

# Cremella

Project Hybrid Theory

Polysytrene Juicer



Trisha Saraogi

25743

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# hybrid theory

For this hybrid theory project, we were tasked to create a traditional manual juicer, a fundamental instrument for extracting juices from citrus fruits. We were tasked to recreate three essential components of the juicer: the cup, the strainer, and the juicer itself, using the combination of one primary material and one perishable food waste by fusing them together in order to create a visually appealing and functional product.

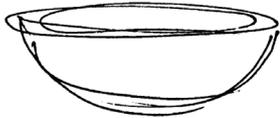
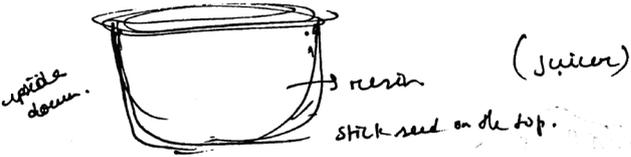
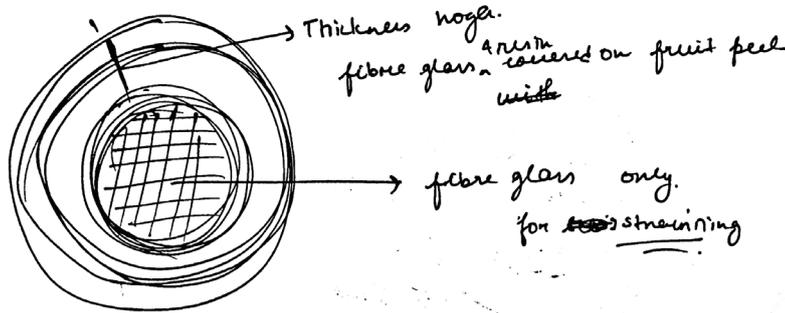
The chosen material and food waste had to be consistent among the three components. Through the material experiments, a traditional juicer was successfully created that not only serves its practical purpose but also portrays the unique properties and characteristics of the primary material and how it reacts with different food wastes. The final product was made using Polystyrene and peanut shells.

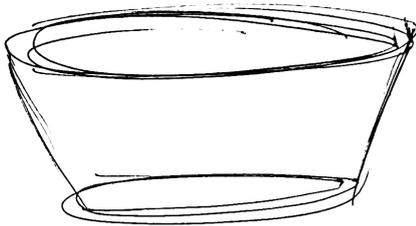


# Sketches

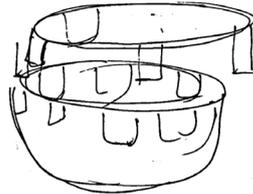
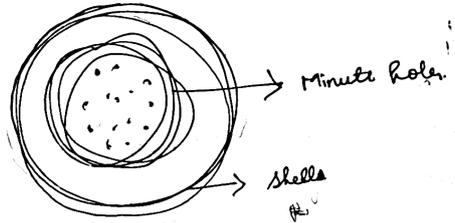
The sketches illustrate the steps involved in achieving the intended result. All these include various forms of the juicer and the strainer that fulfill the criteria of achieving a functional product that juices and strains properly. It was a challenge to seek harmony between the form and the fused material that was suitable for all the three components to work together in order to juice conveniently.

The cup's design not only serves its purpose of holding the strained juice but also seamlessly integrates the fused materials. For the strainer, various shapes and patterns were explored to achieve the desired filtration capabilities. Different juicer mechanisms and shapes were tried for the juicer, which is both efficient in its juicing function and harmonious with the overall aesthetic of the traditional juicer.

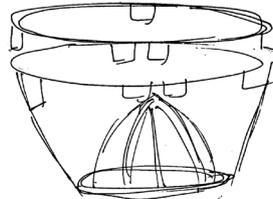
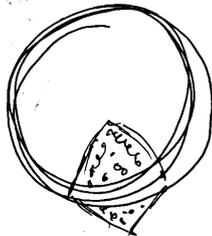
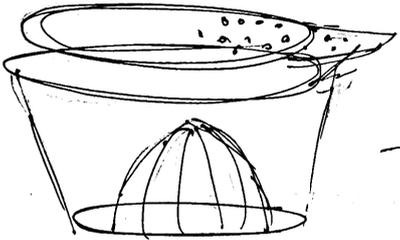
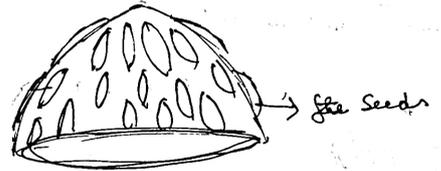




cut →



Loop about the rim



100%

# Research on food waste

Benefits of an addition to the properties of resin when ~~and~~

## ★ Peanut shells are added.

- ~~they~~ peanut shell fibres ~~and~~ effectively reinforce with resin composites, improving their mechanical properties such as tensile strength, flexural strength and impact resistance.
- will increase the overall strength and durability of the juicer.
- promotes sustainability by repurposing waste material, making it more eco-friendly.
- peanut shells impact the mechanical properties of the ~~the~~ resin increasing its resistance to impact ~~and~~ <sup>wear</sup>, thus extending its lifespan.
- peanut shells due to their biodegradability & renewability, align with sustainable, contributing to a more environmentally conscious product.

