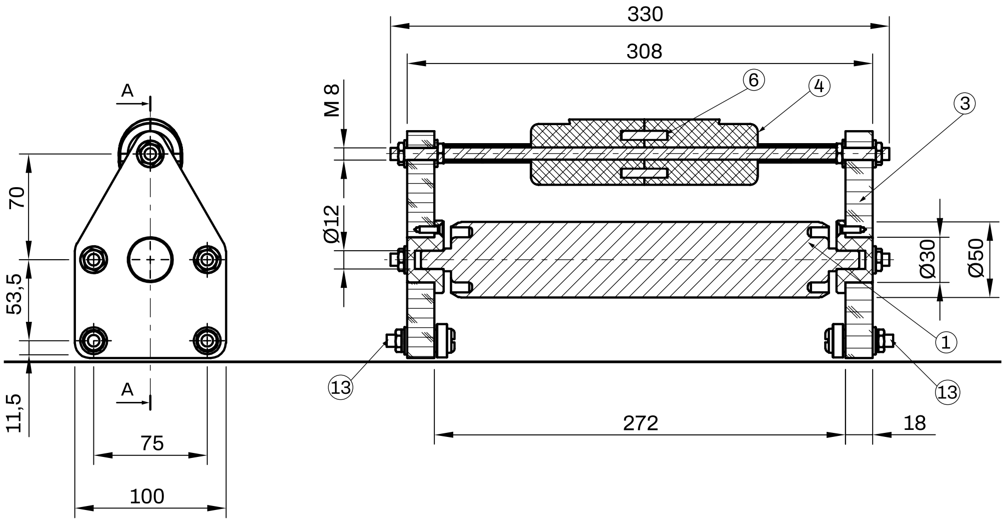


SCALE 1:5
measures in mm

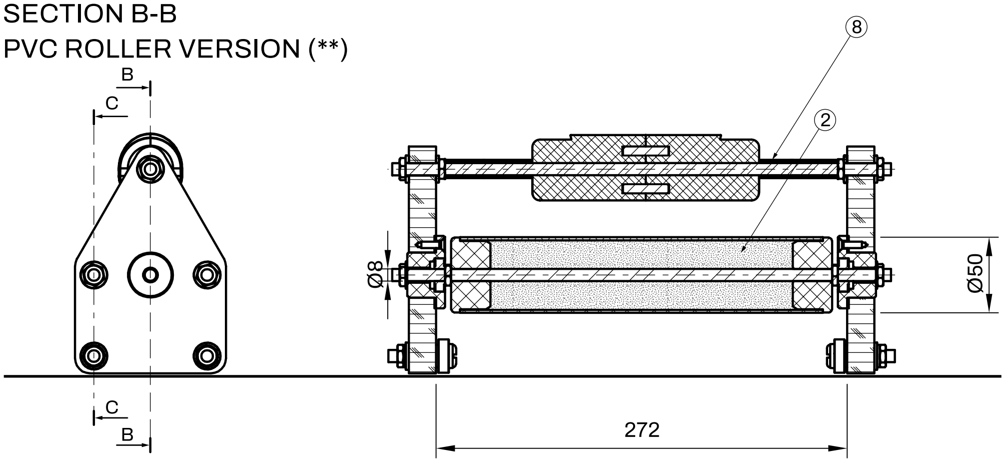
Number	Part name	Description	qty
1	IM-01-0-00	IMPRESSION CART	1
2	IM-02-0-00	FRAME STRUCTURE	1
3	IM-03-0-00	MATRIX HOLDER	1

IM-01-0-00 - CART

SECTION A-A
STAINLESS STEEL ROLLER VERSION (*)

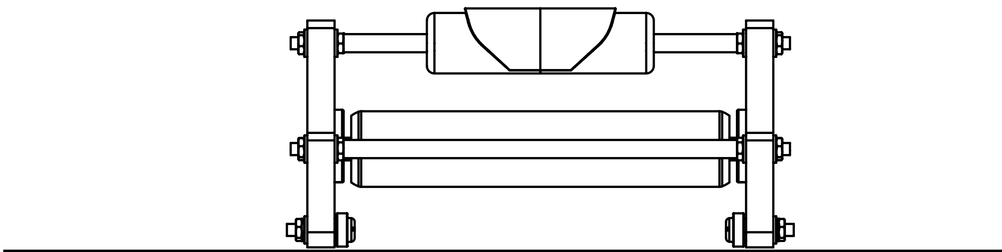


SECTION B-B
PVC ROLLER VERSION (**)

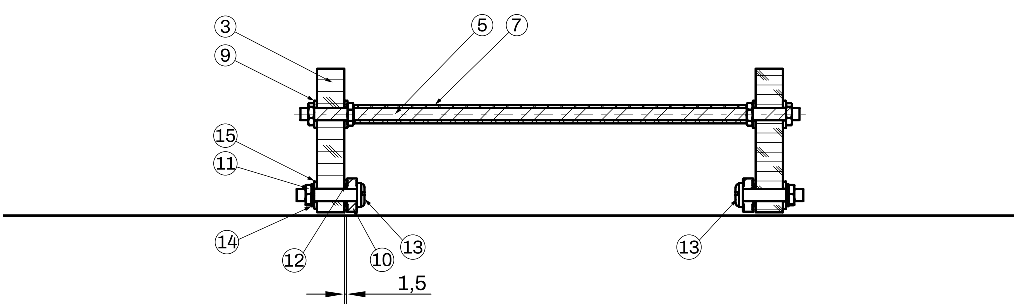


SCALE 1:5
measures in mm

FRONT VIEW
STAINLESS STEEL ROLLER VERSION



SECTION C-C
PVC ROLLER VERSION (**)



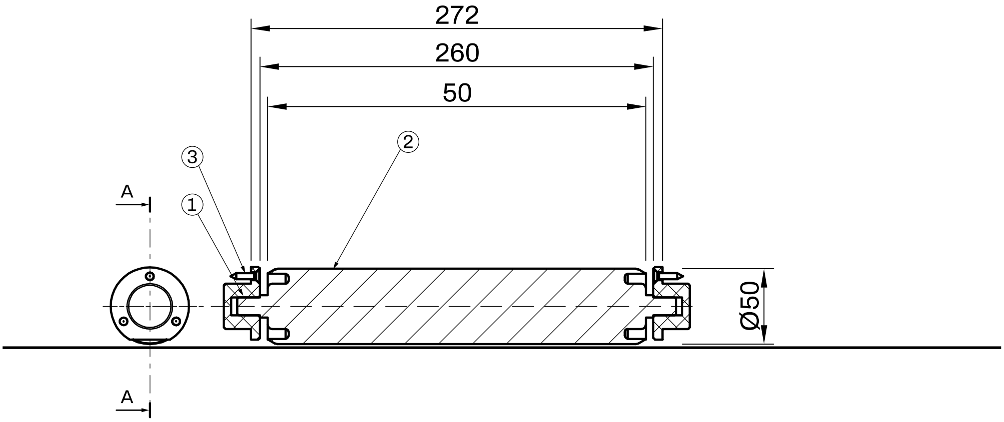
SCALE 1:5
measures in mm

No.	Part name	Description	qty (*)	qty (**)
1	IM-01-A-00	Steel Roller (*)	1	-
2	IM-01-B-00	PVC Roller (**)	-	1
3	IM-01-0-01	Sides	2	2
4	IM-01-0-02	Handle	2	2
5	IM-01-0-03	Threaded Rod M8	3	3
6	wooden dowels	wooden dowels Ø6x30	2	2
7	IM-01-0-05	Pipe Ø9x12x260 (PVC)	2	2

No.	Part name	Description	qty (*)	qty (**)
8	IM-01-0-06	Pipe Ø9x12x55 (PVC)	2	2
9	Washer 8x18	Washer 8x18x2	12	12
10	SB608ZZ	Radial Ball Bearing Ø8xØ22x7	4	4
11	Hex nut M8	Hex nut Ø8xØ22x7	16	16
12	Washer 8x15	Washer 8x15x1,5	4	4
13	s.p.head screw	s.p.head screw M8x40	4	4
14	c.s. lock washer	c.s. lock washer Ø8	4	4
15	washer 8x24x2	washer 8x24x2	4	4

IM-01-A-00 - STAINLESS STEEL ROLLER

SECTION A-A

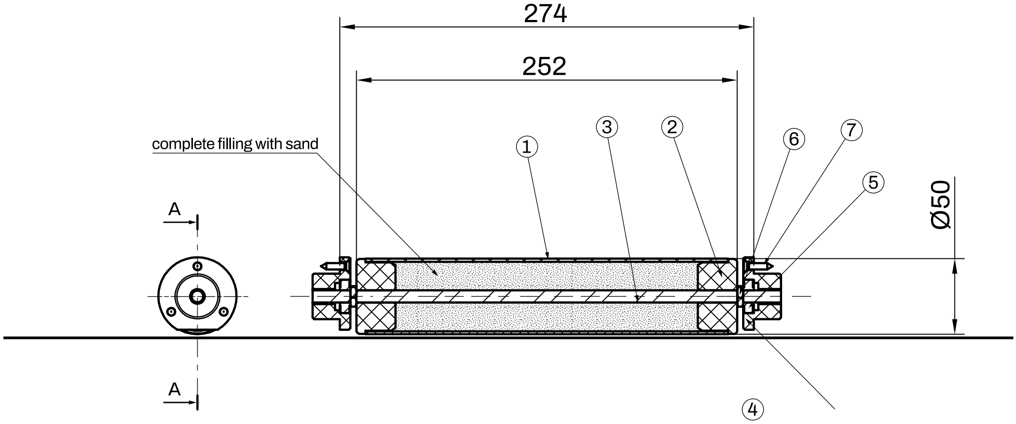


SCALE 1:5
measures in mm

No.	Part name	Description	qty
1	IM-01-A-01	flange	2
2	IM-01-A-02	steel roller	1
3	hex tapping screw	hex tapping screw 4,2x19	6

IM-01-B-00 - PVC ROLLER

SECTION A-A

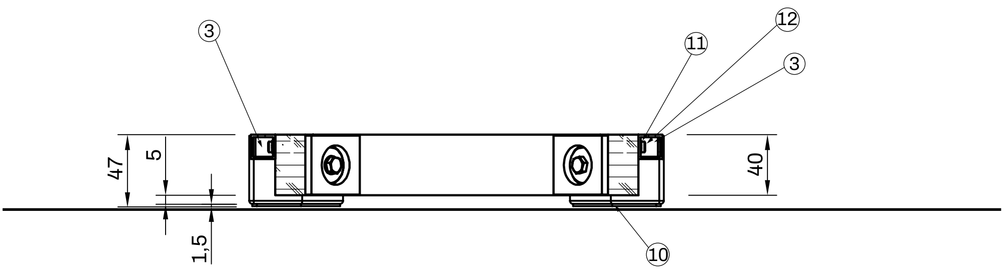


SCALE 1:5
measures in mm

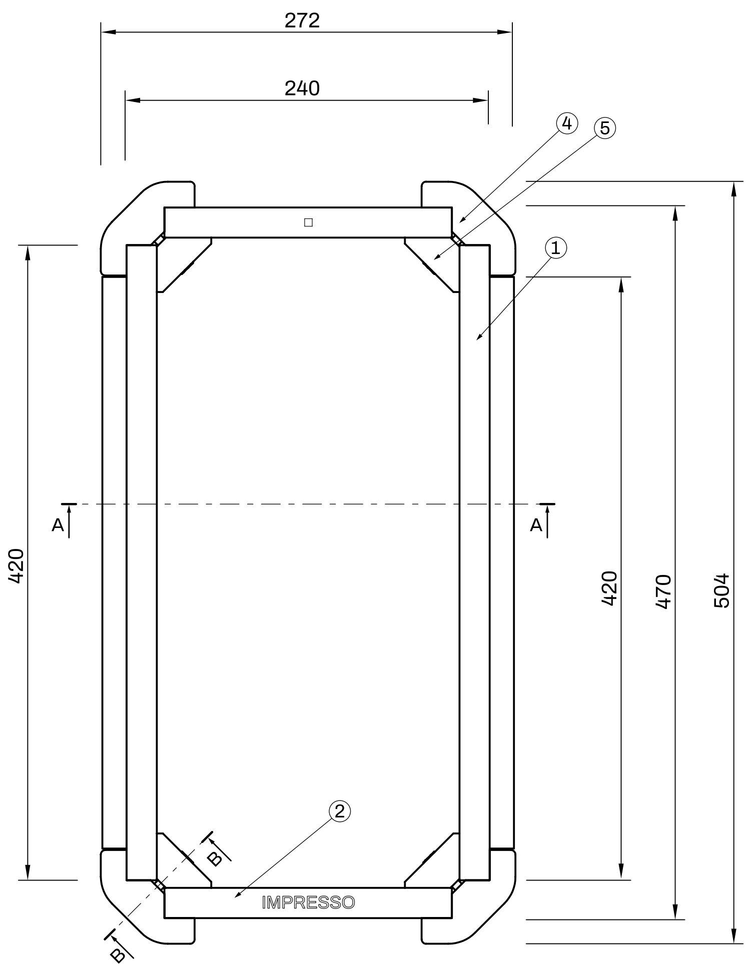
No.	Part name	Description	qty (*)
1	IM-01-B-01	pvc roller	1
2	IM-01-B-02	flange	2
3	IM-01-B-03	Threaded Rod M8	1
4	IM-01-B-04	flange	2
5	SB608ZZ	Radial Ball Bearing Ø8xØ22x7	2
6	lower hex nut-m8	lower hex nut	2
7	hex tapping screw	hex tapping screw ø4,2x1	6

IM-02-0-00 - FRAME

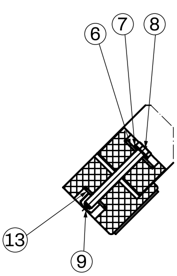
SECTION A-A



TOP VIEW



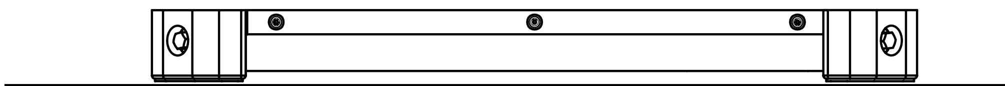
SECTION B-B



SCALE 1:5

measures in mm

SIDE VIEW



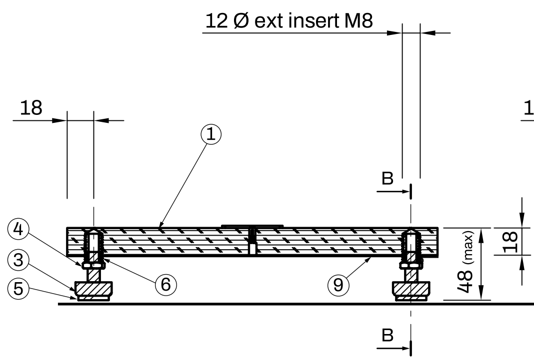
SCALE 1:5
measures in mm

No.	Part name	Description	qty
1	IM-02-0-01	wooden long. lath 40x20 l=420	2
2	IM-02-0-02	wooden tran. lath 40x20 l=190	2
3	IM-02-0-03	aluminium track 16x16	2
4	IM-02-0-04	joint ext	4
5	IM-02-0-05	joint int	4
6	washer_6x24	washer_6x24x1,5	4

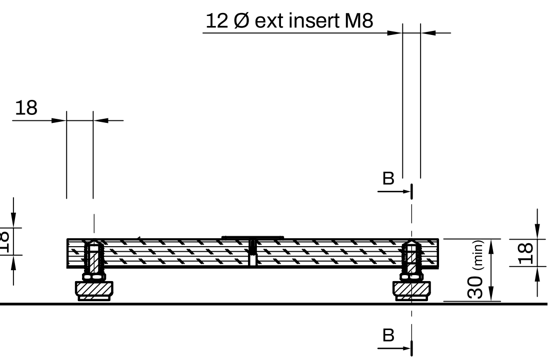
No.	Part name	Description	qty
7	washer_6x12	washer 6x12x1	4
8	h.h. screw M6	h.h. screw M6 x 50	4
9	hex blind nut M6	hex blind nut M6	4
10	suction cups	suction cups	4
11	washer 4,3x8	washer 4,3x8x0,75	6
12	hex tapping screw ø3,5	hex tapping screw ø3,5x13	6
13	washer 6x18	washer 6x18x1,5	4

IM-03-0-00 - MATRIX HOLDER

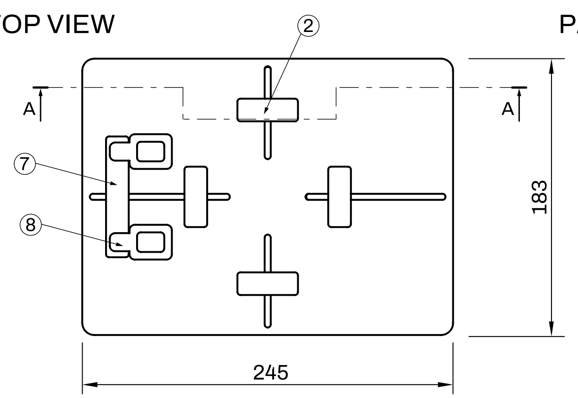
SECTION A-A
maximum support height conf.



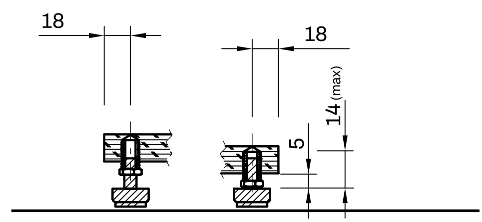
SECTION A-A
minimum support height conf.



TOP VIEW



PARTIAL SECTION B-B

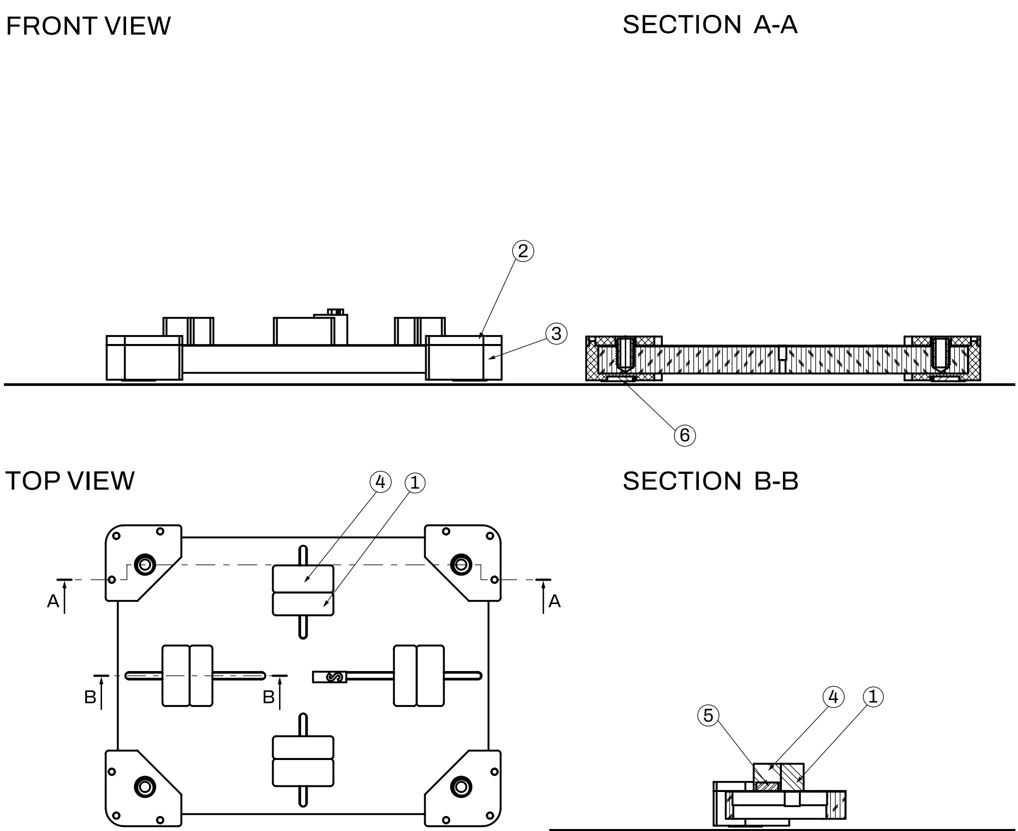


SCALE 1:5
measures in mm

No.	Part name	Description	qty
1	IM-03-0-01	plate	1
2	IM-03-0-02	sliders	4
3	X001X3VDHZ_M8	adjustable Support	4
4	low hex nut M8	low hex nut M8	4
5	ø20 felt pad	adhesive felt pad	4
6	threaded insert M8	threaded insert	4

No.	Part name	Description	qty
7	IM-03-0-03	Registration pin	1
8	IM-03-0-09	Registration tab	2
9	IM-03-0-04	Ferrous sheet	1

IM-03-0-00_A - MATRIX HOLDER FOR MOVABLE TYPES



SCALE 1:5
measures in mm

No.	Part name	Description	qty
1	IM-03-0-05_A	sliders	4
2	IM-03-0-06_A	upper corners joint	4
3	IM-03-0-07_A	lower corners joint	4
4	IM-03-0-08_A	magnetic slider	4
5	magnet	magnet 15x27x6	4
6	Ø25-FELT PAD	adhesive felt pad	4

4.1.3 Printing Techniques

Impresso is characterised by its adaptability, both in terms of form and function. Users can experiment with a variety of printing techniques, as the adjustable pressure allows printing with a wide range of materials. With Impresso, it is possible to carry out both traditional and experimental techniques. The traditional methods, which were already demonstrated in Volume 1, include the use of PVC, movable type, linoleum, MDF, 3D-printed elements, and pieces of LEGO, as well Tetra Pak packaging and natural materials such as leaves.(Figg.166-213) Experimental approaches involve unconventional materials and textures, such as potatoes, threads, fabric, bubble wrap, rice paper, and photographic techniques, including the chlorotype process, which has been adapted and integrated with printing using the printing press. During the latest phase of the project, further experimentation was conducted on new printing techniques; these tests yielded significant results which are detailed in the following section.

Two-color printing

As part of the technical experiments conducted with Impresso, specific focus was placed on multi-color printing to verify the device's precision and stability. An initial exploratory phase took place during the workshop at the Accademia Albertina. On this occasion, color overlay was tested using two separate matrices, inked in red and blue respectively, with the aim of simulating a three-dimensional effect (anaglyph). Subsequently, the experimentation advanced towards greater technical precision thanks to the introduction of registration pins. This system allowed for two-color printing tests on linoleum with rigorous alignment control. The use of registration pins to register the matrix ensured accurate overlapping of the ink passages, leading to optimal results and confirming the device's ability to handle more complex graphic designs.

Movable characters

With the aim of enhancing the versatility of the printing system, the possibility of incorporating typography was taken as the starting point. This led to the idea of allowing the matrix holder to rotate, resulting in a fully black, magnetised surface designed to facilitate the sliding and precise positioning of the letters.(Fig.162)

The matrix's sliding components are also magnetised. At the end, corner pieces were added to replace the adjustment support, providing the necessary height for the matrix holder according to the thickness of the movable type. This ensures that the roller can apply the proper pressure required for correct operation and optimal printing results.

Chlorophyll Print

Originally, the chlorophyll print was a photographic technique that utilises the natural photosynthesis process of leaves to produce image impressions. More recently, within the context of contemporary visual arts, various artists have adopted this technique to create works on unconventional supports, drawing inspiration from the early processes of photographic printing. [01]Since chlorophyll printing is an ephemeral process and is not inherently self-fixing, established artists such as Almudena Romero have developed methods to enhance the durability of the images. Once the image has been transferred onto the leaf, it can be immersed in a 1% copper sulphate solution, which significantly improves the pigment's lightfastness. TipiaLab, the first school in Colombia specialising in traditional and alternative chemical photography, founded by Katalina Fuentes and Mario Nieto, recommended using Romero's formula for image fixation: 500 ml of water, 25 g of glycerine, and 5 g of copper sulphate. An alternative method suggested involves a two-bath fixation process:

Solution A:
Boiling water
Sodium bicarbonate, dissolved thoroughly

Solution B:
Boiling water
Glycerine (5% of water volume)
Copper sulphate, dissolved while stirring

Fig. 162 Printing with movable types

After obtaining the image, immerse the fresh green leaves in Solution A for 5 minutes, followed by immersion in Solution B for another 5 minutes. This treatment reduces the leaf's light sensitivity, as the copper partially replaces magnesium in the chlorophyll molecules. The leaves should then be dried thoroughly on absorbent paper, ideally under slight pressure to prevent deformation. They can subsequently be sealed with a UV-filtered resin spray or beeswax. During experimentation, contact was made with a photographer and lecturer at Unitec University, Colombia, who advised that if one prefers to avoid direct contact with chemicals, the image could still be preserved for approximately five years, provided it is not exposed to light. In this case, the chlorophyll print should be sandwiched between two parchment leaves within a book to protect the image from the pH of the paper, as acidity can affect preservation.

To understand the translation of this process into printmaking, discussions were held with Professor Marcelo Diaz from the Javeriana University's Industrial Design programme. Marcelo recommends that when printing the acetate with a press, a linoleum matrix should be used, with typographic or lithographic ink. The ink must have appropriate viscosity and be oil-based but water-soluble.

Open Shapes of Print has decided to experiment with this technique due to the high level of detail achievable and the aesthetic qualities of analogue printing, particularly the textural imperfections. The first experimentation was conducted at the end of August 2025.

INITIAL TEST RECORD
Plant: Xanthosoma (Bore), identified using the PlantNet application
Duration: Saturday to Friday (7 days)
Start: Saturday, 9:00 a.m.
UV Exposure: 16 September, continuous ultraviolet light exposure from 9:04 a.m. to 6:30 a.m. the following day (10 hours of exposure). During the nights, an additional UV lamp was used for 12 hours with a power of 50 watts to simulate controlled climatic conditions.
End: Friday, 19 September, 3:00 p.m.
Humidity: 50%
Weekly UV Index: Between 7 and 8

Observation: After attempting the chemical treatment, the leaf tore when boiled with baking soda; it was sufficient for the leaf to be only lukewarm.

CHEMICAL TEST 2 - RECORD
Saturday, 20 September
14:50: The image began exposure to sunlight after the leaf had been placed in the refrigerator the previous evening to ensure proper hydration.
20:16: The image was placed under UV light.
07:20 (Sunday morning): The image was removed from UV exposure and returned to sunlight until 17:30.
18:30: The image was placed back under UV light.
Monday, 22 September
07:30: UV exposure concluded.
07:39-10:55: The image was exposed to sunlight.
Important Observation: It was discovered that the distance between the UV light and the image must be maintained between 5-15 cm. Adjustments to the lamp design are therefore required, as this distance can affect exposure time.
Recommendations:
Prepare the mixture with hot water to facilitate the dissolution of glycerine.
Ensure the glycerine is fully dissolved before adding the sulfate, stirring until completely dissolved.
Patience is essential, as certain chemicals may require extended periods to fully integrate.
Confirm that the mixture is homogeneous before proceeding with the exposure process.
Observation: The sulfate remained on the leaf when it was not intended to do so. However, it could have been removed through an additional bath in water.

The leaf was exposed to sunlight for three days on a windowsill, with no UV lamp light applied. Containing approximately 80% water, the "inking solution" used to reveal the leaf produced a green impression. The logo was printed using the Impresso press with Cranfield oil-based, non-washable ink. The print was left to dry for two days on an acetate sheet, with a thickness equivalent to that of a standard sheet of paper. (Figg.163-165)

Fig. 163 Chlorophyll Print using a photo

Fig. 164 Logo printed with chlorotype

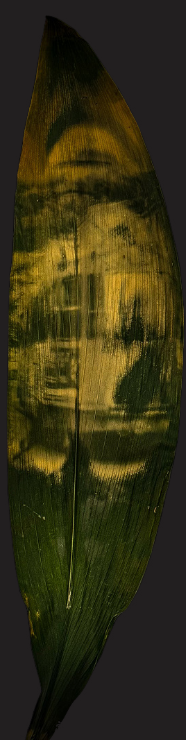


Fig. 165 Chlorophyll Print using a photo

Fig. 166 Print with linoleum matrix

Fig. 167 Maker Faire matrix: planet

Fig. 168 Maker Faire matrix: rocket

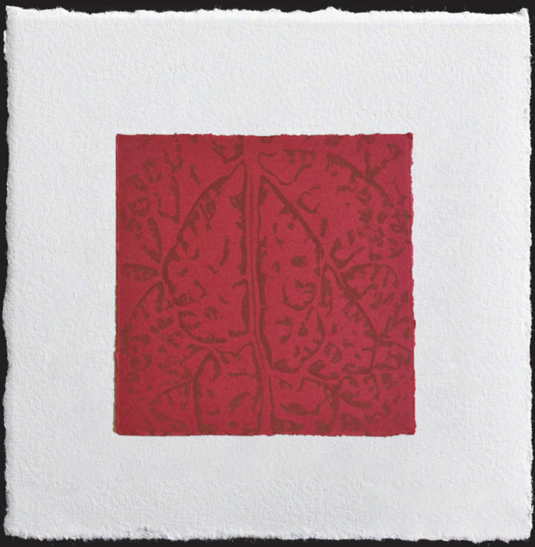


Fig. 169 Print with a cabbage leaf

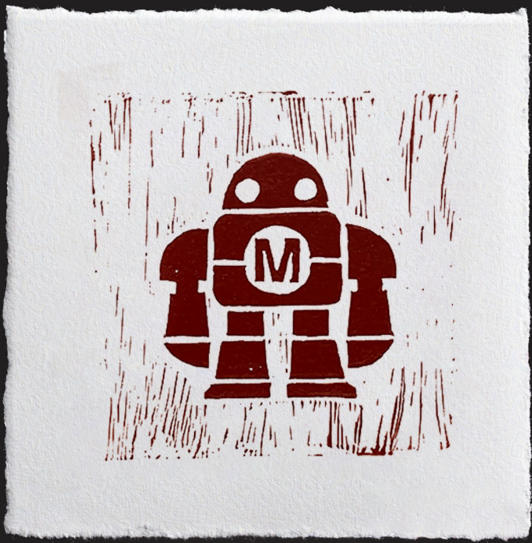


Fig. 170 Maker Faire matrix: robot

Fig. 171 Print with a cliché

Fig. 172 3d effect with red and blue

Fig. 173 Maker Faire matrix: ufo


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Fig. 174-205 Prints with different techniques

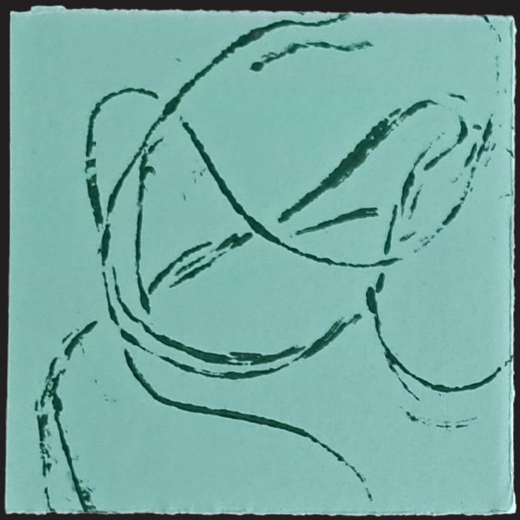


Fig. 206 Print made with string

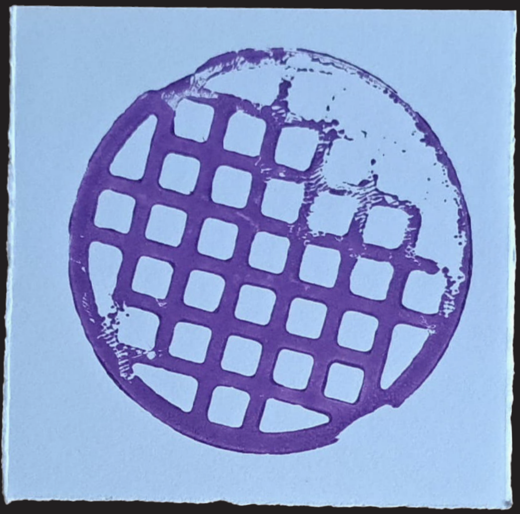


Fig. 207 Print made with stamp

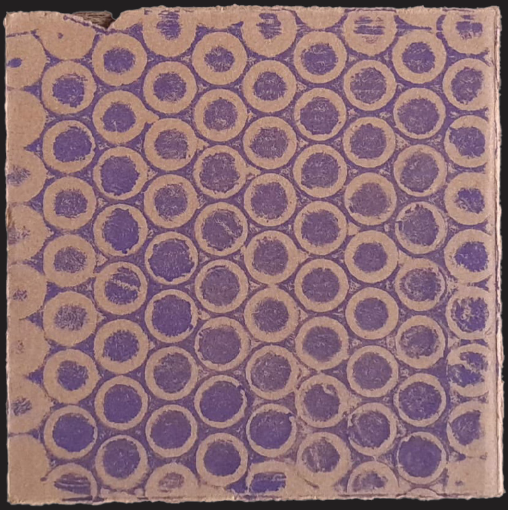


Fig. 208 Print made with bubble wrap

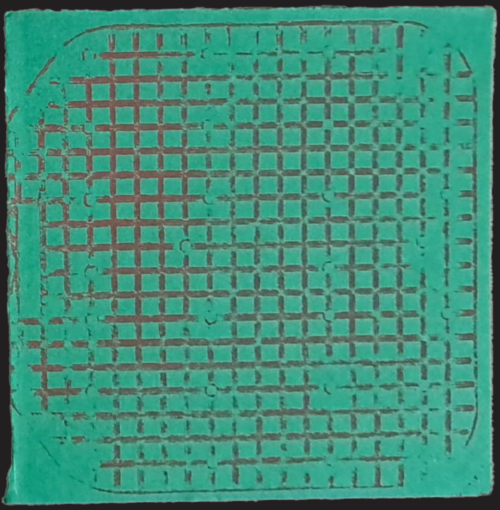


Fig. 209 Print made with stamp

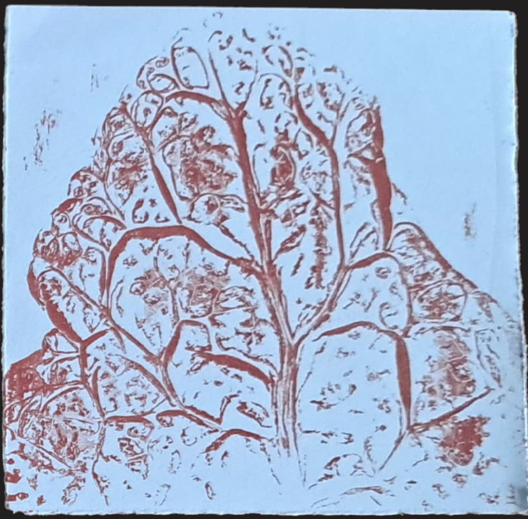


Fig. 210 print made with leaf

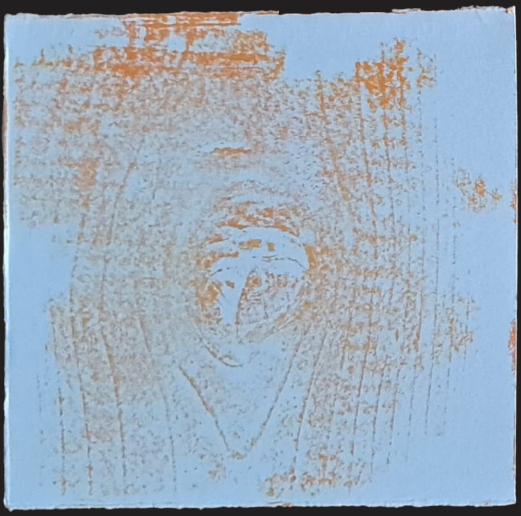


Fig. 211 print made with wood

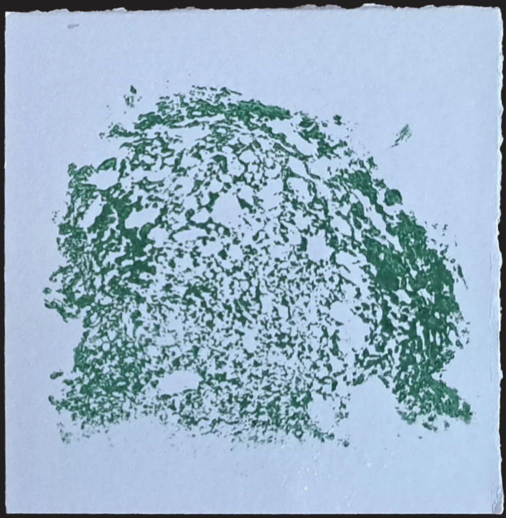


Fig. 212 Print made with bread

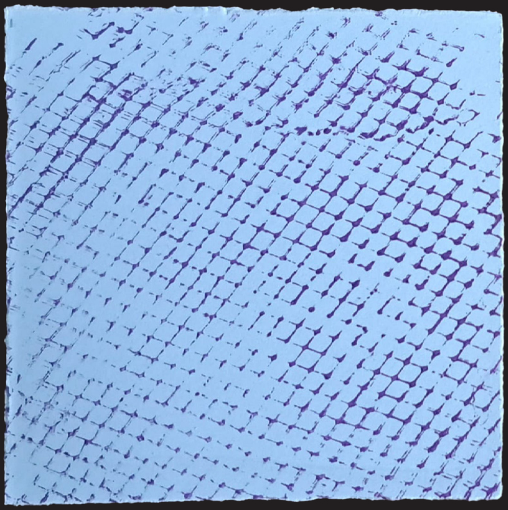


Fig. 213 Print made with screen

Kitchen litho

Kitchen Litho is a simplified and accessible version of traditional lithography, designed to allow even those without professional equipment to experiment with the principles of planographic printing. The technique is based on the chemical-physical principle underlying classic lithography: water and grease repel each other, allowing the drawn (greasy) areas to be separated from the non-printing (hydrophilic) areas. In Kitchen Litho, however, the porous stone plate is replaced by materials easily found in a "kitchen": aluminium foil applied to glass or Plexiglas.

