PD4043 - MATERIALS

PROCESS BOOK

SARA MIKOLAJCZYK

22348204

Timeline

1. Assignment 1 Character analysis
2. Assignment 2 Product Specification
3. Assignment 3 Product disassembly
4. Assignment 4 Compare 5 different materials using CES
5. Assignment 5 Materials and manufacture process
6. Assignment 6 Single use plastic
7. Industrial Design Database Project

TABLE OF CONTENT

Assignment 1 Character analysis

- Conduct a character analysis of three similar products expressed through different material characteristics.
- Step 1 photograph each product.
- Step 2 Characterize as follows:

Character analysis:

Context.

Materials and processes.

Usability and personality.

- Aesthetics.

Form, colour, feel.

- Associations.
- Perceptions.

Character analysis of photo frames

You'll find photo frames in all sorts of materials, each with its own special look and qualities.

Glass photo frame

Metal and synthetic crystals photo frame

Wooden collage photo frame

Character analysis – Glass photo frame by Addison Ross

Context	Displaying formal occasions for example wedding photos or studio shots
Materials and processes	Glass which has went through an angled surface cut (bevel) around the entire periphery, silver bezel, black velvet backing, glass insertion Simple removal for photos with clips
Usability and personality	Able to stand both Landscape and Portrait Colour: transparent Feel: Cold, light, smooth Aesthetics: hard, abrasion resistant, permanence of colour Associations of culture, luxury, sophistication Perceptions of refinement, quality

Character analysis – Metal and synthetic crystal photo frame by Sixteen

Context	A feminine touch used to enhance the photos, a luxuries and elegant setting
Materials and processes	Metal base-sheets cit nd shaped in style, fake diamond finish placed in desired style, glass insertion. Simple removal for photos with clips
Usability and personality	Standing usually in main bedroom Colour: Mainly fake diamonds wit are shiny and transparent Feel: Rough, cold, light Aesthetics: cold, clean, hard, stiff, strong, often ages well, mosaic Associations of machinery, precision instruments, weapons Perceptions of strength, precision, durability, quality

Character analysis – Wooden collage photo frame by Lasercuts

Context	Displaying happy moments in a cozy environment, pictures of family
Materials and processes	Wood selection (rosewood), Cutting-pieces cut into individual shapes, Joinery (collage), sanding for smooth edges, staining (protective), glass insertion Simple removal for photos with clips however multiple for each photo
Usability and personality	Wall hanging for living room, to present the family. Colour: Dark brown Feel: Smooth, heavy Aesthetics: tactile, warm, textured, it ages well Associations of fine furniture, musical instruments Perceptions of craftsmanship, tradition, heritage, quality

Assignment 2 Product specification

Compare 2 products for material properties.

Select which properties are important for that product to function and state why

- Young's modulus
- Tensile strength
- Yield strength
- Compressive strength
- Hardness
- Density
- Electrical resistivity
- Thermal conductivity
- Cost
- Etc…. (select more properties from the slides)

Product Specification

Wind turbine

Radiator

Product specification – Wind turbine

Young's Modulus	It is essential for wind turbine blades to bend with the force of the wind while maintaining structural integrity. To avoid excessive deformation.
Tensile Strength	High tensile strength is necessary to prevent blade failure or damage because wind loads exert significant tensile stresses on wind turbine blades.
Yield Strength	To avoid permanent deformations or breakdowns, it is imperative that materials used in wind turbines remain within their elastic range.
Compressive Strength	The tower can bear the weight and structural stresses put on it because to its high compressive strength.
Hardness	it's still important for the longevity and maintenance of components like gears and bearings within the wind turbine.
Density	To minimize the weight of the turbine overall, which may have an impact on shipping, installation, and overall effectiveness, lower-density materials are chosen.
Electrical resistivity	Components of wind turbines like generators and wires must have low electrical resistivity in order to minimize energy losses due to electrical resistance.

Product specification – Wind turbine

Thermal conductivity	-
Cost	In the design of wind turbines, cost is crucial since materials with exceptional mechanical qualities need to be affordable for broad use in production
Corrosion	Corrosion must be avoided in wind turbines. Small corrosion damage might cause considerable corrosion damage and possibly jeopardize the tower's stability. Some, though, continue to rust.
Wear Resistance	Because of continual spinning and hostile conditions, bearings, gearboxes, gears, and blade leading edges are prone to wear. Effectiveness and lifespan depend on wear resistance.

Product specification – Radiator

Young's Modulus	-
Tensile Strength	-
Yield Strength	-
Compressive Strength	-
Hardness	-
Density	The total weight and structural stability of a radiator can be impacted by the density of the materials used in it. The less weight, the easier it will be to install.
Electrical resistivity	In some specialized appliances, they are often not common home appliances. The electrical resistance of building materials may be important for safety.

Product specification – Radiator

Thermal conductivity	Important component for effective heat transmission to the surroundings.
Cost	Customers must be able to afford it
Corrosion	Essential to maintain long-term performance and prevent harm
Wear Resistance	Guarantees resilience against the consequences of ongoing usage and flow

Assignment 3 Product disassembly

Find 2 products (can be related) that are made up of at least two different materials.

1. Dis-assemble the products.
2. Photograph each component and identify the materials and manufacturing process of each. (use the CES software to help.

Product disassembly – Computer mouse

Product disassembly – Computer mouse

Materials	Manufacturing process
The Body - Acrylonitrile butadiene styrene (ABS)	Injection Moulding • A mold, often made of steel or aluminum, is created based on the design. The mold consists of two halves, and each half represents the shape of one side of the mouse part. • The mold is mounted onto an injection molding machine. The machine is equipped with a heating unit to melt the plastic material, and a system to inject the molten plastic into the mold. • Plastic pellets, usually made of polymers such as ABS (acrylonitrile butadiene styrene) or other suitable materials, are fed into the injection molding machine. • The plastic pellets are heated until they melt into a molten state. The molten plastic is then injected into the mold under high pressure. The mold is kept closed until the plastic solidifies. • The molded part is allowed to cool and harden within the mold. Cooling times can vary depending on the size and complexity of the part. • Once the plastic has solidified, the mold is opened, and the newly formed mouse part is ejected from the mold. • The ejected part may undergo additional processes such as trimming, deburring, or surface finishing to achieve the desired final appearance and dimensions.
Scroll Wheel - Rubber	Injection molding • A mold is created with cavities in the shape of the desired rubber parts. This mold is usually made of metal and is designed to withstand the pressure and heat of the injection molding process. • The rubber compound is preheated to make it more malleable before injection. The preheated rubber compound is injected into the mold under high pressure. The mold is closed, and the rubber fills the mold cavities, taking the shape of the desired parts. • The injected rubber is then cured or vulcanized. This process involves applying heat to the rubber to promote cross-linking of polymer chains, resulting in improved strength, elasticity, and other desirable properties. • After curing, the molded rubber parts are cooled within the mold before being ejected. The mold is opened, and the finished rubber parts are removed.
Electronic Components - Metal (aluminum, steel, and various alloys)	Sheet Metal Fabrication • Metal sheets are often used to create the outer shell and structural components of a mouse. Sheet metal fabrication techniques include cutting, bending, and stamping. • Laser cutting or water jet cutting may be used to precisely cut metal sheets into the desired shapes. CNC Machining: • Computer Numerical Control (CNC) machining is a process where metal components are cut, drilled, and shaped using computer-controlled machines. This is often used for creating precise and intricate parts. Die Casting • For certain metal components with complex shapes, die casting may be employed. This involves injecting molten metal into a mold to produce the desired part. • Metal components may undergo surface treatments for aesthetic and functional purposes. Processes like anodizing (for aluminum) or coating help improve corrosion resistance and provide a finished appearance. • Metal components are assembled with other parts, such as plastic components, electronic circuits, and sensors, to form the complete mouse.

Product disassembly – Hair straighter

Product disassembly – Hair straighter

Materials	Manufacturing process
Heating Plates - Ceramic	• Preparation of the ceramic powder, which consists of milling dispersants and adding solvents, mixing with a binding agent and a plasticizer, and controlling the viscosity of the result. • Moulding and drying of the ceramic powder to form thin plates. • Cutting the plates and screen printing the resistor on one of them. • Laminating the two plates by pressure and then cutting them again to fit the size and shape of the iron. • Burning the binding agent and performing a sintering process to fuse the ceramic material and the resistor. • Welding the contact terminals and applying a polished layer for coating purposes.
Handle – Heat Resistant Thermoplastic (polypropylene)	Injection Moulding • A mold is created based on the design. This mold consists of two halves (cavities and cores) that fit together. The mold is typically made of metal, such as steel or aluminum. • Polypropylene (PP) is chosen as the material for injection molding due to its properties, including durability, heat resistance, and ease of molding. • Polypropylene pellets are loaded into the injection molding machine's hopper. • The injection molding machine heats the polypropylene pellets until they melt into a liquid form. • The molten polypropylene is injected into the mold under high pressure. It fills the cavities of the mold, taking its shape. • The mold is cooled to solidify the molten polypropylene and set the shape of the hair straightener parts. • Once the plastic has solidified, the mold is opened, and the newly formed hair straightener parts are ejected.
Power Cord - Rubber	• The chosen rubber is mixed with other ingredients in a process called compounding. This involves blending the rubber with additives such as curing agents, accelerators, antioxidants, plasticizers, and reinforcing agents to achieve the desired properties, including flexibility, durability, and resistance to environmental factors. • The rubber compound undergoes milling and mixing processes to ensure a homogeneous mixture. This is typically done using specialized machinery, such as two-roll mills or internal mixers. • The mixed rubber compound is then fed into an extruder, which is a machine that processes the rubber through a shaped die. In the case of cords, the extrusion process forms a continuous rubber cover or insulation around the conductive wires or cable cores. • The extruded rubber is then vulcanized to enhance its strength and stability. Vulcanization involves exposing the rubber to heat and pressure. This process forms cross-links between the polymer chains, making the rubber more durable and heat-resistant. • After vulcanization, the rubber is cooled to room temperature to set the shape and structure of the rubber insulation. • The extruded and vulcanized rubber is cut into specific lengths, depending on the intended use of the cord. The finished rubber cords are often wound onto spools for storage and transportation.

Assignment 4 CES Material selection

- Complete all following exercises;

Exercise 1: Browse material records

Exercise 2: Browse process records

Exercise 3: Searching

Exercise 4: Creating property charts

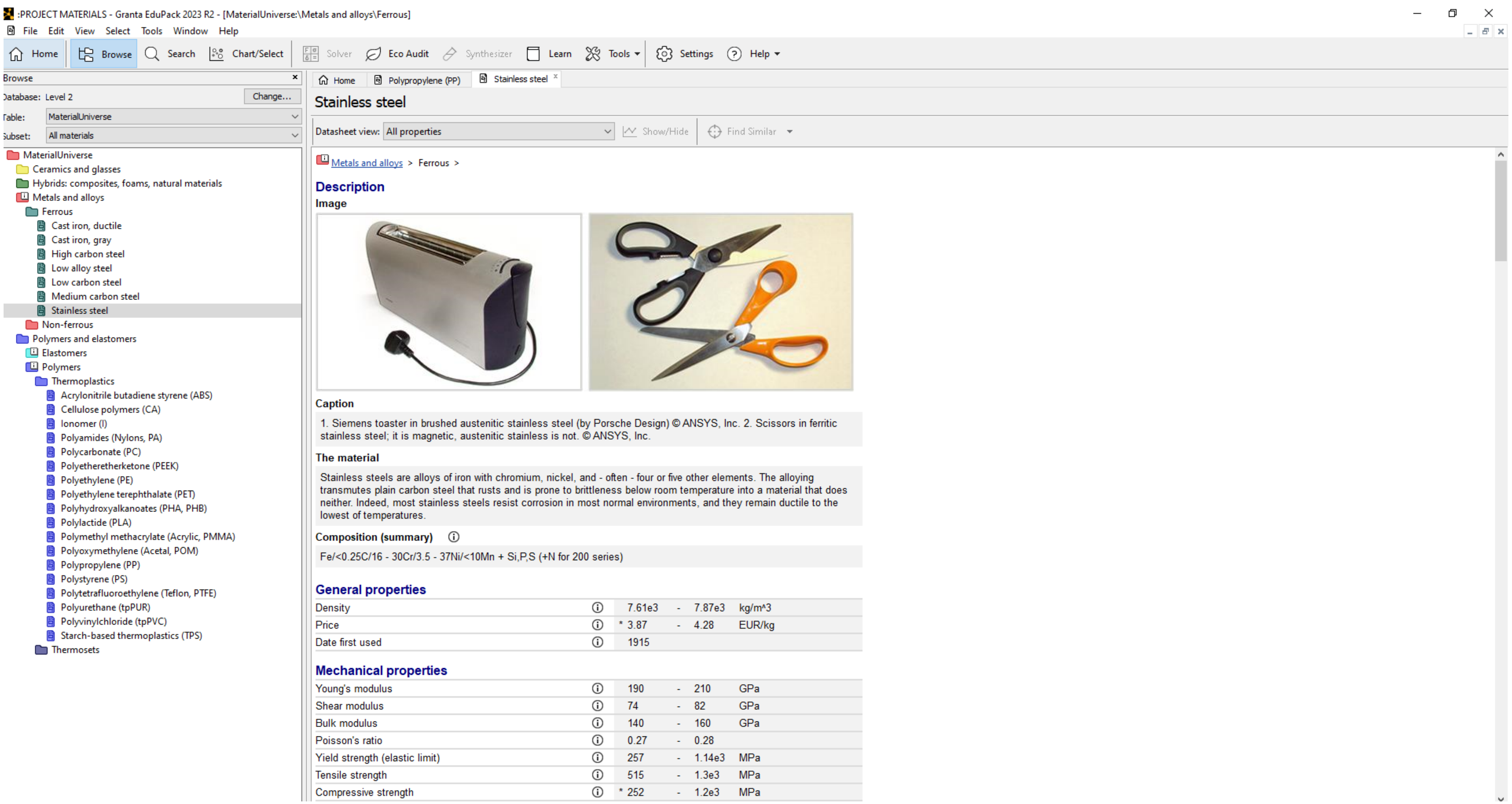
Exercise 5: Creating bubble charts

Exercise 6: Filtering and Screening -Selection using a Chart Stage

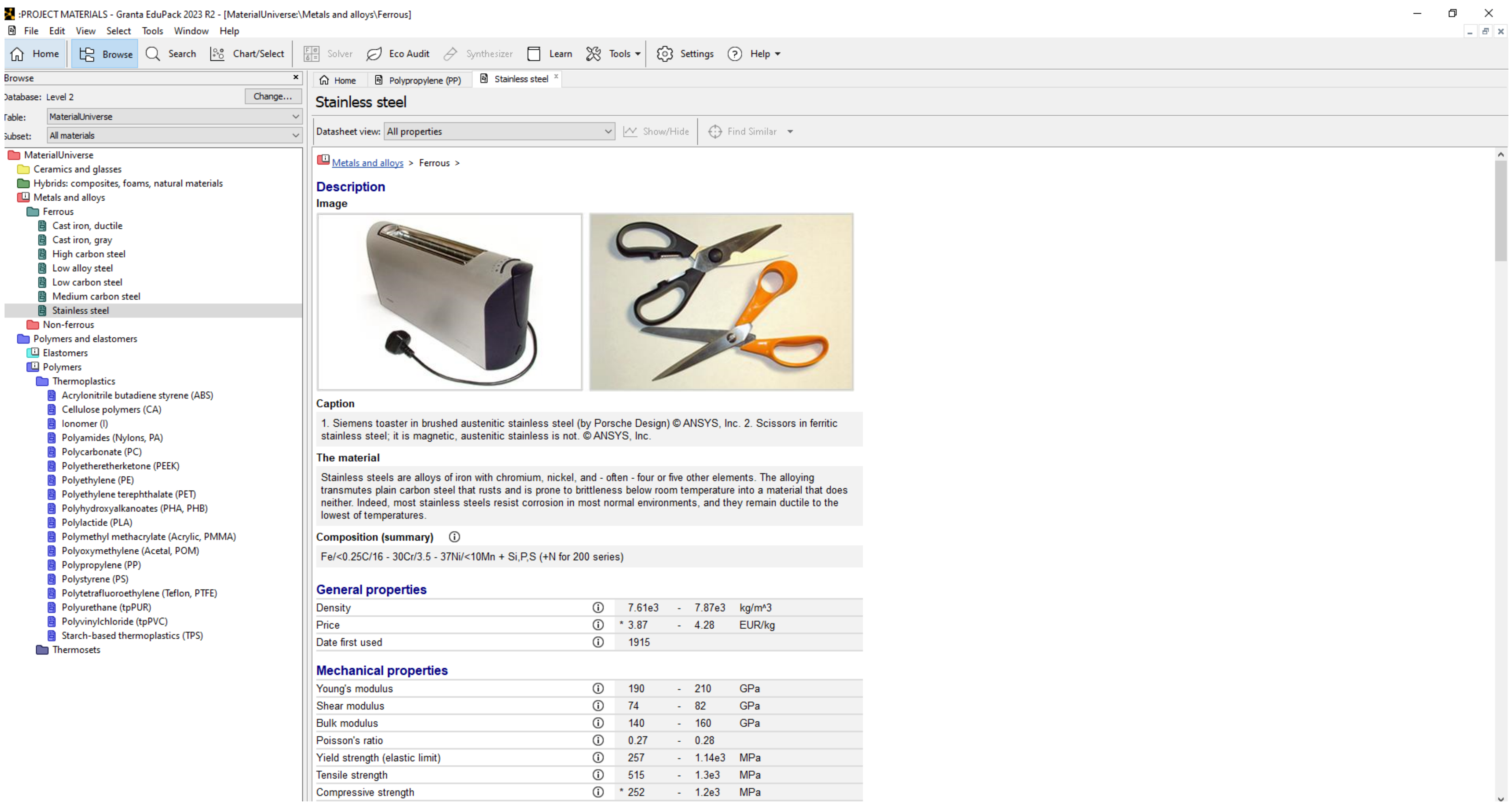
Exercise 7: Selection using a Limit Stage/Tree stage

