

# WINCH

Transformable unitised  
facade system

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4<sup>th</sup> November 2019



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3. Research question
4. Design concept
5. Construction design
6. Final design
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# 1. MOTIVATION

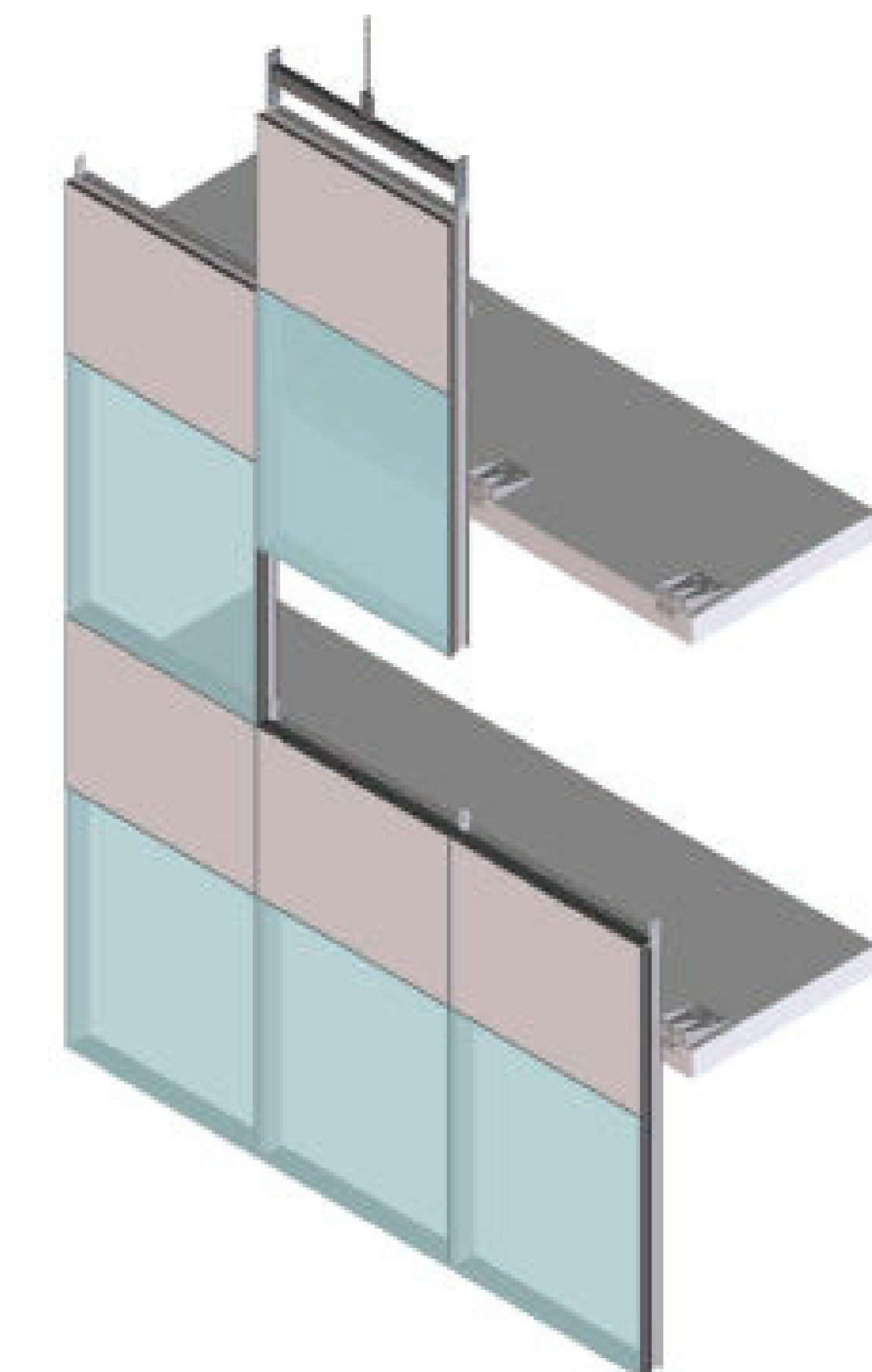
- Residential market exploded
- Outdoor space
- Enhances the unitized facade system
- m<sup>2</sup> floor space
- Dynamic facade
- Facade adapts to weather



(Source: Markt delft)



(Source: Leiden Delft)



(Source: Aucklanddesignmanual)







## **2. BACKGROUND**

### **UNITIZED FACADE SYSTEM**

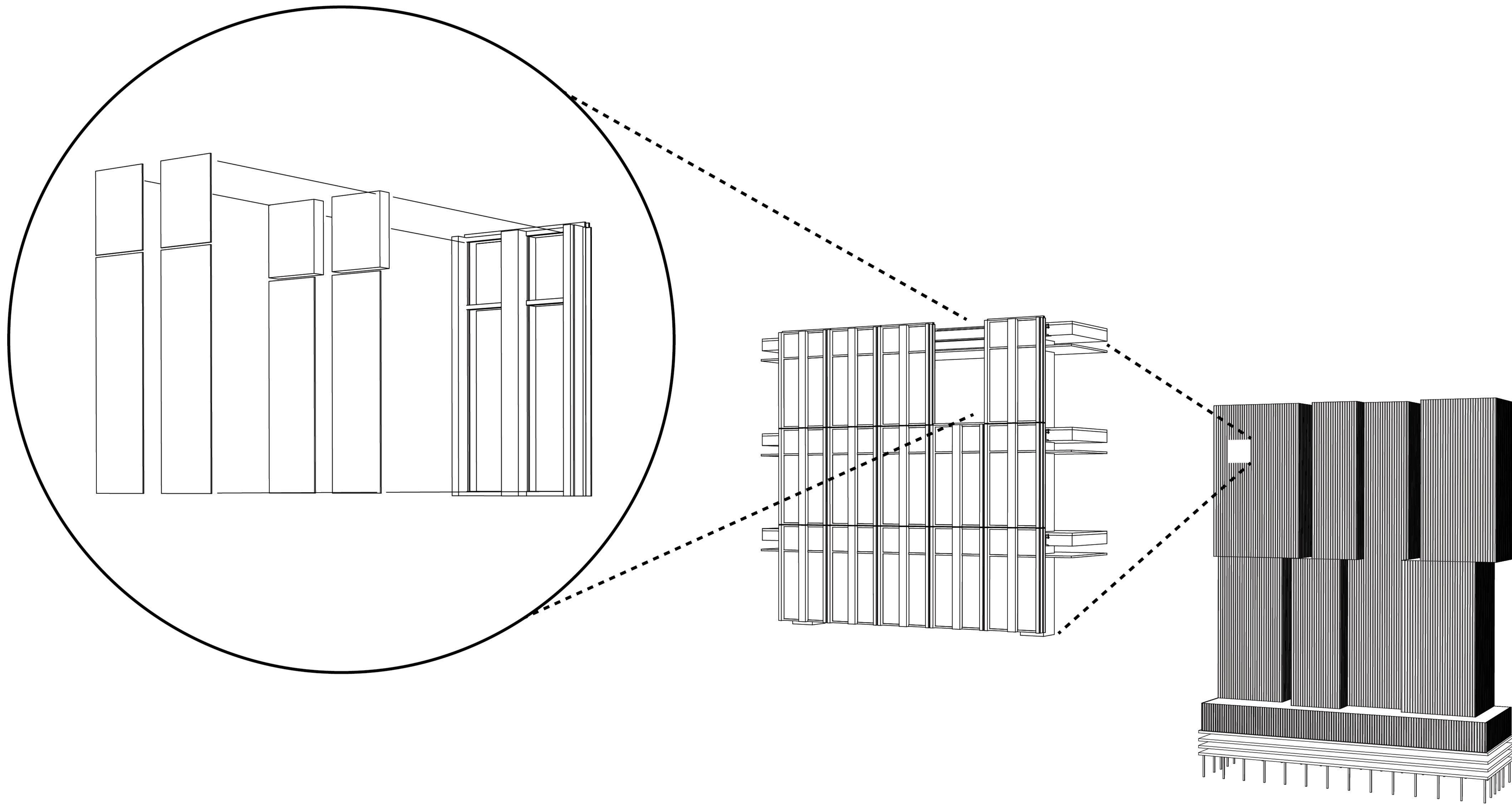




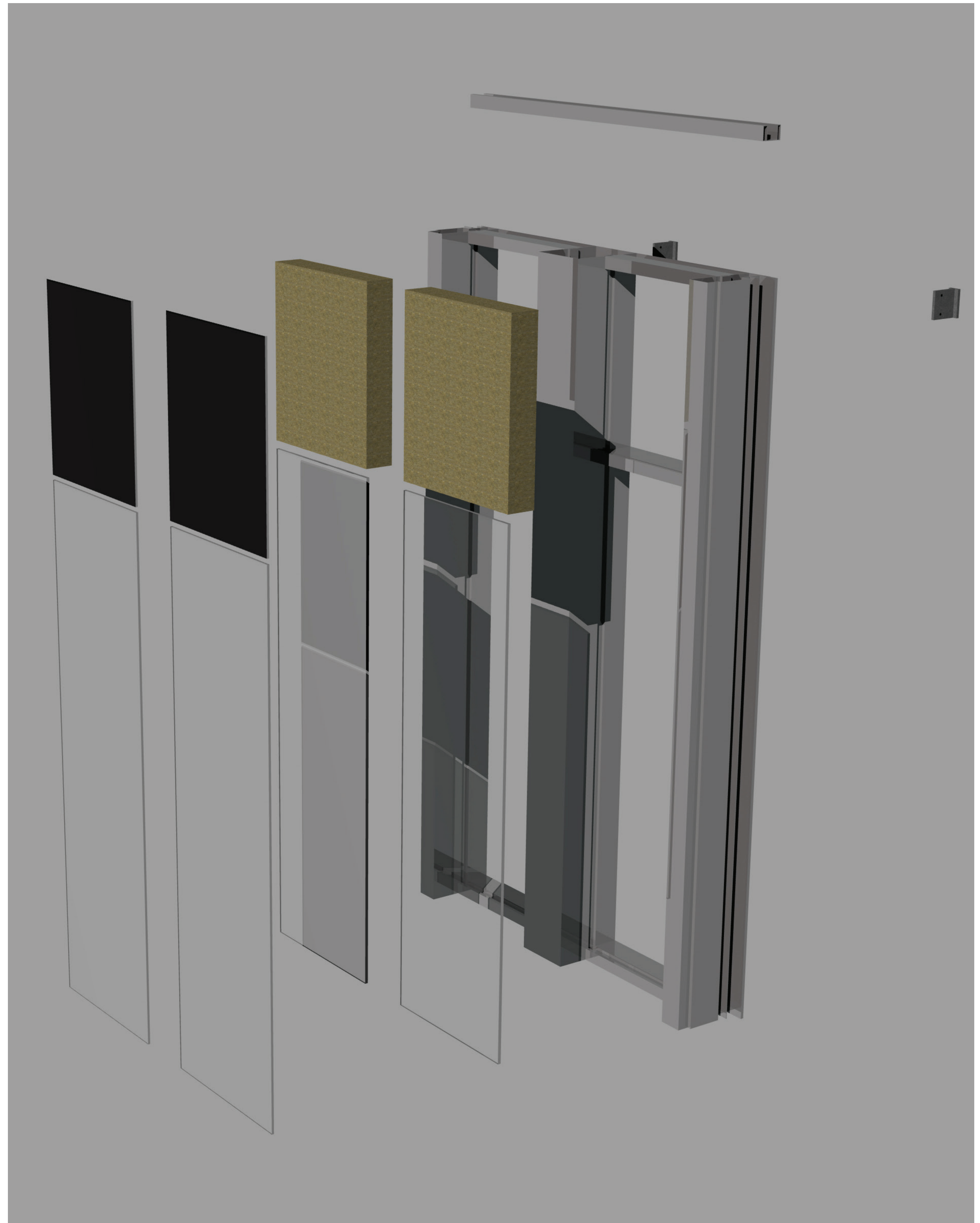
(Source: Rotterdam)



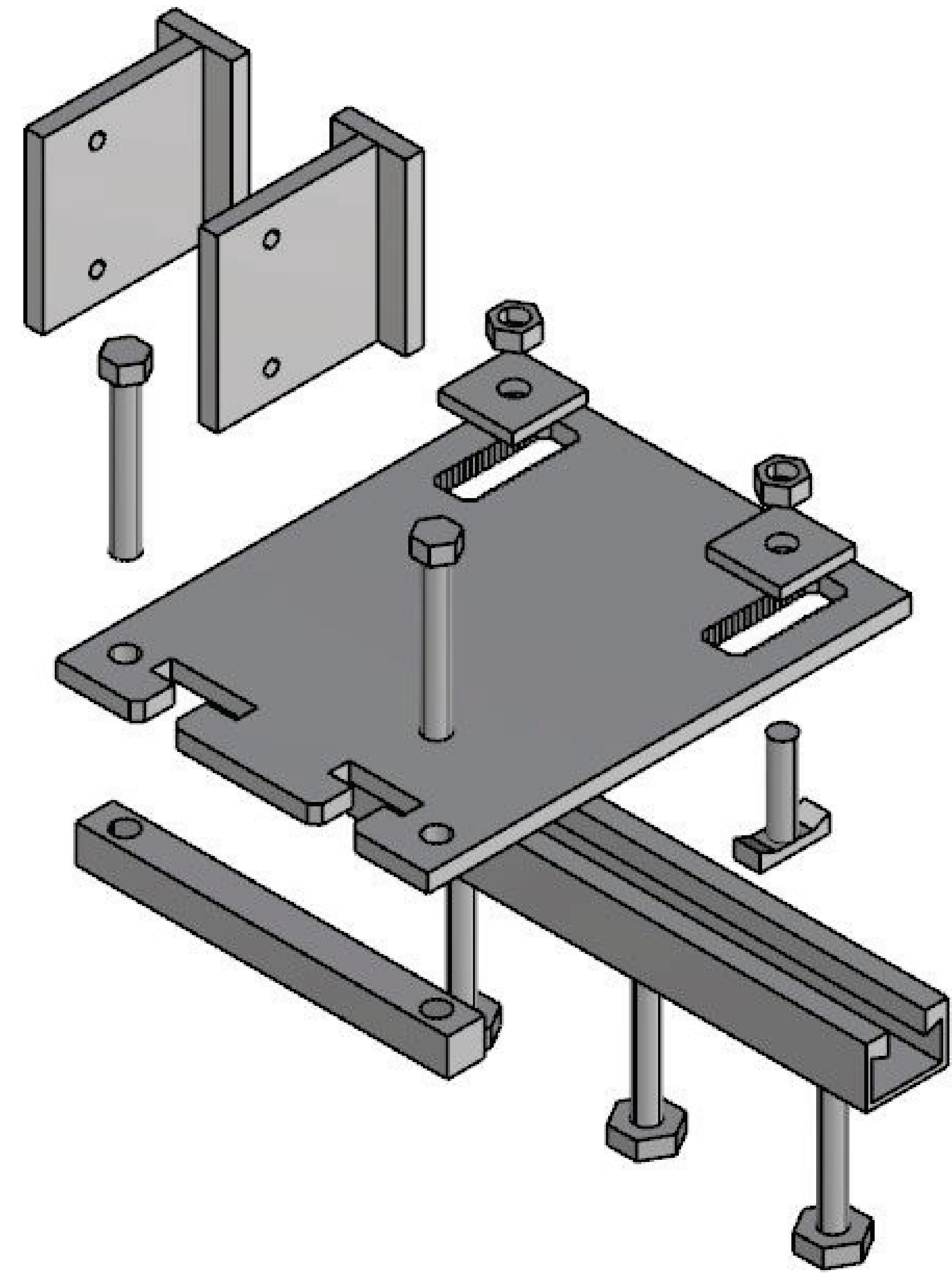
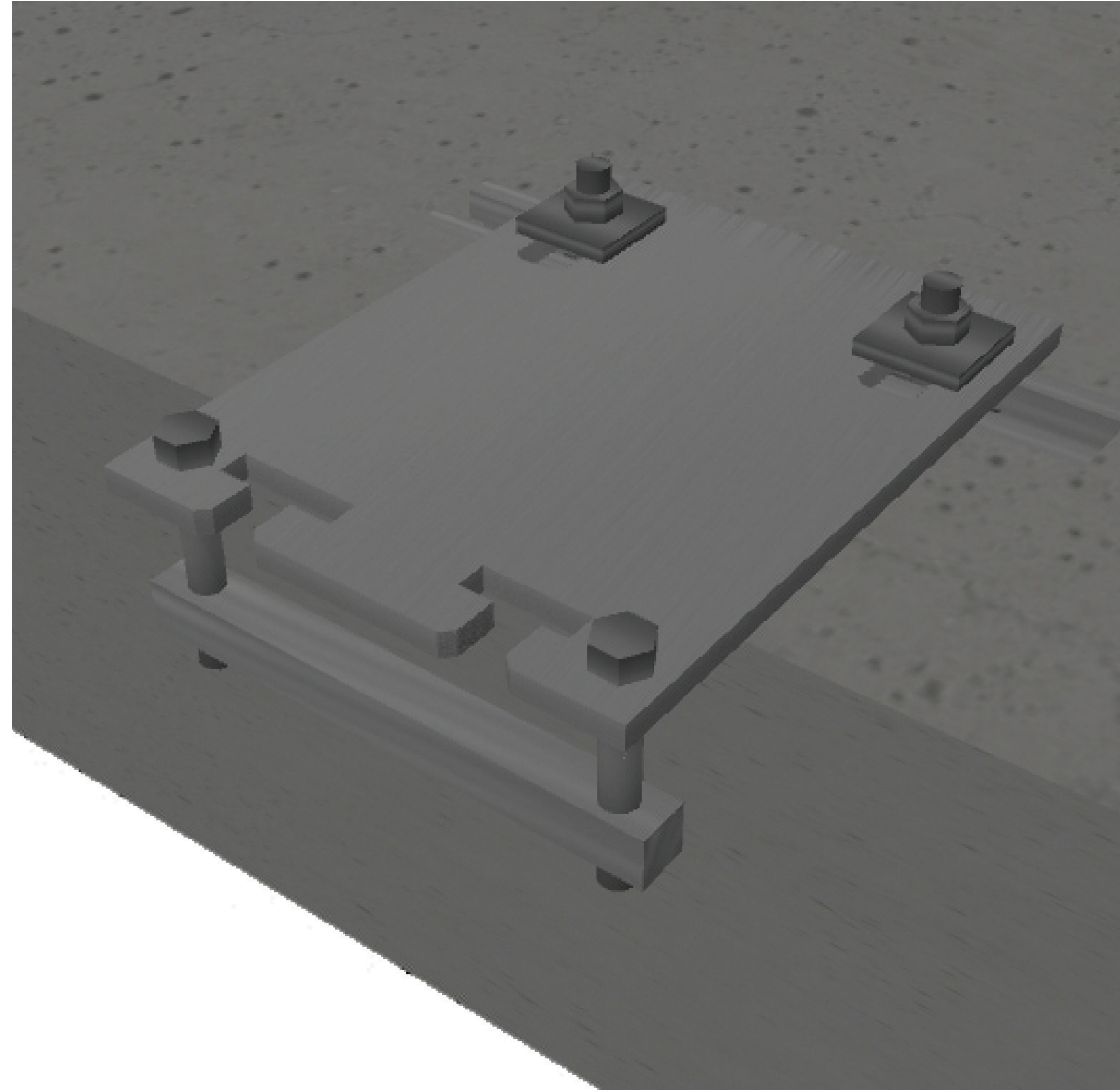
# Facade Fragment













## **2. BACKGROUND**

### **EXISTING PRODUCTS**



BLOOMFRAME



(Source: Bloomframe)



# COMPARISMENT EXISTING PRODUCTS

BLOOMFRAME



(Source: Bloomframe)

Dimensions

↓ 1100  
↔ 1752 / 2352 / 3052  
m<sup>2</sup> 1,9 / 2,5 / 3,3

Cost

1pcs € 10,000 +

B-TOWER ROTTERDAM  
TYPE 1



(Source: Scheldebouw)

Dimensions

↓ 2300  
↔ 4950  
m<sup>2</sup> 11,4

Cost

1pcs € 7,000 - 10.000

Facade € 750 m<sup>2</sup>

GREENWICH LONDON  
TYPE 3



(Source: Scheldebouw)

Dimensions

↓ 1200  
↔ 4500  
m<sup>2</sup> 5,4

Cost

1pcs € 9.000 - 12.000

Facade € 1.250 m<sup>2</sup>



# 3. RESEARCH QUESTION

How can a unitized vertical façade element be transformed in a temporary horizontal outdoor living space?



