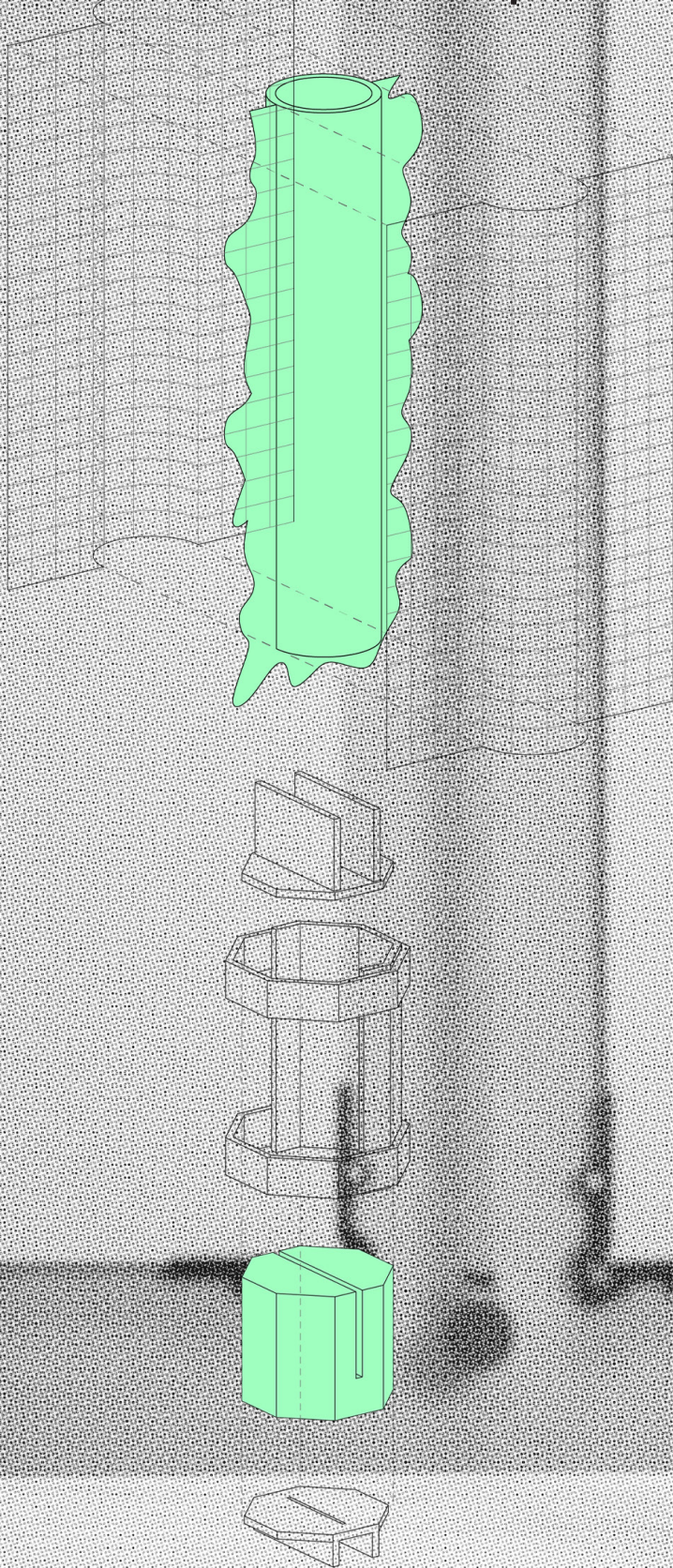


Re-imagine Materials

Bio-material workshops for young people



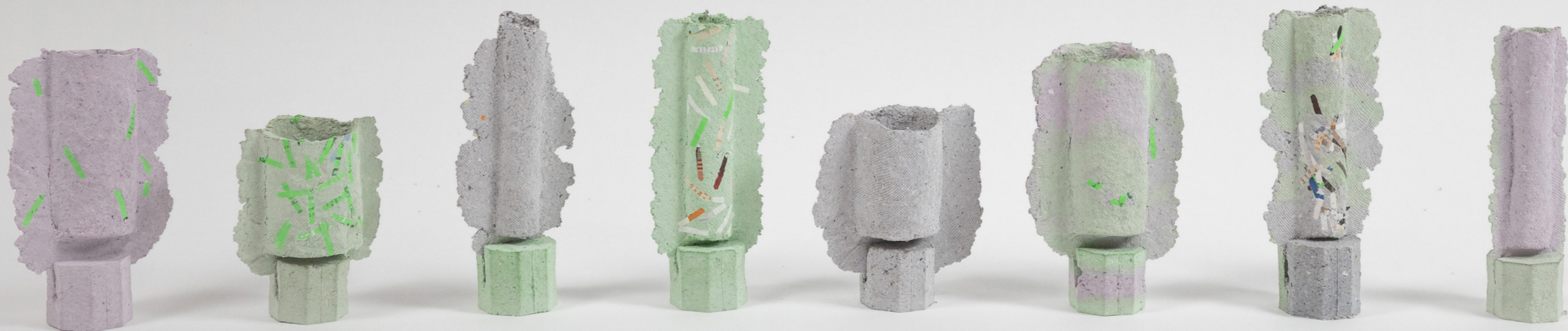
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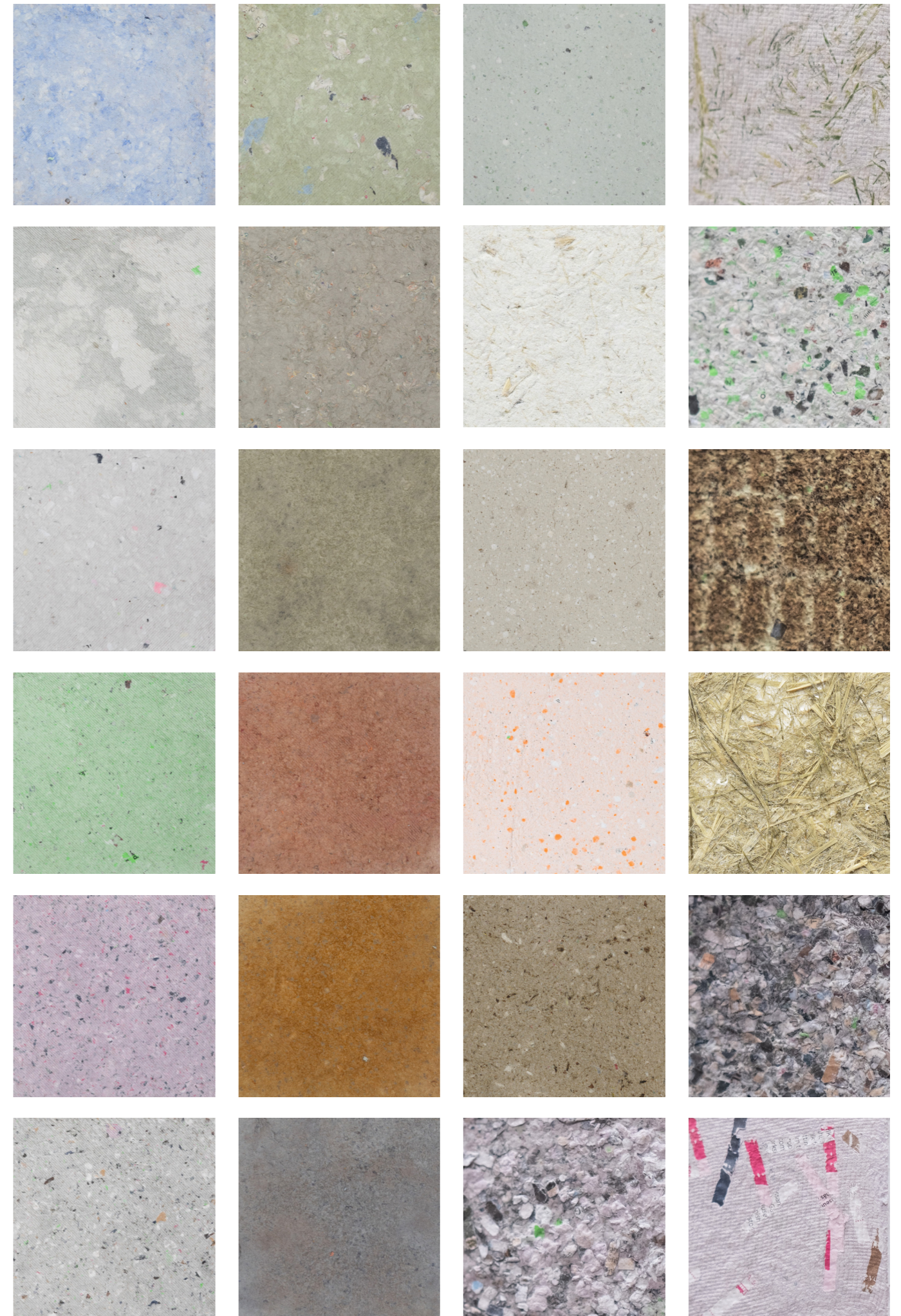
Re-Imagine Materials Workshop Initiative

