

Stroud BrewPulp



A Hyper-Local Bio-Material
Case Study by Dominika Opalena



Stroud Investigation

‘Stroud Brew Pulp’ is a material outcome of investigating hyper-local waste at Stroud, Gloucestershire, it’s potential as a bio-material and it’s possible applications.*

By identifying local companies which are willing to experiment, through cooperation the project is able to act as an exemplar hyper-local ‘recipe’ and provide a unique case study, contributing to the dialogue of tackling issues of sustainability.

*The research stage of this project has also identified further sites where the same ‘recipe’ approach could be implemented.



Stroud Brewery, local organic beer brewers



One of the very first, early samples of 'Brew Pulp'.



Flaxland, an educational flax farm

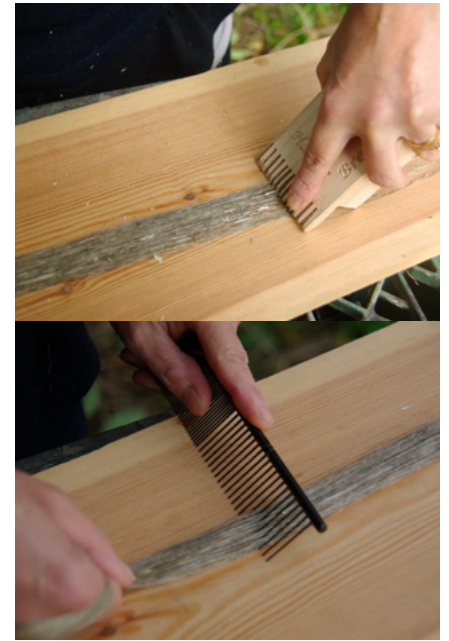
Bio-waste of both companies, which are in very close proximity, has been combined into a bio-material.

Flaxland – Unique Bio-waste

Ann and Simon from *Flaxland* are artisan natural fibre growers and processors of flax seed. Amongst many of their activities involving flax seed, they run educational workshops which guide you through the process of turning the flax plant into linen, inspiring people to learn about this beautiful native fibre.



Ann demonstrating hackling of flax



Flax fibre straw mix



Spinning flax fibre on a cone distaff

As participants in these workshops learn how to process flax by hand using processing tools built by Simon, they generate improperly processed fibre mix with straw - as one would when doing something for the first time.

Industrial processing of flax seed does not generate this type of waste therefore it is unique to hand processing.

Stroud Brewery – Extending the Lifecycle

Stroud Brewery has become a cherished local landmark, it's taproom providing great tasting, ethical and organic beer. Alike many other breweries, in the process of brewing they boil grains and hops. This waste currently has it's use as fertilizer for local farmers. By taking the waste source and adding an extra use as a 'material', I am attempting to extend the lifecycle.

Malt is a grain product and some of the polyphenols from the starting grain survive through to beer and contribute to health. Malt has a broad profile of minerals and vitamins that are maintained during the brewing process. The colour of beer comes mostly from malt. Malt also has proteins, which are responsible for beer foam properties. Malt provides the sugars for fermentation.



Waste malt from brewing

What we know as 'hops' are cone-shaped flowers of the female hops plant called *Humulus Lupulus*. This flower is a cousin of cannabis (without the THC, but very aromatic) containing acids and oils that give beer bitterness, flavour, and keep beer fresh for longer.



Waste boiled hops from brewing



Stroud Brewery

Stroud Brew Pulp – Material Recipe

By creating a material ‘recipe’, combining three local waste sources, from two different local businesses, the designer attempts to create a hyperlocal material.



Hops



Flax Straw Mix

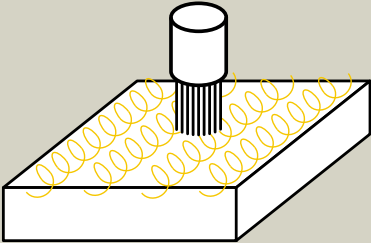


Grains

Stroud Brew Pulp – Material Recipe

This is a method that has been developed after initial experiments with the material for moulding.

