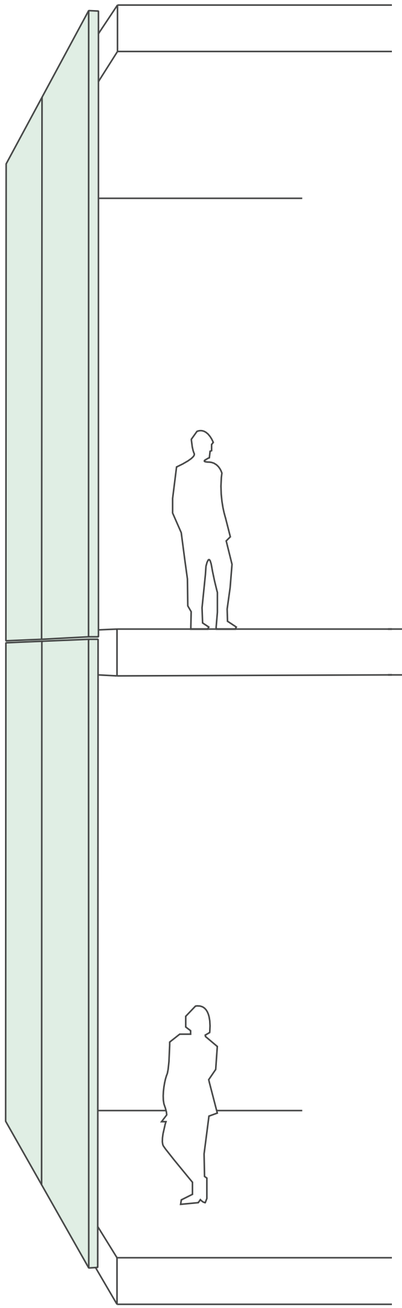

SLIMKINS

"Building a new glazed facade system"

Barbara Foolen de Oliveira
14-01-2022

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→ **EVALUATE**
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→ **CONCLUDE**
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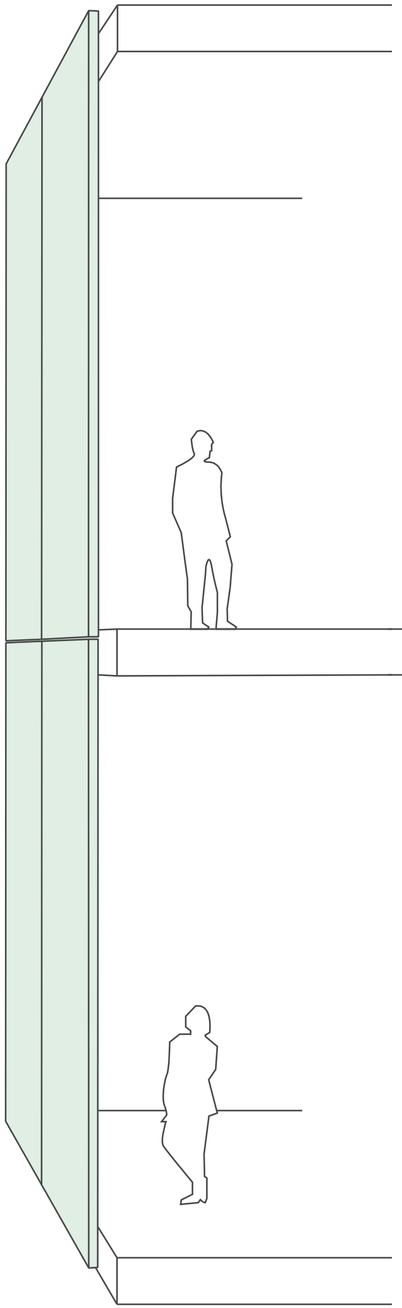
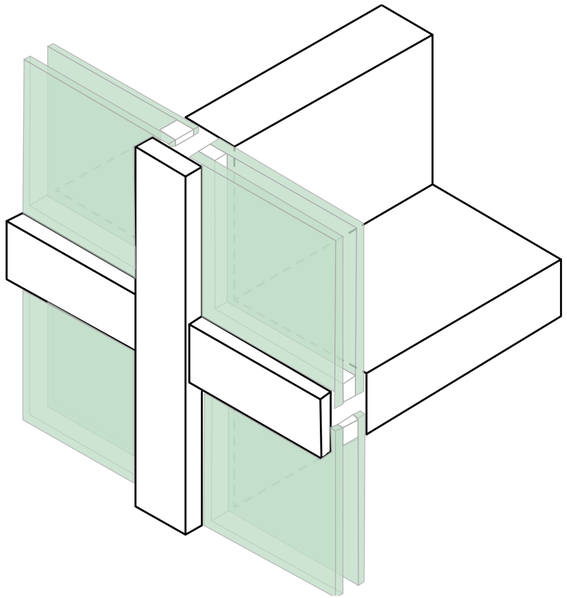


RESEARCH DEFENITION

> Rise in demand for glass facade systems

STATE OF THE ART

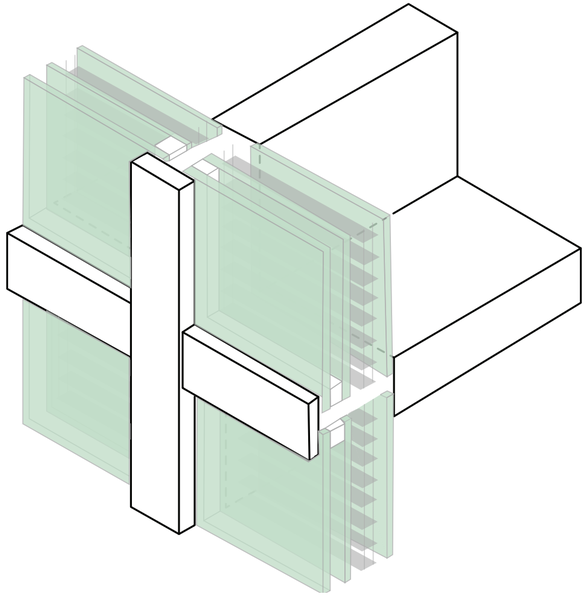
Curtain Wall



100 Eleventh Avenue

Aesthetics: **+/-**
Building sequence: **+**
Sustainability: **-**

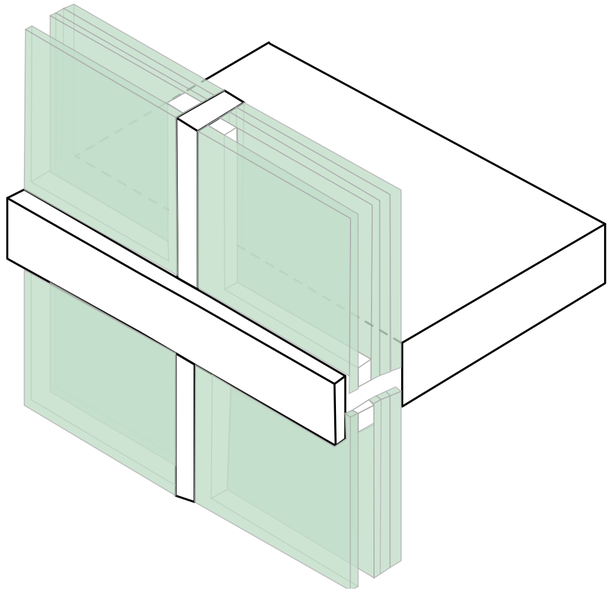
Closed Cavity



EY

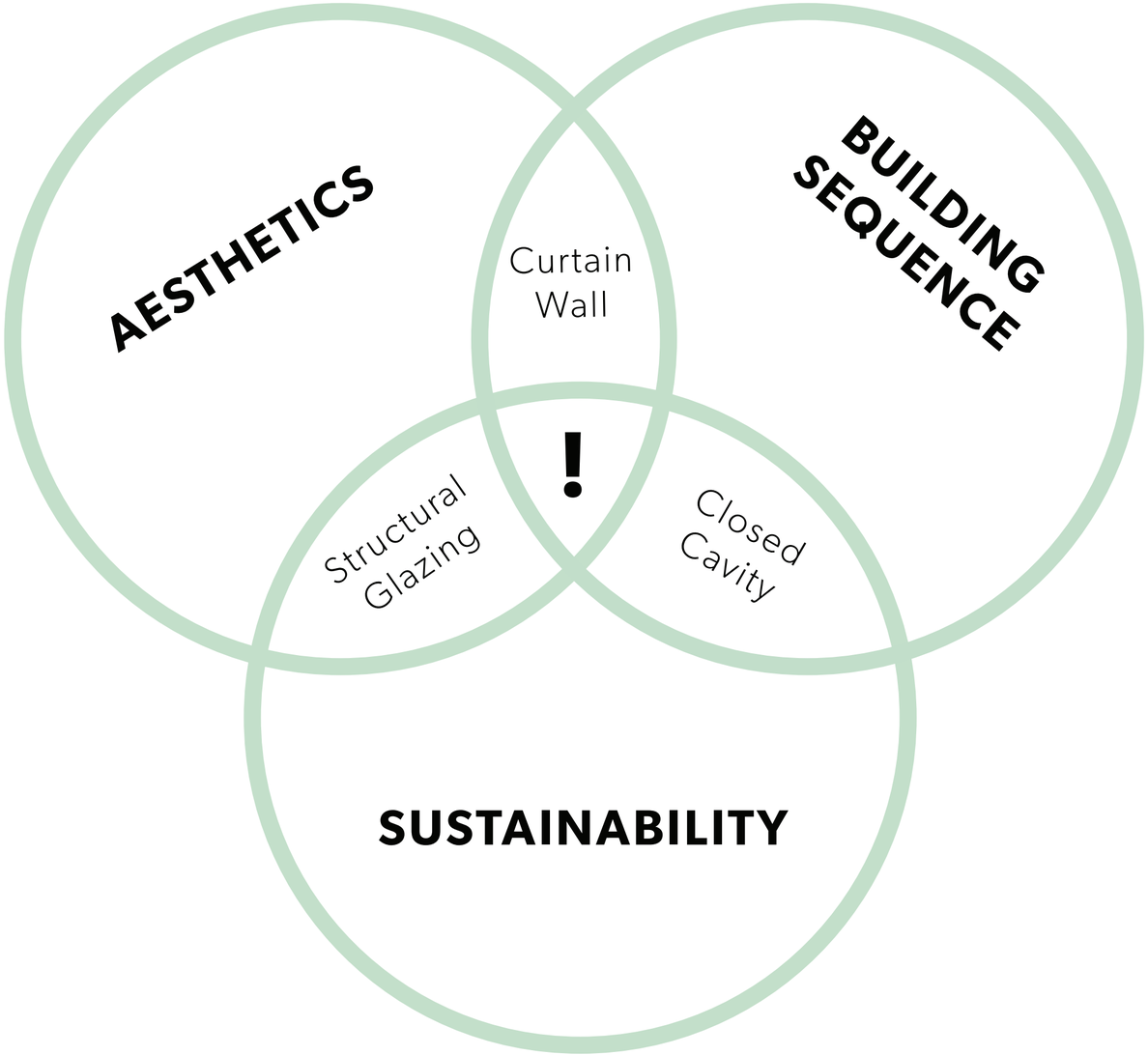
Aesthetics: **-**
Building sequence: **+/-**
Sustainability: **+**

