

Newsletter no. 9 | August 2023  
Climate Challenge Laboratory | Building 313

# COLLABORATION WITH A FOCUS ON SUSTAINABILITY

Theme: Facade

DTU Campus Service  
The Technical University of Denmark

# Collaboration with a focus on sustainability

DTU's model for Integrated Project Design ensures that all parties collaborate from beginning to end. The goal is to harness everyone's knowledge and competencies so that DTU can turn visions into reality. In the Climate Challenge Laboratory, sustainability is a design driver in all phases. Here, we focus on what it has meant for the façade.

Compliments have been extended in recognition of the effective teamwork and cooperation, as contractor Mads Volby, Arch. Tech & Const. Management Claus Bang Lauridsen, and façade supplier Simon Samuelsson Laursen share how they have collectively discovered new and more sustainable solutions in the design and execution of the Climate Challenge Laboratory.

In this newsletter, we zoom in on the façade, which requires close collaboration across disciplines and roles. Two of the three interviewees were also involved when DTU constructed the Climate Challenge Laboratory's sister building, B310, and they draw on their experience from that project. In B313, DTU can now create a building with lower material consumption and a simplified façade structure, allowing the façade to be disassembled and its elements reused. Furthermore, the façade is designed for easy and quick on-site installation.



**AN EXPERIENCED TEAM.** Claus Bang Lauridsen, who is Arch. Tech & Const. Management at CCO Architects has created the details of the façade of B313. Simon Samuelsson Laursen is the project leader at the supplier Eiler Thomsen Alufacader A/S. Both were part of the team behind B310, where MT Højgård was also the main contractor. Mads Voldby, Senior Construction Manager at the main contractor MT Højgård, has the overall responsibility for the execution.

## Great communication from the start

DTU's model for integrated construction means that the contractor is involved from the early stages of the project and collaborates with architects and engineers throughout the design phase. Together and in close dialogue with DTU's client organization, Campus Service, their aim is to develop and deliver a building that aligns with the DTUs visions.

*"For us architects, the big difference is that we communicate with the supplier as we design. We meet in the early stages and use each other's knowledge."*

– Claus Bang Lauridsen, Arch. Tech & Const. Management, CCO

## What makes this collaboration model different?

MV: What makes it different is that all of us - the contractor, consultants, and suppliers - have a shared responsibility to reach the goal. Even in situations where we need to save money, optimize in the best way, and find new solutions together. You shouldn't rock the boat.

CBL: For us architects, the big difference is that the supplier is involved earlier in the process. Usually, we design a façade that is later put out for bid to a contractor, but in DTU's model, we communicate back-and-forth with the supplier as we design. We meet already at that stage and leverage each other's knowledge. Eiler Thomsen (Alufacader A/S) has helped find solutions that are beneficial for both the contractor and us architects.

SSL: We clarified important questions about the façade early in the process. For example, the

“As a supplier, we can also stretch a bit further. The time perspective is not as critical as when we have 3-6 months to deliver, and we can order materials when the price is good.”

– Simon Samuelsson Laursen, project manager, Eiler Thomsen Alufacader A/S

### INTEGRATED CONSTRUCTION MODEL

DTU’s integrated construction model aims to provide the best possible framework for the lead consultant, main contractor, and DTU to collectively bring DTU’s building visions to life, both in their collaborative efforts and in the final construction.

This happens in seven design phases (phases 0-VI) and one execution phase. The lead consultant and the main contractor work together as a team, although they have separate agreements with the client. Together, they ensure that the project is developed with a high level of expertise and collaboration, making the most of early involvement by both designers and builders.

DTU places special importance on the main contractor’s contributions benefiting the project from day one. This requires active participation by the main contractor throughout the project, involving subcontractors and suppliers in a timely manner, so that their knowledge also contributes value to the project.

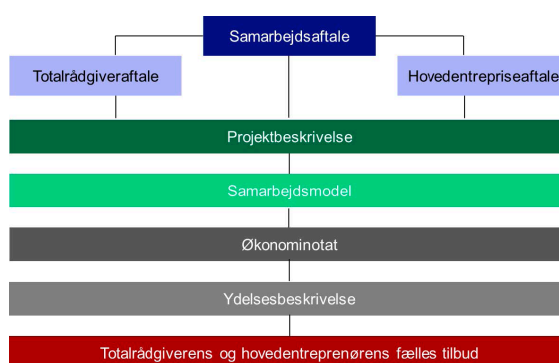
B313 has been tendered according to DTU’s integrated construction model. MT Højgaard has entered as the main contractor, and Artelia (MOE ed.) with CCO Architects as the lead consultant. They have developed the project in close dialogue with DTU. The two bidders have previously collaborated and are behind B310 as well.

architects wanted a frame that was not feasible, and together we decided to use a different model. With the mock-up, we were able to show the client early on how the façade would look and how we would build it.

