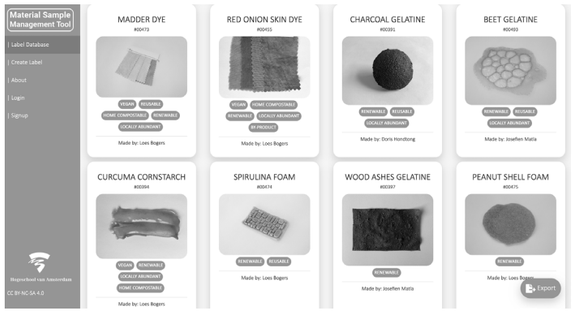
INSTALL A SAMPLE MANAGEMENT TOOL

MANAGE YOUR MATERIAL SAMPLES ON- AND OFFLINE



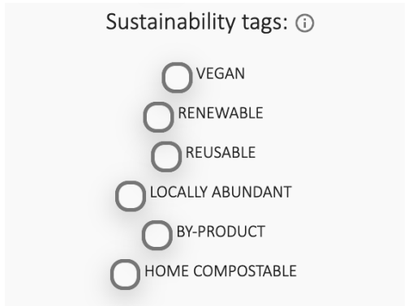
When you want to maintain a material archive for longer, it can help to invest energy in setting up sample management software that helps you organise your samples and generate printable labels.

SEE ALSO: Collaborative open-source archiving | Define your eco-compatibility principles

MATERIOLOGY

DEFINE YOUR ECO-COMPATIBILITY PRINCIPLES

WAYS OF DEFINING "SUSTAINABILITY"



Sustainability is not something absolute that can be measured: it depends on the context a material is applied in, and the life cycle of the object. Shared guidelines help to systematically classify and compare different options.

SEE ALSO: Collaborative open-source archiving | Install a sample management tool

MATERIOLOGY

COLLABORATIVE OPEN-SOURCE ARCHIVING

SHARE YOUR FINDINGS, BUILD ON EACH OTHER'S WORK

Labels designed by Maria Viftrup for Textile Lab Amsterdam can be downloaded here: https://bit.ly/3wdJkdb

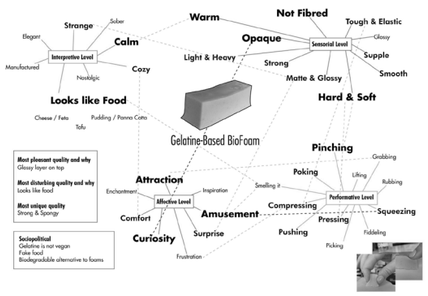
Documenting, archiving, and presenting your material explorations together opens up access to a wealth of options you could never explore alone.

SEE ALSO: Define your eco-compatibility principles | Install a sample management tool

MATERIOLOGY

WHAT IS A MATERIALS EXPERIENCE?

MATERIALS AS BEING SIMULTANEOUSLY TECHNICAL AND EXPERIENTIAL



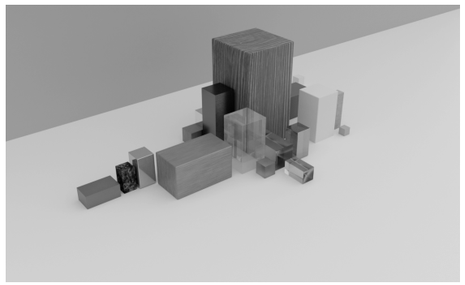
The notion of ***materials experience*** emphasises the role of materials as being simultaneously technical and experiential. People experience materials in products at four experiential levels, namely sensorial, interpretive, affective and performative.

SEE ALSO: What is a material property? | Tactility video

MATERIOLOGY

MATERIAL-OBJECTS

EXPLORING FORM, FUNCTION AND MATERIALITY



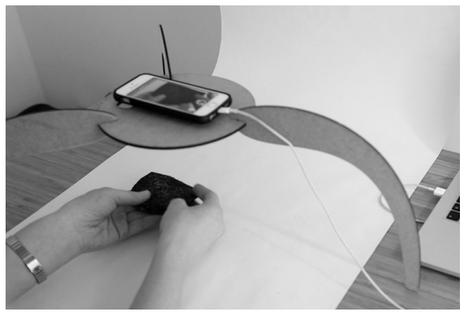
Making, displaying and using series of ***material-objects*** can reveal specific aspects of material science in an experiential way. They communicate aspects of the relationship between form, functionality and materiality.