ORIGINS Kitchen Litho was conceived in 2011 by French artist Émilie Aizier, with the aim of making lithography easily practicable even "at home", using common materials such as aluminium foil, cola and vegetable oil.

MATERIALS REQUIRED The items needed to make a Kitchen Litho print include:
- a rigid plate (glass or Plexiglas) on which to apply aluminium foil;
- aluminium foil;
- fatty or oily drawing materials (grease pencil, graphite, oil pastels)
- oil-based ink;
- an acidifying liquid (cola).

PROCEDURE Compared to traditional methods, the procedure is very simplified and can be described in the following basic steps. First of all, the aluminium foil is fixed to a rigid plate (glass or Plexiglas) with adhesive tape, taking care not to leave any holes and to position the opaque side outwards. It is important not to touch the printing surface with fingers to avoid unwanted greasy fingerprints. Next, draw directly onto the aluminium foil with greasy or oily materials. It is also advisable to wear gloves during this stage to avoid contamination. The sheet is then immersed in a basin and cola is poured over it, turning it so that the areas not drawn on are acidified. The greasy parts repel the glue, creating bubbles. After a few seconds of immersion, remove the glue with a wet sponge. Then wipe with a cloth soaked in vegetable oil to remove any traces of graphite or residual greasy material that could interfere with the inking. At this point, a slightly faded image remains visible on the aluminium. Next, prepare a very greasy ink, spread it on a plate, and apply it with a roller to the prepared plate. First, lightly wet the plate with a sponge or wet cloth, then apply the ink. The substances in the glue make the undrawn areas hydrophilic: when the plate is moistened, the water settles there and repels the ink, which only adheres to the drawn areas. Finally, printing is carried out using a press. Generally, about ten prints can be obtained before the plate loses quality.

CHARACTERISTICS The result of Kitchen Litho tends to have a "dirty" appearance, with an unclear and imprecise line, and may have inaccuracies or smudges in the colour, characteristics that, however, become an integral part of the aesthetics of the print. On the other hand, Kitchen Litho drastically lowers the practical and material barriers: no professional tools or hazardous chemicals are required, making lithography accessible to amateurs, students and workshops.

GEL PRINTING Gel Printing is a creative printing technique that allows to create monotypes, or unique prints, using a soft gel matrix as a printing surface. The matrix, called a "gel plate", is made of a flexible plastic material, similar to gelatine, which allows to imprint any design, texture or pattern on its surface and then transfer it onto paper or other media. The gel plate is the fundamental element of the technique. It is soft, elastic and reusable, making it resistant and durable, storable at room temperature and easily cleanable with soap and water after each use.

MATERIALS REQUIRED To create a print using the gel printing technique, it is necessary to have:
- the gel plate;
- acrylic colours;
- paper (or card), or other media such as fabric, textiles or porous materials;
- in addition, materials to create textures or decorative patterns.

PROCEDURE The Gel Printing process consists of the following steps. First, spread a thin, even layer of acrylic paint on the surface of the gel plate. Next, it is possible to create decorations directly on the plate: use stencils, stamps, textured objects or soft tools to imprint patterns, textures or designs, which will form the graphic basis of the print. When the surface is ready, a sheet of paper (or other chosen medium) is placed on the plate, and the pressure exerted by the press transfers the colour and texture from the gel to the medium: when the sheet is lifted, the print appears imprinted on the paper. After each print, the plate can be cleaned and made ready for new uses.

Gel printing produces unique and unrepeatable prints: each transfer onto the paper generates a monotype with its own characteristics, which are difficult to replicate identically. The technique offers great creative freedom: thanks to the possibility of using textures, stencils, colour layers and overlays, it is particularly suitable for creating creative prints. Compared to traditional printing techniques, gel printing does not require complex tools: it does not require engraved matrices or specialised equipment. This simplicity makes it accessible even in domestic or amateur contexts, and effective as an experimental technique or for creating decorative objects and spontaneous works of art.

An interesting variation of gel printing involves transferring images obtained from a printer, preferably a laser printer, onto the gel plate. In this procedure, the printed image is first prepared and then used through the monotype technique. A layer of acrylic paint is spread over the surface of the plate and then the printed image is placed on top of it so that the design is imprinted on the gel. Next, a new sheet of paper, this time clean, is taken and the design is transferred onto the paper using a press. The final print is thus derived from the original image.

4.1.4 Kit and Packaging

Kit

The kit is designed to meet the needs of the various user groups identified so far. Initially, Impresso was designed to be built and assembled in a DIY manner, but following feedback from users, the authors decided to implement the option of a kit. The kit would consist of all the components already printed, cut or perforated, and would only need to be assembled. This decision was made to extend the use of the press to educational and workshop contexts or to anyone who does not have the appropriate equipment to build Impresso. (Fig.214)

BASIC KIT This kit would include all the components needed to make:

- Frame, carriage and matrix holder: the supporting elements of the press;
- Steel or PVC roller to be assembled (according to preference);
- Screws, bolts and supports: to ensure stable and secure assembly;
- Detailed instructions: with clear diagrams for each stage of assembly.

In addition to these basic elements, there are plans to make the kit available in two versions in the future, to meet the specific needs of schools or individual users:

COMPLETE KIT This would include all the components necessary for a functioning printing press and would come complete with a matrix holder suitable for both intaglio and relief techniques, as well as for movable type. In addition, the kit would provide all the tools necessary for optimal adjustment of the matrix holder and accessories for multi-colour printing, known as "registration pins".

PRINTING KIT In addition to the press and matrix holder, this kit would include a printing set consisting of various printing matrices (such as linoleum, Tetra Pak, 3D-printed movable type), an inking roller, two inks (one water-based and one oil-based), an inking surface and a ream of A5 paper. In addition, the kit would include a "Tips & Tricks" booklet to stimulate creativity, with practical advice and ideas for creating unique prints.

The kits are expected to be available for purchase directly from the project website, where all available options would be illustrated. Each variant would be accompanied by a detailed description and images showing the contents of the kit. This would allow users to choose the solution best suited to their educational or creative needs.

Packaging

As far as packaging is concerned, there are two different moments in which it is necessary to have packaging for transporting Impresso. A first situation arises when Impresso is sold as a kit, to schools or print enthusiasts, and therefore needs to be packed and shipped. At the time of shipment, in fact, each component must be protected to avoid accidental impacts that could damage it and create problems during assembly and use. In addition to this first shipping moment, there is another that involves transporting the printing press once it has been assembled. It is possible, in fact, that once the components have been assembled, the need arises to move Impresso to another place, but it must be immediately ready for use and therefore cannot be disassembled and placed back in the previously described packaging.

Both these situations were tested by the authors of the project on the occasion of Maker Faire Rome (see chapter 3.2.2) for the transport of two printing presses from Turin to Rome and from temporary storage on the outskirts of Rome to the fair.

In cases where the components need to be shipped or transported disassembled, it is essential to pack them individually, adding a label that can identify the contents of each of the packages. Taking inspiration from some case studies analysed in the first phase of the desk research (see chapter 1.3.2), it would be optimal, for the purposes of communicating the device, that the identifying labels were printed using movable type or through 3d matrices. Moreover, the possibility of having codes and identifying labels would allow the instruction book to include precise references that would simplify the user's assembly experience. Especially in the case of the screws and bolts, these should be differentiated by numbers according to the subset to which they belong. The components would then be placed inside a larger cardboard box, also containing any additional elements provided by the type of kit purchased. (Fig.215)

Below is the optimal division of components for their inclusion in the packaging:

CART
- sides: wooden components cut with CNC router with flanges suitable for the pvc or steel roller version
- handle: handle 3d printed in two halves and wooden dowels for assembly
- threaded rods and white pvc tubes for covering them
- roller: depending on the version, component in steel or pvc (pvc tube with 3d printed caps)
- screws and bolts: bearings, washers, nuts, screws

FRAME
- long laths: wooden laths with predrilled aluminium bars
- short laths: wooden laths with lettering and symbols made with laser cutting
- joints: a total of four joints 3d printed (each made of two parts) and suction cups
- screws and bolts: screws, washers, nuts

MATRIX HOLDER
- matrix holder: wooden component cut with CNC router and grid made with laser cutting
- metal sheet for the movable type side
- sliders: low for the wooden side, high for the magnetic side, and magnets for the movable type
- measuring tool: wooden component cut and engraved with laser
- adjustable support: rubber feet with felt pads to apply on the underside
- corner joints: a total of four 3d printed corner joints (each made of two parts) with felt pads to place on the underside
- registration pin for multicolour printing
- screws and bolts: nuts, threaded inserts, hole covers

EXTRAS (only for kits that include them)
- roller, ink and inking plate
- A5 paper
- printing matrix
- instruction booklet
- Tips & Tricks booklet

As for the second usage scenario, namely the transport of Impresso already assembled, a large bag which has dimensions similar to the overall dimensions of the press, namely 500x272x163mm, in plastic material, with or without zip fastening, and carrying handles usually proves sufficient. At the moment the solution involves the use of items such as large storage bags, for laundry or for moving, already available on the market. In the future development of the project, the intention is to create a dedicated solution that reflects the visual identity of Open Shapes of Print and can be immediately recognisable as part of it even during transport.

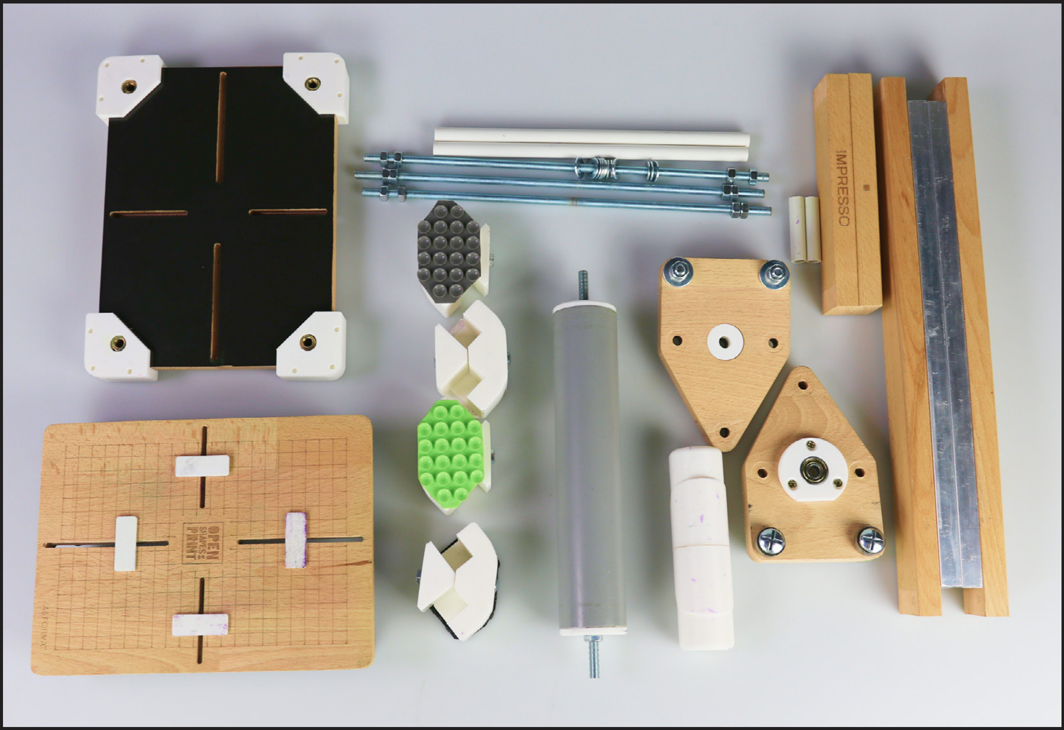


Fig. 214 Kit components

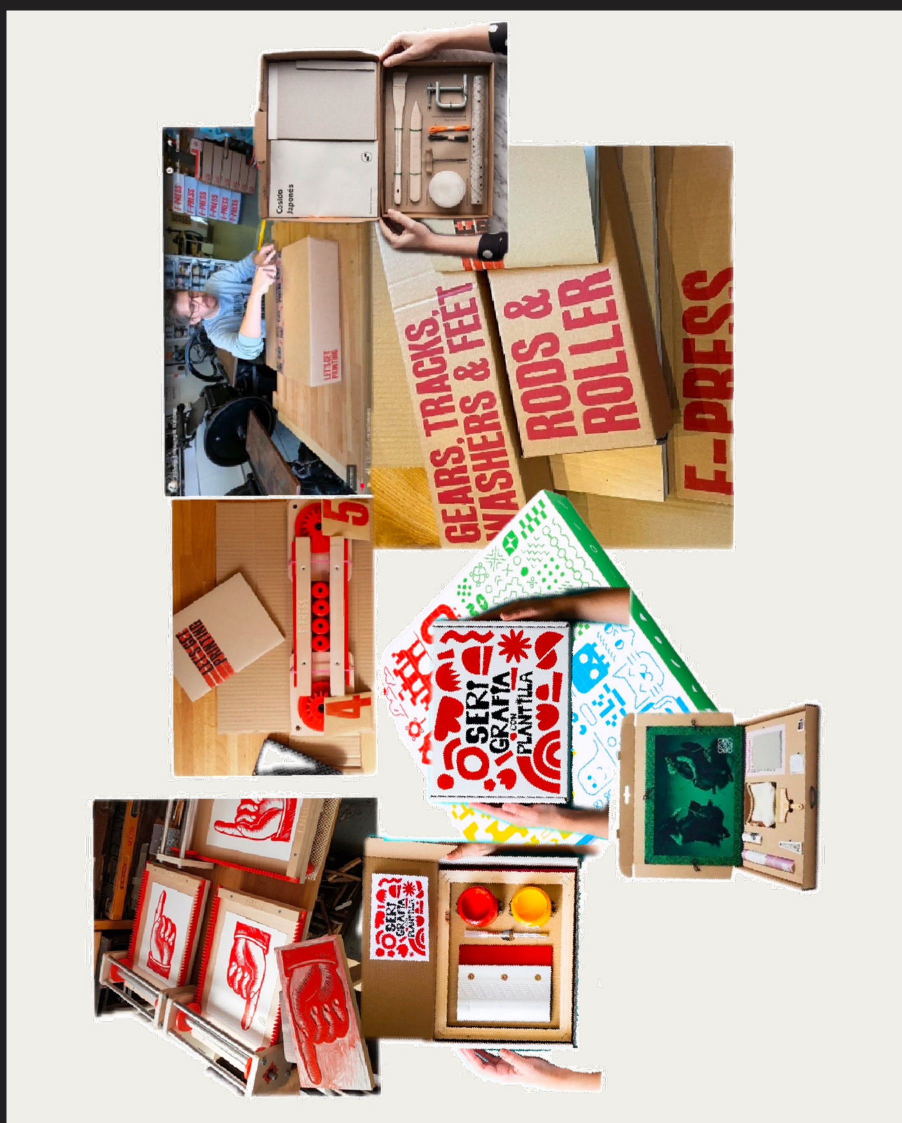


Fig. 215 Packaging inspirations

4.1.4 Costs

The estimated cost of self-producing Impresso is reported below, including the costs of materials, mechanical components and specific processes such as 3D printing and wood cutting. This was based on the estimated costs for the first prototype, to which were added the costs of the new components, both those that make up the movable type version of the matrix holder and some modified components, such as the joints, for which printing times have increased and, consequently, the cost has also risen.

As mentioned in Volume 1, the goal is to make the project economically sustainable, by choosing affordable materials and components, and allowing for flexibility in production, such as the option to choose between the more expensive steel roller or a roller made from a PVC pipe.

The cost estimates, shown in the table, are organised by sub-assemblies. The total cost of the press differs between the steel roller and the PVC roller, with the former costing € 144 and the latter €122. The cost is still lower than other traditional printing machines, which cost up to €1,500.

Furthermore, as stated above, the total cost has increased due to the inclusion of components for adapting the matrix holder to movable type. In this case, the user can choose whether to carry out this part of the project as well, if they have lead or wooden movable type available, or by printing them in 3D. Alternatively, since 3D-printed movable type can also be lower than traditional type, the user can decide to use the matrix holder on one side only and thus print the movable type without introducing the second option.

DESCRIPTION	TOTAL AMOUNT
Cart - steel roller option	73 €
Cart - PVC roller option	50 €
Frame	40 €
Matrix holder	16 €
Extra	16 €

TOTAL PRINTING PRESS (steel roller)	€ 144 *
TOTAL PRINTING PRESS (PVC roller)	€ 122 *

4.2 Open Shapes of Print

Fig. 216 Matrix with Open Shapes of Print logo

The previous chapters outlined the research context (see chapter 1) and then presented the interviewees' direct comments (see chapter 2). Subsequently, the entire technical development that led to the prototyping of Impresso was illustrated (see chapter 3). At this point, attention must necessarily shift from the physical artefact to the ecosystem that surrounds and enables it. Impresso was not conceived as an isolated, self-contained project. It was immediately imagined as the first step in a broader, systemic initiative called Open Shapes of Print. This chapter therefore aims to define the identity of this "umbrella project". To do so, it will outline its mission and vision (see chapter 4.2.1), such as the founding principles that guided the design choices, and then map the community (see chapter 4.2.2) that was created and interacted with the project. The latter represents a fundamental network of actors, ranging from the first testers to the industrial partners who recognised its value, demonstrating the vitality of the idea beyond the purely academic context.(Fig.216)

4.2.1 Mission and Vision

The mission of the project came about as a conscious reaction to the perception, also revealed by research (see chapter 2.1), that image reproduction is now an exclusively digital, rapid and sterile domain. Open Shapes of Print is a movement that aims to rediscover and restore value to traditional printing, promoting manual work and the resulting imperfections not as an error, but as a real and tangible added value. The resulting vision is that of a hybrid system, in which digital manufacturing, with its accessibility and precision, merges with traditional technologies. The intention is to design printing machines that are “open” in their design (replicable, modifiable) and “close” to people in their affordability and ease of use. The ultimate goal is to enable a collaborative and widespread community. The vision is of an ecosystem that, starting from individual domestic use, can extend to laboratories (such as Fab Labs) and ultimately reach its primary focus: the school environment.(Fig.217)

Fig. 217 Impresso printing press

Mission

Contrary to the prevailing notion that the reproduction of images and words is associated with the digital world,Open Shapes of Print sees itself as a movement to restore the importance and beauty of traditional printing. In this case, imperfection is the real added value.

Vision

Digital manufacturing and traditional technologies come together, as well as innovation and tradition, to shape printing machinery that is open and close to people. An open and collaborative community that starts in the home, continues in the laboratories and reaches the school environment.

4.2.2 Community

An open project cannot exist without its community. From the very beginning, Impresso and Open Shapes of Print have coexisted thanks to constant dialogue with a diverse network of actors. This network has evolved on three main levels which, as illustrated in the diagram,(Fig.218) are interconnected: research, support and experimentation.

The first level, of fundamental importance, was the research community. As documented extensively in the chapter "Interviews" (see chapter 2.1), the project began through critical discussion with experts, teachers, students, and amateur printers. This core group, which defined the project requirements, includes valuable contributions from Ocho Collective, Sabina Finiguerra, Marco Liguori, Hassna Bendaoud, Nella Caffarati, Prof. Marcelo Diaz and the Printing Museum, as well as feedback gathered during the "Teams Wheel" sessions of the "Product Components" course at the Politecnico di Torino.

The second level is that of the support community, which emerged in a later, more mature phase of the project. This group of people provided fundamental validation of the project's value through concrete material and technical support.

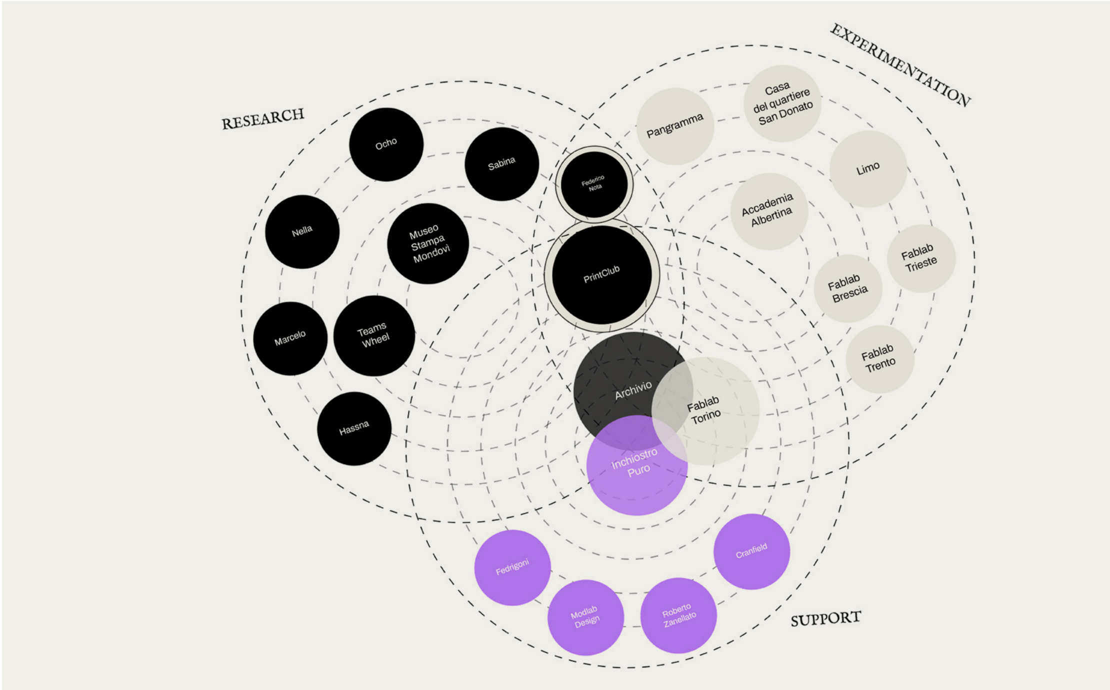


Fig. 218 Network scheme

Fig. 219 Fedrigoni paper

The most significant aspect of this mapping, however, lies not in the individual levels, but in the overlaps, meaning the connections that reveal the systemic nature of the project. Some actors, in fact, have played multiple roles, acting as bridges between different areas.

Precious interest was shown by leading companies such as Fedrigoni,(Fig.219) which believed in the initiative by supporting prototyping with a supply of Sirio Color paper (210 g/m²), and Cranfield Colours, which provided professional inks (*Traditional relief inks* and *Caligo safe wash inks*). They were joined by Roberto Zanellato, who donated movable type for testing, and Modlab Design, which provided technical assistance in the creation of the devices.

The third level is the experimentation community, i.e. the actors who helped transform the prototype into an actual device. This is where the most concrete collaborations are found, such as the workshop held at the Accademia Albertina thanks to Prof. Luca Porru and all the proposals for future activities, such as those with Pangramma, the Fab labs in Trieste, Trento and Valle Sabbia, and those that were planned but unfortunately did not come to fruition, such as the series of workshops with Limo and the Casa del Quartiere San Donato.

- Research and support: Inchiostro Puro not only provided a key interview to define the context, but also materially supported the project by donating some matrices for the initial tests and offering advice on the choice of materials for printing the book.

- Support and experimentation: Fab lab Torino played a double role: it was a technical-production support partner that actively helped in the creation of the devices, and then became an experimentation partner, proposing a workshop that uses Impresso as a central tool.

- Research and experimentation: Prof. Federico Nota and Printclub Torino were first valuable sources of research (through interviews) and then experimentation partners: the former hosted the validation workshop with students from the Liceo Artistico Primo art school, while the latter offered a live printing space at Graphic Days 2025 as a field test phase.

- Research, Support, and Experimentation: Finally, Archivio Tipografico, which took on all three roles. It was interviewed at various stages of the project, supported the research with a donation of inks and proposed an experimentation activity (which unfortunately was not finalised) in Torre Pellice at the Museo di Stampa Clandestina.

This network of relationships demonstrates that Impresso has evolved from an academic idea into a project with concrete value and an active, varied community ready to support its future development.

4.2.3 Workshop and Educational Activities

An essential part of the Open Shapes of Print project is undoubtedly the workshops and educational activities. The interest in designing something that could also be relevant from a pedagogical point of view comes from far away. Even the very first concept focused on educational value, even before deciding what the object of the redesign would be.[136] At that time, at the beginning of the process, five guidelines were drawn up to be followed and interpreted throughout the project. Each of these is re-examined below to verify its applicability to the final project.

136. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Impresso. Open Shapes of Print* (Vol. 1, pp. 20–25). Politecnico di Torino - Dipartimento di Architettura e Design, Laurea Magistrale in Design Sistemico.

ACCESSIBLE - Simplifying an activity or product to make it more understandable and approachable for a broader range of users. One of the fundamental principles on which Impresso is based, which has also become part of its mission, is to make printing accessible and affordable for everyone. In addition, the proposal for activities involving the assembly of the press from scratch by the students makes it possible to convey theoretical notions about the importance of certain components, such as the pressure exerted by the roller, and also makes it extremely clear that without one of the components, the whole system cannot function.

EDUCATIONAL - Supporting students' learning processes in a practical and visual way. The very fact of having redesigned a machine to simplify it and make it suitable for a school environment for teaching concepts related to printing already fulfils this guideline. Added to this is the fact that different visual combinations can be experimented with through the various printing techniques.

PARTICIPATORY - Fostering a collective environment where knowledge is shared, and creativity is explored through the object. Starting from the end of this statement, it can be seen that creativity is the very soul of the project, as it is dedicated to the printing sector, which allows experimentation with paper, inks and matrices, leading to ever-changing results. This is precisely what distinguishes Impresso: imperfection. On the other hand, knowledge is shared according to the very principle of Open Design. The printing press, in fact, has a Creative Commons CC BY-NC-SA licence, which was chosen to allow the material to be copied, adapted and redistributed but, at the same time, to exclude the project from commercial purposes and make it necessary to use the same licence.

INTERDISCIPLINARY - Bridging the worlds of communication and product design within a single object. Impresso is as much a product as it is communication, and if one of these two souls were missing, the project would not have the incisiveness and completeness that distinguish it. The very choice to include the printing press within the broader Open Shapes of Print movement is part of a comprehensive narrative.
MULTIPLE - Creating an object that can perform multiple functions or be part of a product family. As clearly illustrated in the previous chapter, "Impresso" (see chapter 4.1), the printing press is both multifunctional, as it has been implemented with the ability to print movable type, and part of a product family, which in this case is represented by Open Shapes of Print, of which Impresso is only the first in a series of open source printing devices.

This brief discussion has shown how the initial intentions of the project have remained the same and have been completely and fully satisfied. To provide an overview of the main activities in which the authors have participated in recent months under the name Open Shapes of Print, a brief presentation of each activity is provided in chronological order, specifying the type, the environment in which it was carried out, the place and date, and a brief description of the steps taken with users.

Build & Print at School

The first activity involved about twenty students from the fourth year of the art programme at an art school in Turin. After about half an hour spent presenting the project, the class was divided into small groups to assemble the three basic components of the press: the roller, the carriage and the frame. The groups were then brought together to assemble all the parts and complete the construction of the press. After a short break, the printing phase began, during which the students were able to give free rein to their creativity by printing different types of matrices on both paper and fabric. At the end of the activity, which lasted a total of three hours, each student was able to keep the prints they had made.

Type of activity: Educational activity
Environment: Secondary school
Location: Liceo Artistico Primo
Date: 31 January 2025

Love Now!

The second activity took place in a completely different context, where the two Impresso presses were literally put under pressure. They were positioned as the second step in a printing line that led to the experimentation of different techniques (screen printing, relief printing, dry stamping, risograph) and the final binding of a small book. The space was that of Print club Torino and the part just mentioned was the "live printing" section, where users could choose to print one of three linoleum matrices with Impresso. The press was also the star of a masterclass led by artists Isidro Ferrer and Pep Carrió, where it was used for printing movable type, even though it was not really suitable for that use, but the results were excellent, nonetheless. (Fig.220)

Typology of activity: Live printing and Masterclass
Environment: Festival
Place: Graphic Days Torino 2025 - Visual Design Festival
Date: from 08.05.2025 to 18.05.2025

Red & Blue 3D Effect

Immediately after Graphic Days, the authors were invited to a lesson in the "new art technologies" course to do an activity that was a little different from the previous ones. In fact, after talking to the course lecturer, it was agreed to experiment with two-colour printing to recreate a similar 3D effect. This theme integrated well with the topics of the previous lessons in the course, allowing Impresso to enhance the learning of concepts and techniques even at university level. The activity was structured in much the same way as the one at Liceo Artistico Primo, with the only difference being that, as two colours had to be printed, the ink had to be allowed to dry between prints. The prints made by the students were then featured in an end-of-year exhibition held at the Accademia Albertina.

Typology of activity: Educational activity
Environment: University
Place: Accademia Albertina
Date: 23 May 2025

Print Your Own Mini-book

The activity carried out at Maker Faire was a continuous live printing session. The main difference with the Graphic Days festival was that the type of users was very varied and only a few were familiar with the type of printing offered by Impresso. On this occasion, a complete printing experience was designed, as the public could print both a linoleum matrix and a lettering with movable type, choose an initial cover with the project logo and a final texture, and everything was then bound into a small booklet. The feedback received at Maker Faire was objective and allowed us to realise that Impresso and matrix printing is also suitable for younger children attending primary or secondary school.

Type of activity: Exhibition stand
Environment: Fair
Location: Maker Faire Rome 2025 - International fair dedicated to innovation, creativity and maker culture
Date: from 17.10.2025 to 19.10.2025

In addition to these four main activities, which are described in detail in the "testing & validation" section (see chapters 3.1.1, 3.1.2 and 3.2.2), there were others that unfortunately did not come to fruition. To get a complete picture of the project, it is only fair to include the small failures as well.