# 4. DESIGN CONCEPT

Safety

- Stays attached to the facade
- Always fall protection

Aesthetic

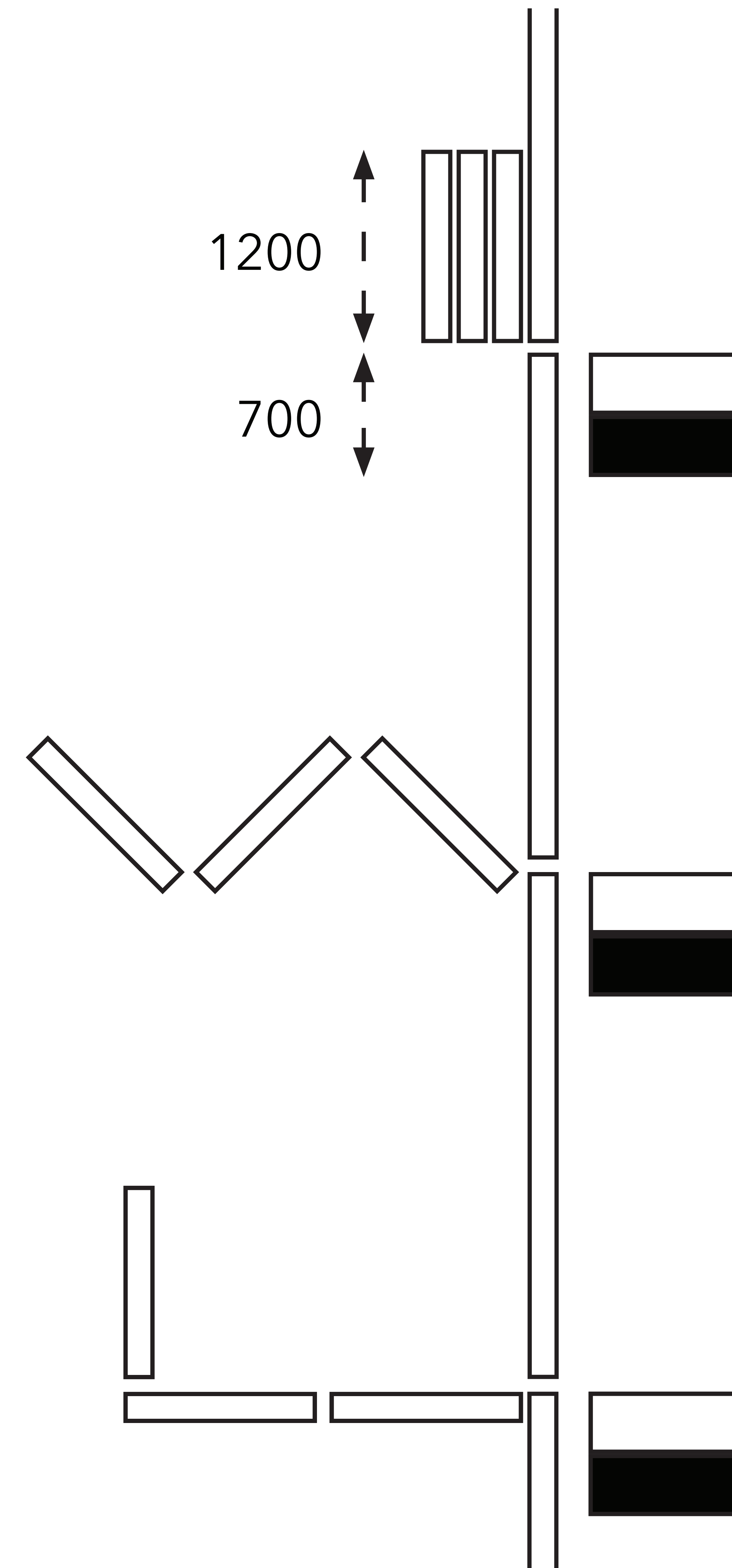
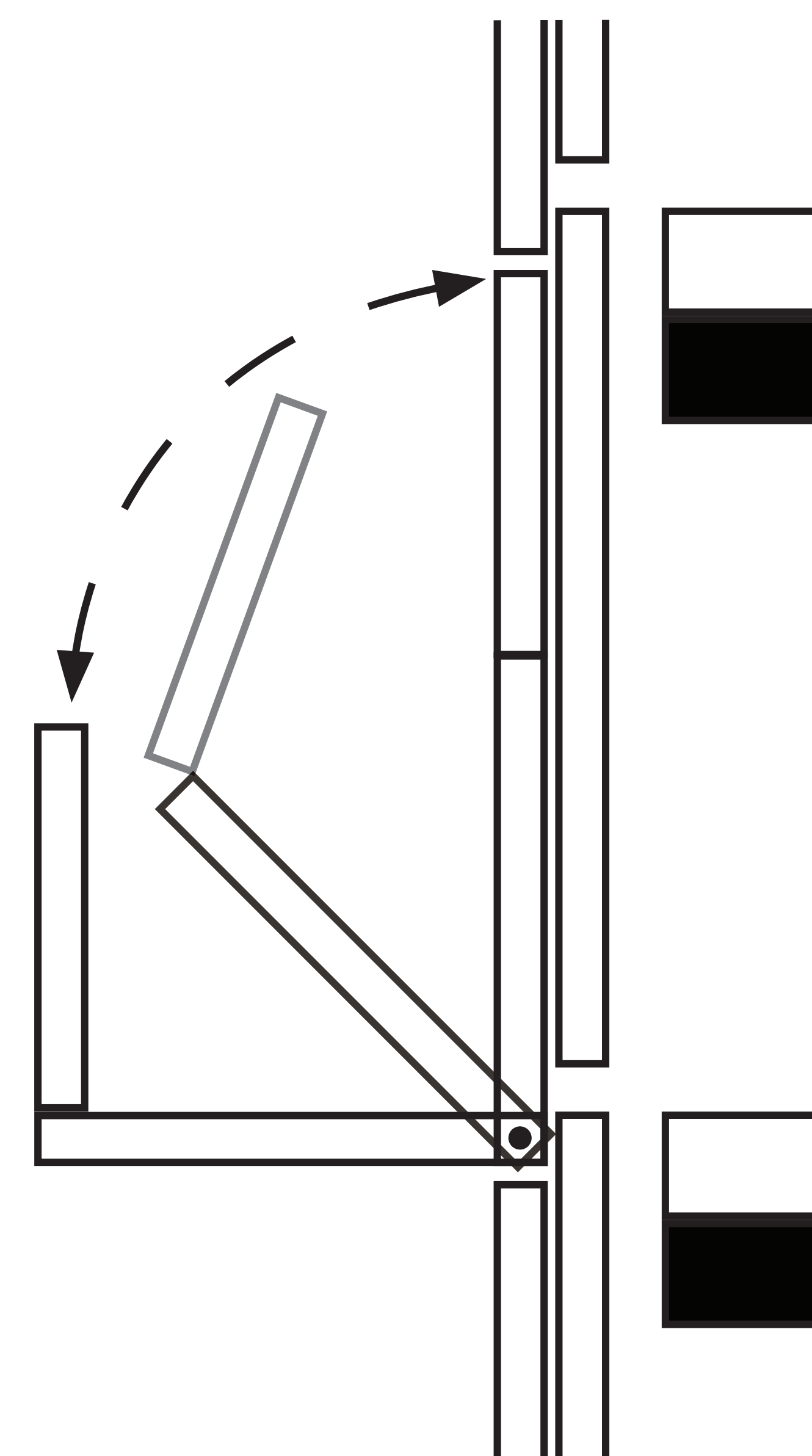
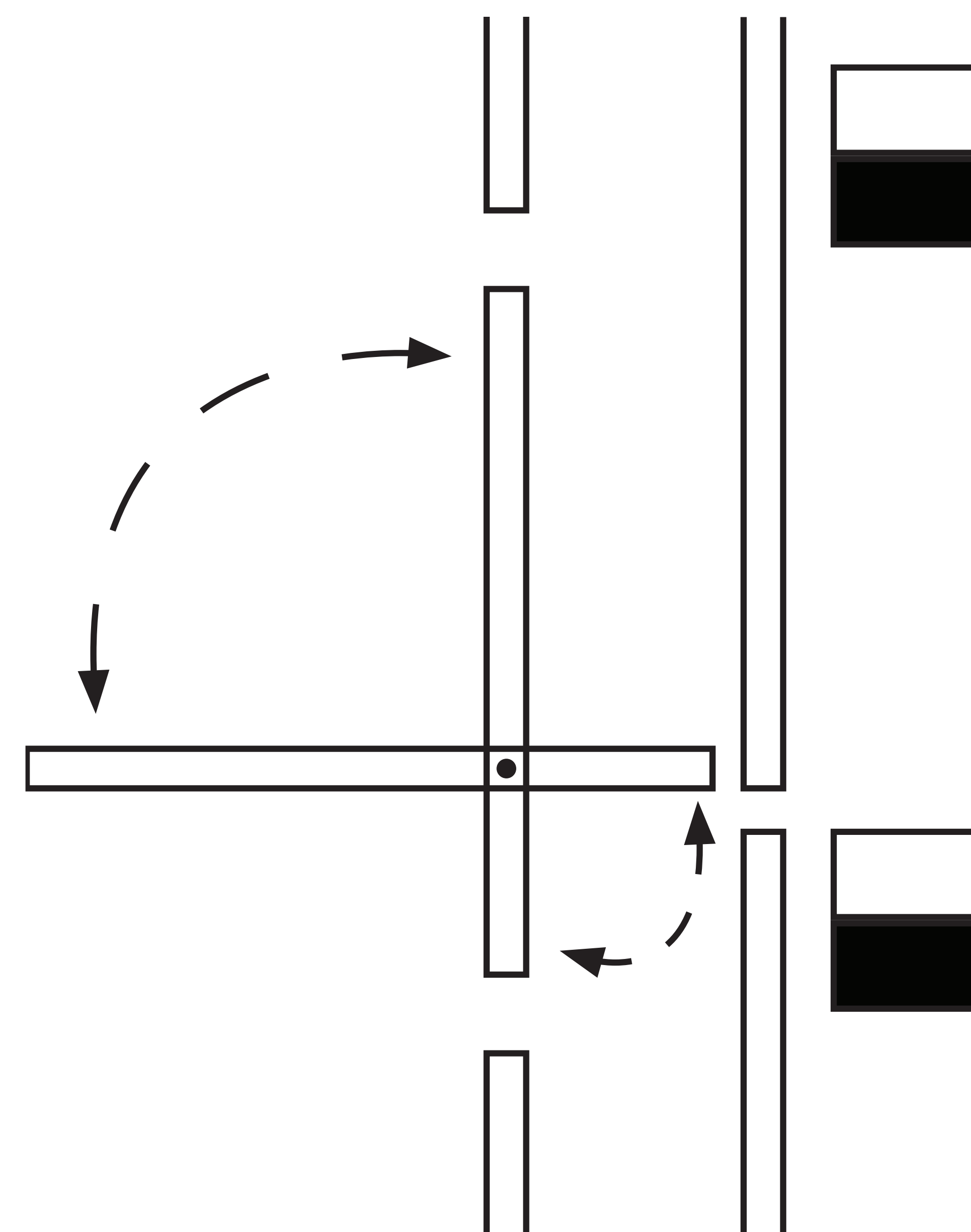
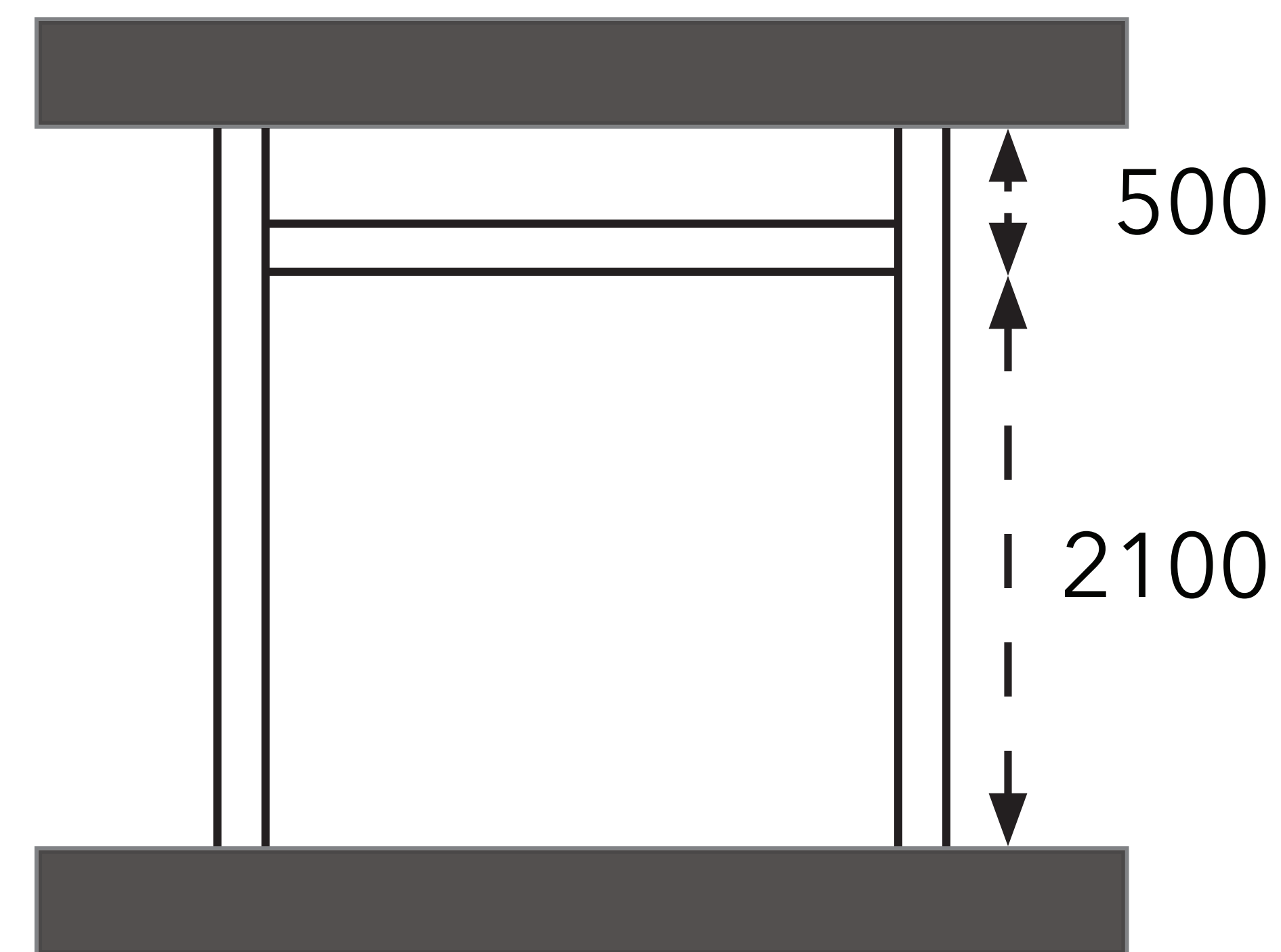
- Unobstructed view
- Balcony depth

Practicality

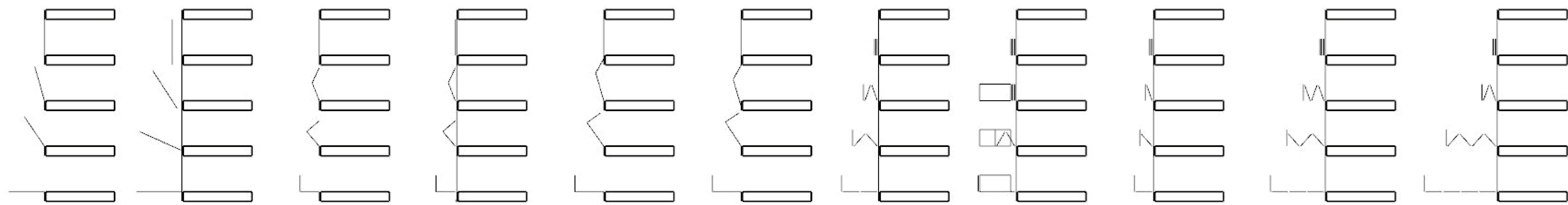
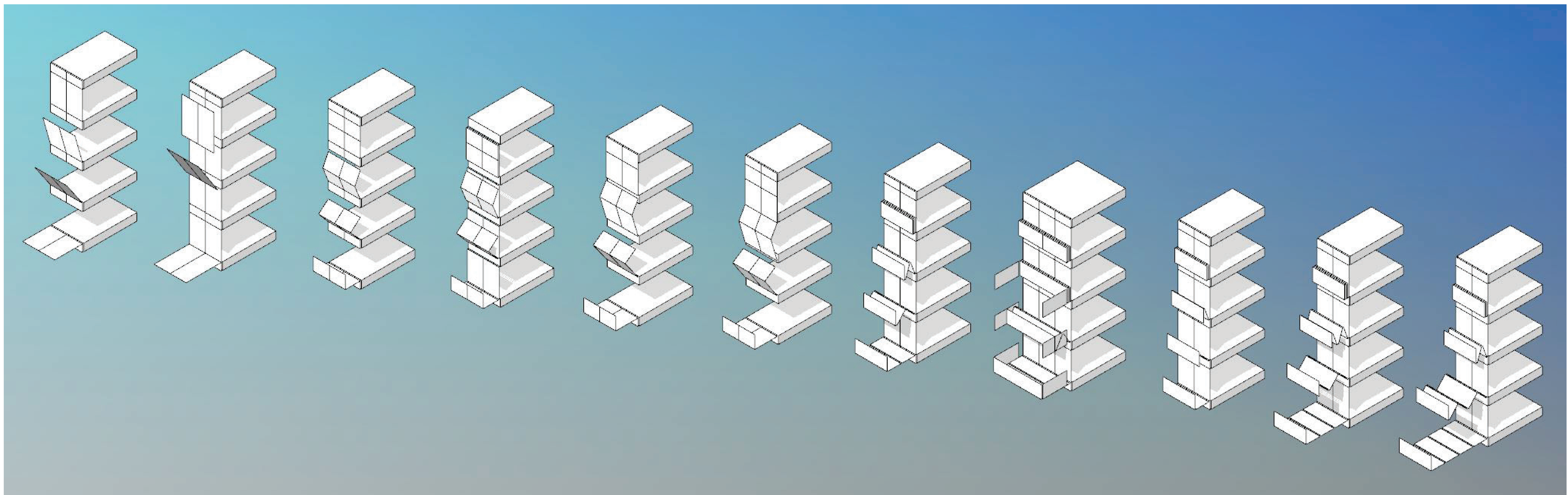
- Cleaning
- Single facade
- Balcony  $\neq$  Thermal barrier

Comfort

- Frequency resonance (own)
- Deflection

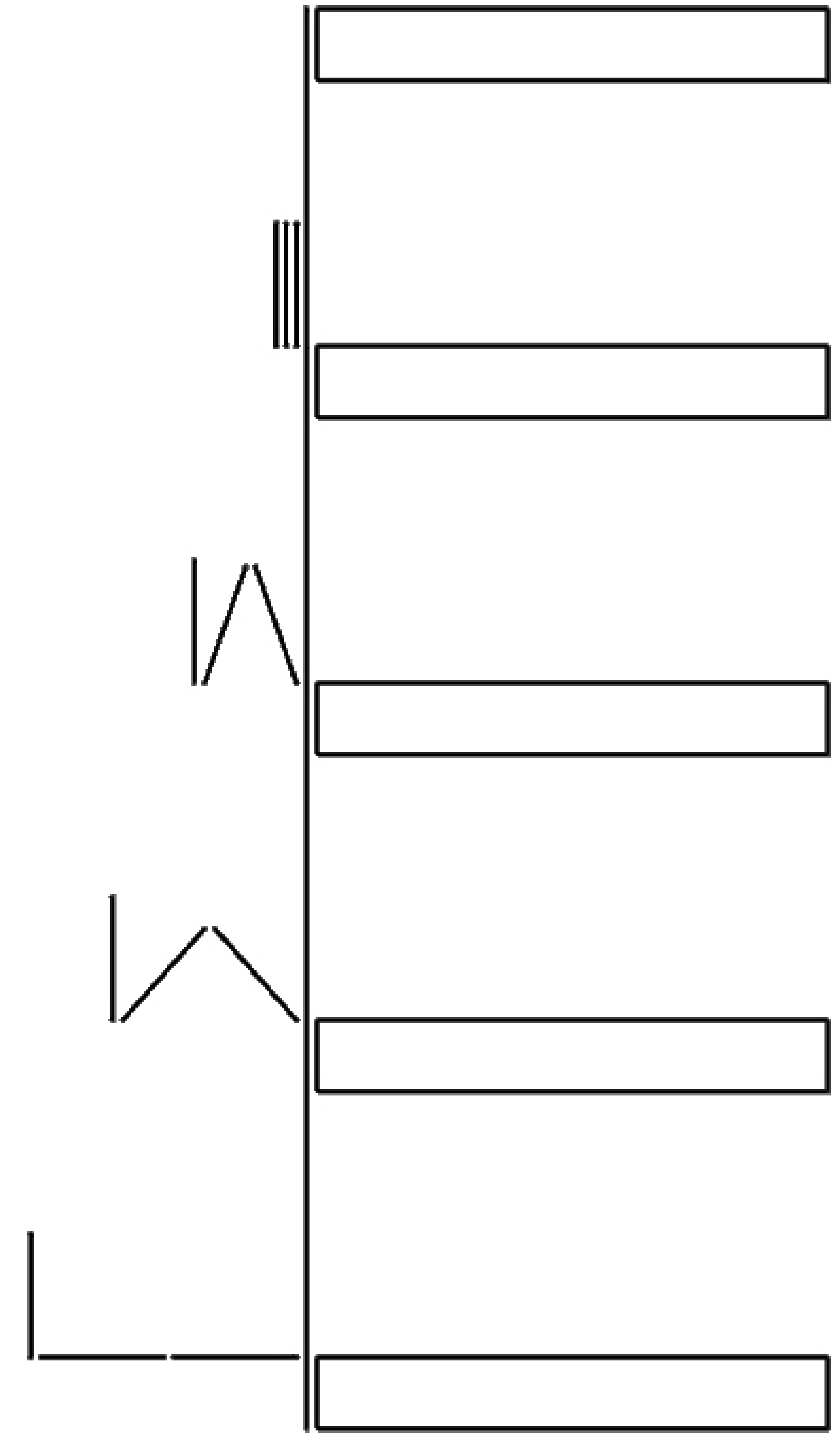
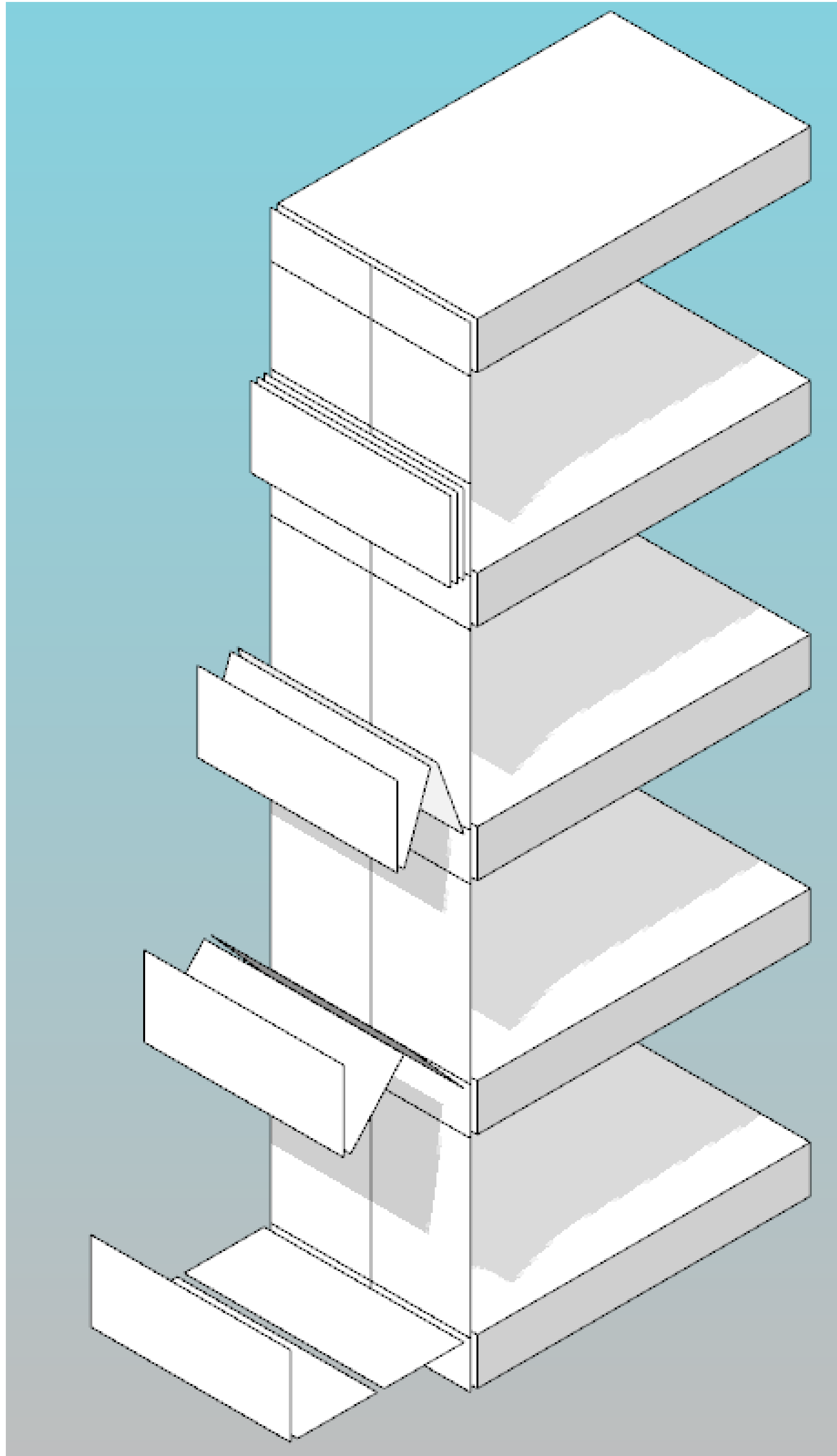






1 2 3.1 3.2 4 5 6 7 8 9 10







# 5. CONSTRUCTION DESIGN

Safety

- Strong enough
- Fail-safe

Aesthetic

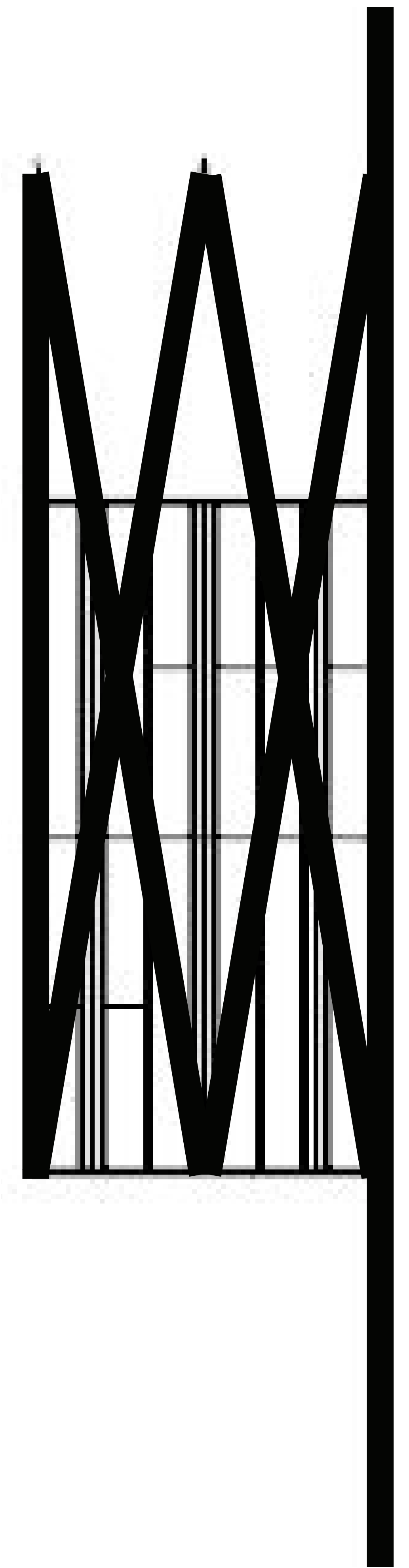
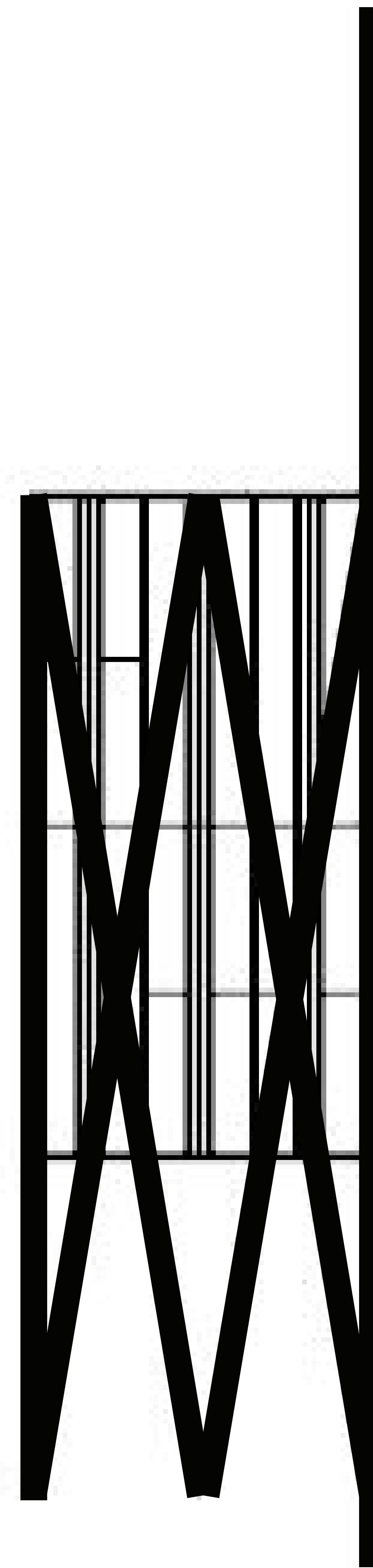
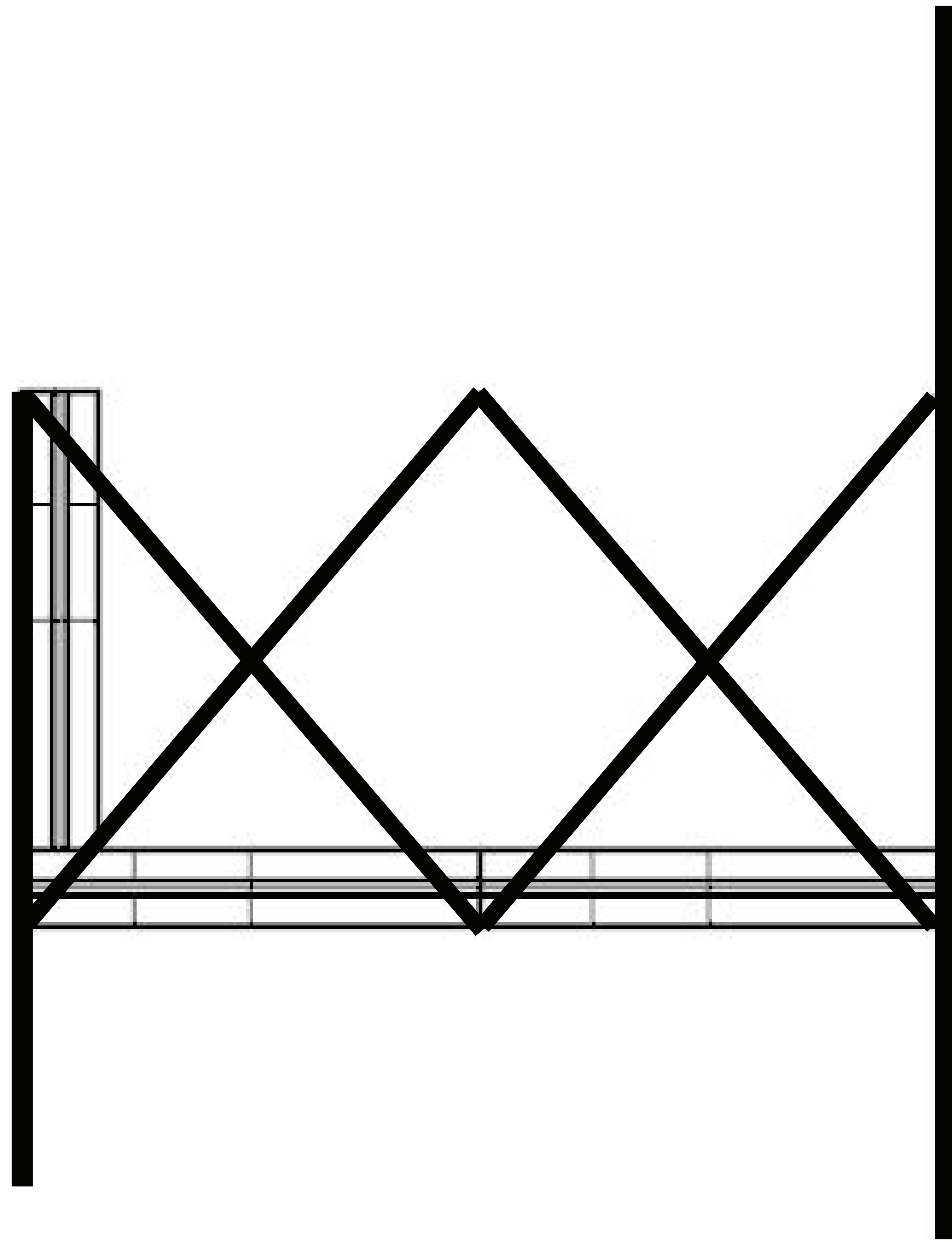
- In view
- Parallel movement

Practicality

- Maintenance
- Extendable
- Electric control panel
- manual override (power failure)