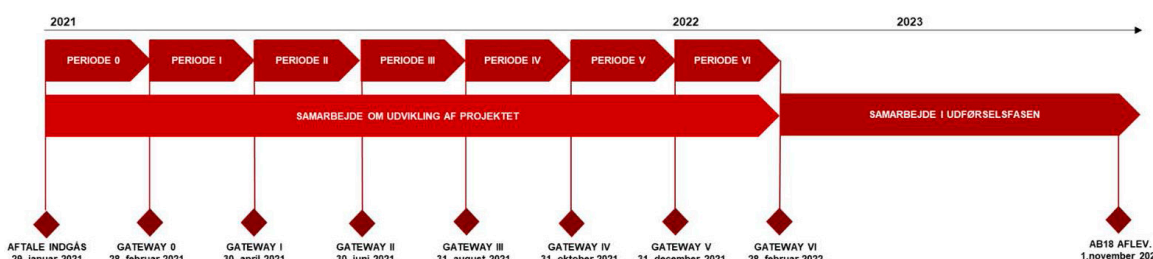
CBL: The advantage of developing together is that our ideas become buildable and easy to assemble. And we reach an agreement with the client early on. It’s been a year since we got the mock-up approved during Gateway 3, when DTU’s architectural council had to approve it. Developing the mock-up together allowed us to optimize the entire façade. For example, the size of the panels affects the surface treatment we can use. The mock-up is not a complete reconstruction of the façade, but it shows profile and panel sizes as well as surfaces, textures, and patterns.

SSL: Yes, in B313, we need to lacquer some of the façade panels. In B310, we anodized the façade elements, but here we are using a different surface treatment due to sustainability, which the client needed to see how it would look. As a supplier, we can also stretch a bit further. The time perspective is not as critical as when we have 3-6 months to deliver. We can also order materials when the price is good.

MV: As a contractor, it’s been fantastic to be able to work on the project for a whole year before. The façade was almost fully designed when we created the mock-up. There are still some minor things we need to solve as we go along while building... for



CONTRACT MODEL FOR INTEGRATED PROJECT DESIGN. A graphical overview of the entire contractual framework.



PHASE MODEL FOR INTEGRATED PROJECT DESIGN. The division of the collaboration phase into periods, separated by gateways with agreed-upon outcomes.

example, a beam at the main entrance that needs to support the façade. Something that must be there, or it wouldn't hold. It's quite common, but there has been very little of it because we were involved so early and designed it together. It's been thoroughly reviewed.

### **Sustainability Requires Innovation**

B313 is being designed and executed by the same team that was behind B310. This time, DTU has placed a greater emphasis on sustainability in all aspects of construction, from material selection and construction systems, transportation, and site setup. Through knowledge sharing and close collaboration, the façade has become simpler in its structure, using fewer materials and being designed for disassembly and reuse.

*Sustainability has been a design driver in the development of B313. Where have you been able to benefit from this collaborative approach?*

MV: We got started early. A whole year before we began work on-site, we were working on the façade design. We had a regular weekly meeting where we discussed various questions, such as how to design the façade and solve various situations. Then