Exercise 8: Combining filtering and charting tools

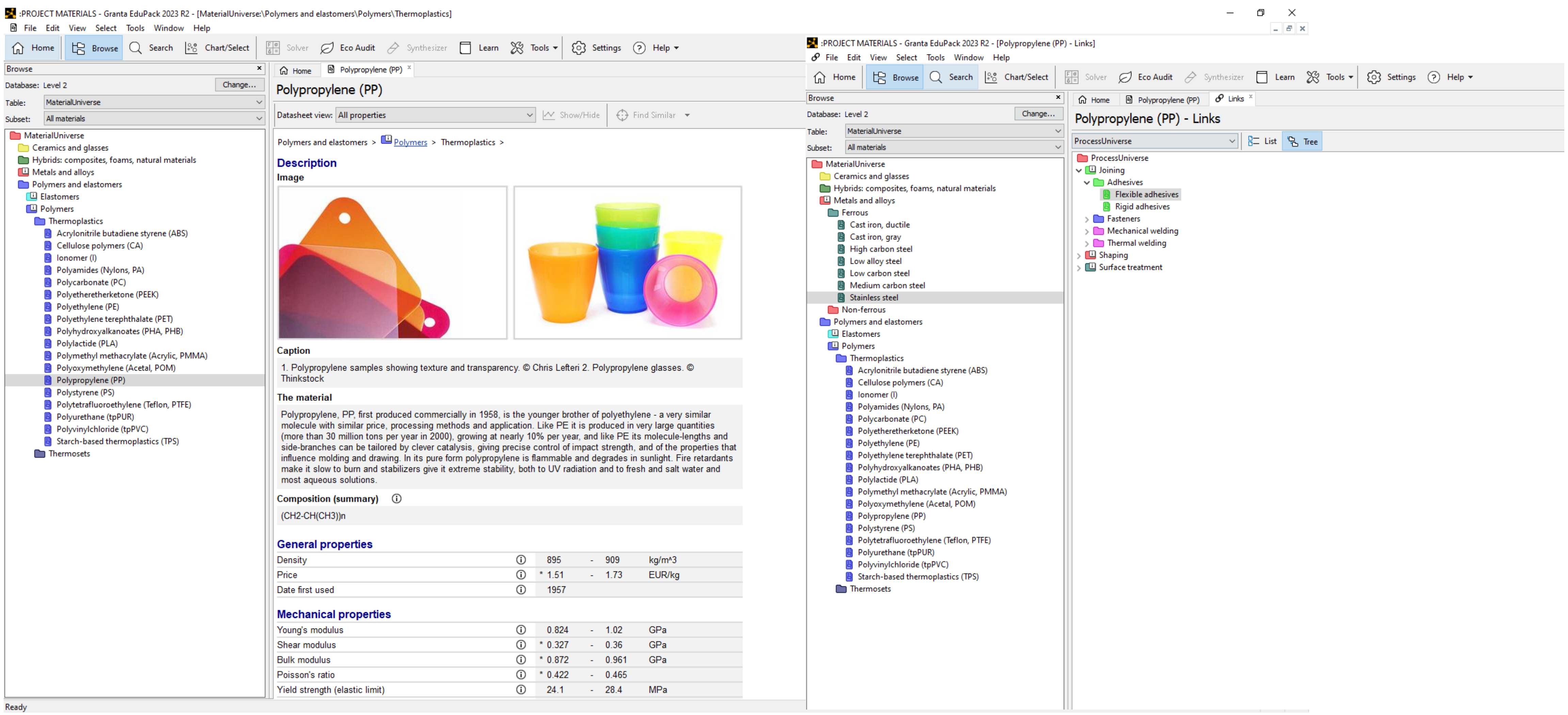
Exercise 1: Browse material records



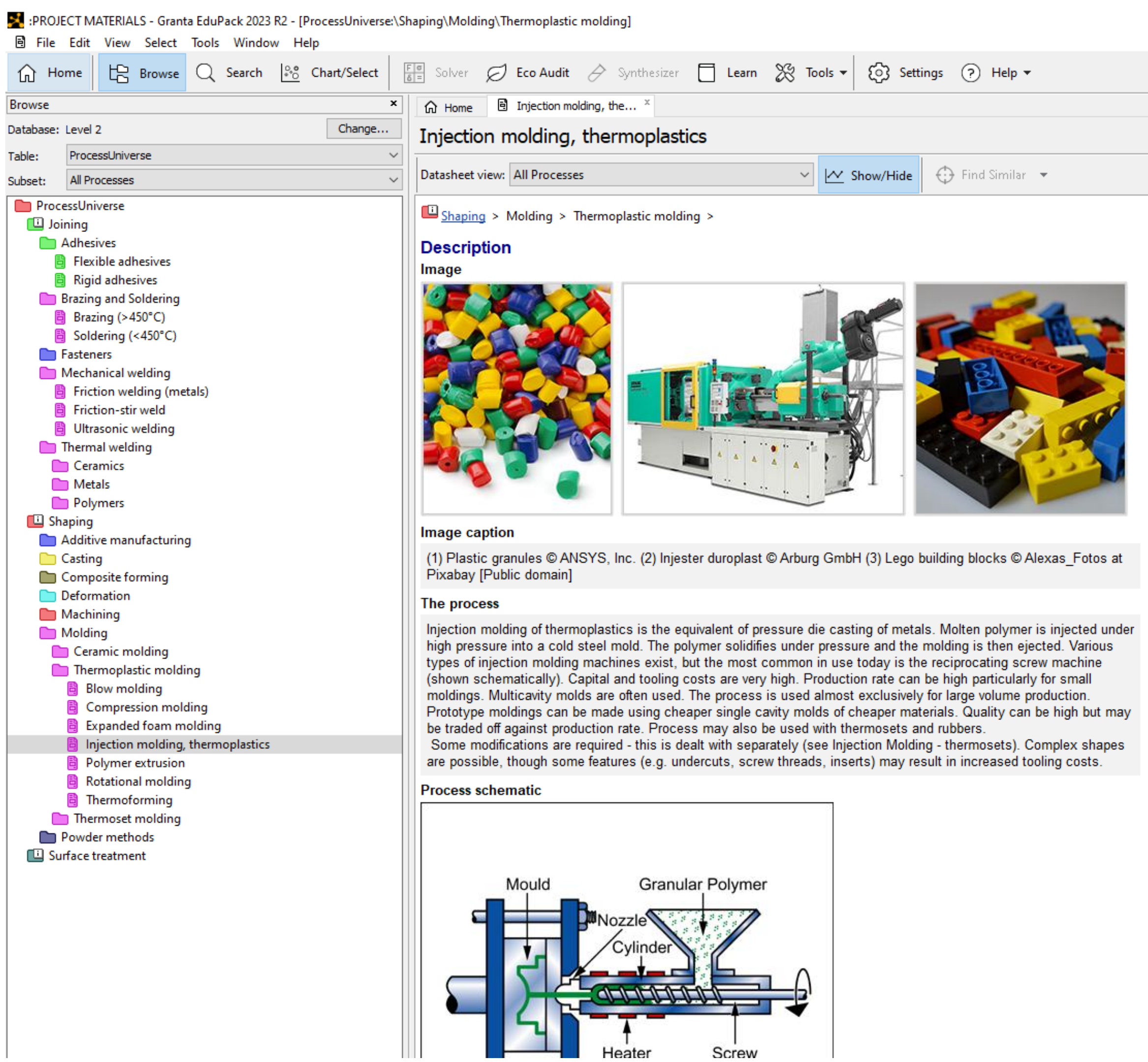
Exercise 1: Browse material records

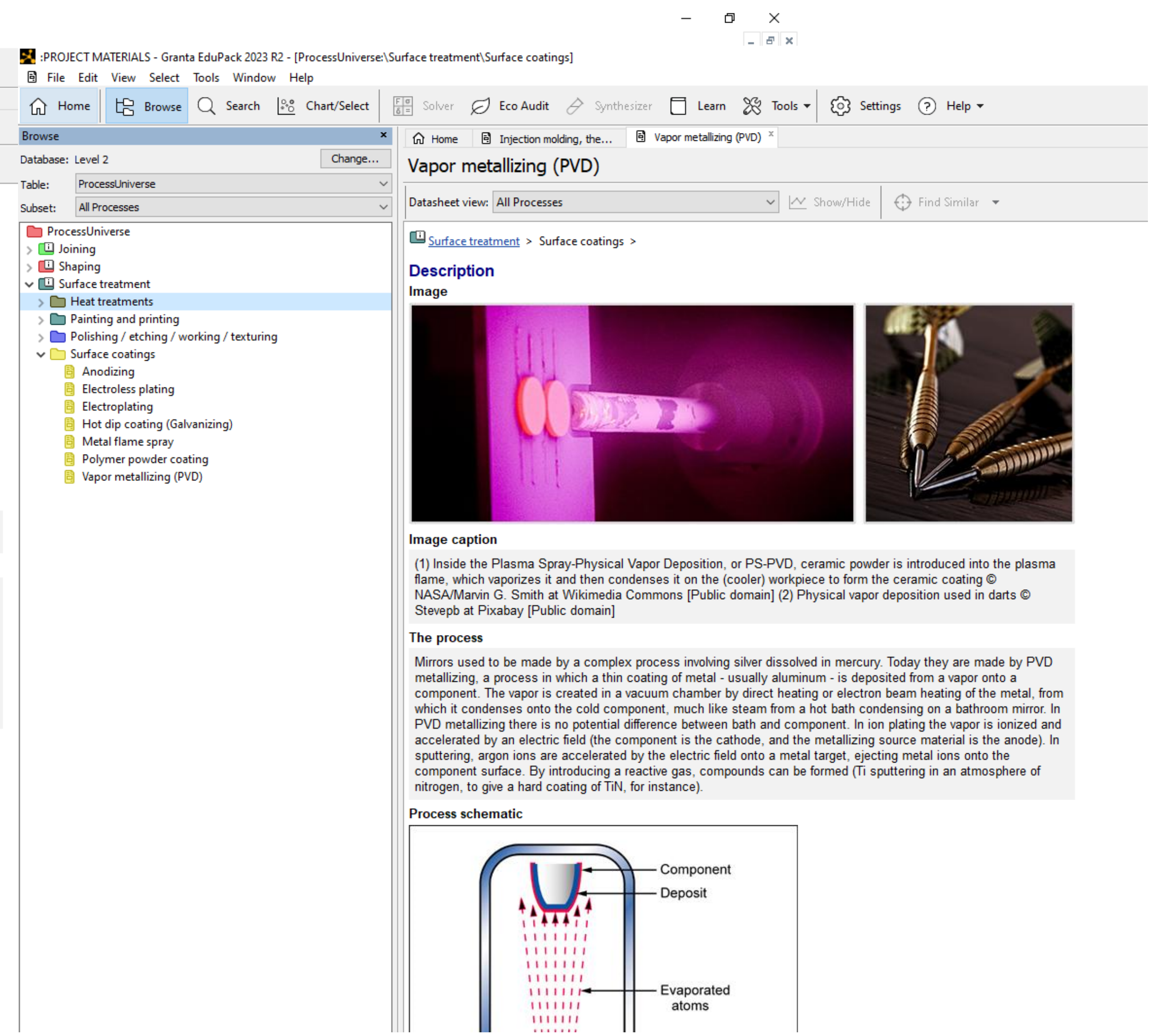


Exercise 1: Browse material records

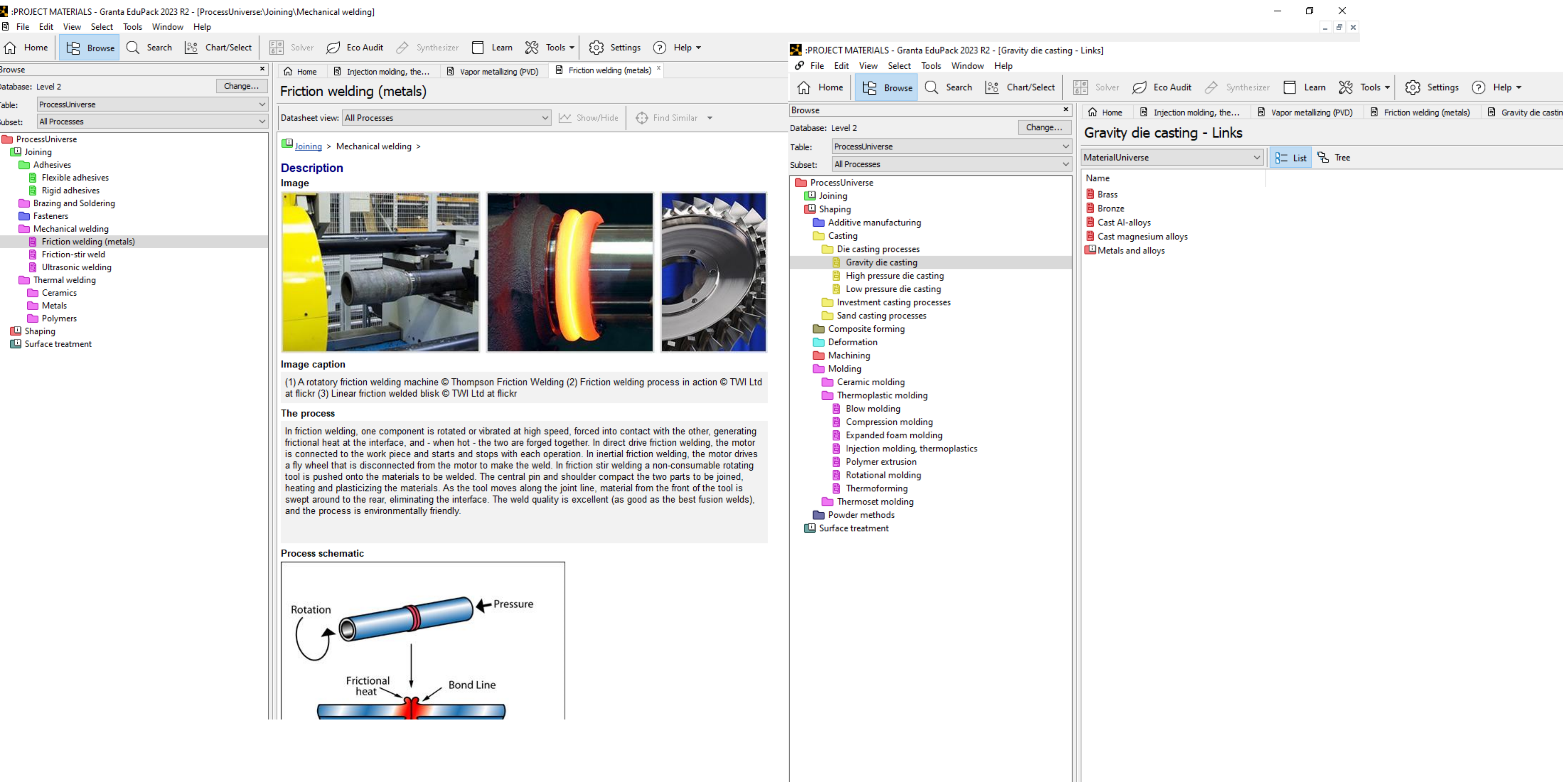


Exercise 2: Browse process records

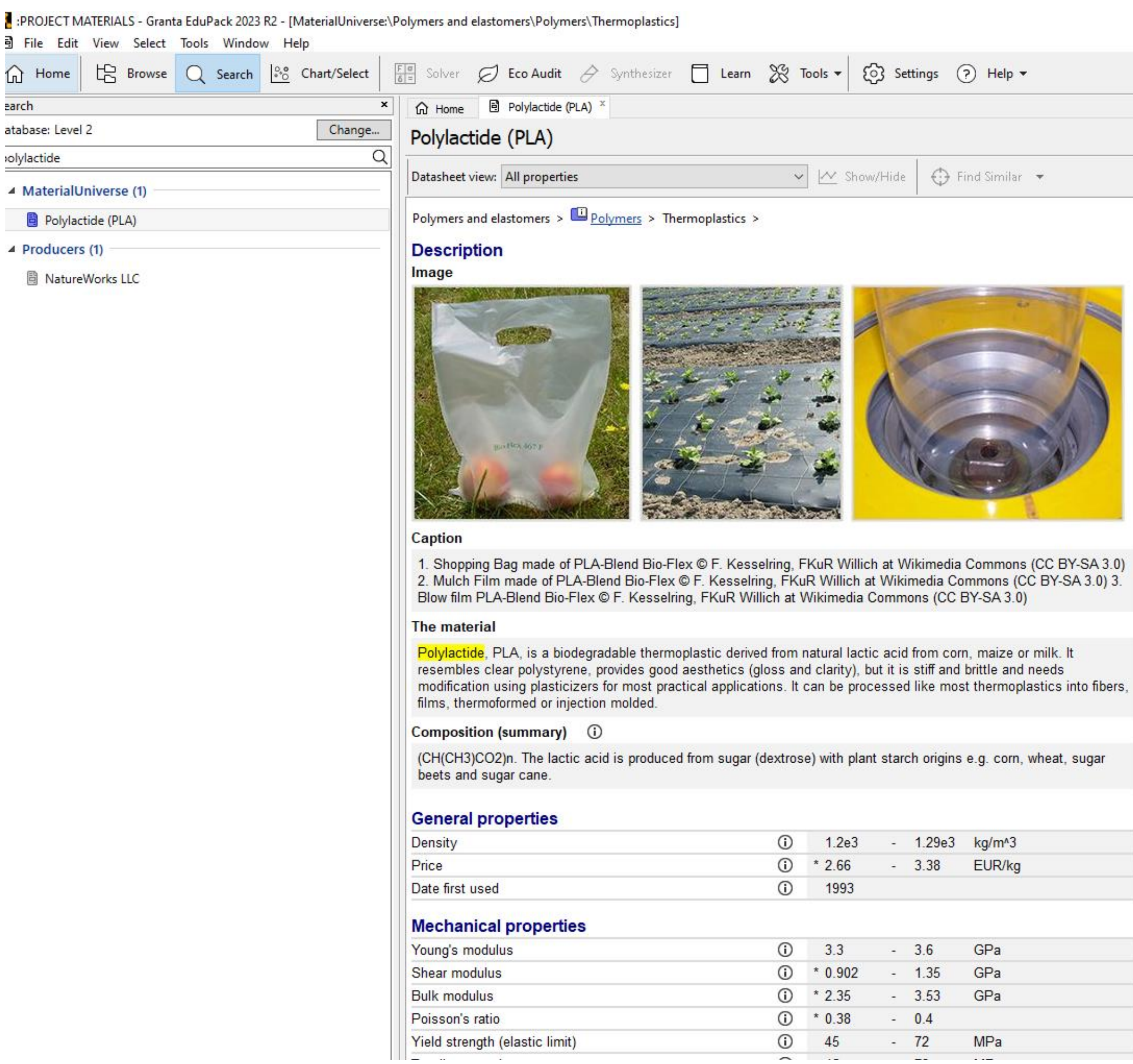


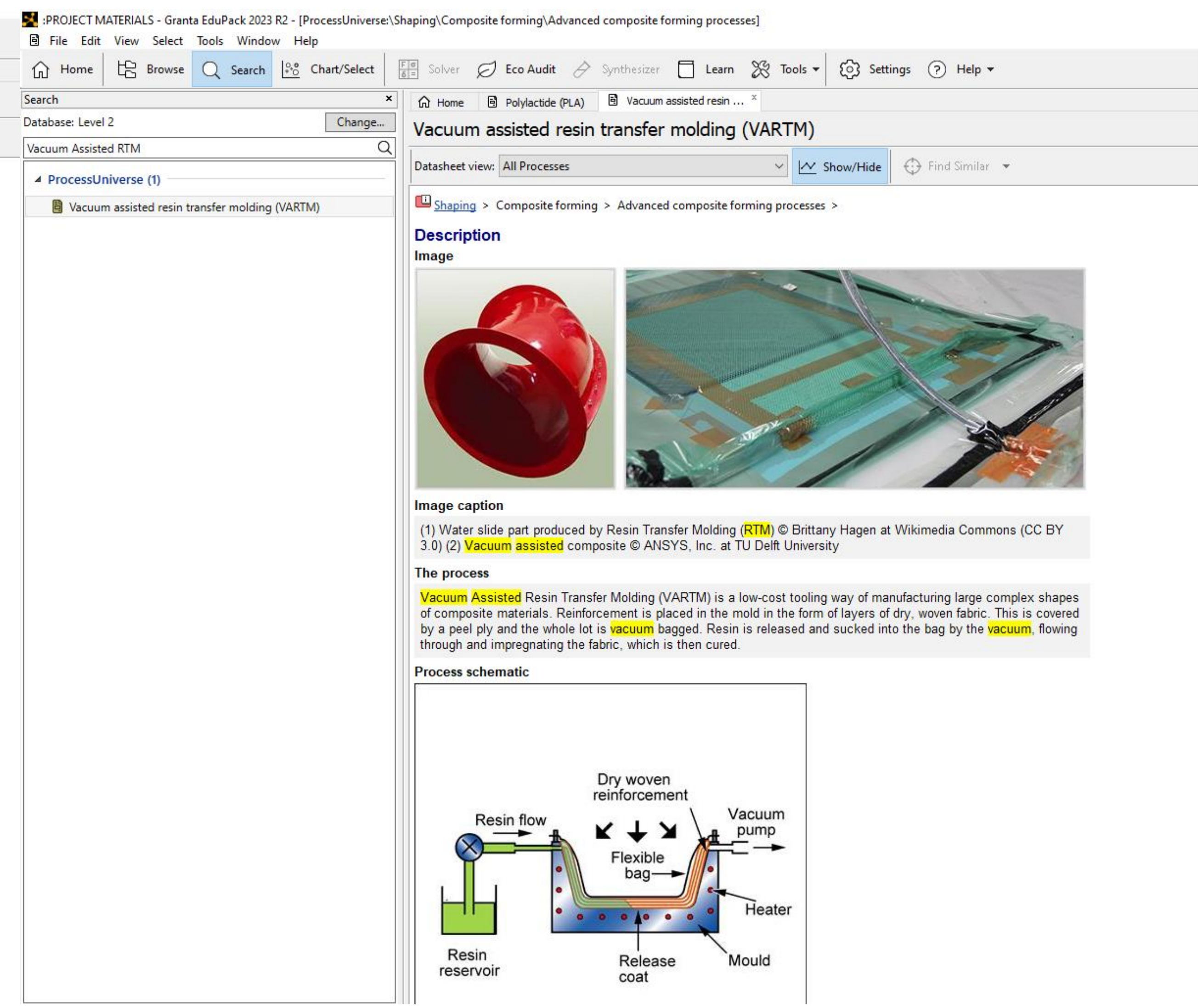


Exercise 2: Browse process records

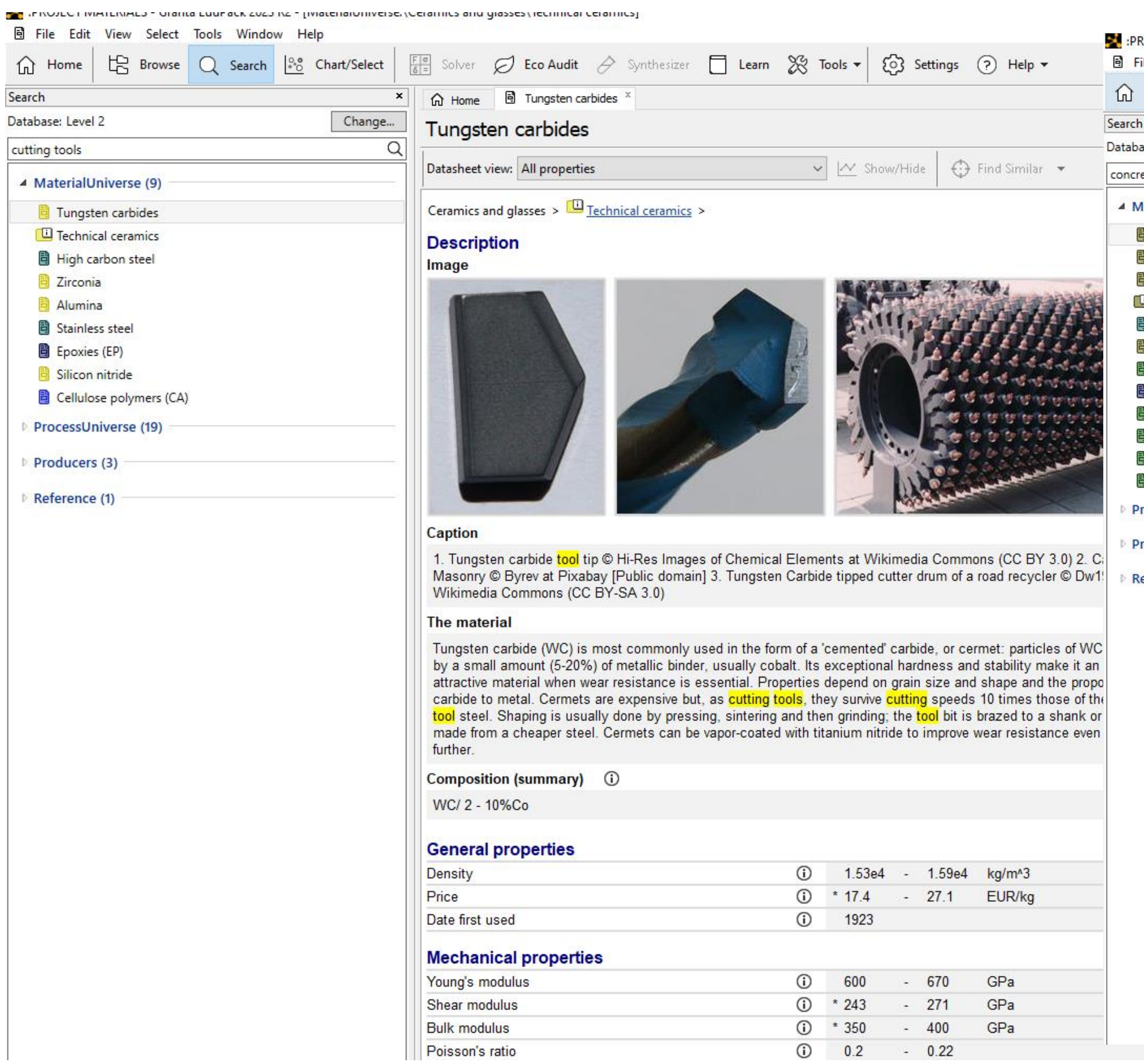


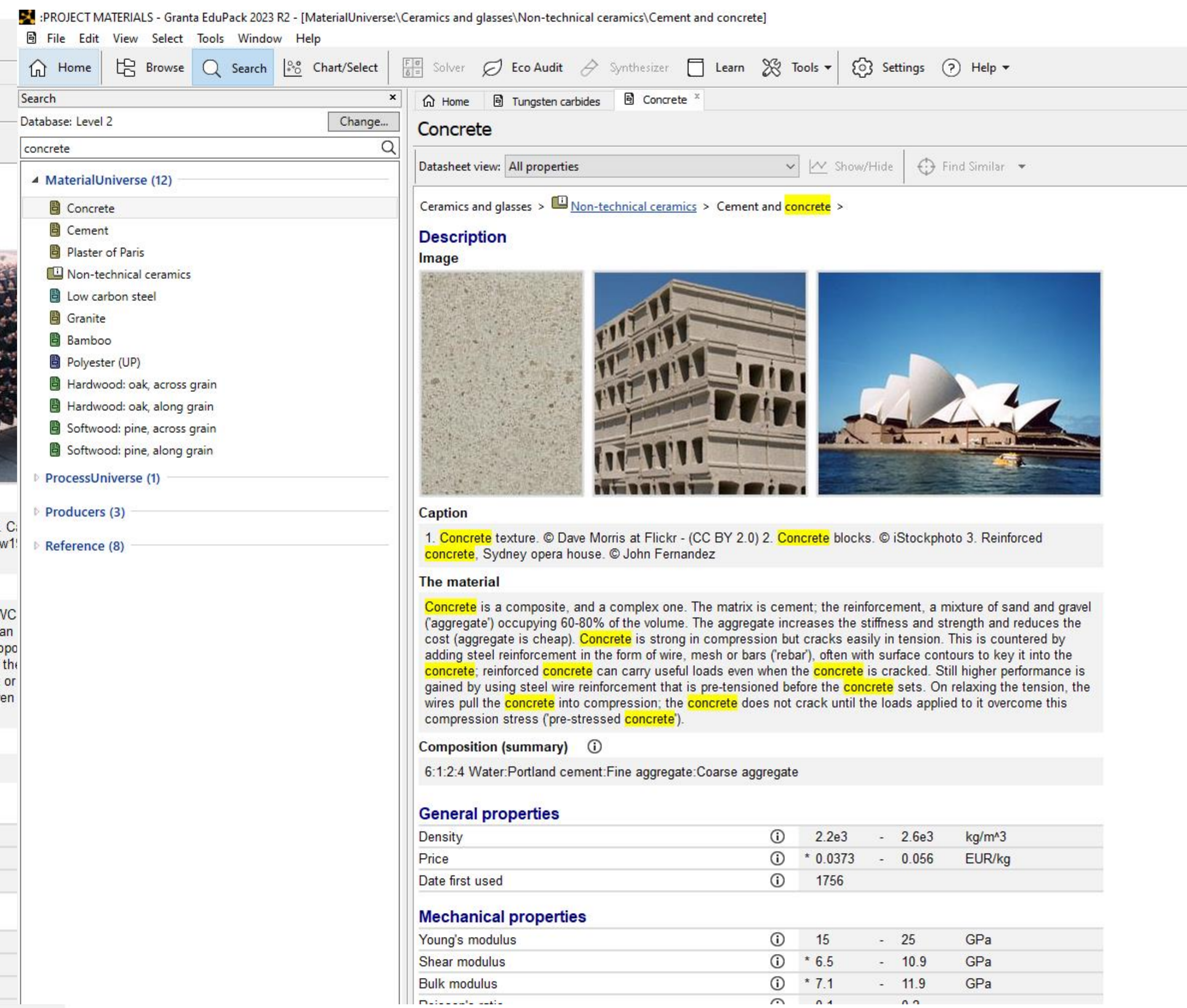
Exercise 3: Searching



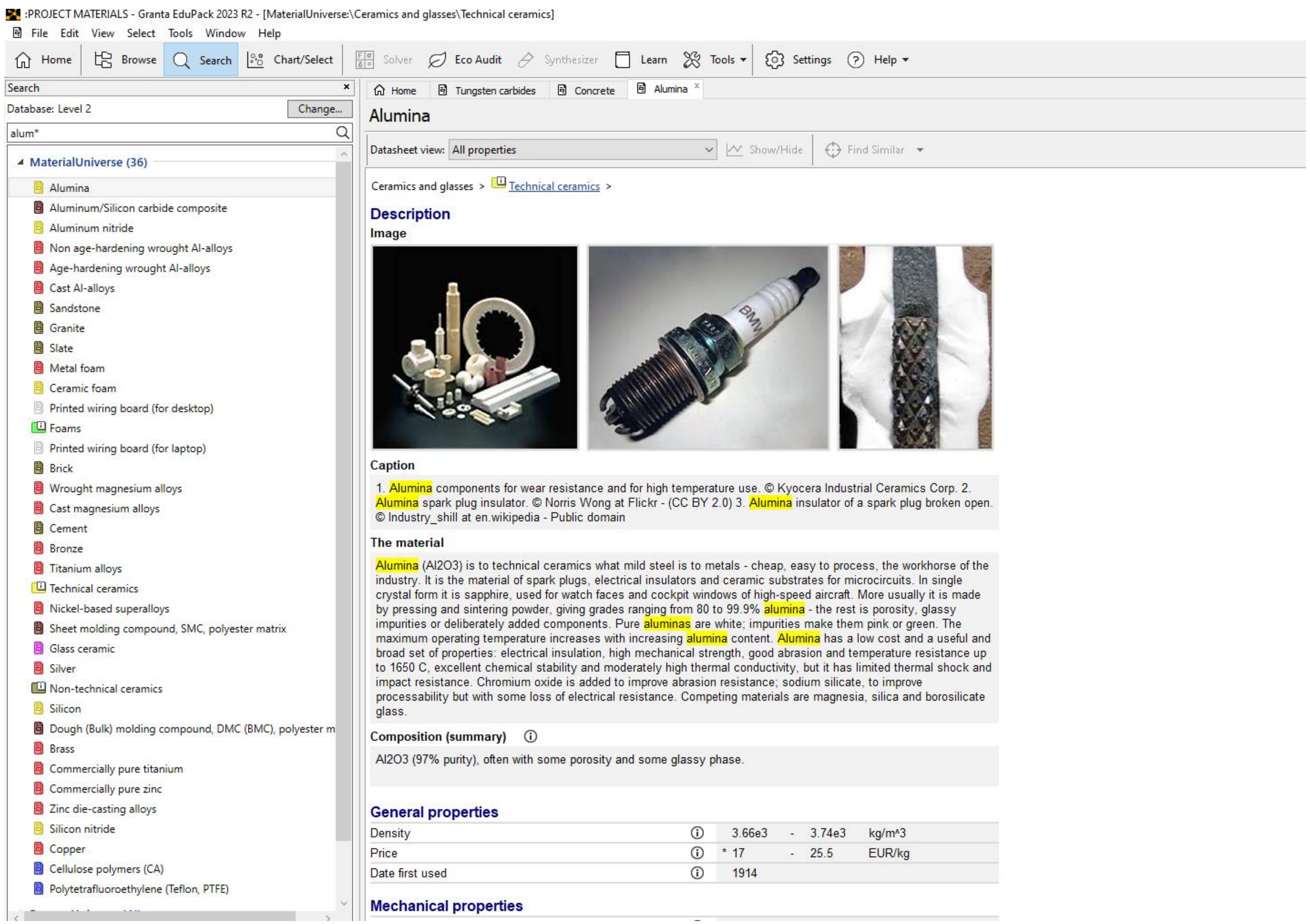


Exercise 3: Searching



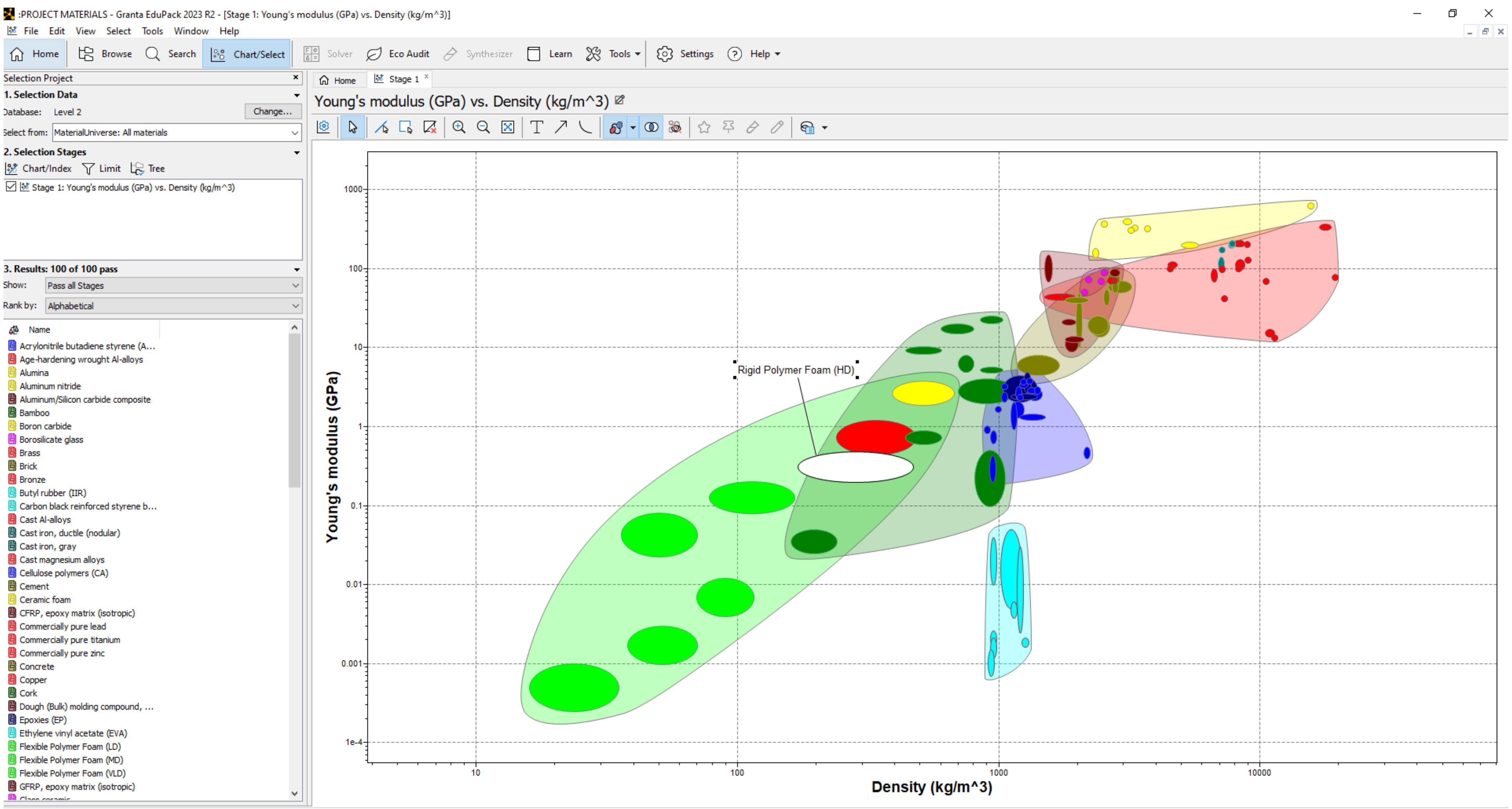


Exercise 3: Searching

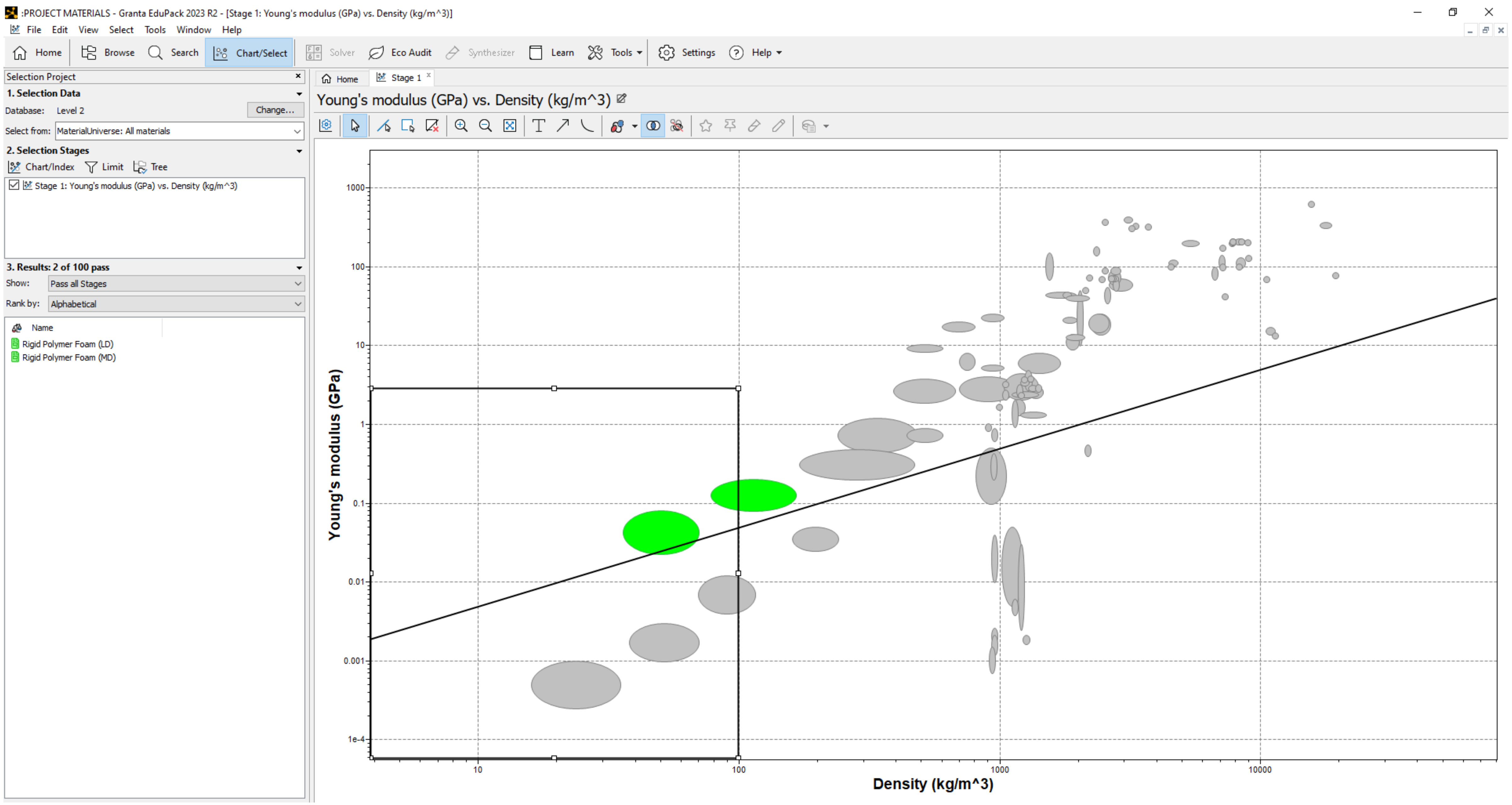


Exercise 4: Creating property charts

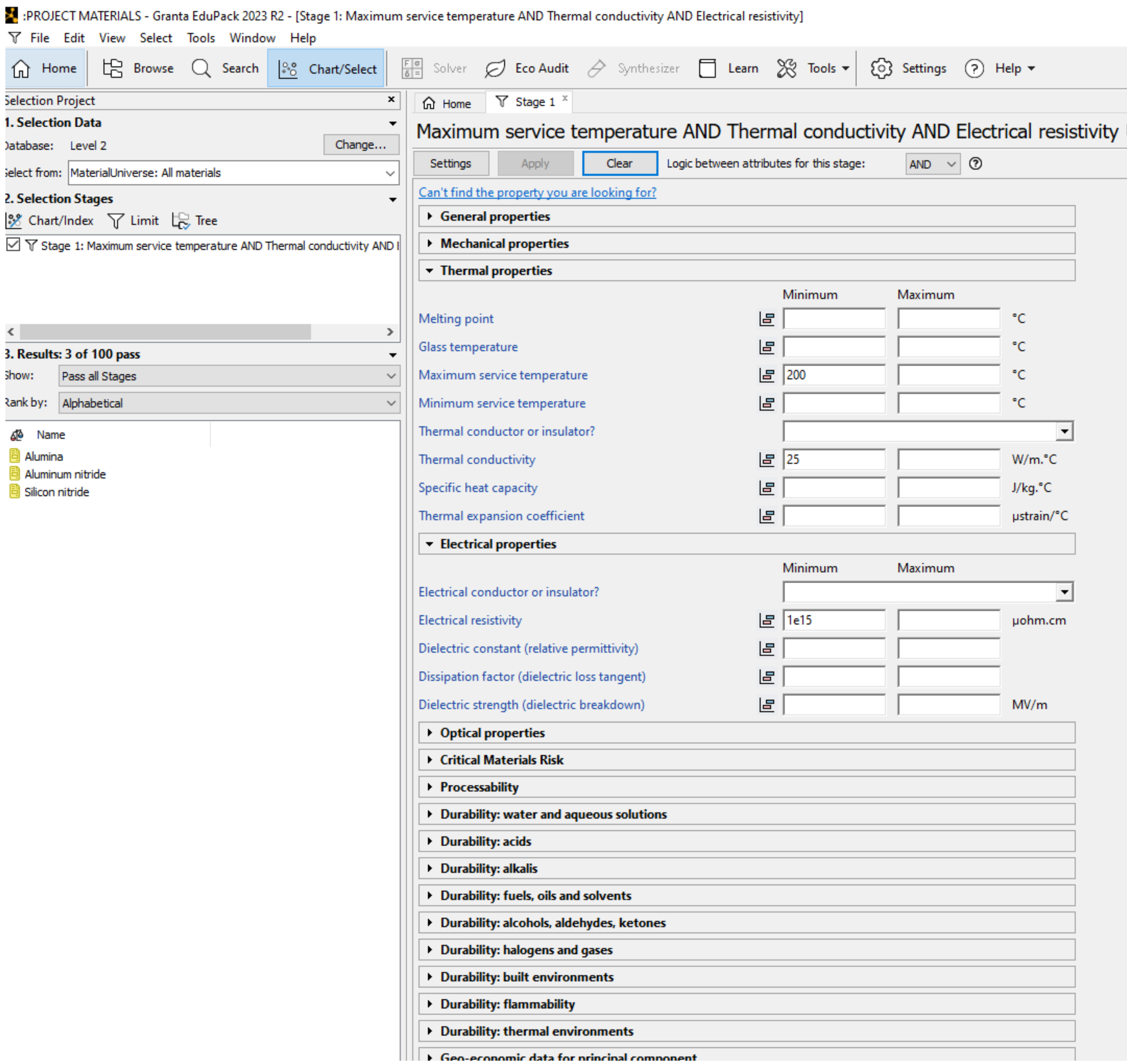
Exercise 5: Creating bubble charts

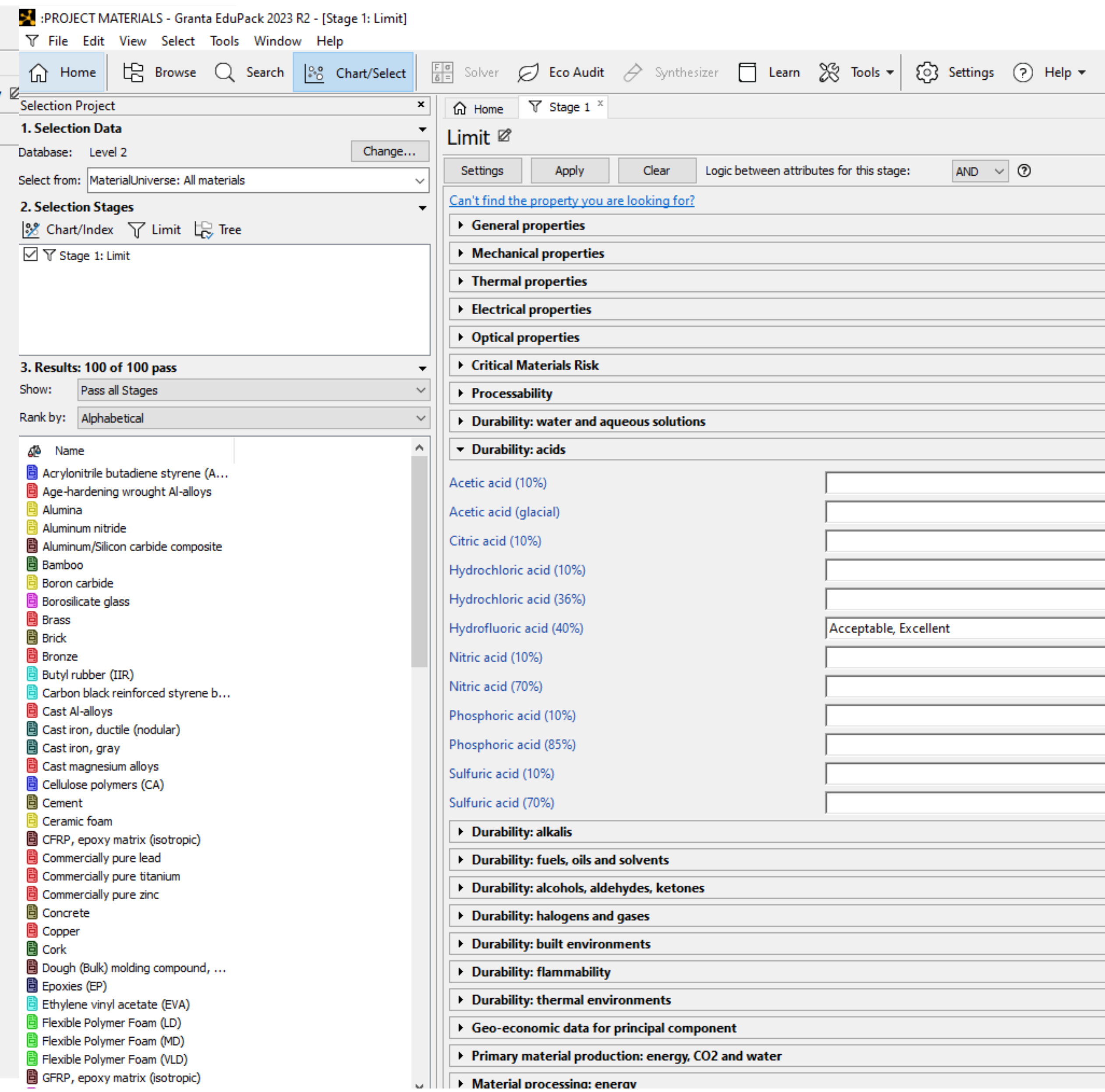


Exercise 6: Filtering and Screening - Selection using a Chart Stage

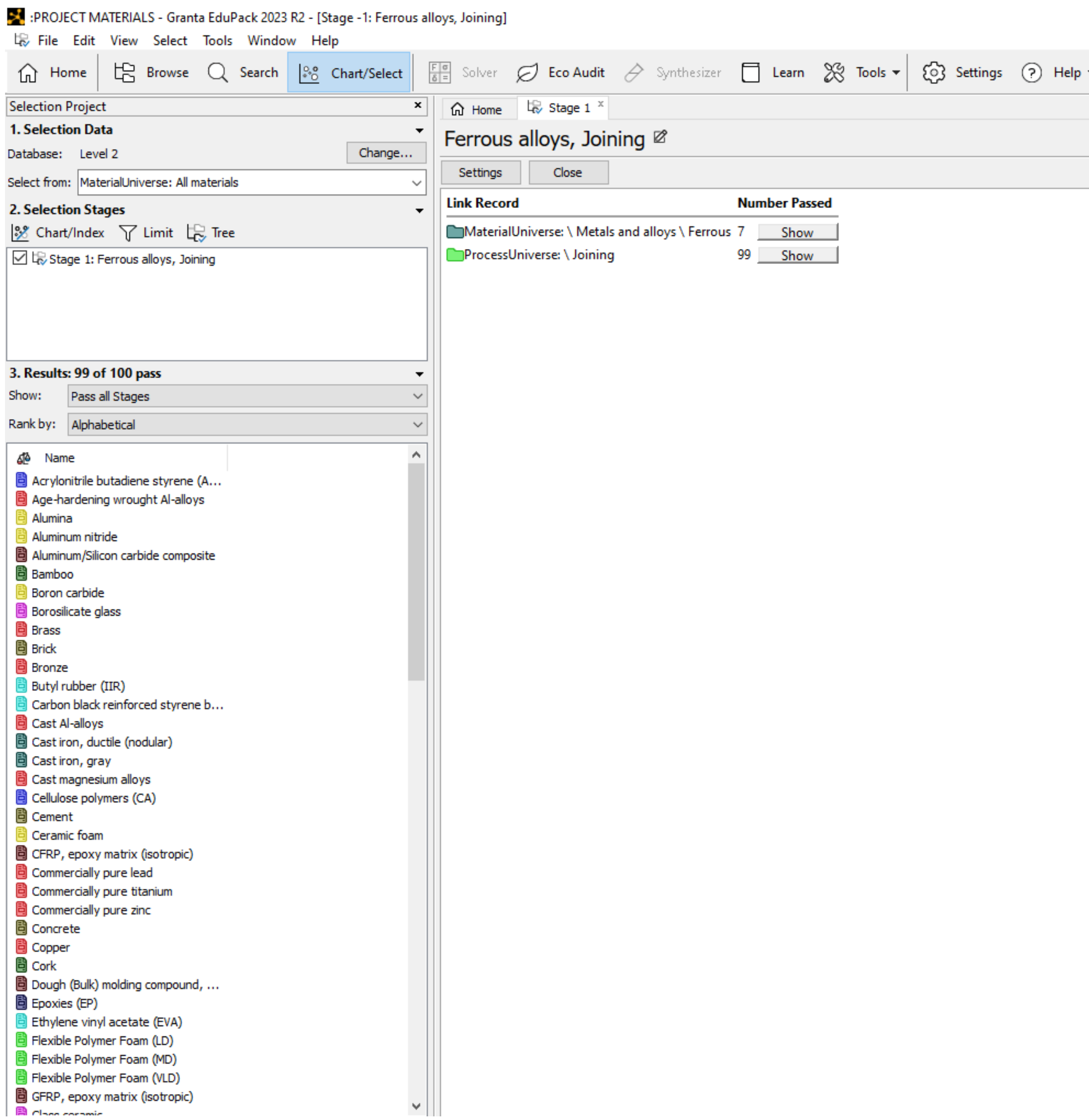


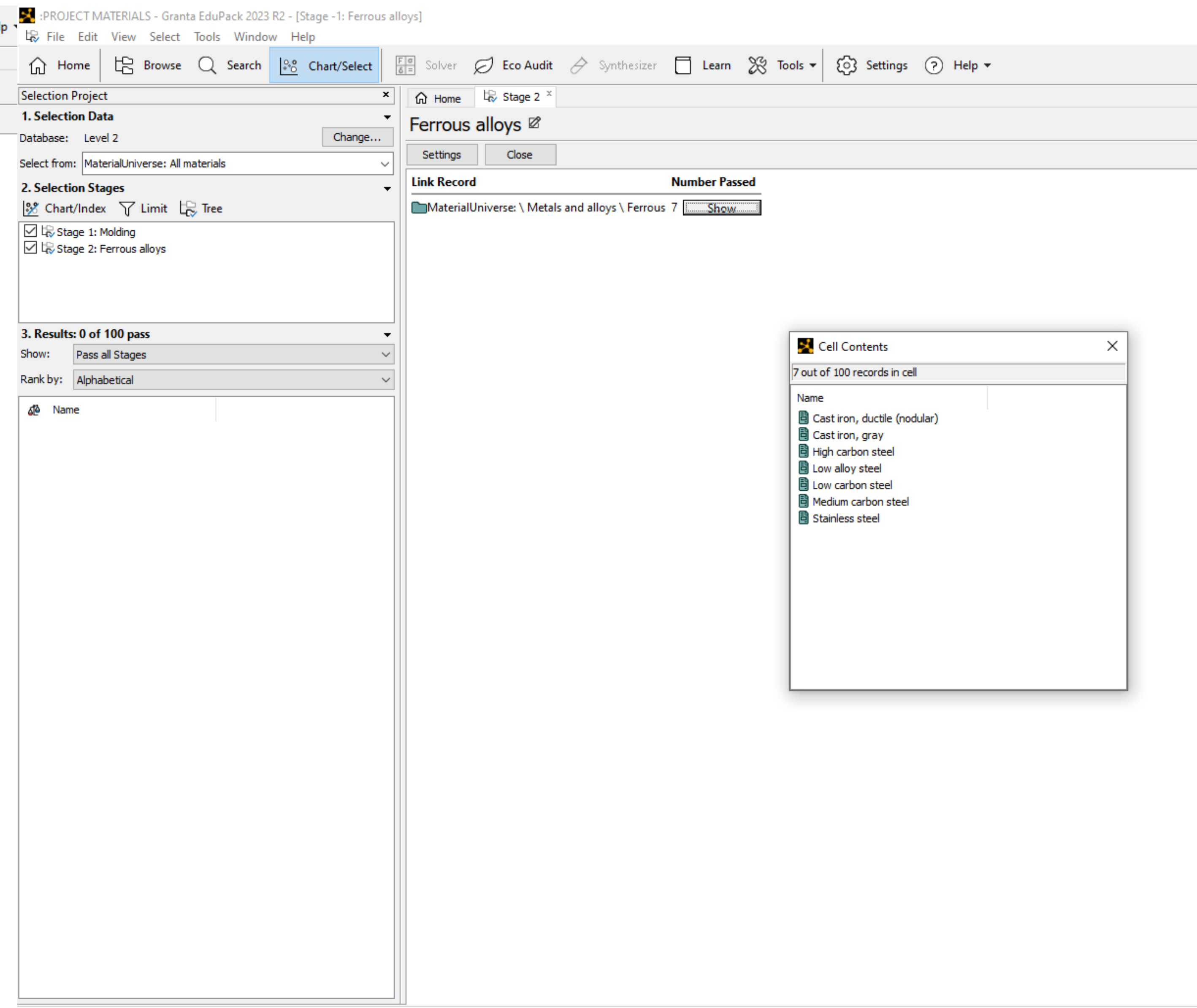
Exercise 7: Selection using a Limit Stage/Tree stage



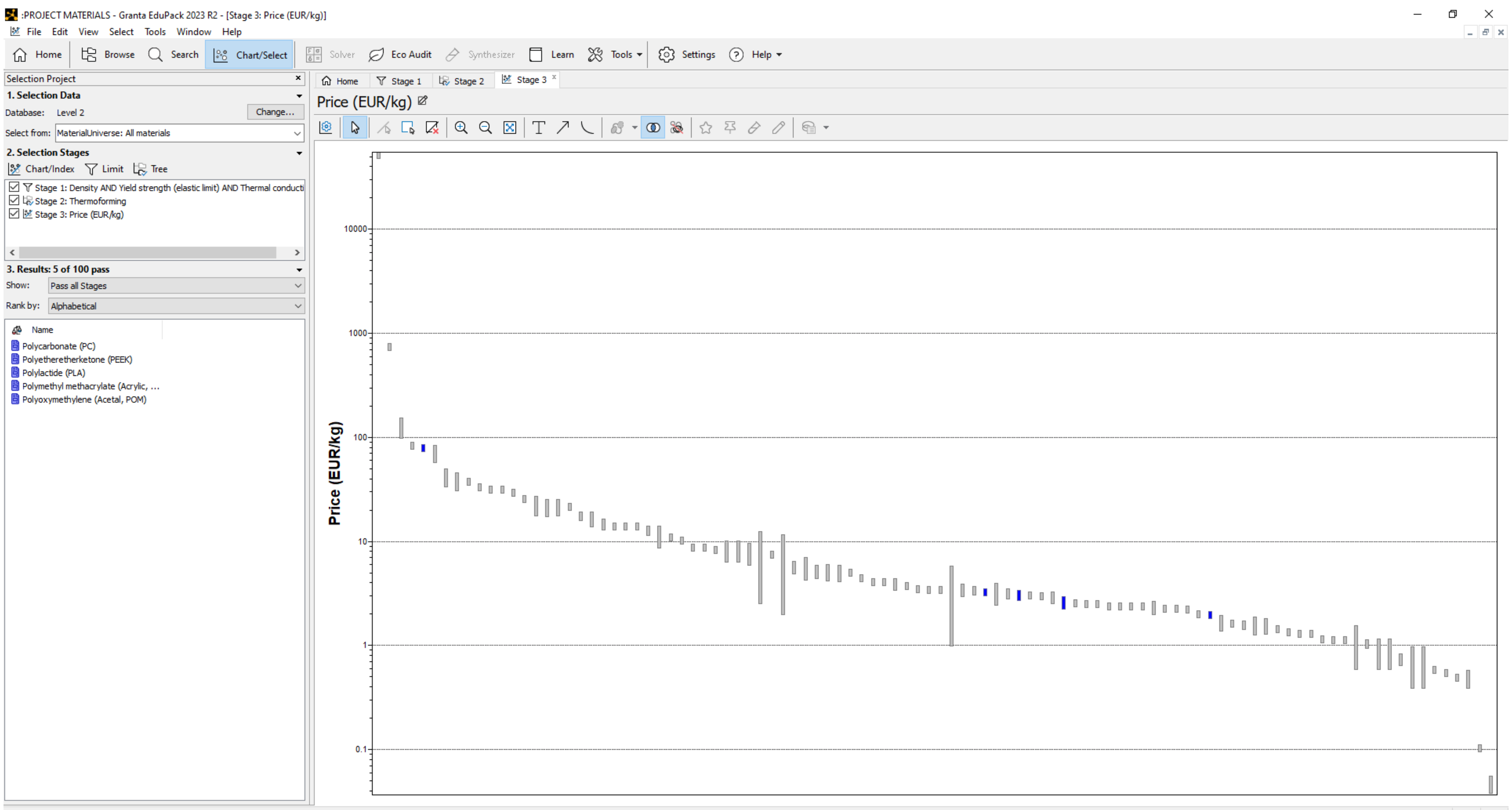


Exercise 7: Selection using a Limit Stage/Tree stage





Exercise 8: Combining filtering and charting tools



Assignment 5 Materials and manufacturing processes

- Select a product type such as a rubbish bin or a chair that can be placed in different environments
- such as indoor or outdoor.
- Propose 2 different materials and manufacturing process to suit the two different environments.
- Provide a rational for both

Lighting – Material and manufacturing process

Indoor Lighting

Materials	Manufacturing process