The Open Shapes of Print project was submitted to two calls for proposals: the first focused on proposals for activities to enliven the spaces of the community centre in the San Donato neighbourhood, while the second, LIMO, was a call promoted by KAIROS ETS to support and implement five workshop proposals. The latter were intended to encourage active participation in cultural and artistic activities and to activate shared processes of production and research. In neither case, however, did the project pass the selection process.

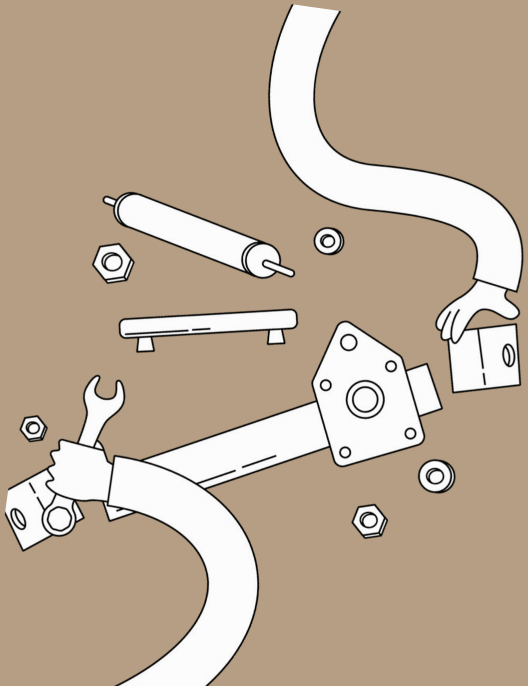
The possibility of further collaboration with the Print Club Torino for a series of workshops for children at the Geisser Library in Turin was also mentioned. The proposed activity would have involved printing "simple" objects, such as leaves, string and potatoes, to allow children to get their hands dirty and have their first contact with printing. Here too, the collaboration did not go ahead, and the workshops never took place. Another possibility was the participation of Open Shapes of Print in "noi scriviam la nostra storia" (we write our history) in Val Pellice, a series of events promoted by ANPI on the theme of clandestine printing. Three types of activities were proposed, differing in duration and number of participants, but again, it remained just a nice proposal and never materialised.

From everything that has been reported so far, it can be deduced that the activities proposed by Open Shapes of Print can vary substantially depending on the context, the users and the purpose they are intended to serve. In this regard, and based on previous experiences, four initial "models" of educational activities and workshops have been developed that could be carried out through collaboration between third parties and Open Shapes of Print.

Under press

SECONDARY SCHOOL / WORKSHOP

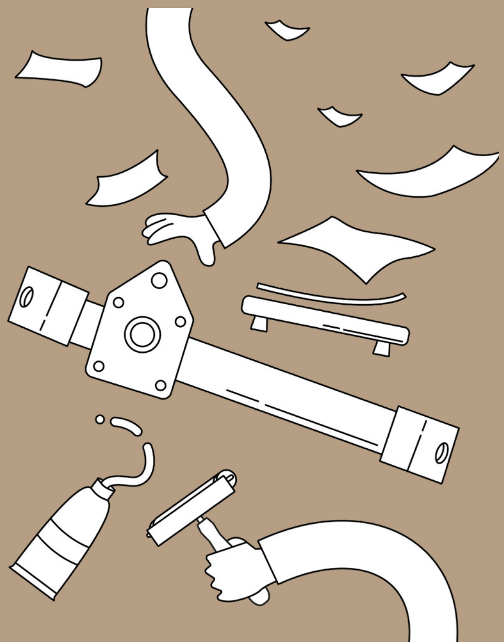
A brief, fascinating journey through the history of printing, to understand how human ingenuity has enabled the reproduction of texts and images, leaving an indelible mark on our culture. This experience invites you to discover the art of typography through manual action and collaboration: divided into small groups, participants will try their hand at the exciting construction and assembly of a real printing press, a machine with an antique charm. Once ready for use, the press will be the tool for creating colourful prints using pre-supplied linoleum matrices, allowing participants to experience first-hand the transformative and unique power of printing under pressure.



Print! Print! Print!

WORKSHOP

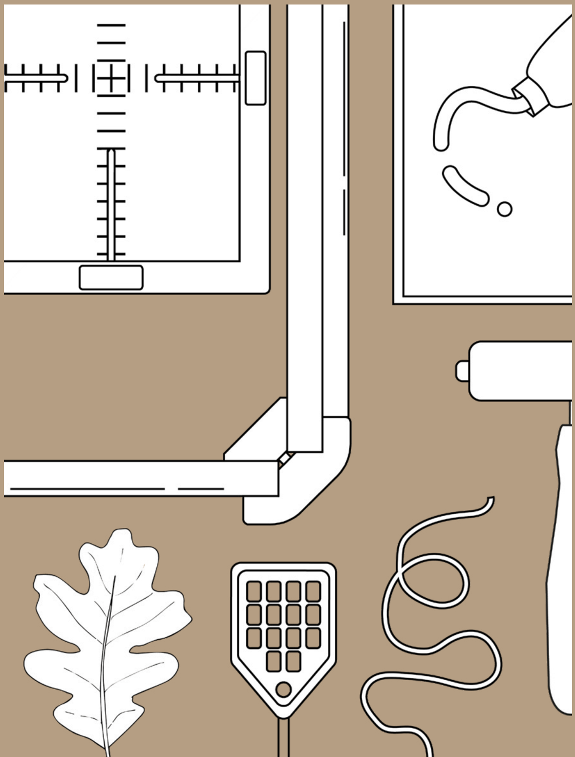
Print! Print! Print! is a dynamic and interactive experience, ideal for enlivening spaces such as festivals, fairs and events with large crowds. A live printing activity that captures the attention and engages the public in a vibrant and creative atmosphere, offering the opportunity to print their own souvenir on the spot. Participants can choose between the texture of linoleum matrices, the innovation of 3D-printed matrices, or the elegance of movable type compositions. Depending on their preferences, the experience can be made even more complete with the creation of a small, precious bound booklet, or remain immediate with single, unique prints. The theme of this exciting activity is fully customisable and to be agreed upon.



Matrices & Matrices

PRIMARY AND SECONDARY SCHOOL

With this workshop, we introduce the fascinating world of different types of printing, discovering the magic behind every impression. The activity guides young participants in the creation of their own matrices, using diverse and surprising materials: from linoleum to 3D printing, to ingenious recycled materials, discovering the creative potential in every everyday object. After learning the secrets of inking and pressure and how to print with the aid of a press, the session becomes a moment of pure freedom, allowing everyone to experiment, create and take home their own imperfect impression.



Matter of type

SECONDARY SCHOOL / WORKSHOP

Let's immerse ourselves in the history of typography with this engaging workshop, an activity that brings the ancient and noble art of manual composition back to life. After a brief introduction to the origins of movable type, small metal elements that revolutionised communication, participants will get down to work, creating typographic compositions using real metal type, just like the typographers of yesteryear.
The next step involves printing posters using a press, to see their creations take shape on paper, black on white. A final free session encourages experimentation and boundless creativity, allowing participants to play with loose letters and artistic compositions.

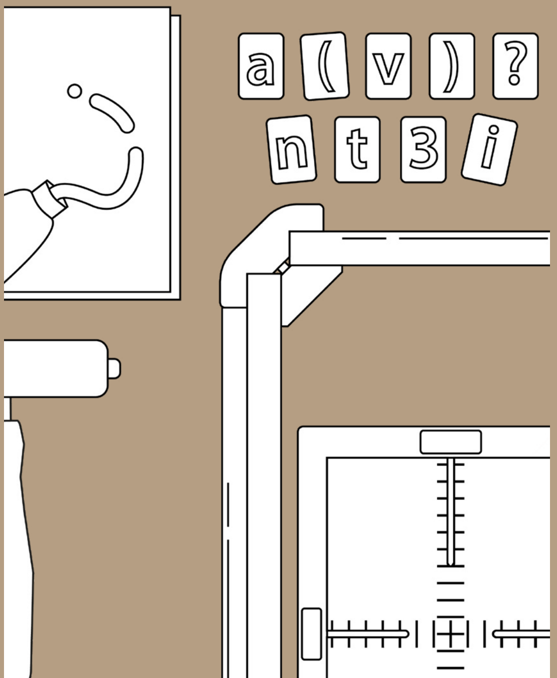
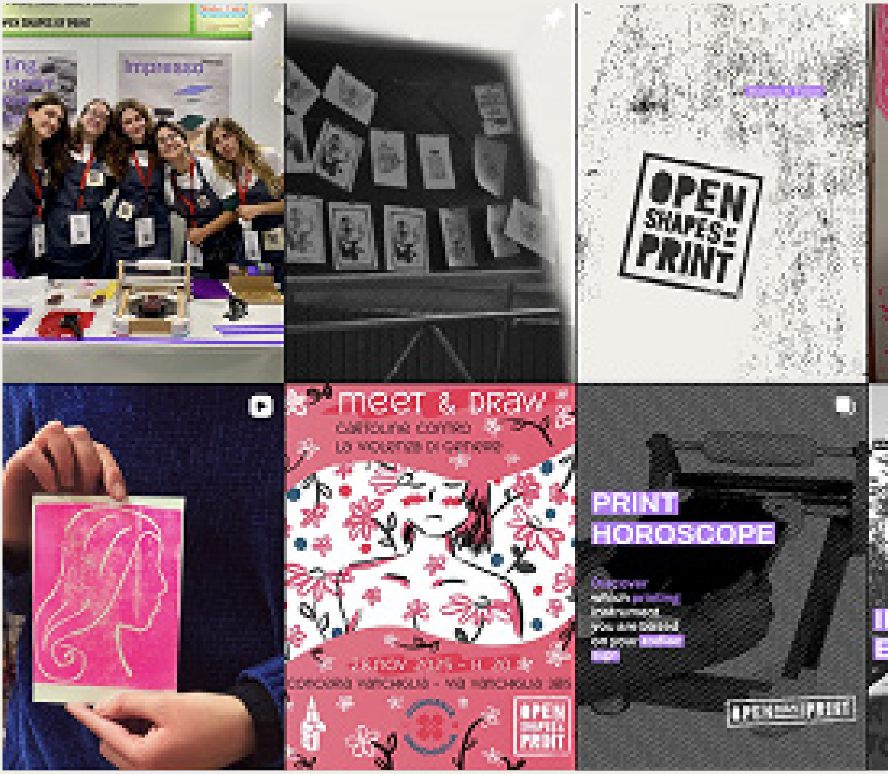


Fig. 220 Graphic Days

4.3 Communication Strategy



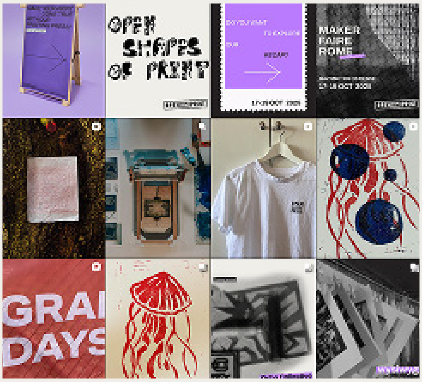


Fig. 222 Instagram posts

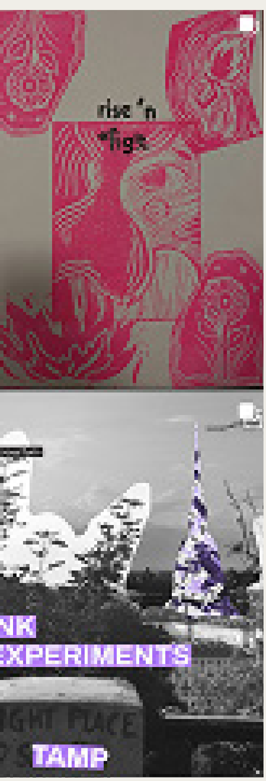


Fig. 221 Instagram page

This section encompasses the entire process, from the construction of the project's identity to the definition of both offline and online touchpoints that enable interaction with users, foster their active participation and, ideally, support the formation of a community and the means to establish a genuine connection with it. The following pages present and justify the decisions that led to the development of the visual identity, as well as the resources designated for disseminating the project across various platforms.(Figg.221-222)

The digital touchpoints include the website and social media channels specifically Instagram and LinkedIn while offline communication will be articulated through printed materials such as the instruction manual, posters, the Tips and Tricks booklet and the product packaging. This structure aims to ensure a coherent and meaningful experience that remains aligned with the conceptual values underpinning the project.

4.3.1 Identity

Letters, colours, images and words form the core elements of a project's presentation, revealing its innermost character at a glance. Everything begins with the name, the ultimate synthesis and abstraction of the project's essence. In this case, the broad conceptual umbrella is represented by Open Shapes of Print and Impresso, the product itself.

The inspiration for creating the project's "dress" originates from the moodboard, which blends traditional printing languages with contemporary effects to produce a visual identity that turns imperfection into a strength.

This approach is echoed in the selection of typefaces primary and secondary, a serif and a sans serif respectively and in the colour palette, composed of two traditional tones and one accent shade. Completing the visual identity, the tone of voice conveys the manner in which the audience is addressed: open and accessible to all, yet subtly alluding to a niche sector through the occasional use of specialised terminology.

Moodboard: is a first approach to the visual identity of the project. It uses shapes and typographies that evoke the style of traditional printing. Some of them feature irregularities in their forms to express the manual work involved in analog printing. Textures typical of traditional printing are also evident, such as ink traces, varied tones, and gradients. This offers a new way of understanding an existing object, the printing press, projecting it into a new contemporary.(Fig.223)

Naming: Impresso is the name of the printing press. This name combines the concept of imprinting, meaning leaving a material mark as in analogue printing, with that of impression, both technical and emotional. It also evokes the English term to impress, suggesting the idea of leaving a durable impact by combining tradition, creativity, and emotion.

In addition, the "O" at the end is meant to emphasize the uniqueness of Open Design, the movement from which the project stems.(Figg.224-227)

Fig. 223 Moodboard of the visual identity

Fig. 1 First prototype of Impresso

Palette: The palette uses very muted and complementary base colours, such as matt black, lavender and cream, with lavender acting as a dynamic accent to highlight and enhance the main visual elements. This selection of colours creates a contrast between light and dark tones that facilitates user readability while offering versatility in communicating the various design intentions.(Fig.228)

Font: The typographic style is the visual backbone that builds the entire narrative around traditional printing. The worn finishes of the typography recall the imperfections typical of insufficient pressure or uneven ink distribution, an aesthetic characteristic of traditional printing.The bold typography provides a strong visual weight that conveys decisiveness in the message while evoking the various traditional printing techniques on materials like wood and linoleum.

ToV: Communication with the community is approached in a friendly, curious and creative manner. The intention is to invite creative and passionate individuals ranging from art students to professionals and print enthusiasts to reinterpret and revalue the classic technique of analogue printing in an increasingly digitised world. Simple, approachable language, occasionally enriched with a touch of humour, is used to create a memorable and enjoyable experience, helping to establish an emotional connection between the user and the product. The historical and cultural importance of traditional printing is consistently emphasised, reflected in the development of the product Impresso. The communication style remains both engaging and informative, reminiscent of a friend sharing something intriguing. Within Open Shapes of Print, efforts are made to ensure that users feel comfortable and connected to the creative process and the distinctive charm of print. This involves employing print-industry terminology that appeals to a niche audience, while ensuring that it remains understandable and accessible to the widest possible range of users.

Fig. 224 Logo, vector version

Fig. 225 Logo, vector printed version

Fig. 226 Logo, vestor extended version

Fig. 227 Logo, extended printed version

A a

IM FELL English

Aa Bb Cc D
Hh Ii Jj Kk
Oo Pp Qq R
Vv Ww Xx Y
0 1 2 3 4 5 6 7

IM FELL En

CMYK 0, 1, 3, 6
RGB 240, 238, 232
HEX #f0eee8
PANTONE 663 C

Isabelline

A

Arc

&

IM FELL English Italic

CMYK 0, 1
RGB 35, 3
HEX #231
PANTONE
Black C

Raisin

d Ee Ff Gg
Ll Mm Nn
Rr Ss Tt Uu
Yy Zz
8 9

glish Regular

CMYK 27, 52, 0, 0
RGB 186, 123, 255
HEX #ba7bff
PANTONE 528 C

Lavender

Aa

hivo

Regular
SemiBold
Bold

Archivo Family

11, 9, 86
31, 32
1f20
E Neutral

Black

Aa Bb Cc Dd Ee Ff Gg
Hh Ii Jj Kk Ll Mm Nn
Oo Pp Qq Rr Ss Tt Uu
Vv Ww Xx Yy Zz
0 1 2 3 4 5 6 7 8 9

Archivo Regular

Fig. 228 Font and palette

4.3.2 Website

Compared to the wider vision outlined in Volume 1, this version is deliberately more streamlined and focuses on three primary objectives:

1. Presenting the project: the "home"(Fig.230) and "about"(Fig.231) pages define the values, mission and vision of "Open Shapes of Print".
2. Present the device: the "Impresso"(Fig.232-233) page serves as a showcase for the product, explaining how it works and its value.
3. Consolidate the community (Fig.234): gathering and retaining users is currently the most important objective for which the site was created.

During the development of the Open Shapes of Print project, it became necessary to create a digital space that would serve as a reference point for the community, a showcase for Impresso, and an archive for the knowledge gathered.(Fig.229)

The decisive push for putting the site online was the opportunity to participate in Maker Faire 2025. This event imposed a definite deadline and shaped the nature of this first version of the site: it had to be an essential, functional and communicative core, capable of presenting the project to a wide audience.

Development: was divided into two distinct phases, following a standard web design workflow.

- The first phase was the design phase (UI/UX), carried out entirely on Figma. Starting from the visual identity and mood board already defined in chapter 5 of Volume 1[137], the layout and information architecture of the site were designed. During this phase, all the sections that would make up the complete ecosystem were designed, including those (such as the "Share of Prints" page or the "Resources" section) that, for reasons of time, were put on hold for the first online version of the site.

- The second step was development (CMS). For the actual construction, we chose not to proceed with custom programming, but to rely on an accessible and widely used platform: WordPress, implemented with the Elementor page builder. This decision was not random, but consistent with the principles of the project: the use of open-source and user-friendly tools ensures much simpler management and updating of the site in the future.

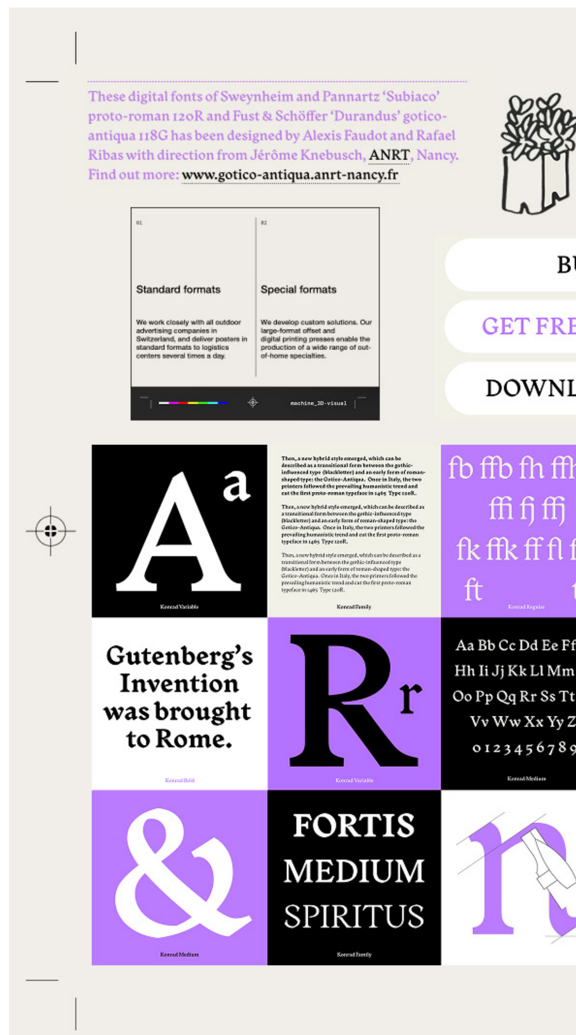
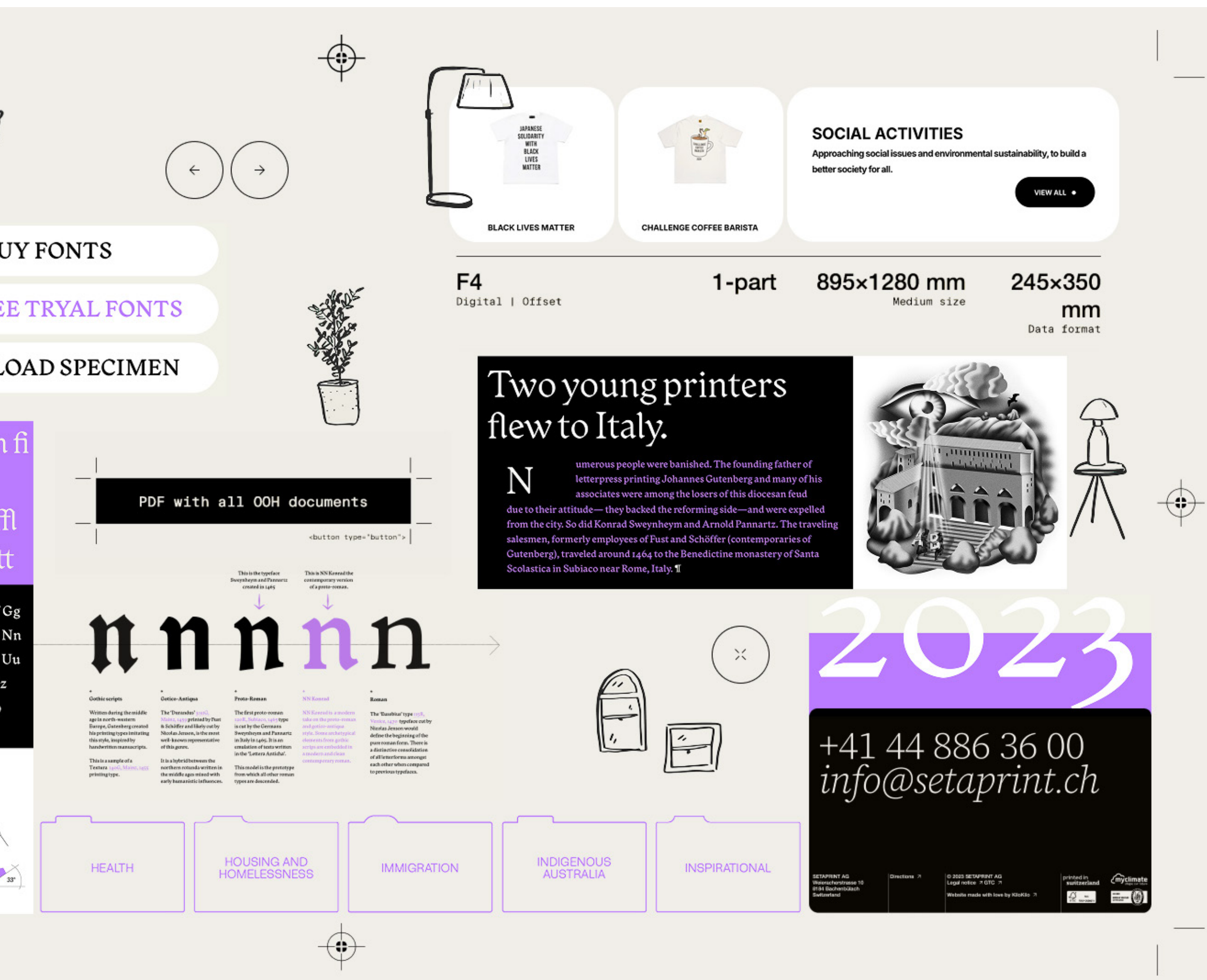


Fig. 229 Website moodboard

One element that has been given particular importance in this first version is the newsletter. In the absence of a forum or sharing page (planned for the future), the newsletter becomes the primary strategic tool for community building. The newsletter is designed to be a call to action that transforms a casual visitor, curious about the exhibition stand or arriving on the site via social media, into an active member of the community, to be contacted again for future workshops, updates and the release of open-source files.

It is important to note that this version of the site, in line with its purpose of visibility and contact collection, does not yet include an e-commerce section (which is included in the prototype presented in Volume 1). The selling of the kit is not the objective of the current phase of the website, but the future intention is to implement the website with the possibility of purchasing.

137. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Impresso. Open Shapes of Print (Vol. 1, pp. 274-287).* Politecnico di Torino - Dipartimento di Architettura e Design, Laurea Magistrale in Design Sistemico).



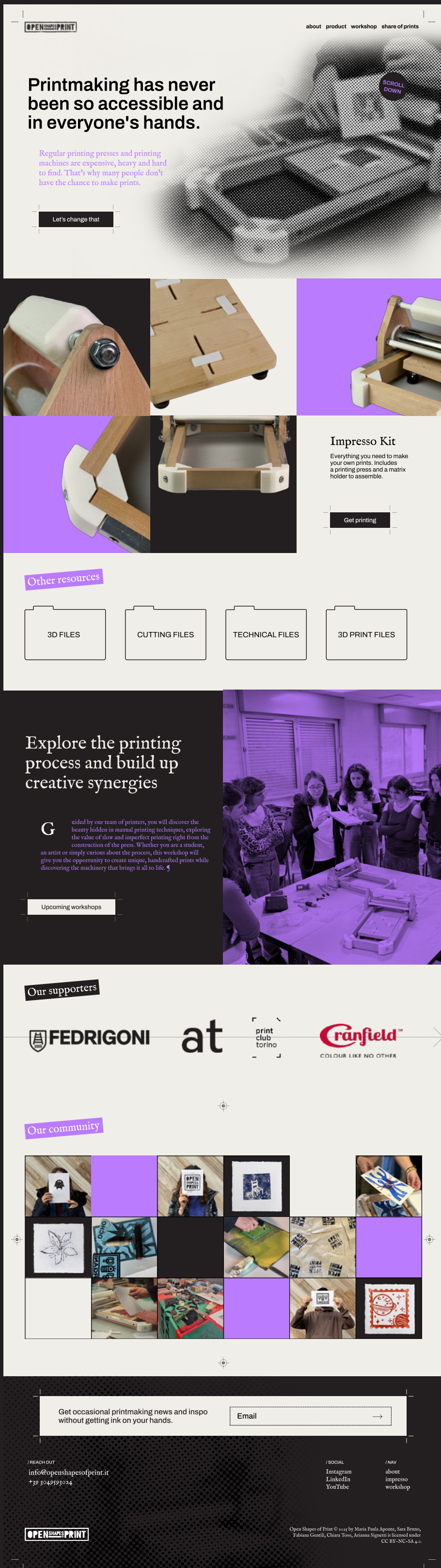


Fig. 230 Homepage

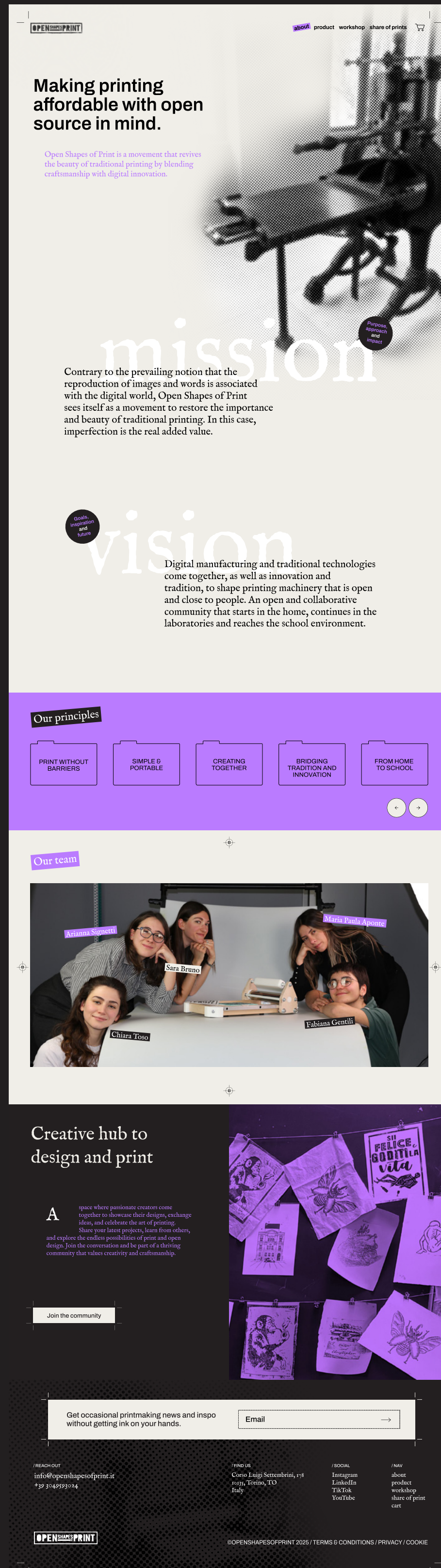


Fig. 231 About page

Fig. 232 Product page

trategy

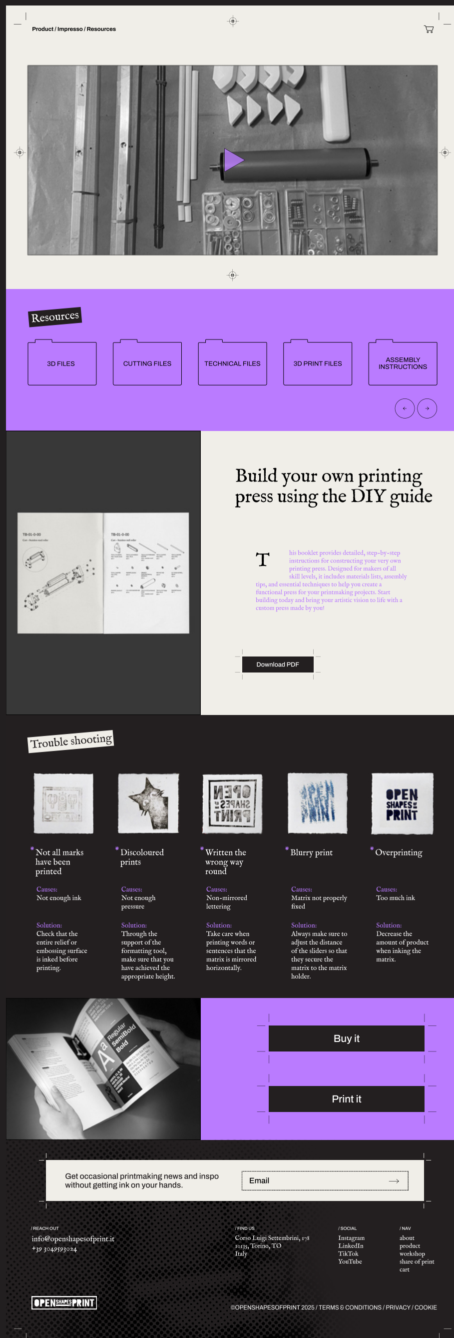


Fig. 233 Product Resources page

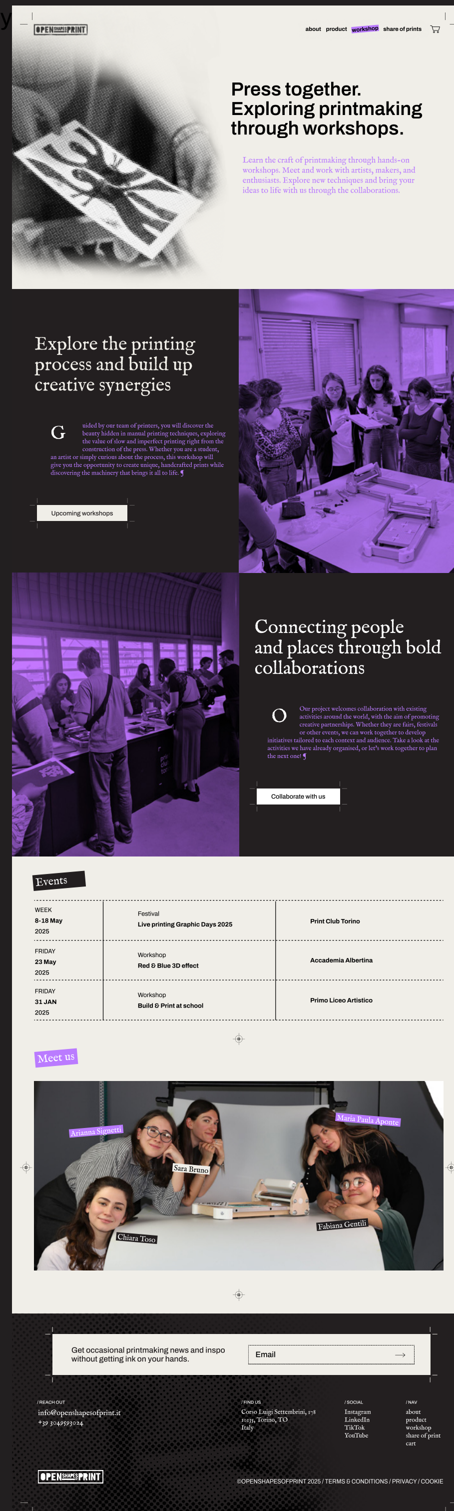


Fig. 234 Workshop page

4.3.3 Social Media

One of the most significant updates introduced to the project's Instagram profile was the official launch of the website www.openshapesofprint.it, presented through a reel that recorded the screen and offered a brief preview of the material available on this new interactive platform.(Fig.235)

The profile's stories were organised into five main sections:

About Us
Repost
Workshops
MFR
Fail Prints

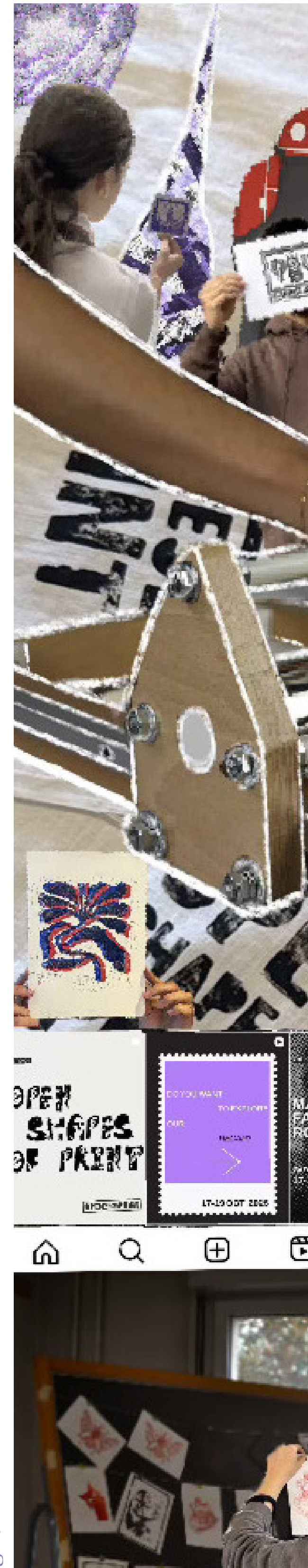
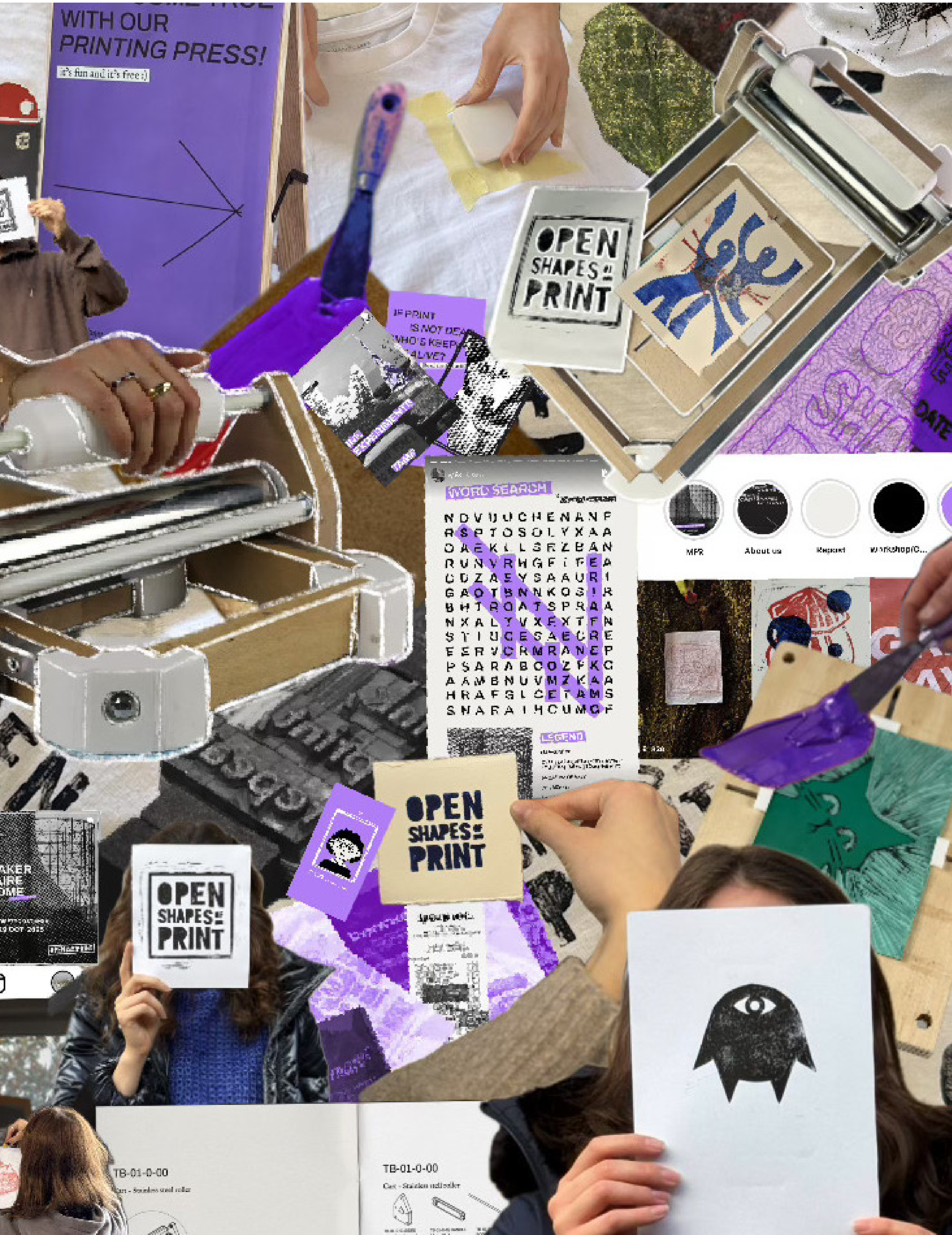


Fig. 235 Social media moodboard


WITH OUR
PRINTING PRESS!
it's fun and it's free :)
OPEN SHAPES of PRINT
IF PRINT IS NOT DEAD WHO'S KEEPING IT ALIVE?
WORD SEARCH
LEGEND
MPR
About us
Report
DATE
OPEN SHAPES of PRINT
OPEN SHAPES of PRINT
TB-01-0-00
TB-01-0-00

Compared with the first volume, two new highlighted story sections were added. The first focused on introducing the team(Fig.237), highlighting the shared values of its members and featuring photographs, everyday quotations, and expressions frequently used in their creative processes. This section articulated the collective identity, the roles assumed within the project, and the diverse backgrounds of each member.

The MFR section(Figg.239-243) compiled documentation of the project's participation in the Maker Faire Rome (17-19 October). It included various posts used to promote and inform the community about the project's presence at the event as an open-source initiative. The announcement campaign began with a story presented as a word search, revealing information about the when, how, and where of the involvement. This was followed by a storytelling-based video set in a forest, in which a child encountered an announcement that could only be deciphered using a red acrylic sheet. This visual device corresponded to the leaflet's design, which employed a red-blue chromatic combination and a hybrid of the Open Shapes of Print and Maker Faire logos, while maintaining the usual visual identity of the event.

The highlighted story also included acknowledgements to sponsors such as Fedrigoni(Fig.238), documentation of users engaging with the press, the introduction of the movable type function, reposts from individuals who had interacted with the project, the results of live printing sessions, and a final recap video entitled "Do you want to explore our recap?". This video summarised key moments ranging from the arrival in Rome to the activities at the fair and the various ways users of different ages engaged with the printing device.

Compared with the previous volume, new stories were added to document experiences from additional workshops, including participation in Graphic Days and activities at the Accademia Albertina.(Fig.243) Further images were also incorporated into the Repost section, featuring content shared by participants who published the results of their interactions with the press during these events.

In addition to these developments, a structured content-planning strategy was implemented to support community growth. Monthly calendars were produced to organise creative material, define storytelling approaches, and programme posts related to upcoming events in which the project would be involved. This systematic planning aimed to ensure consistent communication, enhance audience engagement, and maintain coherence across all visual and narrative elements.(Fig.236)

With the intention of adopting a more approachable and personable tone within the Instagram community, a series of informal contents was produced. These materials reflected both the creative process and the distinctive characteristics of the five team members, who share a common passion for print despite their different personalities. Among these was a post composed of 26 letters, each illustrating a memorable moment experienced by a member during the Maker Faire. Another post emphasised the elements that define the distinctiveness of Open Shapes of Print, featuring photographs from the most recent event in Rome and accompanied by a caption entitled "Open Shapes Of Print starter pack" , which presented a deliberately stereotyped and playful portrayal of the traits that characterise the participants and the collective as a whole.

At this stage of the project, a LinkedIn (Fig.244) account was also created with the aim of establishing new connections capable of providing relevant information, supporting the project's development, and expanding opportunities for collaboration and ideation. To date, two posts have been published: the first expressed gratitude to the Maker Faire for its hospitality and to each individual who dedicated time to contributing to and strengthening the project; the second announced the launch of the website, in alignment with the communication approach used across other platforms.

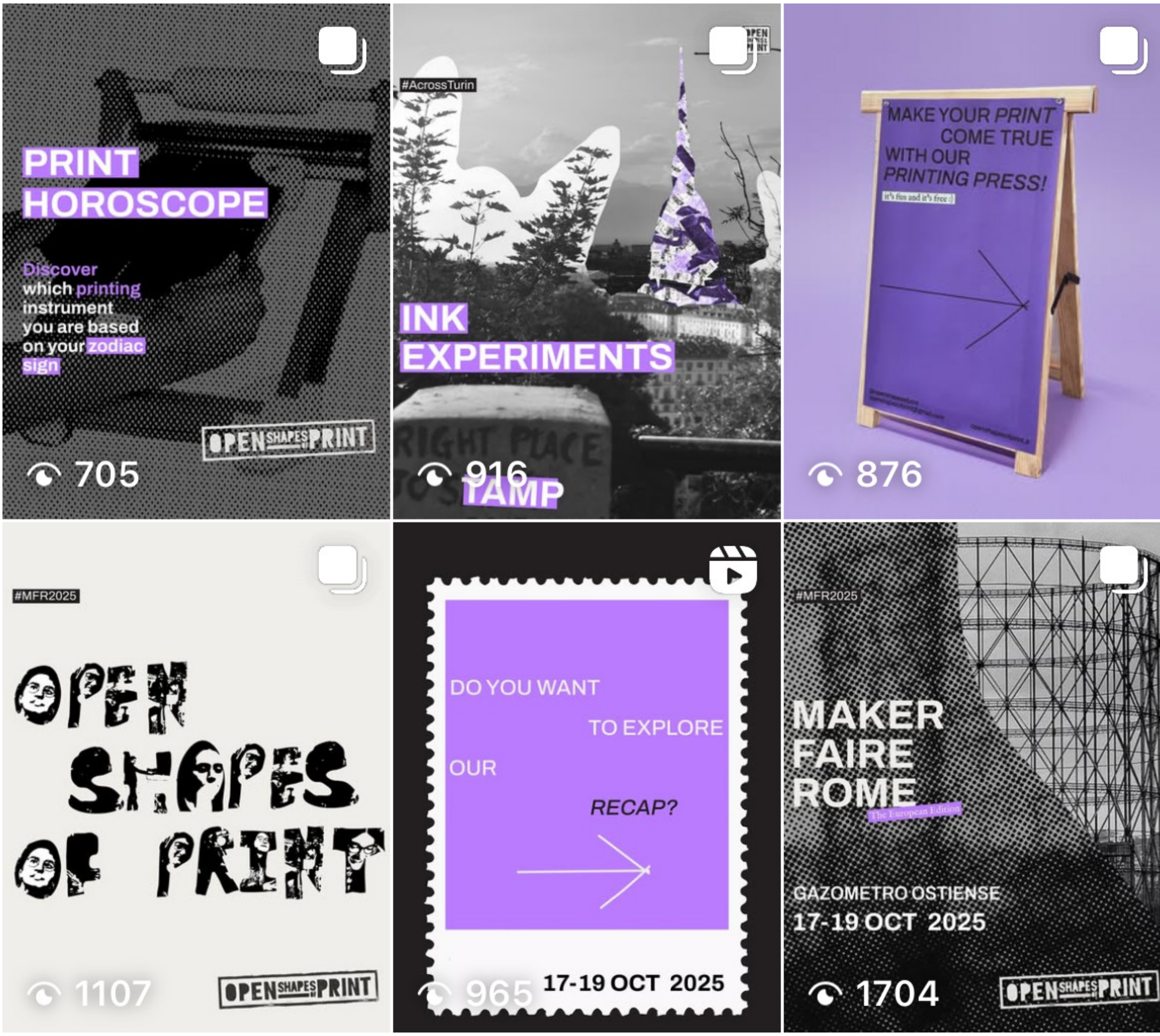
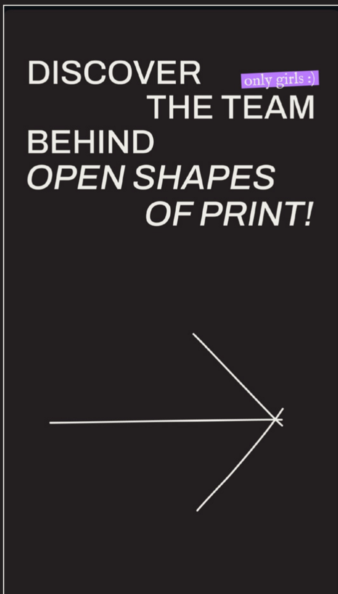
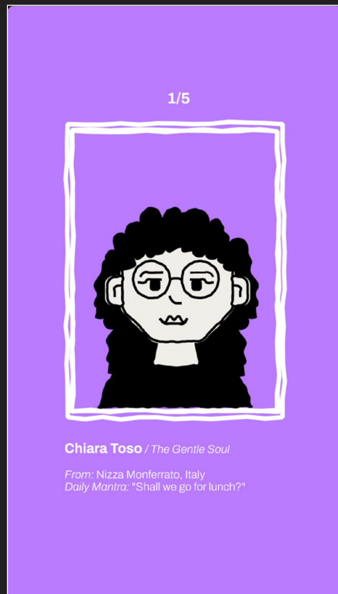
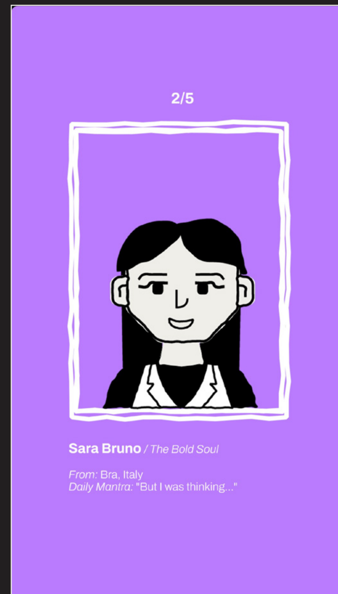


Fig. 236 Instagram posts







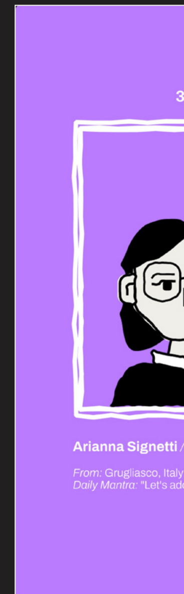
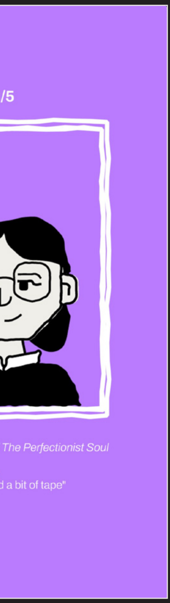
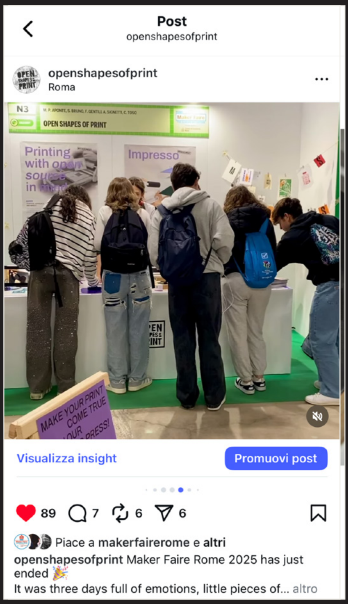
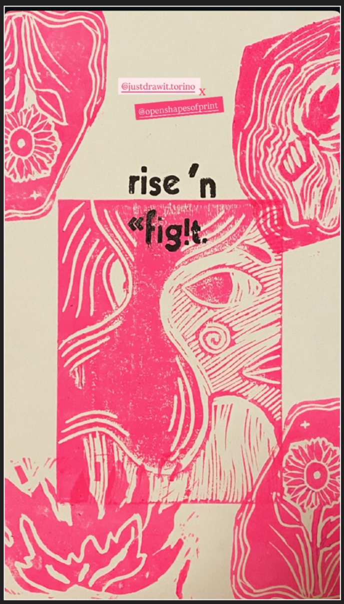


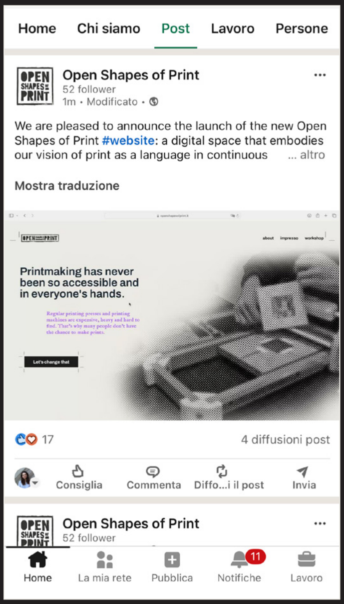
Fig. 237 Instagram story about the team

Fig. 238 Instagram story about network *Fig. 239 Instagram story for Maker Faire* *Fig. 240 Instagram story for MF* *Fig. 241 Instagram*









osts about MF

Fig. 242 Instagram posts about MF

Fig. 243 Instagram story about collaborations

Fig. 244 Linkedin post

4.3.4 Paper and Digital Communication

Instruction booklet

Impresso's open design philosophy is realised by making available online the instruction and DIY booklet (Fig.245), designed both for those who buy the kit to assemble and for those who intend to build the press themselves.[138]

The instruction booklet is designed to guide the user step by step through the manufacture of the press components, in case they prefer to build it themselves, and through the assembly process. This booklet is included in the kit. In addition to the printed instructions, two explanatory videos have been produced, one for assembly and the other for the printing stages.

The organisation of the new DIY booklet is consistent with the version created for the first prototype of the press. The first part presents all the useful details, technical drawings and some practical advice for making the components.[139] In fact, the materials have remained the same: wood, 3D-printed PLA and aluminium. The predominant choice of wood, as opposed to cast iron, which is used as the main material in print shops, also makes the product less cold from a perceptual point of view.[140] The ease of processing the materials is also taken into account, for example by providing for additive manufacturing, thus allowing users to either use their own 3D printer or seek support from laboratories such as Fablabs.

The booklet is organised as follows:[141]

- An introductory page illustrates all the components to be made, with their respective codes, and the semi-finished products to be purchased in order to build them
- The tools and files required for each component are presented in detail, accompanied by technical drawings for production.
- The section dedicated to assembly presents the information in a schematic manner; the assembly phases are divided according to the different sub-assemblies, cart, frame and matrix holder, identified by codes. This version of the booklet therefore adds information on the assembly of the new components of the matrix holder for printing movable type. At the beginning of this chapter, the possibility of building the roller independently with PVC or purchasing a commercial steel one is also clarified. The assembly stages are accompanied by a brief explanatory description alongside line drawings of axonometric exploded views, in which the component codes are indicated.

138. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Impresso. Open Shapes of Print (Vol. 1, pp. 274-287).* Politecnico di Torino - Dipartimento di Architettura e Design, Laurea Magistrale in Design Sistemico).

139. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Ibid.*

140. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Ibid.*

141. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Ibid.*

Fig. 245 Instruction booklet

Tips and Tricks book:

This book draws inspiration from Wreck This Journal by Keri Smith, although it does not aim to replicate its concept. Its approach is oriented towards a playful, engaging and accessible experience, conceived as a companion tool for the user and as a complement to the user manual. Tips and Tricks does not intend to provide an exhaustive explanation of how to use or design the Impresso press; instead, its aim is to enrich the user's experience through a book that accompanies them and in which they can leave a personal mark, recording the various adventures lived with the transportable press.

The book(Fig.246) offers several methods to improve print results, understand what may have occurred during the printing process, and optimise the final quality. However, its principal objective is to invite the reader to experience printmaking as a sensory and everyday activity, in which any corner, object or material may become a surface or tool for printing. In this sense, the book revolves around a single fundamental rule: "put it under pressure". Users are encouraged to print as if the world were their experimentation laboratory, where the surrounding objects are available to create and narrate stories through ink and the printing press. Some pages are designed for the user to express their emotions, while others propose giving a second life to materials that would normally be discarded. This section does not in any way promote food waste; rather, it encourages the responsible reuse of elements such as peels or materials close to deterioration, whose destination would in any case be disposal. Through their transformation into improvised matrices, these materials enable experimentation, play, creation, and imagination. The book opens with pages dedicated to testing inks, textures, pressure levels and colour combinations. It then presents practical advice for overcoming creative blocks, offering suggestions for generating images or matrices when ideas do not emerge naturally. Technical guidance for achieving a good print is also provided, accompanied by explanations of the possible causes of errors and useful recommendations for correcting them.

The volume includes three types of challenges:
- The first focuses on printing with linoleum and everyday objects whose density and thickness are compatible with the press's capacity.
- The second addresses typography and experimentation with the new movable-type matrix function.
- The third invites users to give "a second life" to scraps, exploring their expressive potential through printmaking.

At the end of the book, the user will find several blank pages labelled "add your own challenges". This space reflects the intention to encourage individual appropriation of the book, allowing each person to modify and use it according to their own interests, values, and curiosity about the world of printmaking.

Maker Faire Posters

Three posters were created for Maker Faire with the aim of presenting the project in an immediate way, intriguing the public and inviting them to visit the stand to learn about the project or try printing. Two of these posters, "Printing with open source in mind" and "Impresso", were designed to be hung on the wall of the stand, while the third, "Make your print come true", was hung on an easel to invite visitors to print with the press.

The first poster(Fig.248) highlights the phrase 'Printing with open source in mind', with the aim of combining the two main aspects of the project, namely analogue printing and the open source design of the Impresso press, to make it more widespread and accessible. Next, the mission and vision of Open Shapes of Print are presented, followed by a timeline illustrating the different stages of Impresso's evolution, from the first tests with waste materials to understand how analogue printing worked, to the first prototype.

A common theme is then created between this poster and the second one, 'Impresso', which shows the new prototype in the form of an exploded view illustrating the various components. This poster aims to show the press from a more technical point of view, in the context of the fair, where visitors are interested in the practical aspects of products and inventions. (Fig.249)

As mentioned above, 'Make your print come true' (Fig.247) was hung on an easel and designed as an alternative to the simple roll-up banner often used in these contexts. In fact, it is made with an alternative support, namely a wooden easel, which is usually used to support wooden tables. The tone of voice is friendly and direct, giving a sense of welcome, which is further reinforced by 'it's fun and it's free', which aims to overcome any uncertainty on the part of visitors. All the posters are also consistent with the Opens Shapes of Print identity in terms of colour choice, fonts and illustration style.

Fig. 247 Maker Faire poster

Fig. 246 Tips and Tricks book cover

Fig. 248 Maker Faire poster: Mission and vision

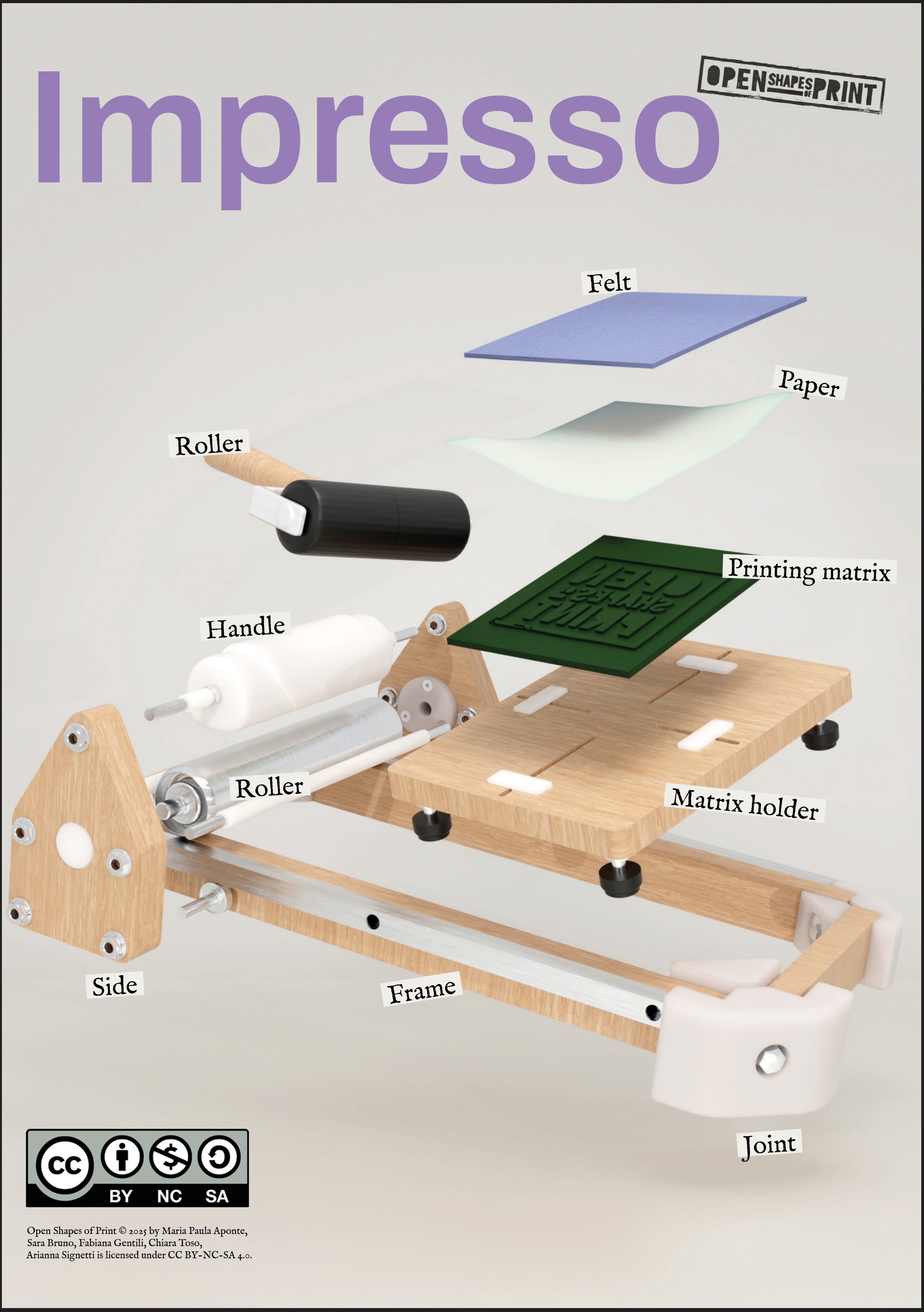


Fig. 249 Maker Faire poster: exploded view

Digital Communication

This section is designed to offer digital resources that can serve as supplementary support for individuals interested in the Impresso press. These resources provide guidance for both the assembly of the press and its proper use, facilitating a more comprehensive understanding of the process and enhancing the overall user experience.

HOW TO PRINT?(Fig.250)

The video begins by presenting, through stop-motion animation, the various tools that the user will need to employ during the printing process using the printing press. These include the roller, the demonstration platen, matrices (in this case made of linoleum, although other materials may be used), felt, ink, and the measuring instrument used to ensure that the matrix holder is set at the correct height.

Initially, in a time-lapse sequence, it is shown how portions of the linoleum are removed with a gouge to create a three-dimensional design that will subsequently be printed. The next step demonstrates the application of ink onto the demonstration platen, moving the roller back and forth to spread it evenly without overloading it. The matrix is then inked and positioned in the matrix holder. Sliders are used to secure it, preventing movement when the press applies pressure.

The user then checks the height of the matrix holder using a measuring tool, colloquially referred to as the "strumentopolo," to ensure that it is appropriate. Adjustments may be required depending on the thickness of the material to be printed; the adjustment support of the matrix holder can be raised or lowered so that the roller applies the correct pressure when moved across the surface.

Once adjusted, the matrix holder with the matrix is placed within the frame. The sheet or material to be printed is added, and a layer of felt is placed on top to increase thickness and enhance pressure during printing. The user operates the handle, moving it back and forth; this can be repeated as desired to achieve the intended effect.

After printing, the felt and printed sheet are removed, revealing the final result. The drying time varies depending on the type of ink used: oily inks typically require longer to dry, while washable inks dry more quickly, with the process taking approximately 5 to 10 minutes.

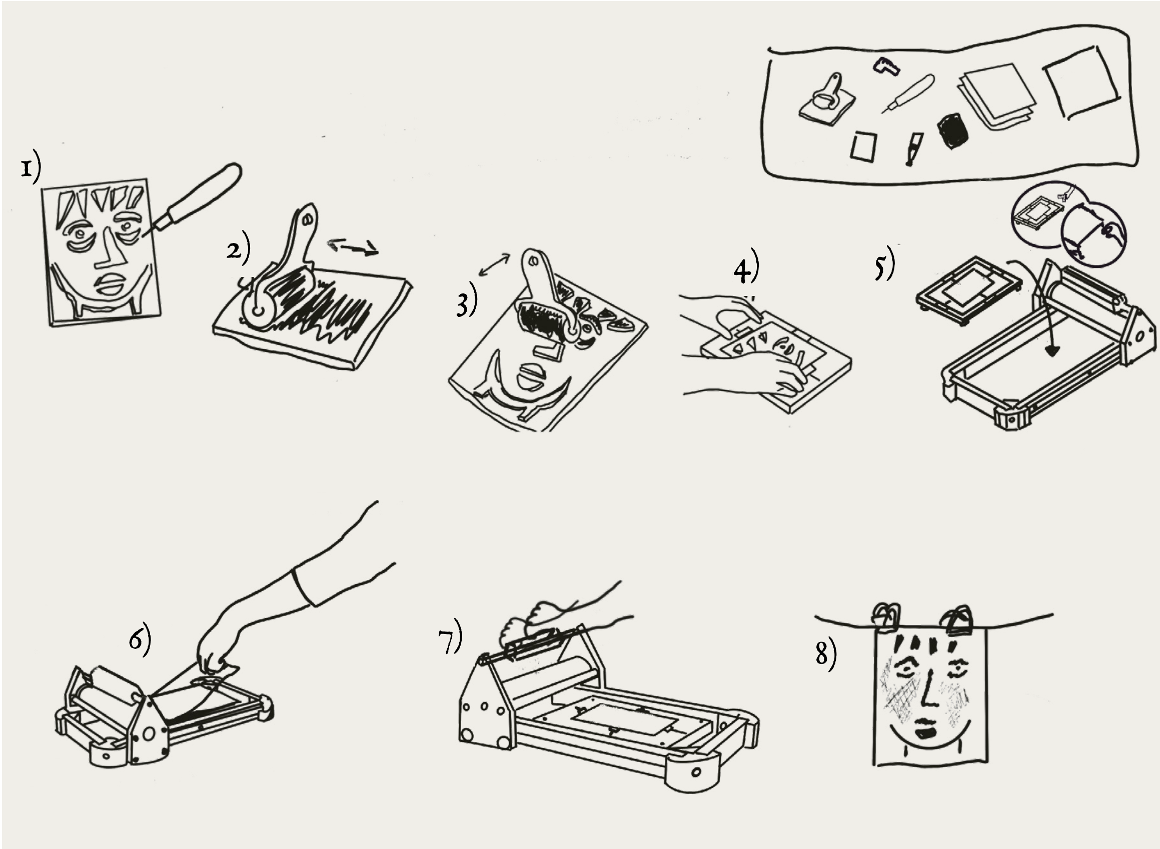
HOW TO ASSEMBLY?(Fig.251)

The video begins by presenting, through stop-motion animation, the various tools and materials required for the user to assemble the press independently. It opens with a 360-degree view of the product, enabling the user to visualise the object they are about to construct.

In the initial stage, the user is invited to consult the manual, which provides explanations of the different assembly steps as well as projections of the required components. The video assumes that the user already possesses all pieces pre-printed and cut to the necessary dimensions.

In the subsequent scene, the two types of rollers available to the user are presented: one constructed from steel, designed to deliver a precise and uniform impression, and the other made from a PVC tube coated with sand, which produces a more handcrafted, textured effect. Both rollers are equally effective, and the choice depends on the user's personal preference and practical considerations. The video does not aim to provide a detailed breakdown of each component; rather, it demonstrates how the combination and connection of individual parts progressively forms the Impresso press. As the assembly progresses, each component is visually highlighted with a label identifying the part in use. This approach illustrates how the integration of the various elements results in a more complex system, guiding the user intuitively through the construction process.

Figg. 250-251 At the top how to print Storyboard, at the bottom how to assembly Storyboard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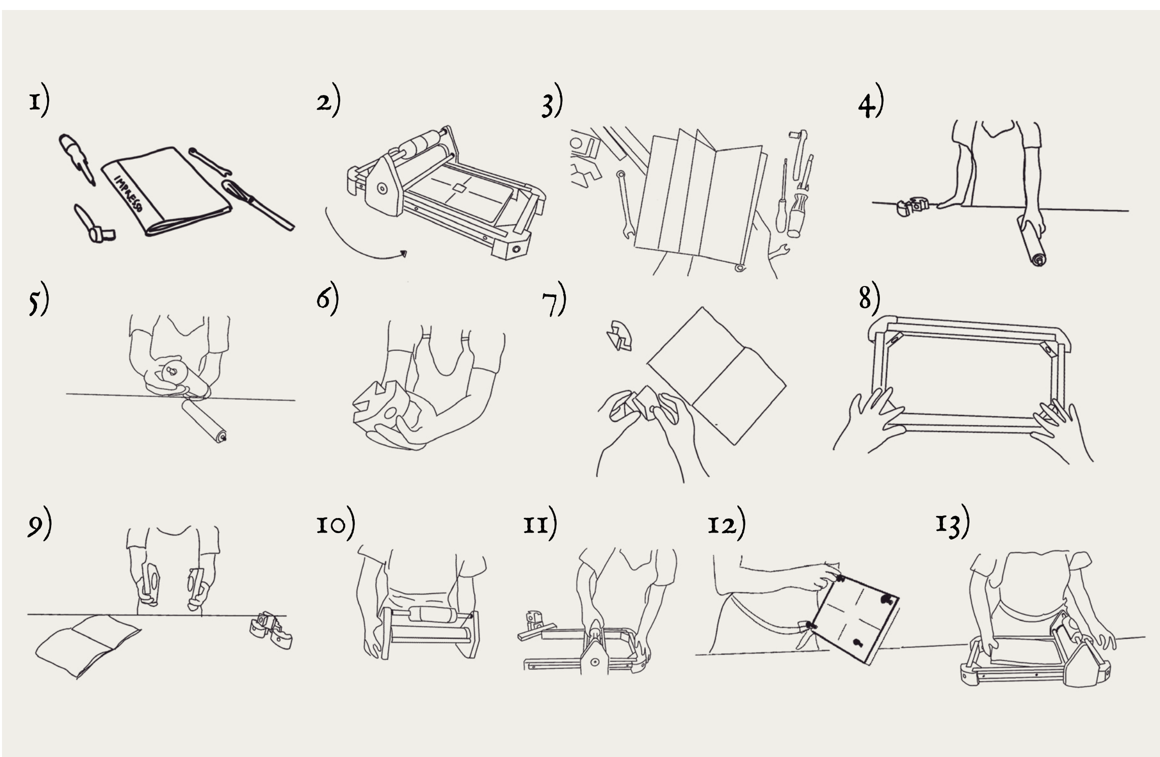
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4.3.5 Openness

Open Shapes of Print, being a project developed within the scope of Open Design, is based on principles of accessibility, sharing and collaboration. Consequently, Impresso not only provides the resources necessary for self-construction but also guarantees a dynamic space that encourages experimentation and creativity.