Felting



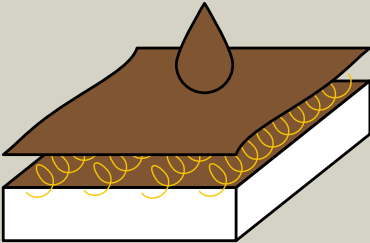
Felting flax fibre and straw (similar to wood wool process)

Boiling



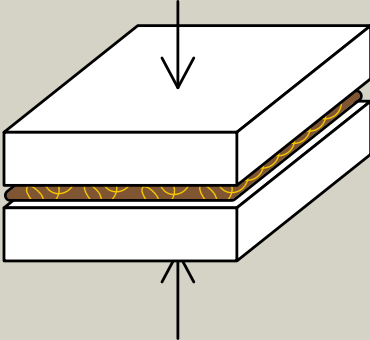
Boiled hops and spent grain combined with a binder

Sandwich



Pour bio-material over felted flax fibre straw

Pressing



Pressed and cured

Stroud Brew Pulp – Material Recipe

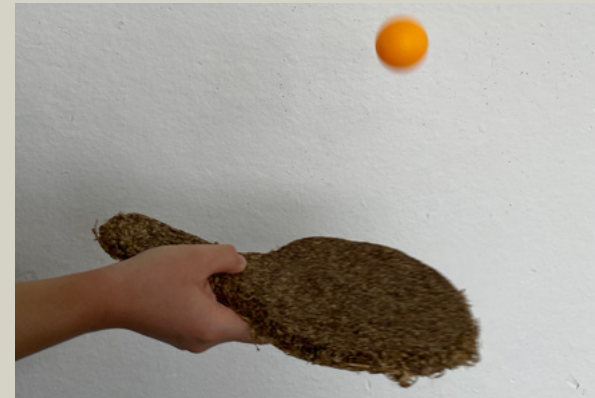
To move away from flat samples, and to find the material a local application, the designer proposes moulds for workshop use. By facilitating biomaterial workshops and engaging locals with the material the designer hopes to share knowledge, spark interest and involve the local in finding an application for the material.



Material samples with natural dyes

Moulds Development

Working with bio-material is not straight forward. I've had to develop a process and tools, which have continuously evolved as I tried to apply the material to more complex moulds.



An early paddle prototype, presenting great strength, sufficient for ping pong play



Development of a heavy metal press designed much like a flower press for mould pressing



Improvised press (Fit for purpose)



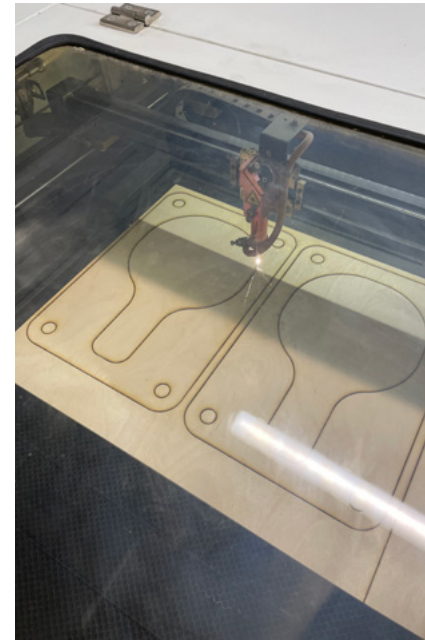
The development of a ping pong bat



Unfinished, unrealized design of mould for a workshop play interaction

Material Recipe In Practice

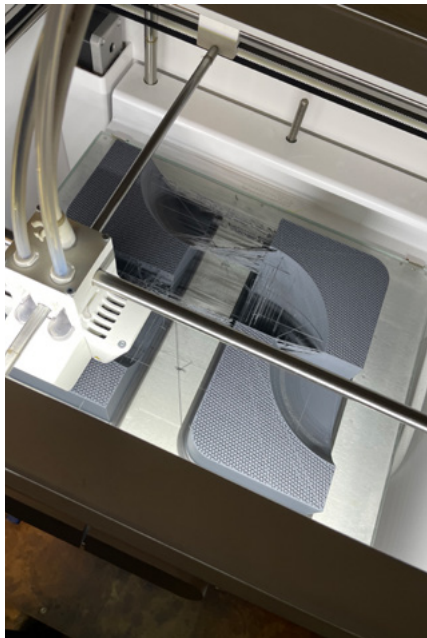
The material recipe dictates the process, which limits manufacture to press moulds, male and female parts. I've tried various methods to develop moulds, 3D printing, laminating, and plaster casting.