Structural Glazing



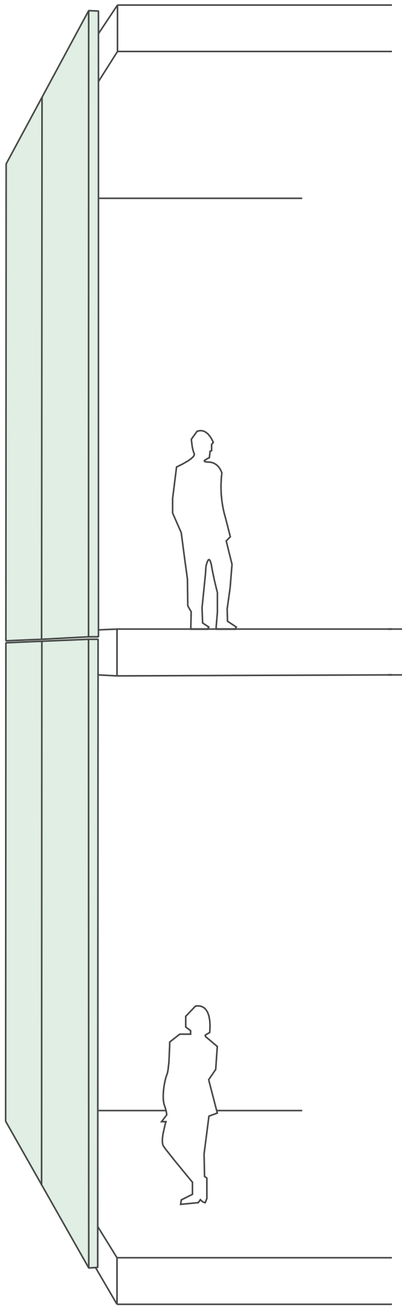
Triodos Bank

Aesthetics: **+**
Building sequence: **-**
Sustainability: **+/-**



RESEARCH QUESTION

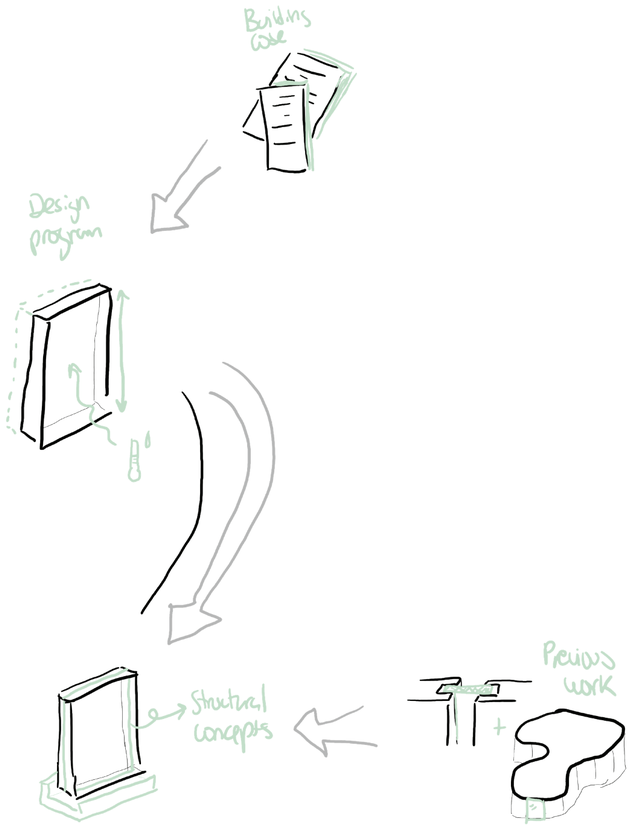
"How can a unitized facade system achieve a higher transparency?"