Metal (aluminum, steel, and brass) used for frame, different coatings for aesthetic appeals.	Sheet stamping • Sheets cut into blanks of the desired size and shape. • Design and create dies and tools to shape the metal. • Configure the press machine with the necessary dies and adjust setting. • Place between upper and lower dies • Apply force to the blank to shape it using the dies • Trim excess material. Die casting Cutting Joining Seam welding
Glass clear, frosted, coloured, and textured	Glass blow molding • Shaped using tools and molds. • Air is blown into pipe to expand and hollow out the glass • Adjust and shape to achieve desired shape • Place the glass in a kiln to cool and strengthen it.

Lighting – Material and manufacturing process

Outdoor Lighting

Materials	Manufacturing process
Metal (aluminum, steel, and brass) durable, withstand outdoor conditions, treated with protective finishes, UV-resistant coating.	Sheet stamping • Sheets cut into blanks of the desired size and shape. • Design and create dies and tools to shape the metal. • Configure the press machine with the necessary dies and adjust setting. • Place between upper and lower dies • Apply force to the blank to shape it using the dies • Trim excess material. Die casting Cutting Joining Seam welding
Plastic resistant rust and corrosion, not as durable as metal, lightweight and easy to install, affordably.	Glass blow molding • Extrusion • Parison formation • Blow molding • Cooling • Mold opening • Ejection • Trimming

Assignment 6 Single use plastic

- Select two ‘single use’ item from your list.
- Choose an alternative material (with less negative environmental impact)
- Justify your selection 2-5 lines on each.

Tampon applicator - Single use plastic

Original – Polypropylene (PP) contribute to plastic waste

Alternatives – bio- gradable and renewable sugar cane