To visualise the openness of Open Shapes of Print and Impresso, a diagram has been created that summarises the structure of the project from the initial research stage to the digital touchpoints. An early version of the diagram also appeared in volume 1,[142] but it has been updated to accurately reflect the current stage of development of the project. The diagram highlights the dualism that has always characterised Impresso. In fact, the analysis starts from two types of machinery, intaglio presses and proof presses, which are hybridised into a single device. On the other hand, Impresso is divided into two main uses: "make it open source", aimed more at the maker world, and "make it for schools", focused more on the educational aspect. Both worlds have their own guidelines, but they converge in a single object, which can be either self-produced or purchased as a kit.

In the lower part of the diagram, the content of the website pages was updated to align with what is currently published online (see chapter 4.3.2). In particular, the "share of print" and "shop" sections appear less opaque as they have not yet been implemented in the public version of the site.(Fig.252)

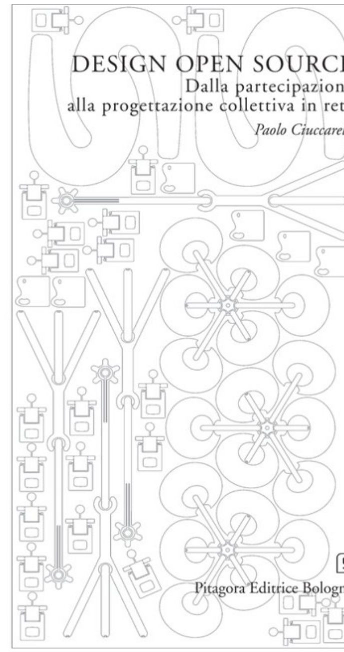
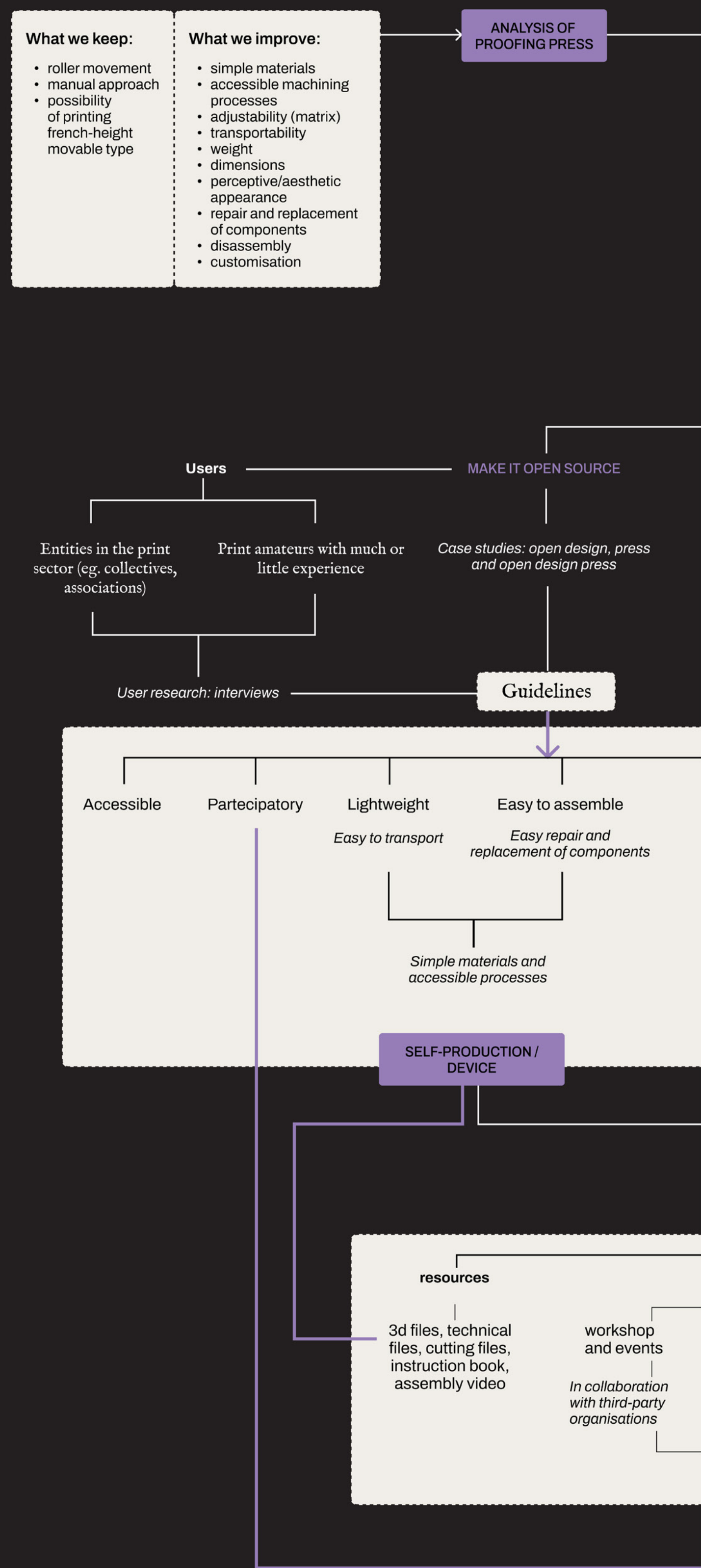
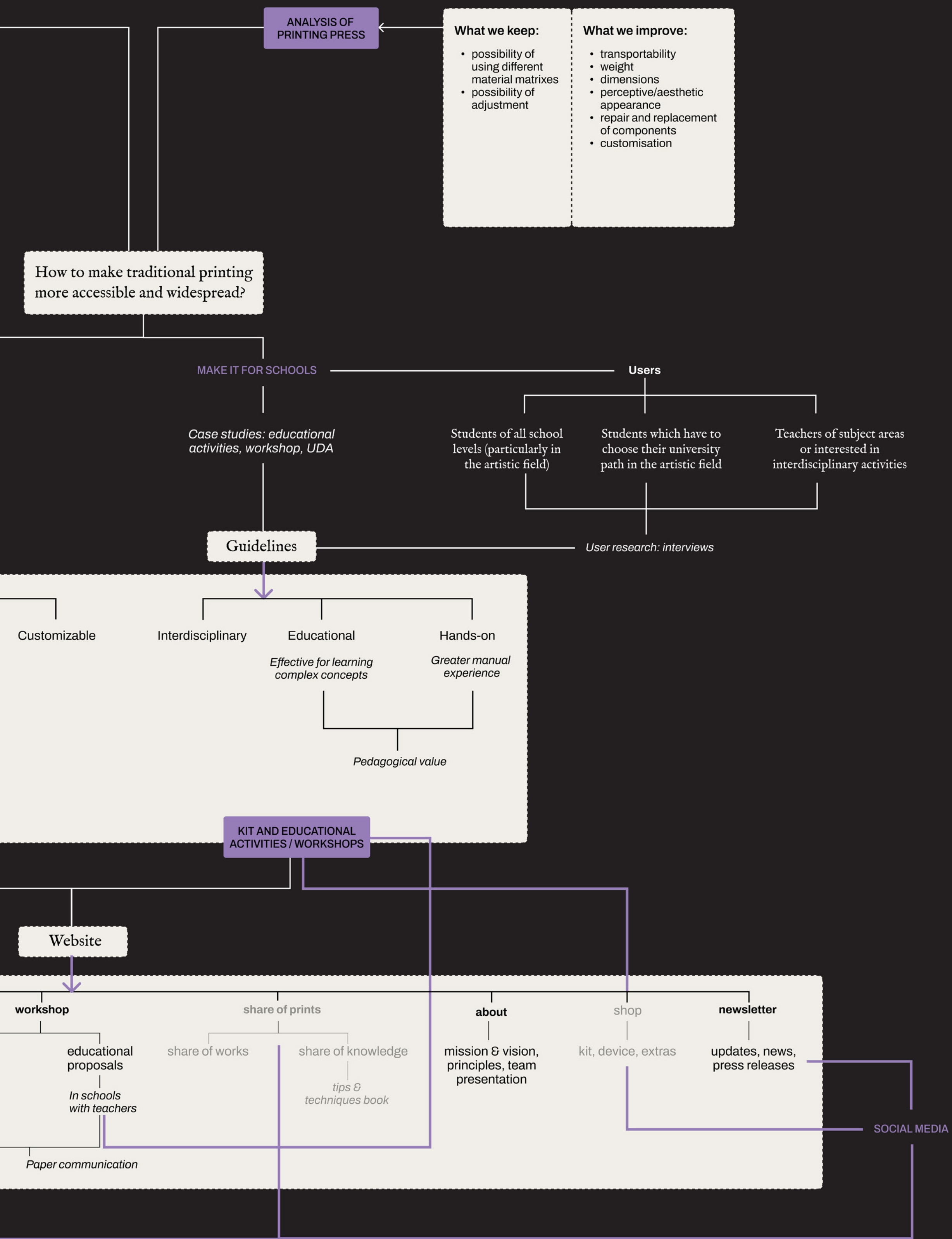


Fig. 252 First prototype of Impresso

142. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Impresso. Open Shapes of Print (Vol. 1, pp. 274-287).* Politecnico di Torino - Dipartimento di Architettura e Design, Laurea Magistrale in Design Sistemico).


What we keep:
• roller movement
• manual approach
• possibility of printing french-height movable type
What we improve:
• simple materials
• accessible machining processes
• adjustability (matrix)
• transportability
• weight
• dimensions
• perceptive/aesthetic appearance
• repair and replacement of components
• disassembly
• customisation
ANALYSIS OF PROOFING PRESS
Users
MAKE IT OPEN SOURCE
Entities in the print sector (eg. collectives, associations)
Print amateurs with much or little experience
Case studies: open design, press and open design press
User research: interviews
Guidelines
Accessible
Partecipatory
Lightweight
Easy to transport
Easy to assemble
Easy repair and replacement of components
Simple materials and accessible processes
SELF-PRODUCTION / DEVICE
resources
3d files, technical files, cutting files, instruction book, assembly video
workshop and events
In collaboration with third-party organisations


ANALYSIS OF PRINTING PRESS
What we keep:
possibility of using different material matrixes
possibility of adjustment
What we improve:
transportability
weight
dimensions
perceptive/aesthetic appearance
repair and replacement of components
customisation
How to make traditional printing more accessible and widespread?
MAKE IT FOR SCHOOLS
Users
Case studies: educational activities, workshop, UDA
Students of all school levels (particularly in the artistic field)
Students which have to choose their university path in the artistic field
Teachers of subject areas or interested in interdisciplinary activities
Guidelines
User research: interviews
Customizable
Interdisciplinary
Educational
Hands-on
Effective for learning complex concepts
Greater manual experience
Pedagogical value
KIT AND EDUCATIONAL ACTIVITIES / WORKSHOPS
Website
workshop
share of prints
about
shop
newsletter
educational proposals
share of works
share of knowledge
mission & vision, principles, team presentation
kit, device, extras
updates, news, press releases
In schools with teachers
tips & techniques book
SOCIAL MEDIA
Paper communication

Licence

Once the openness of the project has been examined, it is important to define to what extent and with what degree of freedom users can access resources. To do this, Creative Commons (CC) licences were used. CC is an international non-profit organisation that offers free licences to allow creators to clearly indicate how their works can be shared, reused or modified. The six CC licences specify what users are and are not allowed to do.

The licence chosen for Open Shapes of Print and, consequently, Impresso is CC BY-NC-SA.(Fig.253) The latter allows a work to be distributed, modified and reused for non-commercial purposes only, always attributing the author and sharing any derivative works under the same licence. It includes three conditions: BY (attribution), NC (non-commercial use) and SA (share alike).

CC BY-NC-SA

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2. Adapt — remix, transform, and build upon the material.

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- the title of the project: Impresso. Open Shapes of Print
- reference to the Creative Commons licence: CC BY-NC-SA 4.0
- the link to the original version of the project: www.openshapesofprint.it

Furthermore, in accordance with the Politecnico di Torino "Regulations on Industrial and Intellectual Property", the authors have the moral right to be recognised as the creators of the work, together with an indication of their institutional affiliation. Therefore, in addition to the authors' names, the attribution must include the words "Politecnico di Torino" as the authors' affiliation. For the sake of completeness, although not mandatory for attribution purposes under either the licence or the regulations, the department to which they belong, the Department of Architecture and Design, the master's degree in Systemic Design and the project supervisor, Valpreda, F., are also indicated.

Fig. 253 Open Shapes of Print licence

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3.1 Starting Point

Fig. 61 Impresso, detail on the cart

It is now described the Impresso press and the design process that, starting at the end of the Design by Components course, led to its development and evolution into a new prototype. This prototype maintains the fundamental principles and many of the original elements of Impresso, but modifies and implements some aspects that were not considered in the first design phase.

This process involved some of the original members of the network that had formed around Impresso, but it also reached out to others, expanding and enriching the community. This chapter is therefore dedicated to describing the involvement of these new contacts and the subsequent testing phases, during which the press was tested by a wider range of users. Two particularly important testing opportunities were the Graphic Days festival (chapter 3.1.2) and the Accademia Albertina in Turin (chapter 3.1.3), which allowed us to gather important feedback and grow the community that has gathered around Impresso.(Fig.61)

3.1.1 First Impresso Prototype

The starting concept of Impresso was the realisation of a self-constructable traditional printing press, by realising it with simple and easily available techniques, reducing the overall weight and making choices in terms of reducing the number of components.[109]

The first Impresso prototype, created during the Design by Components course, aims to adhere to the principles of open source and design by components.

An important phase of research was carried out to understand how traditional presses work. This analysis was conducted using the 'Design by Components' methodology proposed by Luigi Bistagnino in his book 'The outside shell seen from the inside', the result of educational experimentation at the Polytechnic University of Turin.[110] Following the study of a calcographic press and a proofing press, reported in Volume 1, it was possible to improve the accessibility of the components, also with a view to disassembly, facilitate maintenance operations and, through the choice of materials such as wood, make Impresso more suitable for the target audience and the environment in which it is used.[111]

Impresso consists of three sub-assemblies, (Fig.62) the cart with the roller, the frame and the matrix holder. The cart consists of two sides of planed laminated beech wood, held together by three threaded bars, and the steel cylinder/PVC tube, which is inserted into the sides using the 3D-printed PLA flange. In addition, PVC tubes are fitted on the threaded bars to make the press safer to use and to achieve a more consistent appearance. The frame is composed of planed beech wood strips and 3D-printed PLA corner joints. Finally, the matrix holder is composed of a plane of planed beech wood on which there are carvings for the sliders and it is mounted on adjustable feet to raise or lower it according to the thickness of the matrices.[112]

Users have to move the cart so that the roller passes over and presses on the inked matrix, transferring the ink onto the paper.

The tests made it possible to verify the functionality of the product and gather important feedback from users.[113] In particular, as recounted in Volume 1, Impresso. Open Shapes of Print, Gabriele Fumero, from Archivio Tipografico, and Riccardo Cecati, from Ocho Collective, carried out printing tests on Impresso. The printing press was also the focus of a workshop, which included assembly and printing, with a class from Liceo Primo high school in Turin. [06]

The observations were then translated into a number of improvements to the press, in order to make it more effective and accessible.

109. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Impresso. Open Shapes of Print (Vol. 1).* Politecnico di Torino - Dipartimento di Architettura e Design, Laurea Magistrale in Design Sistemico.

110. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Ibid.*

111. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Ibid.*

112. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Ibid.*

113. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Ibid.*

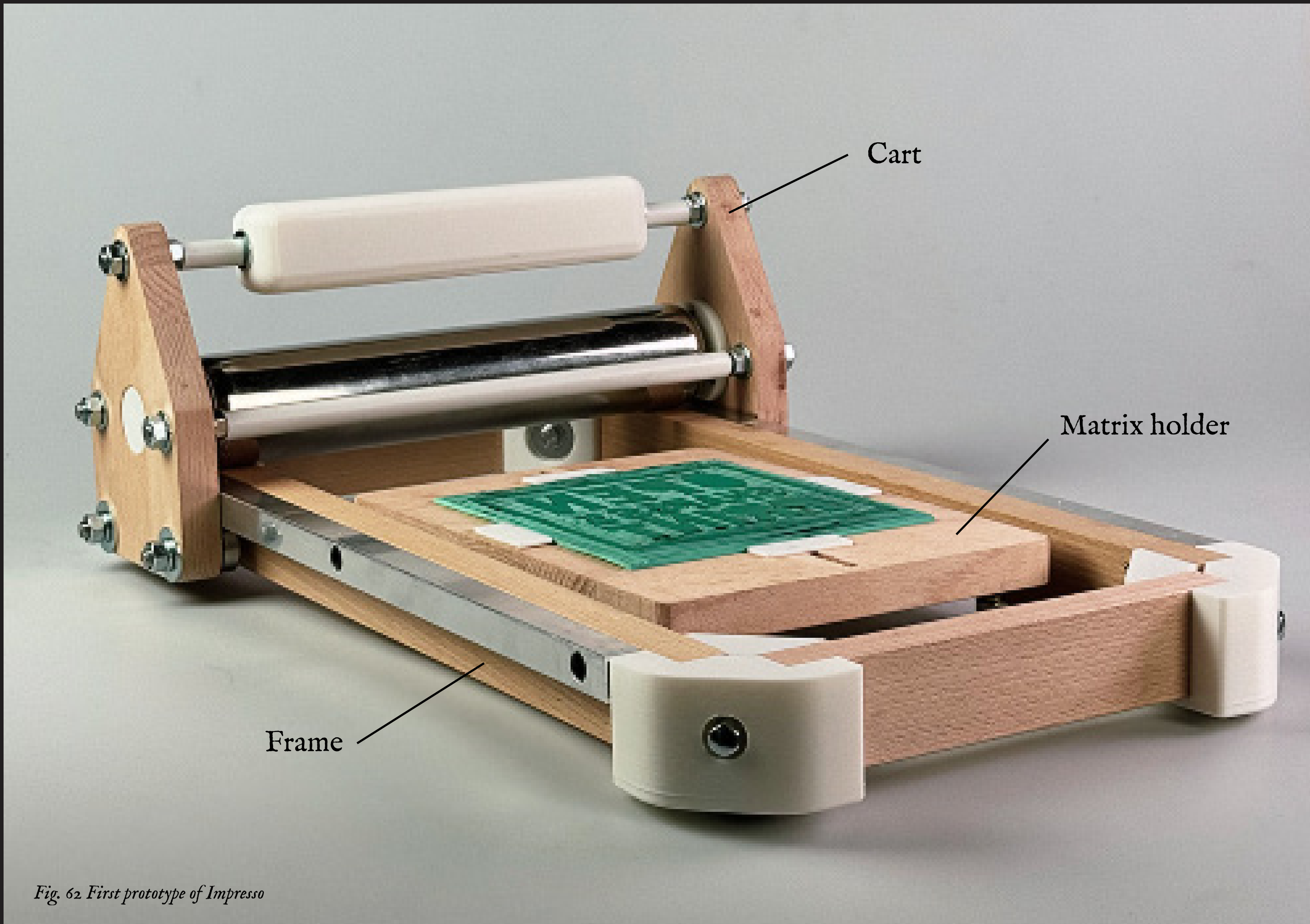

Fig. 62 First prototype of Impresso

3.1.2 Graphic Days

Graphic Days is an annual international festival and observatory on visual and social design, thanks to collaboration with a network of international and local actors. It is a project by Print Club Torino, Italy's first printing and graphic experimentation workshop, located in Turin. It is held every year in a different venue in Turin. This year, the tenth edition of Graphic Days, whose theme was Love Now!, an invitation to welcome, tolerate and be open to diversity, was held at Vitali Park from 8 to 18 May 2025.[114]

Thanks to the cooperation of Print Club Torino, it was possible to bring Impresso to this festival, by including it in the live printing section. This section was the final step of the visit to Vitali Park, where users could try out some printing techniques with different machines first hand and, at the end, bind the various prints into a booklet to be taken home.

Test objectives

Impresso was brought to this festival in order to achieve certain objectives that had been set. The first objective was to have as many people as possible test the printing press, in order to understand their perception of this device and its ease of use. At the same time, the aim was to put it under stress in order to test its durability and efficiency. Another objective was to gather feedback and observations from users. Alongside these more practical goals of gathering feedback on the product, there was a broader one, namely to build connections with other people interested in the world of printing, or professionals in the sector, such as artists and designers. It was also intended to connect with teachers and students, to expand the possibilities for using Impresso, with new ideas for future activities and workshops.(Figg.65-68)

In the live printing section, the printing machinery was arranged on a table so that users could start printing the first technique and then continue with the next ones; at the end, there was the station where the booklet could be bound. Impresso was the second machinery that users could print with. First, there was a screen printing frame, then a typographic handle as the third station, followed by a stamp on some risograph starter sheets and finally the binding station.

At the Impresso station, Print Club Torino had planned to print one of the three linoleum matrices they had created. It was therefore necessary to organise the activity, prepare the materials(Fig.63) and explain to users step by step how the device worked. To simplify understanding for even inexperienced users, cursors were used to indicate the area of the matrix holder where the matrix should be positioned.

Test prints were also made to show visitors the printing results and help them understand that the design on the sheet was mirrored in relation to the corresponding linoleum matrix. Since the table was covered at the front by a stretched fabric featuring the Print Club Torino logo, it was not possible to secure the printing press using the clamp that normally holds the lath in place on the edge of the table. It was also impossible to secure it at the back, as the press would have been too far away from the users. It was thus fixed to the table using double-sided adhesive tape placed under the felt pads on the joints.(Fig.64)

During Graphis Days, Print Club Torino organised a number of workshops and masterclasses, even involving international artists in the latter. This was the case of the masterclass Graphic Love, where artists Pep Carriò and Isidro Ferrer involved a group of people in the collaborative creation of posters printed in risograph through the random sum of the letters of Love Now.[115] There was also experimentation with movable type using a proofing press and, thanks to the invitation of Luisella Cresto of Print Club Torino, also using Impresso. The intention to make Impresso suitable for printing movable type had already emerged, and in this masterclass it was possible to put it to the test, improvising strategies to adapt it, on the spot, to the height of the movable type. It should be noted that the settings used to print them were improvised, so it was not possible to design this function in advance, but it did provide in any case an opportunity to put the printing press to the test. The adjustable supports were removed from the matrix holder and it was placed on the table using inserts and a silicone mat to raise the system to the correct height and prevent it from slipping.

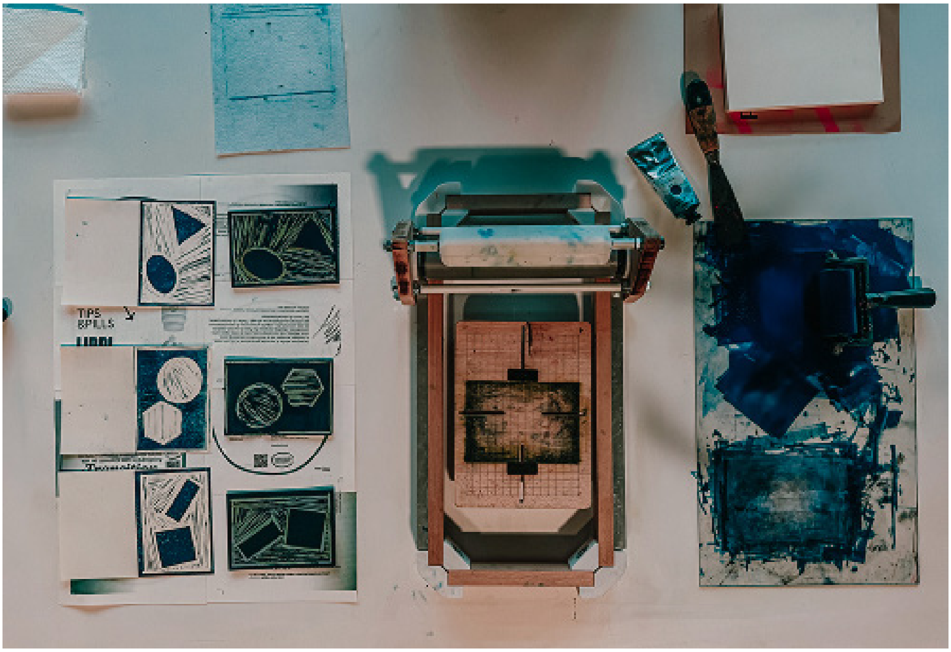

Fig. 63 Organization of print materials

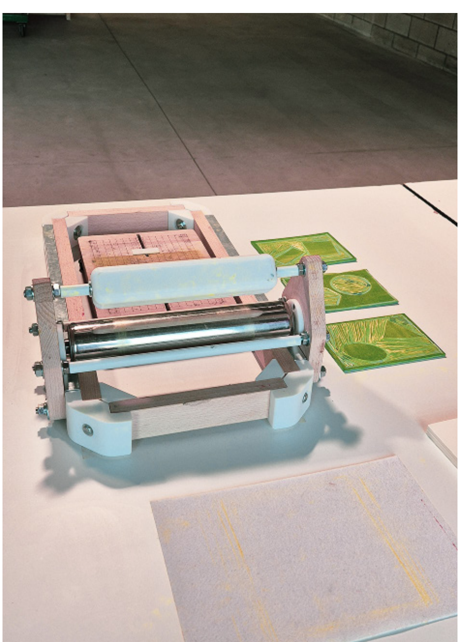

Fig. 64 Arrangement of Impresso on the table

114. Graphic Days. (2025a, February 12). *About Graphic Days.* Graphic Days.

115. Graphic Days. (2025b, March 26). *Masterclass Graphic Love - Graphic Days 2025.* Graphic Days 2025.

Users reached

The festival has a wide target audience and includes people of all ages. On weekends, the majority of visitors were families with children, adults, or teenagers. Weekdays were dedicated to guided tours for schools and high schools. It was therefore essential to adapt the language and explanations to a diverse audience, many of whom had never tried analogue printing techniques before. At the same time, this diversity enriched the feedback on the device and the activity.(Figg.69-76)

Feedback

The observations, feedback and comments that emerged are reported below, organised by topic, namely: Feedback on specific components, Feedback on printing press functionality, Feedback on durability and Feedback on movable types.

Feedback on specific components: the handle is not very ergonomic and it is often necessary to explain that the cart should be gripped by the handle. Some people grip it by the sides. Some users did not understand how the sliders worked. However, when they were used for movable type, it was noted that it was advantageous that the sliders did not slide too easily, as they locked into the carvings making them more stable and secure during use.

Feedback on printing press functionality:

- When using the press, it has been observed that some people, fearing that the press is unstable and may slip, tend to hold it steady by placing a hand on the front wooden lath. However, this can be dangerous, as there is a risk of placing hands in the work area, where the cart slides and then locks into place at the end of its travel, determined by the joints.
- Sometimes people are unsure when to pull the cart towards them, probably because they feel a kind of resistance when the cart presses down on the matrix. However, this resistance is determined by the tolerance between the roller and the matrix holder and allows the exact pressure to be obtained for printing. It should be noted that this uncertainty may also be caused by the fact that users press down with the cart, whereas it is generally not necessary to use force to print.
- Adults in particular felt the need to use a lot of force to print. In reality, as mentioned in the previous point, it is not necessary to press down, because it is counterproductive, as it makes it more difficult to use. In contrast, children moved the trolley more smoothly and did not press down.
- The attachment to the table, such as the clamps, showed limitations in terms of adaptability

Feedback on durability:

- The press was in constant use throughout the festival, from May 8 to 18. It was observed that, following intensive use, some components tended to weaken. For example, the adhesive felt pads attached to the base of the joints tended to flatten at the rear. At the same time, the joints also tend to loosen, and it was necessary to tighten the screws after more intensive use, for example when there was a greater flow of people.
- A young man, who tried printing, provided suggestions regarding the cleaning of the press. For example, it was mentioned by him that a coating could be applied to protect the wood from ink, or beeswax could be used.
- Some users also suggested applying a layer of coating to prevent staining the matrix holder, or gluing or overlaying a transparent sheet to protect the grid without covering it.

Feedback on movable types: during the masterclass, some insights and critical issues emerged regarding movable type printing.

- The first problem is the movement of the matrix holder, as it relies solely on the inserts and the silicone mat. It should also be noted that the table on which it was used was covered with a sheet of fabric, which significantly affected the machine's performance. In addition, some movable type tends to shift or almost tip over when pressure is applied by the roller.
- It was often difficult for users to understand how to compose a text with the types, as words must be composed backwards so that they appear the right way round when printed. In this case, the difficulty was overcome by photographing the text composed with the typefaces and then mirroring it from the phone, checking that it was correct.
- Overall, it was found that movable type printing is possible on Impresso, as demonstrated by the printing results.

Considerations on the experience: the Graphic Days experience was promising and encouraging. A lot of people tried their hand at printing and were very satisfied with the results. People of all ages put themselves to the test and experimented with new techniques. Children also participated in the activity and joined in with commitment and enthusiasm. In these cases, efforts were made to meet their needs, for example by bringing the cart and the matrix holder closer to them, so that they could reach the press more easily. Communication difficulties were overcome, for example when deaf young people printed, by finding alternative ways to explain the activity and meet their specific needs. Similarly, the activity was very inclusive, involving people with intellectual or motor disabilities. By adapting the language to a more or less expert audience, the project was explained to classes of students or interested teachers.

The result was therefore positive, both from a practical point of view, for example it was demonstrated that Impresso works even under pressure (it has, in fact, been tested by around 9000 people), and from a human point of view, creating new contacts and feeling part of a widespread analogue printing community.

Course of the activity

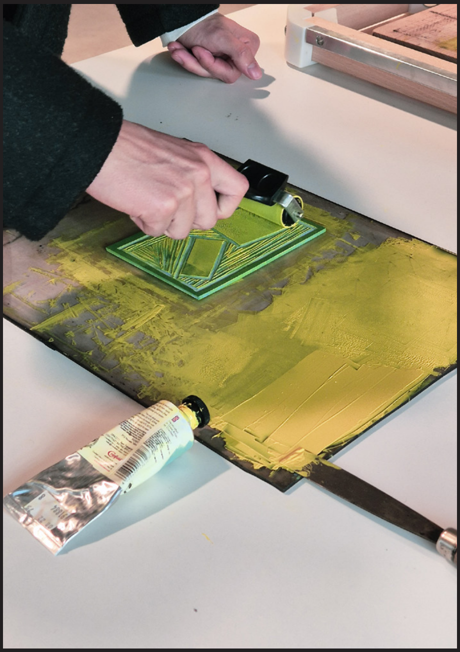

Fig. 65 Inking of the matrix

Fig. 66 Placement of the sheet

Fig. 68 Print results

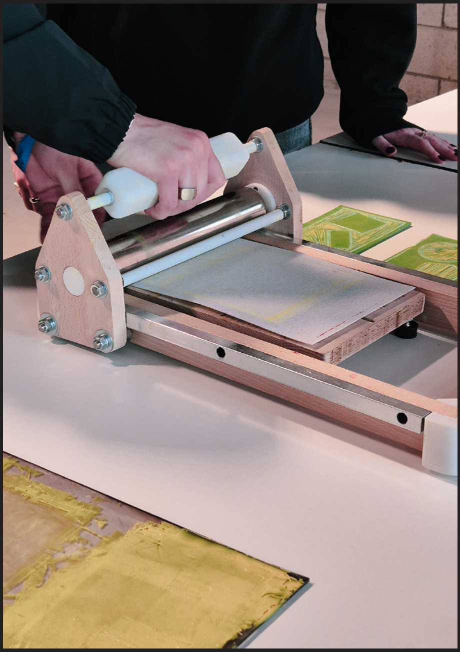

Fig. 67 Print by moving the cart

Fig. 69 Printing station organization

Fig. 70 Live printing activity users

Fig. 71 User engaged in printing

Fig. 72 User placing sheet

Fig. 73 Movable types workshop

Fig. 74 Love Now written with movable type

Fig. 75 Impresso next to a proofing press

Fig. 76 Project team at Graphic Days


GRAPHIC
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3.1.3 Accademia Albertina

A further testing phase was carried out at the Accademia Albertina in Turin on the 23rd of May 2025. The opportunity to have a university class try out the printing press was made possible thanks to Professor Luca Porru, who teaches on the design degree course at the Politecnico di Torino and at the Accademia. He suggested a specific activity for a class of the "New Art Technologies" course, namely two-colour printing, red and blue, to recreate a 3D effect given by the optical effect of the displacement of the two colours.