Laser cutting plywood mould



Laminating a plywood mould



PLA 3D printed modular moulds



Plaster casting



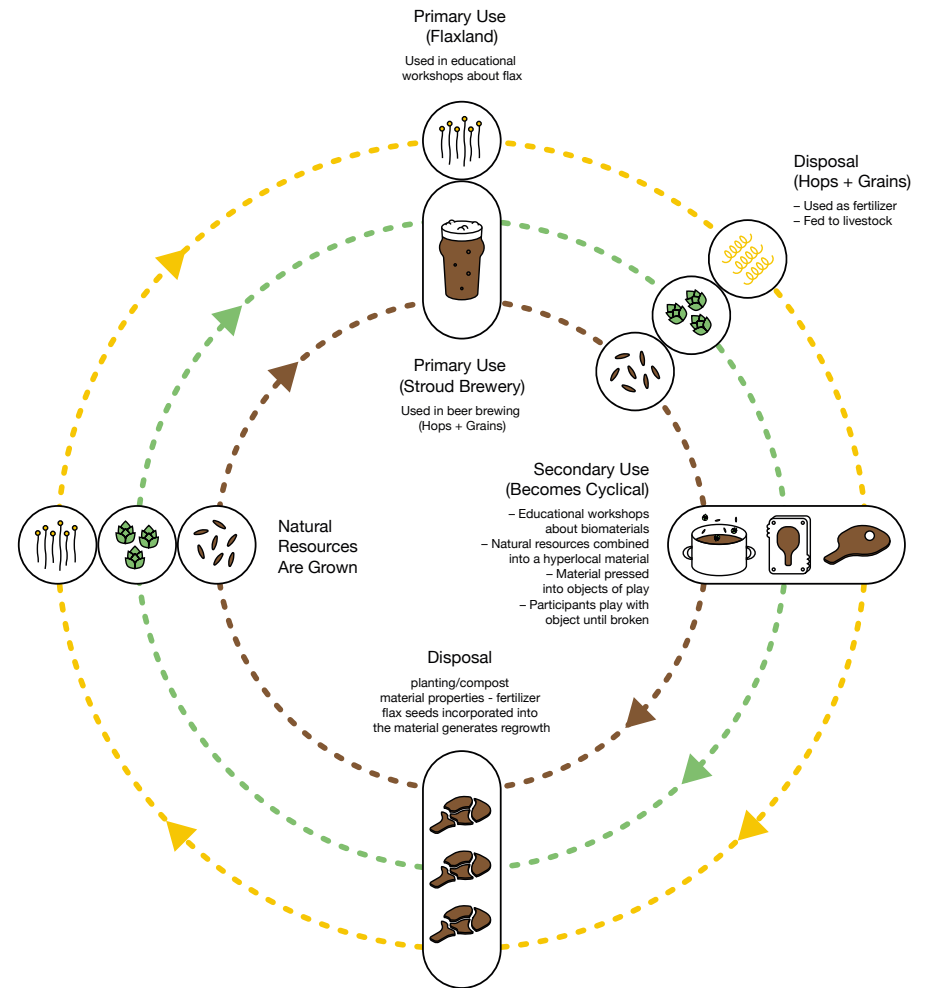
Coating in sealer



Testing durability of a PLA mould in the dehydrator

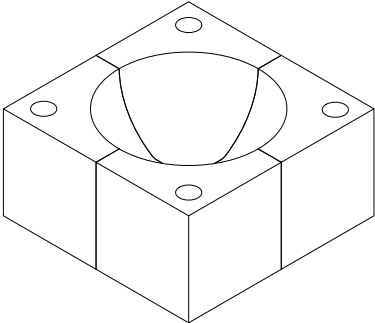
Stroud Brew Pulp – Lifecycle

The creation of this material and its educational workshop use add extra steps, therefore prolong the lifecycle of its natural ingredients - hops, grains and flax straw mix. The circularity continues after objects disposal.