- Sugar cane tampon applicators are made from natural and renewable plant-based materials that are biodegradable and eco-friendly.
- Sugar cane tampon applicators have a smooth and rounded tip that allows for easy and comfortable.
- Sugar cane tampon applicators are free of pesticides, dioxins, fragrance, chlorine, and other harmful chemicals that can irritate the sensitive vaginal area.

Tampon applicator - Single use plastic

Original – Polypropylene (PP) contribute to plastic waste

Alternatives – cardboard

- Cheaper and more accessible than plastic applicators, as they use less materials and are easier to manufacture.
- Cardboard tampon applicators are biodegradable and environmentally friendly.
- Safer and healthier for the vagina, as they do not contain any plastic, chemicals or synthetic materials.

Dental floss - Single use plastic

Original – nylon fibers, which are woven together to form a thin, durable, and flexible thread

Alternatives – pure silk

- Silk dental floss is soft and smooth, making it gentle on the gums. This can be particularly beneficial for individuals with sensitive gums or those prone to gum irritation.
- Silk is a natural fiber, and silk dental floss is often biodegradable
- Silk is known for its strength, and silk dental floss is generally durable - effectively removing plaque and debris from between teeth without easily fraying or breaking.

Materials Design Database Project

Brief

- Choose a product from the design database.
- Step 1: Explain the design and why I picked the material, finish and process.
- Step 2: Change the material and process but keep the same design. Create some sketches and small models to show my ideas. Pick one idea and make a bigger model with card, wire or foam. It should be no bigger than 300mm x 300mm x 300mm.