Re-imagine Materials is a workshop series aiming to offer young people hands-on and playful experience to learn how to create biomaterials from local and organic residues, and to offer them the skillset to participate in the circular economy.

This project began with a simple observation: the process of recycling is largely invisible to the public. When we throw a piece of paper into an office bin, it disappears into a distant and complex infrastructure. We rarely see where it goes, how it is processed, or what it becomes, as recycling and production today rely heavily on centralised facilities and international operations. We live in a time when conversations about circular economy and material circularity are becoming increasingly urgent and relevant. Yet, the knowledge and technologies required to participate in it are not always accessible to most people. As a result, materials feel disposable, and the creative potential of waste remains hidden.

For us material designers, a lot of creativity and possibility emerge precisely from *working directly with* the things we discard. By learning to transform local organic residues into new biomaterials and functional objects, we can re-discover value in what is commonly overlooked.

We started *Re-Imagine Materials* workshop series with the belief that sustainability and bio-materials should not remain confined to factories or laboratories. They should be accessible to public through tangible, playful experience. To flip the conventional process, instead of sending waste away, we bring it back to the table at a local maker space, *Maker V-10*, as a starting point for a “decentralised laboratory”.



“
We believe that the sharing of knowledge
- whether embodied, textual or technological - is essential in making a circular
world.

We introduce young people to emerging, small-scale methods of recycling and production. Through 8 workshops focusing on everyday material waste - leaflets from the mailbox, roadside grass, leftover coffee grounds - participants are invited to touch, mould, experiment, and design with waste themselves. By the end of each workshop, participants can bring home a unique “hOlder” made from everyday waste. In doing so, we aim to make material knowledge accessible, foster curiosity, and empower young people to participate in a circular economy driven by local action and imagination, and, most importantly, to rebuild relationship between us and materials through embodied, playful making.

The workshops are structured around the knowledge of three aspects: (1) Material; (2) Design; (3) Tools. Each area equips participants with the skills and understanding needed to engage with everyday waste and contribute

meaningful conversations to a circular economy, and will be expanded in later chapters.

As a studio, we believe that the sharing of knowledge - whether embodied, textual or technological - is essential in making a circular world. It is precisely this belief that drives the creation of this publication: to reach a wider audience and inspire readers to explore, experiment, and take an active role in rethinking, reconnecting to, and reimagining our tangible, material world.

Enjoy the read!
studio circOlar Team



(1). The Material

“

We must reshape our perception of materials - to see them not as static resources but as active participants in continuous cycles of making, unmaking, and remaking.



Our everyday life is constructed upon the continuous flow of materials. They shape the world we inhabit, yet remain largely invisible.

Within today's systems of production and consumption, materials are mostly encountered as finished commodities - designed for use and disposal. Their stories, transformations, and embedded values are wiped clean in favour of convenience and efficiency. In this process, materials lose their narrative and agency. They are reduced to mere means to an end - something to be extracted, manufactured, consumed,

and then discarded. The circular economy challenges this logic by urging us to see materials not as static commodities, but as dynamic participants in a living system.

How does material contribute to circular economy?

We believe that, to truly realise the vision of a circular economy, we must reshape our perception of materials - to see them not as static resources but as active participants in continuous cycles of making, unmaking, and remaking. This shift calls for a new material awareness - one grounded in locality, transparency, and care.

To move beyond the current production and consumption system that is intentionally made to alienate, we propose an alternative materialist approach - one that sees material not as passive matter but as an active collaborator. By engaging directly with local residues, by touch-

ing, transforming, and experimenting, we begin to build new relationships with what is often dismissed as waste.

In reimagining materials in this way, we begin to move toward a circular economy grounded not only in efficiency but also in empathy - a culture of making that reconnects us with the tangible world and the continuous flow of matter that sustains life itself.



In the workshop series, We chose to work with paper, grass, and coffee grounds, as they are materials deeply woven into everyday life - ordinary, abundant, and often overlooked. Each of them carries traces of daily routines, local environments, and collective habits. By focusing on what is most familiar, we invite participants to see the hidden potential of what they already have touched, used, and discarded.

From waste to usable

A central intention of the workshop series is to share the full process of transformation - from discarded waste to usable material. Transformation is critical to material literacy. By witnessing and participating in each step of this process, participants are able to see waste not as an endpoint, but as a beginning. It is only through this embodied experience that the hidden potential of everyday residues becomes visible.

To anchor this learning in participants' immediate surroundings, we sourced materials directly from the local context. This approach emphasises that circularity is not an abstract concept reserved for specialised facilities; it can begin with what is already around us.

Paper was collected from office waste at Maker V-10, museum brochures, and mailbox leaflets. Rich in cellulose fibres, paper offers toughness and flexibility in composite biomaterials.

Coffee grounds were sourced from the café at Maker V-10. It can act as filler to reduce shrinkage. The colour, scent, and texture of coffee grounds offer unique design possibilities. Grass was gathered from roadside clippings and golf court maintenance; like paper, it contains strong cellulose fibres that can add structure and reinforcement to material blends. Combined with bio-binders like starch and gelatine, these fiber residues can be durable and versatile.

Together, these materials form an entry point into rethinking the everyday. By transforming them into a functional object - the "holder" - participants experience how waste can be revalued through knowledge, care, and craft.



Paper

1. Collect paper, sort by type if you want a consistent texture or color.
2. Shred paper to smaller pieces using a shredder, or cut them with scissors for smaller batch
3. Soak in water overnight (> 6 hrs)
4. Beat or blend paper into smooth and consistent pulp
5. Remove excessive water from the pulp, and mix it with other bio-material
6. Put it in the mould and be ready for pressing

Coffee grounds

1. Gather used coffee ground from the filter
2. Dry the coffee ground by placing it on cloth, under cool and ventilated condition
3. Mix it with matrix material as a filler to support the shape, adjust ratio

Grass

1. Gather dried grass from local source
2. Remove roots, seeds, clean it and shred it into smaller pieces (1-2cm long)
3. Boil it for at least 30 minutes, until the fiber gets softened
4. Grind the grass into grass pulp using mortar & pestle, or electrical blender

(2). The Design

“

Circular design asks us to attune to what materials already want to do, and to build with, rather than against, these tendencies.