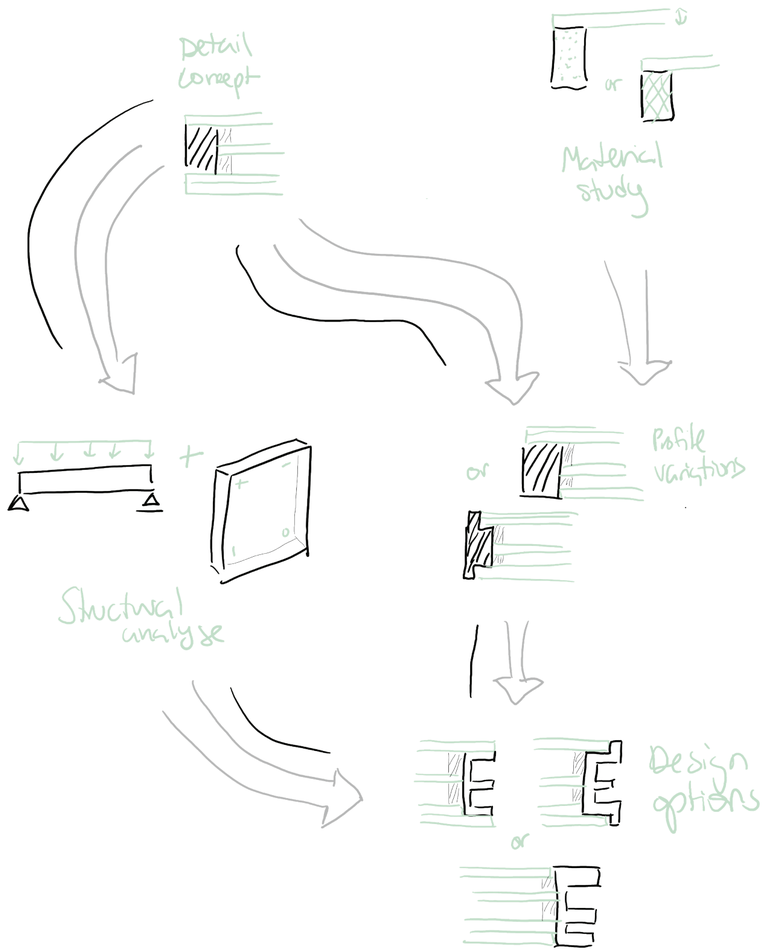
METHOD & SCOPE

METHOD

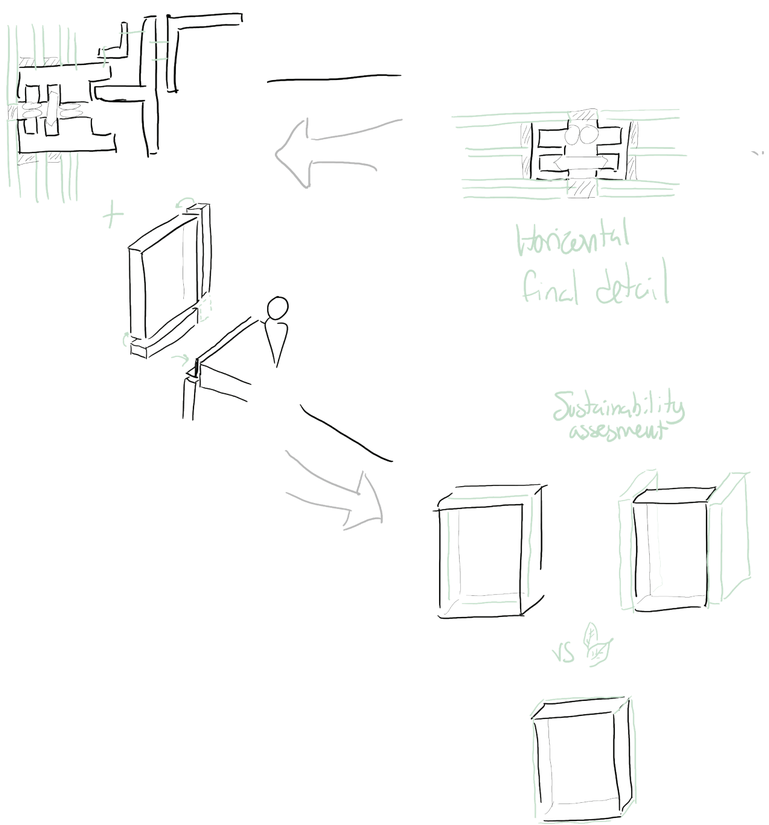
Gather data and define objectives



Analyse and develop the design

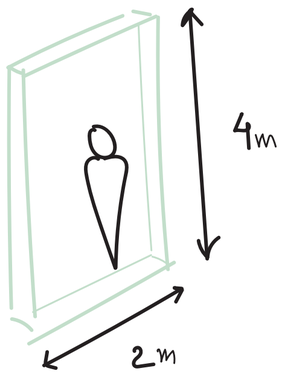


Evaluate the design



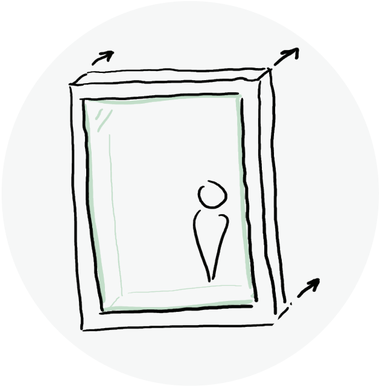
SCOPE & OBJECTIVES

Panel

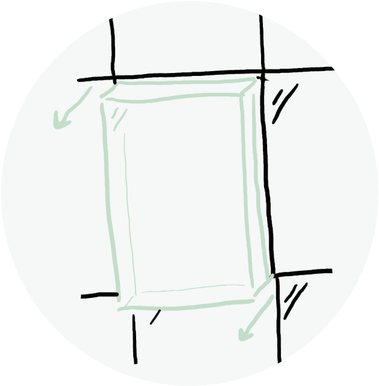


Transparency

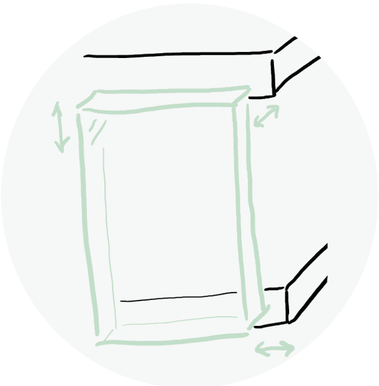
Unitized system



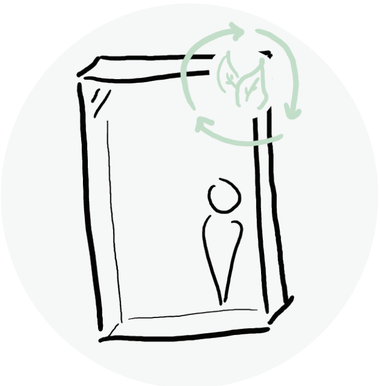
Maintenance

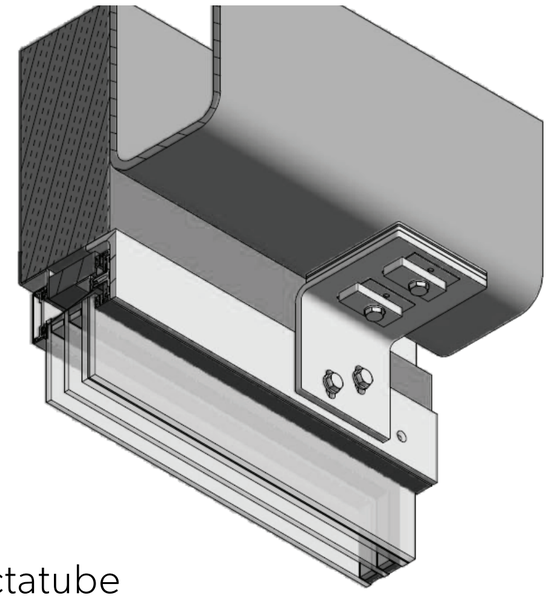


Design for practice

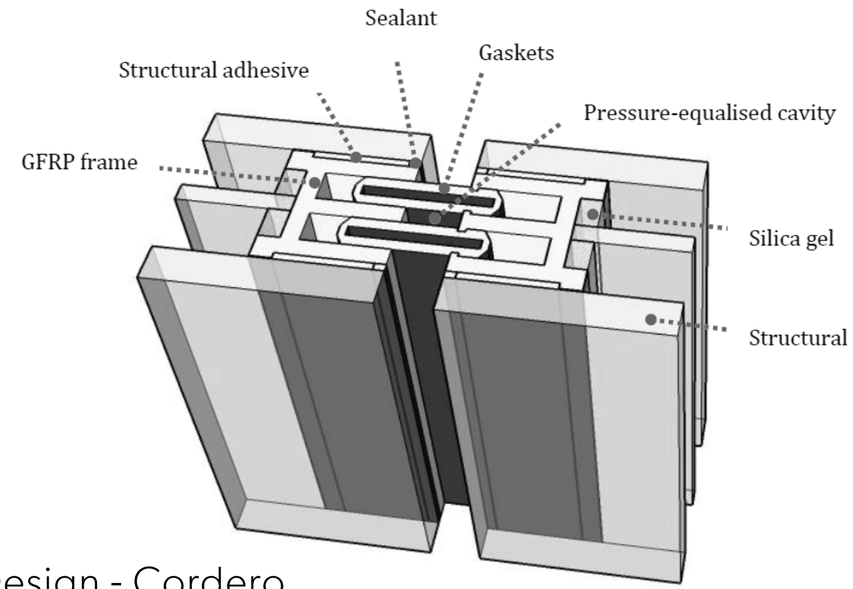


Sustainability





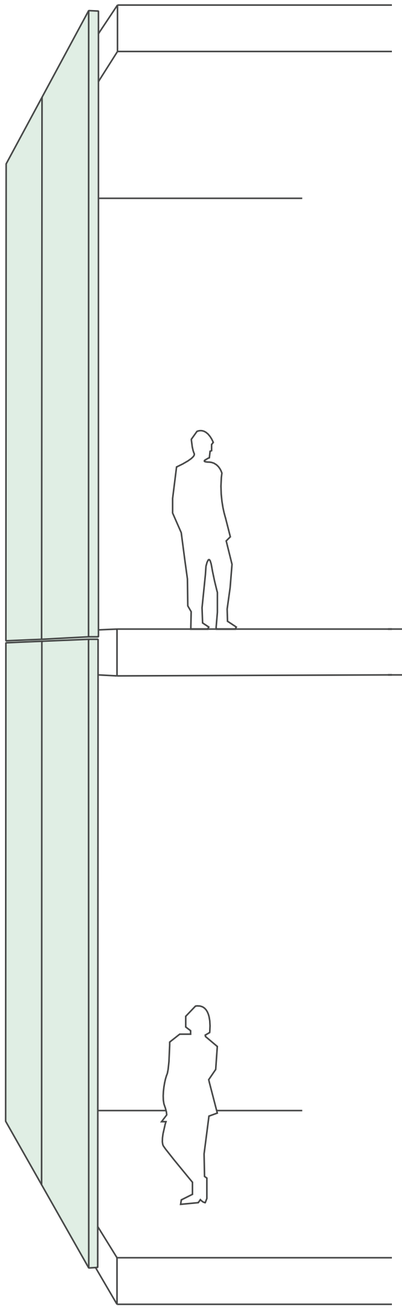
Triodos Bank - Octatube



Profile Design - Cordero

"2 sided hanging system (top and bottom)"

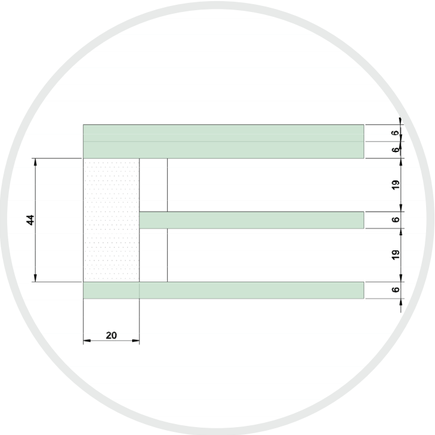
"composite action"