- Step 3: Change the material, process and design. Show this with sketches and small models to show my ideas. Pick one idea and make a bigger model with card, wire or foam. It should be no bigger than 300mm x 300mm x 300mm.
- Present a character, aesthetics, the function, environment and required material properties for each design.

Part 1

Traffic cone by Swintex

Character Analysis

Context:

A traffic cone by Swintex is a type of road safety device that is used to mark hazards, divert traffic, or create temporary barriers. The context of a traffic cone is that it is a cone-shaped object that is usually red and white or yellow, used to keep vehicles away from an area of road temporarily, usually because repairs are being done to it. Traffic cones are also called pylons, witches' hats, road cones, highway cones, safety cones, channelizing devices, construction cones, or just cones. Traffic cones is made of recycled PVC and have a reflective sleeve for visibility at night.

Usability:

- A traffic cone is a cone-shaped marker that is used to redirect traffic or pedestrians in a safe manner. Traffic cones can have different colors and sizes, depending on their purpose and the speed of the road they are used on. Traffic cones are made of plastic or rubber, and usually have a reflective collar for nighttime visibility.
- Traffic cones are versatile and useful tools for creating safe and efficient environments. However, they should be used properly and according to the rules of the road. Placing traffic cones on the road without authorization or for personal reasons is illegal and dangerous. If you carry traffic cones in your vehicle, you can use them to alert other drivers to keep a distance if your car breaks down, especially if you are changing a tire. However, you should always call for roadside assistance or emergency services if you need help.