SEE ALSO: What is a material property? | Morphology of ingredients | Better together | Designed to dissapear

MATERIOLOGY

TACTILITY VIDEO

EXPLORE AND DOCUMENT THE SENSORY QUALITIES OF A MATERIAL THROUGH VIDEO



Making a tactility video is a way to explore and document the sensory qualities of a material, by capturing the "feel" and sound of it in a video.

SEE ALSO: What is a materials experience | What is a material property

MATERIOLOGY

COLLABORATIVE OPEN-SOURCE ARCHIVING

WHY
Having a large collection of small variations gives you a good feeling for how material recipes can be tweaked to achieve very different results. By having a sample available with a recipe attached, you get a better idea than from a picture or piece of text alone.

WHEN
When you find yourself in a group of people who are interested in experimenting with natural design materials, and believe you could learn more from each other than alone.

TASKS

Discuss the idea of *open-source*
- What does it mean? Where does it come from? Could it be applied to making materials? What could be pitfalls? What are the benefits? Do you have any hesitations?

Decide what system you will use
- Design, or choose a template all materials will be archived with
- Make sure there's a template for small, medium and large samples
- Find a place where you can display everyone's samples
- Decide on the paper stock (something that fits an office printer)

Do material experiments
- Keep notes on all material experiments you do: write down details on ingredients, cooking and drying time, references, etc.

Document and archive
- Collect all your notes and fill out the labels for your samples.
- Make sure to list a main reference and state which changes you made to create a new variation (your "contribution to the field")

Display
- Trim your materials if needed, and mount them onto the labels
- Attach a hang tab or other system to hang them up
- Put them in your material archive.

REFERENCE
- OS Material Archive developed at Textile Lab Amsterdam (2016-ongoing): https://tcbl.eu/project/os-material-archive

NEXT
If you want to formalize the process, consider installing software to build your own online/offline archive and sample management tool: https://samplemanagementtool.org/

DEFINE YOUR ECO-COMPATIBILITY PRINCIPLES

WHY
If a product is to be truly eco-compatible during its life cycle it must minimise, if not eliminate, resource con-sumption (energy and materials) and emissions (air, water, and solid waste). Lerma, diGiorgi & Allione developed a multi-criteria interpretation system to help designers interpret the environmental performance of design materials in a context- aware way.

OUTPUT
Shared definitions that work as a yardstick to help you assess when you can make certain claims about a material (e.g. say it is bio-degradable).

TASKS

1. Research & define
Research these terms and define them in 1 or 2 sentences. Try to come to an agreement with your peers on what definition you agree on, so you have a yardstick to assess when these terms apply to a particular material.

2. Suggest ways to research the parameters
Describe methods to look into each of these for a given material or feedstock.

Low environmental impact in use:
- Eco-efficiency (relates to embodied energy & emissions)
- Short distribution chain (relates to sourcing of feedstock)
- Non-toxicity (relates to toxicity of material when in use)
- Renewable resources (relates to time required for resource to replenish itself, e.g. regrow in nature)

Extension of the useful life of materials:
- Durability (is the lifespan of material in proportion to lifetime of use of the product it is used for?)
- Recyclability (consider homo geneity of material, and quality of recycled output)
- Biodegradability (time and conditions required to decompose)

Ethical production:
- Is the feedstock or semi-finished product or ingredient manufactured in a responsible way?

REFERENCE
- Beatrice Lerma, Claudia diGiorgi & Cristina Allione (2013) Design & Materials: Sensory perception sustainability project: p. 103: https://bit.ly/3BHM9nZ

NEXT
Select and- if necessary- simplify some of the parameters to use them as guide- lines in your projects.