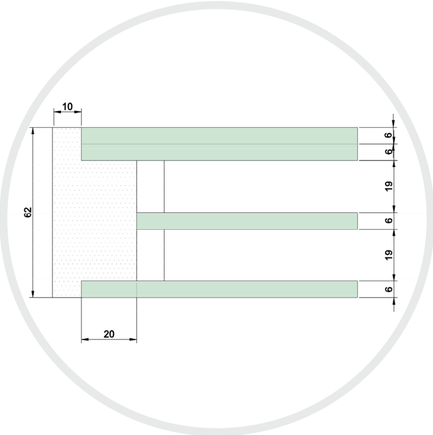
DESIGN RESEARCH

PROFILE VARIATIONS

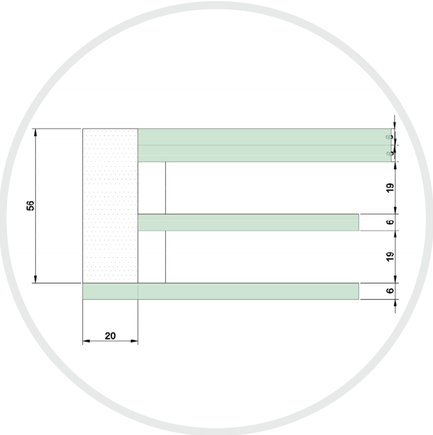
Profile 1



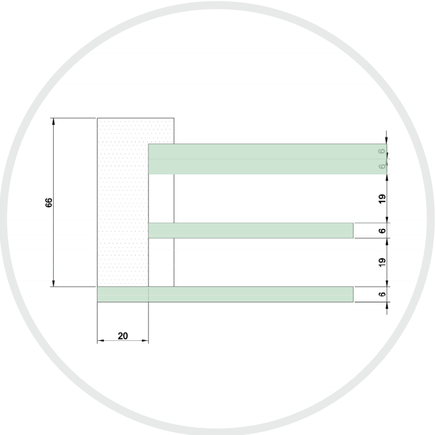
Profile 2



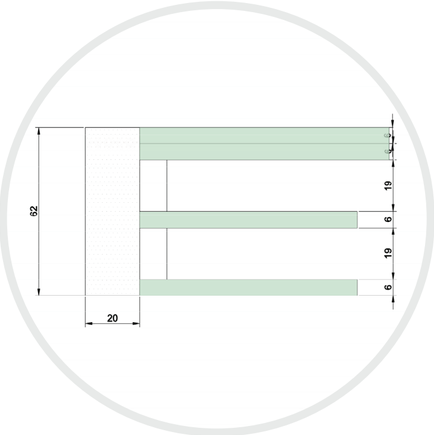
Profile 3



Profile 4

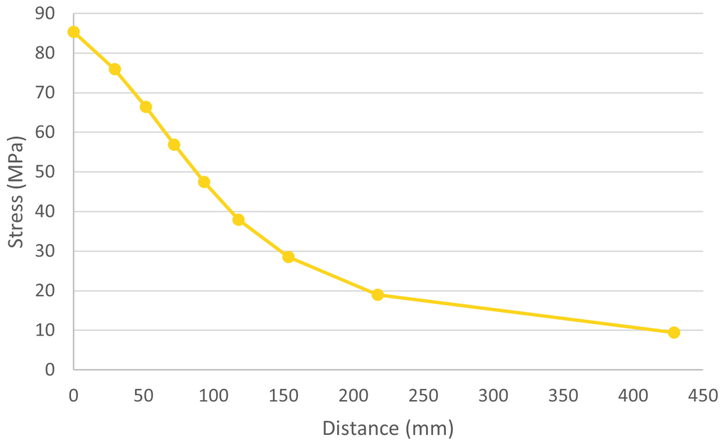


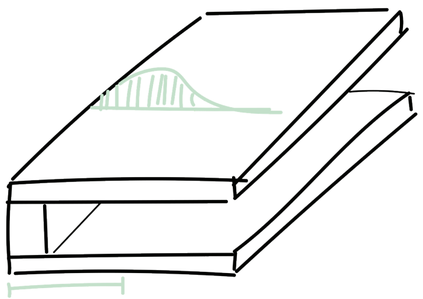
Profile 5



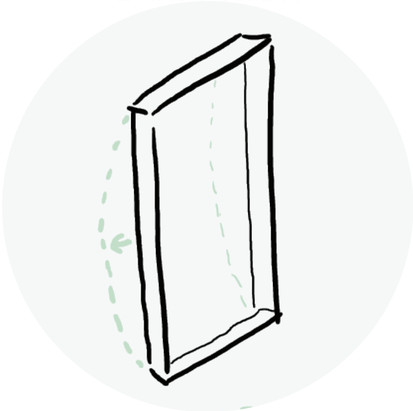
STRUCTURAL ANALYSIS

Minimum required structural values per profile

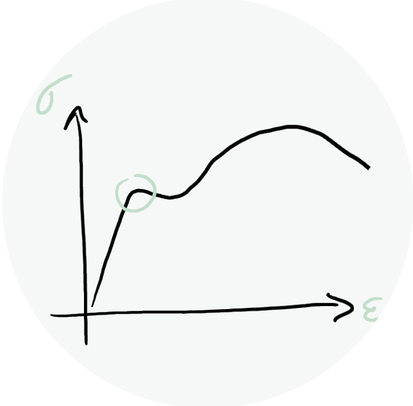




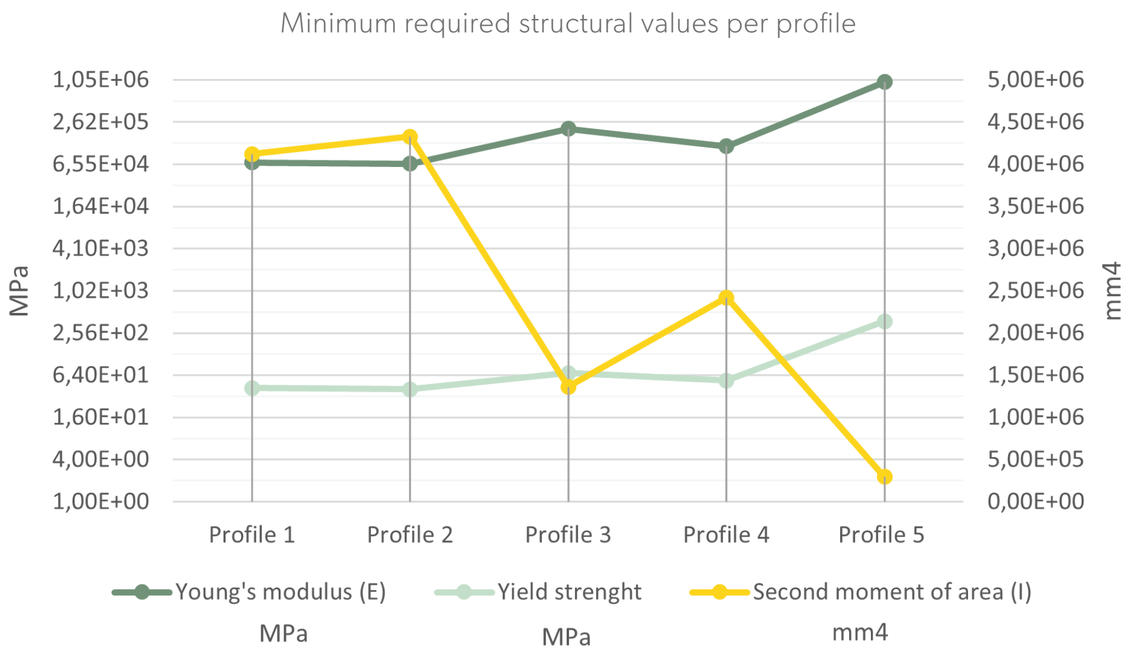
Deflection



Stress



STRUCTURAL ANALYSIS



RESULTS COMPOSITE ACTION

- More contact between glass and mullion = more composite action

- More composite action = lesser required of the mullion in terms of structure

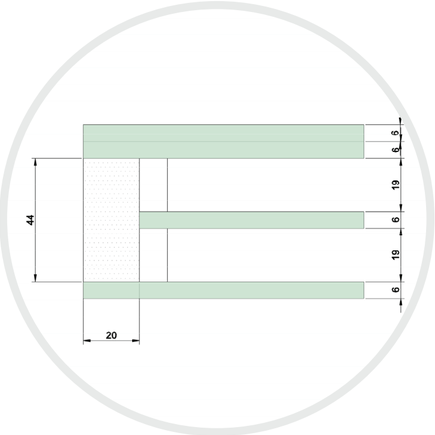
RESULTS STRUCTURAL REQUIREMENTS

- Young's modulus profiles 1 to 4 higher than of glass

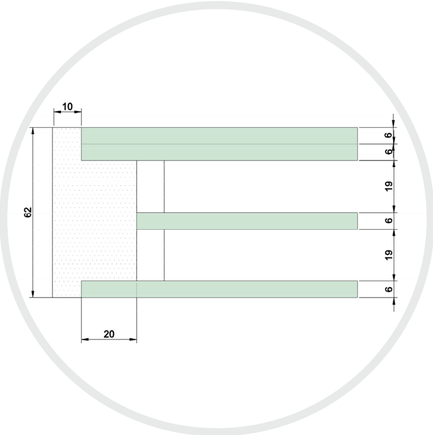
- Young's modulus profiles 5 higher than allowable materials

PROFILE VARIATIONS

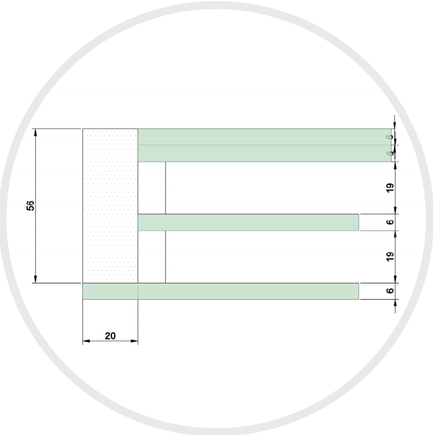
Profile 1



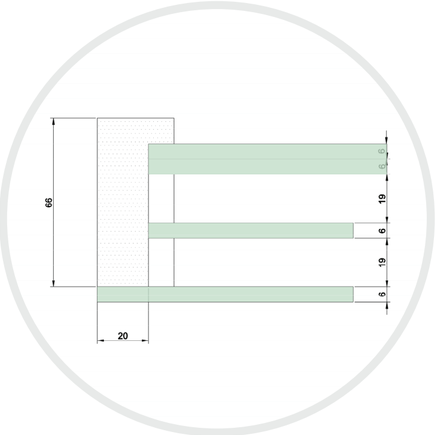
Profile 2



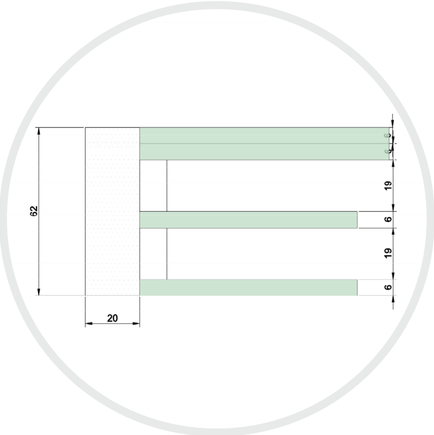
Profile 3



Profile 4

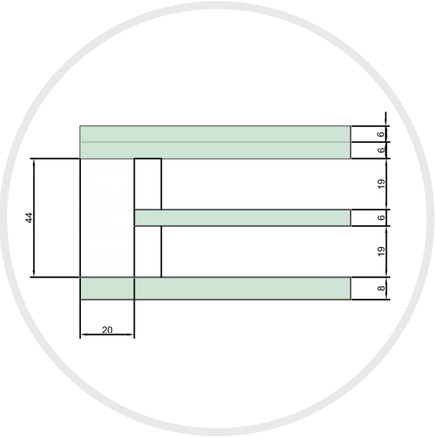


Profile 5

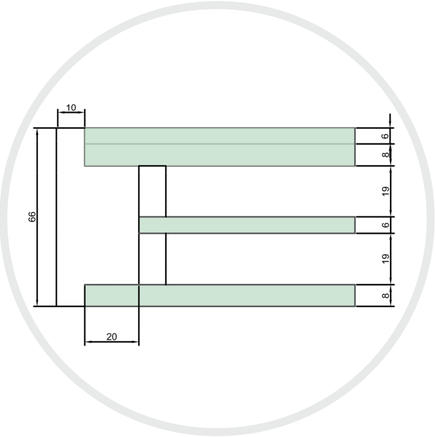


PROFILE IMPROVEMENTS

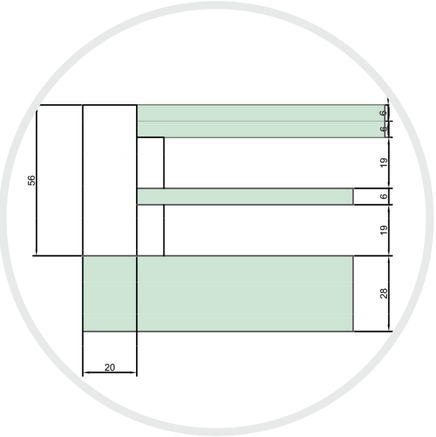
Profile 1



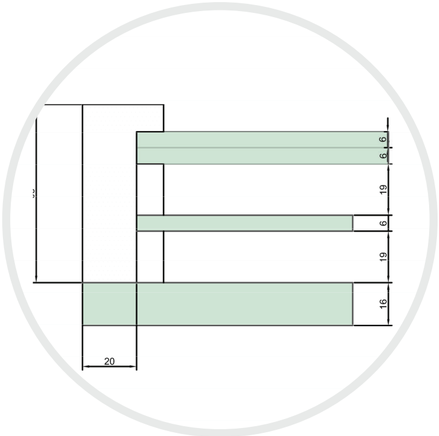
Profile 2



Profile 3



Profile 4



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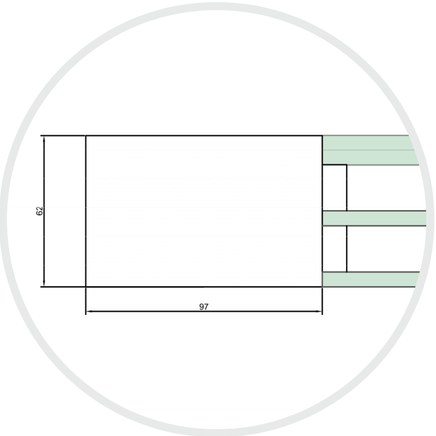
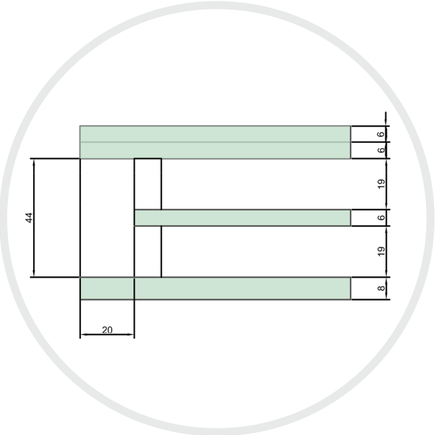
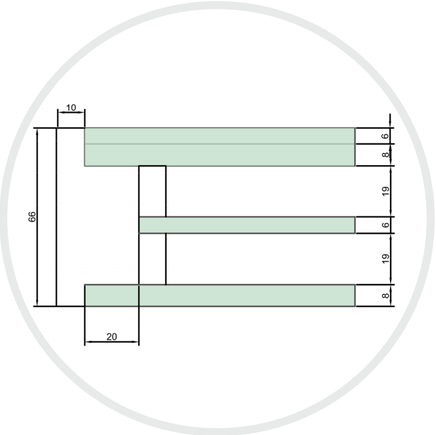


