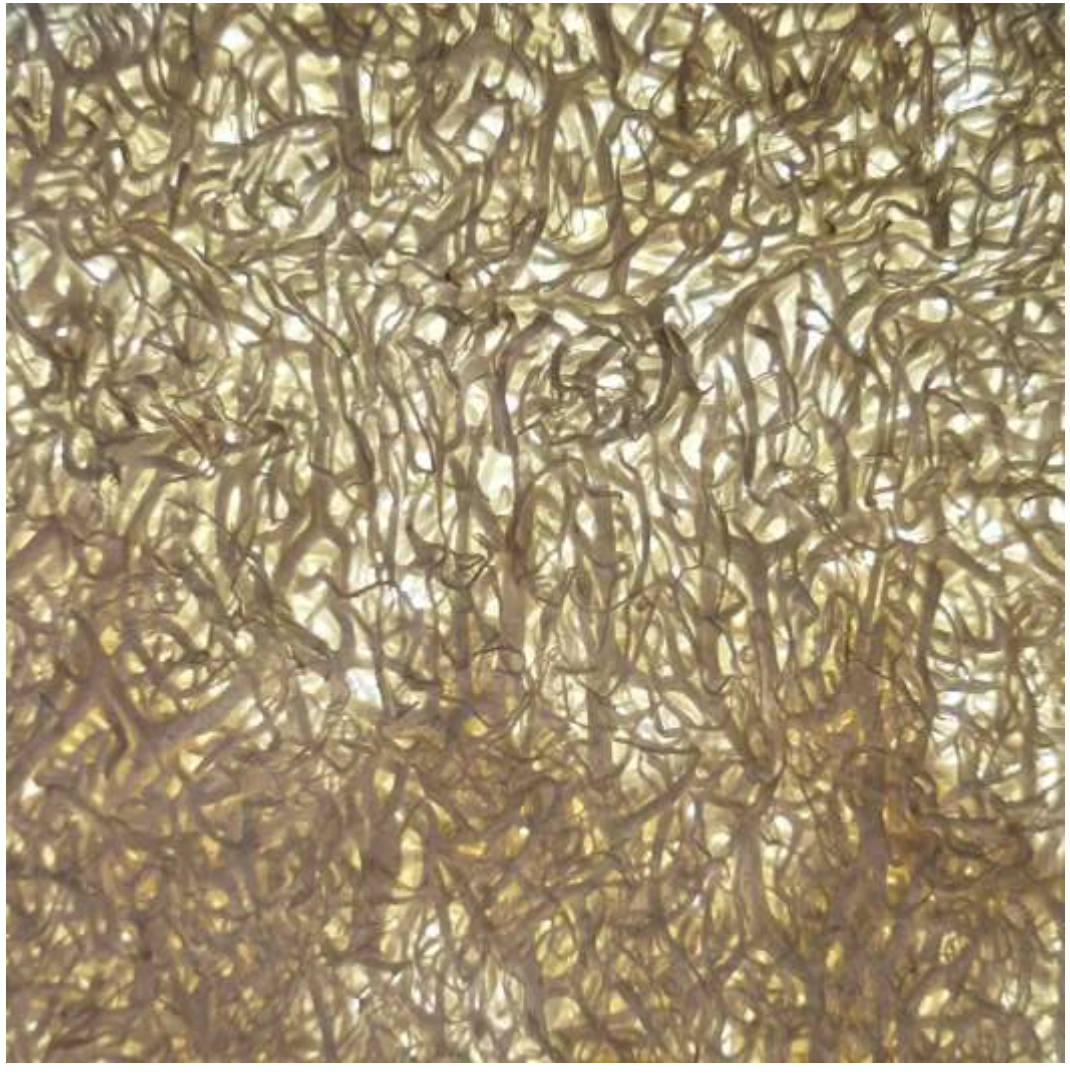
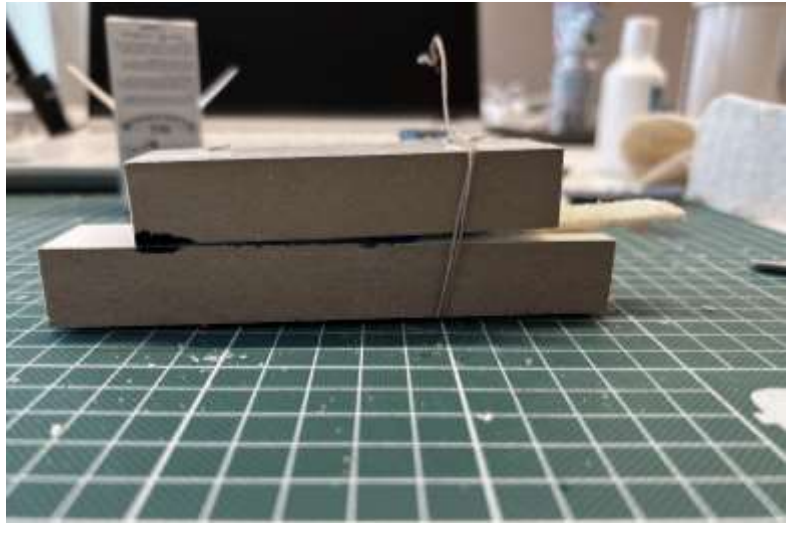


NATURAL LOOFAH SHEET

Luffa is a genus of tropical and subtropical vines in the pumpkin, squash and gourd family (Cucurbitaceae). It is commonly consumed as a vegetable in Asia.