Traffic cone by Swintex

Personality:

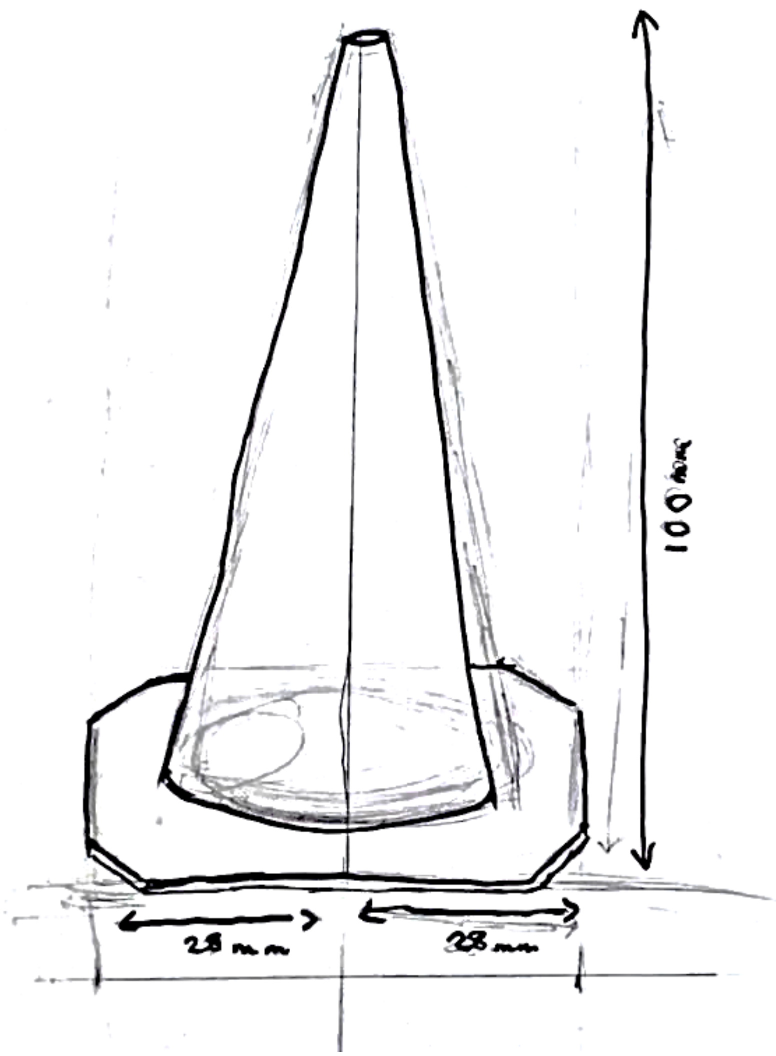
- Reflective band – visibility
- Durable construction
- Stackable design
- Weighted base – stability, preventing them to being knocked over
- Various size- specific requirements and requirements
- Withstand various weather conditions
- Lightweight
- Bright colour – easily distinguishable

Materials:

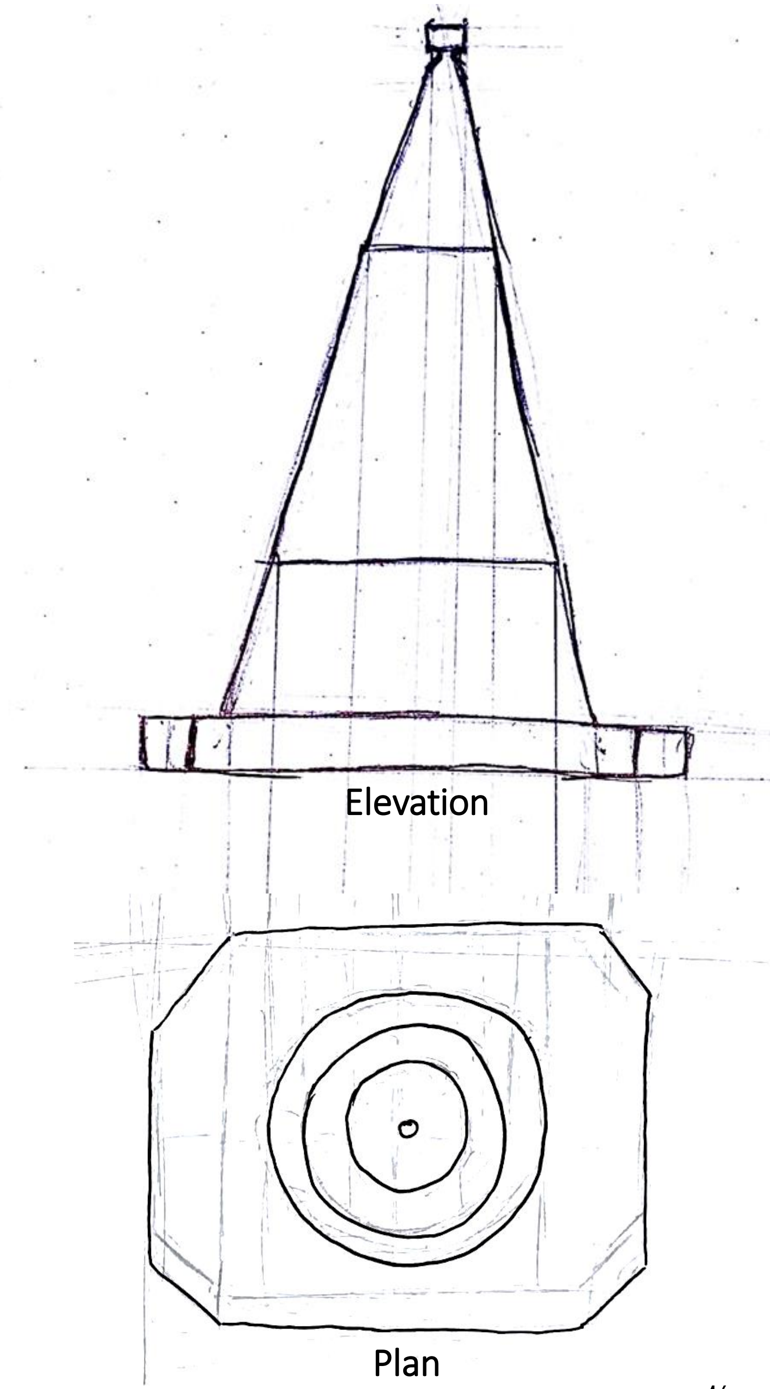
Polyethylene

PVC (recycled)

Scale



1x0.56



Material Properties

Polyethylene

Colour: Bright colours for high visibility, easily colouring

Mechanical: Makes them durable withstanding challenging conditions of road use.

Physical: Must be lightweight making easy to transport and set up.

Flexibility: Polyethylene allows traffic cone to bend upon impact and return to its original shape

Weather resistance: Resistant to moisture, which helps cones endure various weather conditions without degrading

Impact resistance: Withstand bumped or run over by vehicles.

UV resistance: Must maintain its colour and structural integrity.

PVC with anti-slip feature

Mechanical: PVC is flexible, durable, and weather-resistant, making it suitable for outdoor use.

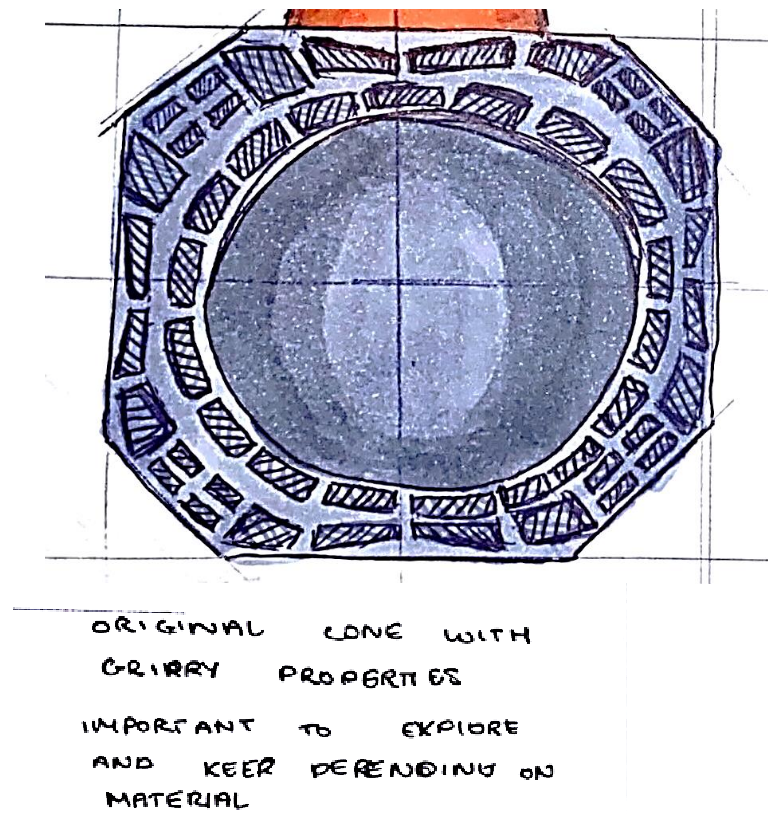
Physical: PVC can be molded into various shapes and sizes and can be colored with pigments or reflective materials. PVC has a low density and a low melting point, which makes it lightweight and easy to carry.

Flexibility: PVC can bend or flex if struck by a vehicle, reducing the risk of damage to the cone or the vehicle.

Environmental: PVC can be recycled and reused, which reduces the environmental impact of waste disposal.

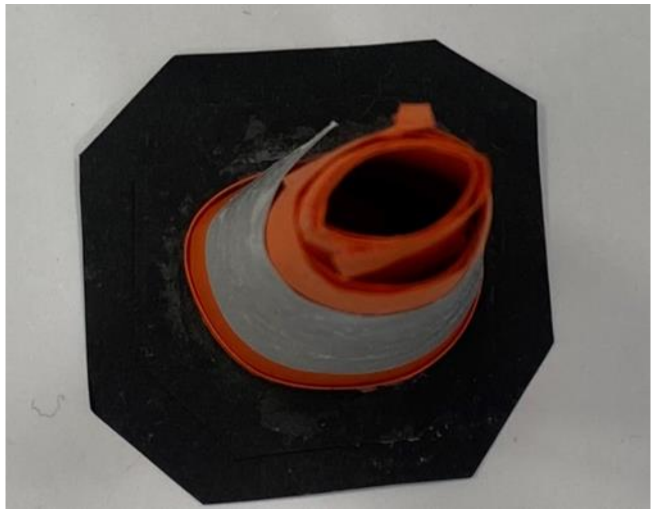
Manufacturing Process

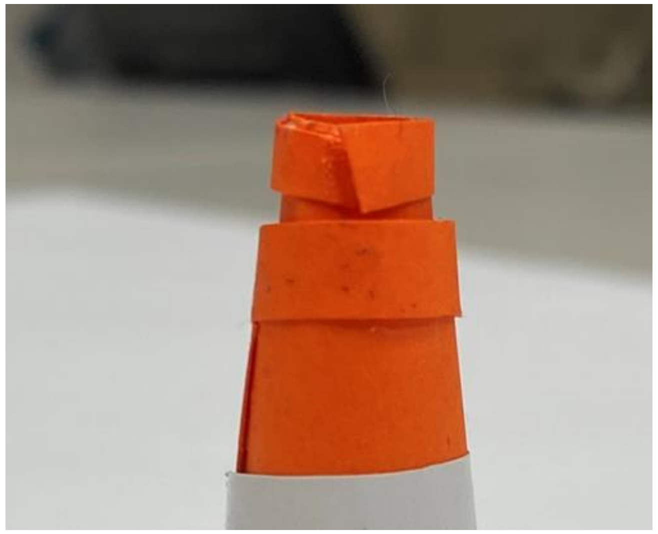
A Swintex traffic cone is a type of traffic cone that is manufactured by Melba Swintex, a UK-based company that specialises in temporary traffic management products. According to their website, the Swintex traffic cone is made through a combination of different moulding techniques. The base of the cone is compression moulded from bits of shredded tyres, which gives it durability and stability. The top of the cone is blow moulded from plastic, which makes it lightweight and flexible. The two parts are then co-injection moulded together, with connector elements gripping apertures in the base. This ensures a strong bond between the base and the top. The cone is also fitted with reflective sleeves for visibility. The Swintex traffic cone is designed to meet the British Standard BS EN 13422:20042



Questions:
How to make it lightweight?
How to make it stay in place?
How will endure weather conditions?

I used colored paper to craft the original traffic cone. The choice of colored paper enhanced the visual appeal, with the body in orange and the base in black. For a white, glossy element of the luminated cover they use. I repurposed an old photocopy cover, with a glossy finish.





Part 2

Picking a New Material

Metal (aluminium)

Sturdy, durable and long lasting

Aluminum has a highly reflective surface, which is an important property for a roadside barrier. This could enhance the visibility of the cones, especially in low light conditions.

Aluminum is known for its durability, which could make the traffic cones more resistant to wear and tear.

Aluminum is easy to fabricate, which could allow for efficient production of traffic cones.

Aluminum increases strength in cold environments, which could be beneficial in colder climates.

Aluminum is non-toxic and recyclable1, making it an environmentally friendly choice.

Aluminum has a pleasing aesthetic appearance, which could enhance the overall look of the traffic cones.

Lightweight Aggregate

Sturdy, durable and long lasting, lightweight

Lightweight concrete has a lower density, ranging between 300 and 1200 kg/m³1. This could make the traffic cones easier to transport and handle.

Despite its reduced weight, lightweight concrete has a high compressive strength in relation to its density. This could result in traffic cones that are robust and long-lasting.

Pose a lower risk of causing damage to vehicles that encounter them, making them safer in the event of minor accidents.

They can still withstand the rigors of daily use in various weather conditions. They are less prone to cracking or breaking compared to some plastics.

Bamboo

Lightweight, durable, eco-friendly.

Bamboo is one of the fastest-growing plants in the world. This makes it a highly renewable resource.

Bamboo is known as the strongest woody plant in the world due to its high weight-to-strength ratio. This could potentially make bamboo traffic cones sturdy and durable.

Bamboo has good elastic properties, which could help the cones withstand impact without breaking. Bamboo is economical and easy to use compared to other types of construction materials. This could potentially make bamboo traffic cones more cost-effective.

Bamboo is easier for transportation and construction, which could simplify the manufacturing and distribution process.

Picking a New Material

Carbon fibre

Carbon fiber significantly reduces the weight of objects, making it ideal for weight reduction applications. This could make the traffic cones easier to transport and set up.

Carbon fiber offers a lightweight alternative to metal while maintaining superior strength and durability. This could make the traffic cones more robust and long-lasting.

Carbon fiber has superior fatigue properties compared to metal, meaning components made of carbon fiber won't wear out as quickly under the stress of constant use.

Carbon fiber will expand or contract much less in hot or cold conditions than materials like steel and aluminum. This could be beneficial in varying weather conditions.

Wood

Wood is a renewable resource, which could make wooden traffic cones a more environmentally friendly option.

Wooden traffic cones could potentially offer a unique and aesthetically pleasing alternative to traditional traffic cones.

Certain types of wood are very durable and could potentially withstand the elements well.

Unlike plastic or metal, wood is biodegradable, which could reduce environmental impact when the cones are no longer usable.

Wood cones can be lightweight, making them easy to transport and handle, especially for temporary or low-traffic situations.

Silicone

Silicone is known for its flexibility, which could make the traffic cones more resistant to impact and less likely to be damaged by vehicles.

Silicone is resistant to weathering, ozone, radiation, and temperature extremes. These properties could make silicone traffic cones more durable in various environmental conditions.

Silicone can be made in bright colors, which is an important property for a roadside barrier.

Silicone resists high temperatures, which could be beneficial in hot climates.

Non-slip surface.

Environmental benefits.

Phosphorescent Paint

Phosphorescent paints are special types of paints that contain phosphorescent pigments. These pigments absorb and store light energy when exposed to a light source and then slowly release that energy in the form of visible light over an extended period, creating a glow-in-the-dark effect. This is different from fluorescence, which involves immediate emission of light upon exposure to light.

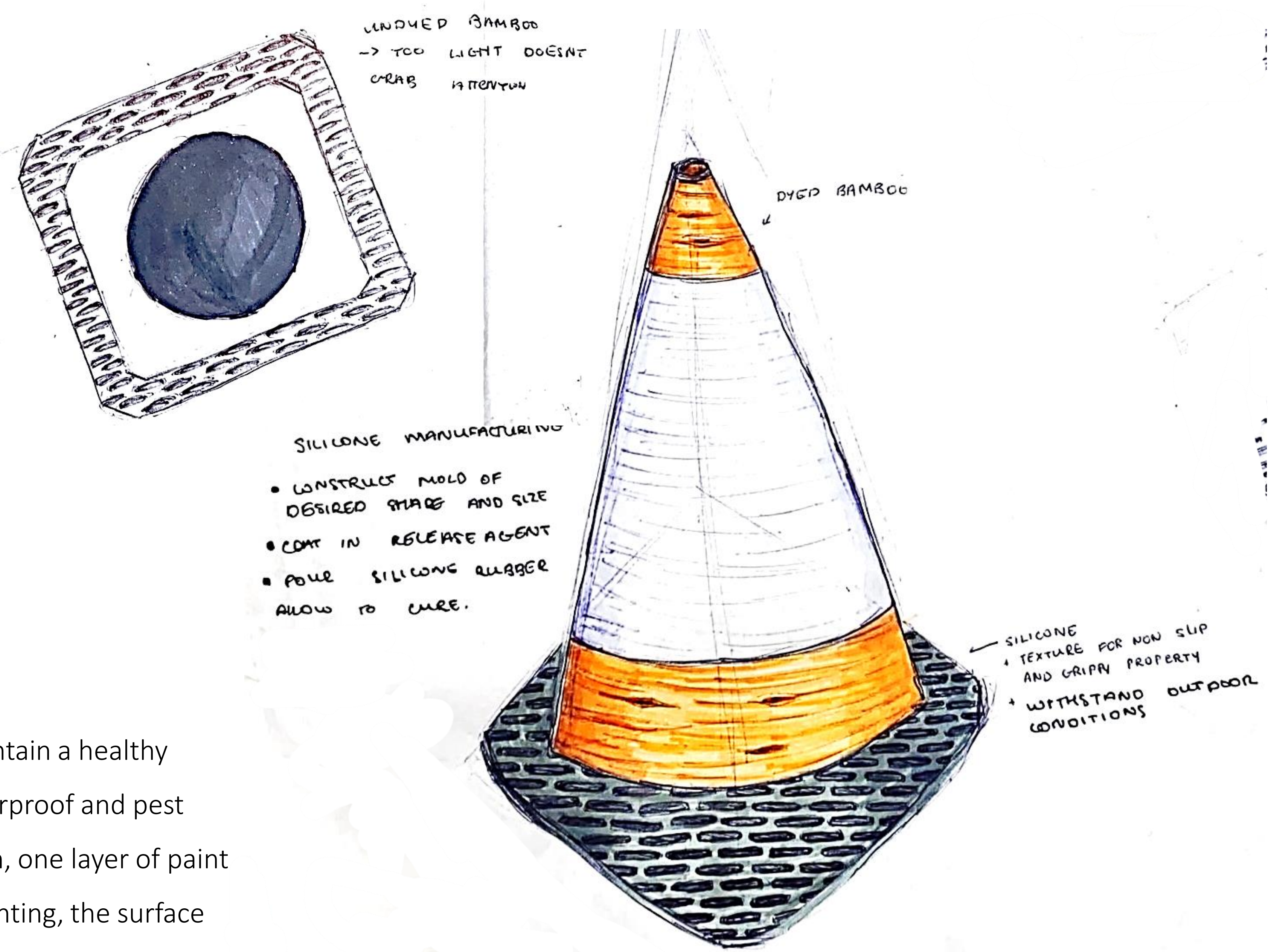
Absorption of Light: When phosphorescent paint is exposed to light, the phosphorescent pigments in the paint absorb photons (light energy).