PROFILE IMPROVEMENTS

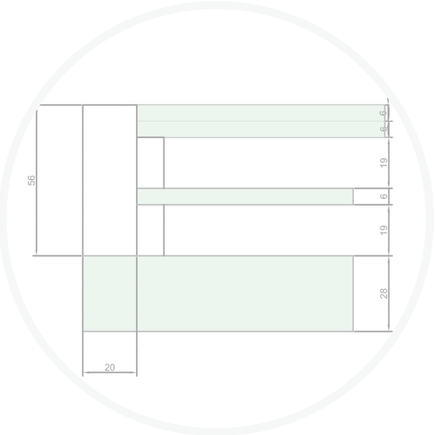
Profile 1



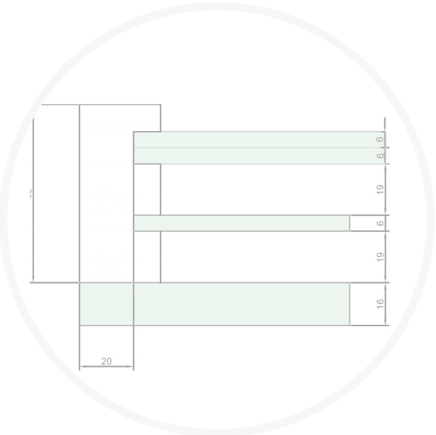
Profile 2



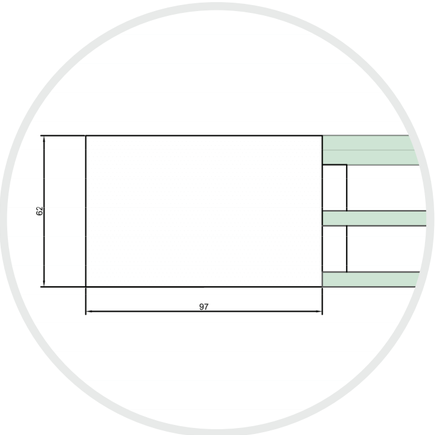
Profile 3



Profile 4

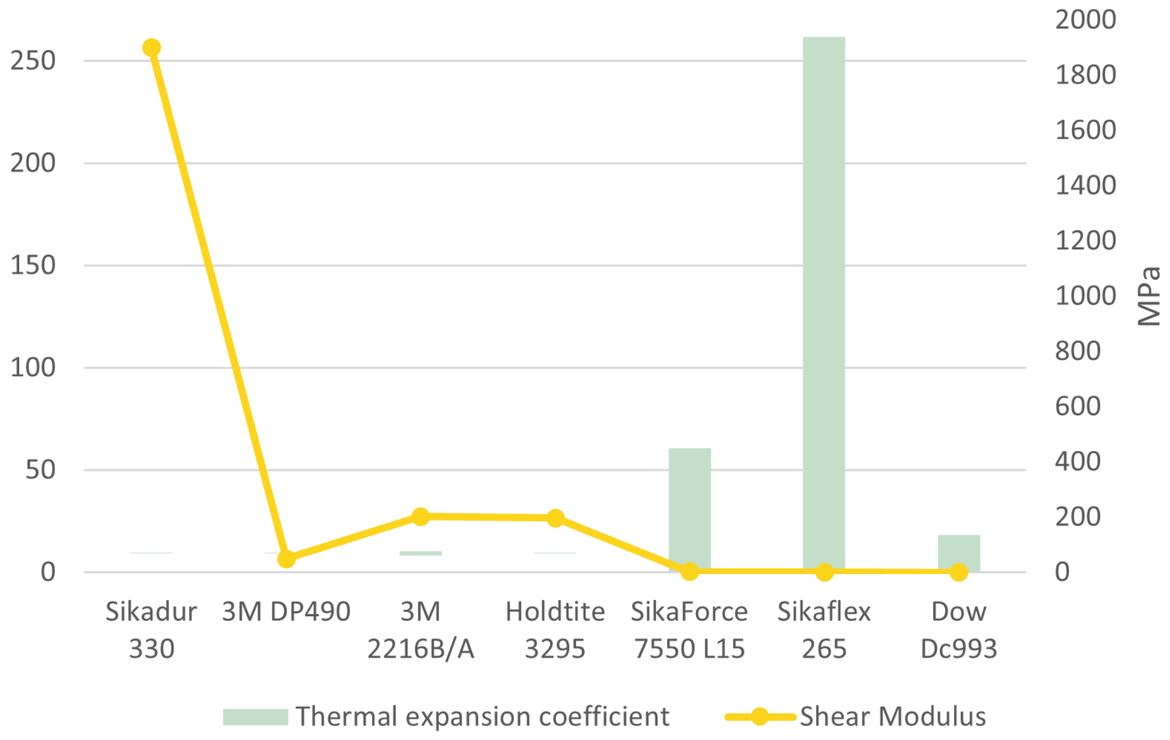


Profile 5



MATERIAL CHOICE MULLION

Adhesive properties and allowable thermal expansion coefficient for the mullion



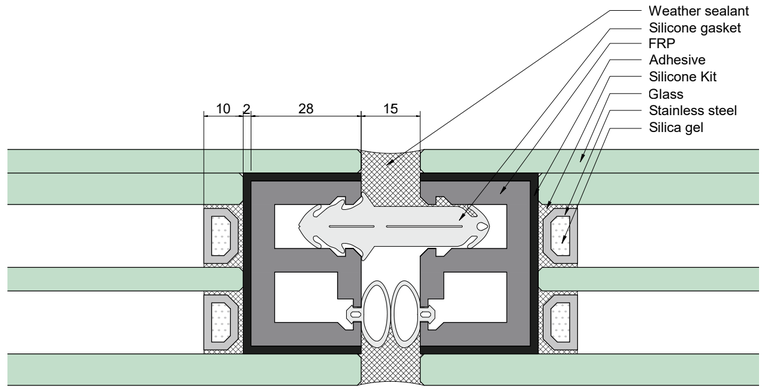
RESULTS

- Flexible adhesives = higher range of allowable thermal expansion for the mullion material