INSTALL A SAMPLE MANAGEMENT TOOL

WHY
The Sample Management Tool is a label generator and database to support creative communities in documenting and sharing material experiments.

It was designed around the idea of collaboratively building an archive of alternative design materials with an emphasis on materials that are easily renewable, reusable, (home) compostable within 90 days, locally abundant and make use of local waste streams.

WHEN
After you have done some experimenting and want to commit to material experimentation for a bit longer.

This tool was designed for use in university and art school courses to help teachers and students showcase material experiments in shared studios, to learn from and get inspiration.

TASKS

- Contact your systems administrator (or find one)
- Ask them if they are able to install the software below on your server
- Decide who you want to make admins
- Update the logo to your organisation's logo
- Add users and explore together how the tool works
- Negotiate and change things that are unclear or not useful to you
- Read the about page for more info: https://samplemanagementtool.org/#/about
- Start archiving your material samples!

REFERENCE
- https://github.com/Koziad/visualm-5
- Example of tool in use: https://samplemanagementtool.org

This tool was developed based on the OS Material Archive, a project developed at Textile Lab Amsterdam by Cecilia Raspanti and others: https://tcbl.eu/project/os-material-archive

TACTILITY VIDEO

WHY
This method provides a way to convey material properties in an accessible, non-textual way.

WHEN
1) To spend time with your material experiments, and get to know their unique features
2) when you cannot provide access to the physical sample you can use this format to convey the feel and sound of a material.

NEXT
Asking others to manipulate the materials while you film them is also a way to research materials experience described in the card ***What is a materials experience?***

TASKS

- Select one or more materials to explore
- Watch the tutorial video https://bit.ly/3bIQHQh
- Lasercut a phonestand with the design file provided
- Find a quiet place with even natural lighting
- Set up your phone in landscape format
- Shoot your tactility video(s)
- Optional: include a link to the video in your archiving template

REFERENCE:
- Loes Bogers (2020) Tutorial for a tactility video: https://class.textile-academy.org/2020/loes.bogers/projects/outcomes/tools_and_templates/tactilityvideo/

MATERIAL OBJECTS

WHY
The strategy of creating ***material-objects*** has been proposed by Zoe Laughlin (2010) as a way to express the relationship between form, function and materialty by letting the material itself represents the science behind materials in the context of a material library. Laughlin demonstrated this by creating a series of cubes, spoons, bells, and tuning forks identical in form but made of different materials, whose properties can then be experienced and compared.

WHEN
Designing a set of material-objects is a method to systematically understand and expand upon a material recipe by making variations on a theme.

OUTPUT
A set of material samples that are identical in form (the thing), but different in terms of the material (the stuff). Can be contributed to a shared material archive when documented together with recipes.

TASKS

Select
- Choose a form or object you are interested in exploring (e.g. a spoon, a sheet material)
- Choose one or more material recipes you are interested in exploring further

Make
- Create a series of objects that have the same form, but are made with a different material recipe.
- Variations between the recipes can be very small and incremental (e.g. from no glycerine to a lot of glycerine), or substantial (e.g. using to entirely different recipes with different biopolymers).
- Document each recipe in detail: weigh the ingredients, record cooking and drying times, measure temperatures etcetera.

Share
- Allow others to explore the material series and documentation and explore what they're able to understand about the materials by interacting with the series and comparing the samples.
- Contribute the set to your material archive.

REFERENCE
- Zoe Laughlin (2010) How can the Science of Materials be Represented by the Materials Themselves in a Materials Library? https://doi.org/10.13140/RG.2.2.16034.94405

WHAT IS A MATERIALS EXPERIENCE?

WHY
Developing an ***experiential characterization*** of a material entails investigating of how a material is received, what it makes people think, feel and do. It helps designers mobilize unique material qualities in design processes.

WHEN
When you've developed one or more interesting materials and want to systematically explore their possible application in real products/objects.

TASKS

Understand the material: technical
tinker with the material (e.g. make variations on the recipe)| test material's properties, compare to similar materials | describe opportunities and constraints | explore and describe possible manufacturing processes

Understand the material: experiential
Explore how the material is experienced by people using the MA2E4 toolkit. Inquire about their experiences on the ***performative***, ***sensorial***, ***affective*** and ***interpretive*** level.