If the loofah is allowed to fully mature and then dried on the vine, the pulp will disappear, leaving only a fibrous skeleton.

Luffa fibers hold a multitude of advantages for use in composites. These include negligible cost, significant mechanical properties, low density, a high strength-to-weight ratio, environmental friendliness, and recyclability. Such characteristics make them a promising alternative to synthetic fibers in various applications. (Alhijazi, M,2020)



I firstly chose this material because of the unique pattern. So, I lightly brushed the ink onto its surface, which made these natural patterns more visible. I also completely soaked one piece in the ink and then used two pieces of wood to clamp it down to prevent it from expanding. But the result does not look well.

Properties

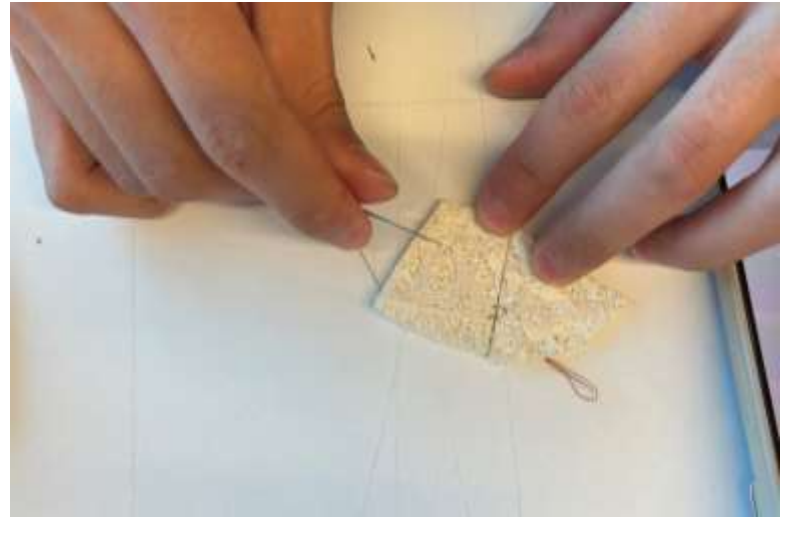
It is found that the luffa sponge material exhibits **remarkable stiffness, strength and energy absorption capacities** that are comparable to those of some metallic cellular materials in a similar density range.

A comparative study shows that the luffa sponge material **outperforms a variety of traditional engineering materials**.(Shen, J, 2012)