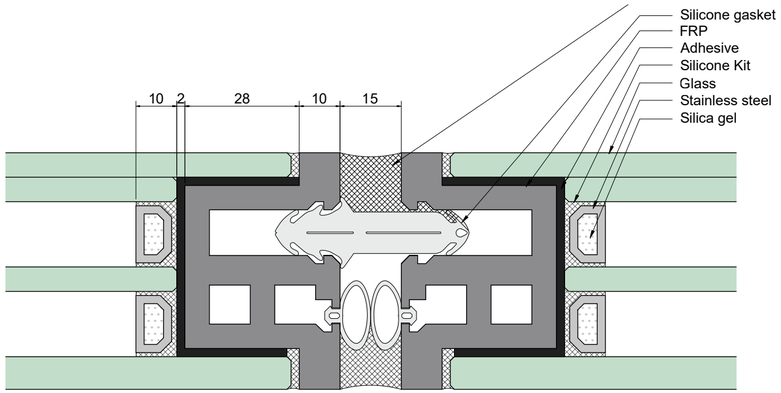
- Flexible adhesive = low stiffness

- Maximum shear stress > flexible adhesives shear strength

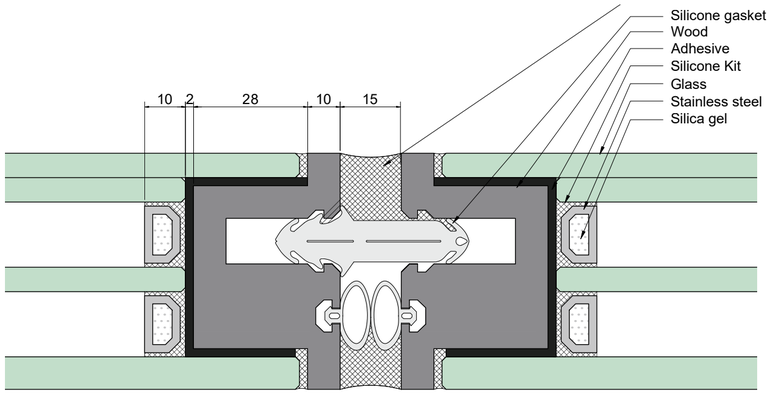
MATERIAL CHOICE MULLION



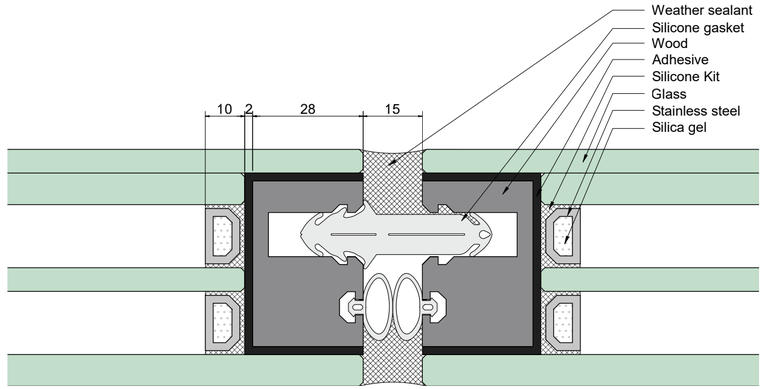
Design A - FRP



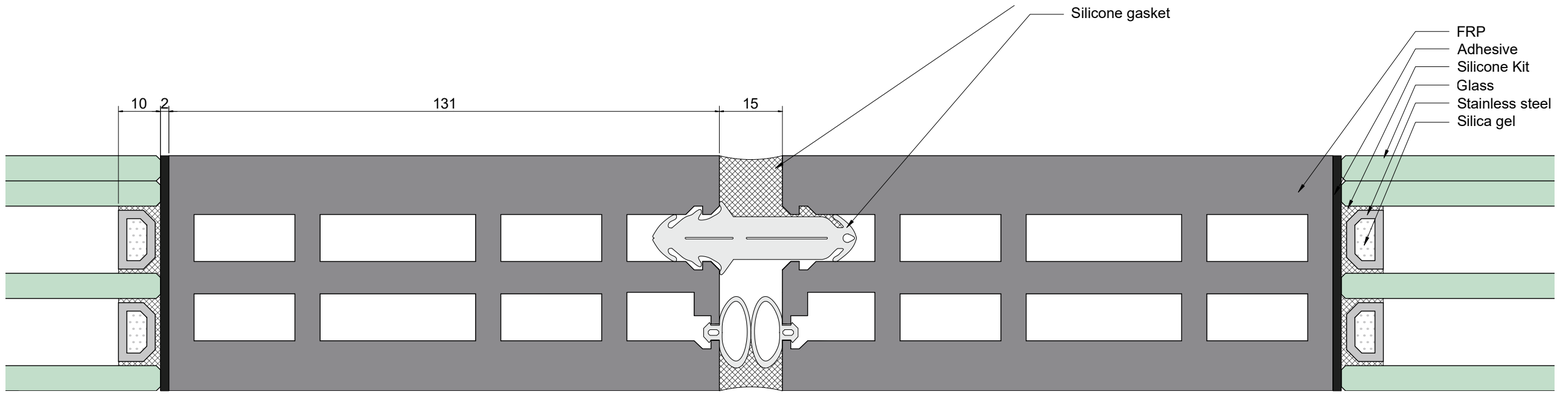
Design B - FRP



Design B - WOOD



Design A - WOOD

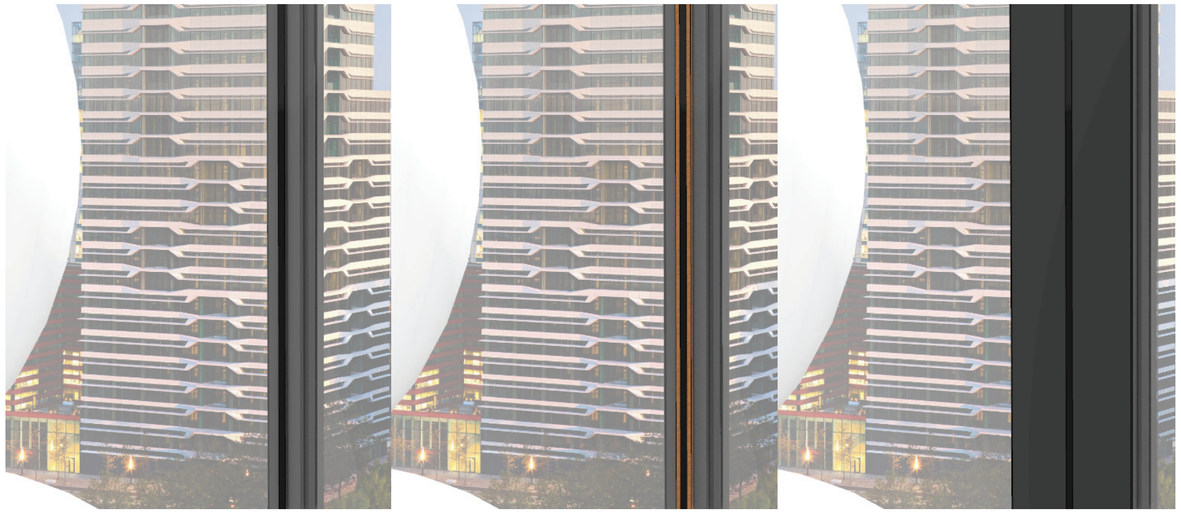


Design C - FRP

Width profile visual

Design A | Design B | Design C

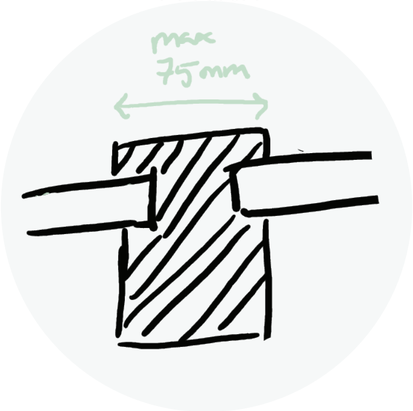
Material profile visual



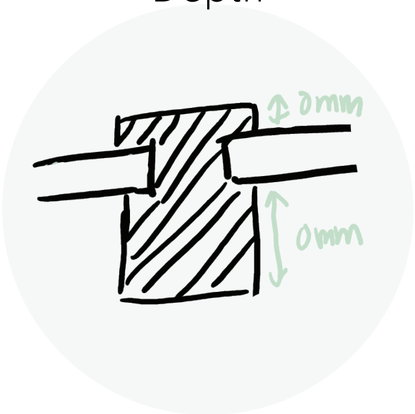
Design A - Wood | Design B - Wood | Design C - FRP

VISUAL COMPARISON

Width

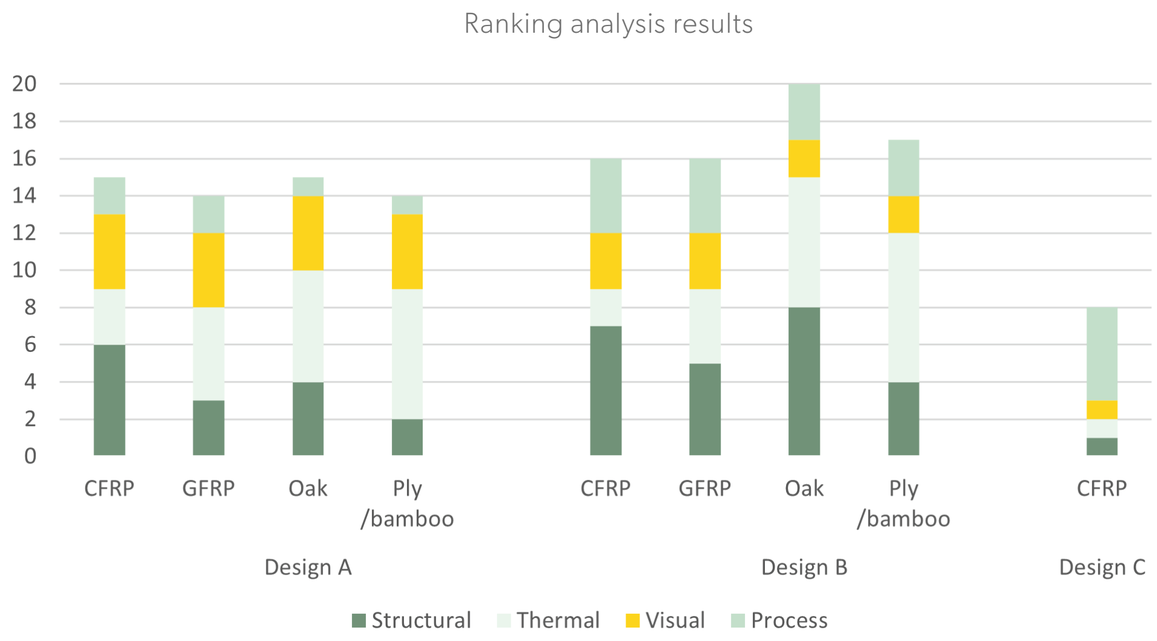


Depth



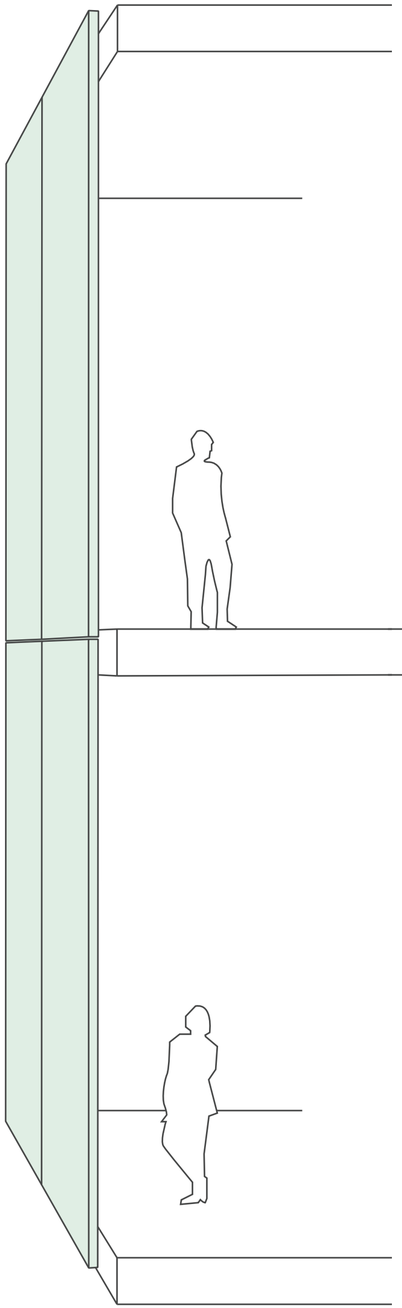
Materialization

TOTAL COMPARISON



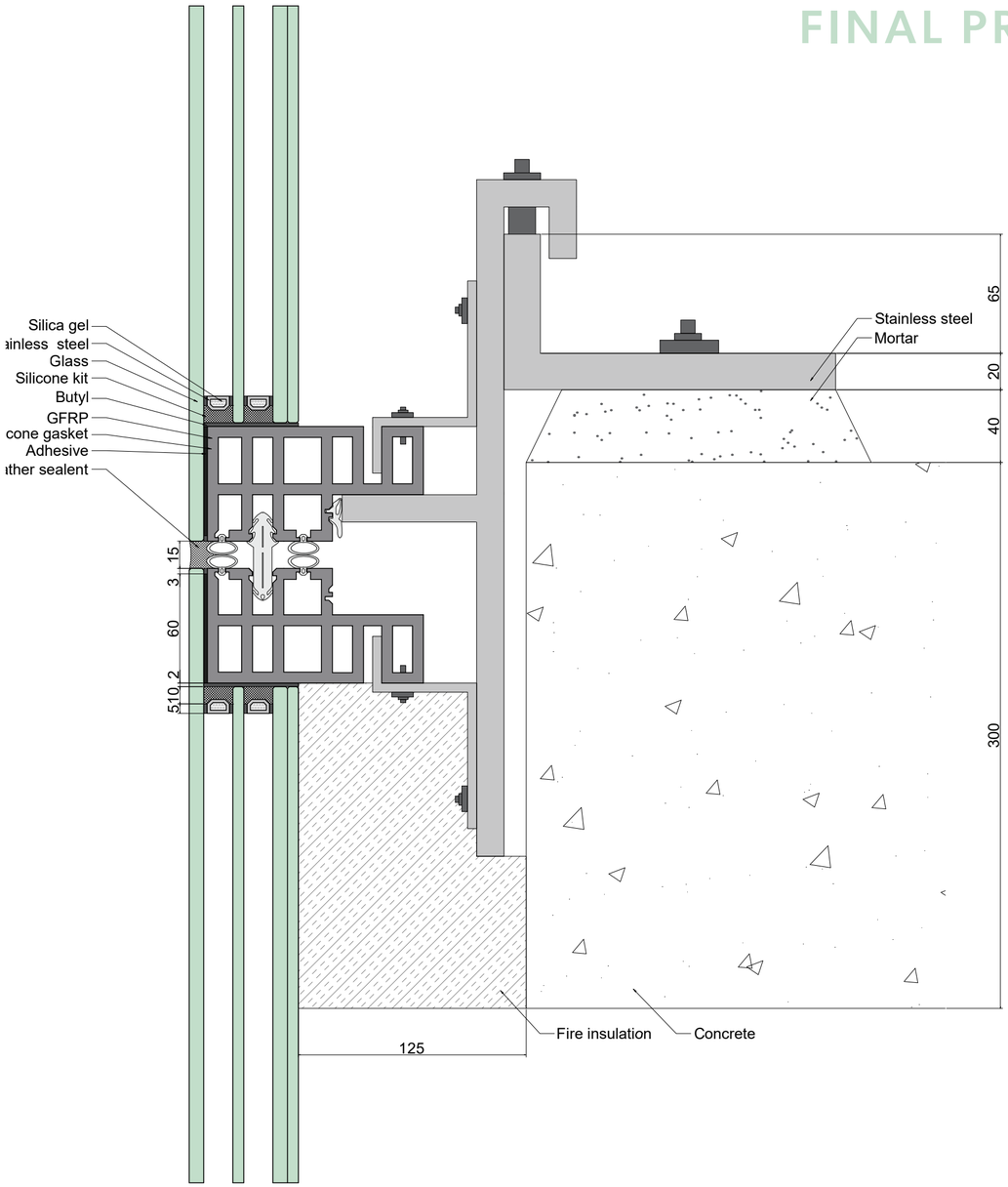
RESULTS
- Design B - Wood has the best overall ranking