Design is not merely a means of giving form; it is a mode of world-making.

Design shapes how materials circulate, how interaction happens, and ultimately how waste is perceived and handled - which is especially relevant in an era of climate crisis, where we have to live with the aftermath of ecological degradation. In a circular paradigm, design becomes a *strategic tool of transformation*. To design with waste is to examine its materiality and histories

with care, and to compose systems of action in response. Instead of forcing matter to comply with industrial norms, circular design asks us to attune to what materials already want to do, and to build with, rather than against, these tendencies.

How does design contribute to circular economy?

To work towards a circular world, we as material designers can contribute in reimagining aesthetics and reimagining what we design.

> Reimagine aesthetics

Waste is complicated. Its surfaces bear stains, irregularities, colour shifts, microbial traces, and histories of prior use. Within linear production logics, these are treated as defects - imperfection to be filtered out, evidence of contamination, justification for disposal. Circular design, however, calls us to linger with these “troubles”, even to highlight them.

Following Donna Haraway, staying with the trouble means resisting the impulse to purify and instead cultivating practices of care, repair, and attentive curiosity. The so-called imperfections of discarded matter can reveal provenance, labour, and time. When held with intention, they shift from flaw to feature - an aesthetic of situatedness, rather than standardisation. In this way, design can reorient cultural desire toward plurality.

> Design relations, not objects

Circularity cannot be achieved by altering objects alone. It requires the design of the relations that surround them: the systems of exchange, return, repair, and disassembly that allow materials to circulate. In this sense, interfaces are as critical as the things themselves. Designers can invite co-creation by designing a participatory framework - and by designing for these relations, objects become more than things: they become catalysts for interaction, care, and shared responsibility.

Circular design therefore refuses the passive consumer role. It imagines users as participants and co-authors in the ongoing life of materials. By shifting how objects are encountered - how they age, transform, and return - design transforms waste from an endpoint into a temporal phase within a continuous becoming.



The hOlder

In every workshop, we share our views of design through embodied making. Participants learn skills and knowledge through playing, experimenting, and eventually making something functional and playful they can bring home. We invite people to create their own hOlder using the bio-materials and tools provided, transforming local waste into such objects.

The hOlder is designed for holding things - for pens, flowers, you name it. With the capitalised O stands for circularity, it embodies how our design thinking translates into tangible practice, addressing both **aesthetics** and **relational** thinking in a circular framework.

> Reimagine aesthetics

The hOlder's design embraces the material histories and imperfections of discarded fibers. By combining two different pulp-moulding techniques - the Mesh technique and the Press technique - we give function to paper waste. The "outflow" from the Mesh technique, which in mass production would normally be trimmed or discarded, is intentionally preserved and integrated into the top part of the hOlder. Rather than hiding imperfections, such design choice celebrates them, highlighting the beauty of traces and irregularities. Combining with a groove on the bottom part, such imperfection is used as a feature to slide in the groove and make the hOlder stand. In this way, participants learn to see waste not as flawed or disposable, but as expressive and generative.

> Design relations, not objects

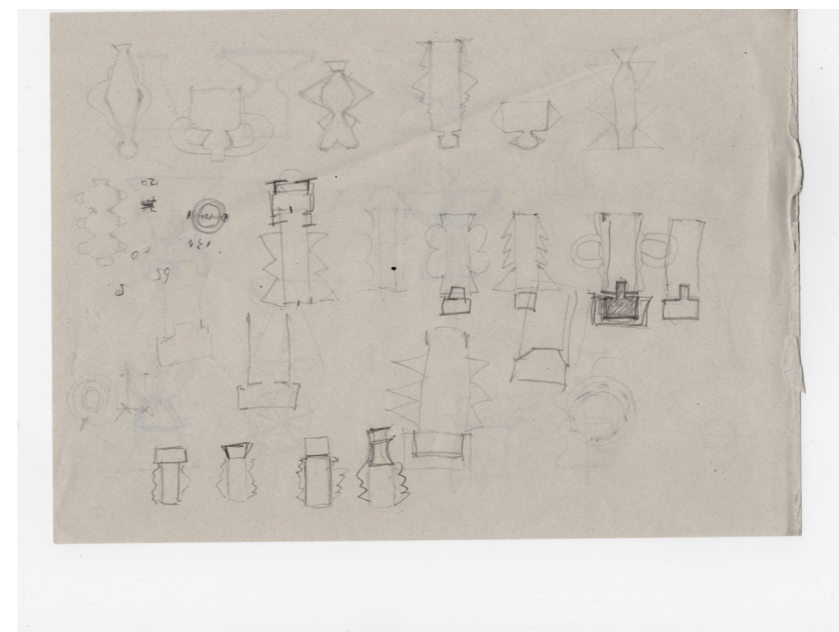
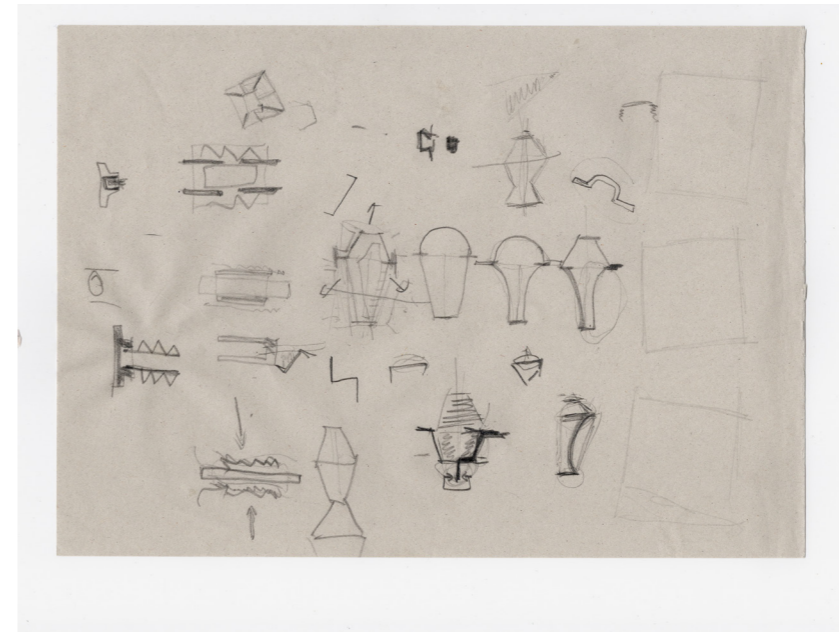
Beyond the object itself, the hOlder workshop is structured as a participatory framework. It is designed not only to teach techniques of fibre processing and bio-composite forming, but also to open space for exploring the creative poten-

The manufacture of the hOlder reflects two key forming techniques developed in the process: the **Mesh Technique** and the **Press Technique**. The top and bottom parts of the object each represent one of these approaches, demonstrating how different methods - one more porous and delicate, the other more compact and solid - can coexist and complement each other. Together, they form the foundation of our pulp-forming practice and embody the spirit of open, shared making.