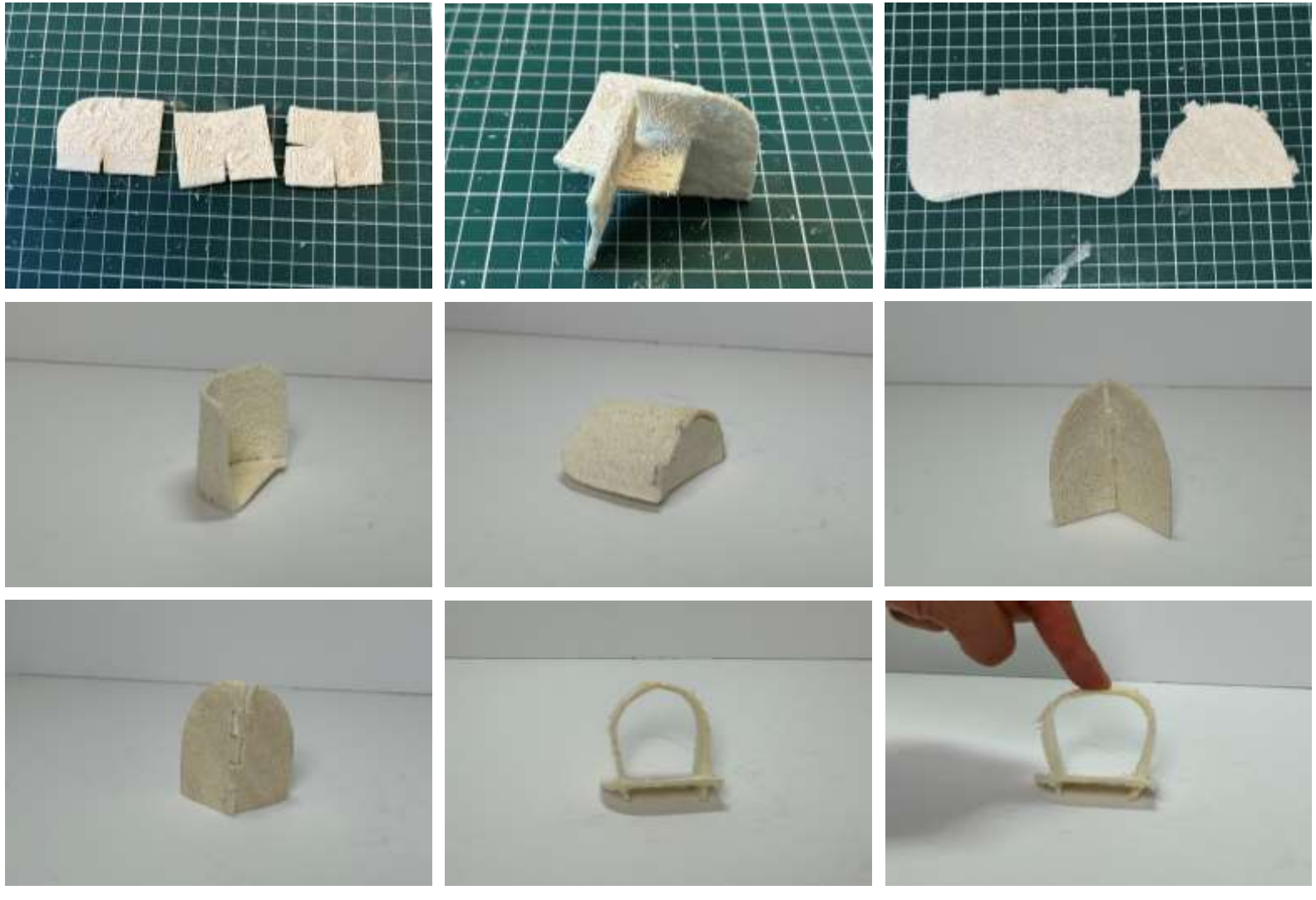
Luffa, like bamboo, is a lignified tissue of plants. The main components are cellulose, hemicellulose, and lignin. Therefore, their physical and chemical properties should be relatively close. Try using **heat bending to shape the loofah sheet**. I tried using **an electric iron to heat the loofah** while **keeping it dry and make it adhere to the mold**.

Loofah sheets can be **easily cut with scissors.** You can easily get straight lines and beautiful curves.

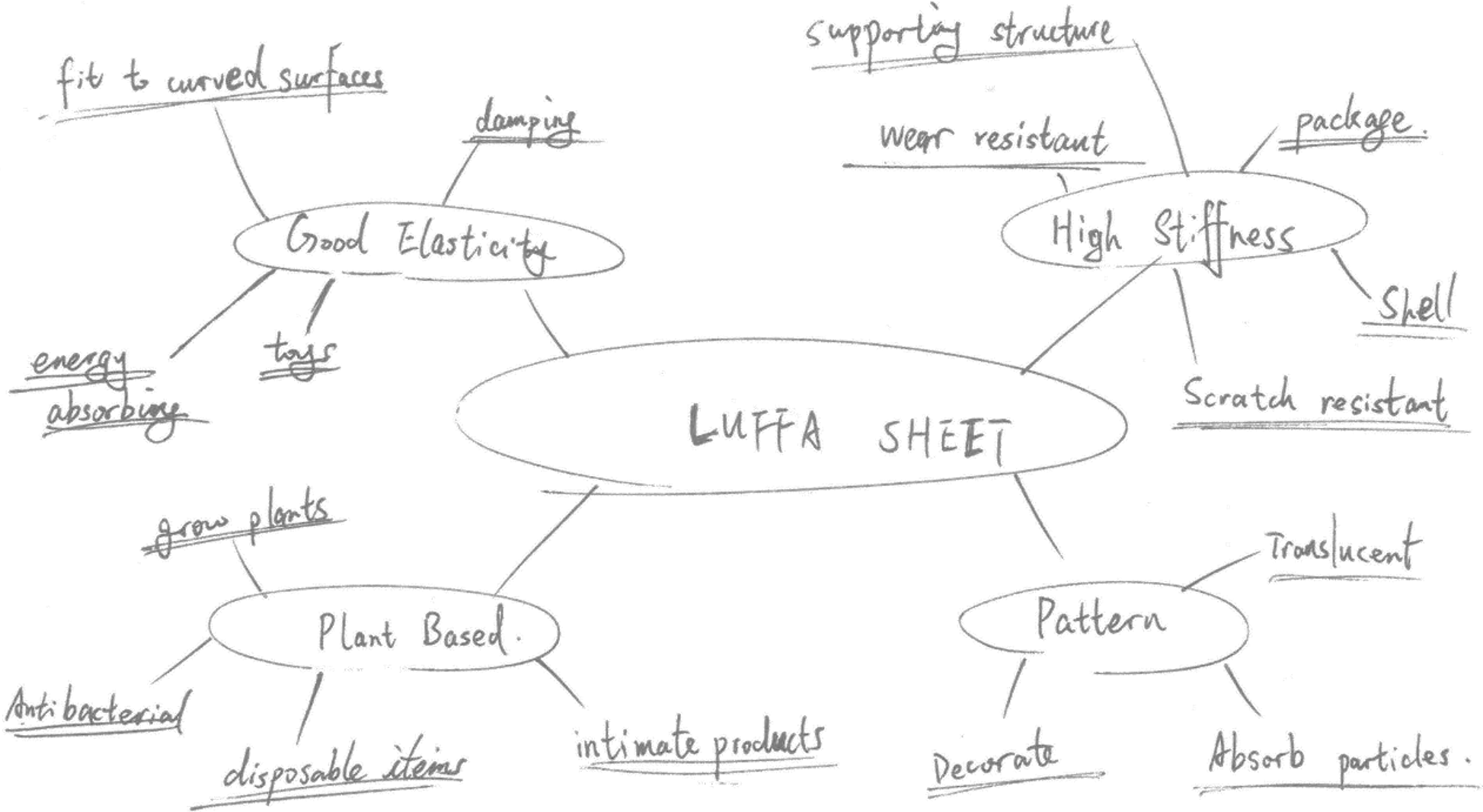
Luffa sheet **can also be fold just like paper.** This is due to its extremely strong toughness.