# SCISSOR CONSTRUCTION FRAME

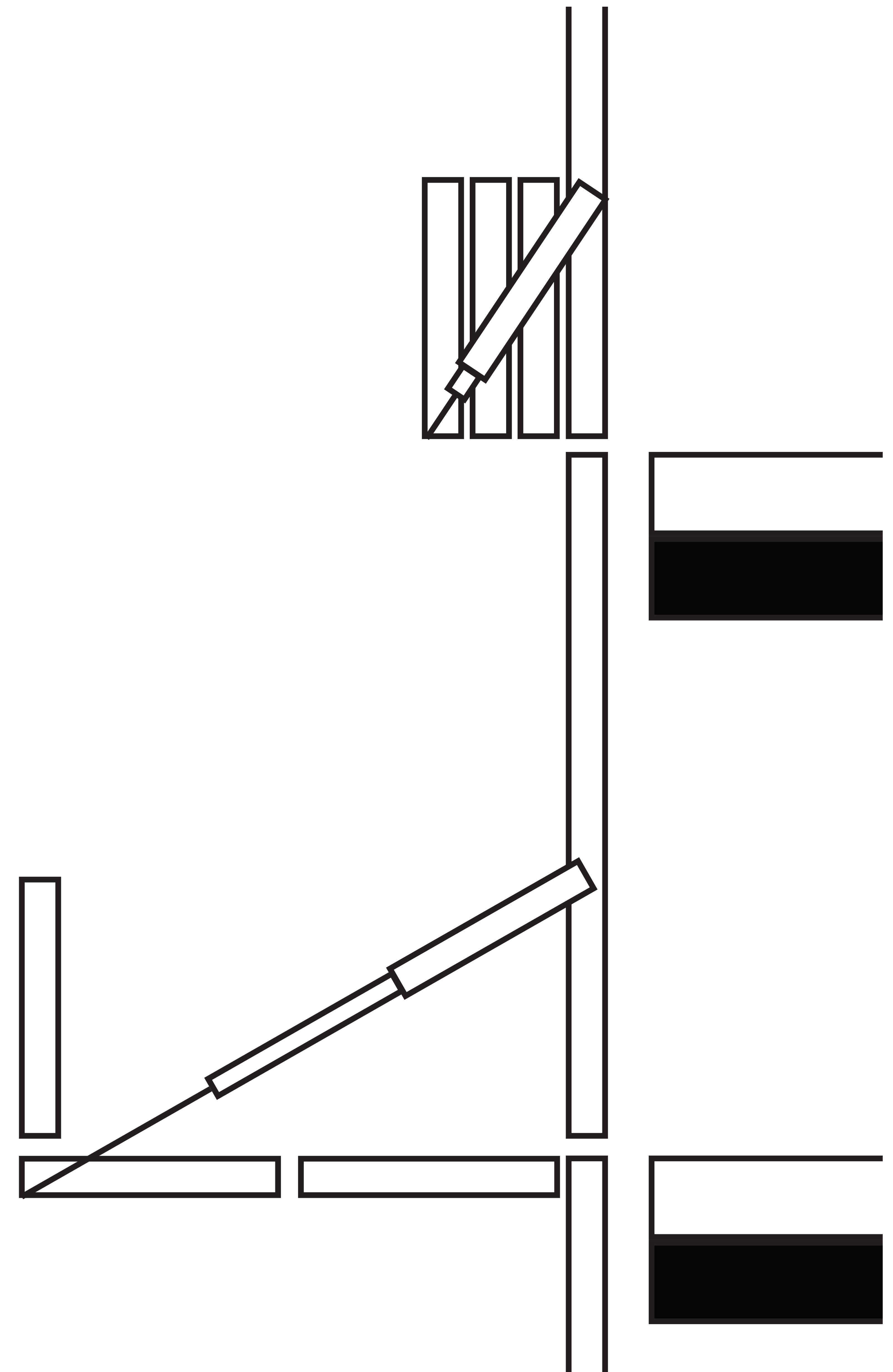




# HYDRAULIC CYLINDERS

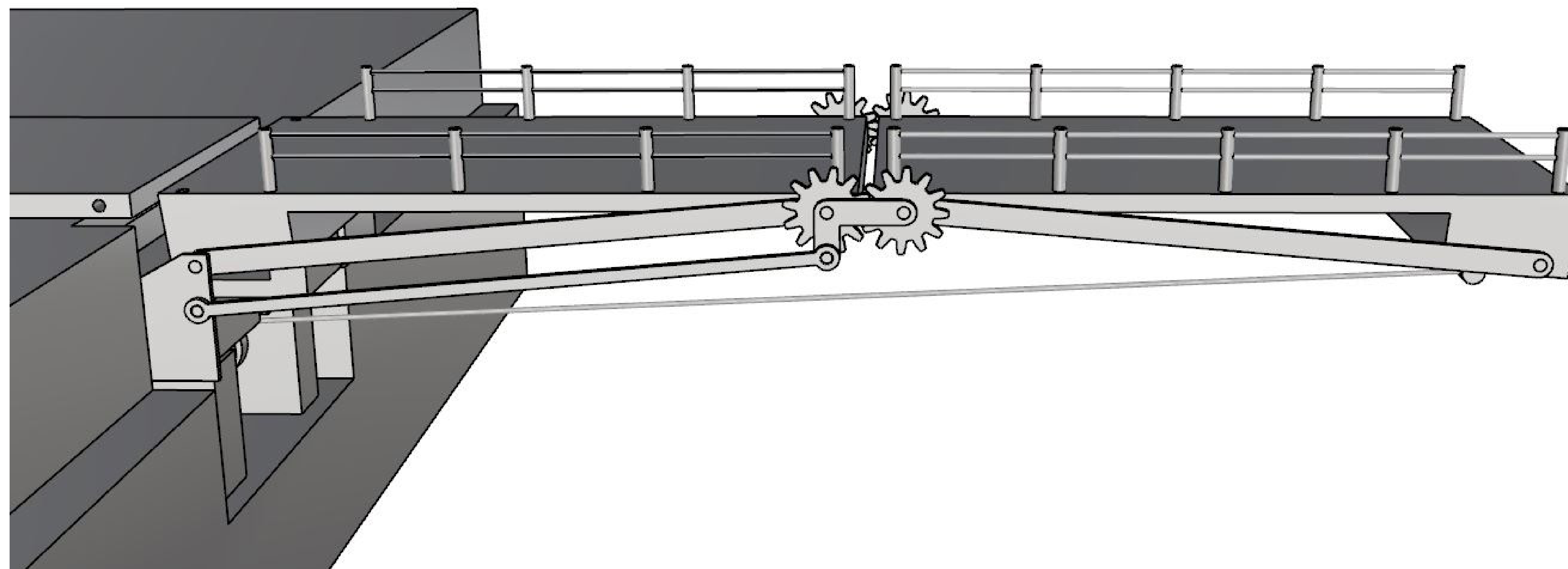
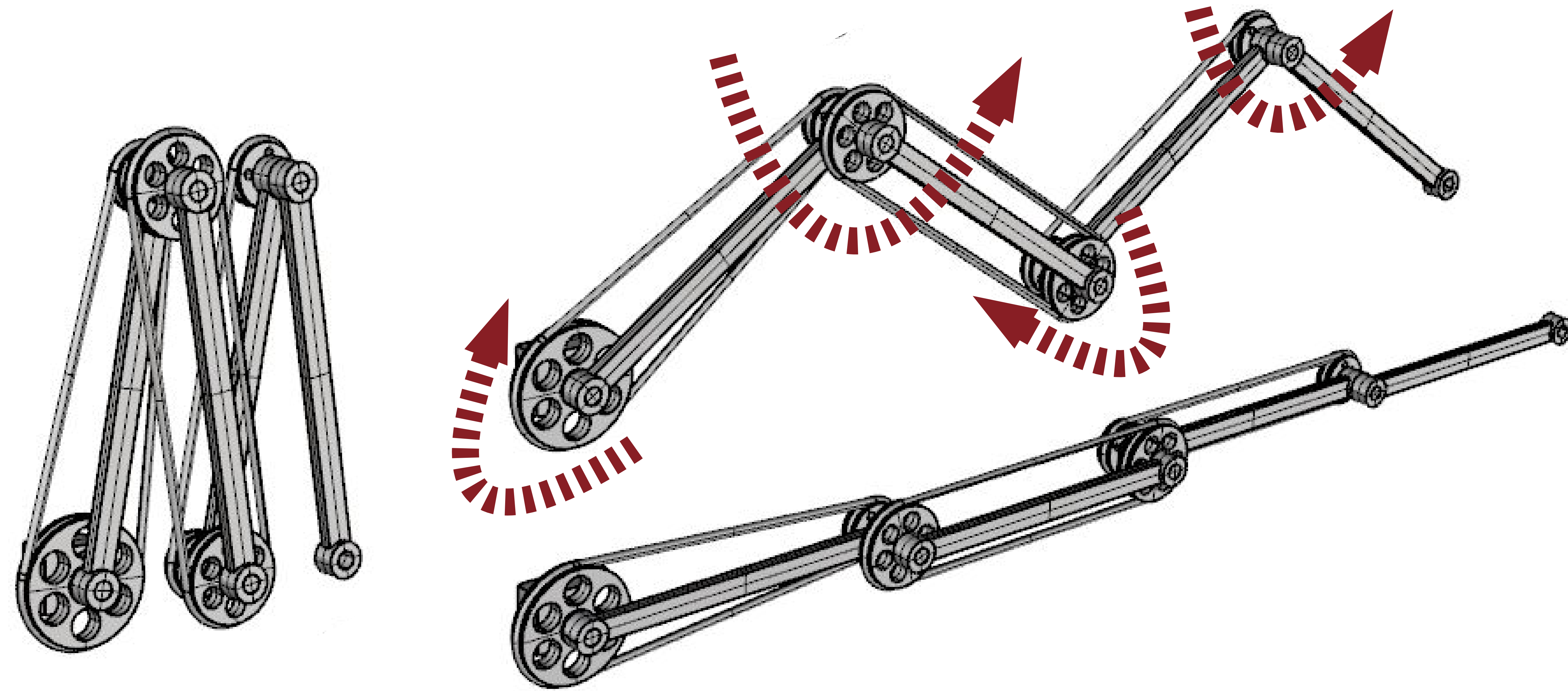


(Source: German alibaba)





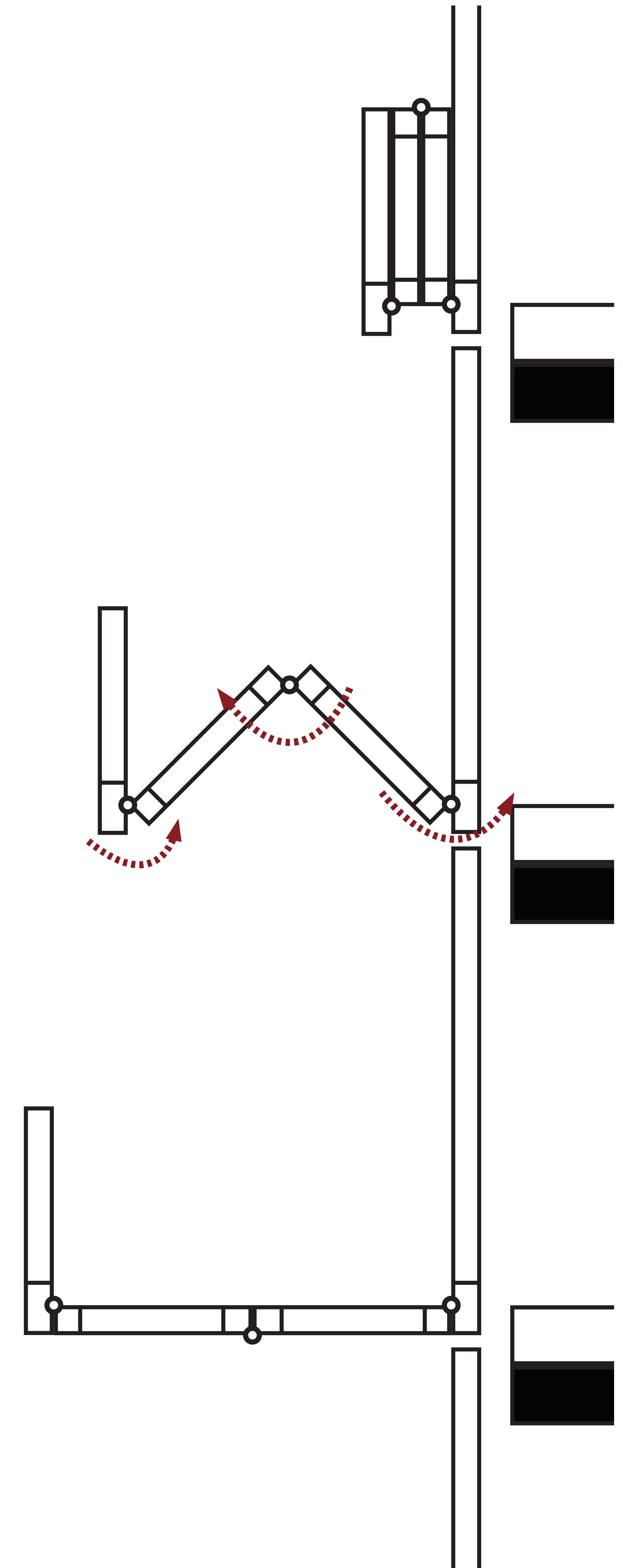
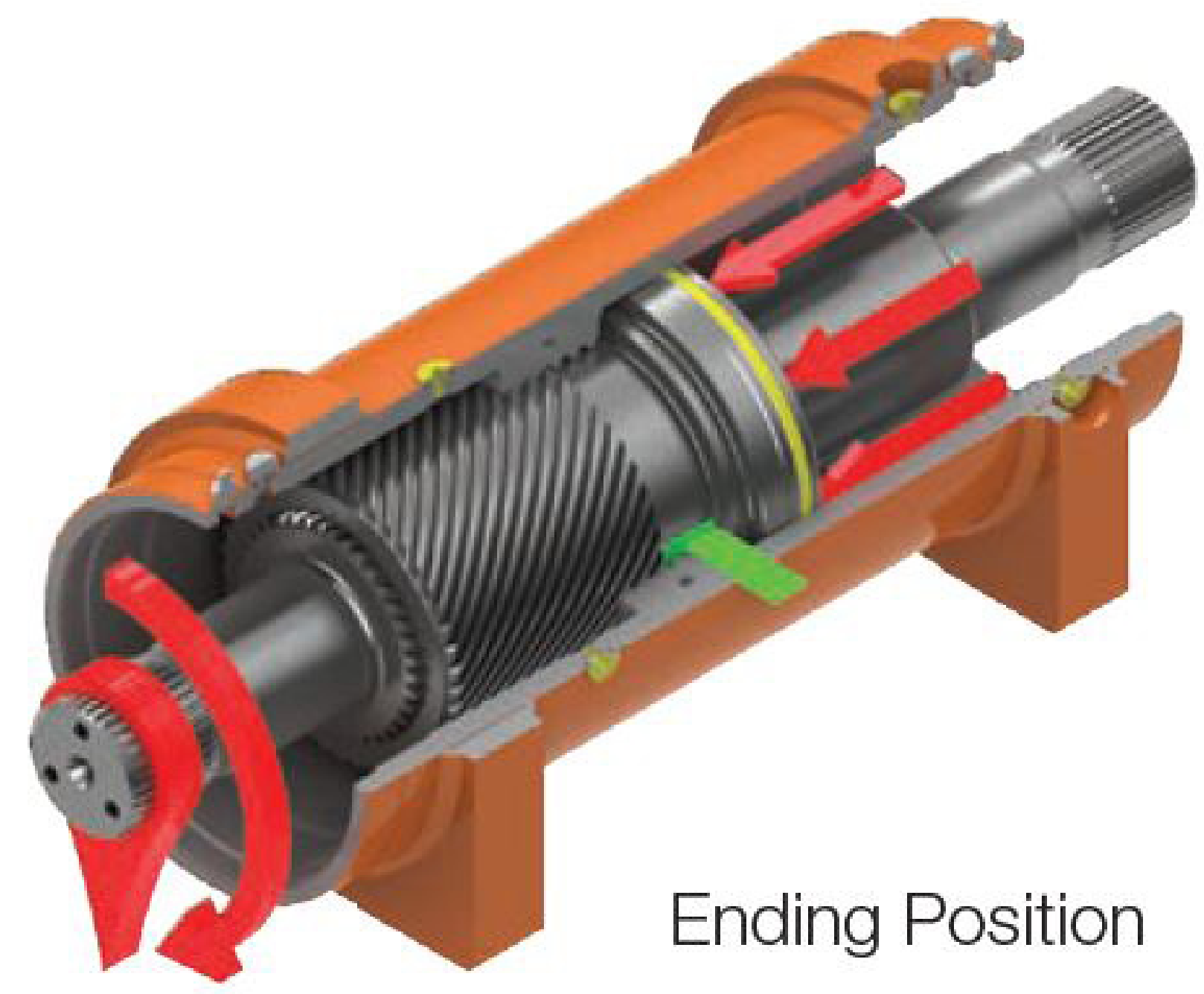
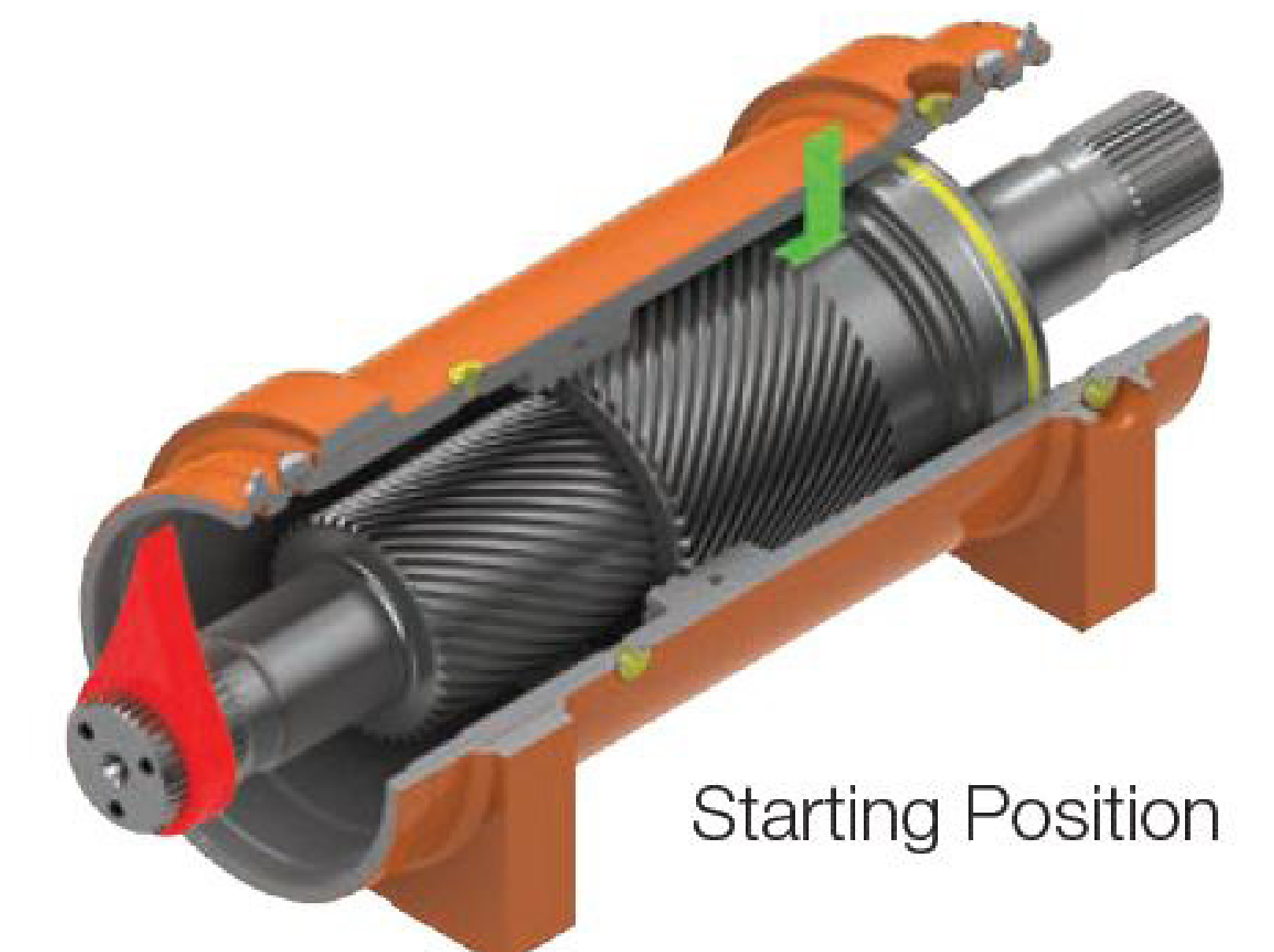
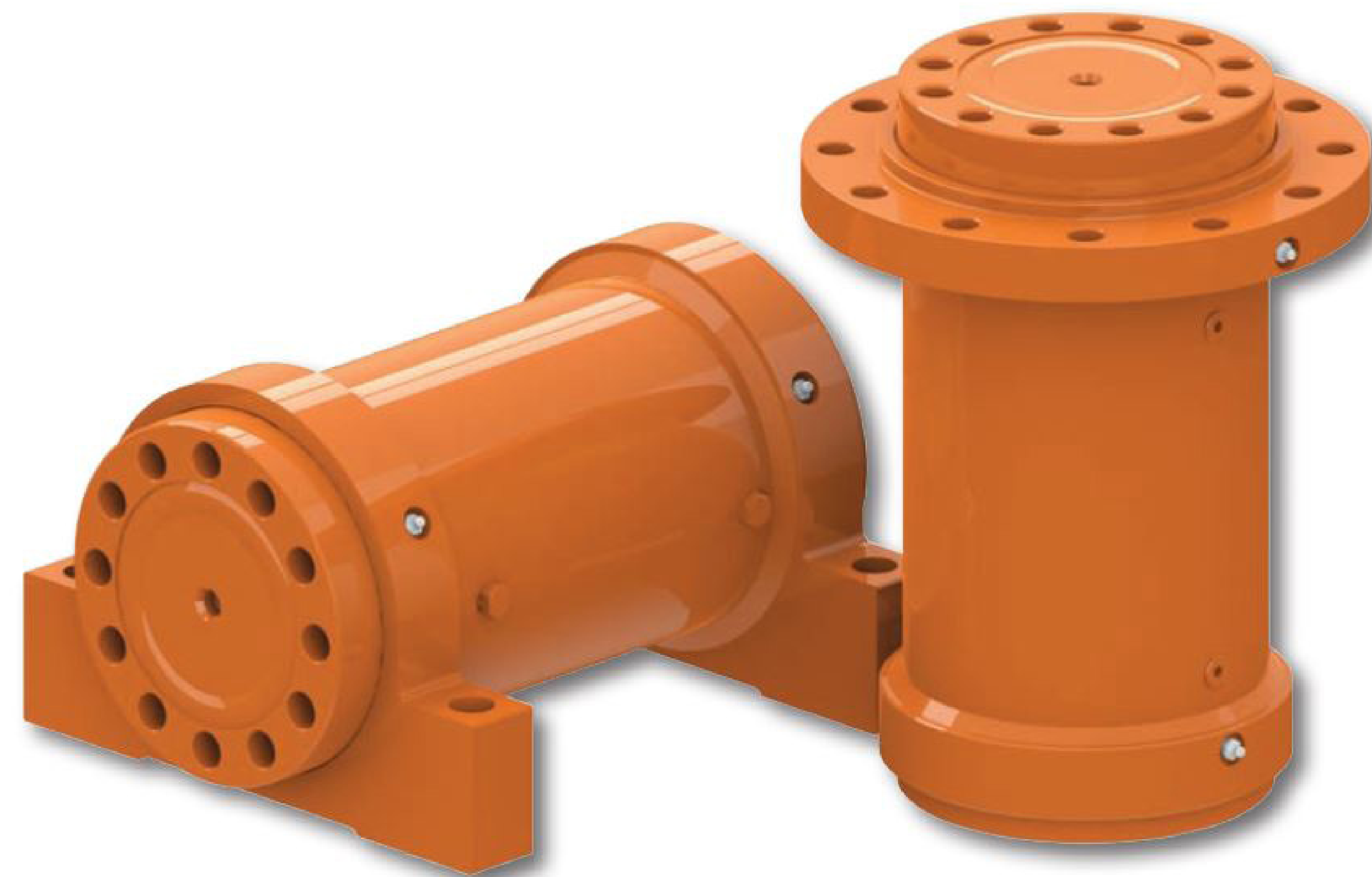
# CHAIN AND SPROCKET



(Source: Thanq)



# HYDRAULIC ROTARY ACTUATOR



(Source: Parker)