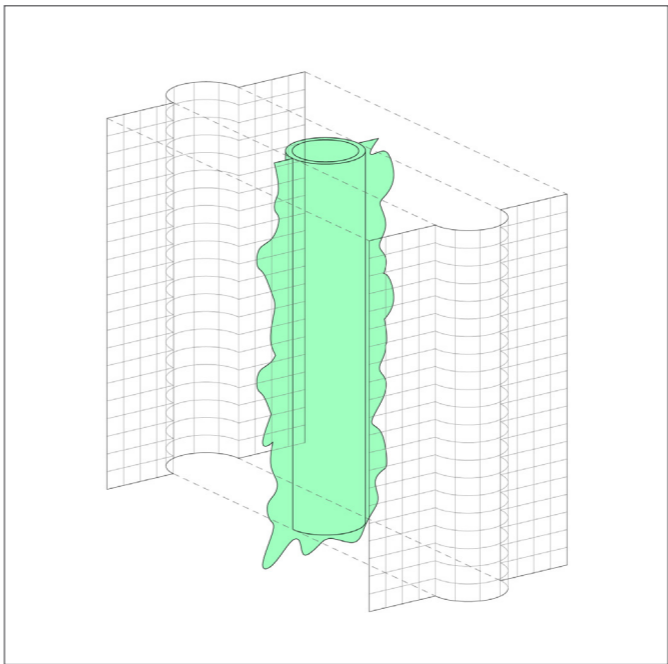
tial of handcrafting. The process balances guidance - showing "how to make a hOlder" - with autonomy, allowing participants to experiment with their own variations.

At its core, the workshop is about designing relations - between people, materials, and place. Working with waste becomes a collective act rather than an individual gesture. As material designers, we step into the role of facilitators who invites others to engage closely with the material. In doing so, the making process becomes a shared authorship: participants contribute their own perspectives and sensibilities, forming a small yet growing community of practice around circular thinking.

Through this dual approach - celebrating the aesthetics of waste and structuring collaborative, participatory design, the circular narrative become not predefined but co-created: it emerges through dialogue, experiment, and care. Each hOlder becomes not only an object, but also a trace of connection: a reminder that sustainability is built through relationships between one and another.

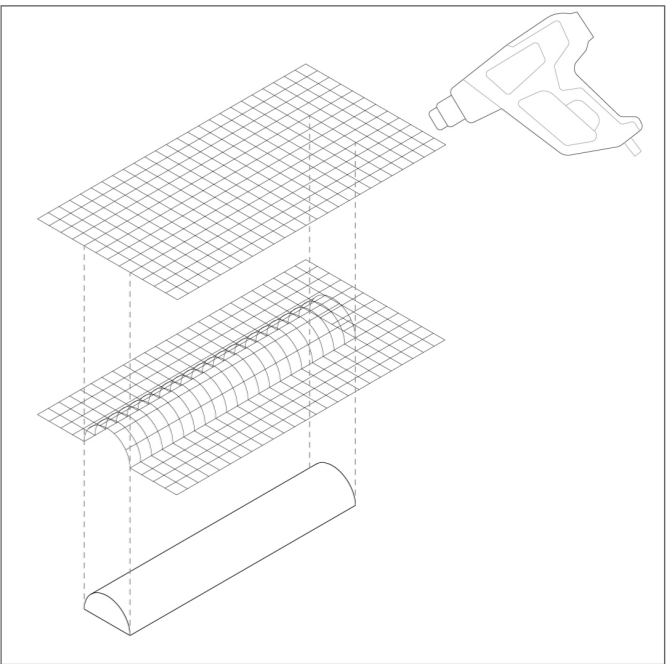


The Mesh Technique



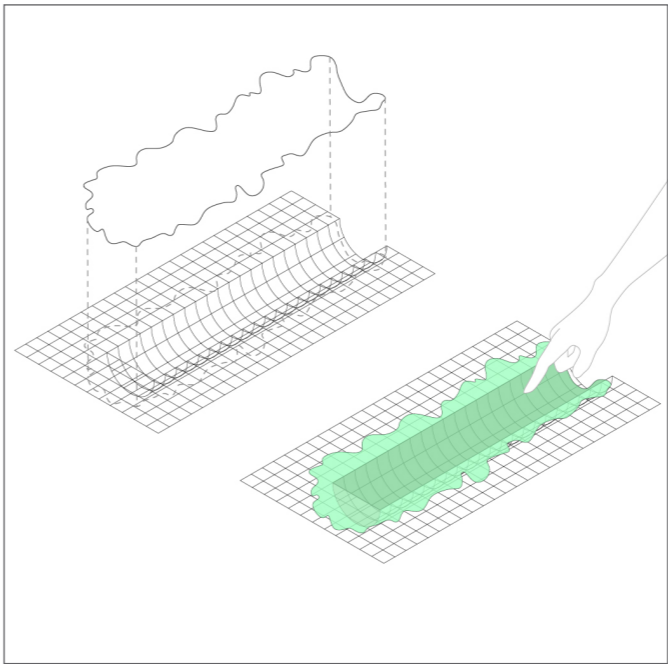
hOlder: Top Part

+ Top part is made using the mesh technique - combining traditional paper-making method and modern paper pulp moulding method. An in-between technique that allows personalisation and craftsmanship to emerge.



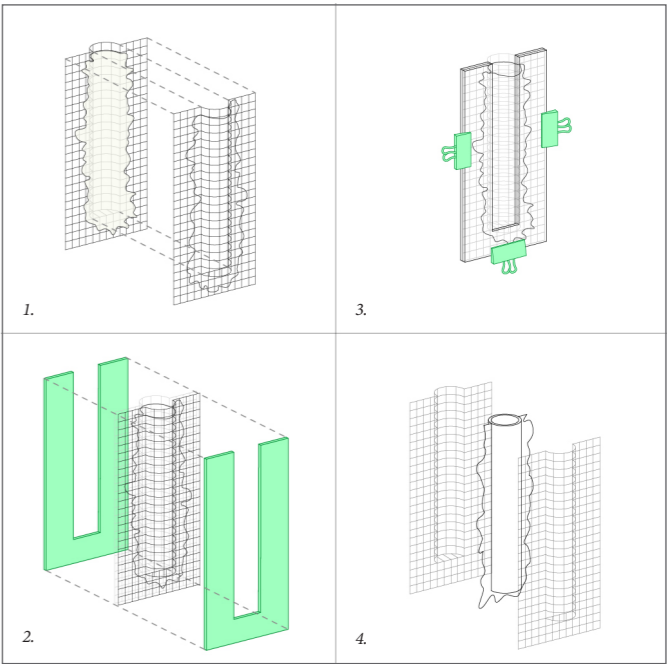
Step I: Shaping the Mesh

+ Use a heat gun to mold the 3D-printed (PLA) mesh into shape.
+ Keep the heat gun 5 cm away from the mesh to avoid overheating.
+ Wear safety gloves and masks while heating up the filament!



Step II: Applying the Pulp

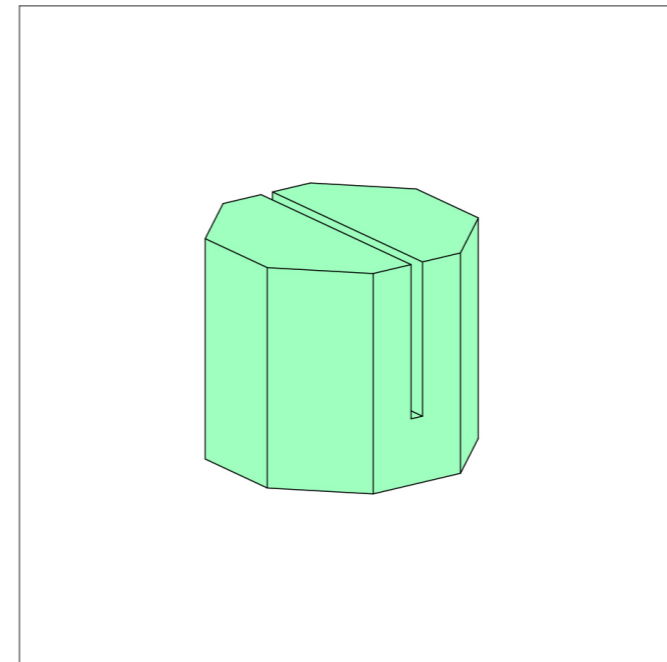
+ Evenly apply the pulp to the shaped mesh.
+ Press firmly to remove excess water.
+ Avoid pressing the edges to prevent thick rims and allow the edges to form naturally.