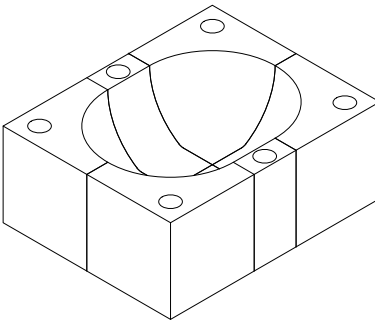


Modular Moulds - Workshop Use

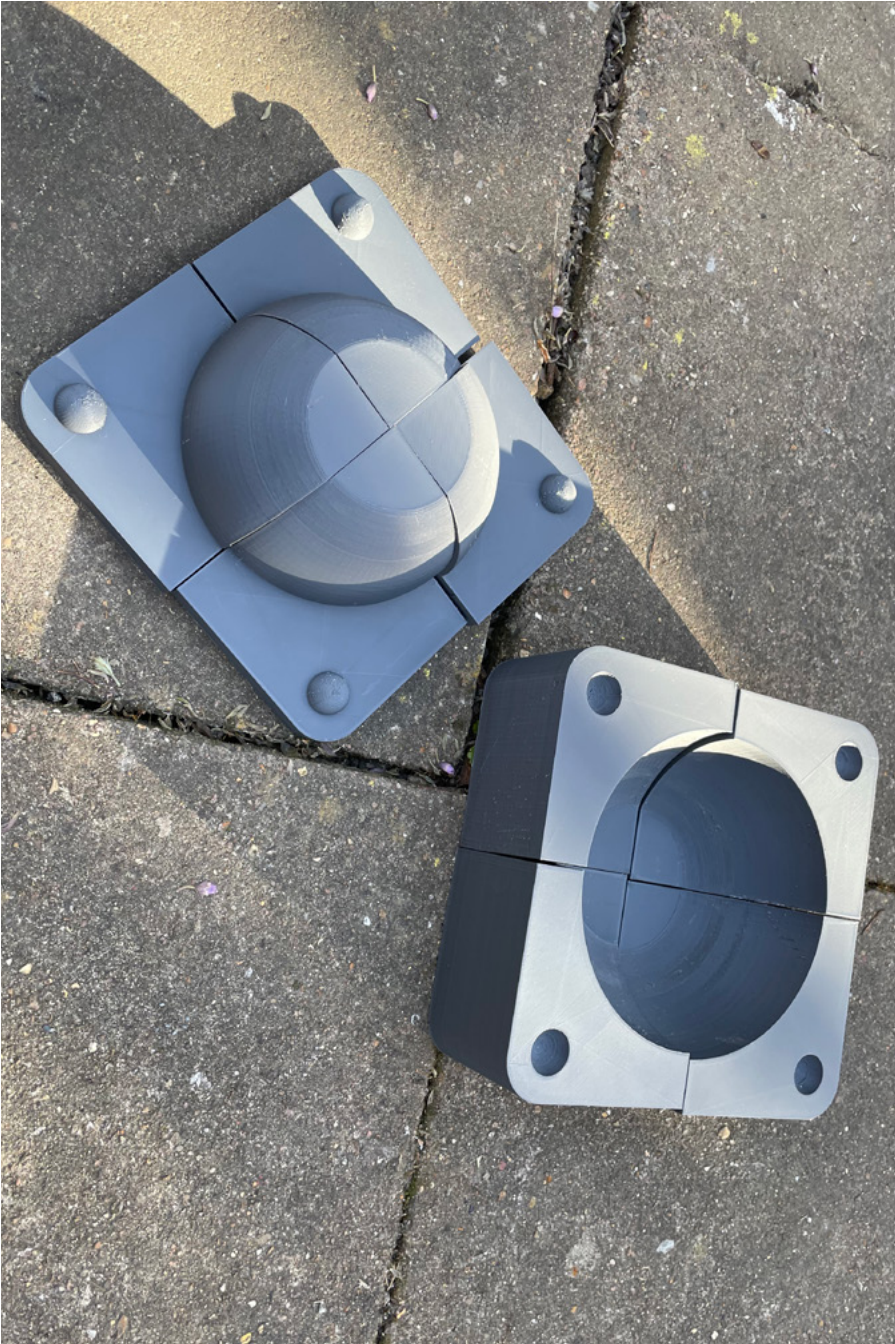
PLA 3D printed modular moulds designed for repeat workshop use and some degree of user participation in the design - starting with a simple round bowl shape. Further parts can be designed and added to create more variations.



