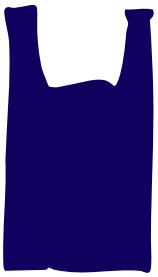
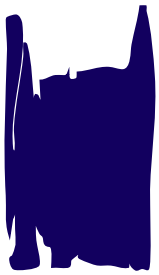
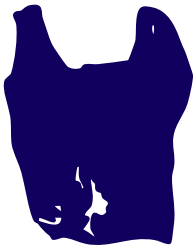




reflection



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design program: modular student housing

aE Studio
reflection P4
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1. **What is the relation between your graduation project topic, your master track (A, U, BT, LA, MBE) and your master programme (MSc AUBS)?**

   My graduation project focuses on designing a modular housing system using recycled plastic material, applying circular design principles to address plastic waste problems. In line with the studio's emphasis on innovation, the project uses underutilized waste streams to create environmentally responsible housing solutions. It integrates materials science, design and environmental impact and combines architectural theory with technical expertise to address housing challenges. This research explores new material applications in construction, focusing on sustainability and adaptability. Rooted in the MSc Architecture, Urbanism and Building Sciences programme, the project addresses the urgent demand for student housing in Delft while promoting a circular economy. It serves as a practical application of my studies and makes a meaningful contribution to sustainable architecture and resource-efficient building practices.

2. **How did your research influence your design/recommendations and how did the design/recommendations influence your research?**

   My research formed the basis of the design process by systematically investigating the properties, limitations and potential of recycled plastic materials, especially PolyAl and mixed plastics. By categorizing these materials according to technical, environmental, economic and aesthetic parameters, I developed a comprehensive materials database that directly influenced key design decisions. Initially, the limitations of these materials posed significant challenges to structural integration. It took a lot of time and repetition to find a viable structural method. A pivotal moment came when I collaborated with a structural engineer, which allowed me to establish ground rules for applying PolyAl materials that, based on parameter data, have promising architectural, structural and aesthetic potential for use in semi-structural and even structural components. This consultation allowed me to establish clear 'ground rules' that clarified the structural framework of possibilities, defined safe approaches and guided the integration of previously researched and new reinforcement strategies (e.g. compression density, composite behaviour, interlocking systems, multilayer compositions, curved surfaces and rounded corners) of the material. These rules significantly accelerated the design process and confirmed one of my key architectural principles: 'form follows material and function'. Applying these different systems further challenged me during the design phase and raised new research questions, which in turn led to even better structural solutions for the material. This iterative feedback loop helped refine both the component catalogue and the architectural expression of the material system, allowing it to function coherently and effectively.

3. **How do you assess the value of your way of working (your approach, your used methods, used methodology)?**

   I see my approach as valuable because it starts from the material and builds up to architectural design. I used a bottom-up, material-driven method that combines scientific research with design practice. One key part of my process was using a multi-criteria decision matrix to compare recycled plastics, specifically PolyAl and Mixed Plastics, with traditional materials like wood, steel and concrete. I looked at technical, sustainable, design and economic factors, which helped me make informed choices based on how the materials actually behave and how they can be made and further produced.

   What made this approach especially strong was the involvement of real industry input. I visited recycling facilities and spoke with professionals, like recyclers, engineers and constructors, which helped me understand what's really possible with these materials. Working with companies like ReconPolymers and Better Future Factory and speaking directly with constructors, gave me valuable insights into both the challenges and potential of recycled plastics. These conversations were especially important when I explored the limitations during the research phase. It took time to explore the right ways to use PolyAl structurally, but once I spoke to a constructor, I was able to

set clear basic rules for using the material. This helped define my "game rules," making the design process much clearer and faster. It also strengthened my belief in the principle: “form follows material and function.” This method showed how the residual or ‘waste’ materials can actually inspire for creative solutions.

Throughout the process, I combined material-focused research with design that responds to users and the site. I used the architectural triangle - technology, use and context - as my main structure. This helped me connect technical research with real-world needs, as the need for student housing. I used personas to make sure my designs matched real user needs, letting the material guide not only the function but also the form and flexibility of the material form the spaces.

4. How do you assess the academic and societal value, scope and implication of your graduation project, including ethical aspects?

Academically, my project connects architecture with materials science by exploring how recycled plastics, especially the waste stream PolyAl, can be used to create both structural and spatial building elements. Using a step-by-step method, the project shows how unusual materials can be tested and turned into scalable building systems that work well with design.

Socially, the project tackles two major problems: plastic waste and the lack of student housing. By treating plastic waste as a useful material, the project shifts the view from throwing it away to using it with purpose. It aims to change how people see waste by showing that these materials can be turned into strong and attractive building systems. This approach offers a first approach towards a positive and scalable model for future housing systems.

Ethically, the project supports the use of safe, reusable building systems and helps build local reuse economies. It also addresses the real-world challenges of using these materials in construction. Beyond reducing environmental impact, the goal is not just to reduce waste, but to build in a responsible and thoughtful way—making circular thinking a core part of architectural design.

5. How do you assess the value of the transferability of your project results?

The results of my project can be used in other places because the design is modular, flexible and can be produced at different scales. The materials are adaptable and the construction system allows for prefabrication, use in different locations and adjustment to local needs. This makes it useful for multiple contexts and situations.

The technical catalogue, with components and matched production techniques, can be used and further developed by other architects and engineers. The way I evaluated the materials, by looking at technical, environmental, aesthetic and economic factors, is also a method that others can use. It can be applied to other recycled materials, like bio-composites. Even though my project was developed in the Netherlands with local recyclers like ReconPolymers, the same process can be used in other countries, as long as the material quality and production are checked.

One important lesson was how useful it was to work early on with construction experts. They helped define clear rules for how the materials could be used. This shows that getting advice from different fields early in the process is key to using new materials in architecture. In the end, the project offers a scalable and useful model for building in a more circular and sustainable way.

2 reflection question which relate to the content of my work

- How can the knowledge and base system developed in this project evolve further in the future of architecture?
- What is the long-term potential of the circular approach towards the materials durability in real-world applications?