Step III: Moulding using the Mesh

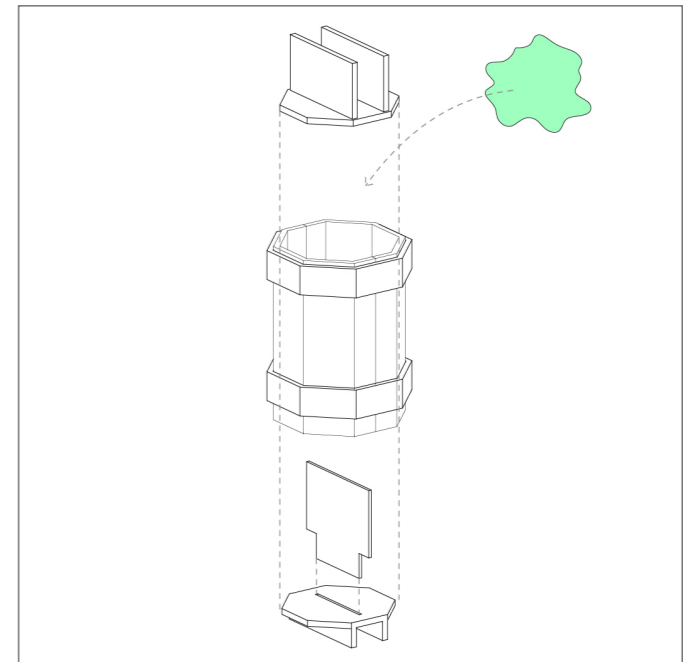
+ Clamp two meshes together using U-shaped clamps.
+ Then, tighten them with clips for a firm hold.
+ Demould carefully after it's completely dried.

The Press Technique



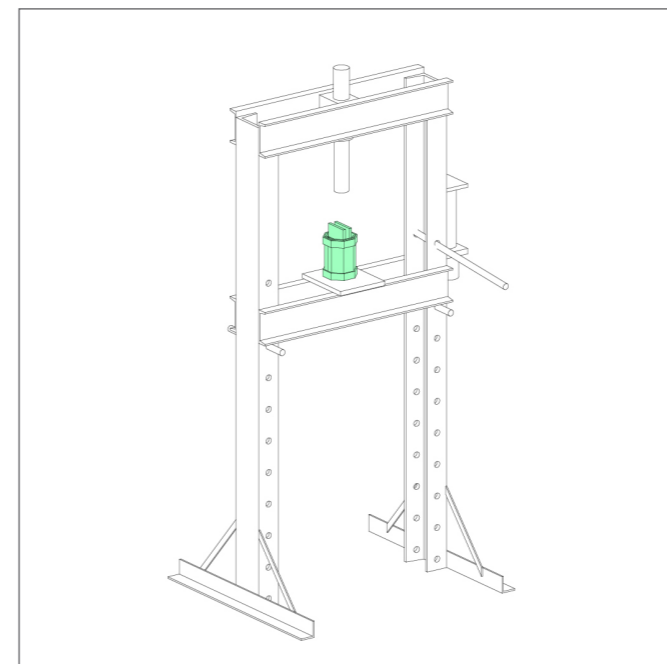
hOlder: Bottom Part

+ Bottom part is made using a press machine and 3D-printed moulds. Durable and heavier, it serves as a base for holding the top part.



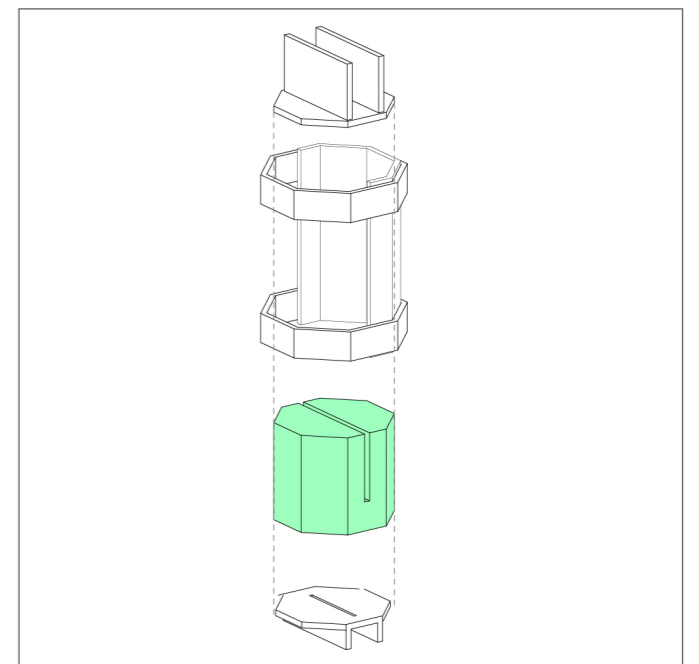
Step I: Preparing the Mold

+ Assemble your mold securely.
+ Load it with pulp, pressing evenly with your fingers to ensure uniform distribution.



Step II: Pressing the Pulp

+ Use the hydraulic press machine to drain the water
+ Release the pressure, and demould carefully.