Test objectives

The aim of the activity carried out at the Accademia Albertina was to test the printing press with a university class, offering a workshop in which students could try printing with the matrices, designed by themselves, and also had the opportunity to assemble part of the press. This made it possible to verify the organisation and planning of the activities, thus confirming the educational value of the project, the functionality of Impresso and its ease of assembly.(Figg.77-85)

The activity involved an initial preparation phase in which the authors tested the multi-colour printing technique before proposing it to the class. The importance of certain steps was understood, such as the order in which to print the colours, first red and then blue, as well as how much the sheet needed to be moved for printing the second colour, relative to the position of the first. In addition, it was decided to use both presses, with stainless steel roller and with PVC roller, to print a different colour on each one, avoiding mixing them. The students were also asked to prepare the matrices in advance, to fully exploit the time available.

The workshop was held in the classroom of the Accademia Albertina in a one-shot morning session. First of all, the project and its principles were presented, then a few volunteers from among the students were asked to assemble the frame of one of the presses. Once the work surface was ready, each student brought their own matrix and printed it first with one colour and then with the other, achieving the desired effect.

Users reached

The class was mainly made up of young men and women in their early twenties but there were also a middle-aged man and woman among the students, who actively participated in the printing session. Unlike the first workshop, held in the Primo high school classroom, it was therefore necessary to adapt the language and explanations, taking into account the students' level of knowledge of printing techniques. It should be noted that most of the students were familiar with analogue printing.

Feedback

Feedback on specific components: the performance of the components was greatly affected by the extended use during the previous week, when the press was employed at the Graphic Days festival. As a result, some components did not hold up well, such as the joints, making the frame less resistant.

Feedback on printing press functionality:

- The assembly phase revealed some limitations. This may be partly due to the condition of the components, which had been stressed in the previous days, making assembly more complicated. Another factor was the lack of involvement on the part of the students, who were more interested in the printing process than in the assembly.
- On this occasion, double-sided tape was again used to secure the press to the table, but this did not provide a lasting hold and began to come off after a certain number of prints. The use of double-sided tape therefore has some limitations, due to the type of material to which it is applied.
- Some students expressed interest in building a version of the press capable of printing a larger format.

Feedback on the activity:

- The multi-colour printing technique is one of a range of possible techniques that can be experimented with on the press. Experimenting with it in class also allowed us to test different activities to propose during the workshops. However, some aspects need to be improved, such as ensuring the correct positioning of the sheet on the matrix inked with the second colour.

- Giving students the freedom to create their own matrices is interesting and allows them to engage actively in the workshop, as they can print their own designs. On the one hand, this led to a personal interpretation of the theme of two-colour printing with a 3D effect. In fact, some brought a single matrix for both colours,(Fig.86) while others created one matrix for red and one for blue.(Fig.87) However, some students brought matrices on supports other than those agreed upon, namely linoleum, using engraved Tetra Paks instead. In this case, the problem was overcome by raising the matrix holder to a height suitable for printing on Tetra Paks.

Considerations on the experience: overall, the experience was stimulating, even if it required overcoming some critical moments, such as when the double-sided tape lost its functionality, or when the students were provided with materials that were different in height from the linoleum. These moments allowed the authors to improve their ability to adapt to unexpected situations, following the different needs of the users, but also to improvise temporary solutions when necessary. It was also noted that the level of class involvement was higher during the printing phase than during the assembly phase. This highlights the importance of tailoring the activity to the target audience in order to achieve greater engagement and attention from the students.

Overall, it was a positive experience, confirmed by the satisfaction of the participants in seeing their own matrices printed. In fact, the prints made during this workshop were then included in a small exhibition at the Accademia.(Fig.88)

Course of the activity

Fig. 77 Workshop Presentation at the Accademia Albertina

Fig. 79 Printing presses arrangement on desk

Fig. 78 Assembly phase with the students

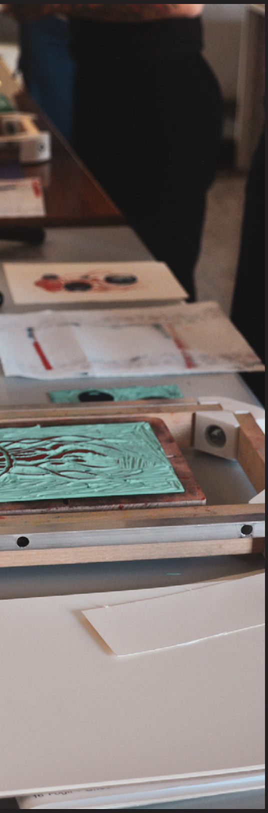


Fig. 81 User inking the matrix

Fig. 80 Users involved in the activity

Fig. 82 Multi-color printing results

Fig. 83 Students with their print

Fig. 84 3D effect of multi-color printing

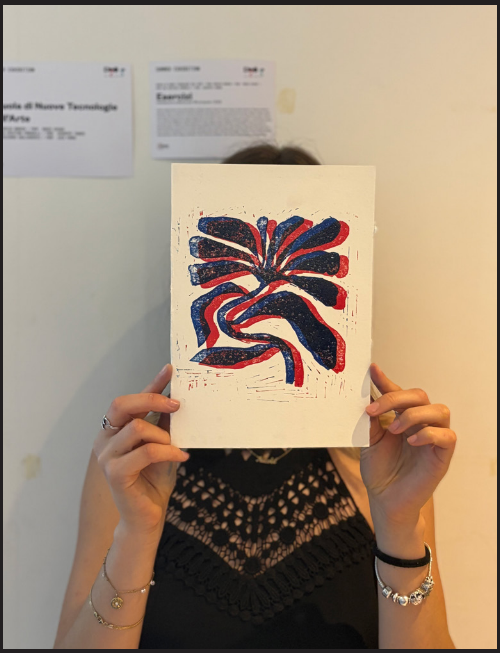


Fig. 86 Print result with the same matrix

Fig. 85 Matrices and results

Fig. 87 Print result with different matrices

Fig. 88 Project team at the Accademia Albertina

3.2 Device Development

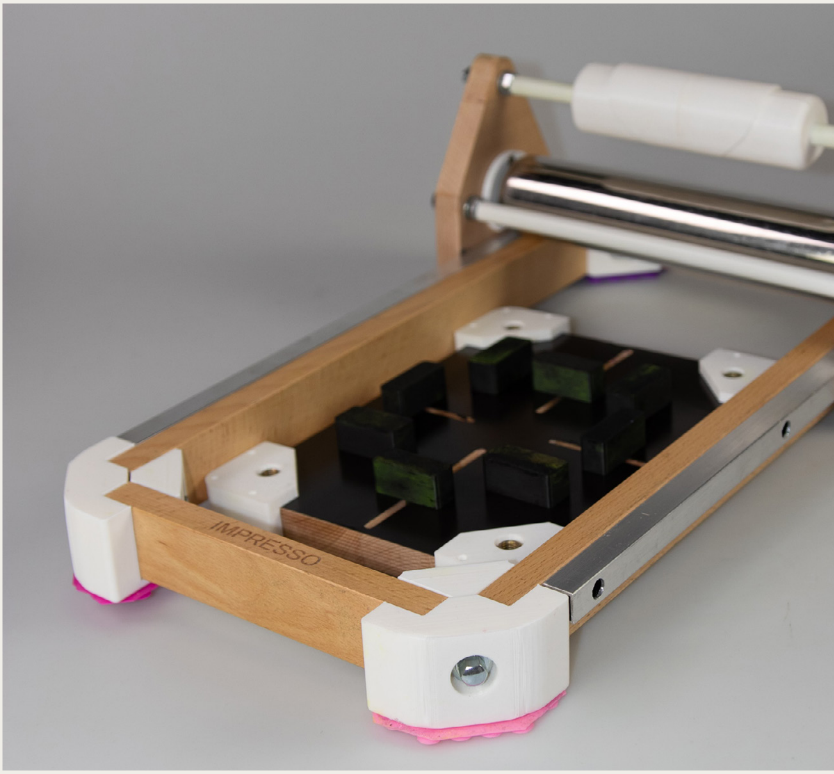


Fig. 90 Team at Maker Faire

Fig. 89 Impresso prototype

The design phases and subsequent testing of the new design solutions are now described, with a view to improving the user experience of Impresso by putting into practice some of the feedback and considerations that emerged during the testing phases. Not only are the successful solutions presented, but the entire process is outlined, highlighting the various alternatives that were evaluated in order to demonstrate the value of the design process.

In particular, the focus is first and foremost on ergonomics, and therefore the first stage of redesign is conceived for the handle. Next, the process for choosing a suitable method for fastening Impresso to the work surface is described. Further modifications are designed for some 3D components, in order to make them more resistant, and for the wooden components, for which a coating is being evaluated to facilitate cleaning and durability.(Fig.89) Alongside these interventions, which aim to make significant improvements to the Impresso press, work is being done to expand the possible printing techniques. Therefore, a way to print movable type, whether traditional, lead or wooden, with Impresso is being designed, and an open project is being adapted to register the sheets in multi-colour printing.

This new Impresso prototype was then taken to Maker Faire Rome, an international fair, where the project was presented to a wide audience, the printing press was tested, and new contacts and future collaborations were established.(Fig.90)

3.2.1 Further Impresso Improvement

Following printing tests on the first Impresso prototype, carried out in various contexts such as the Primo high school in Turin, the Graphic Days festival and the Accademia Albertina, useful feedback was gathered to improve the product. At the same time, the first signs of wear began to appear on the printing press, due to intensive use, especially during the ten days of the Graphic Days festival.

Therefore, some aspects emerged that could be improved, some concerning the intuitiveness of the press itself, others more technical and related to the durability of the materials used to build it. In detail:

THE 3D-PRINTED HANDLE is not very ergonomic, making it unclear to users where to grip the cart. Some users grab it by the handle, others by the sides, and others still grab the threaded bar covered by PVC tubing on either side of the handle. Since the goal is to make Impresso an accessible device that can be used by anyone who wants to work with analogue printing, it is necessary to make changes so that its functioning is as clear and intuitive as possible, modifying the handle and thus improving its affordance. In addition, the handle must also communicate to the user how much force to apply to print by moving the cart, emphasising that it is not necessary to press or pull hard, because the result of the print depends on the pressure created between the roller and the plate. This is designed through the play between the carriage and the frame, which is reset when the roller passes over the matrix, applying the pressure necessary for printing.

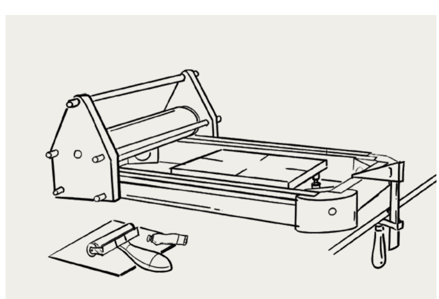


Fig. 91 Press attachment system to the table

THE METHOD OF FASTENING Impresso to the work surface, consisting of a clamp that secures the device to the table from the short side, (Fig.91) is only effective under certain conditions, namely when the press is to be used on a standard table or desk. If the front of the table is covered, it is not possible to apply the clamp. It is therefore necessary to find a more flexible solution that can be adapted to different work surfaces.

SOME 3D-PRINTED COMPONENTS tend to become damaged or break after intensive use. For example, the frame joints are under stress due to the type of assembly, which consists of screws and washers that lock the joint to the lath in order to build the frame. The repeated movement of the cart on the frame tends to wear down the joints, which also work as end stops for the cart itself. In particular, the outer joint is the most damaged; one can in fact see a break in the plastic, both on the inner and outer walls, at the position of the hole. (Fig.92) The result is a progressive weakening of the frame's solidity, which can be repaired on the spot by tightening the screws. However, for a lasting solution, the joint needs to be reinforced. Its mechanical properties depend on the type of material, meaning the PLA printed with a filament 3D printer, and on the print file settings, which must be modified.

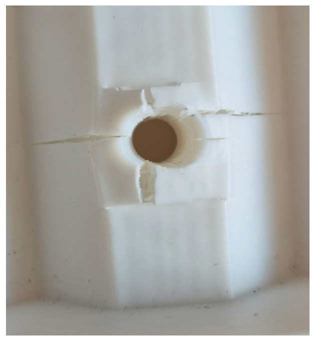


Fig. 92 Damage to the joint

THE WOODEN PARTS, the material from which most of the press components are made, tend to become progressively stained by the inks used in printing. The component most affected by this issue is the matrix holder. With frequent use, it becomes covered with successive layers of ink. During Graphic Days festival, it was observed that, since the matrix is inked on the same Plexiglas surface where the ink is spread, its lower side, the part that comes into contact with the plane of the matrix holder, also gets dirty. The consequences are that the plane is stained, the reference grid becomes difficult to read, and once the ink, usually water-based, dries, the wood tends to warp. This deformation can affect the print quality, as the roller no longer applies pressure on a flat surface, but on a curved one, and as a result, the pressure on the matrix is not constant. A solution must therefore be found to protect the wooden parts, not only for purely aesthetic reasons but, more importantly, for functional ones. (Fig.93)

Fig. 93 Ink-stained matrix holder

The workflow for improving the new press prototype is structured around several main phases: researching references and case studies of similar solutions, including examples retrieved from contexts outside the field of typography, followed by testing of the most promising alternatives and, finally, prototyping the optimised component. The redesign process applied to each of the critical points described above is detailed in the following pages

The handle

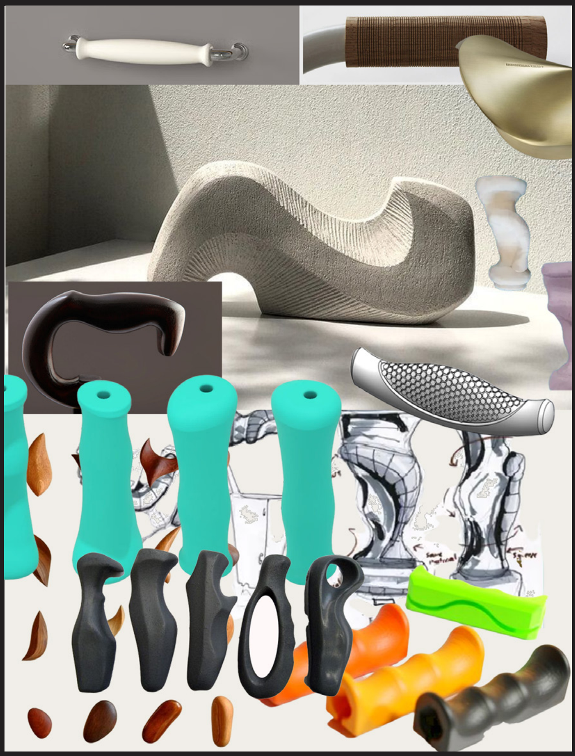
The handle of the first prototype (Fig.95) was designed to reflect the rounded geometric shapes of the press. It was also conceived as one of many possible handle designs, allowing users to customise it according to their preferences, by reshaping it and then 3D printing their personal version. This approach has revealed some limitations, therefore, it is necessary to research alternative solutions to improve its ergonomics, making its shape clearer and more recognisable.

In the initial desk research phase, references were collected from handles used in different contexts, for example bicycle handlebars, where ergonomic studies are important to ensure a firm and comfortable grip for users, kitchen furniture handles and inspiration from objects characterised by organic shapes. (Fig.94)

Fig. 94 Moodboard of handle shapes inspiration

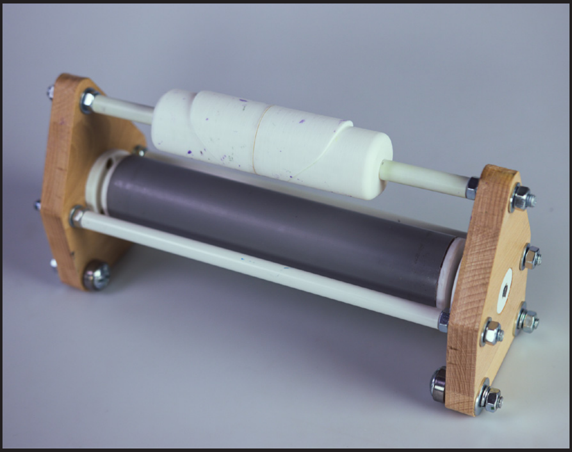
The outcome of this research phase shows that there are various ways to suggest how an object should be grasped. For instance, the handle surface can be differentiated or it can be designed with recesses to suggest the position of the hand and fingers. It is also necessary to take anthropometric dimensions into account.

To study how the handle is gripped, in the specific case of the printing press, practical tests were carried out using modelling clay. It was first applied over the original handle to observe how it was gripped, by analysing the impressions left by the fingers. Then, a separate piece of clay, not mounted on the press, was pressed by hand to simulate the act of gripping. (Fig.96) The resulting hand imprints show the natural position in which the object is held. Furthermore, the second test revealed that the dimensions of the closed hand are smaller than the cross-section of the first handle, highlighting the need to reduce the size of the new model to make it easier to grasp. Based on these observations, preliminary sketches of the possible shapes were drawn up. Two study models were then realised by using polystyrene in order to test the effectiveness of the new handle design, which follows the concept of surface variation. (Fig.97) This concept was declined in two options: the first features a central raised area at the grip, higher than the surrounding surface; the second incorporates an inward offset, so that the central part is recessed relative to the base surface. The difference in height between the surfaces indicates to the user where to place their fingers and thumb. These models measure approximately 39×41×130mm, smaller than the first model, and feature more rounded shapes, which facilitate a more natural grip.



Both versions were then mounted on the cart to be tested in a series of printing trials. (Fig.98) Several considerations emerged: it was necessary to determine the most comfortable way to position the thumb, on top or underneath the handle, and to establish which solution to adopt to suggest the user the appropriate amount of force to apply when using the printing press. Regarding the first point, it was observed that suggesting the user to place the thumb on top of the handle allows for safer use of the press, avoiding positioning the thumb underneath, which would be too close to the cart roller, especially considering the different sizes of hands. Therefore, the most effective model is the one with a central raised area, where the thumb can be placed comfortably in correspondence with the surface variation. (Fig.99) As for the second point, it was noted that fitting the printing press with a handle designed for single-handed use can suggest to the user that excessive force is not required, unlike the handle of the first prototype, which, due to its larger dimensions, could be gripped with either one or both hands. The model of the new handle was printed using a 3D printer. It features the rounded shapes of the polystyrene models and also features a curve, in the lines connecting the surfaces, that recalls the shape of the frame joints, making it consistent with the overall appearance of the printing press. Furthermore, to be easily printable, the body of the handle was divided into two equal parts on the cross-section side, which were then assembled using wooden dowels inserted into the internal blind holes. At the end the two parts were secured with vinyl glue.Once this PLA model had been tested, a final adjustment was made to the dimensions. (Fig.100) In fact the length of the first PLA model was undersized, potentially not being adaptable to the different sizes of users' hands, which vary according to both gender and age. The length of the final model was therefore increased to 150mm..

Figg. 95-100 From top left to bottom right: First prototype handle; Hand impression with modelling clay; Polystyrene study models; Polystyrene handles mounted on the press; Polystyrene handle mounted on the press; New version of the handle.



Straps
Atacca stacca
Clamp
Suction Cups
Velcro
Double-sided Tape
ATTACCA & STACCA
COLLA FORTE & REMOVIBILE
TIENE FINO A 6KG
GAGUIUP
4 PCS
SILICONE SUCTION
3"
Pattex
BIADESIVO TRASPARENTE
Hook & Loop Fastener

Figg. 101-102 Some fastening systems; Suction cups.

Method of fastening to the work surface

The Impresso press is lighter than traditional cast iron proofing presses. When it is used without a clamp, in the moment the cart is pulled to print, the frame tends to lift and move slightly. In the first prototype the slipping problem has been solved by using EVA rubber pads and a clamp that has been added to prevent the frame from lifting. Although the clamp is adaptable to different workbenches, it has shown its limitations when the table on which the press is used is covered at the front or back.

The objective of the improvement is to find an alternative solution that does not completely replace the use of the vice, but rather complements it, making the fastening of Impresso more effective. Desk research was carried out looking for alternative technological solutions, and different methods of fixing objects to surfaces were identified.(Fig.101)

SUCTION CUPS Suction cups are often used on small objects, such as smartphone holders, or as an alternative to non-slip felt pads that can be applied under furniture legs. There are also suction cups with a stronger seal, which are used to secure heavier objects, such as curtains on campers, equipped with a lever to create a vacuum.(Fig.102)

STRAPS Straps allow objects to be secured to a flat surface by tightening them with a specific ratchet.

DOUBLE-SIDED TAPE It is designed for a variety of applications and can be used both to hang objects and to secure them to a surface.

VELCRO Velcro is similar to double-sided tape, allowing the attachment of different loads.

"ATTACCA STACCA MILLECHIODI" It's a glue particularly suitable for hanging objects on walls and easily removable after use.

Fig. 103 Suction cups apply to the press

These options, which come from different fields, were evaluated in relation to the needs of the printing press. In fact the fastening system must be easily adaptable to different surfaces and must be easily repositionable and removable without damaging the surface to which the printing press is attached. Therefore, the alternative that meets these requirements is suction cups, which are easily repositionable and reusable, and once removed, leave no marks or damage on the work surface.

Although initially evaluated as an alternative, double-sided adhesive tape has some critical issues, first and foremost the difficulty of removing it from the table once the press is no longer in use. It was then necessary to analyse how to adapt the suction cup solution to the press. Since the suction cups replace the felt pads, as they prevent both the press from lifting and sliding, they can be applied to the bottom of the frame joints. The decision was therefore made to use rectangular silicone sheets with 24 little suction cups on one side and an adhesive layer on the other, which can be cut to the shape of the joint and glued onto them.(Fig.103) Their functionality was then tested, proving that four suction cups applied to the respective joints hold the press in place when in use. However, it has been noted that the suction cups work on smooth surfaces, such as laminate tables, but not on rough surfaces. Therefore, the hybrid solution of clamps and suction cups allows for adaptation to most variables that may occur.

Strength of 3D printed components

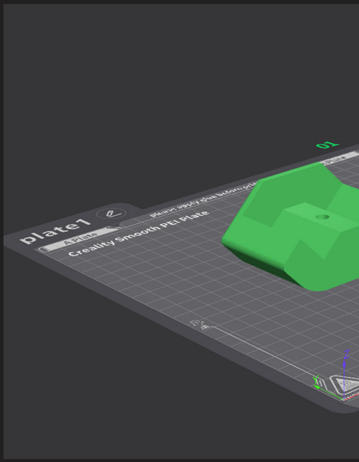
Some components of the printing press are fabricated using FDM (Fused Deposition Modelling) 3D printing technology with PLA filament, allowing users to easily replicate the press at reduced cost and in a shorter time frame.

PLA, or polylactic acid, is a biodegradable thermoplastic derived from renewable resources such as corn starch or sugar cane. PLA filament is particularly suitable for amateur 3D printing users due to its ease of use, as it is inexpensive, biodegradable and does not produce fumes. Even though its mechanical properties are weaker than other types of materials, such as ABS, the latter however does produce toxic fumes and therefore requires a closed 3D printer. The strength of 3D-printed components is also influenced by many factors additional to the material type, such as part orientation, the printing process, the 3D printer settings, and post-processing methods.[116]

Among the components of the press, the joints that make up the frame are subjected to greater stress and have therefore worn out due to frequent use. The aim is therefore to improve the strength of the joints without making excessive changes to the 3D model, but instead focusing on modifying the printing settings of the part. Following a consultation with Alessandro Dentis, a technician at the Virtual Lab of the Politecnico di Torino and an expert in 3D printing, the main parameters that can make the joints more resistant were identified.

PART ORIENTATION Part orientation is an important factor, hence it is necessary to consider the stresses and performance requirements of the product in order to optimize its orientation and strength.[117] The external joint showed a breaking of the plastic, both on the internal and external walls, at the hole. It is in fact more stressed on the axis of the screws, which work at a 45° angle to the frame when closing, containing the structure both transversally and longitudinally. In addition to this stress, there is also the action of the cart. The joint of the first prototype of the press was printed with the base in contact with the printing plate. In this case, the layers that make up the piece, i.e. the filament deposition layers, do not allow it to sustain the stresses observed for long, as 3D-printed parts are more resistant in planes parallel to the construction perimeter, since the molecular bond within a layer is much stronger [118] than the adhesive bonds between the various layers.

It is necessary to change the orientation of the piece, printing the joint with the outer face parallel to the printing plane.(Fig.104)



SPARSE INFILL PATTERN This parameter refers to the repetitive pattern that fills the space inside a 3D-printed part. Among the possible infill styles, triangles, arched, rectilinear, gyroid and honeycomb, the latter is considered the most suitable for the production of the joint, as it allows for a high strength-to-weight ratio.(Fig.105)

SPARSE INFILL DENSITY Defines the percentage of solid material in a printed part. An infill density of 0% results in a completely hollow component, while a value of 100% results in a completely solid part.[119] The joint in the first prototype had an infill density of 15%. Increasing this to 30% gives the part greater solidity and strength.

LAYER HEIGHT The layer height is the thickness of each printed layer, where thinner layers produce a more robust product.[120] In addition, the new joint orientation leads to the creation of overhanging parts at the connection point. Therefore it is necessary to decrease the layer height from 0.2 mm to 0.16 mm so that those parts can be self-supporting, rather than inserting supports in the form of trees, which would ruin the surface quality of the piece.

SHELL THICKNESS Increasing the shell thickness can significantly improve the tensile strength and impact resistance of a part.[121] There are several parameters associated with it. The first one concerns the top layer, specifically the top shell layers, which correspond to the number of solid layers of the top shell. This is linked to the top shell thickness, determined by the number of layers of the top shell. The counterparts of these parameters at the bottom of the object are the bottom shell layers and thickness.[122] These parameters are increased to improve the strength of the part.

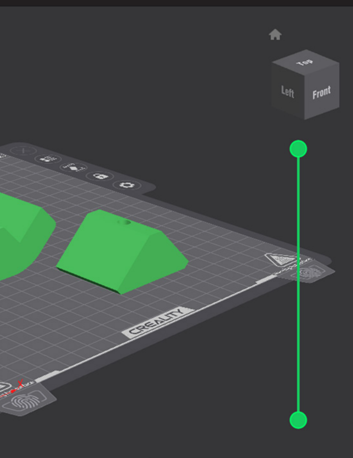


Fig. 104 Joints orientation on the plate

116. Dassault Systèmes. (2023). *Tipi di filamenti per stampanti 3D.*

117. Dassault Systèmes. (2023). *Ibid*

118. Xometry Pro. (2024). *Come ottenere parti più resistenti stampate in 3D.*

119. Xometry Pro. (2024). *Ibid.*

120. Dassault Systèmes. (2023). *Tipi di filamenti per stampanti 3D.*

121. Dassault Systèmes. (2023). *Ibid*

122. Creality. (2025). *Creality Slicer* (Version 5.1) [Software].

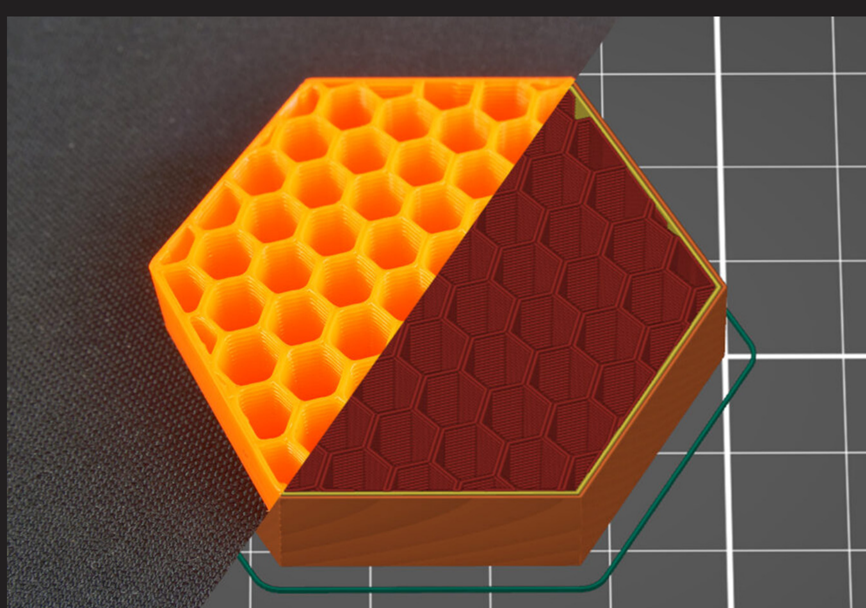


Fig. 105 Honeycomb pattern infill

LINE WIDTH Refers to the width of the line of material formed by the filament melted and extruded from the nozzle during the 3D printing process. The line width is essentially equal to the diameter of the nozzle, but it can be increased or decreased.[123] The line width is defined by the parameters outer wall, which refers to the width of the outer wall line, and inner wall, which refers to the inner wall line. The inner and outer wall values can be indicated as a percentage, which the slicer software calculates based on the nozzle diameter of the specific printer.[124]

123. Anycubic Wiki. (2025). *Line width.*

124. Creality. (2025). *Creality Slicer* (Version 5.1) [Software].

The modified parameters for the new joint have been organised in a table, comparing the old print settings with the updated ones.(Fig.106) Finally, some dimensions of the joint have been modified. In particular, the hole on the external side has been widened to fit a larger washer, which distributes the pressure over a larger area than before. This facilitates the assembly and disassembly of the blind nut that closes the screw and presses on the washer itself.

Settings	Old value	New value
Quality		
Line Width		
Outer wall	0.4	250%
Inner wall	0.42	250%
Strength		
Top/bottom shells		
Top shell layers	4	5
Bottom shell layers	4	5
Bottom shell thickness	0	0.8
Infill		
Sparse infill density	15%	40
Sparse infill pattern	Grid	Honeycomb
Support		
Support		
Enable support	false	true
Type	Normal(auto)	Tree(auto)
Style	Grid	Default
Support critical regions only	false	true

Fig. 106 Comparative table of 3D printer parameters

Coating

The wooden parts are a distinctive feature of Impresso. In fact, from an emotional point of view, Impresso is warmer and cosier due to materials such as wood, making it more suitable for the target and the environment in which it is used.[125] However, it has been noted that when working with inks, these components tend to get dirty and, since the wood is not varnished, they are difficult to clean, especially when the ink is dry. This problem mainly affects the matrix holder, which tends to warp once the layers of ink that have stained it dry, but at the same time it also affects other components, such as the frame laths and sides, influencing their durability. Furthermore, if the matrix holder is stained, there is a risk of damaging the prints. The search was carried out for coatings to be applied to the wooden parts to make them waterproof. Among these, water-based impregnating varnishes were identified, which are often used to protect outdoor wooden structures, such as doors and windows, and also waxes. Since the colour of beech wood is a distinctive feature of the press, both the impregnating varnish and the wax must be transparent. Once the suitable products had been identified, their performance on the wood was tested, also in order to understand how many layers of product to apply, both for the impregnating varnish and the wax. Applying two coats of impregnating varnish, leaving two hours for drying between coats, and then two coats of wax, produced a proper result.

A direct test is carried out on the wooden lath on which both products have been applied. The lath is divided into areas, and each area is painted with a different type of ink.(Fig.107) Specifically, a solvent-based ink, a water-based ink and an offset ink were tested. Once the inks are dry, the piece is cleaned using a cloth soaked in water to remove both the solvent-based ink, which is washable with water, and the water-based ink. For the offset one, however, a degreaser must be used. At the end of the cleaning process,(Fig.108) no traces of ink remained on the strip, but the layers of wax were removed. The only ink that left a slight mark even after cleaning was offset ink. It should be noted that the test involved the use of a large amount of ink, whereas in normal cases most of the stains on the press are caused by stained hands and are therefore less plentiful. The layers of wax removed during cleaning can be reapplied. The treatment also makes the wood look more vibrant and glossy.

125. Aponte, M. P., Bruno, S., Gentili, F., Signetti, A., & Toso, C. (2025). *Impresso. Open Shapes of Print* (Vol. 1). Politecnico di Torino - Dipartimento di Architettura e Design, Laurea Magistrale in Design Sistemico.