Create a materials experience vision & patterns
Express how you envision the material's role in creating functional applications and unique user experiences, in relation to other products, people and wider contexts. See also reference below.

Designing material/product concepts
Integrate all findings into 3 product concepts that mobilize the material's unique properties in a meaningful way.

REFERENCE
- Elvin Karana, Bahareh Barati, Valentina Rognoli & Anouk Zeeuw van der Laan (2015) Material Driven Design (MDD): A Method to Design for Material Experiences. International Journal of Design.

SEE ALSO:
- Serena Camere & Elvin Karana (2018) MA2E4 Toolkit: Experiential Characterization of Materials: https://materialsexperiencelab.com/ma2e4-toolkit-experiential-characterization-of-materials

WHAT IS A MATERIAL PROPERTY?

DEVELOP A SHARED VOCABULARY UNDERPINNED BY EXAMPLE MATERIALS AND TACTILE EXPERIENCES

MATERIAL SCIENCES HAVE DEVELOPED SHARED VOCABULARIES TO DESCRIBE MATERIAL PROPERTIES BUT ARE OFTEN UNDERPINNED BY TECHNICAL MATERIAL TESTS AND MATHEMATICAL FORMULAS. DEVELOP A SHARED VOCABULARY UNDERPINNED BY EXAMPLE MATERIALS AND TACTILE EXPERIENCES.

SEE ALSO: What is a materials experience? | Tactility video | Material-objects

MATERIOLOGY

RECYCLING

INDUSTRIAL PROCESSING AND CONVERSION TECHNIQUES

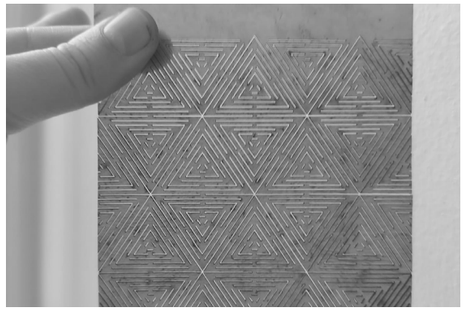
FABRICATION IS ABOUT PROCESSING RAW MATERIALS AND MAKING PARTS THAT ARE SUITABLE FOR ASSEMBLY OR MANUFACTURING OF GOODS FOR CONSUMERS. KNOWING THE MAJOR TECHNIQUES FOR PROCESSING OR CONVERSION OF MATERIALS HELPS YOU EXPLOREPOSSIBILITIES OF BIOMATERIALS IN DEPTH.

SEE ALSO: Extractive Manufacturing | Additive Manufacturing | Moulding & Casting | Transforming Assembling | Finishing

MATERIOLOGY

EXTRACTIVE MANUFACTURING

INDUSTRIAL PROCESSING AND CONVERSION TECHNIQUES



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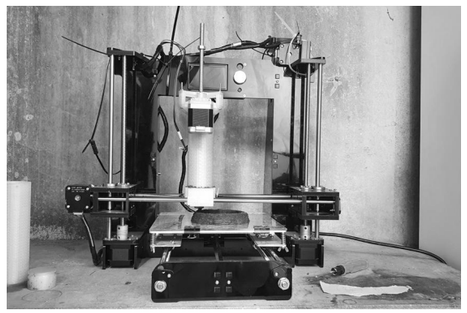
SEE ALSO: Recycling | Additive Manufacturing | Moulding & Casting | Transforming | Assembling| Finishing

MATERIOLOGY

ADDITIVE MANUFACTURING

INDUSTRIAL PROCESSING AND CONVERSION TECHNIQUES



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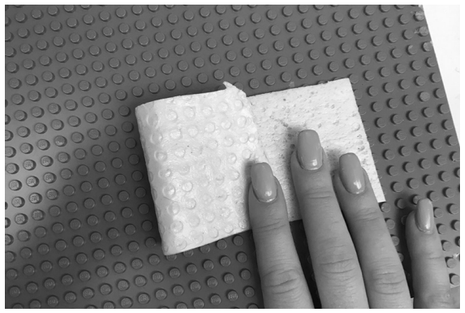
SEE ALSO: Recycling | Extractive Manufacturing | Moulding & Casting | Transforming | Assembling | Finishing