Female mould, circular bowl configuration



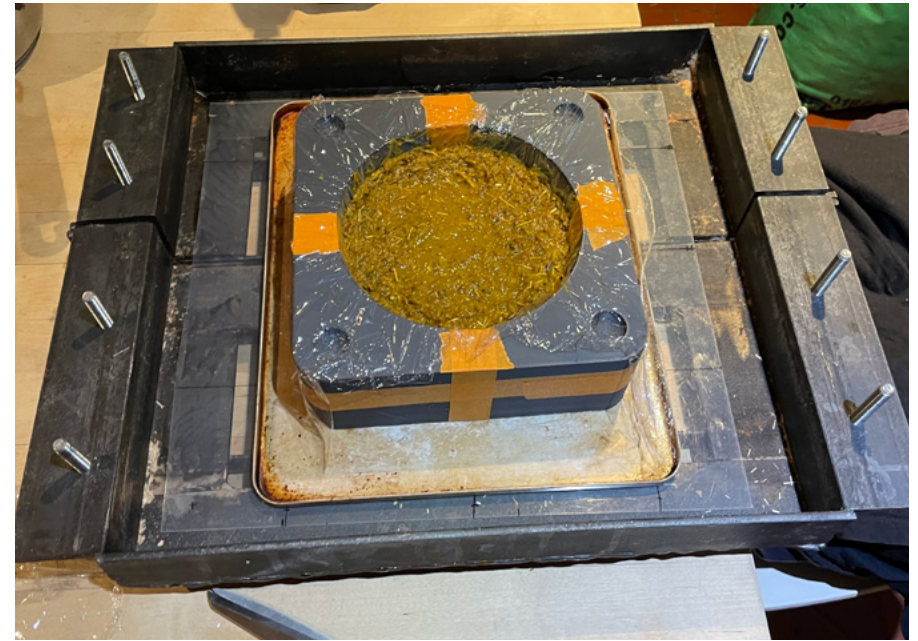
Female mould, pill shaped bowl configuration



PLA 3D printed modular moulds

Modular Moulds - Workshop Use

Moulds are designed to be durable for repeat workshop use and to simply guide the workshop participants through the process of moulding this biomaterial. The workshop is reminiscent of the baking process.