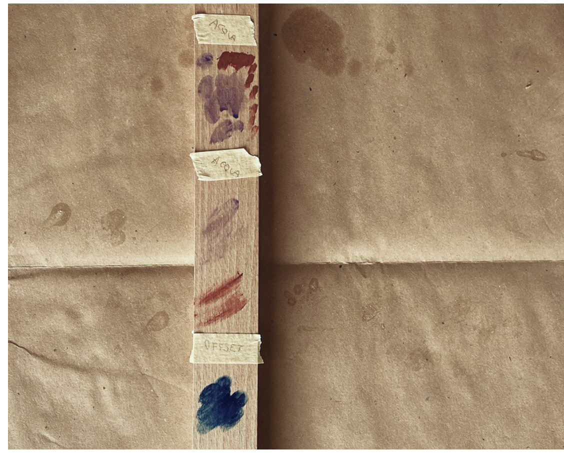


Fig. 107 Inks applied to the coated lath

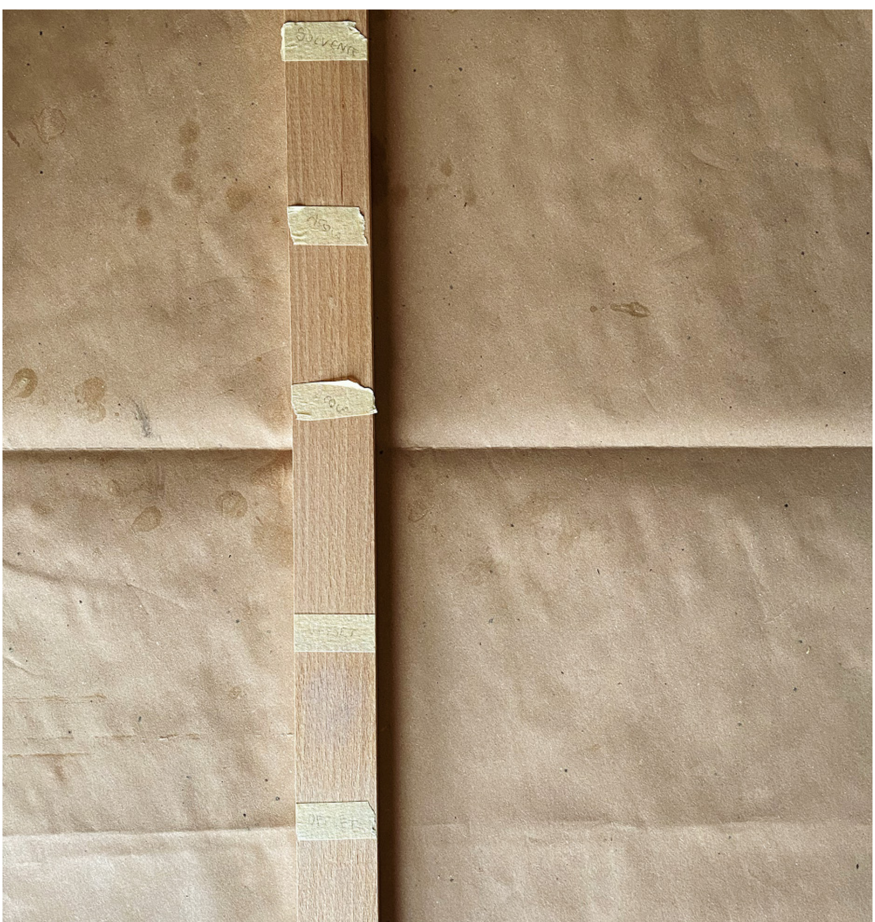


Fig. 108 Lath after the cleaning process

Implementation of movable type printing

Along with defining the improvements to be made to the press, work is also being done on the development and implementation of the printing techniques that can be realised with it. In the first experiments with the first prototype, different printing techniques were tested, like 3D-printed movable type and wooden movable type. Furthermore, during Graphic Days, the press was used during an experimental workshop with movable type, organised by Printclub Torino and artists Pep and Isidro. In this occasion a temporary solution was found to adapt the matrix holder to the height of the movable type:

the feet were removed and the matrix holder was placed on the table, with a non-slip silicone sheet inserted underneath. The aim was therefore to expand the techniques available, so that users could also print compositions with movable type using Impresso, developing the improvised strategies devised during the Graphic Days festival into a structured design implementation. The analysis of the case studies reported in chapter 1.3 was resumed in order to verify whether other open source or self-built presses provided for the possibility of printing with movable type. Four case studies were selected that met this requirement.(Fig.109) The first is "Movable Type, table, and extension for Open Press printer" (see chapter 1.3),

an Open Source project shared on the Thingiverse platform to transform the Open Press intaglio printing machine, created by Martin Schneider, into a relief printing machine. The project involves movable type, 3D-printed typefaces and image plates.[126] The case study presents some interesting ideas, such as the creation of a frame that allows the movable type to be printed. However, it does not specify precisely how the movable type is fixed to the plate. The second is "Home Made Letter Press" (see chapter 1.3), a project shared on the Instructables platform, involving a self-built press for printing 3D-printed movable type in PLA.[127] The interesting aspect concerns the movable type fixing system, because the author creates a laser-cut mask to hold the type composition in place. "The Community Press" (see chapter 1.3) consists of a DIY printing press and custom-designed typeface, made from 12-point end-grain hard maple wood.[128]

"The compositions are fixed to the press using a hybrid approach that involves both traditional lead spacings and self-made wooden spacings. "Provisional Press" is a DIY press designed by Steve and Liz Garst, which allows for different printing techniques and also offers several solutions for fixing movable type to the plate. The first consists of using movable type and traditional lead spacers, while the second involves inserting a metal plate on the wooden surface, on which the type can be secured using magnets. This solution provides some interesting insights, as the magnets can be easily repositioned on the surface and allow very different compositions to be secured.

126. pyzi. (2020). *Movable Type, table, and extension for Open Press printer.* Thingiverse.

127. Roach, R. (2024). *Home Made Letter Press.* Instructables.

128. Lindgren, O. (2024). *The Community Press.* Olalindgren.se.

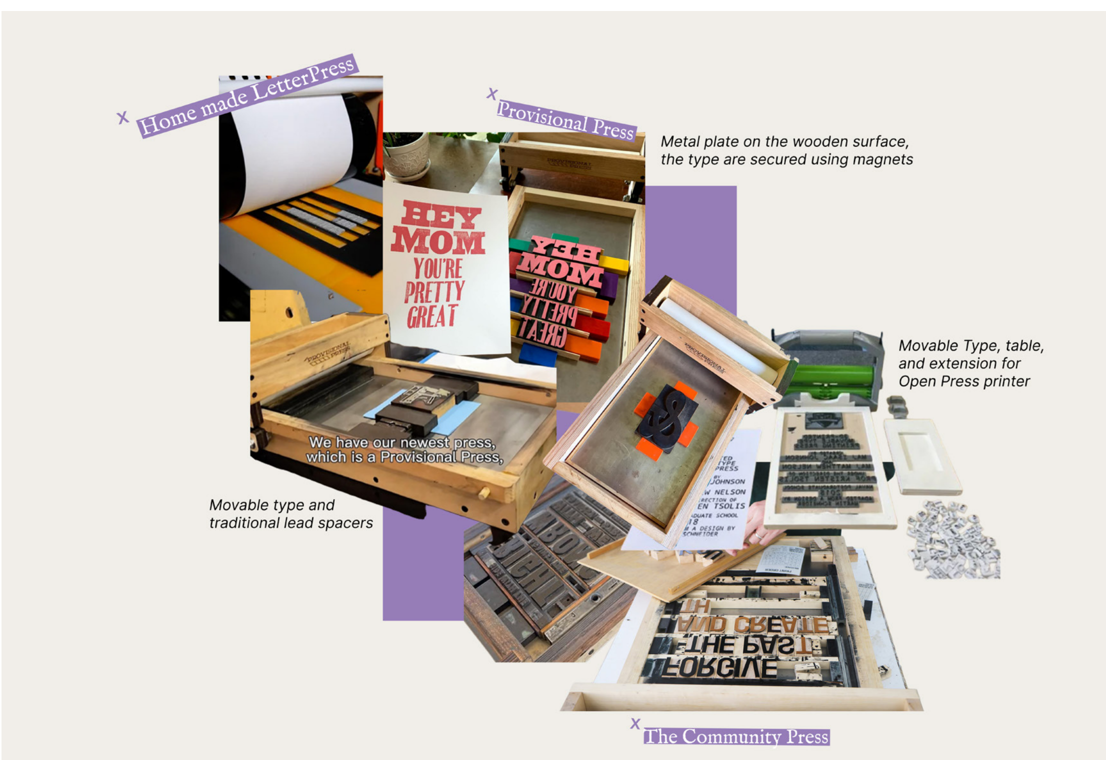


Fig. 109 Projects implementing movable type printing

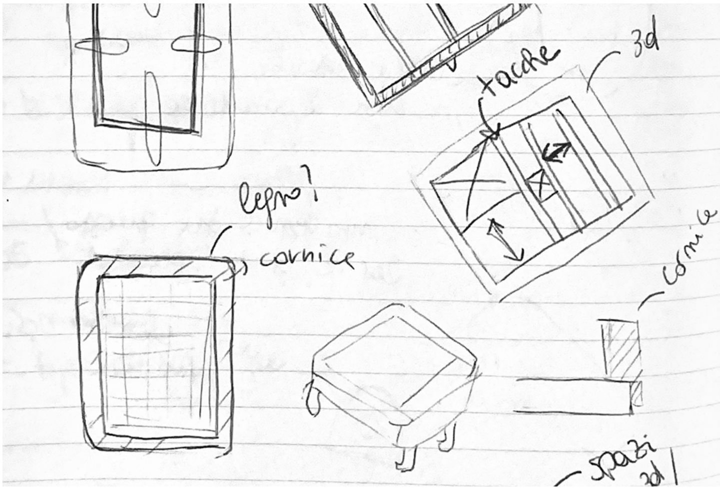
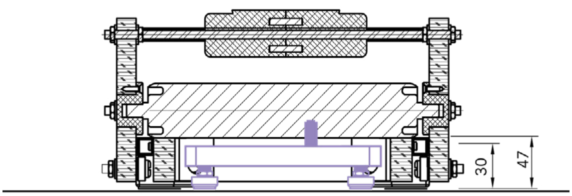


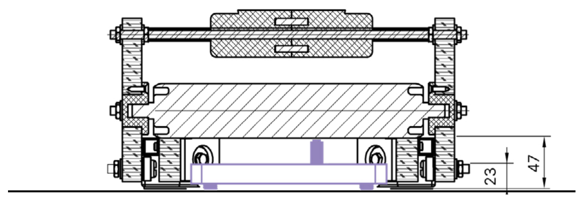
Fig. 110 *First sketches*

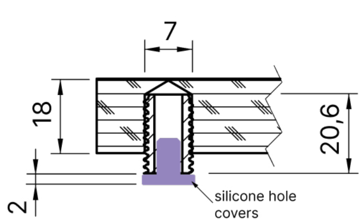
Following the analysis of the case studies, it was decided to use the current matrix holder, without providing an additional support plane for movable type, in order to use the same components for both printing techniques that require the matrix holder to be raised on feet, such as linocut, and for movable type. Only additional adaptation components are expected to be added to switch from one version to another. In fact, the substantial difference between the two versions of the matrix holder is determined by the height of the movable type, which is 23.56mm (French standard). Furthermore, the implementation of movable type aims to offer more possibilities to the user, who can either use the original lead movable type, thus exploiting the new implementation of the movable type plan, or print customised movable type in 3D, thus being able to decide on the height and utilising the current plane for linocut matrices. It is also taken into account that it is currently possible to find original movable type, in lead or wood, in physical and online second-hand shops, while other elements for letterpress composition, such as spacing and quoins, are less common. The latter elements can only be found in specialised print shop.

Some preliminary sketches were drafted to understand how to use the matrix holder plane. In particular, the potential of the sliders emerged, which can be used as a method of fixing the characters, for example by providing a frame that fits into the carvings and holds the character compositions together. It is then necessary to check the current dimensions. The drawing shows that the sum of the height of the movable type, the wooden base and the feet exceeds the height of the frame, causing excessive pressure on the movable type, which is displaced by the cart, thus not enabling printing.(Fig.110) However, if the feet are removed, the sum of the height of the type, the wooden base and the inserts is less than the height of the frame, which also prevents printing.(Figg.111-112) It should be noted that in this first phase of experimentation, the considerations regarding dimensions refer to the first prototype of the press, in which the fastening system is a vice and the felt pads are used under the joints to prevent slipping.

It is necessary to compensate for the difference of a few millimetres, so it is necessary to find components that can be fitted or inserted into the inserts to bring the system to the correct height. The choice fell on silicone hole covers, which can be fitted into the inserts and compensate for the 2 mm difference. Furthermore, due to the type of material, they also provide a non-slip solution.(Fig.113)







Figg. 111-113 From top left to bottom: Drawing of the adjustment for movable type printing; Drawing of the second adjustment for movable type printing; Drawing of the adjustment with silicone hole cover.

At the same time, the possibility of using the sliders as a movable types fixing system was analysed. In particular, it was hypothesised that their dimensions could be changed, increasing the height of the sliders so that they could create a support for the movable characters. However, this solution does not allow for great flexibility, as the positions in which the sliders can be inserted are determined by the carvings.

Some printing tests were carried out, creating models of the new sliders by gluing polystyrene blocks onto the old sliders.(Fig.114) The solution proved promising, as demonstrated by the printing results, but it showed some critical issues when the shape of the composition was not contained within a square or rectangle, or when there were large differences in height between the typefaces. Based on the considerations made in the case studies, one takes up the idea of Provisional Press to add an iron plate on which to apply magnets to hold the composition in place. The peculiarities of the Impresso matrix holder must be taken into account, and therefore it is not possible to insert an iron plate, but rather a flexible adhesive

Fig.114 Composition with movable type and sliders

iron sheet can be applied. Initial tests show that the stability of the system is mainly influenced by the type of magnets used, but in general they provide good support. However, this solution would involve gluing the iron sheet layer onto the matrix holder, thus not only covering the reference grid, but above all contradicting the objective of interchangeability between the linocut plate and the movable type plate.

A new solution is therefore considered, which involves turning the matrix holder upside down so that the adhesive iron sheet can be glued to the back, avoiding covering the grid on the front. In this case, however, the height resulting from the sum of the base and the movable type is less than that of the frame. The possibility of designing a new component to bring the system to the correct height is therefore evaluated and, among the many support options, a new corner joint is designed. The joint can be 3D printed to maintain consistency with the other components of the press. In order to achieve easy interchangeability, it must also be easily removable. Four corner joints are designed to be fixed to the matrix holder, each consisting of two parts, a lower part on which the plane is supported, and an upper part that locks it in place using the protrusion of the insert.(Fig.115)

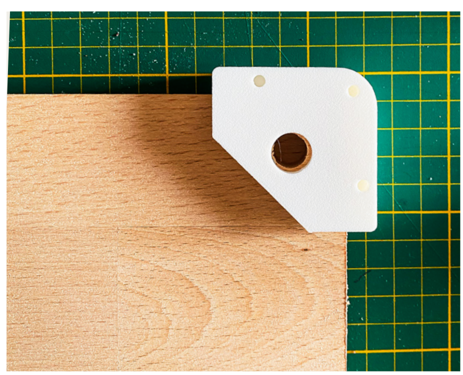


Fig.115 3d printed corner joint model

Fig. 116 **Different configuration of the matrix holder**

Fig. 117 Sliders and magnetic slider for movable types

The sheet of iron is therefore glued to the back of the matrix holder and cut out in order not to cover the carvings. In fact, the movable type fixing system now consists of a hybrid solution(Fig.116) in which there are both sliders that lock the composition in the horizontal and vertical directions, and magnets that can be positioned in a more flexible manner on the surface. A component is also designed to contain the magnets, replicating the shape of the new sliders, removing the tabs for fitting into the carving, and creating a hollow area in which to insert the magnet. (Fig.117) Therefore, this solution, which involves turning the matrix holder upside down and adding the iron sheet components, the corner joints, the new sliders and the magnets, has been tested in a number of print trials. In this case, the tests were carried out on the press with the new suction cup fixing system, so it was necessary to recalculate the height of the corner pieces. These prints demonstrate the functionality of the system, which allows different compositions to be printed, achieving good printing results. (Figg.118-119)

Figg. 118-119 Print results with movable type;
In the other page: Compositions with movable type


Leaving
a mark,
one print
at a time.

Multi Colour Printing

A further implementation concerns multi-colour printing, which can be done on a linoleum sheet, creating as many matrices as colours to be used. Therefore, a system is needed to register the sheet so that the colours overlap perfectly for a correct print result. Initial research led to the identification of registration pins, manufactured by Ternes Burton, a Minnesota-based company, to be used with stripping tabs for various techniques, including relief printing on linoleum and wood blocks, and screen printing. (Fig.120) These registration pins are available in two versions: one in stainless steel, printed, welded and polished by hand, and one in plastic. The stripping tabs are made of Mylar, a Polyester film, which are applied to the paper and can be attached to the registration pins through a hole.[129]

Further inspiration is provided by an open source version of Printmaking registration pins, designed by Pete Prodoehl,(Fig.121) inspired by the Ternes Burton system, and shared on the Printables platform. In this case, both the registration pins and stripping tabs models are available for 3D printing. The files are shared under a Creative Commons licence (4.0 International Licence), attribution required and Commercial Use.

The open source project identified is interesting since it allows users to create registration pin models with their own 3d printer. This approach can be adopted and adapted to the needs of the Impresso press. Therefore the models available on Printables were printed and tested to verify their effectiveness.

Testing them on Impresso(Fig.123) revealed two critical issues: the first is that the registration pins must be attached to the press table with tape, and the second is that the size of the model downloaded from Printables does not allow the entire table of the matrix holder to be exploited. Regarding the first critical issue, while it is difficult to find alternative ways to attach the stripping tabs to the paper sheet, an alternative solution can be searched for the registration pins. Sketches are drawn to assess how to integrate the registration pins into one of the components of the matrix holder. The sliders are suitable for this purpose.

An alternative version of the sliders is designed, which function as registration pins, by inserting two symmetrical holes on the flat part. In this way, they can fit into the carvings on the plane, solving the first critical issue of the case study. Unlike the reference, the holes on the slider are through holes, for orientation requirements on the 3D printer bed. Therefore, the stripping tabs have also been modified to feature an extruded cylinder on the surface that can be inserted into the holes. In this way it is also resolved the second critical issue, as the reduced width of the slider allows the size of the print plane to be exploited.(Fig.122)

Fig. 120 Register Pins and Stripping Tabs

129. Ternes Burton Co. (2025). *Register Pins, Stripping Tabs.*

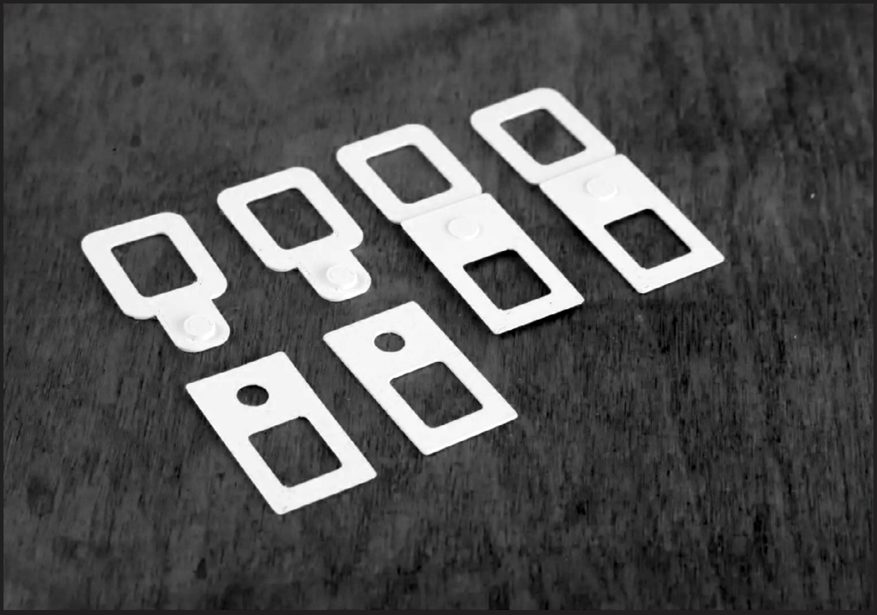
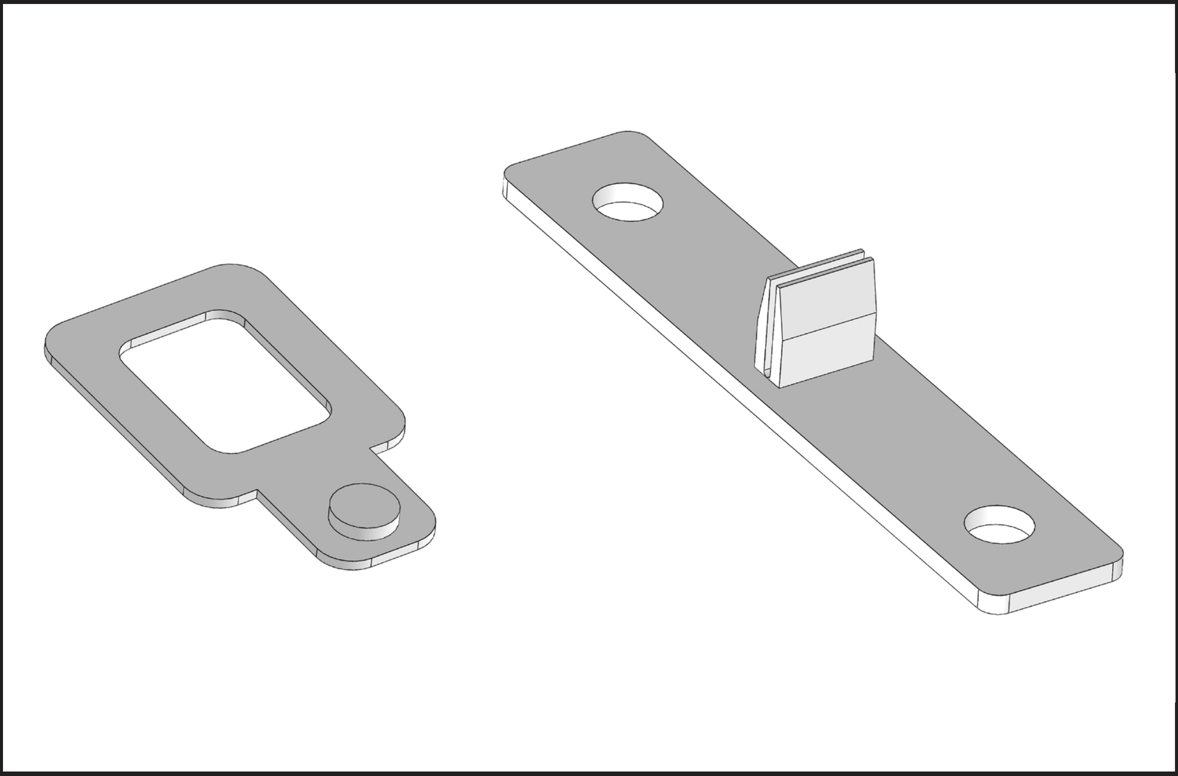
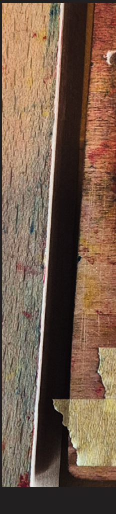
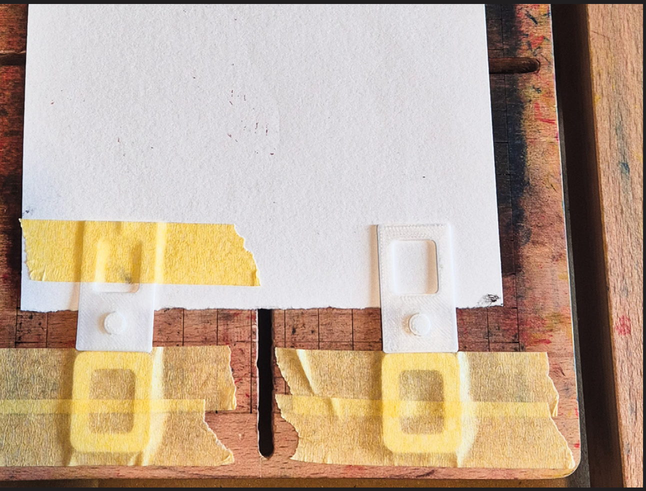


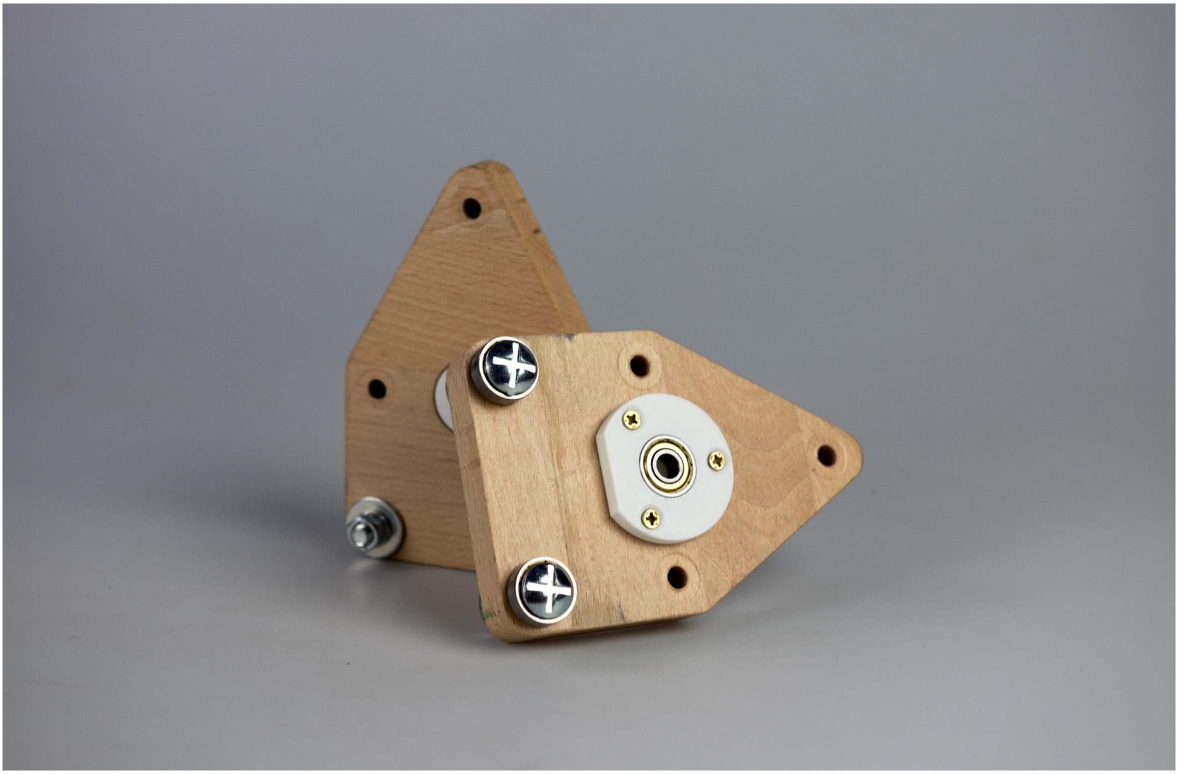
Fig. 121 Open registration pins model





Figg. 122-123 Left: Redesigned registration pins; Bottom: Registration pins functioning test.



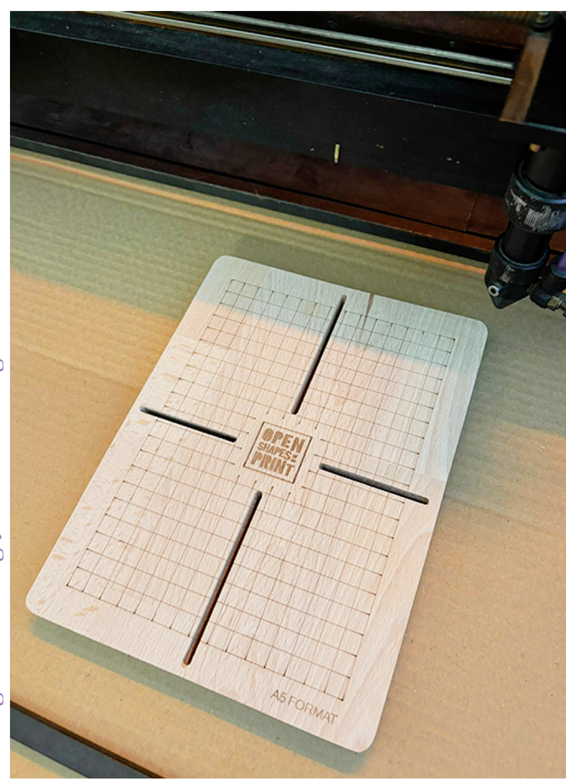


Developments in self-construction techniques

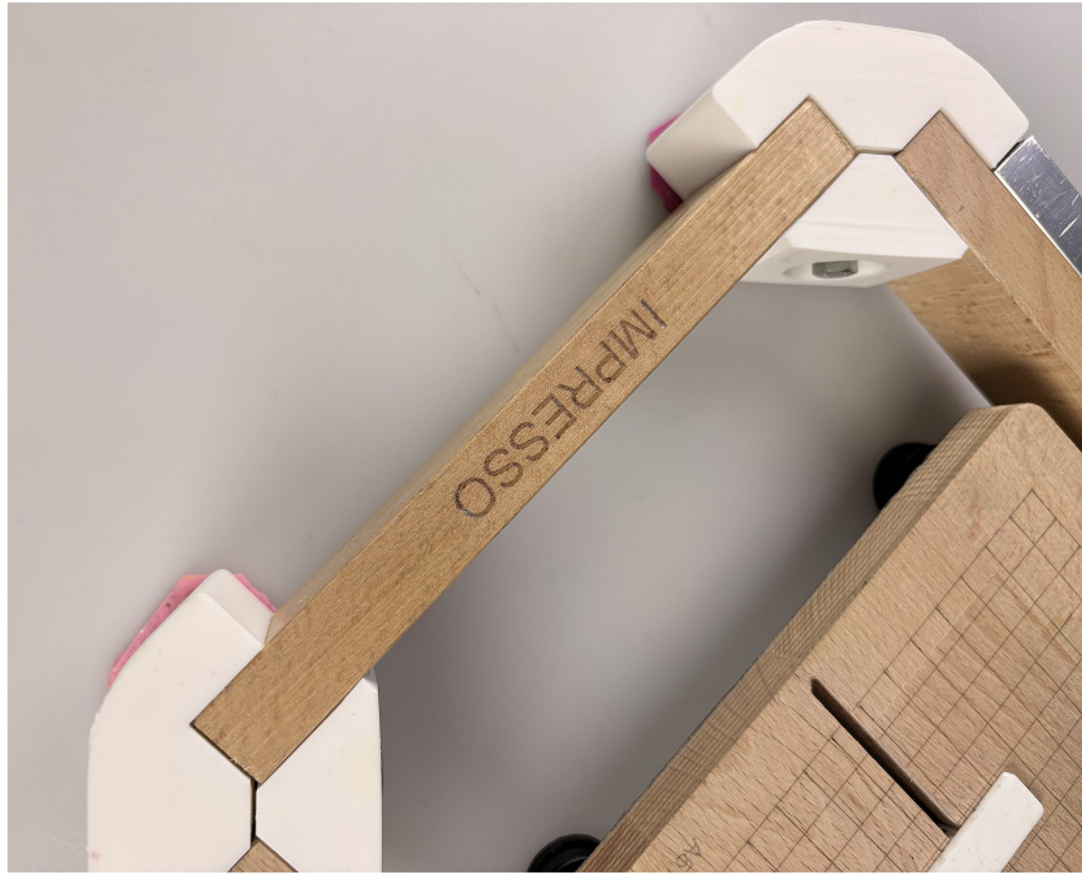
Development of the press has also involved work on expanding the technologies for self-construction. In fact, some wooden components in the previous prototype had been fabricated using the machinery available to the authors, which, however, was not entirely precise and, in particular, there had been difficulties with the carvings on the matrix holder. The result was considered acceptable and functional for the first prototype, but there was margin for improvement.