MATERIOLOGY

MOULDING AND CASTING

INDUSTRIAL PROCESSING AND CONVERSION TECHNIQUES



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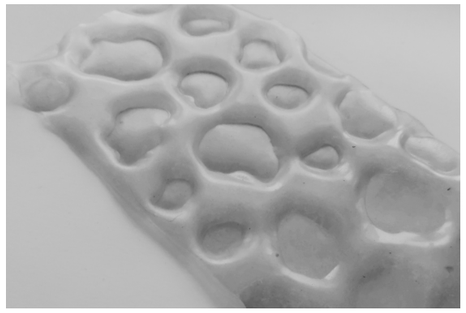
SEE ALSO: Recycling | Additive Manufacturing | Extractive Manufacturing | Transforming | Assembling | Finishing

MATERIOLOGY

TRANSFORMING

INDUSTRIAL PROCESSING AND CONVERSION TECHNIQUES



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SEE ALSO: Recycling | Additive Manufacturing | Extractive Manufacturing | Moulding & Casting | Assembling | Finishing

MATERIOLOGY

EXTRACTIVE MANUFACTURING

WHY
Making bio-based materials is a form of fabricating. To imagine possible applications, we need to understand how they can be made into semi-manufactured materials and functional parts.

TASKS

Explore your material recipes by subjecting them to different processing techniques. Curate a series of samples showing possible processing techniques for one of your material recipes.

Extractive Manufacturing is starting with a block, plate or sheet of material and getting what you want by extracting material from it. You can either remove material (machining and engraving) or cut material (cutting).

- ***Cutting*** (e.g., saws, scissors, knives, lasercutting, hotwire, piercing)
- ***Machining*** (drilling, milling, turning, abrasion)
- ***Engraving*** (laser engraving, etching, carving)

REFERENCE
• Daniel Kula & Élodie Ternaux (2008) Materiology: The Creative Industry's Guide to Materials and Technologies.

RECYCLING

WHY
Making bio-based materials is a form of fabricating. To imagine possible applications, we need to understand how they can be made into semi- manufactured materials and functional parts.

TASKS

Explore your material recipes by subjecting them to different processing techniques.Curate a series of samples showing possible processing techniques for one of your material recipes.

Recycling is re-using materials. Materials can be re-used for fabrication but often need to be decomposed before they are ready for fabrication. Depending on the nature of the material you can choose between several manners to decompose a material.

- ***Chemical recycling*** (treatment to separate constituents for reuse)
- ***Mechanical recycling*** (shredding, beating, grinding, crushing)
- ***Organic recycling*** (composting to produce fuel or fertilisers)

REFERENCE
• Daniel Kula & Élodie Ternaux (2008) Materiology: The Creative Industry's Guide to Materials and Technologies.

WHAT IS A MATERIAL PROPERTY?

TASKS

When we document material experiments, it is useful to have words to describe their properties and be specific about the differences between those words (e.g., hardness vs. elasticity vs. stiffness). Calculating a modulus however is demystifying for those without a background in material science. Finding a shared vocabulary based on tactile experience and discussion offers a contextual and embodied approach to defining and comparing materials and their properties within a community of practice.

Make duos and assign all property keywords
- Formulate a one-sentence definition per property in your own words
- Find an object that represents a material that would score very low on the scale, and one that represents a high score or even maximum of the scale for that property and one in the middle
- Determine words that can express the minimum and maximum of the scale for each property (e.g., for strength: weak to strong)
- List interactions with the material that help determine its score on the scale of that property

Property keywords
Strength, hardness, transparency, glossiness, weight, structure, texture, temperature, shape memory, odor, stickiness, weather resistance, acoustic properties, scratch resistance, surface friction, weight, elasticity, ductility, wear resistance, water resistance, heat conductivity, creep, density

Class discussion
- Bring your objects to class and reflect on each other's definitions
- Assess how well the presented samples represent the range (min/max) of the scale for that property
- Suggest better examples of the min/max/middle

Visualise your shared vocabulary
Together, make a visual overview of your shared vocabulary of material properties, words used to describe the range, and images of the sample materials that represent different points on the scale for each property.