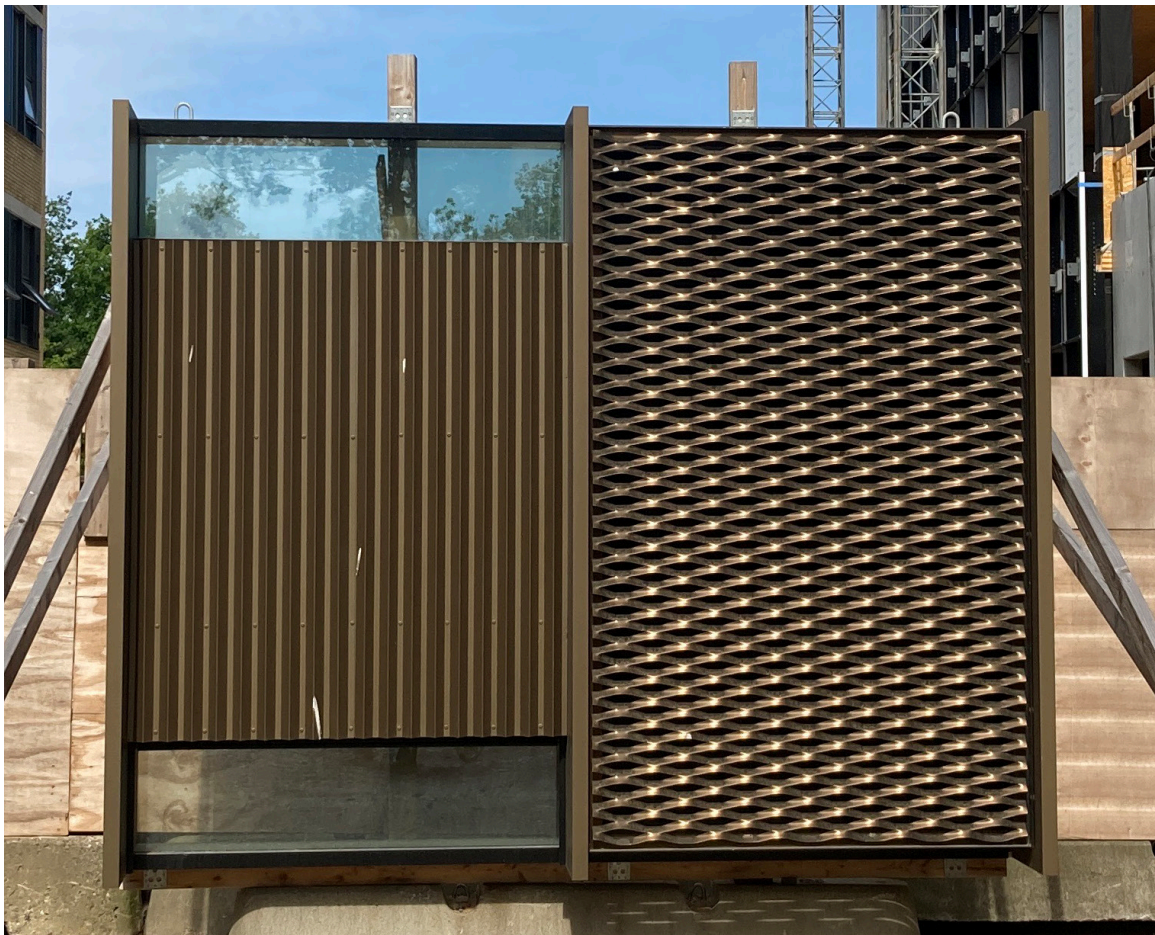
everyone would go back, work on it, and come back the next week. There have been several challenges that we've been able to address because we got started early. For example, the sizes of the profiles, also to keep costs down.

CBL: The façade has become lighter. That's because DTU has requested that the design is driven by sustainability. Even though B313's façade is related to B310's façade, significantly less aluminum has been used.

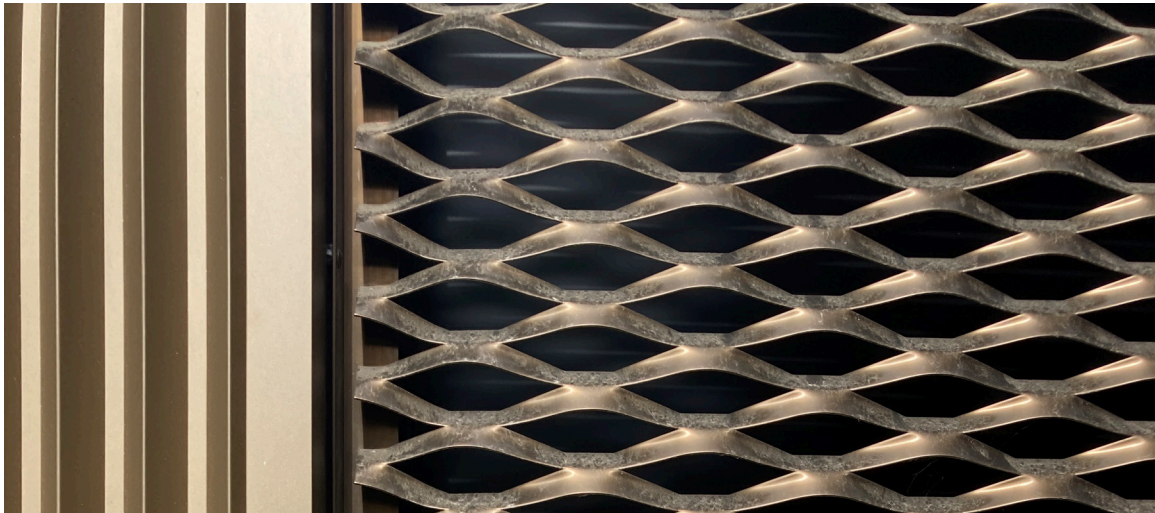
SSL: Our delivery is also simpler. Last time, we delivered a large canopy that consumed a lot of resources. The same applied to the interior paneled ceilings. This time, we can focus on delivering the façade. It's a big plus because we often end up in situations where it becomes challenging to meet the deadline.