Emission of Light: When the ambient light diminishes, the stored energy is slowly released in the form of visible light. This is what creates the glowing effect in the dark.

Bamboo Cone

Hot Pressing and Gluing

Glue spreading and blank assembling: select high-quality environment-friendly adhesive, glue and evenly spread according to the specified glue spreading amount, and then assemble bamboo strips into cone shapes according to the required specifications.



Sanding

The surface of the blank plate is treated to make the surface smooth, and the plain plate is fixed in thickness.

Painting

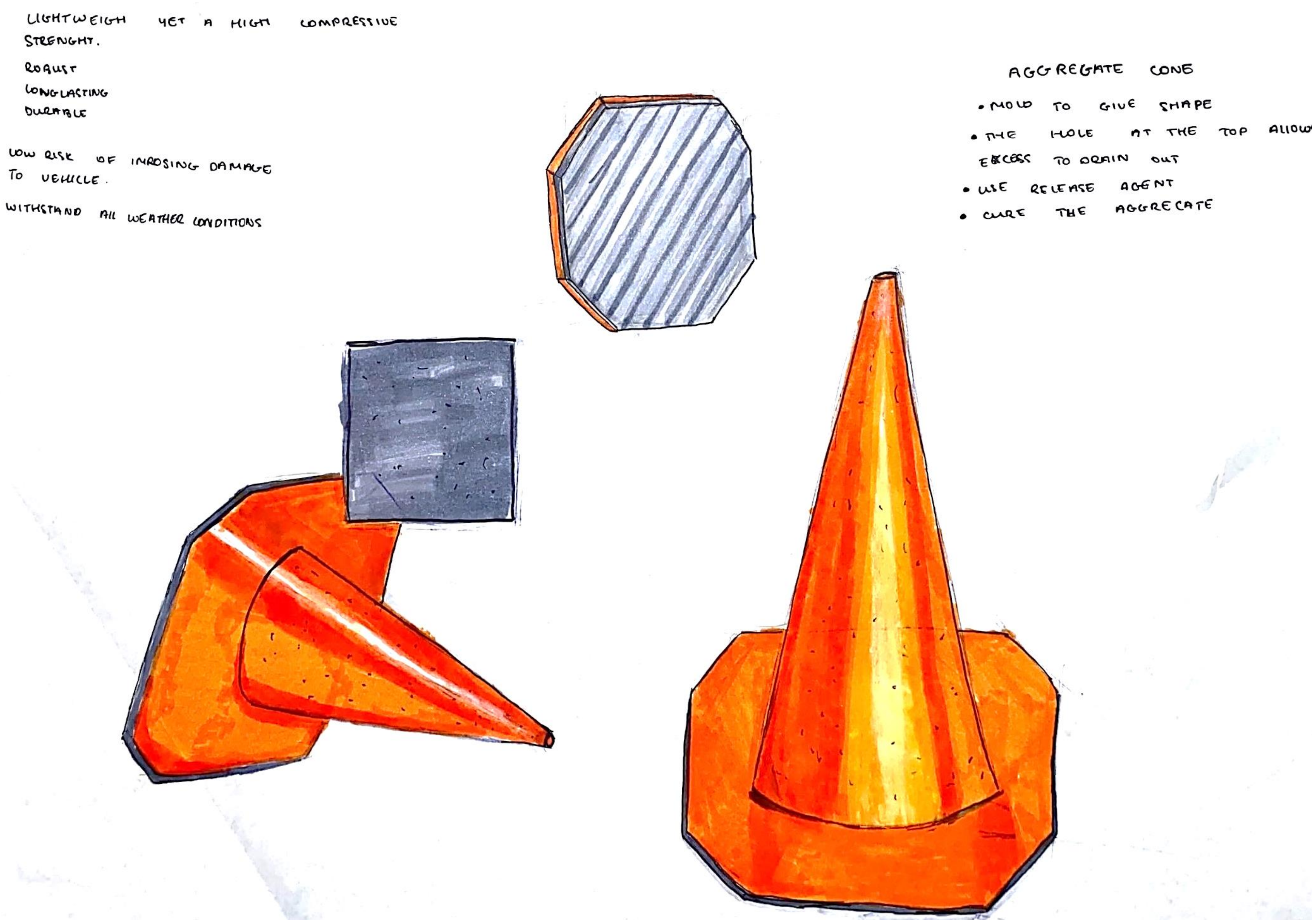
High-quality Phosphorescent paint can not only maintain a healthy home environment, but also achieve aesthetic, waterproof and pest corrosion prevention. To ensure good paint adhesion, one layer of paint must be sanded, and after repeated sanding and painting, the surface can be ensured to be smooth, flat and free of bubbles

Aggregate cone

To make a cone shape out of concrete, you will need a mold. A mold is a hollow container that is used to give shape to molten to hot liquid material when it cools and hardens.

you will need to cut a hole at the tip of the cone to allow the excess aggregate to drain out. You will also need to coat the inside of the cone with a release agent

fill the cone with wet aggregate and tap it gently to remove any air bubbles. Let the concrete cure for at least 24 hours, then remove the mold.



Attaching the base and body

Bamboo Cone

1. Some silicones can be heat-bonded. Heat the silicone component slightly and press it onto the bamboo. As it cools, it may form a strong bond.
2. Design the bamboo and silicone parts with complementary grooves or notches that fit together. This can enhance the bond between the two materials.

Aggregate Cone

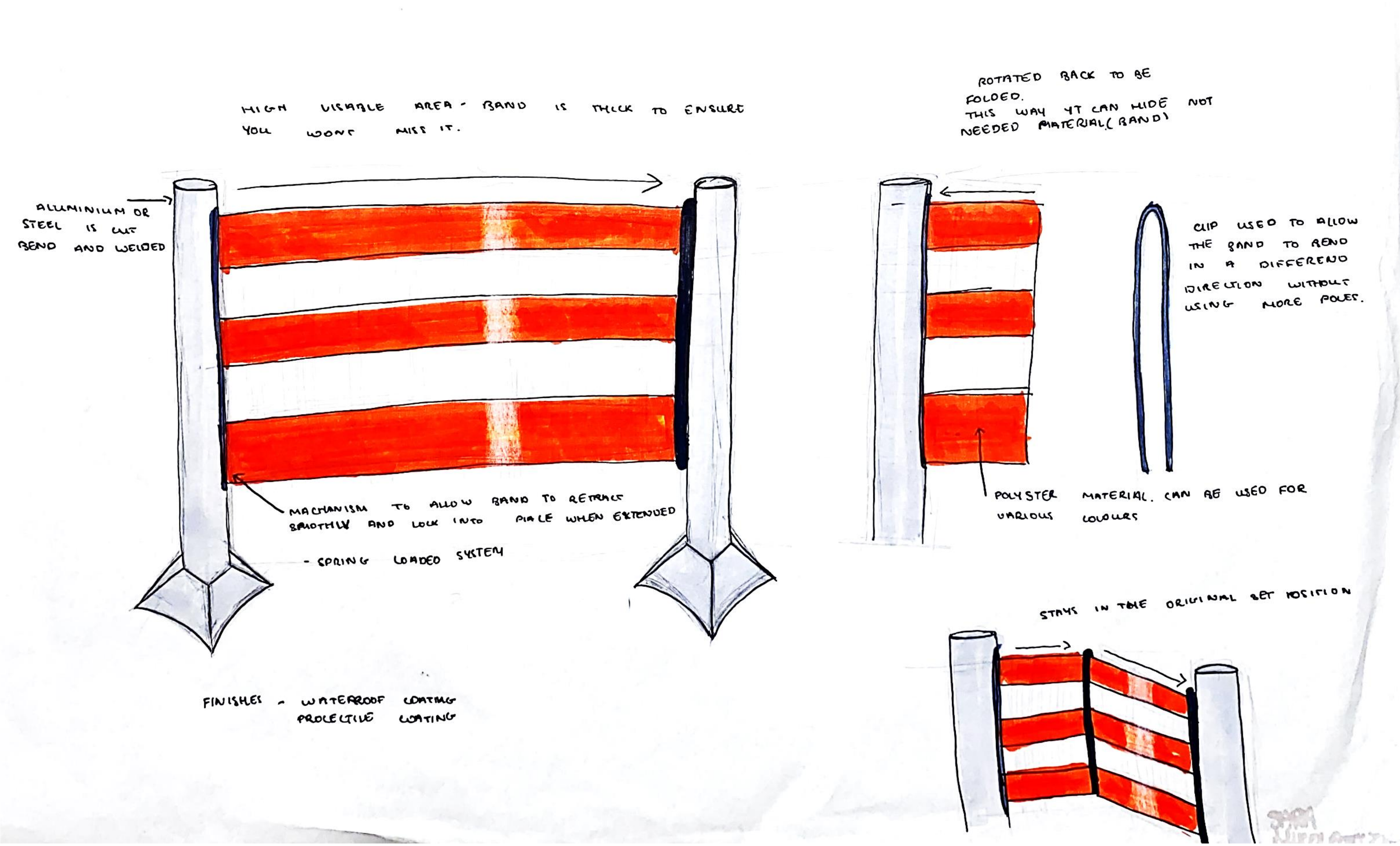
1. Cure the silicone base with the aligned already formed aggregate body.
2. Adhesives.

The different materials used for the original traffic cone would require no shape changes. My intention was to preserve the original forms, and this was achievable even with the change to different materials.

I was able to mold the same shape out of clay as I had previously done with the paper prototype. However, I found that the clay offered a more aggregate feel, making it an interesting choice for prototyping. After achieving the desired shape, I felt it was perfectly suited for the material it was intended to represent. It however lacked the painted element.

Part 3

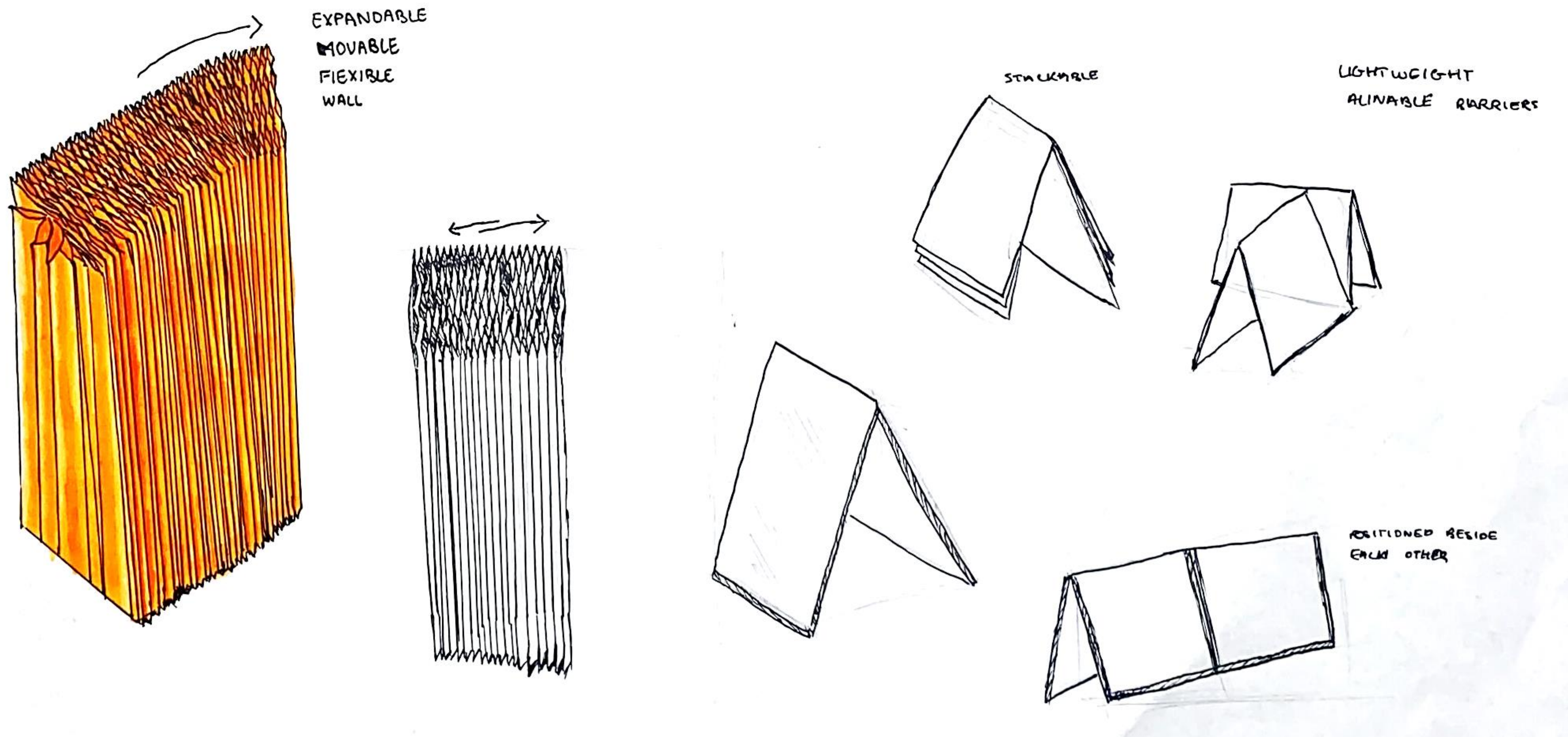
Following my research for the third part of the project, I was determined to create something that would not merely be convenient like the traffic cone. Given that traffic cones are designed to be stackable, I wanted my concept to incorporate a unique feature. Hence, I chose expandability. It was crucial for the design to not be overly complex. An expandable belt seemed to be the optimal choice. Although such belts have been used in barricades before, this one would stand out due to its thickness and colour. The original idea allowed for the position to be altered by adding another pillar. However, I decided to incorporate clips that would keep the belt straight, thereby reducing the number of pillars required.



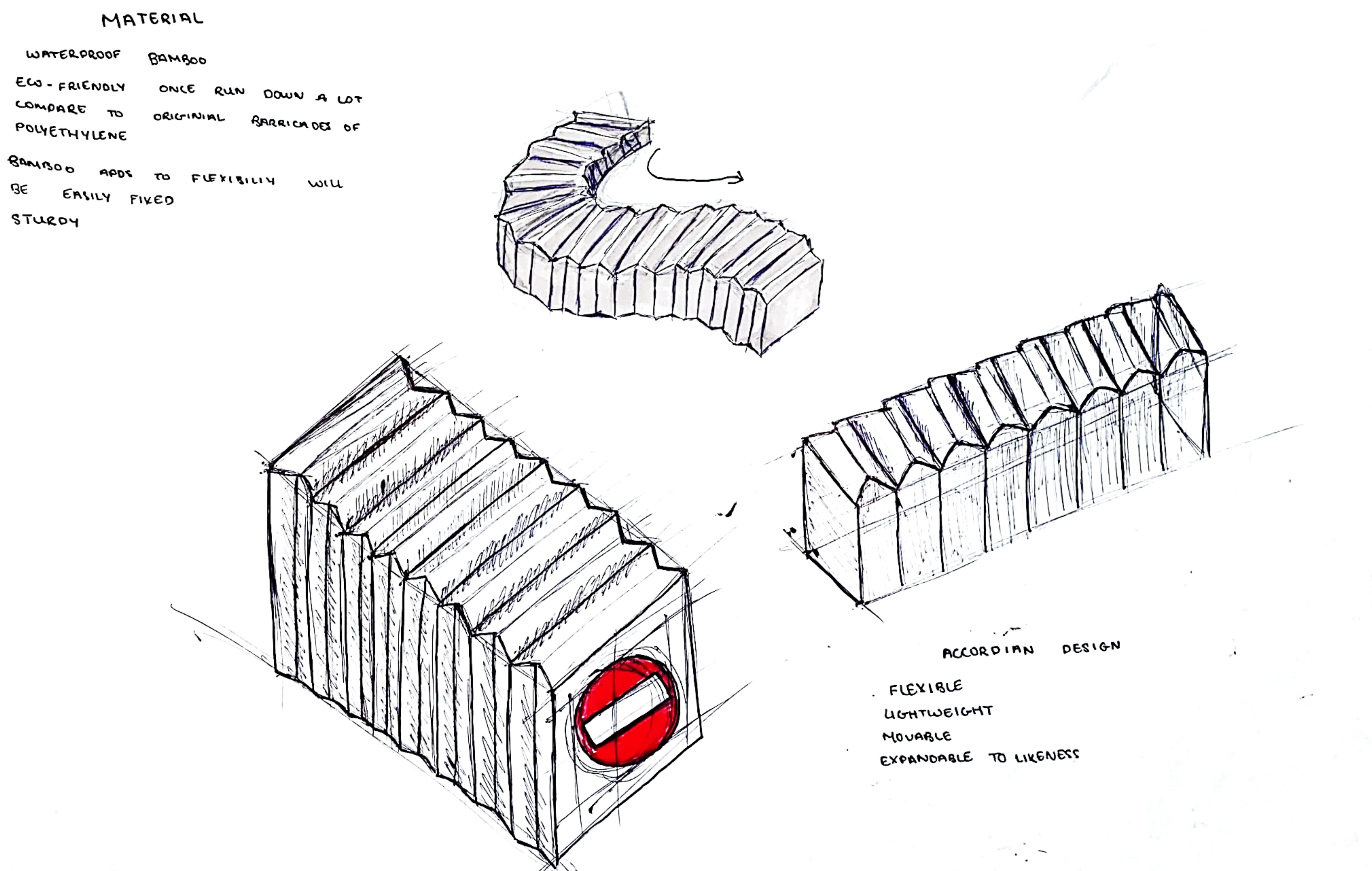
I decided to utilise concertina folding, keeping expandability in mind. This approach would only require a single component for the entire solution, as the concertina folding provides the necessary mobility. To avoid focusing solely on one particular feature, I also made the decision to restore the stickability of a traffic cone. By designing a roof-like shape, the forms could be arranged side by side while having the ability to stack them.