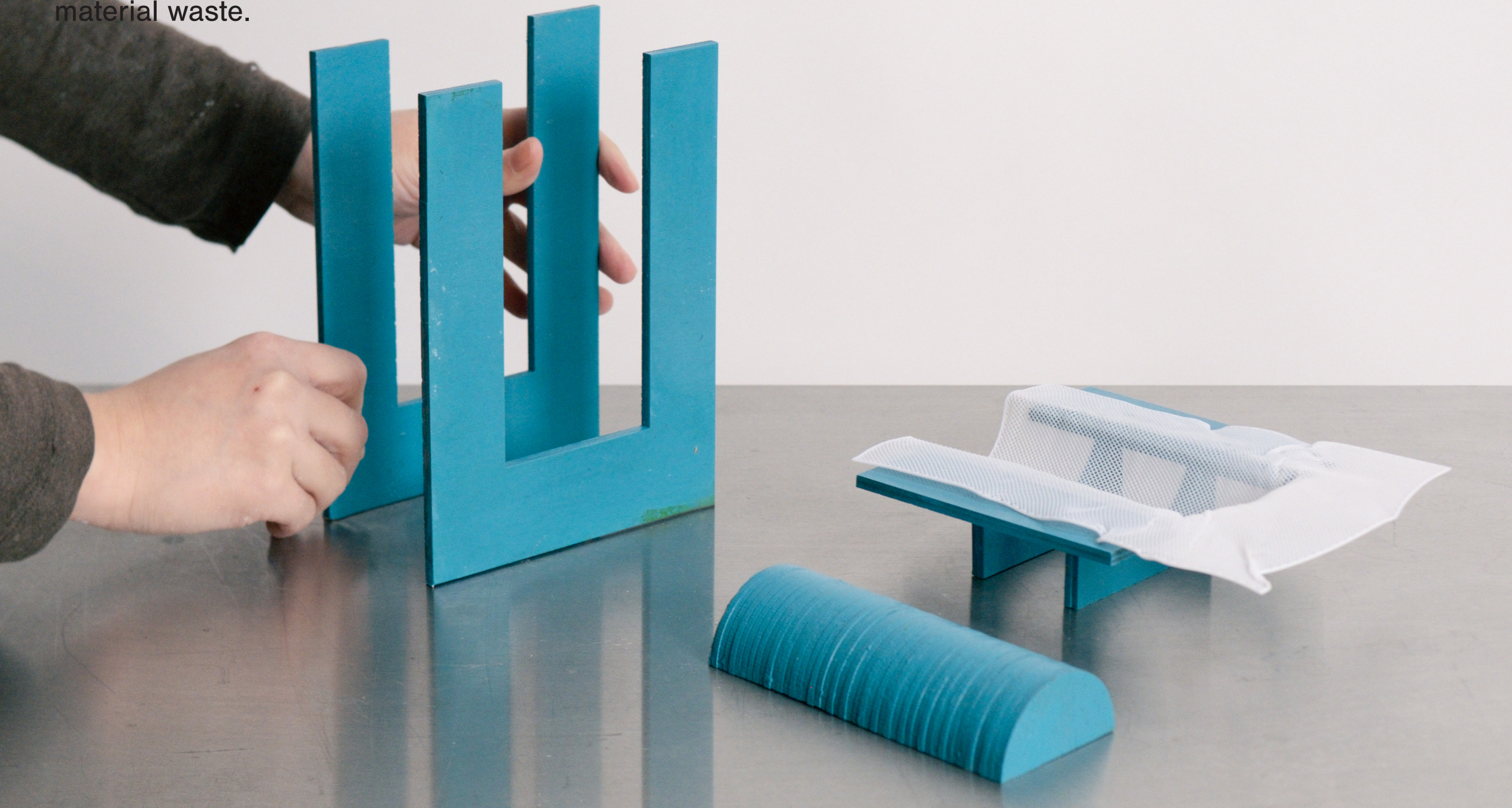
Step III: Removing the Mould

+ Disassemble the mold carefully.
+ Gently remove the pressed pulp to maintain its shape.
+ Dry it for 3-4 days, and you can choose to sand the surface as desired.

(3). The Tools

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Sharing tools is, in itself, a gesture of empowerment - an invitation for others to take part in re-imagining how we relate to material waste.



Tools are as important as the things they help create. The traces of materiality exist not only in the final product, but also in the tactile and technical interactions between hands, materials, and instruments.

Every texture carries evidence of how something was made - in the rhythm between hands and tools.

We see workshops as a way of democratising tools and sharing knowledge — not only about *what* can be made, but *how* it can be made. By opening our process and offering guidance on

the tools we use, we hope to make our methods transparent and replicable. This section highlights the key instruments and techniques and gives an overview of how to begin working with biomaterials using accessible means.

Why does open-sourcing tools matter to circular economy?

When the means of making are shared rather than proprietary, tools can be adapted, reproduced and improved by others. This transparency extends the life cycle of both materials and knowledge, allowing ideas and techniques to evolve through collective experimentation.

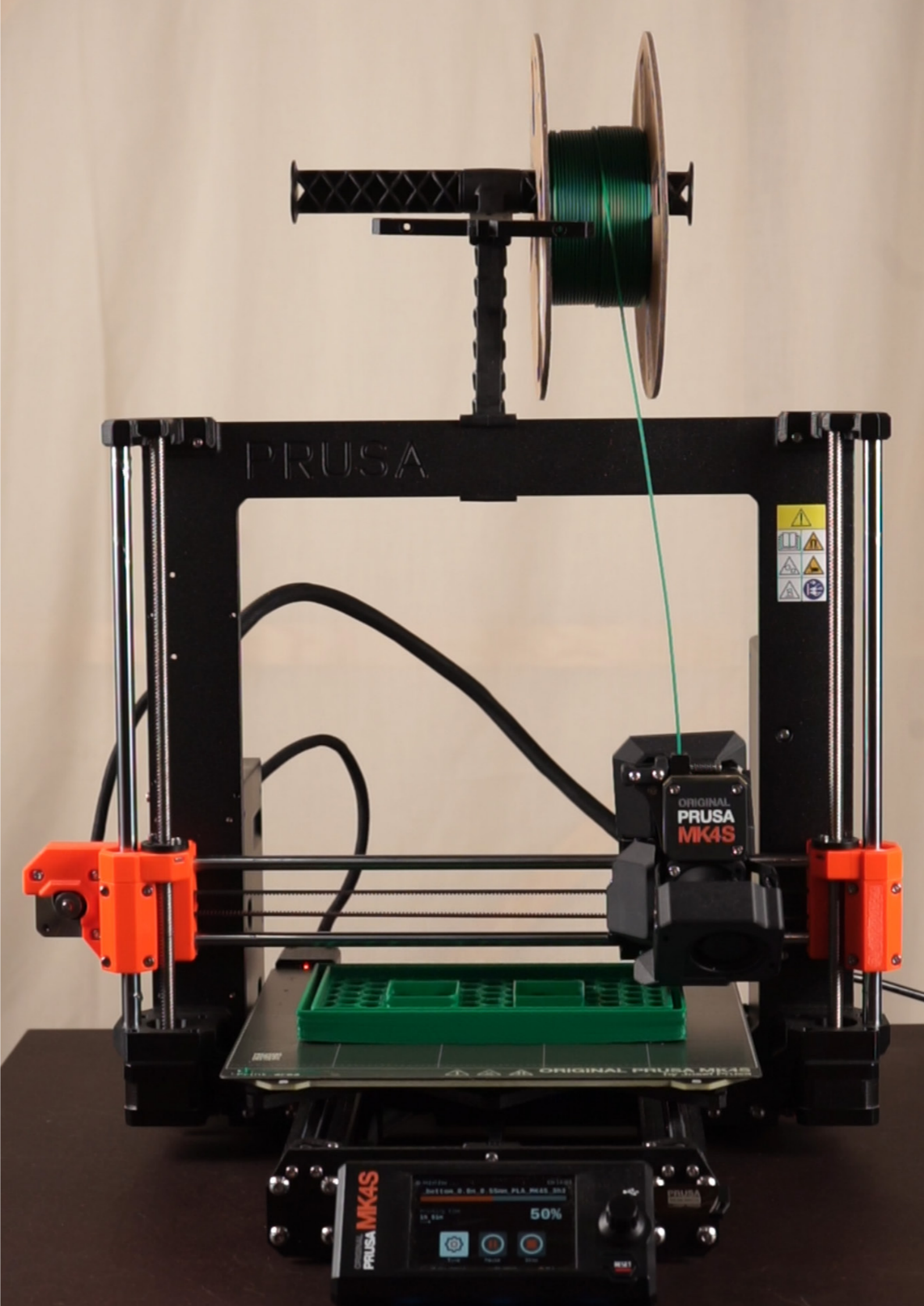
One of the central critiques of current recycling systems is their dependence on large, centralised facilities and global operations. The afterlife of waste materials often remains unseen - and therefore uncared for.

Through the Re-Imagine Materials workshop series, we aim to make local recycling possible and bring care and awareness back into the act of making, by offering open access to the

tools. Sharing tools is, in itself, a gesture of empowerment — an invitation for others to take part in re-imagining how we relate to material waste.

> Accessibility of the tools

In the workshops, we introduce a range of tools and small-scale machinery used in material research and transformation. These include custom-made pulp beaters, presses, and mesh frames designed for shaping and forming biomaterials.