**TOO EXPENSIVE**





**DETAILED DESIGN**

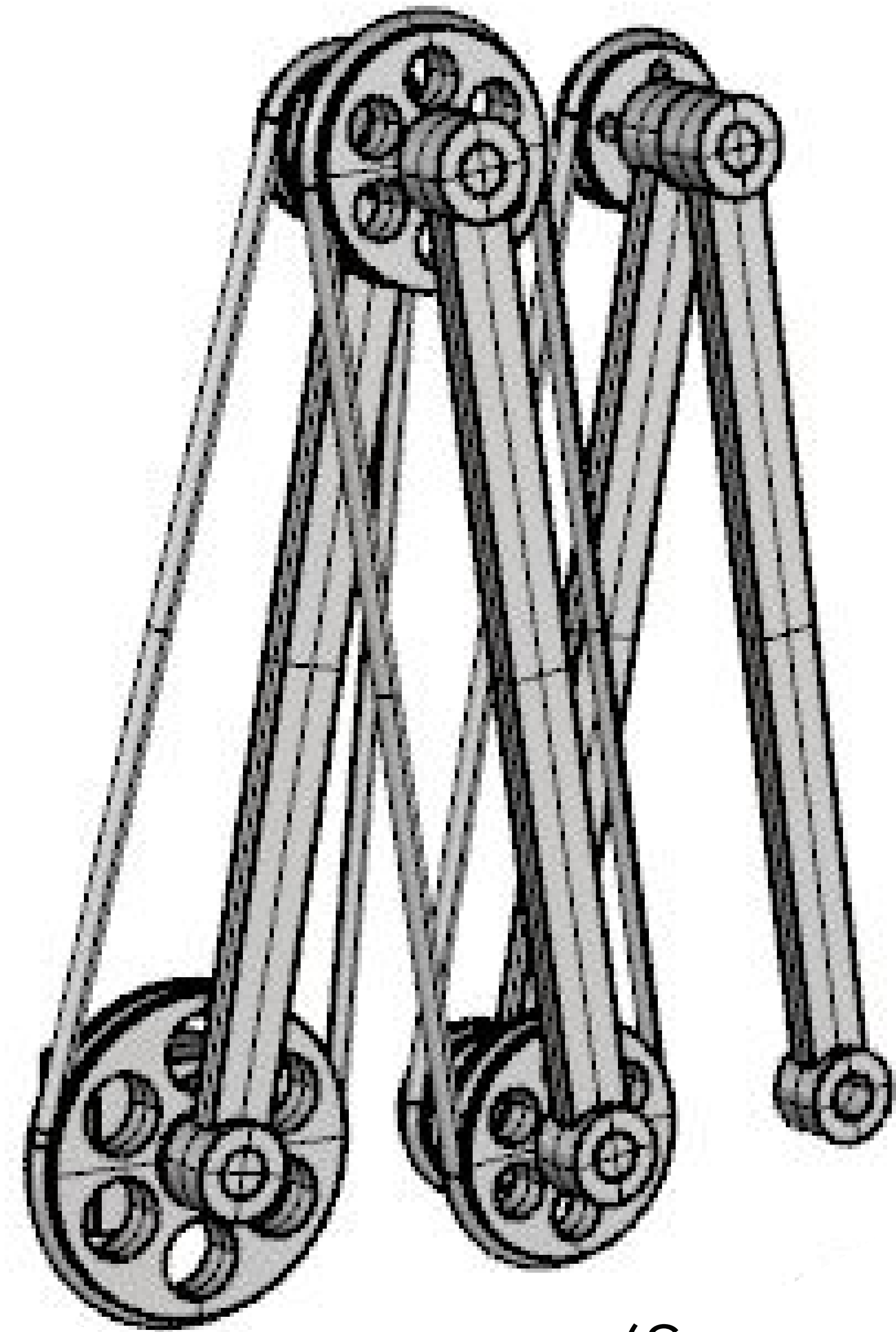
**BROADEN CONSTRUCTION RESEARCH**



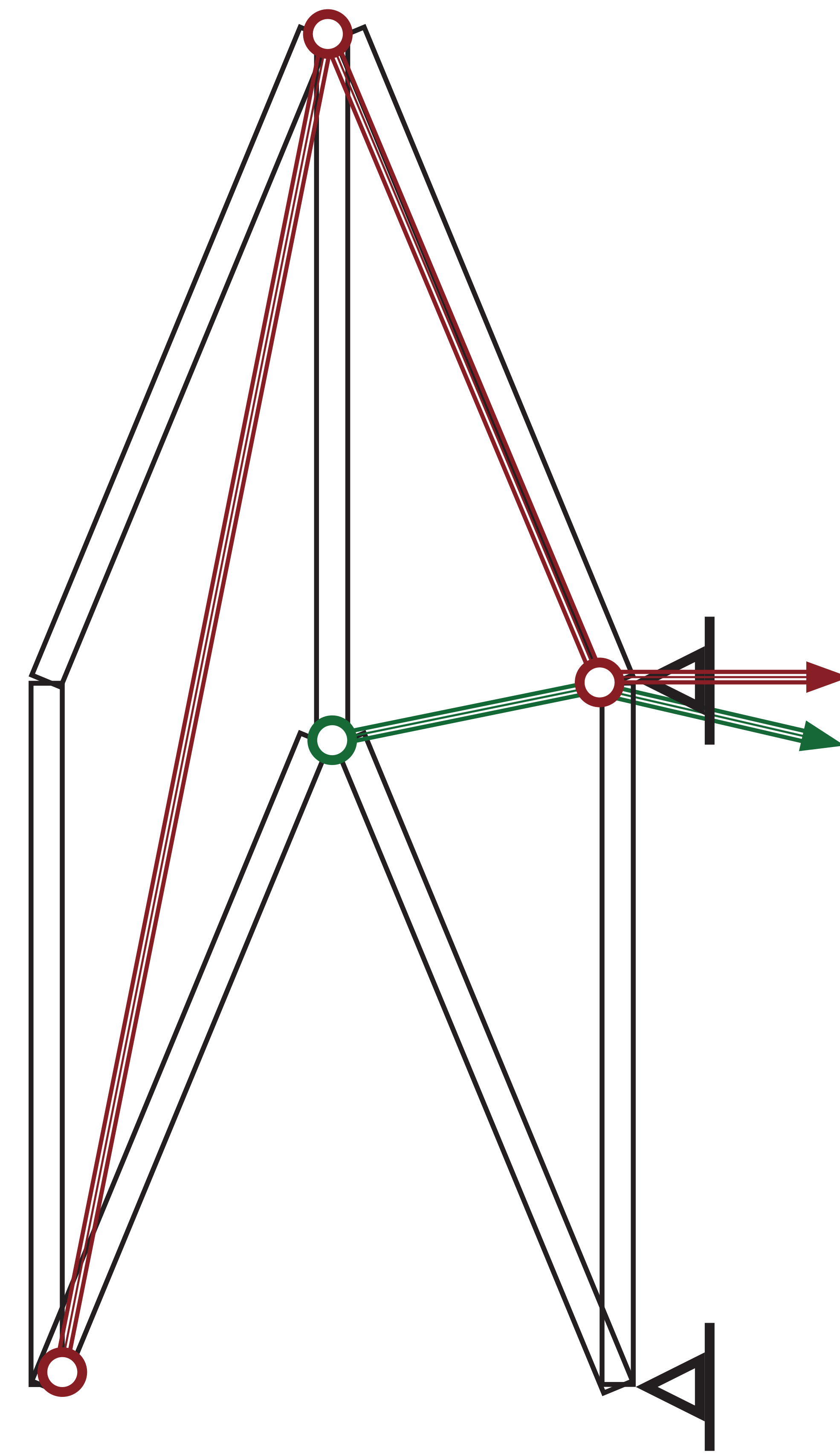
DETAILED DESIGN

**BROADEN CONSTRUCTION RESEARCH**

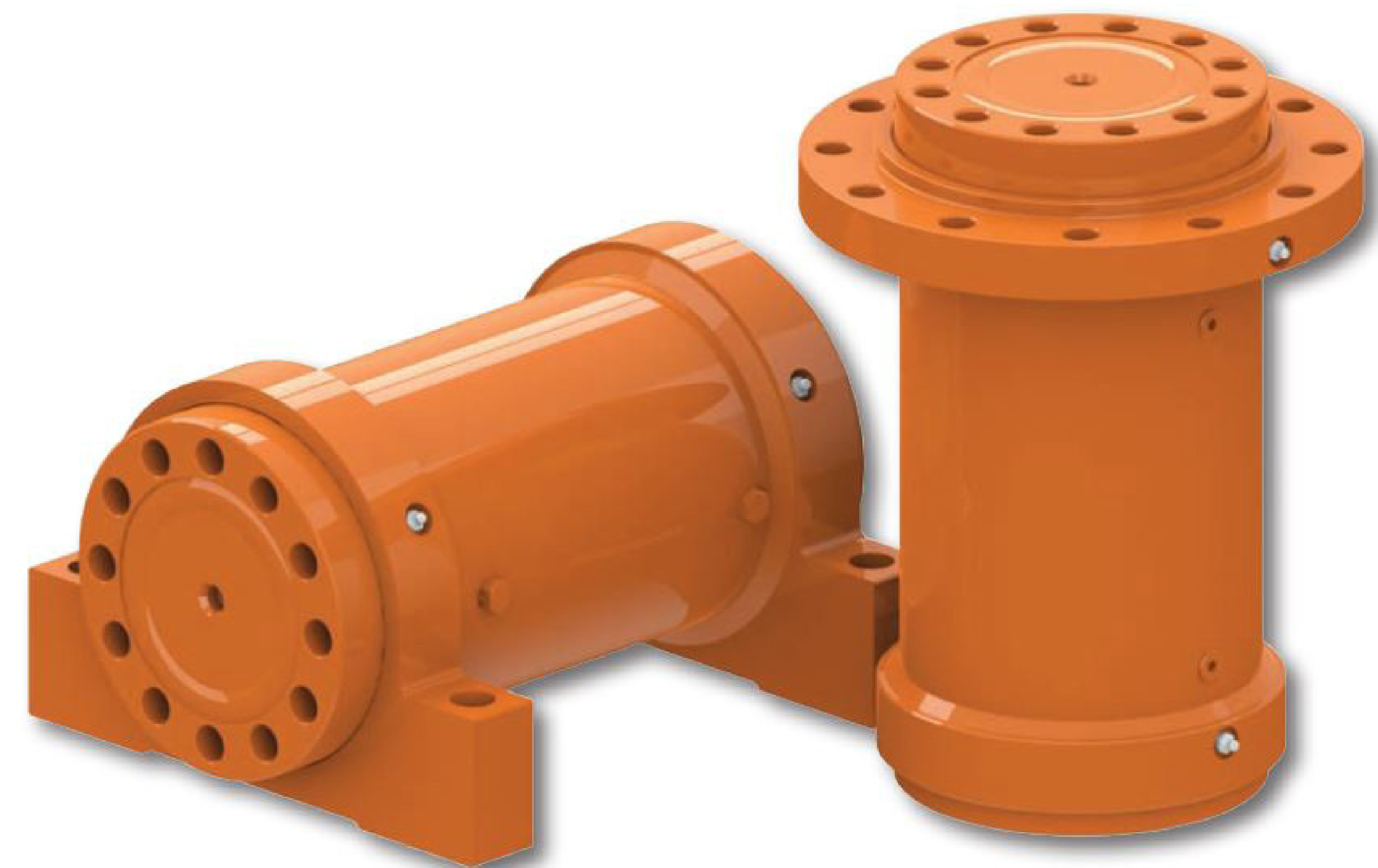
# CONSTRUCTION



(Source: Thanq)



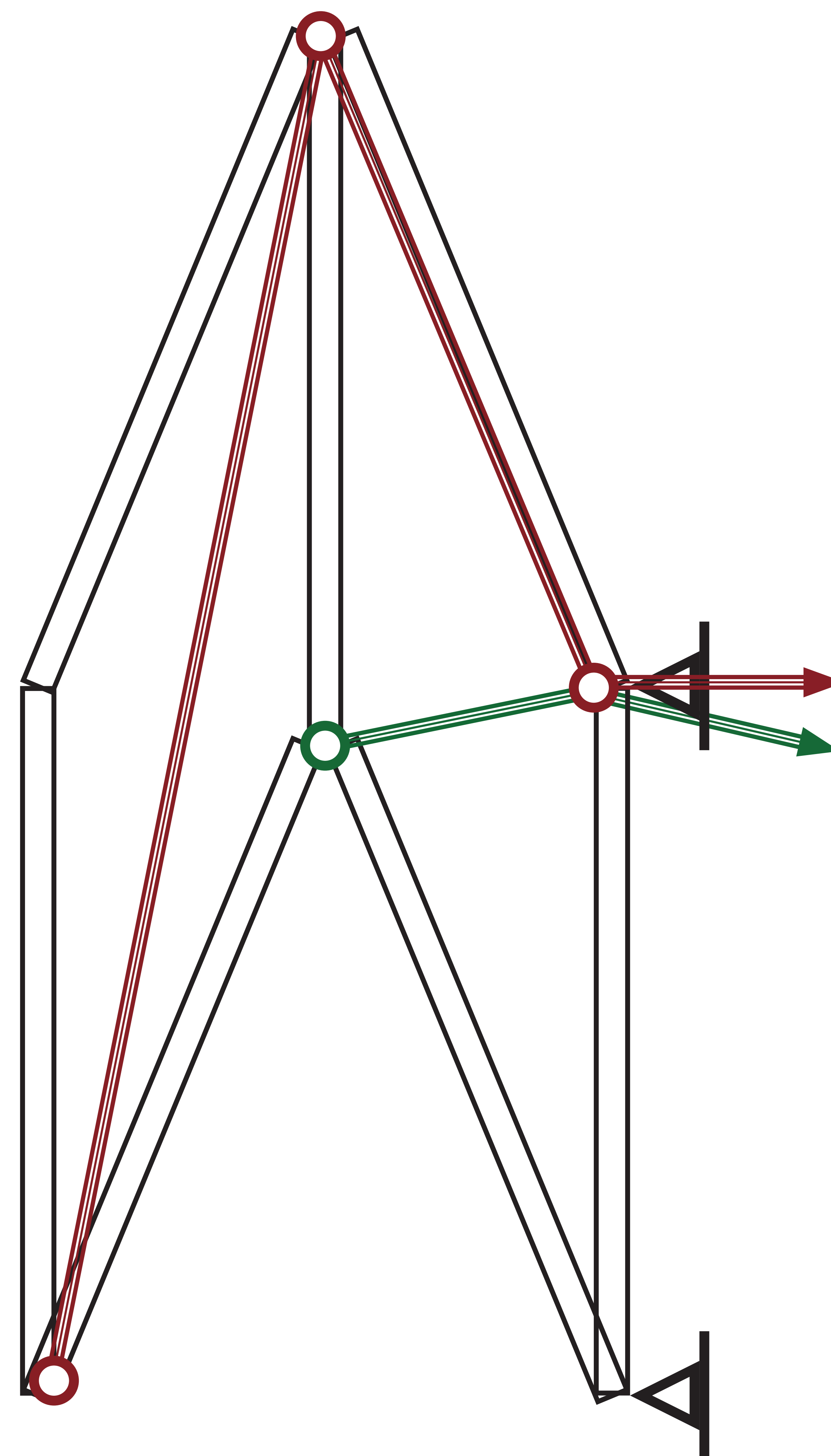
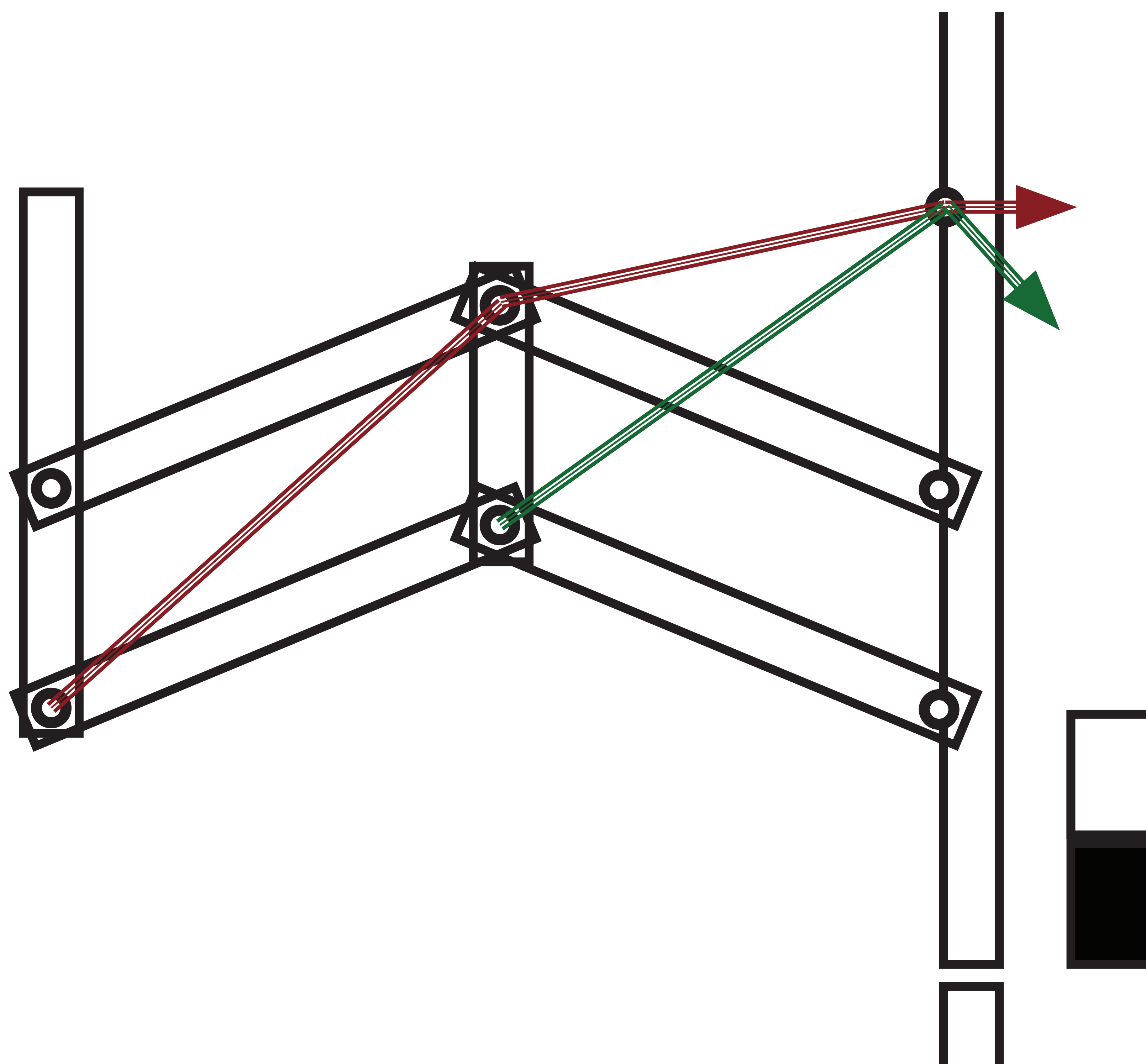
(Source: German alibaba)



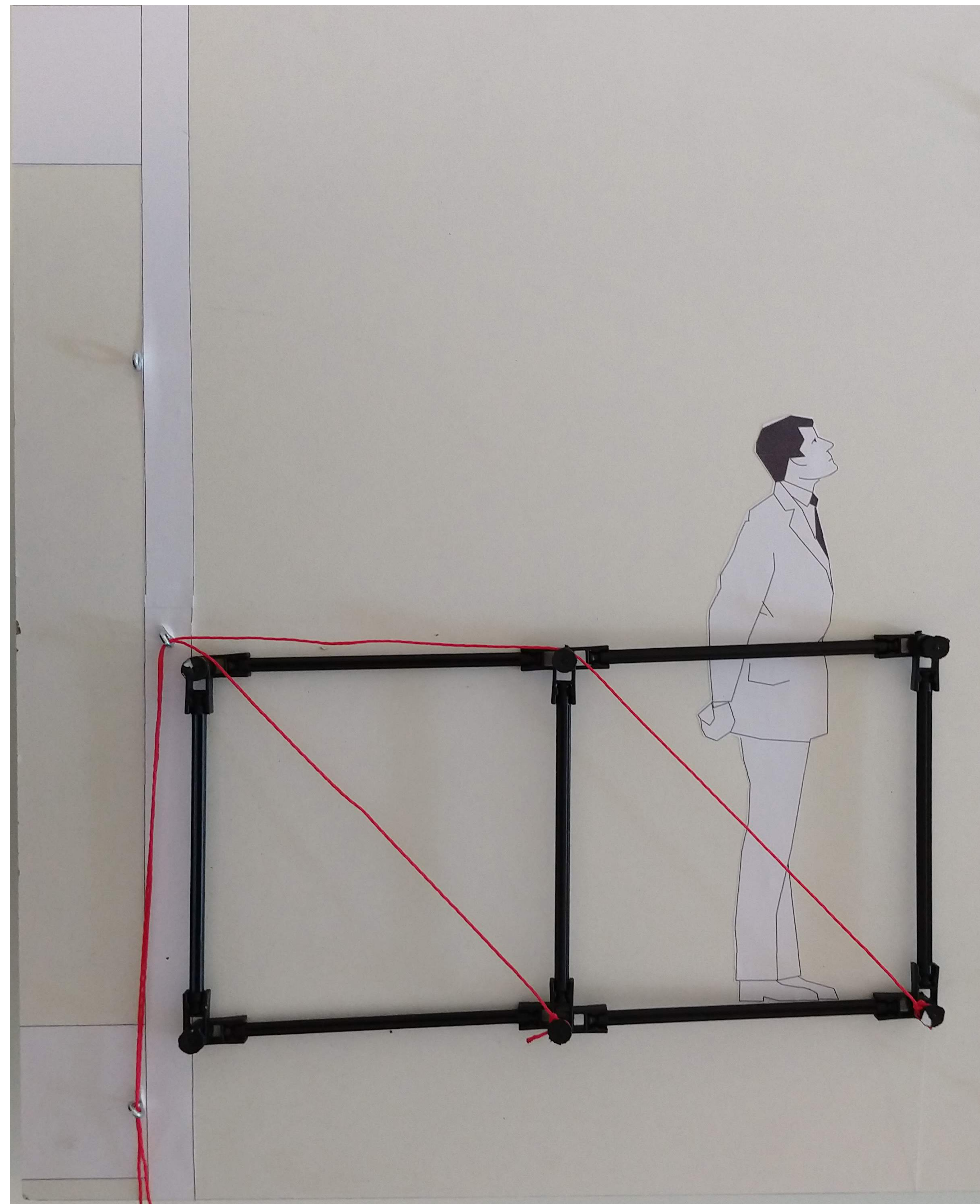
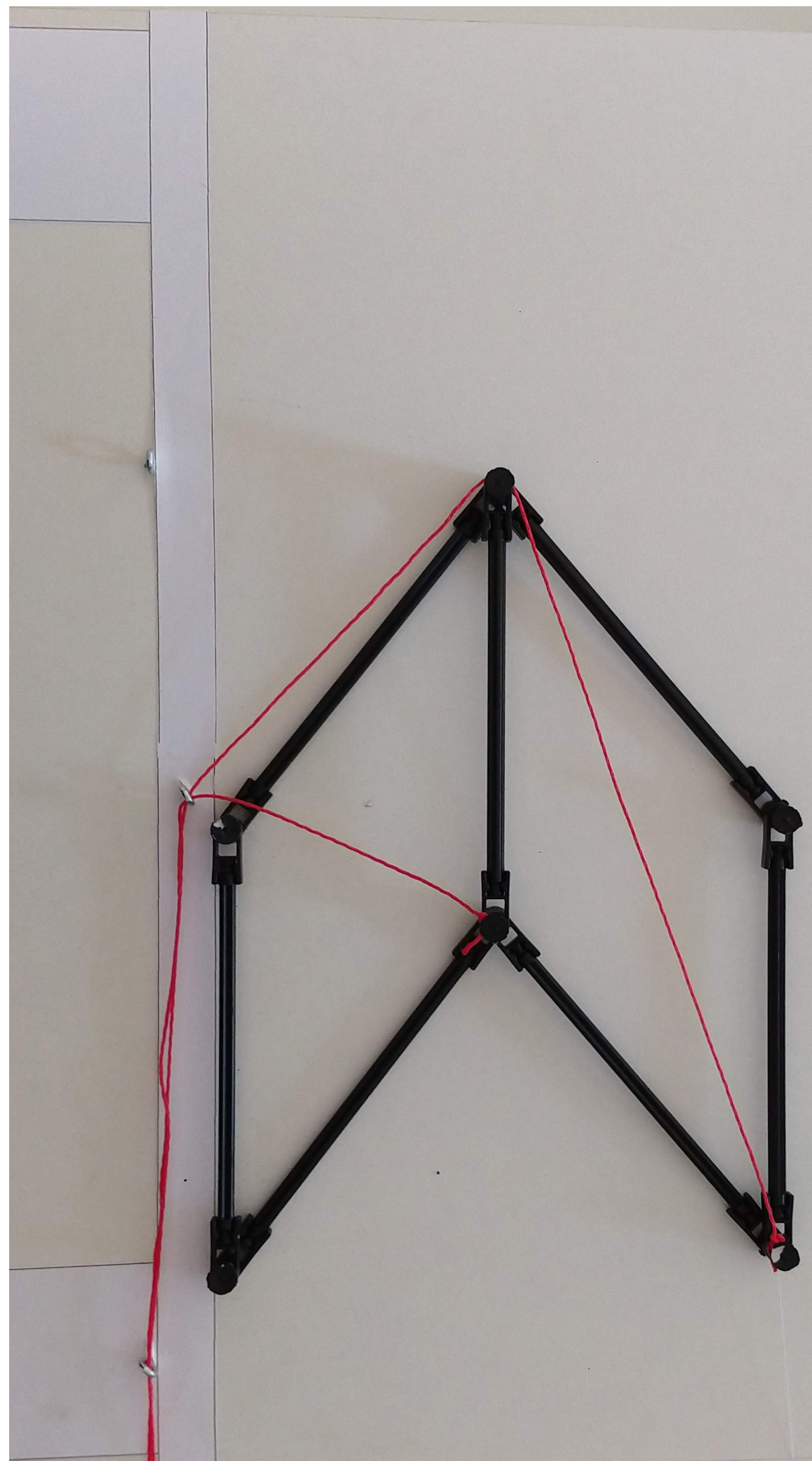
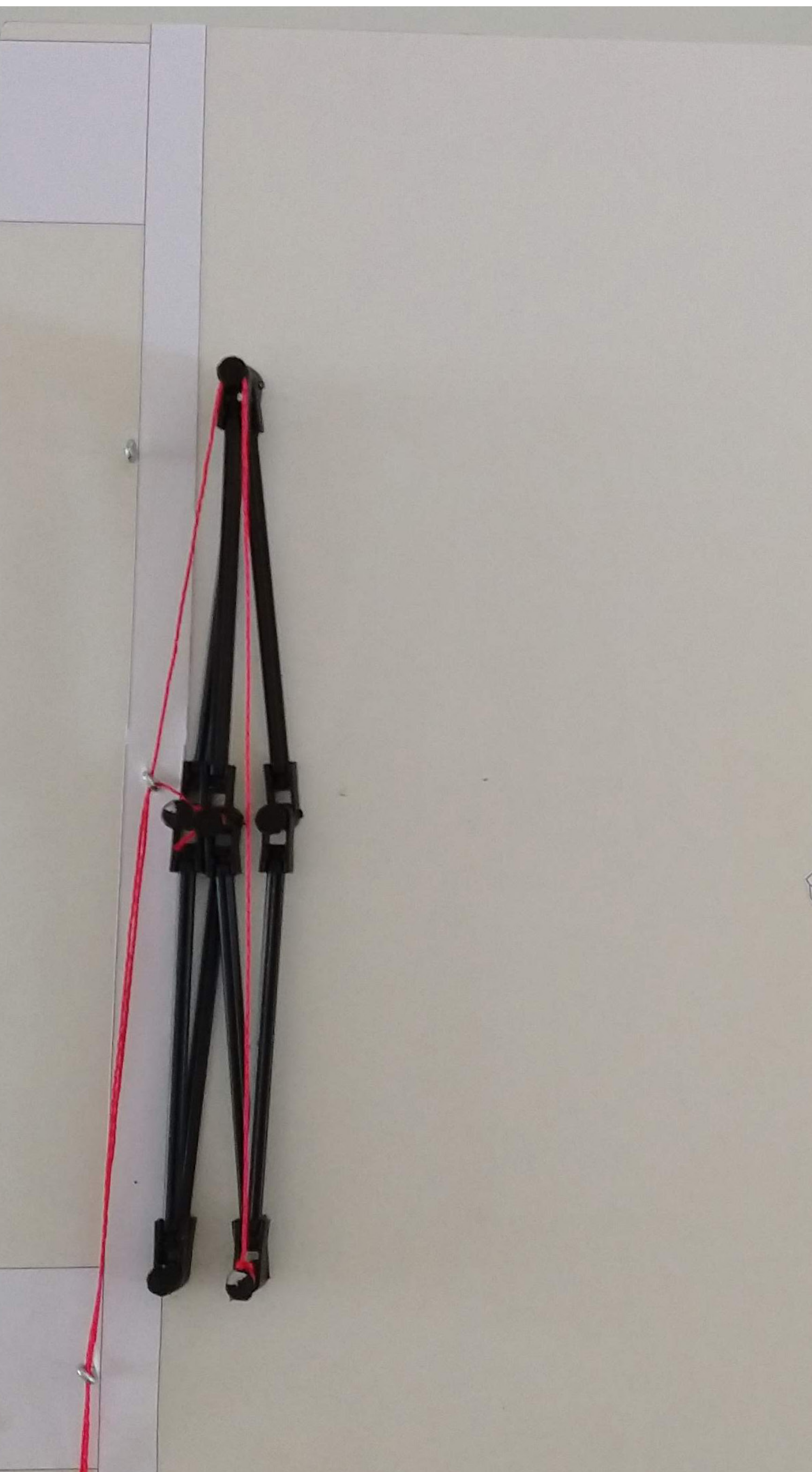
(Source: Parker)