CONCERTINA FOLDING

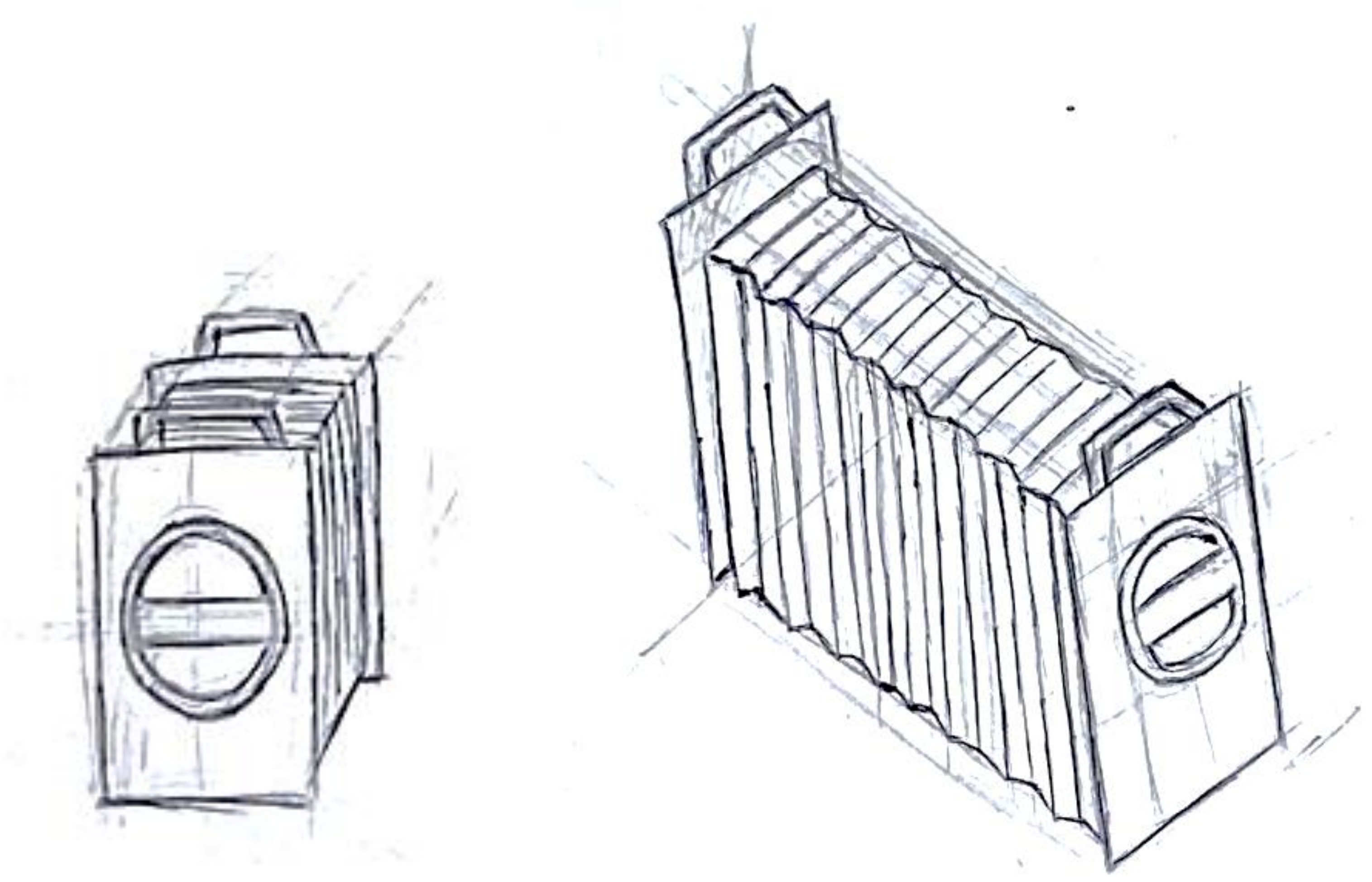
- LARGE SCALE PRINTING PRESSES – FOR DESIRED DESIGN
- CUTTING SHEETS TO SIZE
- FOLDING MACHINES - PRECISE AND RAPID FOLDING AT INDUSTRIAL SCALE



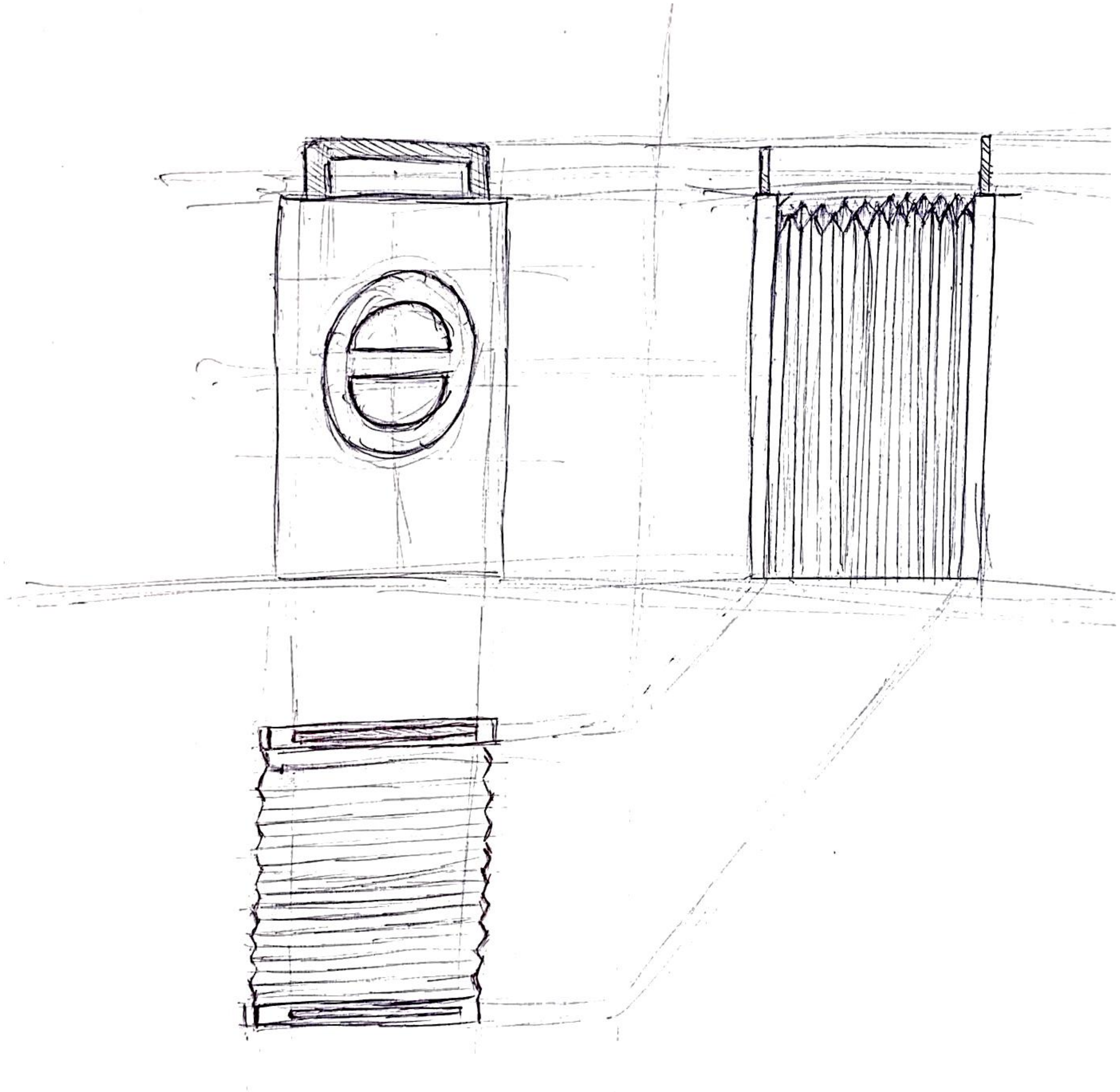
The concept required a material that was both waterproof and durable. Before deciding on an alternative to plastic, I discovered bamboo. Given its versatility in form, bamboo could potentially be used to create a concertina fold. However, the key consideration would be to apply a waterproof finish to. this material. Additions like the bamboo cone, such as phosphorescent paint, would also be incorporated into this concept. Compared to other concertina foldings, this one would be much easier to manufacture due to its less complex structure. Its design is similar to an accordion.



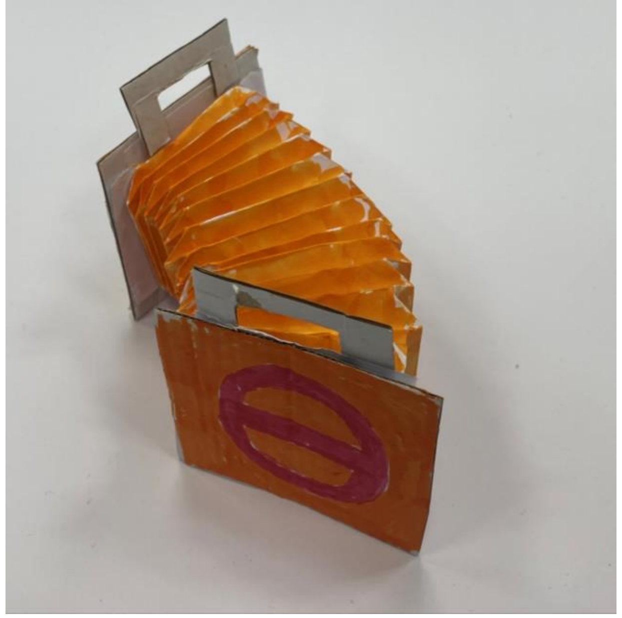
To simplify the folding process, I introduced a handle and a base to the design. The addition of a handle provides users with a means to easily extend the accordion folds. The base also allows for a convenient way to fold the item back into its compact form. This functionality does not only enhance the user experience by making the extension and retraction of the accordion folds effortless, but it also adds a portable aspect to the design, as users can now easily carry the folded item.



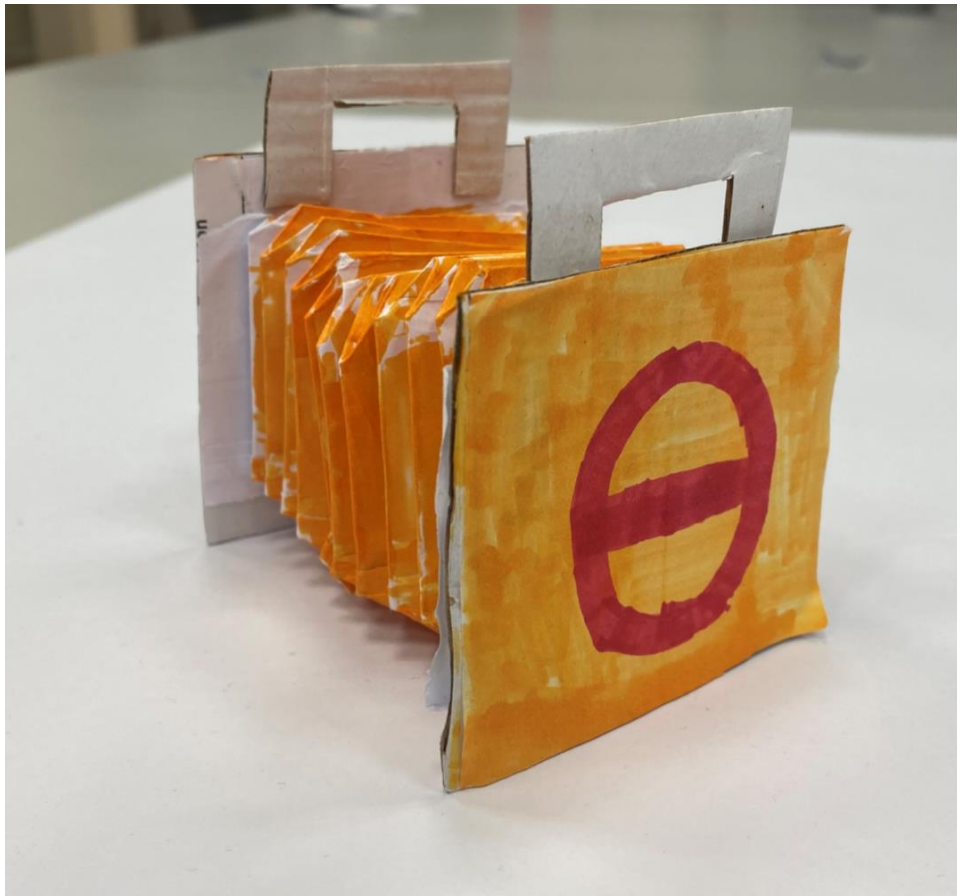
Orthographic view

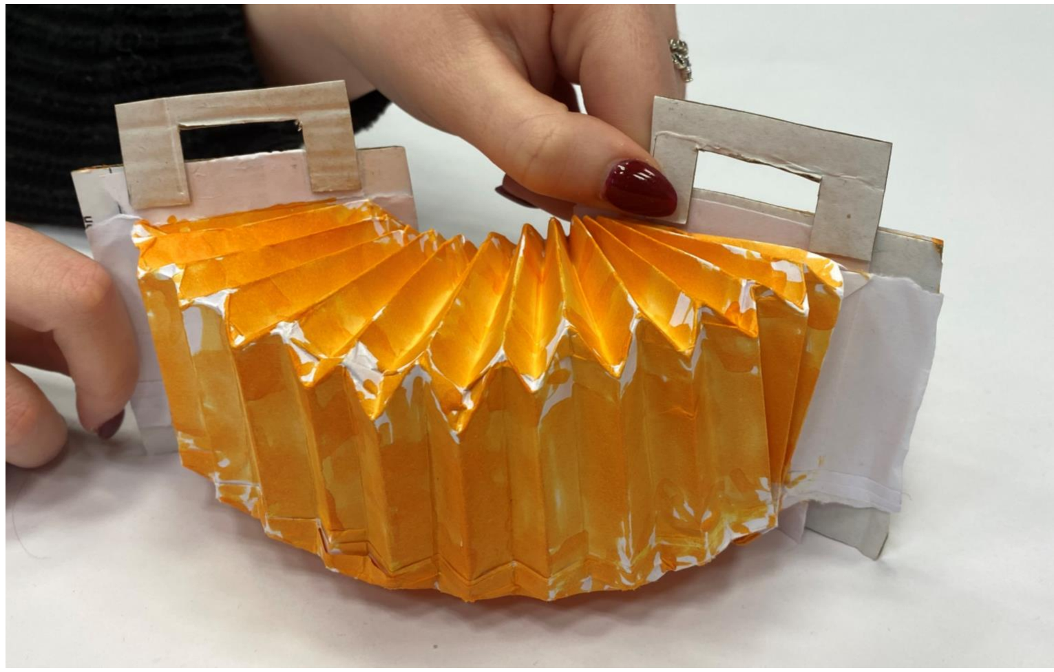


Final Concept



I successfully managed to mimic the accordion fold using paper, although it was a time-consuming process. Following this, I constructed the sides using cardboard. To finalize my concept, I decided to add color that represented the concept I had chosen.





Conclusion

After careful consideration, I decided to choose the traffic cone as a product to work on, which turned out to be an enjoyable challenge. During the second phase, I encountered several difficulties, primarily because I felt that the traffic cone's functionality was optimal with its original material. Despite this, I still believe that its function is best served by the original materials. The materials I selected seemed to align well with the traffic cone's function and offered additional advantages.

Choosing the Swintex traffic cone for the third part was thrilling as it broadened my thought process, considering the already existing (traffic) barriers. I believe my idea was unique, well-developed, functional, lightweight, and capable of protecting traffic in the real world.

This project allowed me to gain my first experience with clay modelling, which will be beneficial for my future projects. I was also able to delve deeper into the manufacturing process of my concepts. This experience will serve as a valuable knowledge for my research in upcoming projects.

Overall, I learned a great deal from this project and will undoubtedly apply these learnings to enhance my future projects.