Tools Checklist

> Shredder or Scissors	Used to cut or tear the paper into small pieces before soaking.
> Containers or Buckets	Large enough to hold the paper pieces and water for soaking overnight, allowing the fibers to soften and loosen.
> Blender	Used to separate and fibrillate the fibers. After soaking, the paper pieces are blended with water for 2–3 minutes until they become a smooth, fibrous pulp.
> Hand mixer	Helpful when adding binders or other additives to the pulp mixture to ensure even distribution.
> Moulds or Frames	Used to shape the pulp into desired forms or sheets.
> Press or Weights	Applied to the mould to enhance fiber bonding and expel excess water.
> Absorbent Cloths or Sponges	Used to remove additional water from the mould during pressing.
> Bowls and Measuring Cups	For portioning, mixing, and measuring pulp, binders, and water.

Design of tools

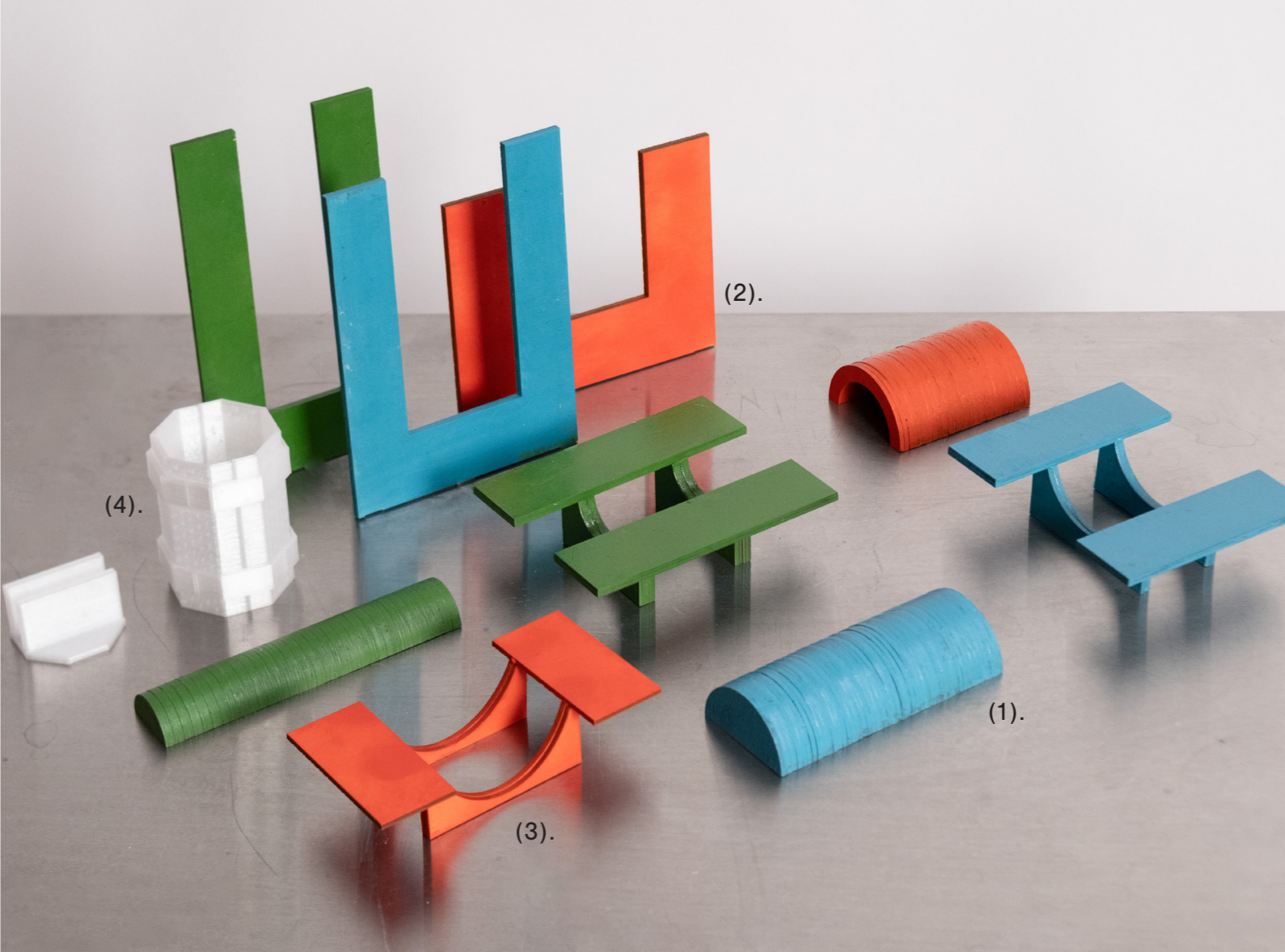
The tools we design are intended to be both efficient and environmentally considerate, using minimal, low-tech materials that support the making process without excess. Each tool is carefully aligned with its role in the creation of the hOlder.

For the top part of the hOlder, the process requires three key steps: heating the mesh and shaping it into a cylinder; applying pulp to the mesh and clamping the symmetrical parts securely; and allowing it to dry with even support. To facilitate these steps, we designed a set of purpose-built tools: (1). the shaping cylindrical form, (2). the clamping plates, and (3). the dry-

ing rack. Each tool guides the hand, supports the material, and enables a smooth process of working with the materials.

For the bottom part, we created (4). a pressing mould for the pressing technique, designed to be stable, easy to use, simple to remove, and adaptable for repeated use. Together, these tools guide the process while keeping it hands-on and accessible.

Not all the tools mentioned are mandatory to make bio-materials. Improvise with what's around you!



In the Making: The Workshops



Making with bio-materials is an intuitive process: it requires both patience and attention to texture and timing.

Together with digital documentation of the workshops, this section also shares a few simple tips for working with bio-materials - small lessons gathered from our collective experi-

ments, failures, and discoveries. The following notes are meant as gentle guidance rather than fixed rules, inviting you to explore and adapt through your own hands-on practice.



Prepare in advance.

Soak paper scraps in water for at least 24 hours to loosen fibres. Grass should be pre-chopped or blended with water to break down its structure. Coffee grounds benefit from being dried and sieved before mixing to avoid mould and achieve an even texture.

Balance moisture.

Water content is a fine line: too much causes shrinkage, warping, or cracking during drying; too little prevents proper binding. Aim for a thick, cohesive paste that feels damp but holds its shape.

Experiment with binders.

Natural binders such as starch, gelatin, or alginate can add strength, but they may also influence colour or surface quality. Some ingredients oxidise over time, leaving darker tones - test small samples to learn how your mixture behaves.





Use the press machine wisely.

Pressing helps remove excess water and create a denser, smoother piece. Apply pressure gradually to avoid tearing or uneven thickness.

Control drying conditions.

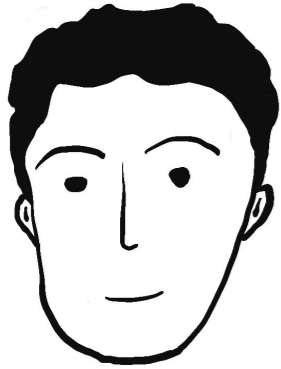
Dry your mixture slowly and evenly - rapid drying or direct heat can cause cracks or curling. A shaded, well-ventilated space or a drying rack helps maintain consistent airflow and reduces stress on the material as it sets.

Embrace imperfection.

Every piece will differ in texture, tone, and finish - these variations reflect the nature of handmade material. Instead of controlling every detail, notice what the material does and let it guide the outcome.