Therefore, support was requested from the Modlab Design at the Politecnico di Torino, a laboratory that provides students with technical tools to create study or final models, together with the assistance of technical staff. Thanks to the help of Professor Vicentini, head of the laboratory,[130] the wooden plane of the matrix holder and the sides were produced with a CNC milling machine.(Fig.124) The machining allowed for greater precision and, especially for the carvings of the matrix holder, created a regular profile to ensure correct insertion of the sliders. In addition, thanks to Fablab Torino, it was possible to update the laser-engraved grid on the matrix holder.(Fig.125) In the initial prototype, it was a simple positioning guide for the matrix. This new prototype also includes the Open Shapes of Print logo and indicates the maximum format for the matrices, which is A5.(Figg.126-130)

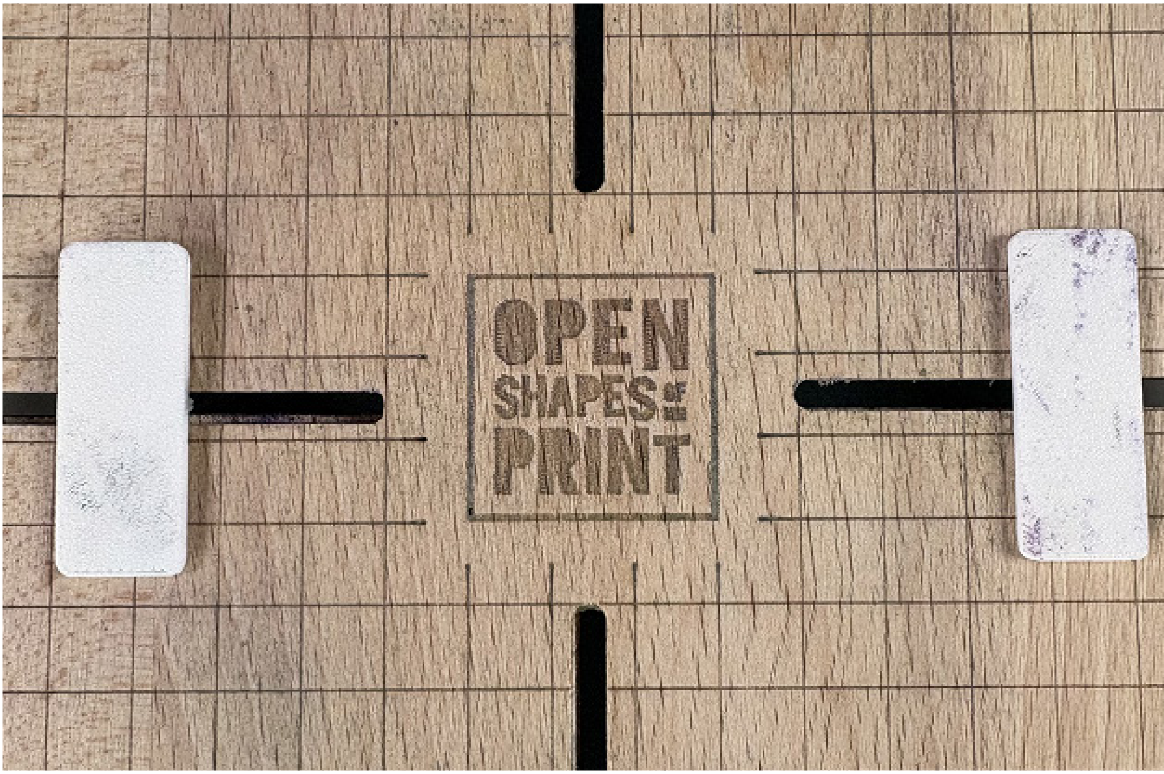
130. MOD Lab Design. (2025). *Laboratorio Modelli Dipartimento di Architettura e Design.*

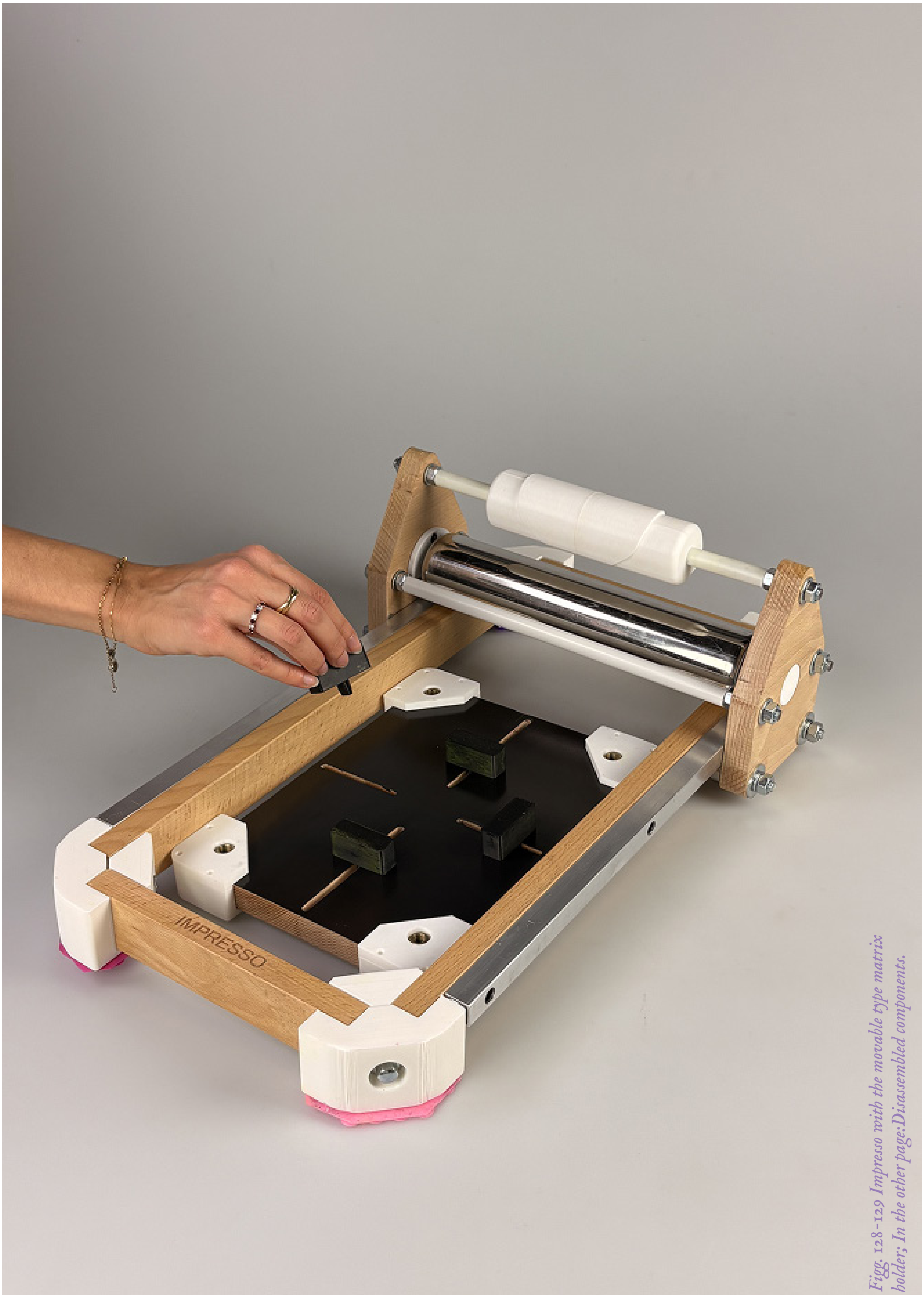


Figg. 124-125 On the left: Sides made with CNC milling machine; On the right: Laser cutting of the matrix holder grid

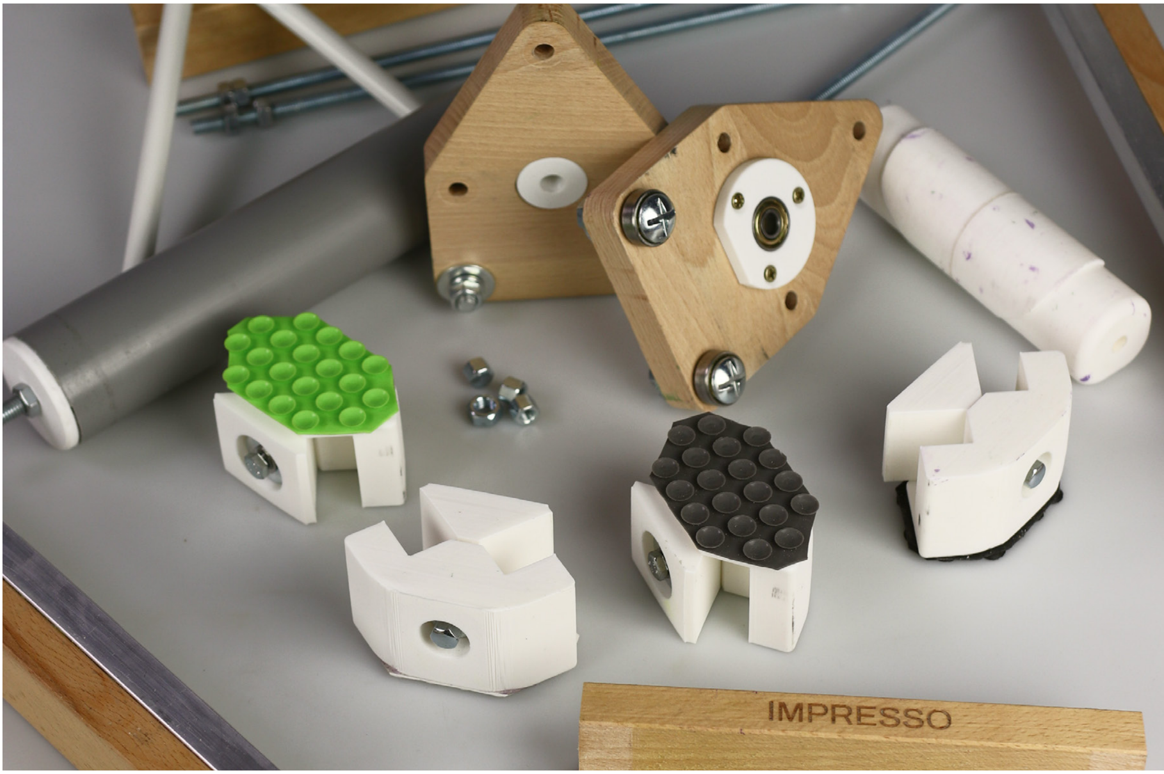


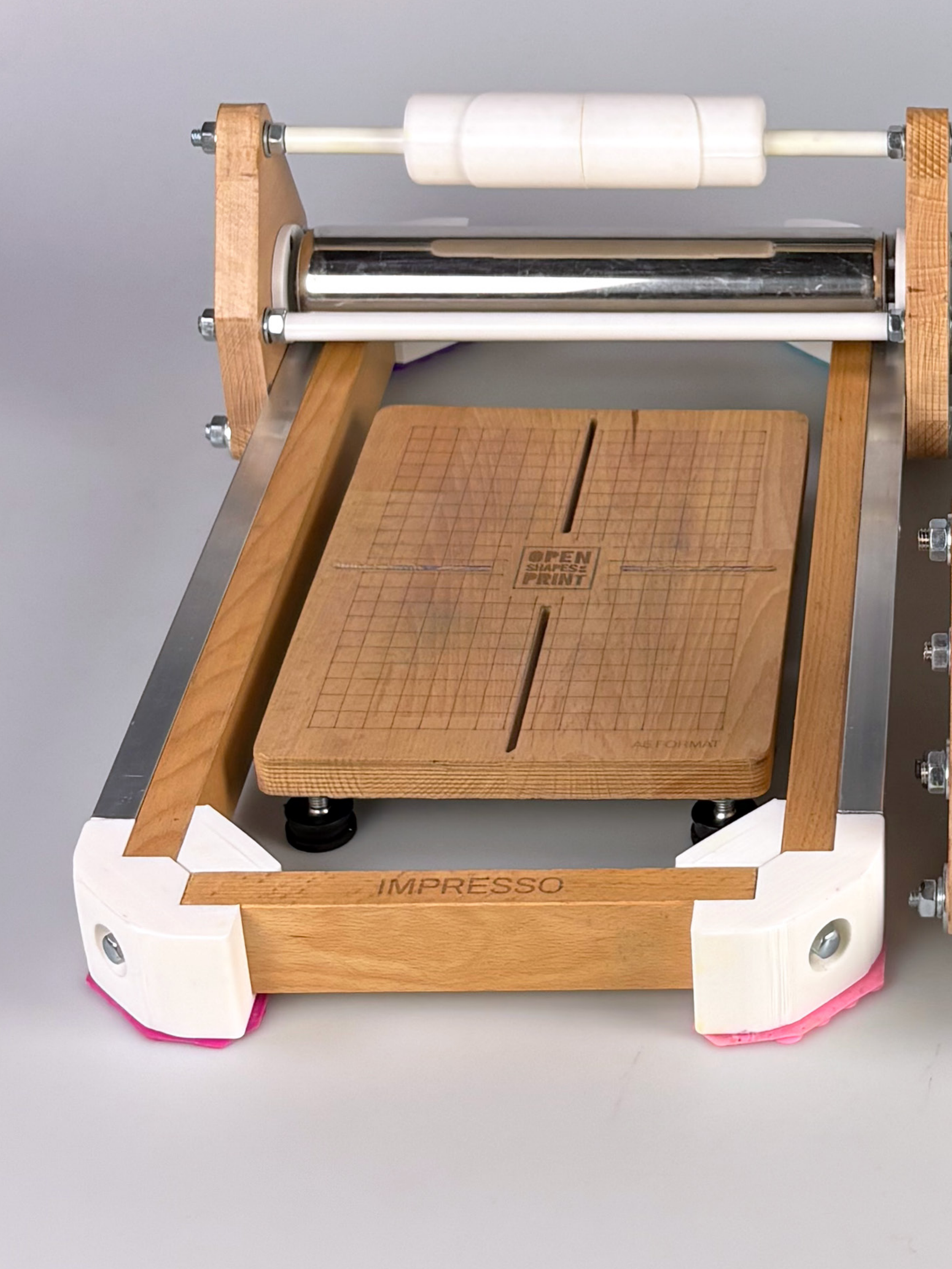
Figg. 126-127 Laser-engraved "Impresso" texts;
In the other page: Laser-engraved grid and logo.


OPEN
SHAPES OF
PRINT



Figg. 128-129 Impresso with the movable type matrix holder; In the other page:Disassembled components.


IMPRESSO


OPEN
SHAPES
PRINT
A5 FORMAT
IMPRESSO

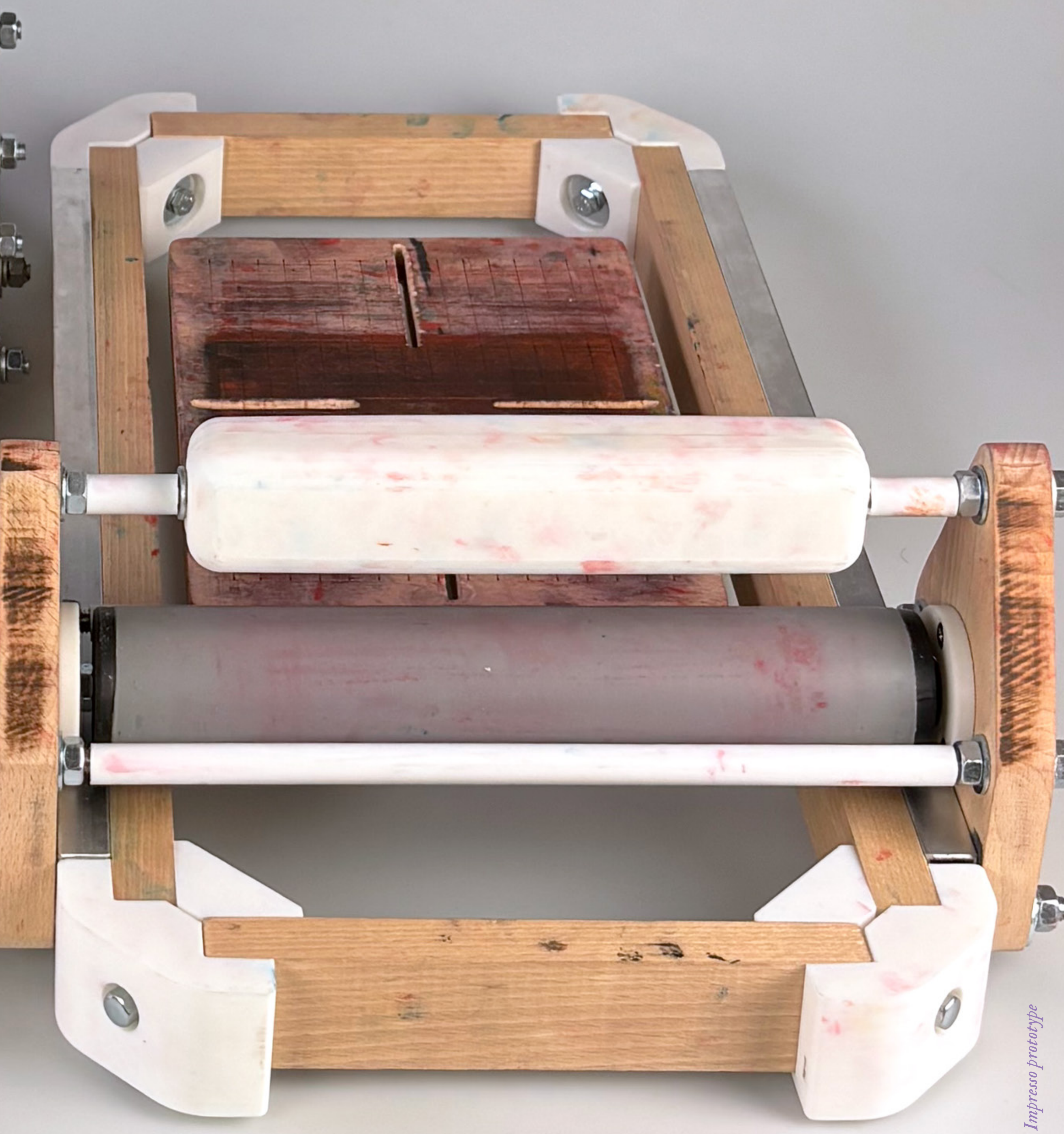


Fig. 130 New vs old Impresso prototype

3.2.2 Maker Faire

The Maker Faire is a fair held annually, open to an audience interested in innovation, technology, and creativity. It is a meeting space where people from different professions and backgrounds come together to design the future collectively. Each year it offers workshops, conferences, and laboratories to acquire new skills and equally encourage collaboration. The project is promoted by the Camera di Commercio di Roma and organized by Innova Camera, a Special Agency dedicated to innovation and the development of the entrepreneurial system, within the framework of the PID - Punto Impresa Digitale project, in synergy with other national and international institutions.[131] This year, the Maker Faire Rome 2025 hosted the Open Shapes of Print project in its thirteenth edition, which took place at the Gazometro Ostiense from October 17 to 19.

131. Maker Faire The European Edition. (2025). *Cosa è Maker Faire?* Maker Faire Rome.

Objectives

The participation of the Open Shapes of Print project in the fair was aimed at obtaining diverse feedback from a broad range of user groups. A key objective was to assess whether the new adjustments made to Impresso, particularly the intuitiveness of the user grip, were effectively perceived, given that both its formal and ergonomic features had been redesigned in comparison with the previous version. Another aim consisted of testing the suction cups located on the underside of the press, to evaluate their adaptability and versatility when applied to various smooth surfaces. Furthermore, the participation made it possible to examine whether the matrix holder could function, on its reverse side, as a support for movable type, and to test this feature with users of different profiles. Particular attention was devoted to determining whether its operation, and especially the sliders which now offered a wider range of movement than those of the earlier press model were regarded as functional and intuitive.

Preparation and Execution of the Activities

At the Maker Faire, a 4x2 metre booth was provided for the Open Shapes Of Print Project. (Fig.131) On the upper part of the structure, a 20cm high Forex strip displayed the booth's name and number. In this instance, space N3 was assigned, located in the creativity section, an area dedicated to a range of playful and educational activities for children. For this edition, the theme of space was chosen for the design of the printing matrices: one featured a rocket, another a planet, and the last a ufo.(Figg.132-135) The creation of a matrix depicting the Maker Faire robot had initially been considered; however, authorization for the use or modification of the image was not granted by the organisers. Around the booth, various images and experimental prints produced over the past year were displayed on strings. These illustrated different printing techniques, ranging from chlorophyll print to wood and PVC matrices, including two-color printing. The aim was to spark visitors' curiosity and provide an overview of the activities carried out within the exhibition space. Moreover, to provide users with a clear and coherent explanation of how to interact with the printing press, videos were displayed on the sides of the table illustrating how to print in ten simple steps, as well as showing the internal assembly of the device. This was intended to offer a broader understanding of the nature and functioning of the product.

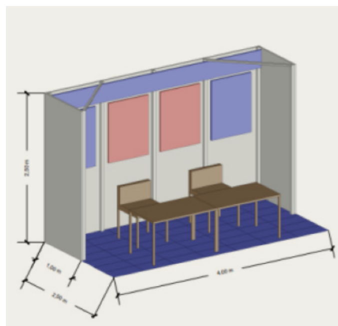


Fig. 131 Maker Faire stand

Two posters were also created to explain that the project followed an Open Design approach. These included certain physical characteristics of the press and an exploded view that allowed visitors to appreciate its different components, not merely as a single object, but as the sum of various parts and to understand the structural, formal, and functional transformation it had undergone from early prototypes to the current "updated" version. During the event, a live printing activity was conducted, structured in three stages: the first station employed linoleum matrices; the second station focused on printing with movable type; the third station allowed visitors to assemble a mini book, completed with prints of the logo and textures created from everyday materials such as aluminium foil, bubble wrap, kale leaves, and thread. (Figg.136-150)

Fig. 132 Planet linoleum matrix

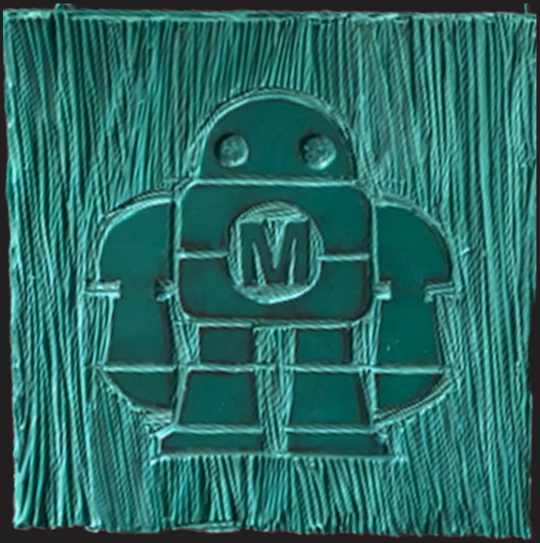
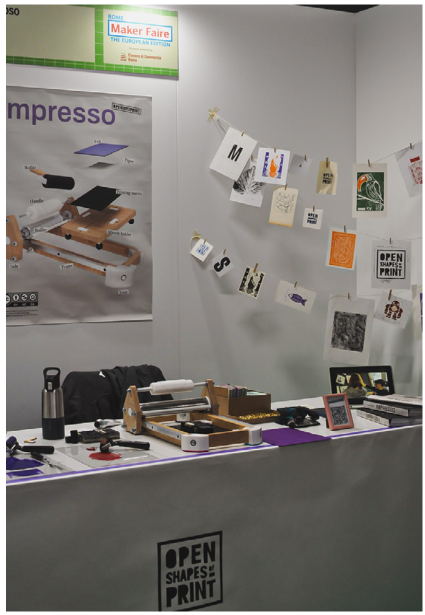


Fig. 133 Robot linoleum matrix

Fig. 134 Rocket linoleum matrix

Fig. 135 Ufo linoleum matrix

OPEN SHAPES OF PRINT
Printing with open source in mind
Mission
PURPOSE, APPROACH AND IMPACT
Open Shapes of Print sees itself as a movement to restore the importance and beauty of traditional printing. Imperfection is the real added value.
Vision
GOALS, INSPIRATION AND FUTURE
Digital manufacturing and traditional technologies come together to shape printing machinery that is open and close to people.
Impresso
THE EVOLUTION OF THE PRINTING PRESS THROUGH THE VARIOUS STAGES OF ITS DEVELOPMENT
Phase 1
Phase 2
Phase 3
Phase 4
Phase 5
Phase 6
Impresso
OPEN SHAPES OF PRINT
Felt
Paper
Roller
Printing matrix
Handle
Roller
Matrix holder
Side
Frame
Joint
BY NC SA



Figg. 136–138 From top left to bottom right: Maker Faire Posters; Set up stand at the Maker Faire; Printing of the logo on the sheets

Course of the activity

Fig. 139 First printing station

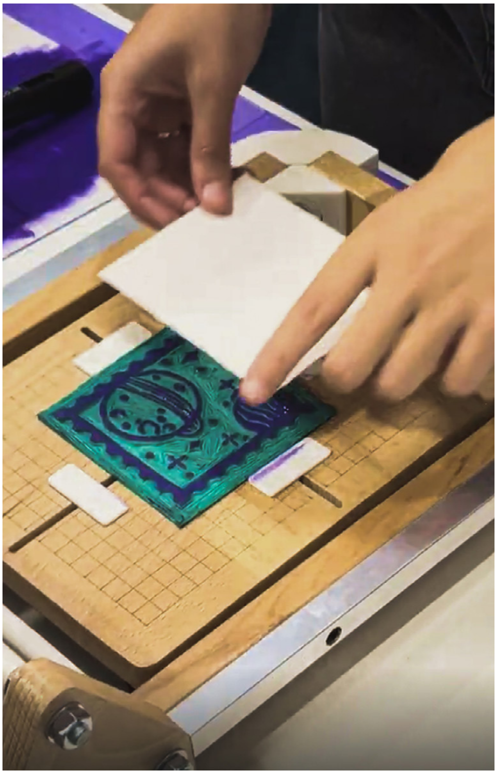


Fig. 140 Application of the sheet

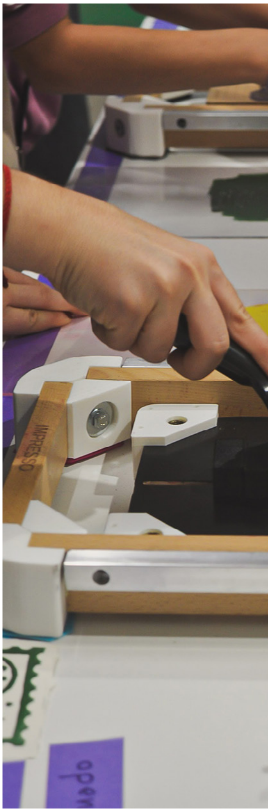


Fig. 141 Inking of movable type

Fig. 142 The two printing stations

Fig. 143 Sheet hole punching

Fig. 144 Visitors with the printed booklet

Fig. 145 Visitor printing

Fig. 146 Visitors printing

Fig. 148 Visitor printing

Fig. 147 Detail on cart movement

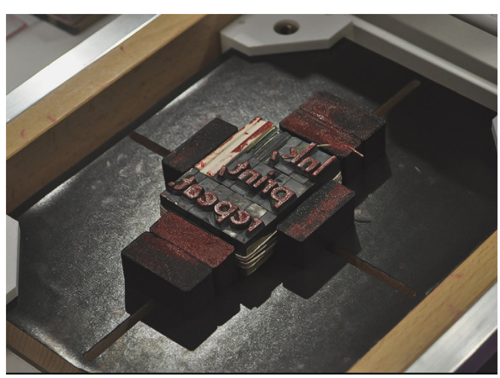


Fig. 149 Movable types composition


N3
CREATIVITY
OPEN SHAPES OF PRINT
makerfairerome.eu
#MFR2025
Printing
with open
source
OPEN SHAPES PRINT
Mission
Impresso
MAKER
TICKET VALIDITY
Leaving a mark, one print at a time.

Fig. 150 The team at the Maker Faire

Approximately 3,200 paper squares (10x10cm each) were cut in total, more than half of which were printed during the fair itself. This live printing activity was made possible thanks to the support of sponsors such as Cranfield and Fedrigoni, who provided the paper and inks necessary for the project's implementation.

The choice of theme was the outcome of a brainstorming session, in which each participant freely shared their interests and proposed potential topics of inspiration. Ultimately, the group decided to focus on space, consistent with the atmosphere of the Maker Faire and aligned with the event's technological and innovative spirit. To test the new version of the Impresso press, which also allows printing with movable type, three phrases highlighting the relevance and modernity of printmaking were selected:

"Leaving a mark, one print at a time"
"Print isn't dead"
"Ink, print, and repeat"

It's important to note that many visitors initially assumed that Open Shapes of Print was offering a paid service, despite the presence of two posters indicating that the project followed an open design approach. Consequently, staff frequently had to clarify what Open Design meant. Several visitors also expressed interest in constructing the press at home. However, as many did not own a 3D printer, they suggested a self-assembly kit with pre-manufactured parts and expressed a desire for such a set to be available for purchase. To collect feedback on ergonomics, form, aesthetics, and functionality, a QR code was positioned at the end of the live printing activity, directing participants to a questionnaire. Given the busy environment of the fair and the abundance of attractions, the response rate was relatively low. While many visitors provided verbal feedback regarding the press, few completed the form.

Audience Reached

The N3 stand location enabled experimentation on a large scale with a younger audience. However, not every day was primarily aimed at children or students. Friday was mainly reserved for schools, with an average age range of 14 to 18. Saturday attracted a more diverse audience, while Sunday, being family day, primarily drew children, who were particularly fascinated by the printing press. (Figg.151-157)

Feedback

FEEDBACK ABOUT COMPONENTS AND THE OPERATION OF THE PRESS The suction cups proved to be highly effective, as they significantly reduced users' perceived insecurity when interacting with the device compared to previous trials. Participants operated the device with one or both hands on the handle, yet did not feel the need to apply pressure to ensure its stability on the table. Furthermore, the matrix holder designed for movable type yielded excellent results. The prints were of high quality, and the mechanism was intuitive to use. Participants expressed surprise that movable type is still in use; for many, it evoked childhood memories and fostered an emotional connection. Additionally, extending the slot through which the slides move enabled a more precise alignment of the sliders with both the movable type and the linoleum matrices.

FEEDBACK ON THE ACTIVITY The activity was well received by participants of all ages, from the very young to older adults. Children were the group that engaged most naturally with the press; the fact that it rolls made the experience entertaining for them. Moreover, many participants expressed interest in purchasing the device or paying to take part in the activity, not realising that the project is open-source. Several children queued multiple times to make prints, as they wished to bring this mini-book to their loved ones or even to their teachers, since they had been learning about printing at school.

- Because the movable type quotes were in English, children initially had difficulty understanding what they were printing. However, once the text was translated into their language, they appreciated the message that the authors intended to convey: the revival of analogue printing.
- Some participants still held the press from the sides, even though the handle is now visibly more intuitive. Adults often believed they themselves were applying the force manually, whereas children did not question the mechanism and simply slid it back and forth without any difficulty.
- Cleaning the press was much easier this time, after coating Impresso with wax and impregnating agent. Although color removal remains more effective

with oil, the press can now be almost completely cleaned, even after being used by over 500 people.

- It is also worth noting that the project attracted interest from various makerspaces, including FabLabs from Val di Sabbia, Trento and Trieste, with whom contacts were exchanged, establishing a connection to collaboratively plan a workshop using the printing presses.

The Open Shapes of Print project found valuable insights after the Maker Faire Rome experience, the event confirmed that the recent design modifications concerning ergonomics, stability, and functional versatility implemented in the printers were successful and positively received, by a wide audience. The suction cups significantly enhanced operational stability, reducing users' perception of insecurity and eliminating the need to apply pressure to the frame. At an emotional level, the product reinforced the capacity of Open Shapes Of Print to be so transversal, attracting a highly diverse audience.

Secondly, the activity reaffirmed the ability of analogue printing to engage audiences across generations. Children interacted with the press in a spontaneous and playful manner, while adults frequently expressed surprise and nostalgia when encountering movable types. The pronounced curiosity observed manifested in multiple visits, detailed questions, and interest in constructing or acquiring the press indicates a renewed cultural relevance for accessible, hands-on printmaking tools.

Thirdly, the fair highlighted several communication challenges. Despite the presence of explanatory materials, many visitors misunderstood the open-design nature of the project or required clarification regarding the printed messages, which were initially presented in English. These observations underscore the need for clearer on-site communication strategies and potentially multilingual materials at future events

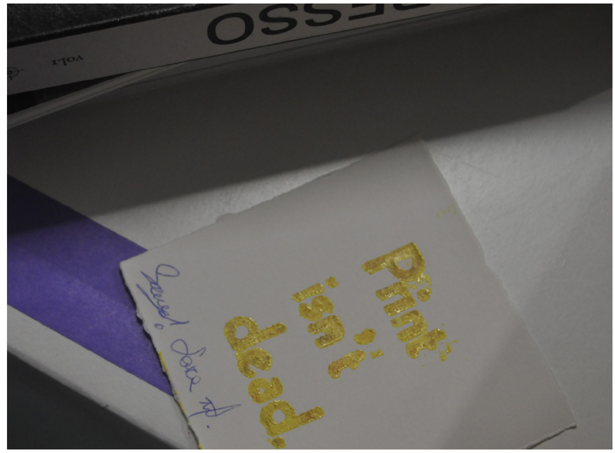


Fig. 151 Print result of movable types

Fig. 152 Visitors queuing to print

Fig. 154 Crowded stand

Fig. 153 Booklet binding

Fig. 155 Visitor printing

Fig. 156 Person consulting the instruction manual

Fig. 157 Printing experiments

EPILO

GUE

Fig. 1 First prototype of Impresso

Future developments

In the future, the idea would be to continue the project and try to make it even more comprehensive and complex. This certainly requires keeping the study and research aspects active, experimenting with printing techniques and continuing activities on the project's two main social networks. In addition, some organisations have already expressed their willingness to include Open Shapes of Print in workshops or events in the coming months.

The "Meet and Draw" collective has invited the authors to participate in an evening meeting where, after the usual drawing session that characterises these events, the drawings could be transferred to linoleum matrices and then printed with the printing press. Another possibility on the horizon is a collaboration with Fablab Torino on a series of workshops in 2026 focusing on projects that combine design and digital manufacturing. This could take the form of one or more workshops in which Impresso is presented and tested within a maker space. Similar interest was expressed by the Turin-based design studio Pangramma, which expressed its willingness to involve Open Shapes of Print in a workshop in collaboration with Maria Luisa Russo of the Amalia studio. Following Maker Faire Rome, several Fablabs, such as those in Trento and Valle Sabbia, have also expressed interest in building and assembling the printing press at their premises, involving the authors, for example, in the launch event. Impressed by the project, Fablab Trieste offered to include Open Shapes of Print as one of the exhibitors at the 2026 edition of Maker Faire Trieste.

In addition to these collaborations, the possibility has emerged that Open Shapes of Print could find space in a publication such as a scientific article, a conference, a magazine article, a book chapter or a book itself.

All these future experiences testify to how Impresso and Open Shapes of Print can arouse great interest from the community, which is also a sign of the project's effectiveness and practicality. After almost a year of work, the authors hope that Open Shapes of Print will continue in the future without being relegated to a mere university "exercise". To do this, however, it is necessary to define a clear strategy so that future participation in events or festivals is not a one-off occurrence but rather a mutual exchange with the network that is gradually taking shape.

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Finally, this work leaves us with an important realization: designing means weaving relationships even before assembling components. The network that has been created around Open Shapes of Print is tangible proof of a widespread desire to return to manual skills. The hope is that this device will continue to evolve and “get ink on its hands,” becoming an everyday tool for anyone who wants to leave their mark.

ITA

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Una volta realizzato, il progetto si è consolidato e affinato grazie alla community di sperimentazione, che ha interagito direttamente con il dispositivo testandolo in ogni sua fase. Gli studenti del Liceo Artistico Primo, con l'entusiasmo dimostrato nell'assemblaggio e la soddisfazione nel vedere le stampe realizzate, hanno fornito una delle validazioni più significative del percorso. Essenziale, in questa fase, è stata la disponibilità di docenti e professionisti che hanno unito ricerca e sperimentazione: Federico Nota, Luca Porru e Silvia Diani. Un ringraziamento particolare va a Luisella Cresto per la fiducia data al progetto e per l'opportunità di presentare "Impresso" ai Graphic Days 2025.

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Infine, questo lavoro lascia una consapevolezza importante: progettare significa tessere relazioni prima ancora che assemblare componenti. La rete che si è creata attorno a Open Shapes of Print è la prova tangibile di un desiderio diffuso di ritorno alla manualità. La speranza è che questo dispositivo possa continuare a evolversi e a "sporcarsi di inchiostro", diventando uno strumento quotidiano per chiunque voglia lasciare il proprio segno.

Impresso **Open Shapes of Print**

A movement that aims to restore the value of analogue printing, through the Open Design approach, which takes shape in the design of Impresso, a contemporary printing press.

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