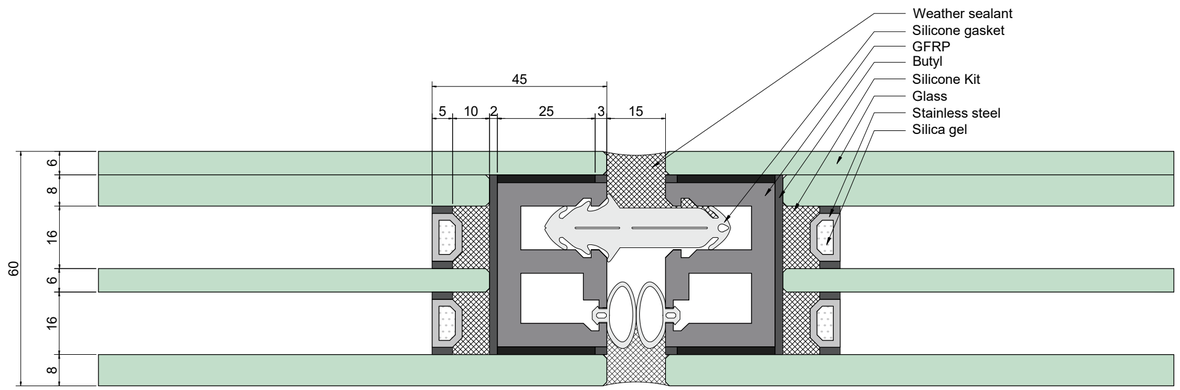
- Design C - CFRP has the worst ranking



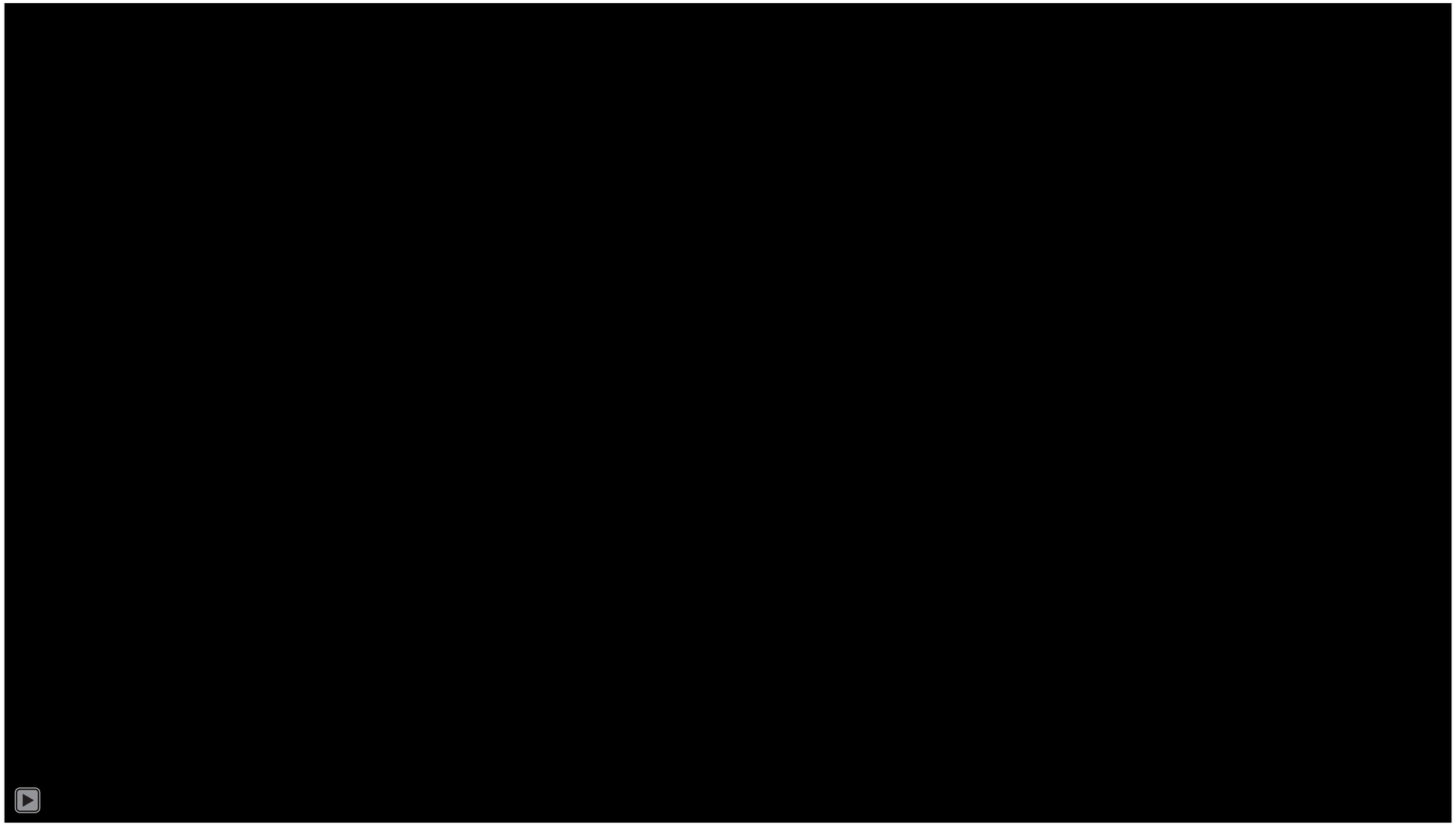
FINAL DESIGN

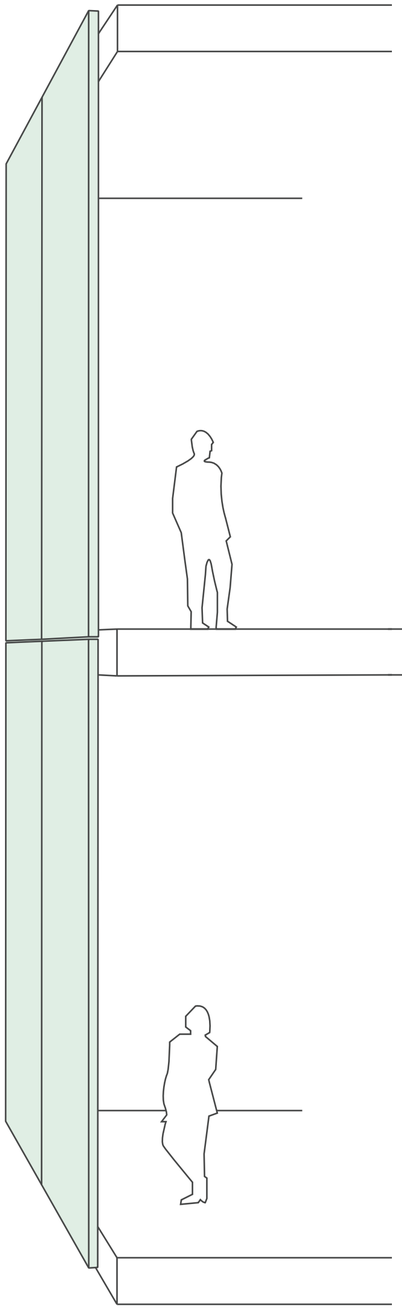
FINAL PROFILE DESIGN





ASSEMBLY ORDER



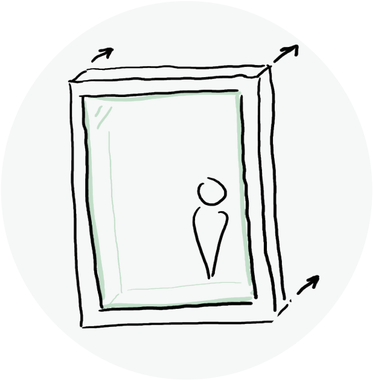


EVALUATION

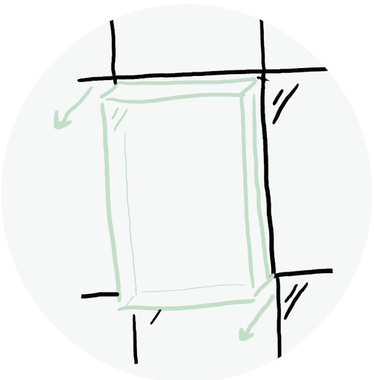
GENERAL EVALUATION

Transparency

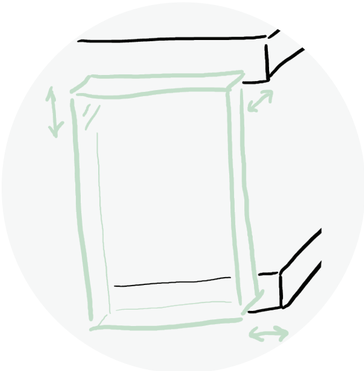
Unitized system



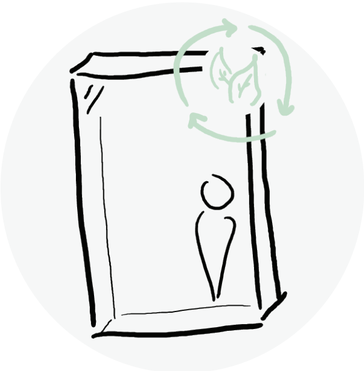
Maintenance

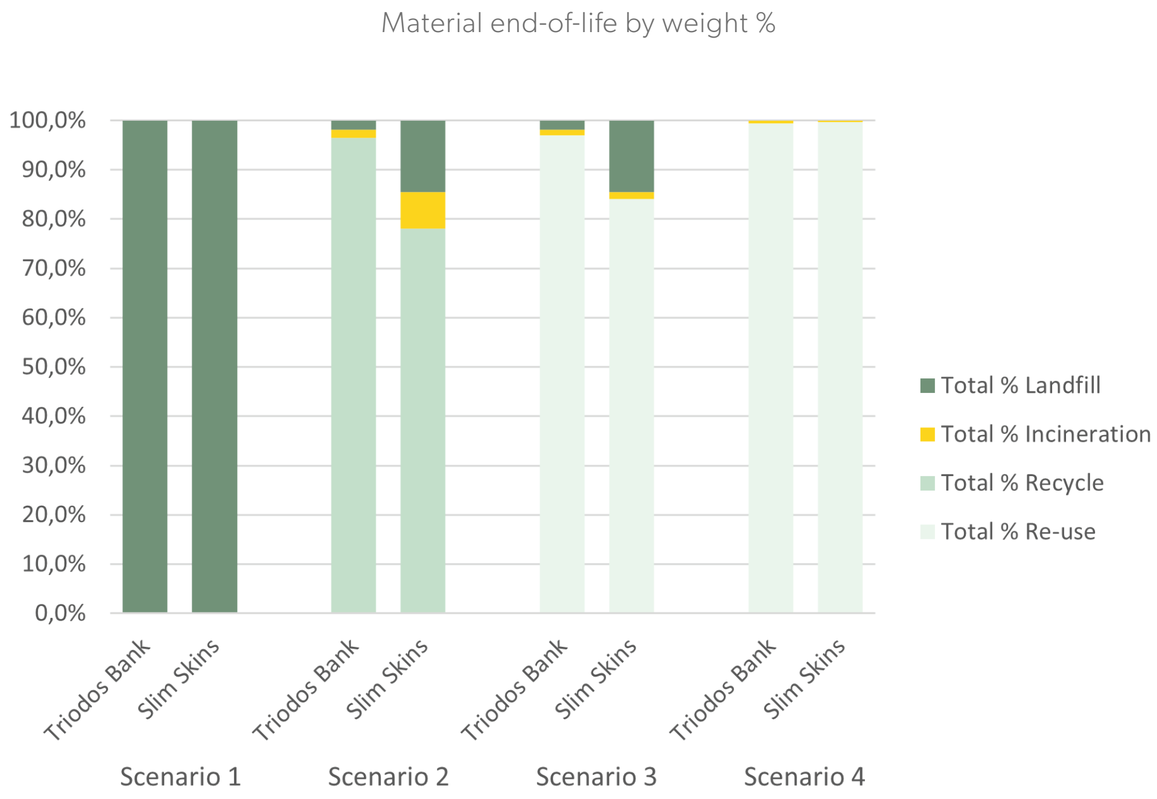


Design for practice

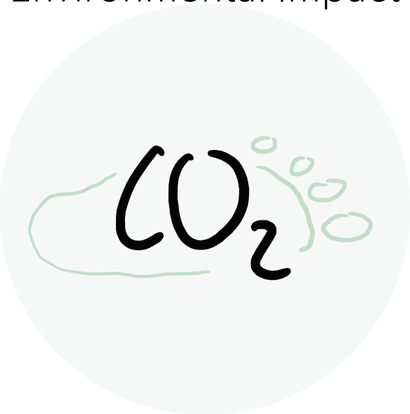


Sustainability

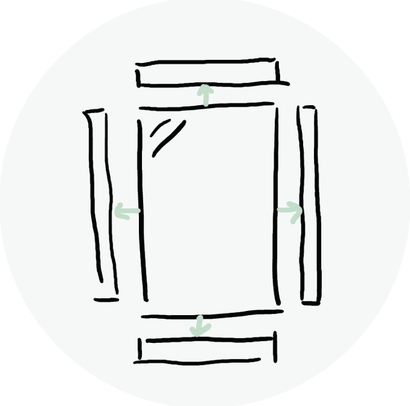




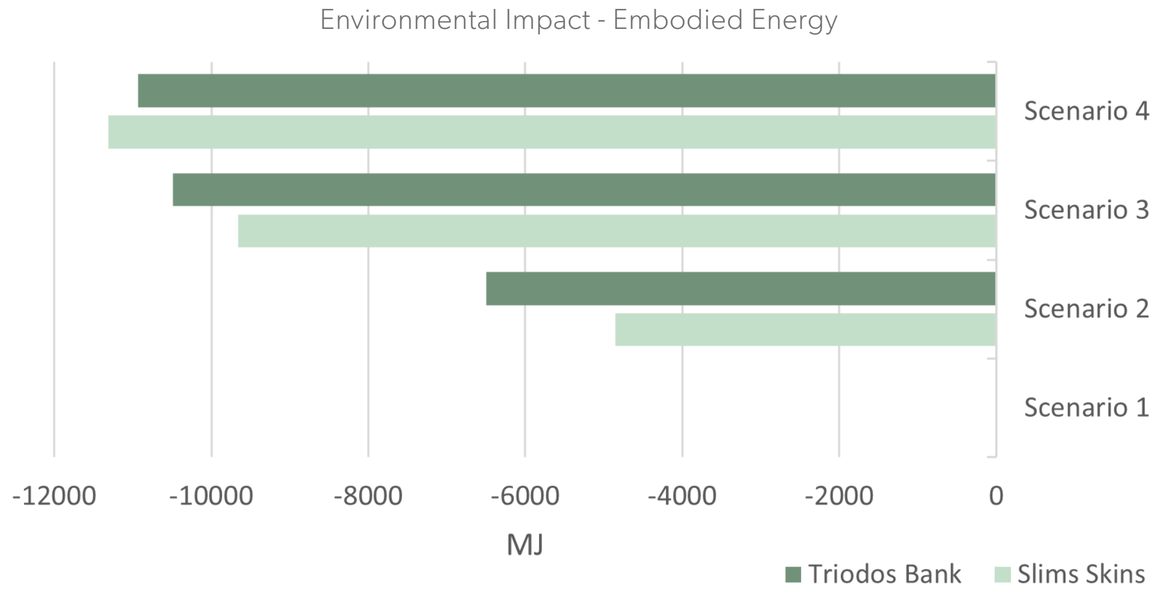
Environmental Impact

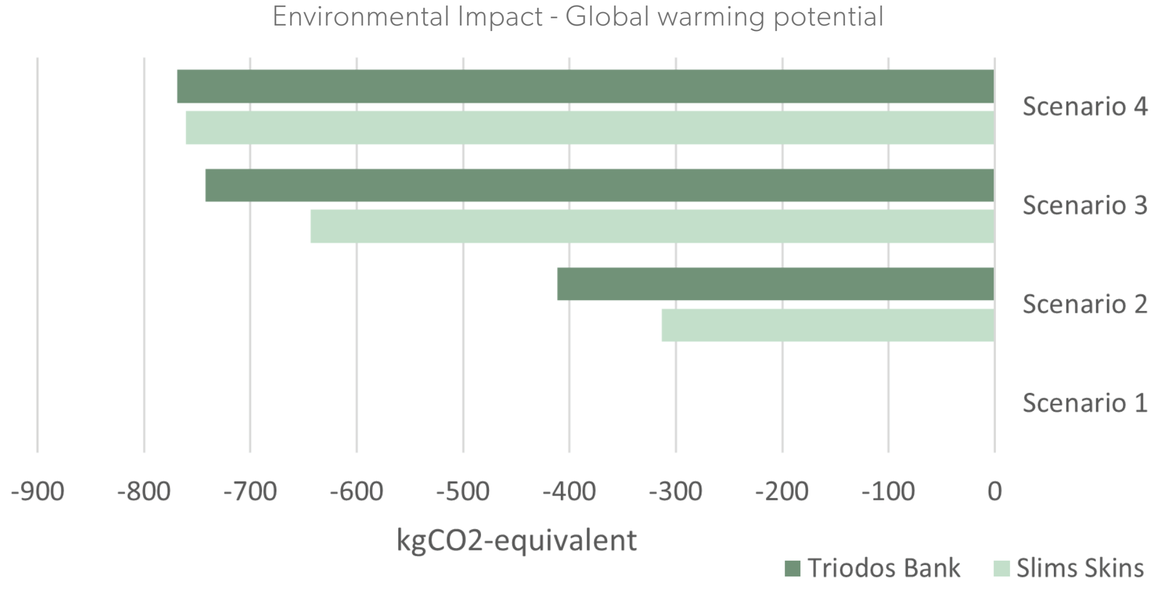


End-of-life



SUSTAINABILITY ASSESSMENT

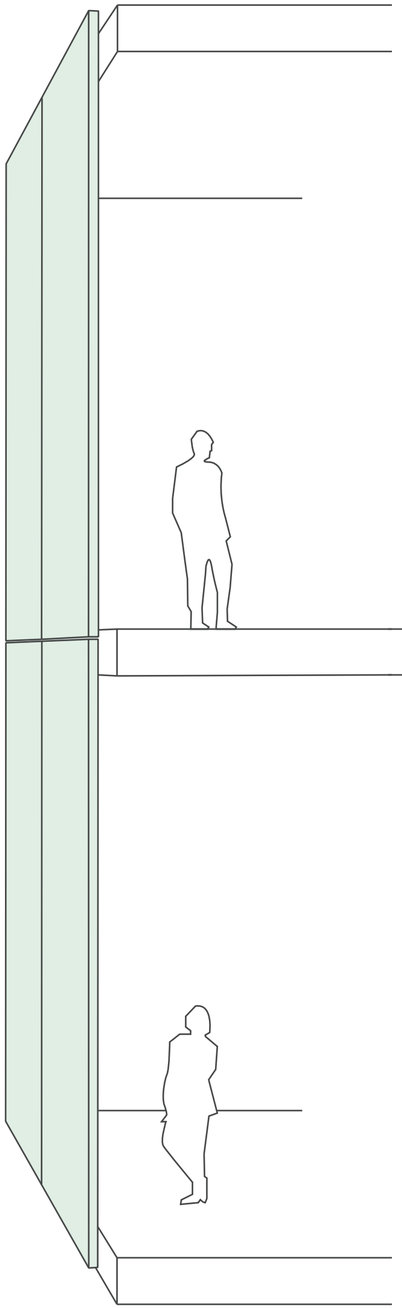




RESULTS

- Scenario 4 (Reuse system) is overall the best option
- Scenario 2 (Recycling) used most nowadays, not a great option compared to 3 and 4

- Triodos Bank and Slim Skins perform similarly
- Slim Skins slightly better in scenario 4
- Triodos Bank slightly better in scenario 3



CONCLUSION & FUTURE WORK

> How can a unitized facade system achieve a higher transparency?

CONCLUSION

- Composite action
- Frame integrated system

CHALLENGES

- Intricate detail needs high precision while building
- High amount of adhesive used

FUTURE WORK

- Elaborate on the adhesive study
- Study the composite action between wood and glass
- Explore new methods to break a adhesive bond
- Explore other designs which use an interlocking system


SLIM
KINS
THANK YOU
QUESTIONS?

Connection Diagram Slim Skins