REFERENCE
• Properties of Materials Introduction (2018) Science Learning Hub https://www.sciencelearn.org.nz/resources/2659-properties-of-materials-introduction
• List of materials properties, Wikipedia: https://en.wikipedia.org/wiki/List_of_materials_properties
• Open-Source Universal Test Machine (2019) CNC Kitchen Youtube: https://youtu.be/uvn-J8CbtzM

TRANSFORMING

WHY
Making bio-based materials is a form of fabricating. To imagine possible applications, we need to understand how they can be made into semi-manufactured materials and functional parts.

TASKS

Explore your material recipes by subjecting them to different processing techniques. Curate a series of samples showing possible processing techniques for one of your material recipes.

Transforming encompasses techniques that change the state of a solid body of material in a controlled way. Although these techniques focus on the plasticity of a material, the coherence of the material and the mass of the material body remain intact. These techniques can be applied to cold material, semi-hot or hot material.

- ***Folding*** (cold vs hot, optional: scoring, applying stiffeners)
- ***Thermoforming*** (vacuum forming, dome blowing)
- ***Stamping*** (cold pressing sheets using moulds)

REFERENCE
• Daniel Kula & Élodie Ternaux (2008) Materiology: The Creative Industry's Guide to Materials and Technologies.

MOULDING AND CASTING

WHY
Making bio-based materials is a form of fabricating. To imagine possible applications, we need to understand how they can be made into semi-manufactured materials and functional parts.

TASKS

Explore your material recipes by subjecting them to different processing techniques. Curate a series of samples showing possible processing techniques for one of your material recipes.

Moulding & casting are both processes in which materials in a non-defined shape or stage are directly converted into a defined shape. Casting is mostly done with metals and clay and moulding with plastics.

- ***Cast-moulding*** (using liquids, open/closed mould)
- ***Rotational*** moulding (multi-layered, open-closed)
- ***Extruding*** (extruding and co-extruding, blow-moulding)
- ***Injecting*** (injecting into mould, compression moulding)
- ***Sintering*** (heating powders with or without binder, laser sintering)

REFERENCE
• Daniel Kula & Élodie Ternaux (2008) Materiology: The Creative Industry's Guide to Materials and Technologies.

ADDITIVE MANUFACTURING

WHY
Making bio-based materials is a form of fabricating. To imagine possible applications, we need to understand how they can be made into semi-manufactured materials and functional parts.

TASKS

Explore your material recipes by subjecting them to different processing techniques. Curate a series of samples showing possible processing techniques for one of your material recipes.

With **additive manufacturing**, you build your design by adding or fusing materials in layers on top of one another.

- ***3D printing*** (manual or digital/automated)
- ***Contact moulding*** (alternating plastics with various substrates e.g., fibres, using a lay-up method. Also called composites)

REFERENCE
• Daniel Kula & Élodie Ternaux (2008) Materiology: The Creative Industry's Guide to Materials and Technologies.

ASSEMBLING

INDUSTRIAL PROCESSING AND CONVERSION TECHNIQUES

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SEE ALSO: Recycling | Additive Manufacturing | Extractive Manufacturing | Moulding & Casting | Transforming | Finishing

MATERIOLOGY

FINISHING

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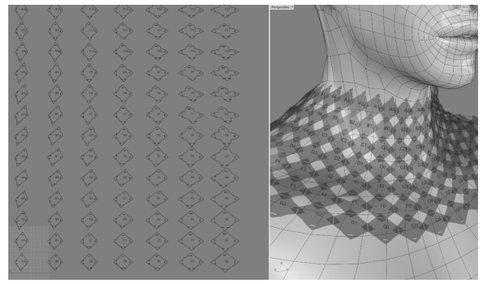
SEE ALSO: Recycling | Additive Manufacturing | Extractive Manufacturing | Moulding & Casting | Transforming | Assembling