*Which solutions is there?*

SSL: As mentioned, we're lacquering the aluminum instead of anodizing it. Anodization requires a significant amount of energy. When anodizing, aluminum is immersed in a bath of chemical liquids, and then an electric current is applied. It's a heavy



**MOCK-UP.** DTU has desired that the façade of B313 resembles the façade of its sister building, B310, to create a unified appearance for the two buildings. In B313, DTU has placed increased emphasis on sustainability. Therefore, architects, suppliers, and contractors have optimized material usage, chosen a different surface treatment, and simplified the construction system. Photo: Seriously Fun



**AN OPTIMIZED FAÇADE.** B313 echoes the gold-en-brown tone of B310 with varying relief and texture. The façade is constructed around a modular structure that mirrors the rhythm of the underlying structures and functions. From a construction standpoint, B313's façade has been optimized. For instance, while B310 has a double façade on 100% of its surface, B313 has only 30%, resulting in significant resource savings.

process and not very sustainable. Lacquering is a significant improvement. We have also chosen a supplier with a high percentage of recycled aluminum.

CBL: As architects, we think a lot about sustainability. Every time we create a detail, we consider sustainability, such as the choice of materials and whether it can be disassembled and reused. The entire façade can be taken apart. There are areas with seals and rubber membranes that we cannot avoid, but otherwise, we have designed and planned with the idea of Design for Disassembly. You can unscrew everything. There may be some scratches, but the elements can be reused.

SSL: Yes, with a simpler structure, it becomes more circular. I have also been able to reduce the thickness of the fittings by four millimeters because I could work with a construction model early on. That's a third of the material I've been able to eliminate. It also means something. I have over five hundred fittings.

### Optimization

Early involvement also means that the contractor and supplier can contribute with solutions that make on-site execution easier. Eiler Thomsen and CCO Architects have also found optimal solutions, both in terms of time and the workers' working conditions.

#### *How have you organized the execution?*

SSL: We manufacture complete elements for the concrete house at our factory for the Climate Challenge Laboratory. Here, we put in a batch with a welded aluminum box around it. Nothing is glued together. We weld them for the sake of sealing and simplicity. We can close the entire concrete structure in a very short time.

CBL: It also makes sense to be able to work indoors at the factory in Holstebro and build the elements. If you must do it manually on-site, it requires more time at the site, and there is an increased risk of weather-related and water damage. When the façade elements come here, they are hung up in large sections, and it goes much, much faster. It's definitely an advantage.

SSL: On B310, we set up the structures to blow in insulation. There was a bit of hesitation due to concerns about whether the insulation would compress and settle. It's been considered in the design from the beginning.

CBL: Another aspect is buildability, that it's easy to assemble. It doesn't have to be rocket science. The easier it is for the workers to build, the faster it goes. We use fewer resources, make fewer mistakes, have happier people, and we use less time and energy. So, there's also a sustainability aspect in that.

MV: The collaborative approach allows us to ensure it goes smoothly all the way around. It's been a great collaboration.

*It also means that you have to be part of finding the solutions yourselves, when you run into a problem?*

MV: In those situations, it was easy to find solutions because we have Eiler Thomsen (Alufacader A/S) with us. They knew how the façade should look and suggested solutions in various situations. If it had been a different supplier, we would have had to start from scratch. It would have been a much bigger job. So, it's been very beneficial that it's the same people who are involved now as we develop new solutions.

