

## Design for disassembly guideline

P4 reflection

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The following reflection questions are addressed:

1. How is your graduation topic relevant in the studio?

The graduation topic about cladding products designed for Disassembly (DfD) is relevant to the Building Technology studio because it enables more sustainable and environmentally conscious building practices. Designing innovative and sustainable building components for the built environment is one of the main objectives of the this Master's program.

2. How did the research approach work out (and why or why not)? And did it lead to the results you aimed for? (SWOT of the method)

This research was carried out with the company Aldowa that produces ventilated façade cladding systems. The following SWOT analysis was carried out:

### Strengths

- Collaborating with Aldowa allowed for practical, hands-on learning about real building projects and the construction industry.
- Consistently working at Aldowa's office helped establish a productive work routine.
- Gaining insights into the production and fabrication processes of Aldowa's products provided valuable knowledge.

### Weaknesses

- Extended Research Time: Tailoring the guideline to the company's needs required more time for user research, limiting the time to apply the guideline and design alternative connections
- Diverse User Opinions: User research revealed a range of opinions among engineers. The challenge lies in putting together these diverse perspectives and preferences, as the Dfd guideline aims to provide a general design roadmap.

### Opportunities

- The research experience helped me clarify my career aspirations within the building industry.
- Proximity to the fabrication area facilitated the creation and testing of mockups.

### Threats

- Resistance to adopting new guidelines and practices within the company could limit the guideline's application. Users may be hesitant to embrace changes to established workflows.
- Technical challenges, such as the need to convert the grasshopper script from one software to another, can present obstacles. Ensuring compatibility with existing software and tools is crucial for practical implementation.

### 3. How are research and design related?

Research and design are closely interlinked in this paper. Research is essential as it provides the foundation for informed design decisions.

#### Research:

User research was conducted to understand how engineers at Aldowa approach design, helping identify their needs and preferences.

Investigating existing design for disassembly guidelines was crucial to determine what could be integrated into Aldowa's project workflow.

#### Design:

Research through design was applied when creating a new connection, as this design process allowed for the practical application and testing of the newly developed design for disassembly guideline.

In essence, research informed the design process, and the design process, in turn, allowed for the testing and application of research findings.

### 4. Did you encounter moral/ethical issues or dilemmas during the process? How did you deal with these?

One requirement of the Cradle to Cradle certification involves material health. If the materials being considered contain chemicals listed in the Restricted Substances List (RSL), Aldowa cannot incorporate them into their certified products. In the course of my research, I had to approach suppliers and request them to fill in an RSL declaration even before contemplating the disassembly of a particular material component. In one particular case, I reached out directly to a supplier based in Germany, bypassing Aldowa's local supplier. The supplier from Germany agreed to fill in the documentation with the condition that Aldowa would buy directly from them. This decision introduced a

delicate challenge in terms of client relationships, as Aldowa had already established a contract with their local supplier. At the end, Aldowa agreed to buy the product from the German supplier only for the purposes of their Cradle to Cradle and not for the other projects.

### Societal impact

#### 1. To what extent are the results applicable in practice?

The results of the Dfd (design for disassembly) guideline are highly applicable in practice, particularly within the company Aldowa. The guideline was specifically tailored for their sales and engineering departments, with the goal of being user-friendly. Most of the documents can be readily implemented, except for the Structural analysis, which is currently in a Grasshopper script format. Aldowa would need to translate it to their Catia software, but overall, the guideline is designed for practical use within the company.

#### 2. To what extent has the projected innovation been achieved?

The projected innovation, the DfD Guideline, has undergone practical testing by its users. This testing process has led to valuable modifications and improvements to the guideline, indicating that the project has successfully achieved its intended innovation within the company and has evolved based on user feedback.

#### 3. Does the project contribute to sustainable development?

The project significantly contributes to sustainable development. The Guideline enables Aldowa to design products that can be easily disassembled, aligning with the requirements of the Cradle to Cradle certification for Design for Disassembly. This facilitates the certification process for their products and can be applied to future product designs, further promoting sustainable development.

#### 4. What is the impact of your project on sustainability (people, planet, profit/prosperity)?

The project's impact on sustainability is substantial, encompassing various aspects. By helping Aldowa attain higher levels of the Cradle-to-Cradle certification for product circularity, it reduces waste generation and promotes environmental sustainability. Additionally, it can lead to increased profitability and prosperity for the company as they adopt more sustainable practices.

#### 5. What is the socio-cultural and ethical impact?

The socio-cultural and ethical impact of implementing the guideline is significant. It fosters a change in the work culture at Aldowa, encouraging engineers to consider the disassembly potential of their products. This shift toward design for disassembly contributes to a transition from linear production processes to

closed-loop systems, aligning with ethical considerations for sustainability and responsible product design.

6. What is the relation between the project and the wider social context?

The project is closely linked to the wider social context, as it promotes the idea of products designed for disassembly having a second life. This supports principles of reuse, repair, refurbishment, and remanufacturing, leading to the development of different business models and a broader societal shift toward circular systems.

7. How does the project affect architecture / the built environment?

The guideline for disassembly empowers Aldowa to produce demountable products that can be easily detached from buildings. This has implications for maintenance contracts and introduces the potential for new business models within the built environment, where products are seen as services, thus influencing architectural and construction practices.