MATERIOLOGY

MONO- MATERIAL CONNECTIONS

EXPLORE INTERLOCKING STRATEGIES TO DEVELOP MONO-MATERIAL DESIGNS



DESIGNING INTERLOCKING CONNECTIONS – OR HOW YOU CAN CONSTRUCT BY CONNECTING A MATERIAL TO ITSELF - IS A USEFUL DESIGN STRATEGY TO CREATE OBJECTS MADE FROM ***MONO-MATERIALS***.

SEE ALSO: (Un)making the mould | Be a 3D printer

MATERIOLOGY

MONO-MATERIAL CONNECTIONS

WHY
Many waste materials (e.g. leather offcuts) often come in small pieces, and making your own materials will initially happen on smaller scale before scaling up in size. Moreover, materials are easier to recycle when they are made of one single materials or mono-materials.

WHEN
When you want to design products that don't need to be de-constructed to be recycled.
When you decide to work with a material feedstock that typically comes in small pieces.

TASKS

Select a material
- Select the material you want to design a connection for. Not all connections are transferable to other materials, so choose first, design after.

Paper prototyping
- Prototype your material connections by drawing and making paper prototypes using scissors.

Testing
- Test your paper prototypes with more accuracy. Design them in a vector drawing software and cut them with a laser cutter.

Play & iterate
- Play with your modules, experiment with the kinds of shapes and structures you can make with them. Iterate on their design as new ideas come up.

NEXT
Translate your interlocking connection mechanism into a generative design. Using parametric design tools, you can make your modules adaptive, expanding their potential for creating complex 3D shapes, rather than only flat materials.

REFERENCE
- Zoe Romano (2019) Circular Open-Source Fashion, for Fabricademy. https://class.textile-academy.org/classes/2019-20/week03/ and https://oscircularfashion.com/
- Tutorial interlocking tesselation design with Rhino & Grasshopper by Lorenzo Massini (2020) https://youtu.be/Nb_IfpgM9WU

FINISHING

WHY
Making bio-based materials is a form of fabricating. To imagine possible applications, we need to understand how they can be made into semi-manufactured materials and functional parts.

TASKS

Explore your material recipes by subjecting them to different processing techniques. Curate a series of samples showing possible processing techniques for one of your material recipes.

Finishing is a surface treatment, either for protection or decorative purposes. Biomaterials can also be developed as a finish for other materials.

- ***Painting*** (mix of binder, pigment, additives and solvents)
- ***Coating*** (finishing processes for textiles and paper)
- ***Varnishing*** (transparent paints, with or without color)
- ***Sanding & polishing*** (sanding, chemical polishing, rubbing)
- ***Printing*** (gravure, silkscreen, offset, UV-printing, stenciling, RISO)

REFERENCE
- Daniel Kula & Élodie Ternaux (2008) Materiology: The Creative Industry's Guide to Materials and Technologies.

ASSEMBLING

WHY
Making bio-based materials is a form of fabricating To imagine possible applications, we need to understand how they can be made into semi-manufactured materials and functional parts.

TASKS

Explore your material recipes by subjecting them to different processing techniques. Curate a series of samples showing possible processing techniques for one of your material recipes.

Many products exist out of several parts, and even the smaller parts can be assemblages of different components.
Assembling is connecting these parts in such a way that they can perform their intended function and can withstand the occurring load (in the form of pressure or friction, or else).

- ***Joinery*** (wood joinery, snap fit, interlocking, screws, nails)
- ***Sewing*** (stitches: running-, basting-, slip-, back-, zigzag-, overlock-)
- ***Bonding*** (using adhesives, heat or solvents)
- ***Folding*** (riveting, rolled edges)
- ***Heat sealing*** (heat welding, soldering, laser welding, friction welding)

REFERENCE
- Daniel Kula & Élodie Ternaux (2008) Materiology: The Creative Industry's Guide to Materials and Technologies.