Due to the size limitations of the material, how to connect them to each other may be an important thing. At first, I used **PVA glue** to attach them. This is strong. But white glue is also a kind of liquid, so it expands where it comes in contact with the glue, and became harder as the glue dries, and making it difficult to bend or fold. I tried **binding and sewing** as well. Binding is strong but destroy this beautiful pattern. Sewing is weak, but it can hide itself if we have a similar colored string.



I also tried **mortise and tenon**. These structures are **good demonstrations of the rigidity and elasticity** of the luffa sheet. Moreover, its complex **texture increases the friction** on the surface, **making it difficult** for the mortise and tenon **to be opened**.


LUFFA SHEET
Good Elasticity
fit to curved surfaces
damping
energy absorbing
toys
High Stiffness
supporting structure
wear resistant
package.
Shell
Scratch resistant
Plant Based.
grow plants
Antibacterial
disposable items
intimate products
Pattern
Translucent
Decorate
Absorb particles.

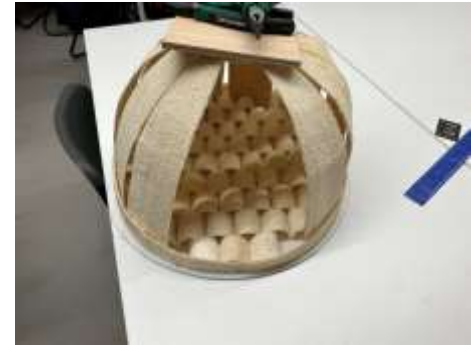
This material always reminds me of bamboo sheet. Both of them have **high stiffness** and **good elasticity**. But Luffa sheets have **a cozy, rough, beautifully patterned surface**.

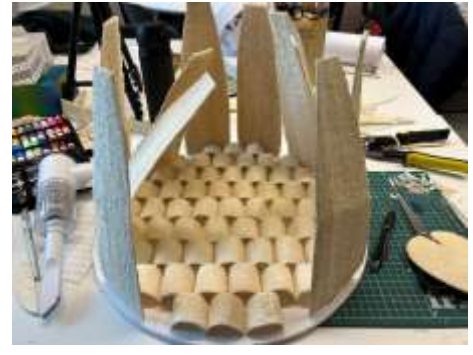
So, what can be done with this cozy, high-stiffness, toughness, good elasticity, and beautiful patterned material? I want to transform it into furniture, just like what we often do with bamboo sheets. Due to limitations in material size and quantity of materials, the furniture may not be designed for human, but for pets, especially the cats.








I used foam board as the bottom board of the cat bed, and fixed small pieces of loofah sheet on the bottom board through a mortise and tenon structure to form a tight-fitting arch structure that provides good support and elasticity. The long loofah sheets are also fixed to the base plate through a mortise and tenon structure, and are connected to each other with staples at the top to form an arc-shaped roof. Due to the limited number of materials, I had no room to choose the materials. The thickness of the materials is slightly different, resulting in different elasticities, so a heavy object needs to be pressed on the top to obtain a better arc.