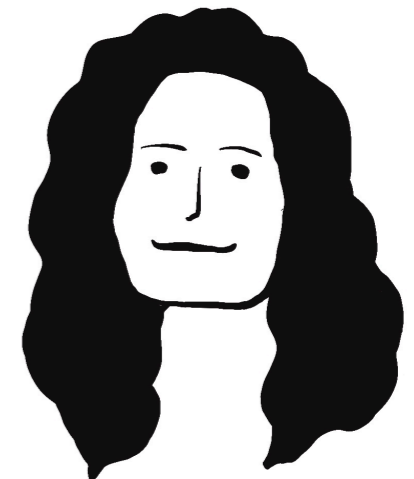
Conversations



Marcus Shi

Engineer.
Master's student in Renewable Energy in the department of
Environmental Science.

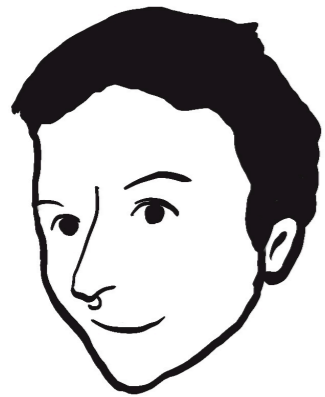
I'm very excited to use the machinery, such as the mixer, the pulp-beater, and the hydraulic press. The tool-kit you designed is also inspiring. I think, the **machinery** really aided me thinking about the possibility of sustainable material, and it is a rare opportunity to try making paper and biomaterial into functional solid objects.



Martas Dias

The flexibility and beauty of paper pulp, in different scales and objects, makes me confident about the **bio-material future**, especially imagining the infinite possibilities lying in the combination between the paper pulp and other products.

Editor at Archello, freelance photographer, and workshop trainer
PhD student at DTU Sustain, researching circular economy and waste value chains.



Lærke Rosgaard

Master's student in Psychology

It expanded my view of what the materials can be used for, and who it can be upcycled by - it made the up-cycling process accessible to someone like me, who doesn't have an educational background in the field of design and material use.

I am fascinated by low tech ideas and **DIY toolkit**, especially when it explore results in being less dependent on capitalist mass manufacturing - it gives me hope and a feeling of agency in a time of climate crisis and ecological collapse.

Before, I only thought paper could be recycled into new paper, but this project opened my eyes to its broader potential. It inspired me to see how **upcycled** materials can be transformed into functional products that perform just as well as conventional ones.



Yu Li

Data Engineer. Holds interest in sustainability and environmental awareness



Our Shared Material Future

Material circularity will not be built by one entity alone - it has to come from decentralised effort of people from all the industries rethinking our relationships with the materials that shape our everyday life.

This publication ends in the same place the workshops begin - with our hands, and the materials they meet. It is here - in the entanglement of hands and matter - that new futures, our shared material future can emerge.

Each gesture of mixing, pressing and moulding is a reminder that materials are not distant abstractions, but familiar companions in our daily lives. Through Re-Imagine Materials, we have seen how waste can become a medium of creativity, connection, and care - not only in what it becomes, but in the process of us seeing the waste with different eyes.

What began as a question about invisibility evolved into a collective act of making visible: revealing possibilities and stories embedded

in the things we often overlook, through bodily touching. In the workshops, new ideas and conversations emerge through the simple act of making together.

As we continue to develop new materials and collaborations, our hope is that this work remains open - open to adaptation, to new hands, and to new contexts. A circular world is not a closed loop but a continuous conversation between people, places, and materials.

We see this publication as both a record and an invitation: a shared language of transformation shaped by experiment and play. One that can travel, take root elsewhere, and grow in the hands of anyone willing to look closer and begin again.

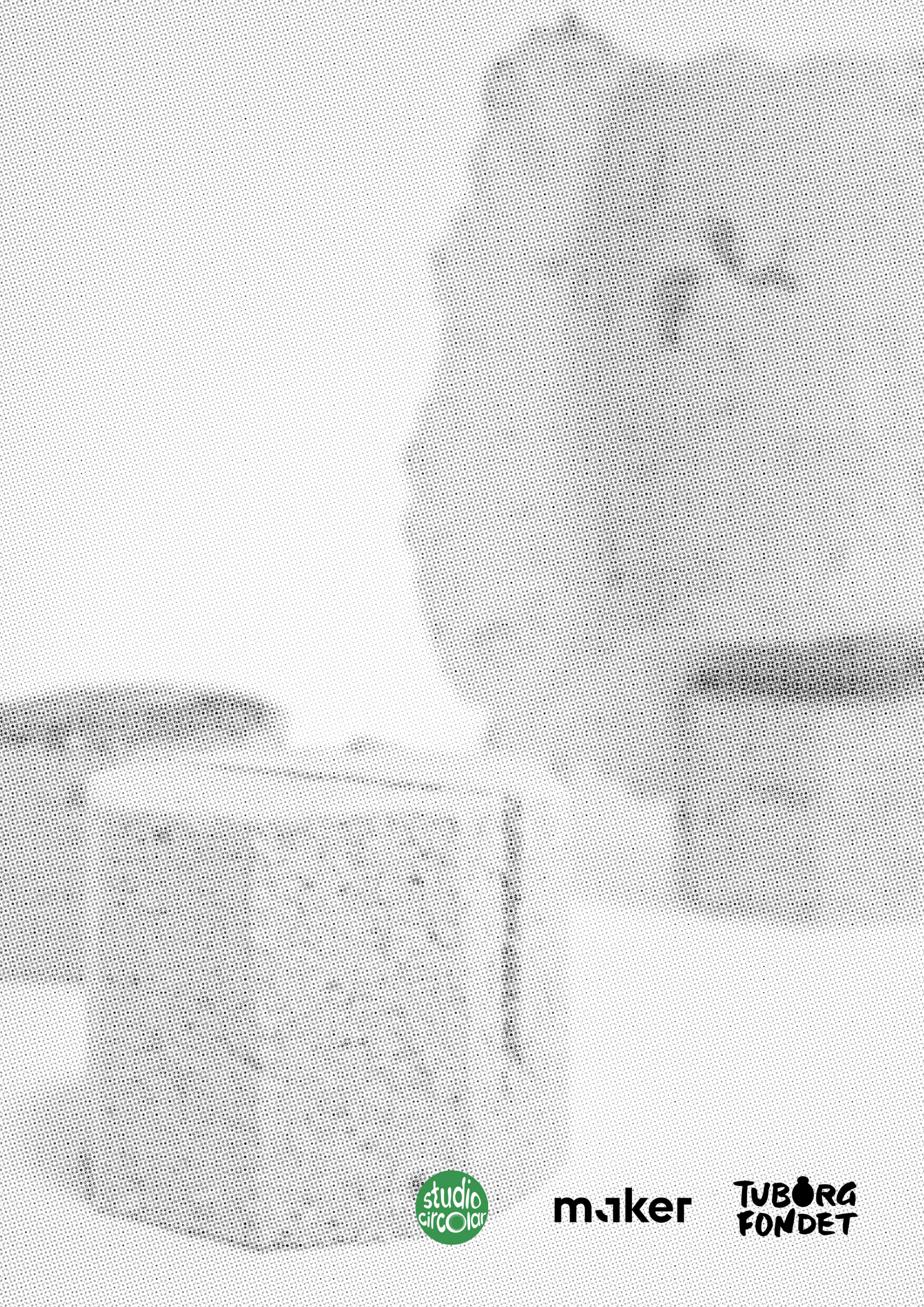




The project is initiated by studio circOlar, collaborated with Maker V-10 and funded by TuborgFondet.

Thank you for everyone who has participated in the workshops and the publication.

Special thanks to who contributed their voices to the publication. This publication would not have been possible without the support and valuable perspectives from all sides!



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