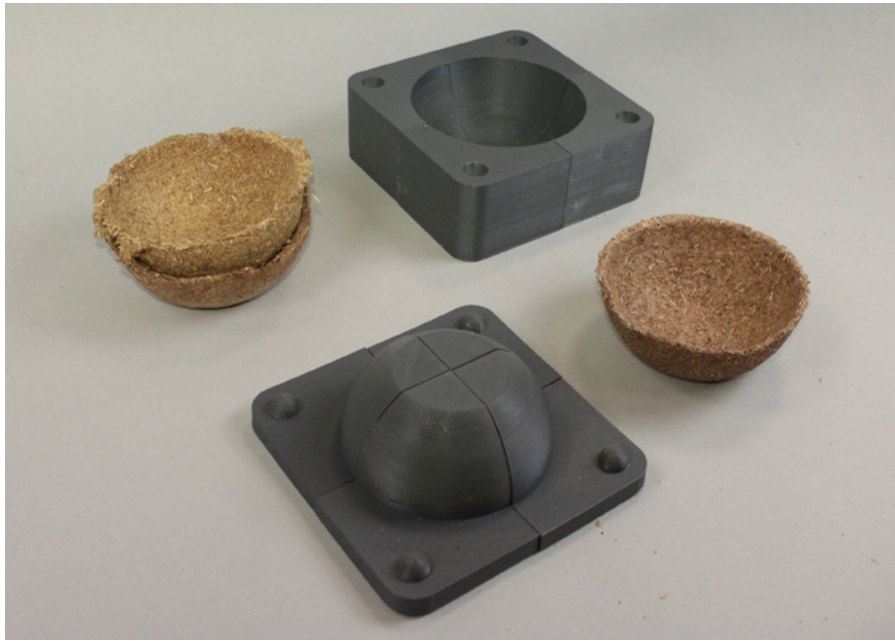
Modular mould ready for pressing



Cheesecloth as a de-moulding mechanism



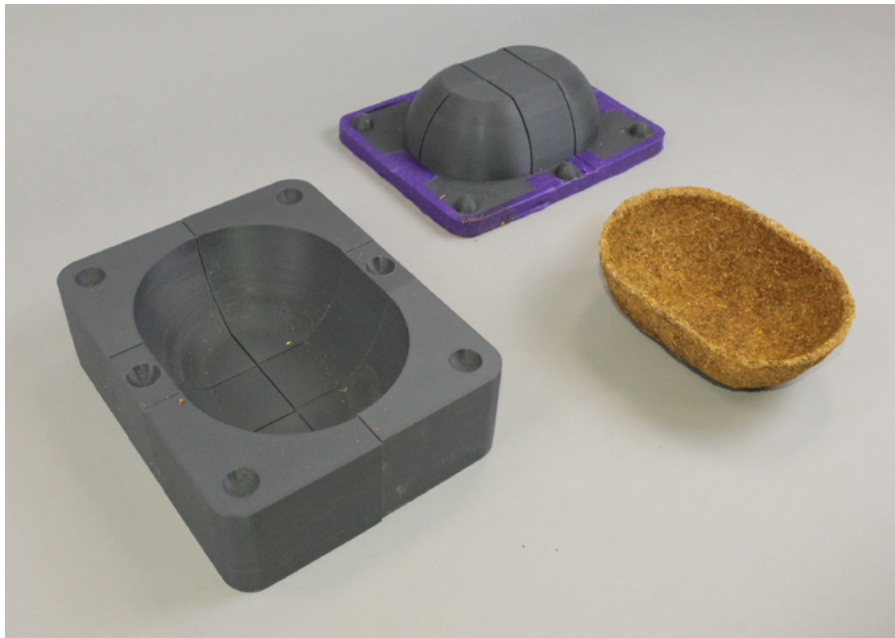
First bowl from the modular 3d printed press mould