# WINCH

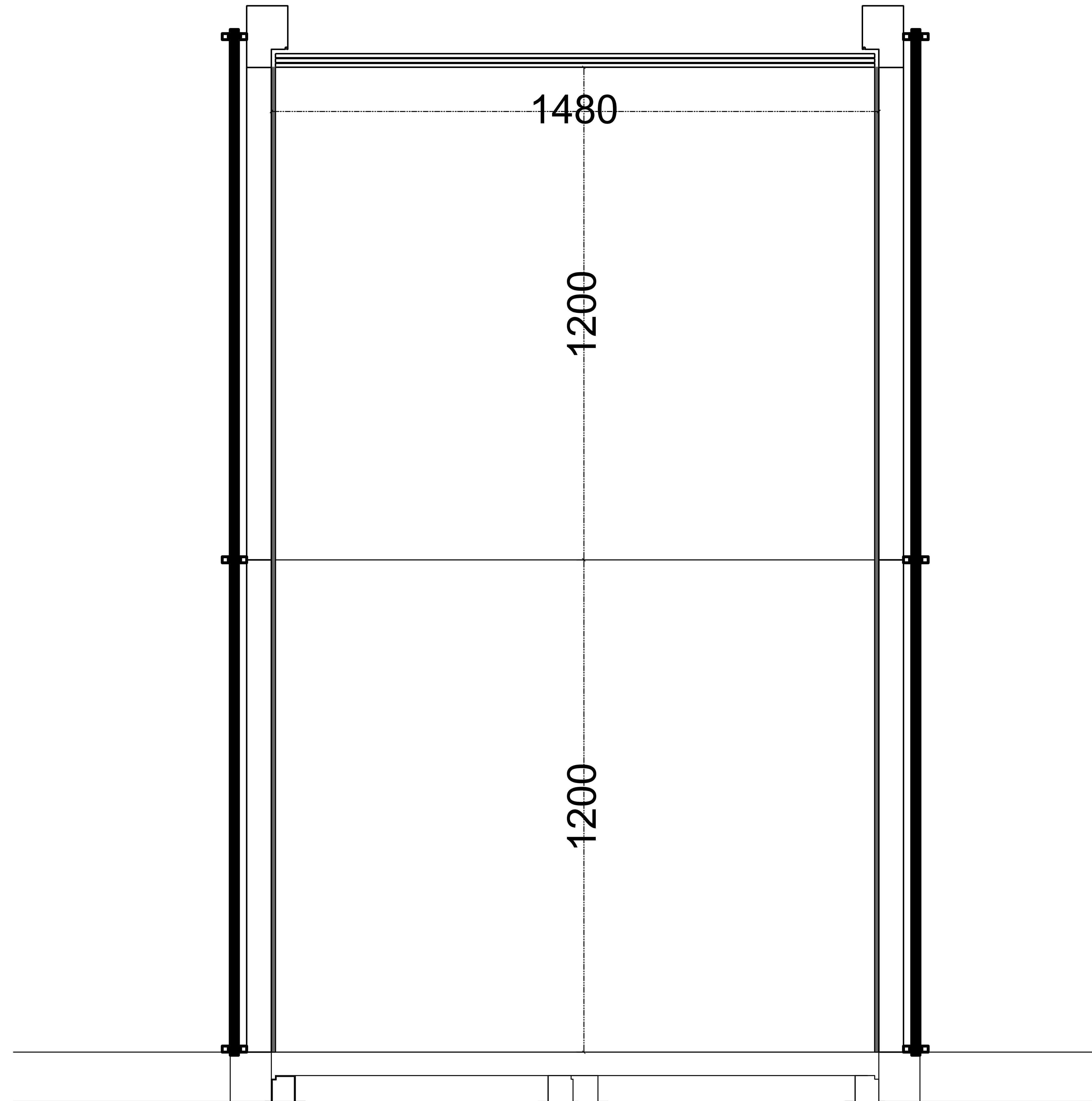
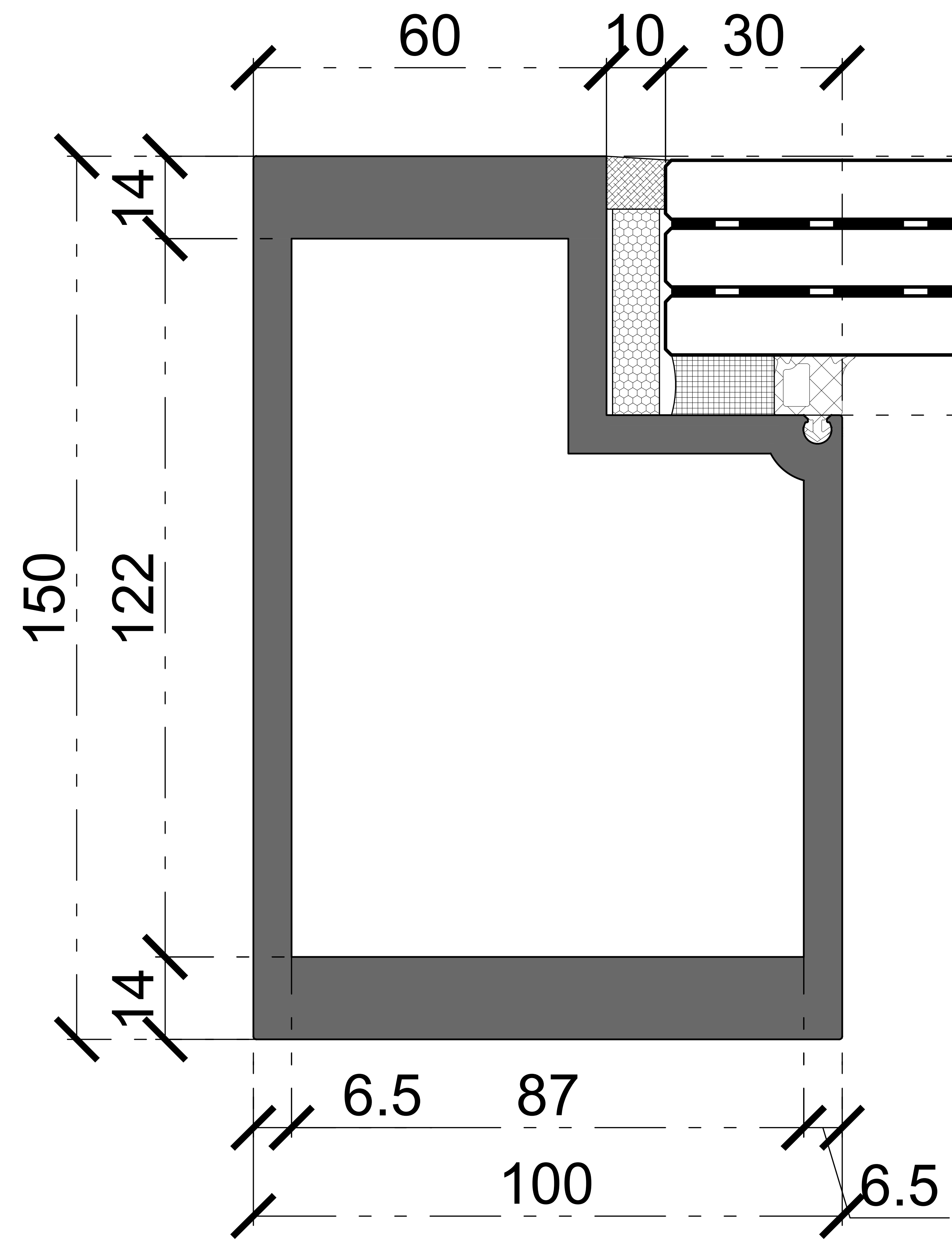






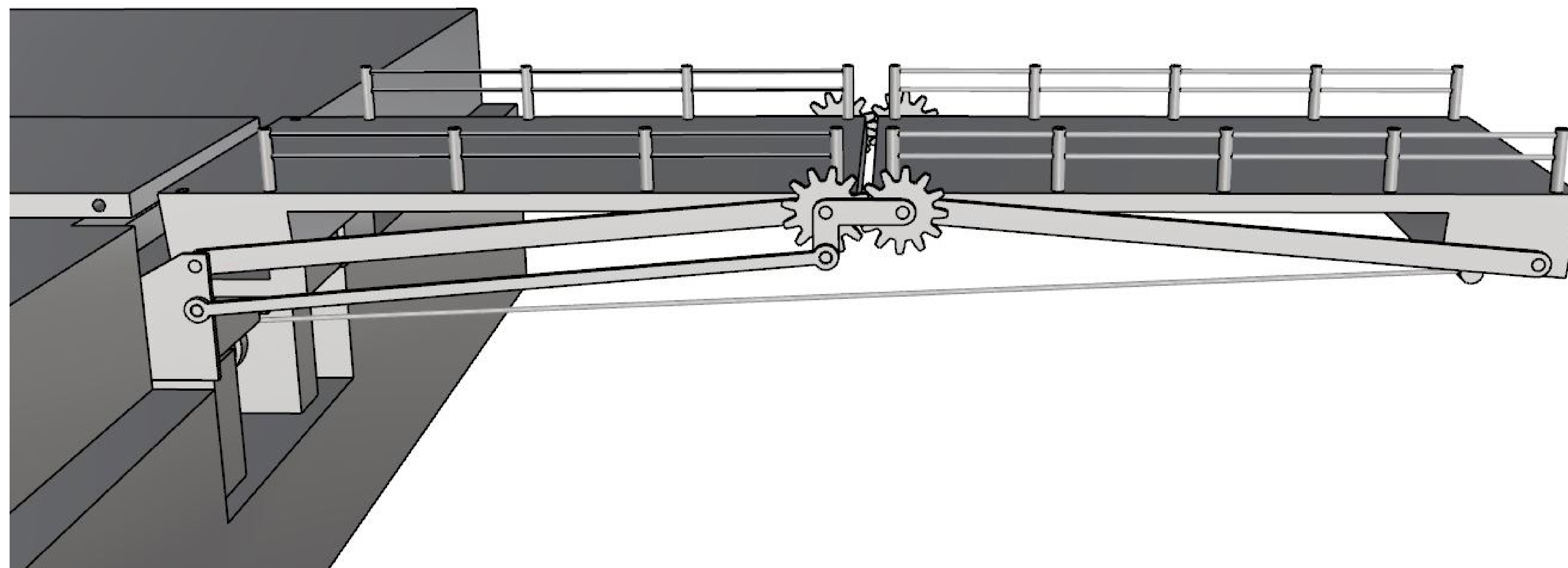
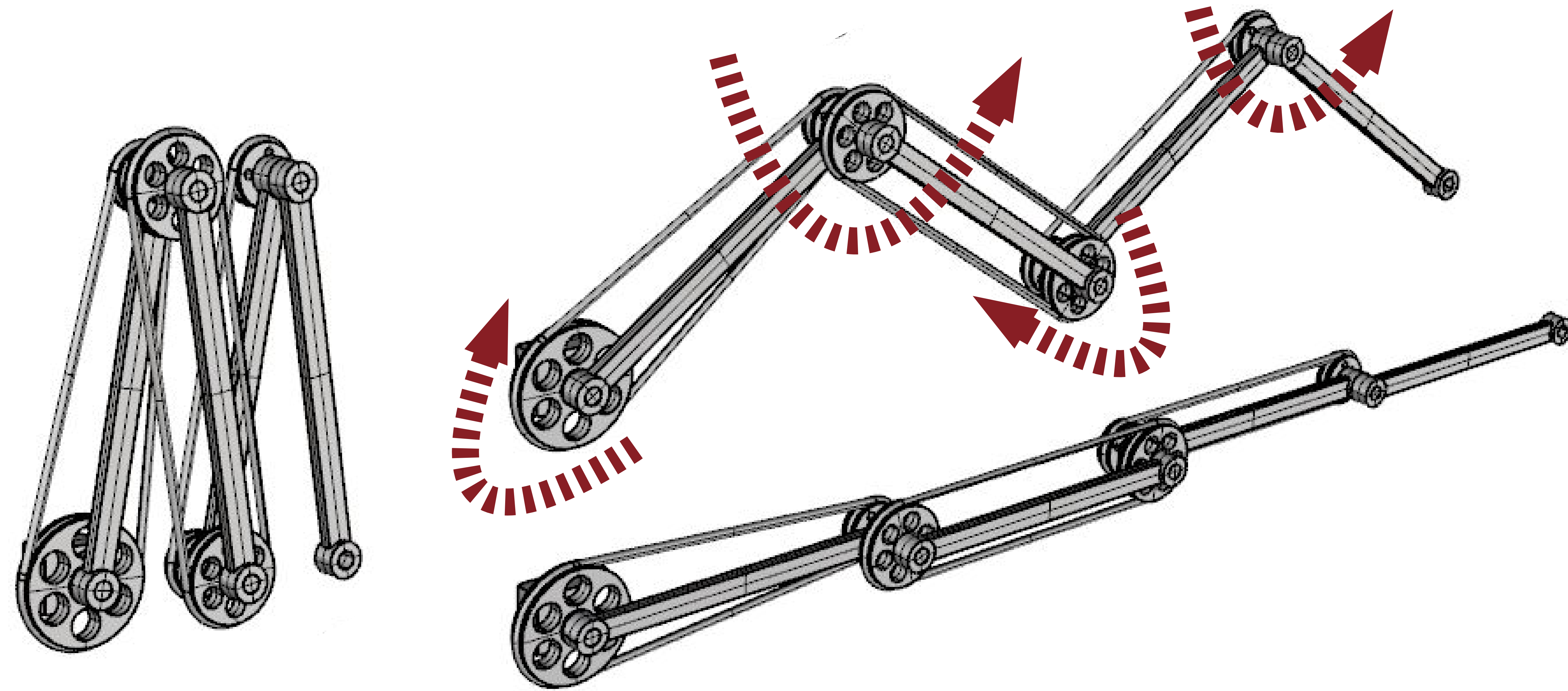


# WINCH



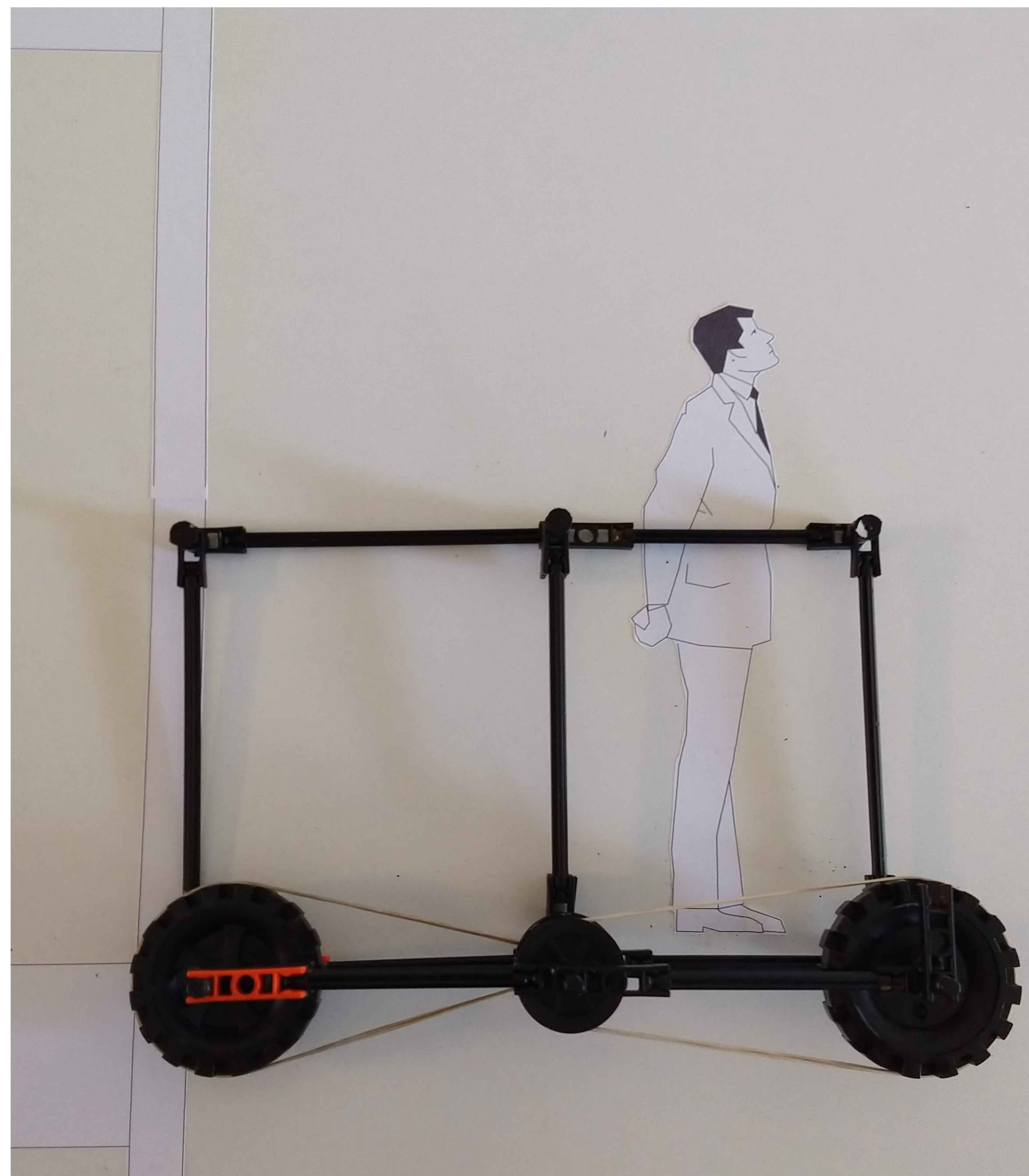
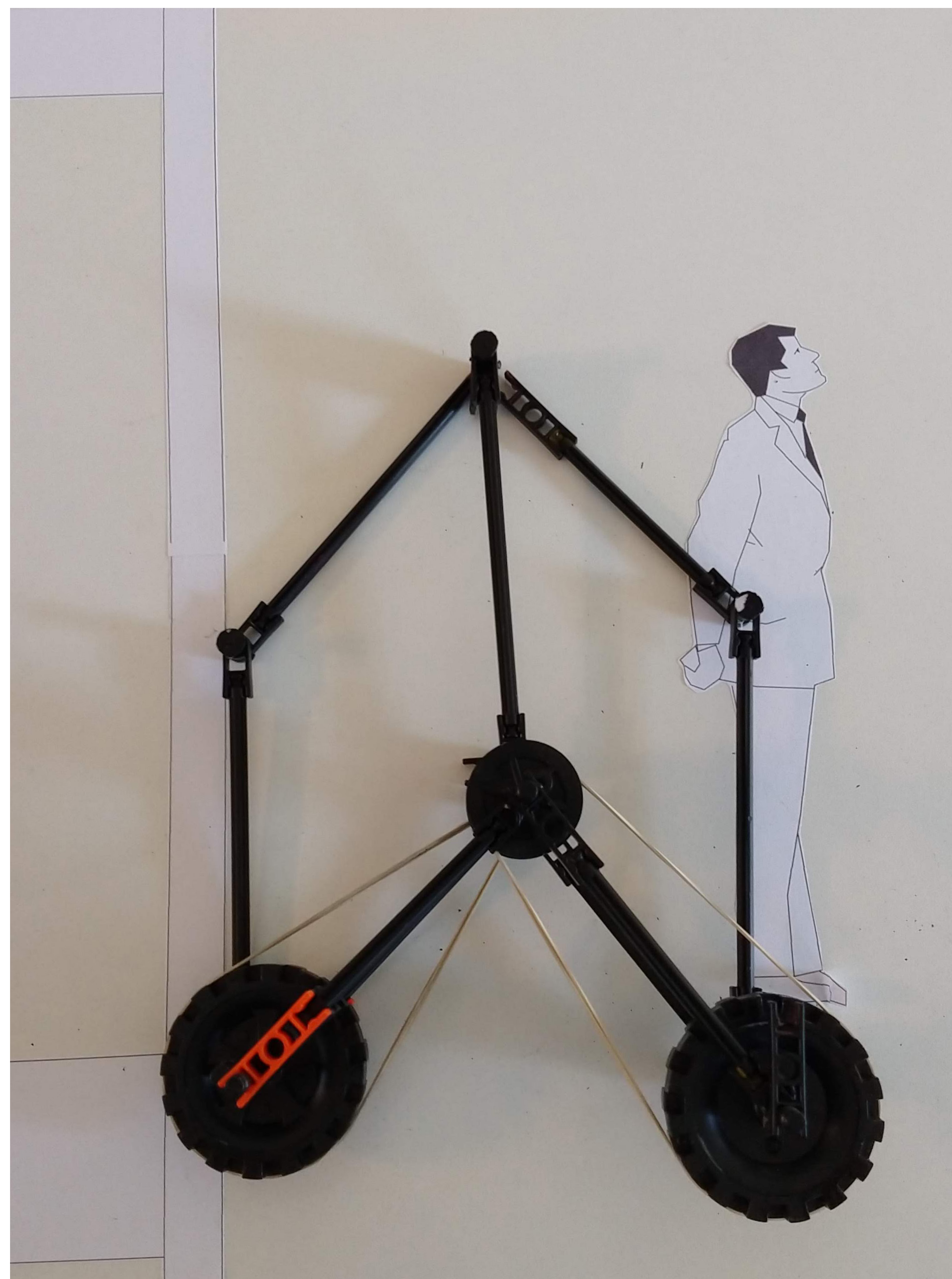


# CHAIN AND SPROCKET



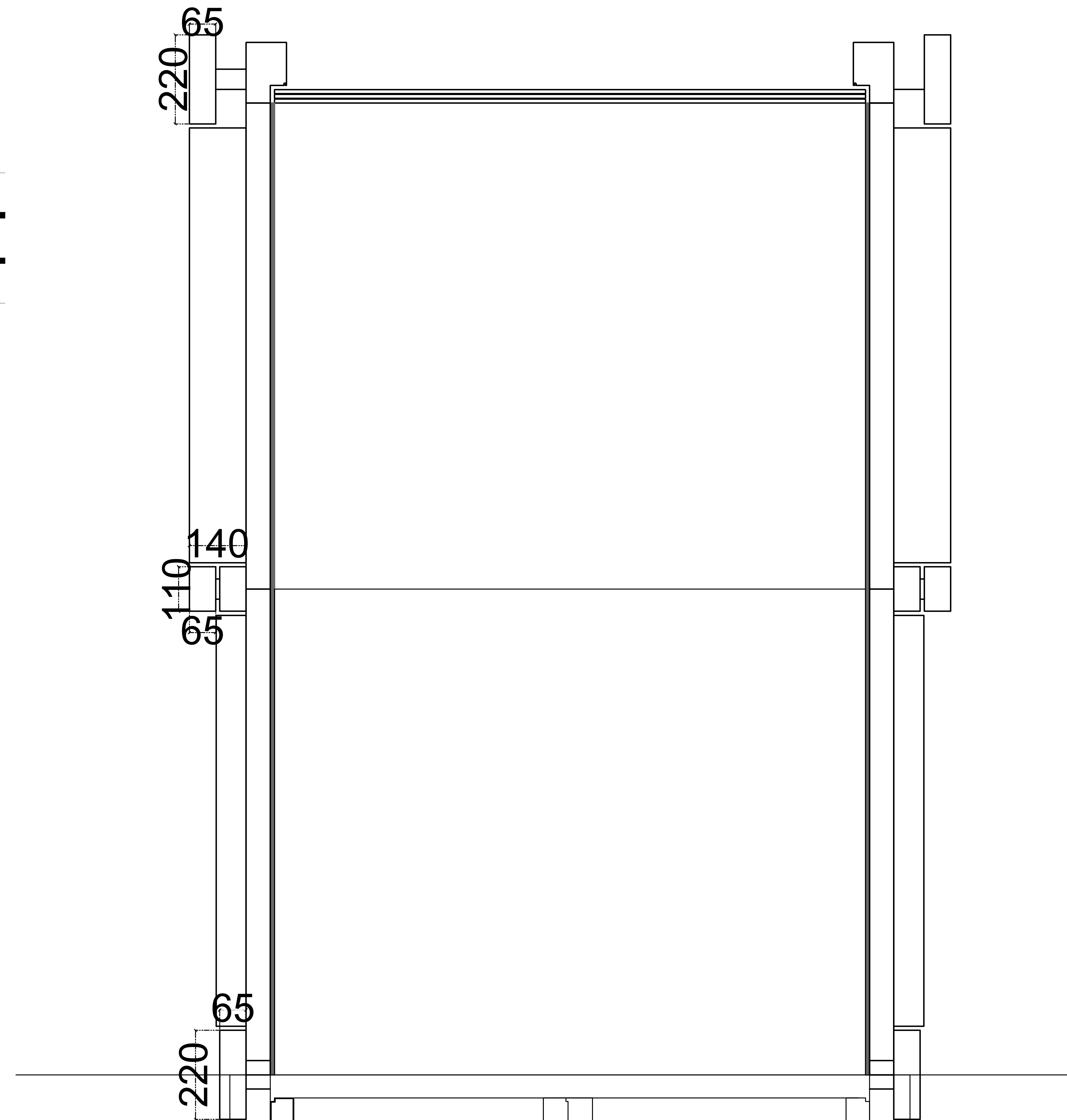
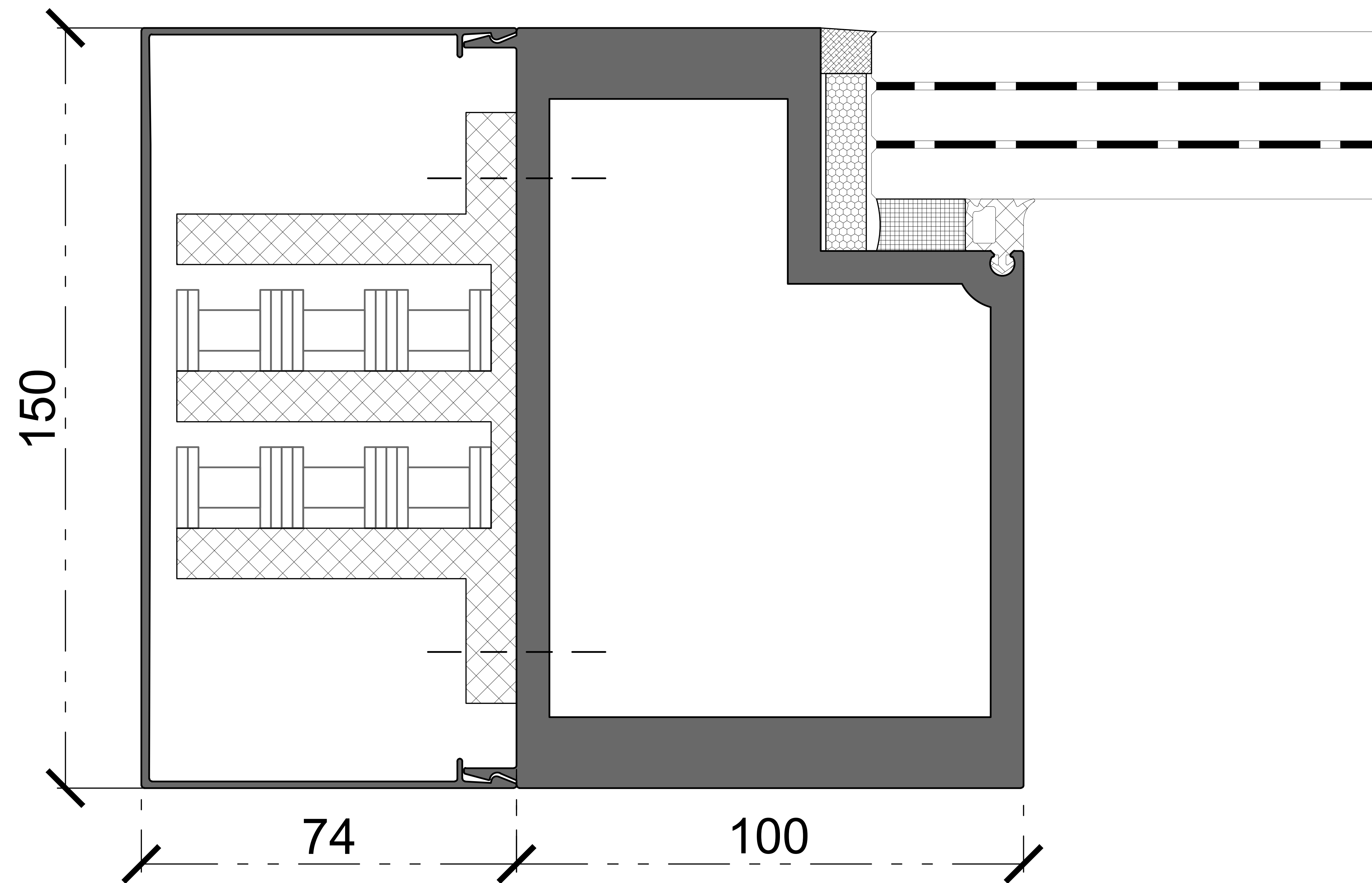
(Source: Thanq)