## ★ Pistachio shells

- improves mechanical properties & environment friendly. (results in a more durable & robust manual juicer).
- introduces a unique texture & visual appeal to the resin, creating a distinctive ~~and~~ appearance that adds depth.
- creates high quality kitchenware.

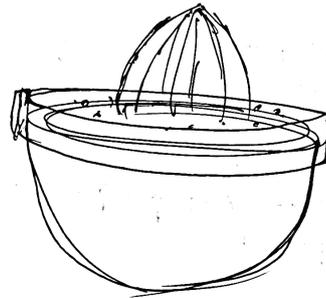
## ★ Tea leaves

- creates a visually appealing & unique texture, ~~can~~ results in a distinctive and organic look for the final product.
- promotes sustainability.
- enhances the durability & strength of the manual juicer. This could lead to a more robust and long lasting product.

## ★ Sunflower seeds

- sustainability & eco-friendliness
- Cost-effective raw
- enhanced strength & durability.
- Unique texture & visual appeal (create a textured finish that adds depth and character to the juicer, plus it adds a natural and organic feel to the juicer).

★ beet skin → contribute to texture & colour diversity in resin



final product

# Polystyrene & Peanut shells

White polystyrene spoons were melted in a square metal mould using a heat gun, then a layer of crushed peanut shells was added to and pressed onto the melted plastic. After that, another layer of plastic was melted on top of the shells. The heat from the process caused the peanut shells to turn black, which, when combined with the white spoons, produced a mesmerizing marbled pattern. Moreover, the fibrous nature of the peanut shells reinforced the polystyrene, making the final product more durable and resistant to damage. It was left for 10 minutes to solidify and cool down completely. The plastic had its own natural shine, which made the surface appear polished.



# Styrofoam & Pistachio shells



The white Styrofoam ball was melted by adding acetone, creating a slippery and flowing mixture. Crushed pistachio shells were then incorporated into the melted polystyrene, and the combined material was left to dry for two days. After drying, the sample had become very hard but exhibited a porous structure with numerous air bubbles. Due to the high porosity of the material, it was necessary to cover the sample with resin to improve its durability and stability. This sample was not used to make the final product because covering it with resin could have potentially masked or even eliminated the unique visual and tactile qualities of the original material fusion. The sample's thickness, around 10 millimeters, necessitated an extended two-day drying duration due to its relatively thick nature.

# Polypropylene & Peanut shells



Translucent polypropylene straws were melted in a square metal mold using a heat gun, followed by the addition of crushed peanut shells onto the plastic surface. Another layer of polypropylene plastic and shells was then applied. However, during heating, the peanut shells turned black, creating an uneven surface when combined with the translucent straws, partially or fully encompassing the peanut shells. Additionally, air pockets formed within the plastic, resulting in small voids or bubbles. These imperfections required filling with resin. Unfortunately, this led to an aesthetically unsatisfactory outcome, resembling a charred appearance.





## Final Material

The combination of polystyrene (PS) plastic and peanut shells emerged as the most suitable material choice for the various components of the traditional juicer. The fibrous nature of the peanut shells provided reinforcement and enhanced the structural integrity of the juicer, while the polystyrene offered the necessary durability and strength required. The contrast between the white polystyrene and the black, burnt peanut shells created a unique and visually striking marbled effect, which was seamlessly integrated across the bowl, strainer, and juicer components, resulting in a cohesive and captivating design.



# Juicer & Strainer

It was a challenge working with polystyrene plastic, as it solidifies quickly, making it difficult to mould. To solve this, a steel mould was used to create the juicer. The process involved coating the steel mold with a releasing agent, melting the polystyrene, and carefully layering it with crushed peanut shells. Pressing the hot plastic with a metal cylinder to avoid air bubbles or voids. This layering process was repeated until the mold was filled, and then the mold was submerged in cold water to allow the temperature to decrease and the shape to come out seamlessly. The use of the steel mold, along with the meticulous layering and pressing techniques, enabled to create a cohesive and structurally sound design for the juicer.

When creating the strainer, the same challenge of working with quickly solidifying polystyrene plastic was faced. To overcome this, a round steel container with a flat base was used as the mould, coated with a releasing agent. The same process of melting plastic and layering with peanut shells was followed as in the juicer until the desired thickness was achieved. However, after de-moulding, the surface of the strainer was uneven and bumpy, requiring the use of a hand sander to even it out. Then, a handheld drill was utilized to create the necessary holes for straining the juice.



## Cup

Creating the cup posed additional challenges due to the plastic's rapid solidification. To overcome this, a unique two-bowl mold system was employed. The larger bowl was coated with releasing agent, then filled with melted plastic and crushed peanut shells. Then, the smaller bowl was used to press the shells onto the surface. This process was repeated, gradually building up the sides of the cup by melting additional layers of plastic and pressing them with the smaller bowl to create a smooth, even surface. After demolding, the side rims and surface of the cup remained rough. They were hand-sanded with progressively finer grits, culminating in wet sanding for a flawless finish



Making of the juicer, strainer and cup by melting PS plastic and using a heat gun adding layers of peanut shells.







Dry sanding of the components in order to get rid of the bumpy surface. Then wet sanding the components to achieve an ultra smooth surface.