Modular mould - spherical bowl



Bowl prototypes



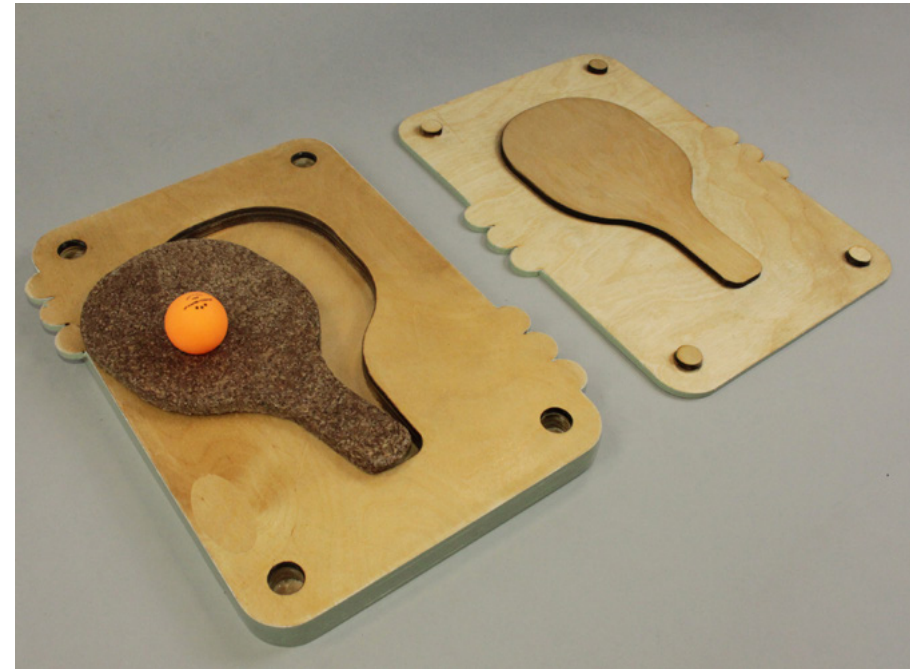
Modular mould - pill shaped bowl



Bowls pressed by workshop participants

Plywood Mould - Play Interaction

By engaging participants in creating and using these ping pong bats the designer attempts to create a hands on interaction with the material and it's strengths and weaknesses.



Plywood ping pong bat mould with samples

Plywood Mould - Material Preparation

Ingredients preparation is reminiscent of crafts and the process of baking.

Stroud Brew Pulp



Ingredients measured and prepared for a ping pong bat



Tools for felting a sheet of flax, a borrowed process from wool felting

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Plywood Mould - Material Moulding

This page illustrates the steps and the process of moulding a ping pong bat.

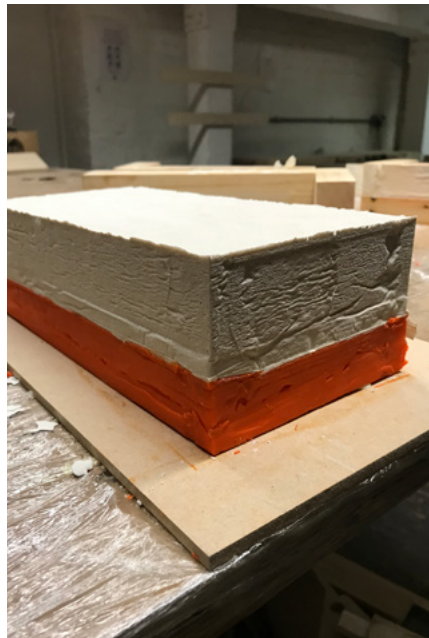


Plaster Mould - Play Interaction

The other attempt to create a play interaction with the biomaterial workshop participants uses the traditional British game of skittles. The designer created a prototype of the skittles from the biomaterial and a simple wooden skittle pole with a flax-rope ball.



Half a skittle cast from plaster



Plaster and plasticine cast



Plaster mould for bar skittle casting



Prototypes of skittles and the skittle pole

Material Preservation

Hops and grains come from the brewing process soaking wet and unless you are able to work with the material immediately or within 2/3 days, it will not last (especially grains as they are more densely packed together). After spending months experimenting with the material, I had to find ways to dry large amounts in order to preserve it. This is one down side of working with these waste sources.



Custom trays to assist the drying process



Protecting wet hops and grains from flies



Air drying hops and grains

Stroud Workshops - Material Learning



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Stroud Workshops - Material Play Interactions



Workshop participants playing ping pong



Setting up game of skittles



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Special Thanks

Special thanks to Ann and Simon Cooper from Flaxland, Greg Piley and Richard Gasser from Stroud Brewery for the continuous support and supply of these materials.

Special thanks to the many great thinkers and doers I've been able to consult this project with: Mariam Ribul, Nikki Kostur, Phoebe Baines, Mat Fowkes, Luke Wright, Chris Lefteri, Freddie Robbins, Rob Phillips, John Nussey, Geraldine Wilkins, Milo McLouglin Greening, Celia Marchessaux and George Taktak.