# CHAIN AND SPROCKET

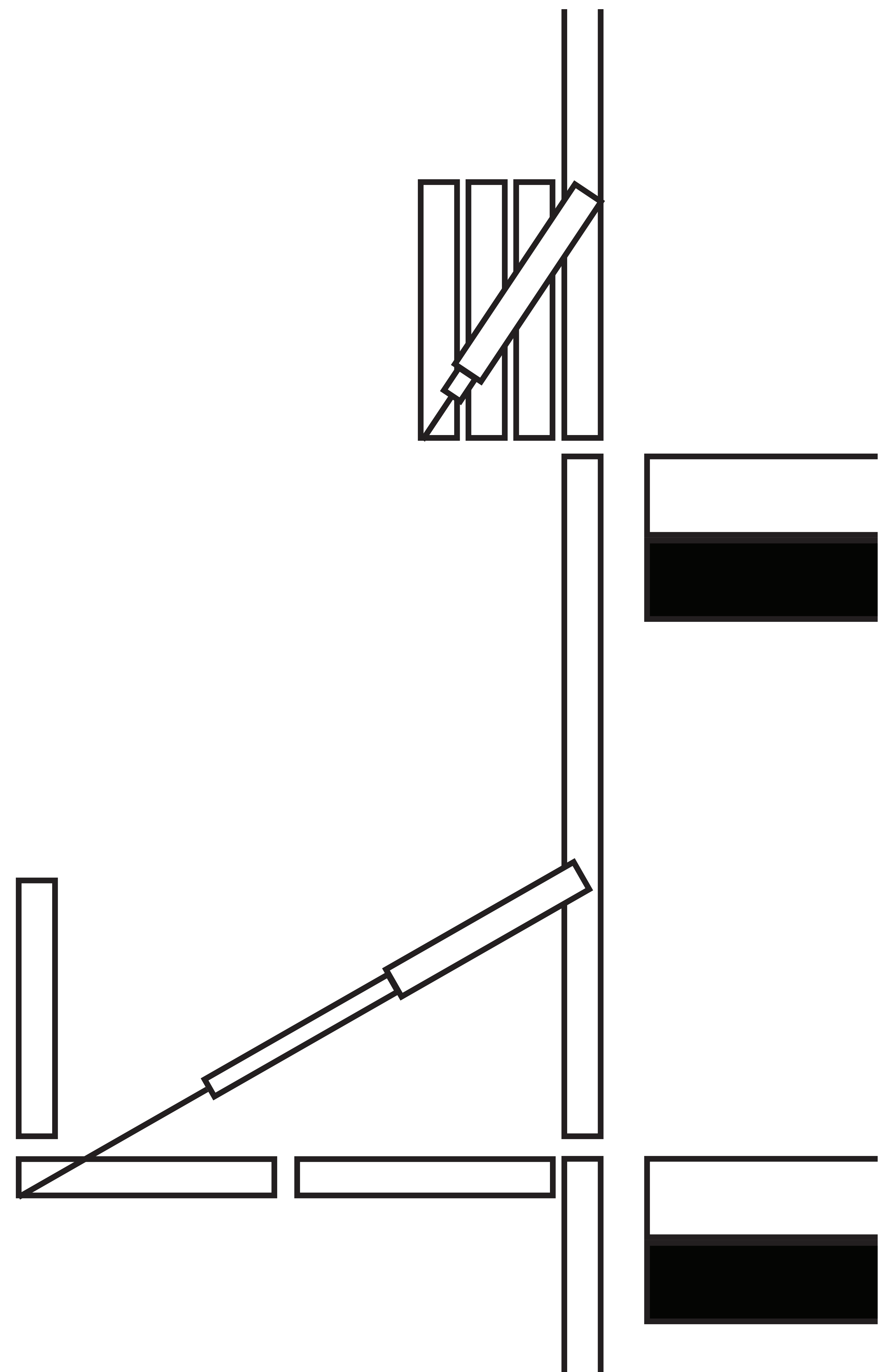




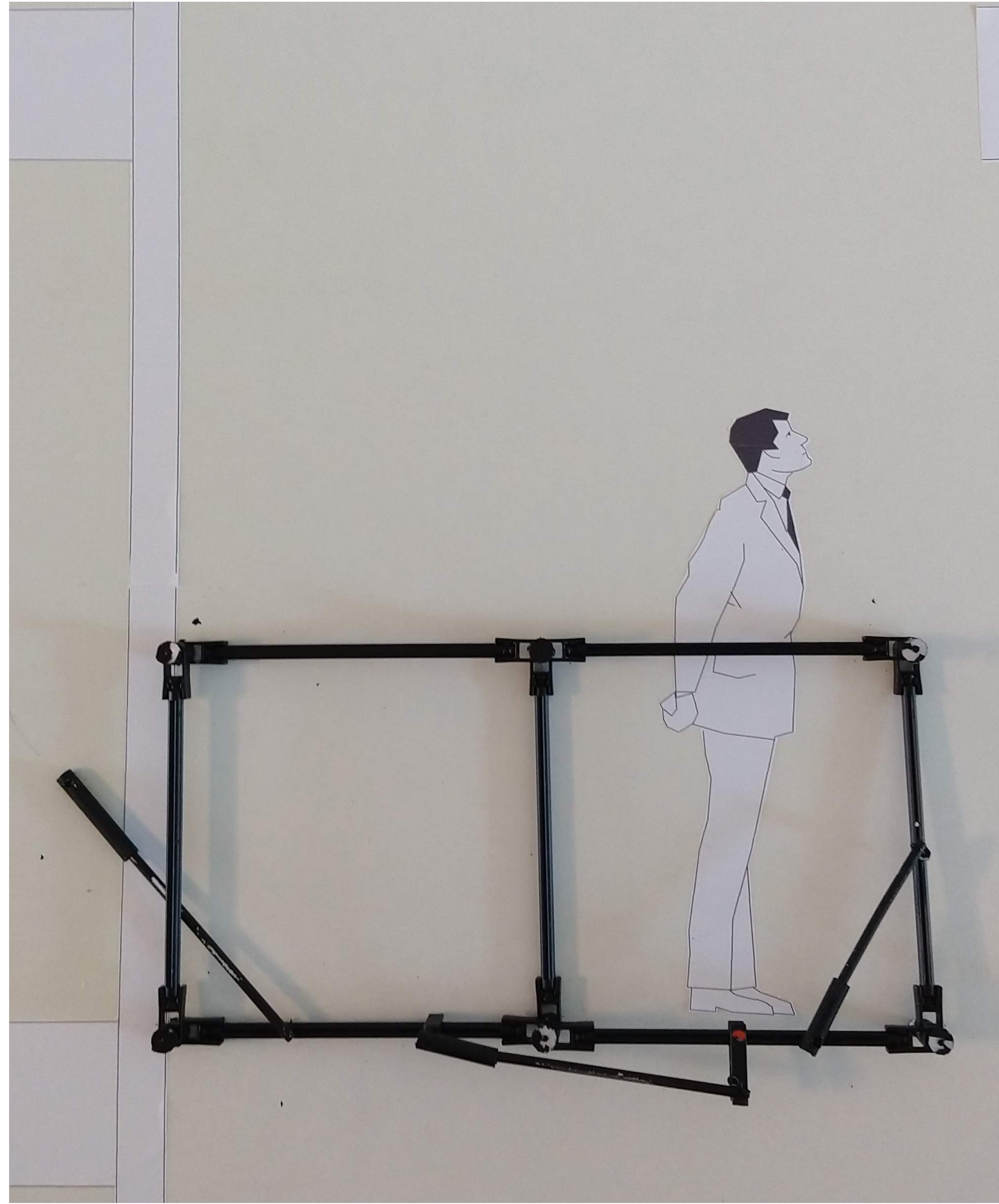
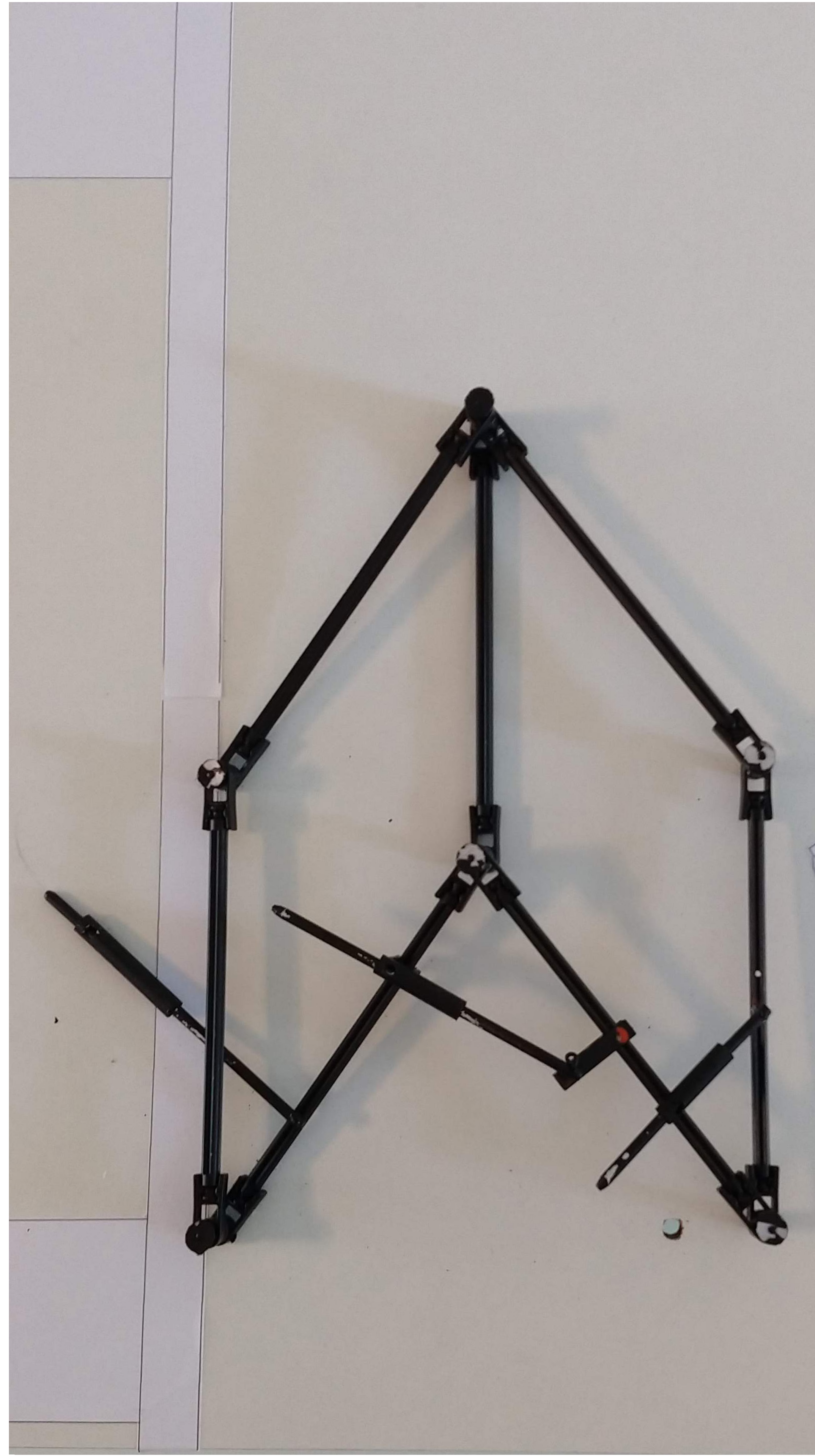
# HYDRAULIC CYLINDERS



(Source: German alibaba)

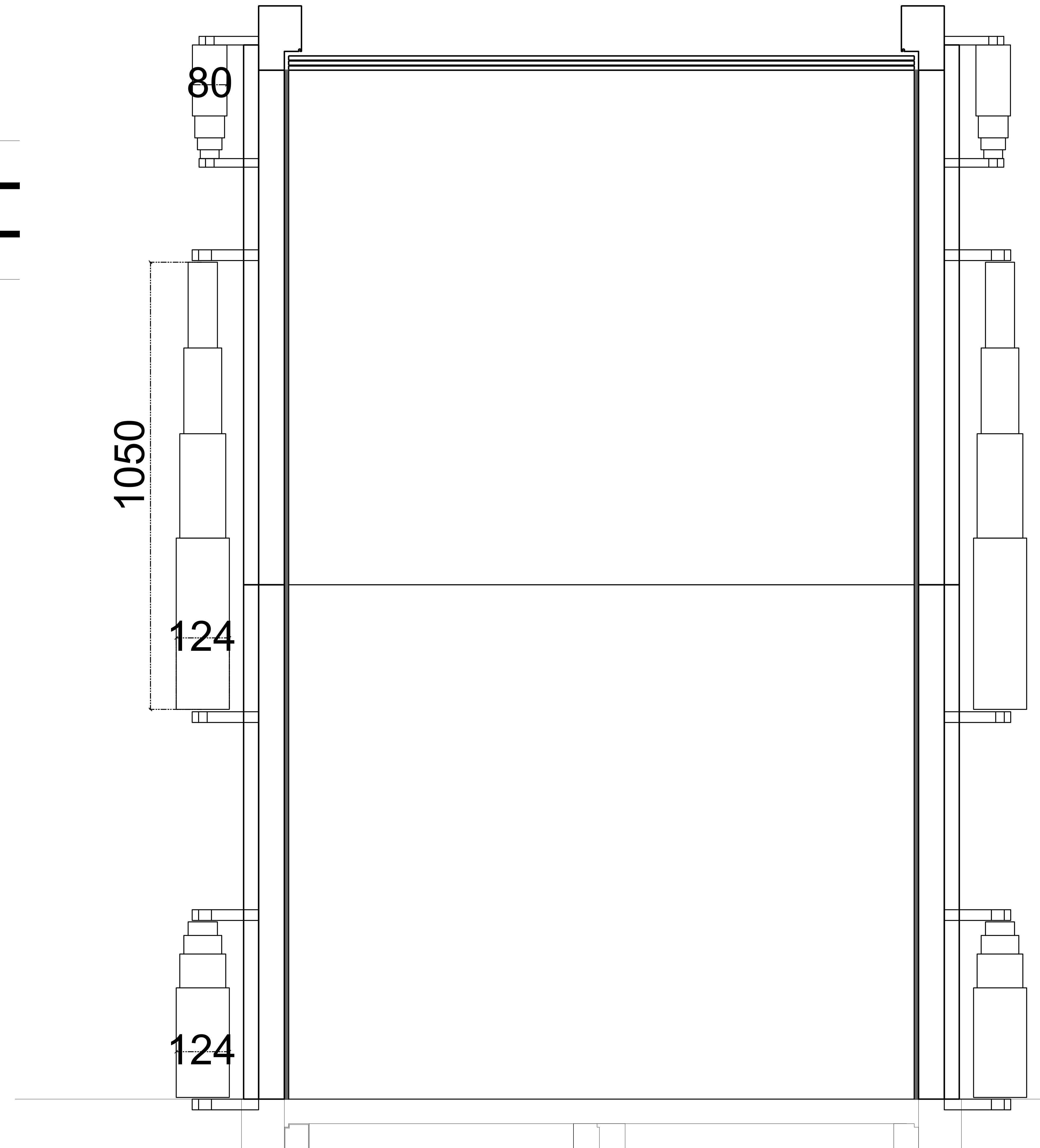
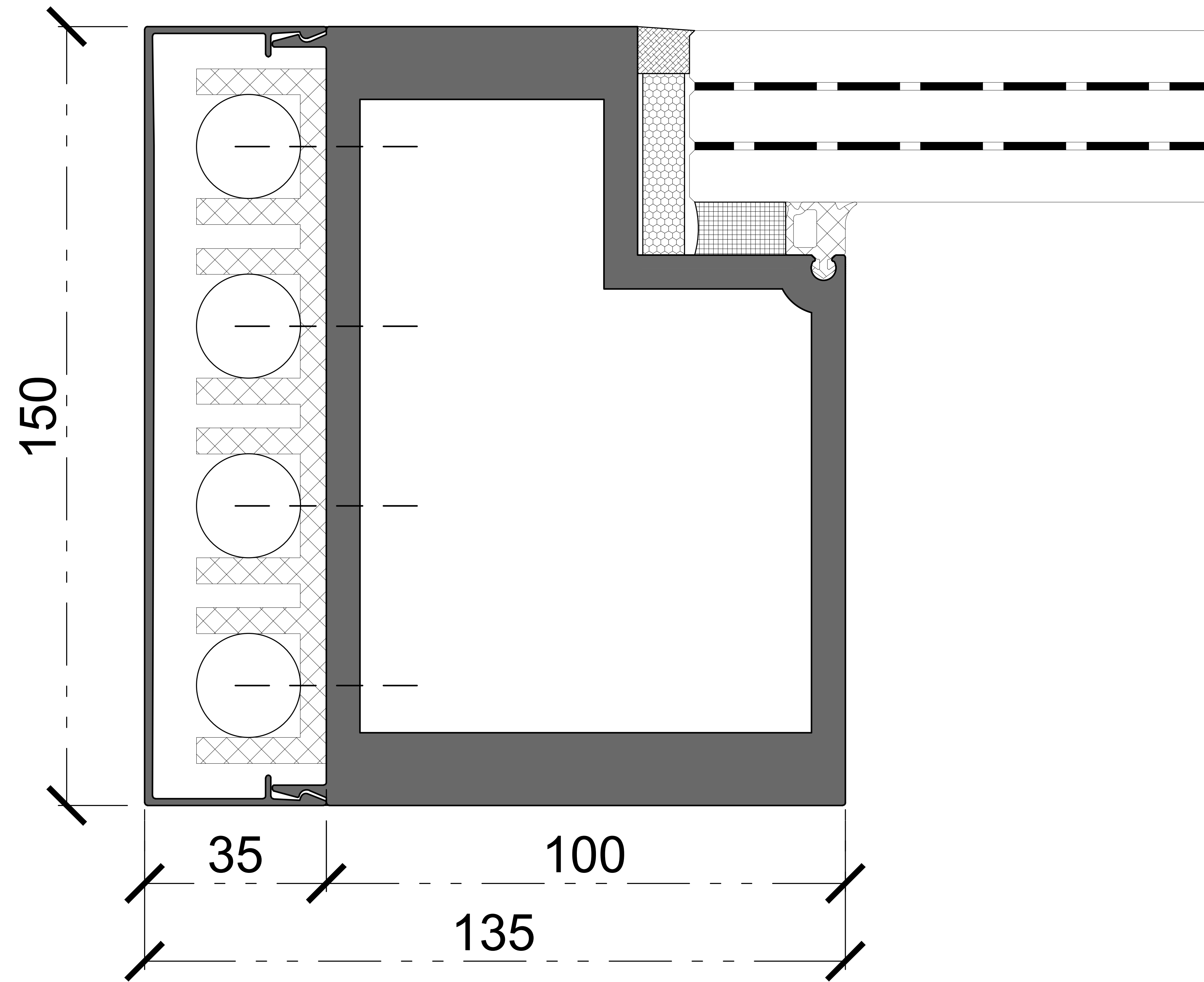






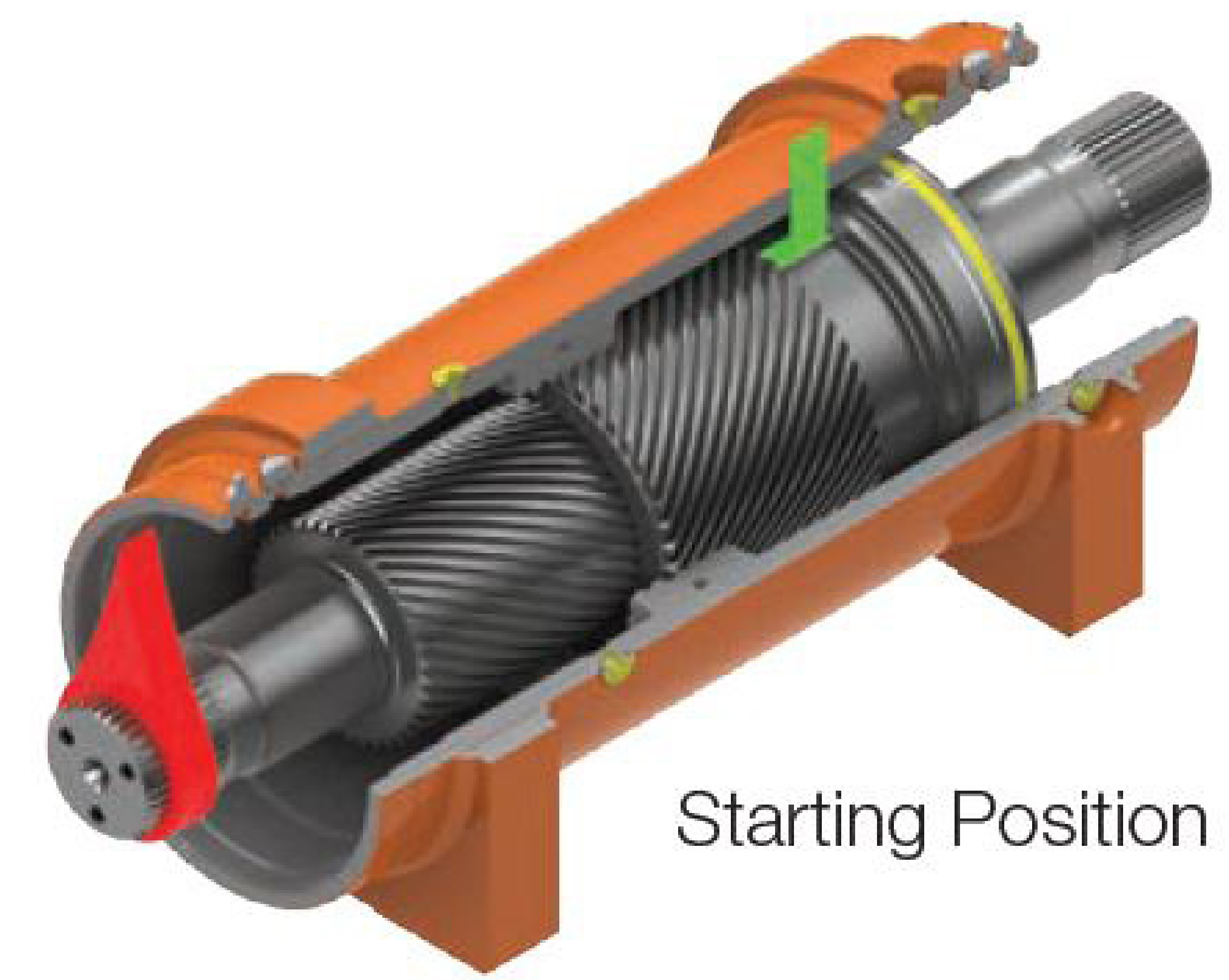
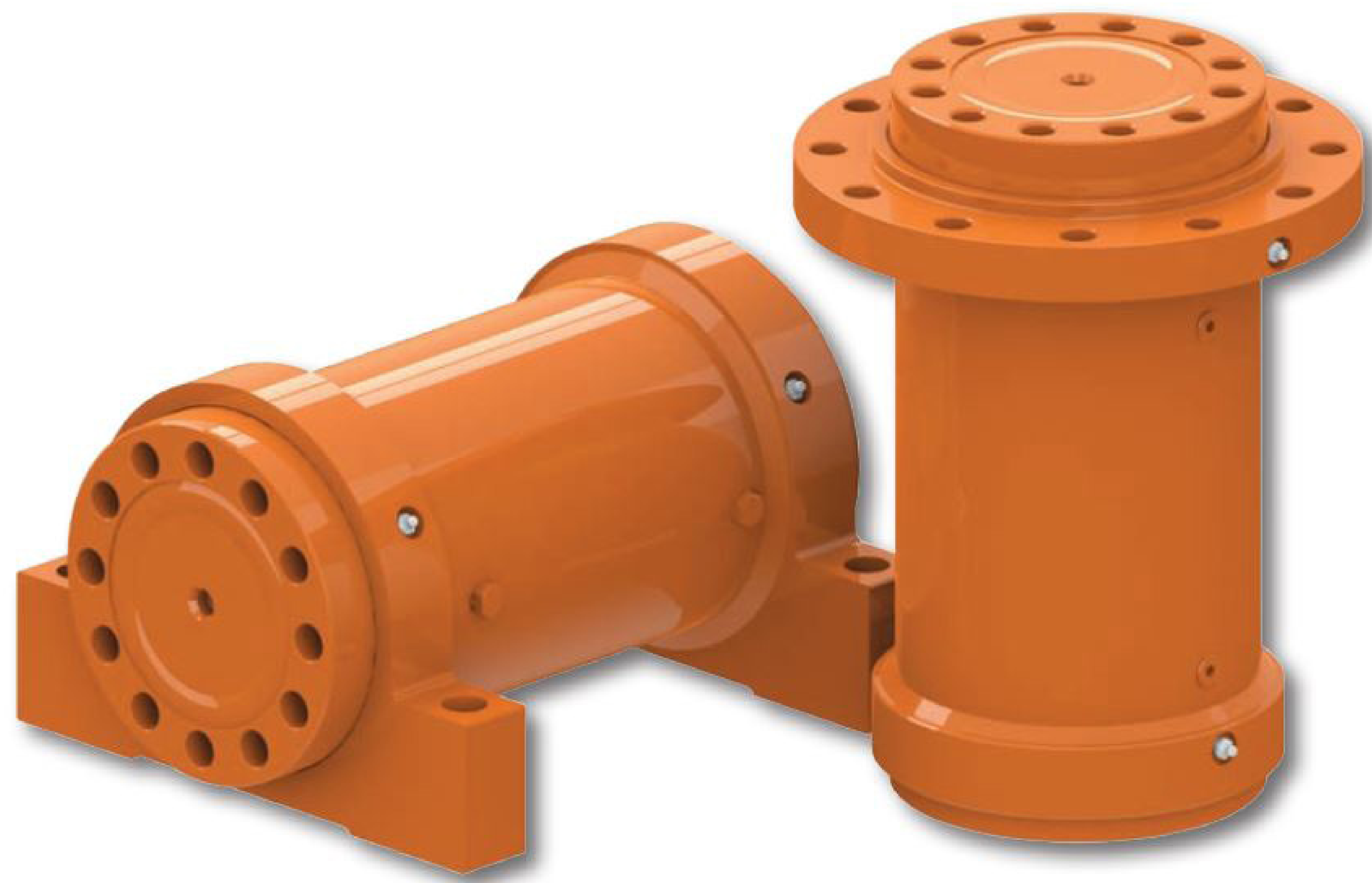


# HYDRAULIC CYLINDERS

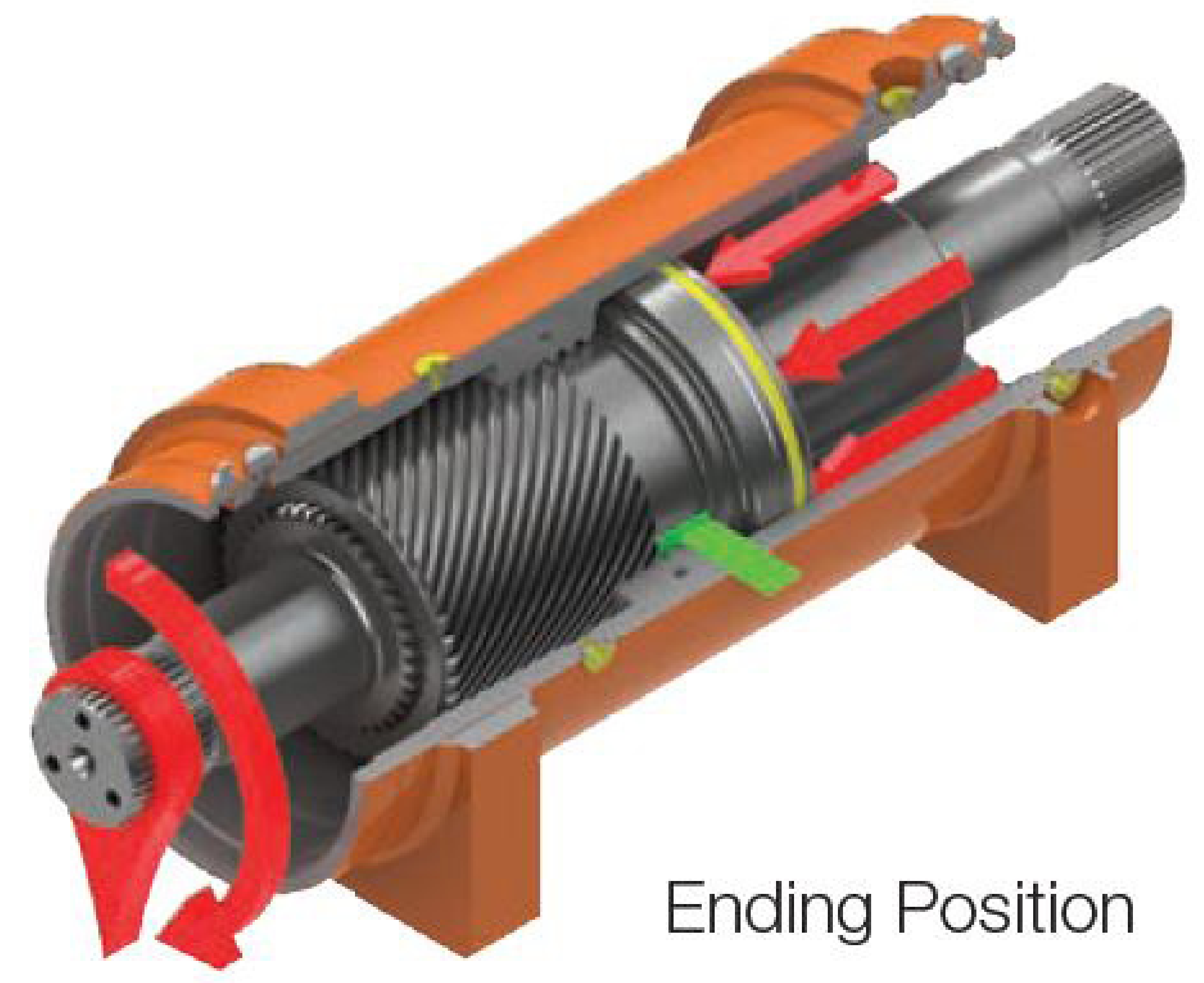




# HYDRAULIC ROTARY ACTUATOR



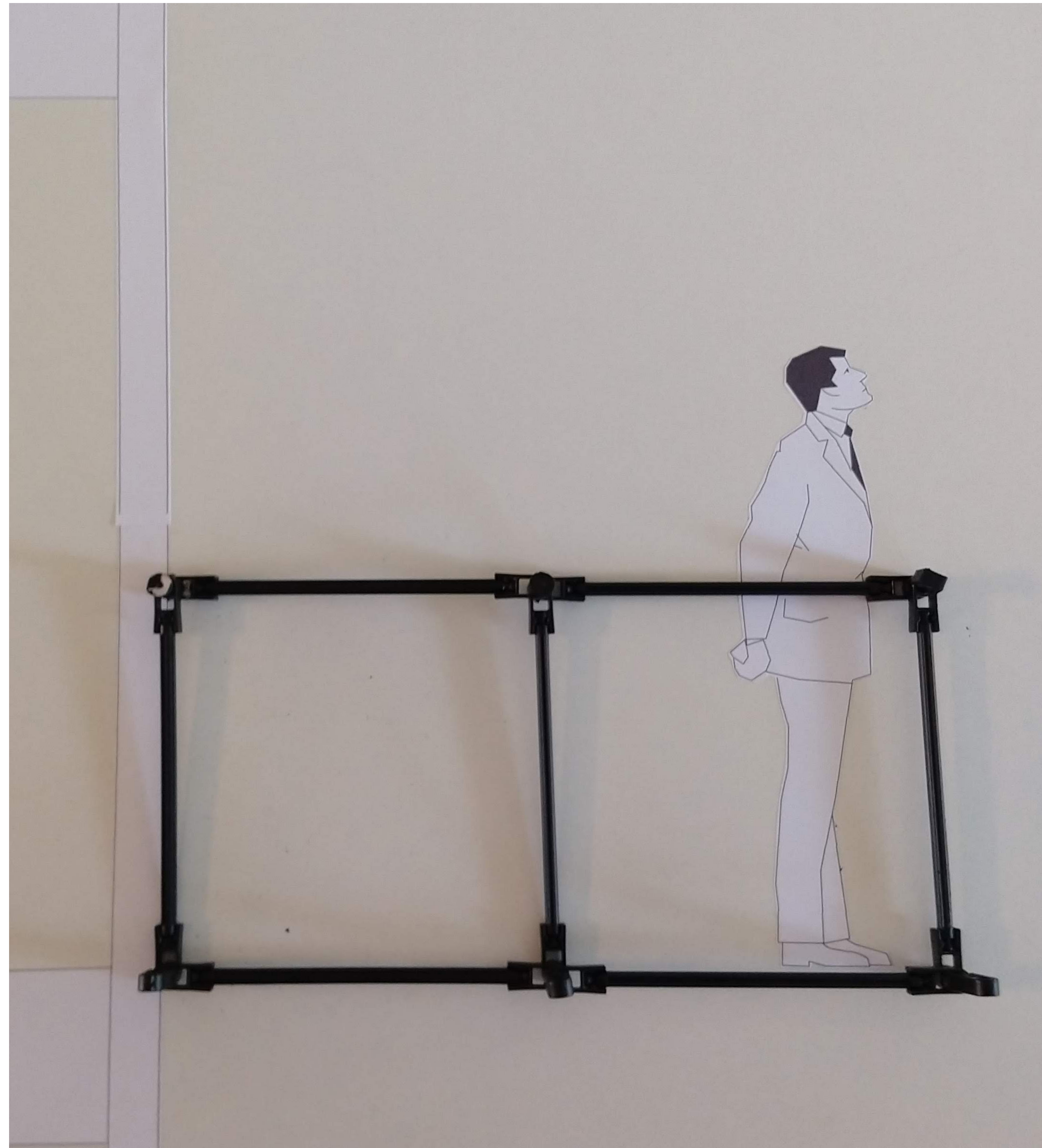
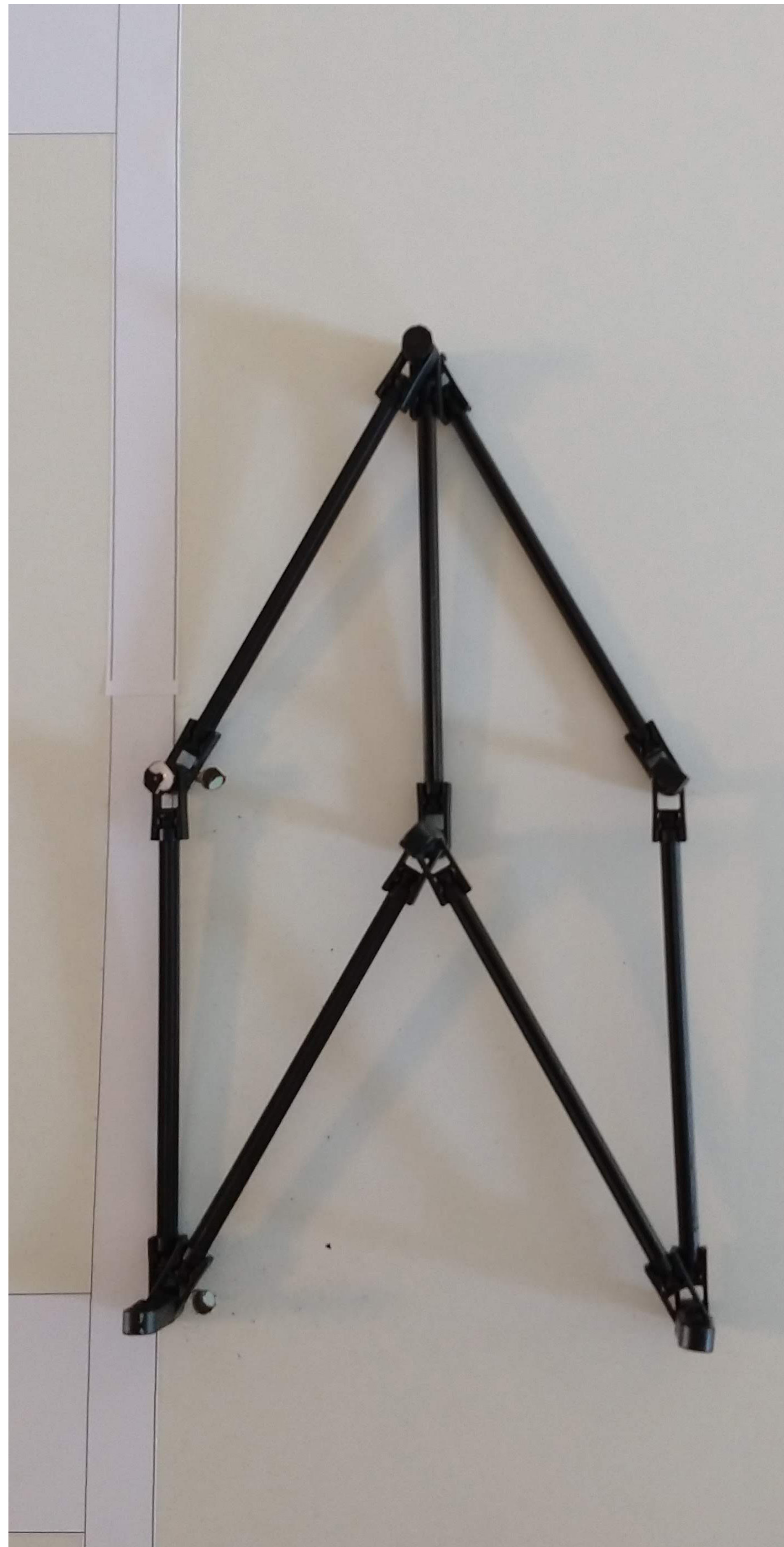
Starting Position



Ending Position

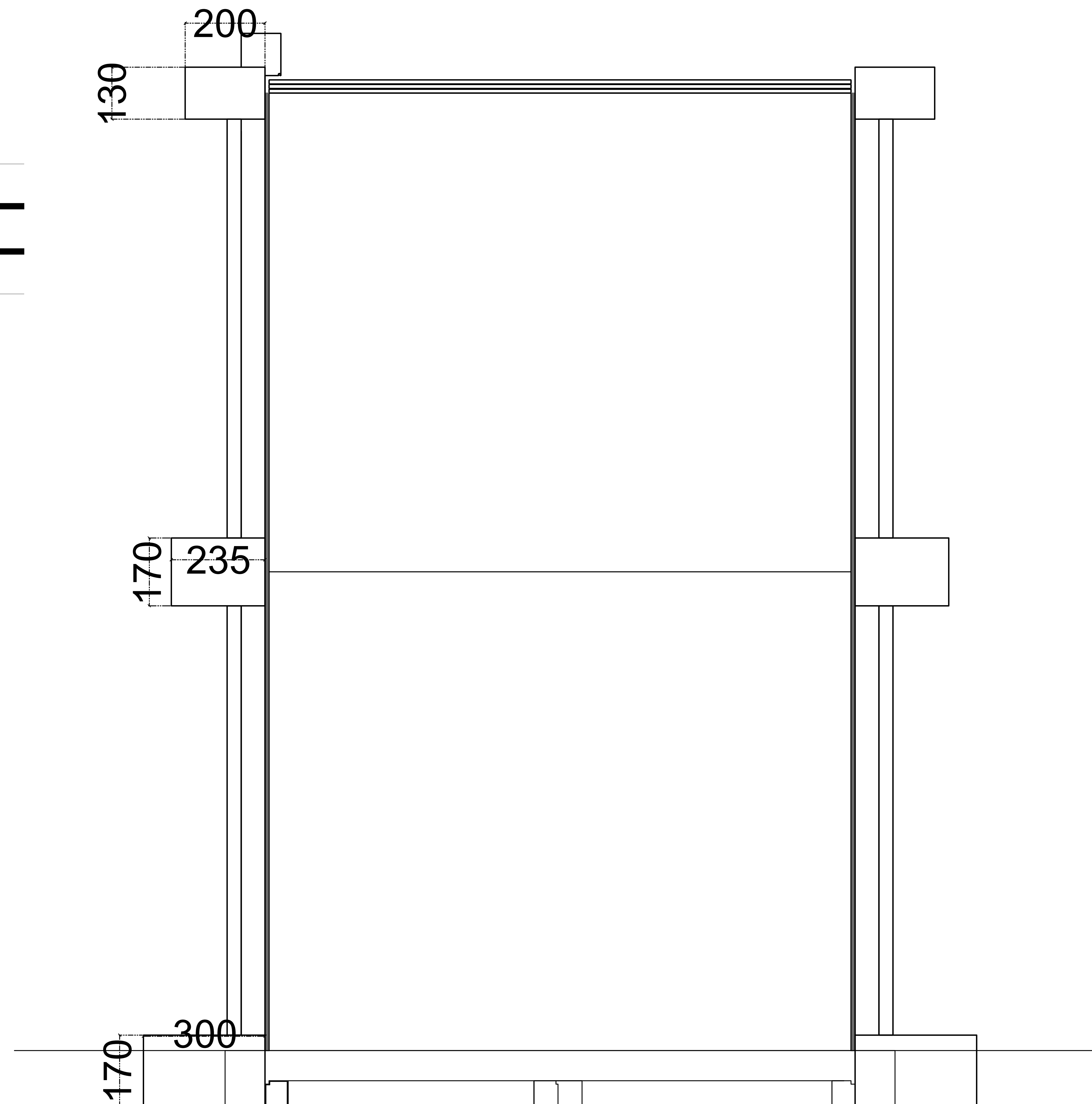
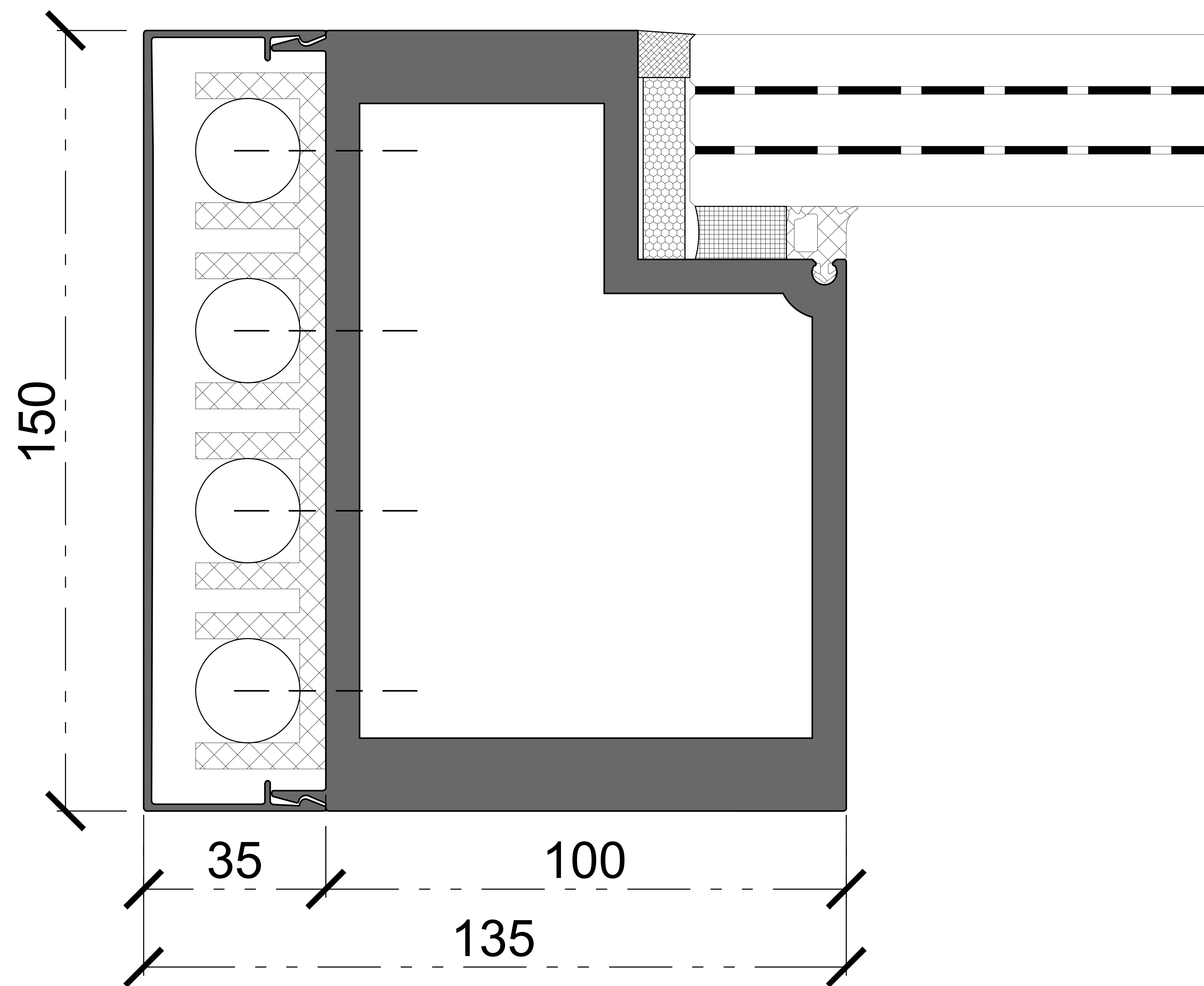
(Source: Parker)







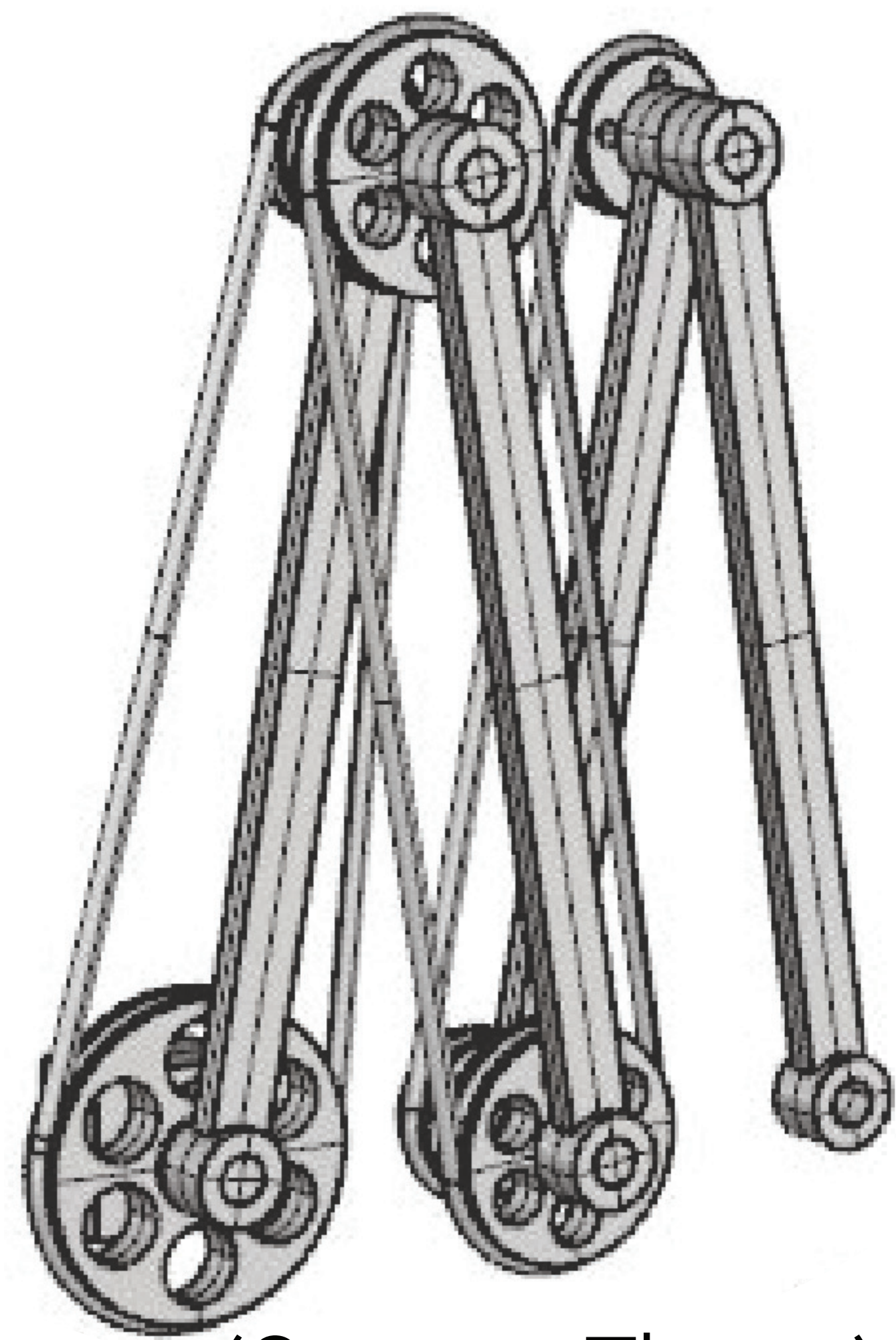
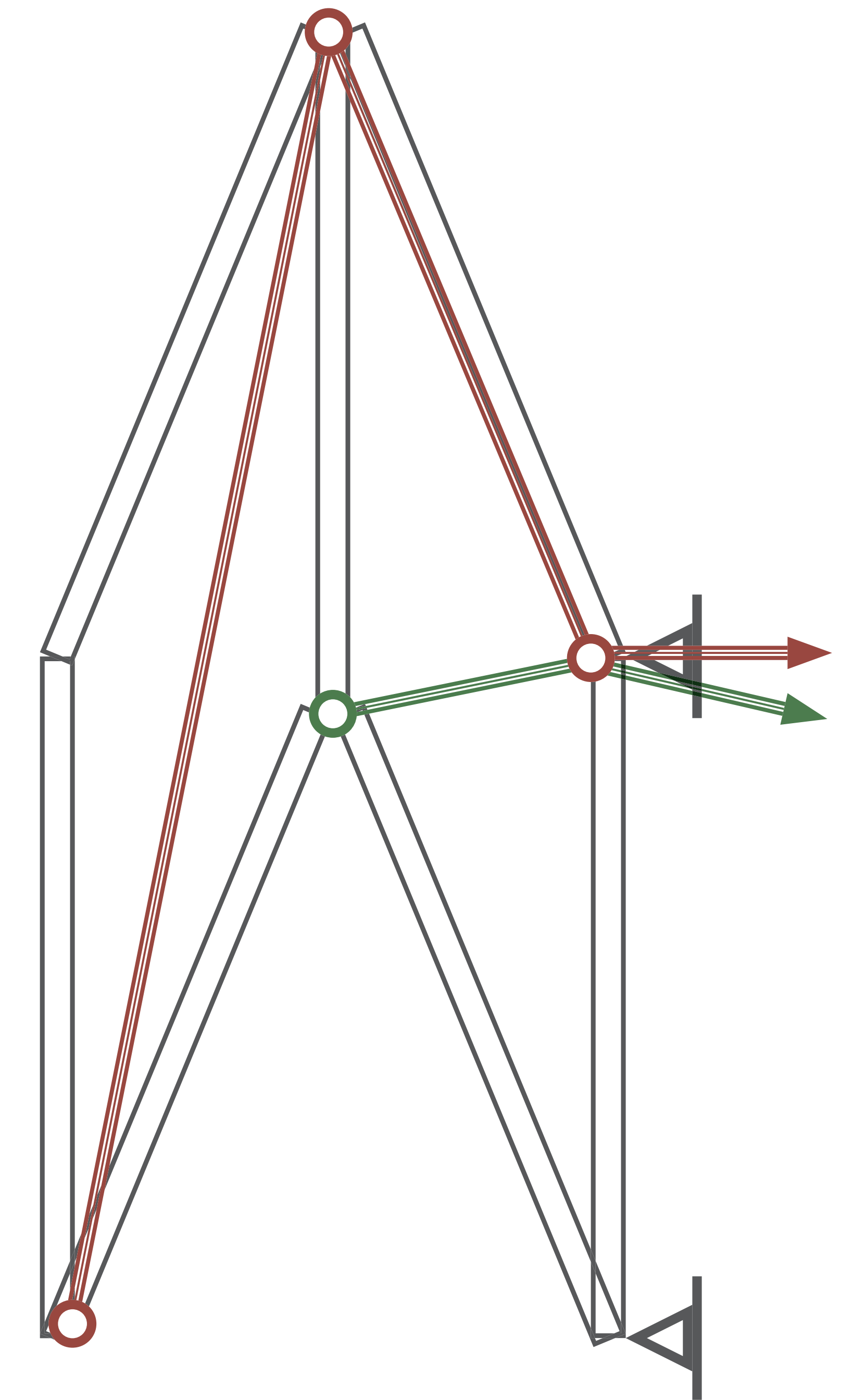
# HYDRAULIC ROTARY ACTUATOR





# COMPARISMENT

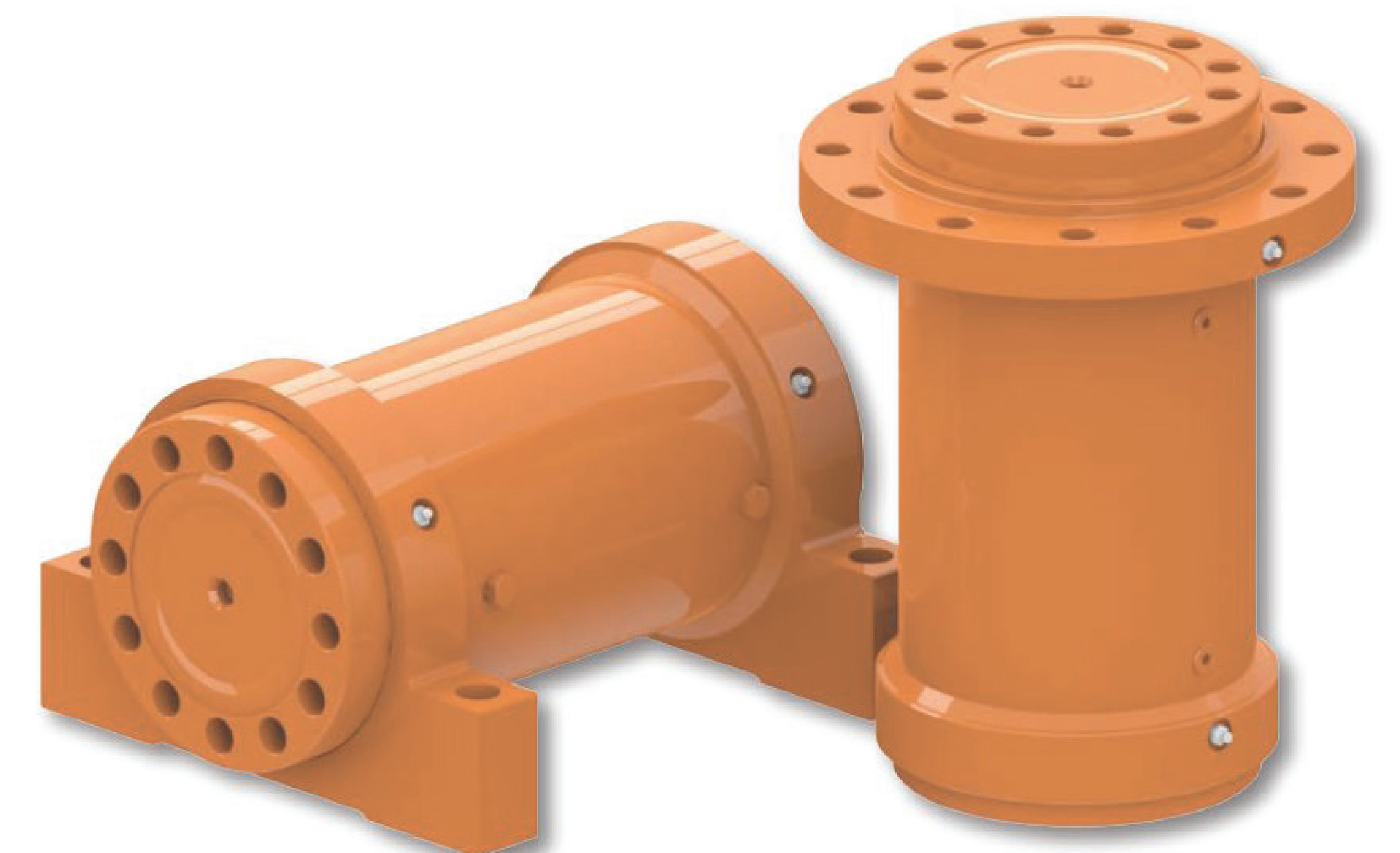
Winch	€ 2.000,-
Chain And Sprocket	€ 4.400,-
Hydraulic Cylinders	€ 4.500,-
Hydraulic rotary actuator	€ 32.200,-



(Source: Thanq)



(Source: German alibaba)



(Source: Parker)







# COST TOTAL BALCONY

Parts & labour	€7300
Construction	€2000

Total cost €9300



# COMPARISMENT WITH BLOOMFRAME

BLOOMFRAME



(Source: Bloomframe)

Dimensions

↓ 1100  
 ↔ 1752 / 2352 / 3052  
 m<sup>2</sup> 1,9 / 2,5 / 3,3

Cost with facade  
 1pcs € 10,000 +

B-TOWER ROTTERDAM  
 TYPE 1



(Source: Scheldebouw)

Dimensions

↓ 2300  
 ↔ 4950  
 m<sup>2</sup> 11,4

Cost  
 1pcs € 7,000 - 10.000

Facade € 750 m<sup>2</sup>

GREENWICH LONDON  
 TYPE 3



(Source: Scheldebouw)

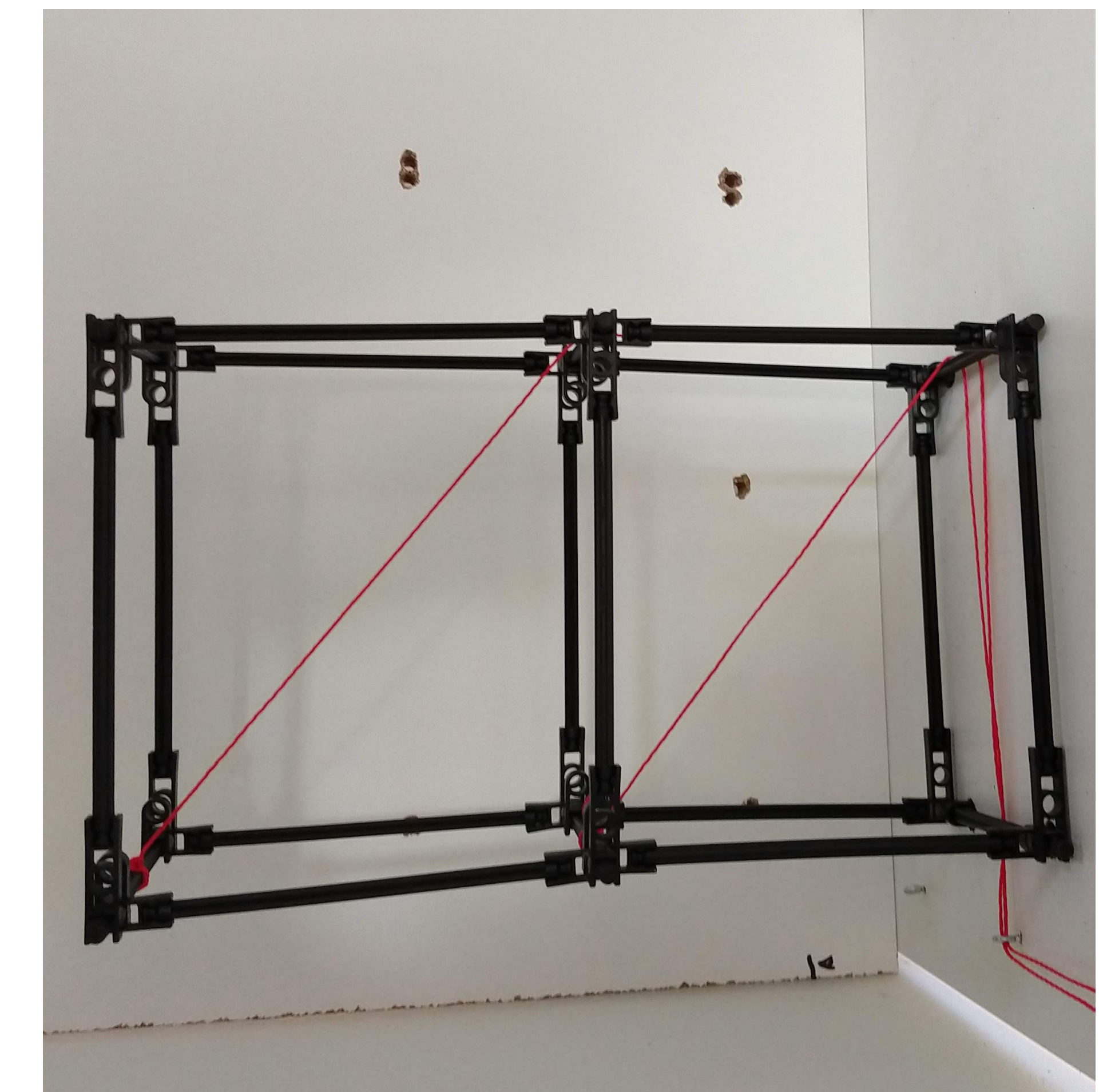
Dimensions

↓ 1200  
 ↔ 4500  
 m<sup>2</sup> 5,4

Cost  
 1pcs € 9.000 - 12.000

Facade € 1.250 m<sup>2</sup>

WINCH



Dimensions

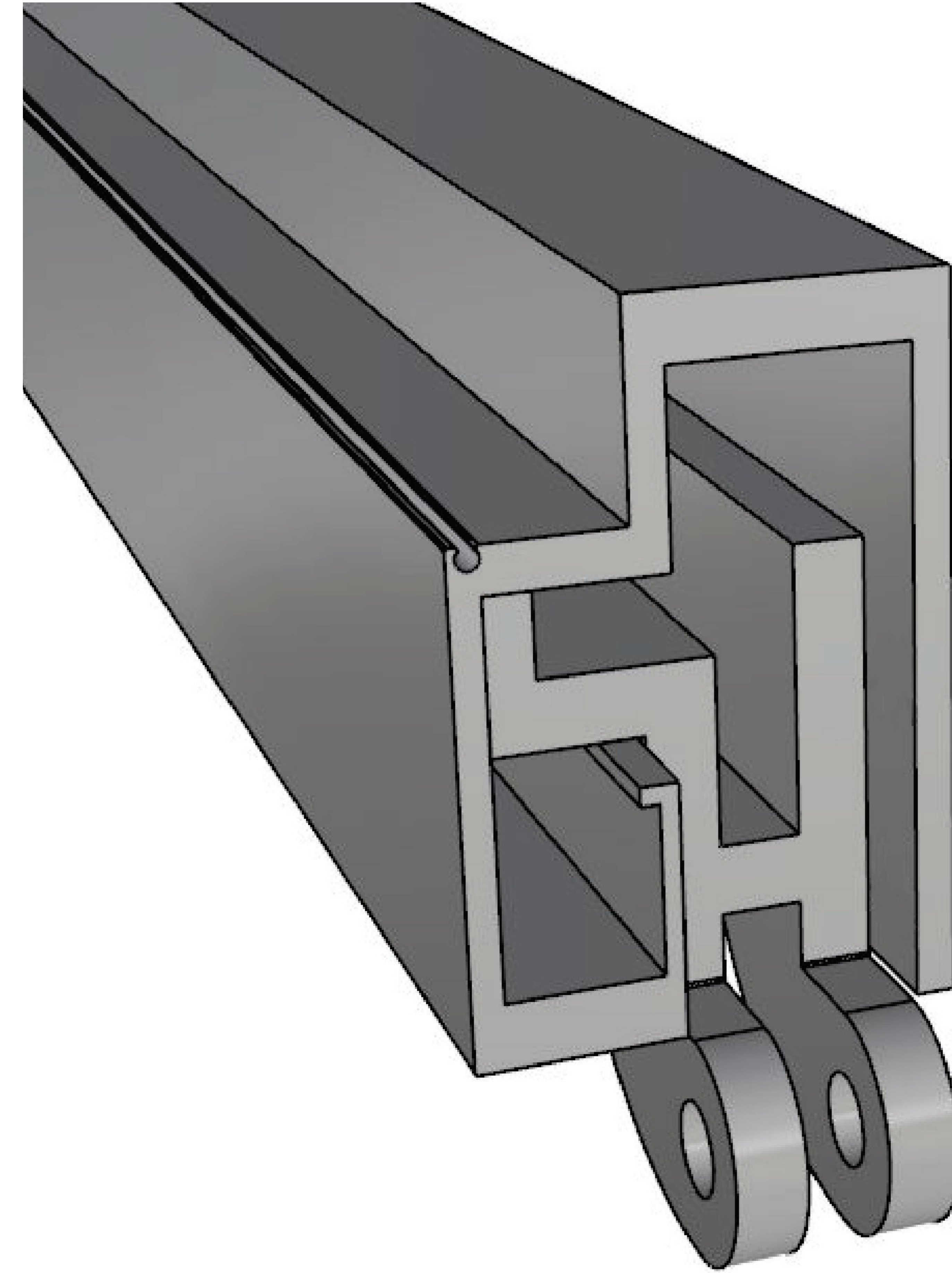
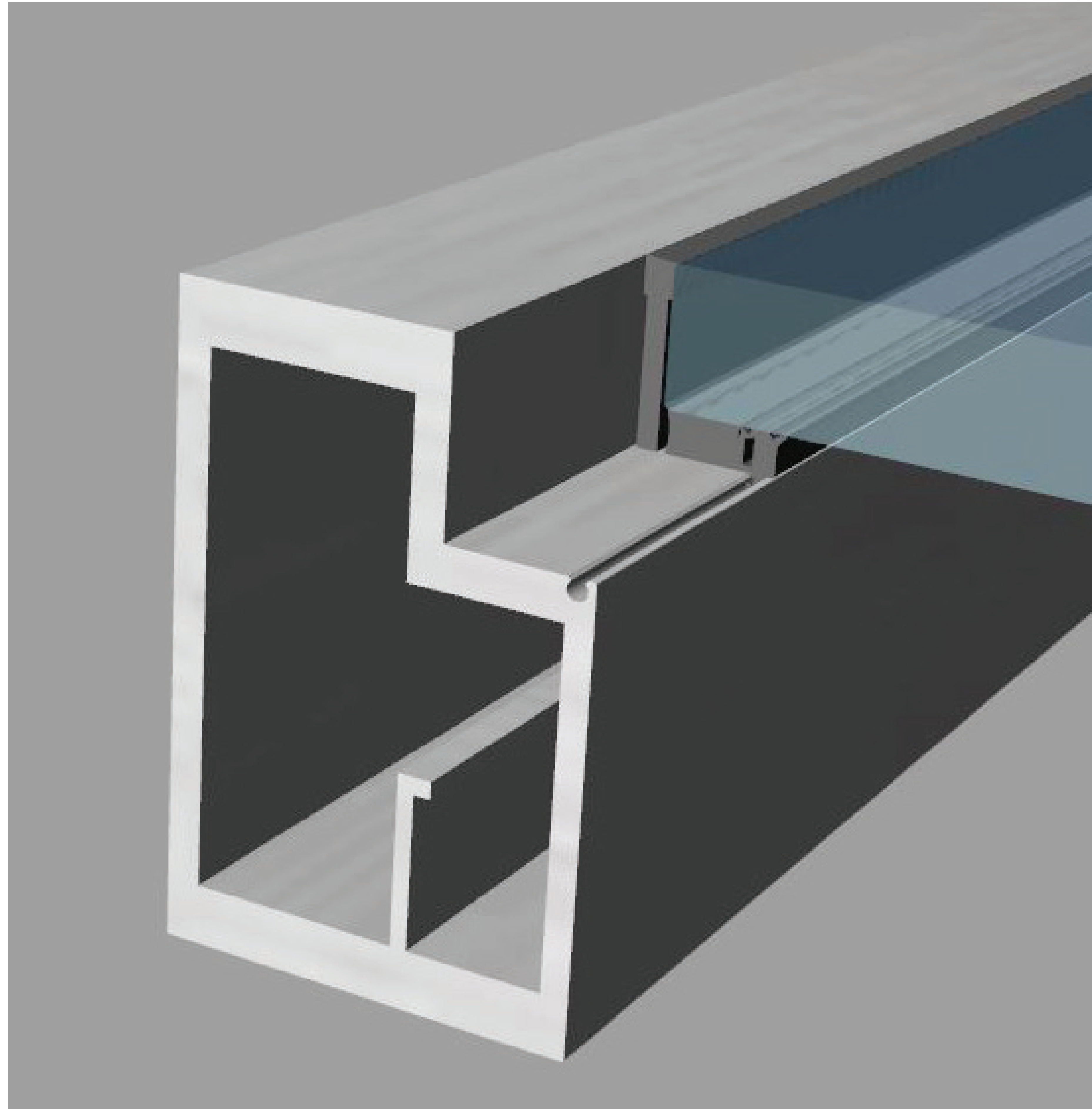
↓ 2400  
 ↔ 1500  
 m<sup>2</sup> 3,6

Cost  
 1pcs € 9.300

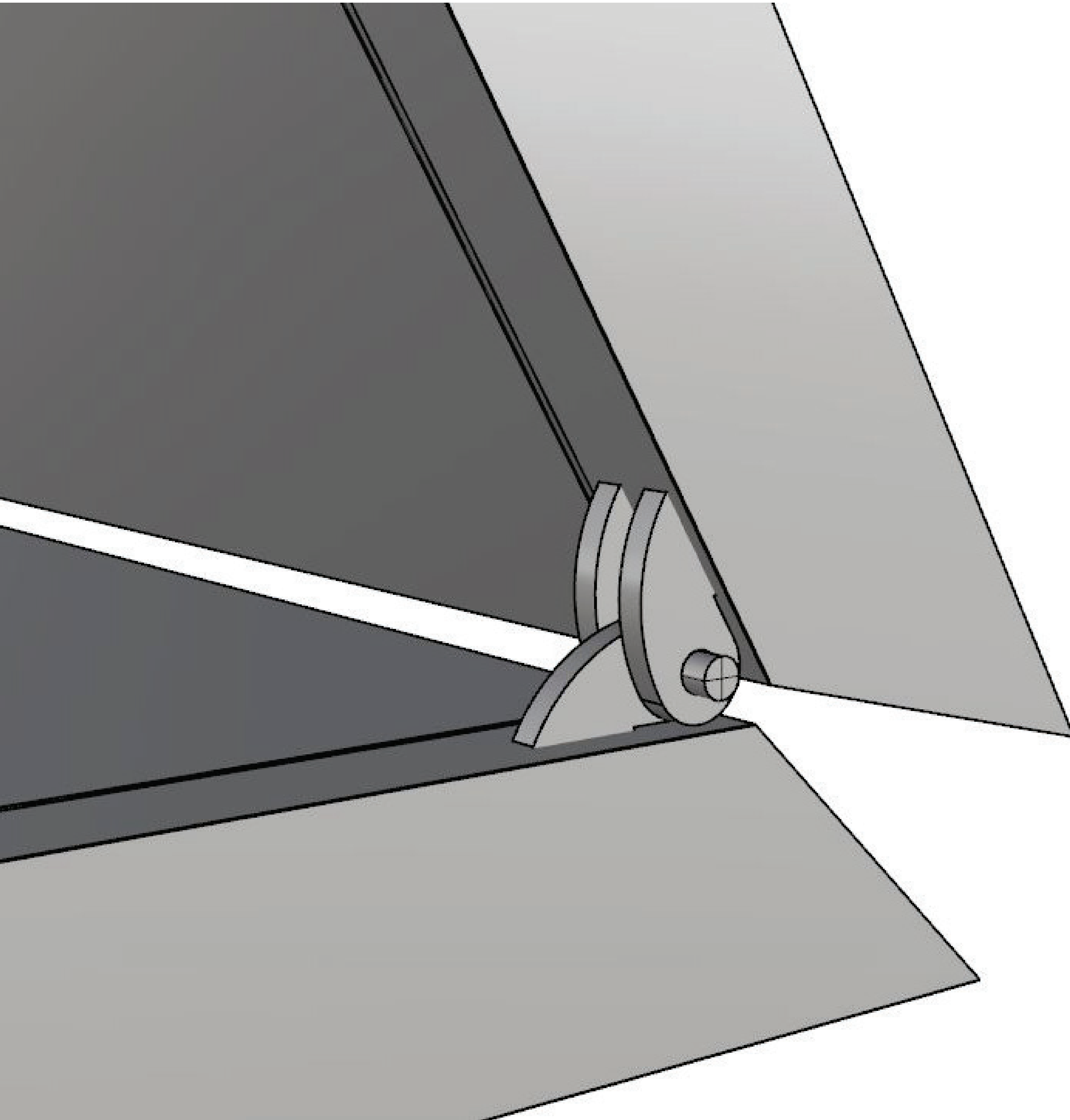
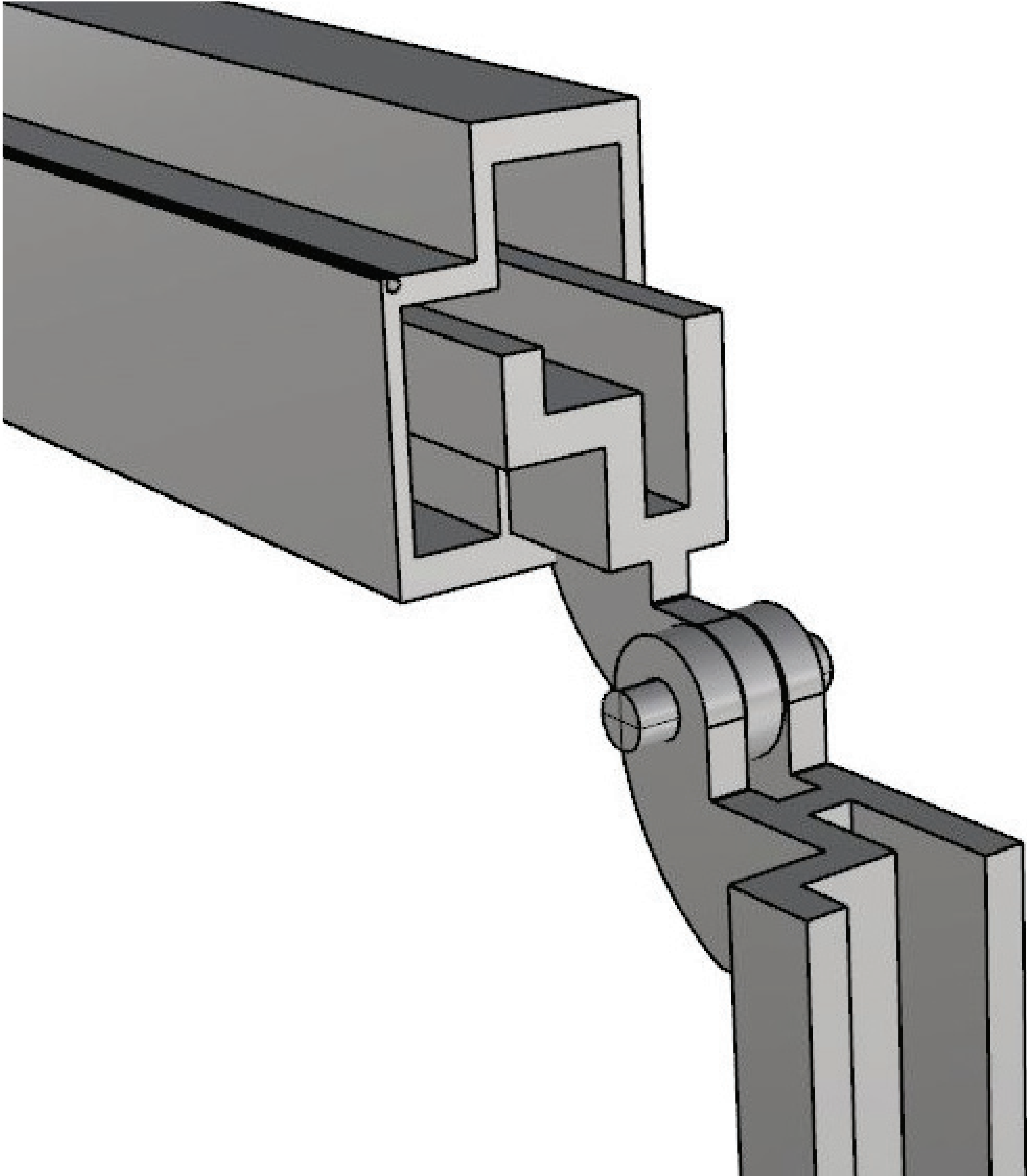
Facade € ?



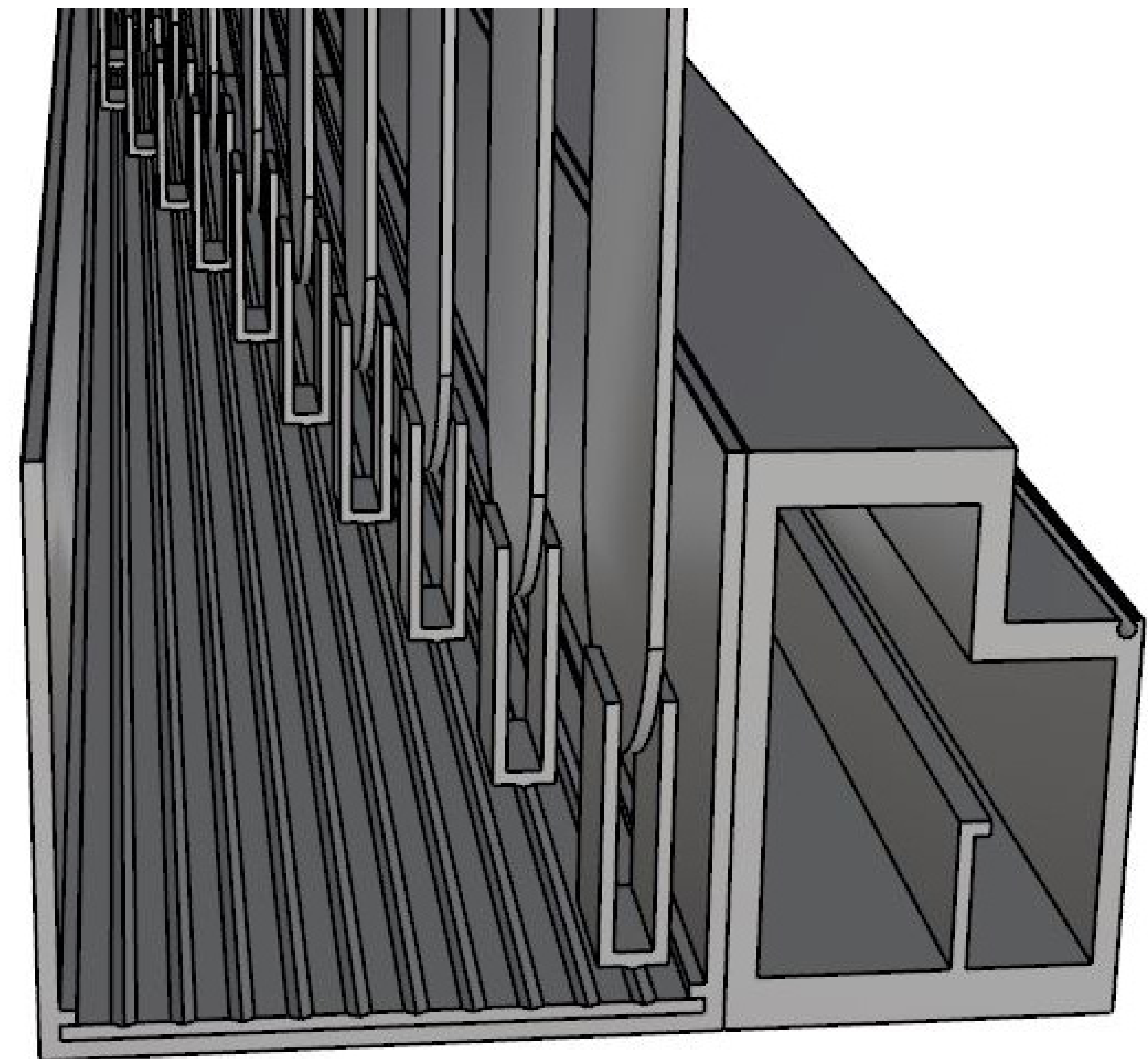
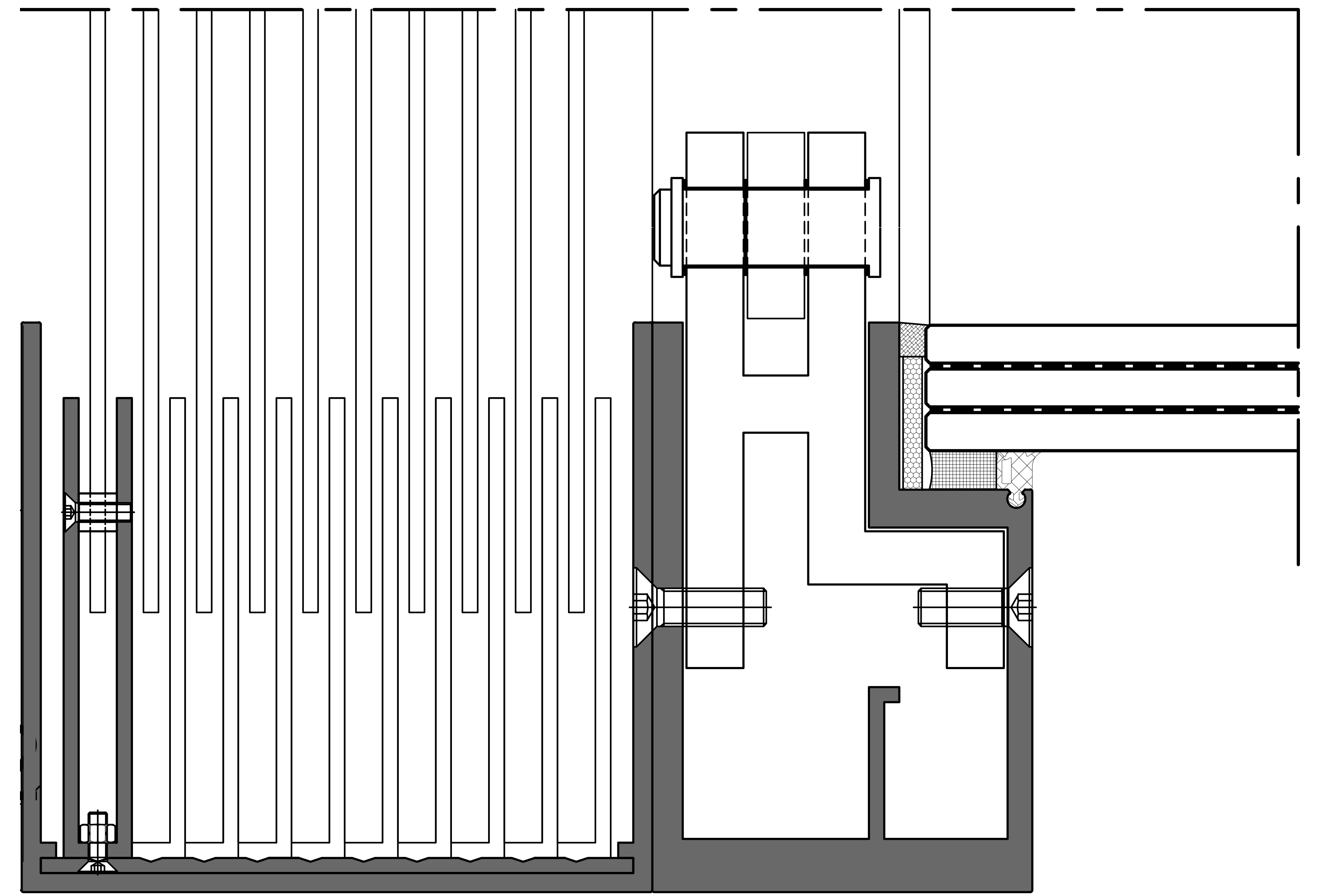
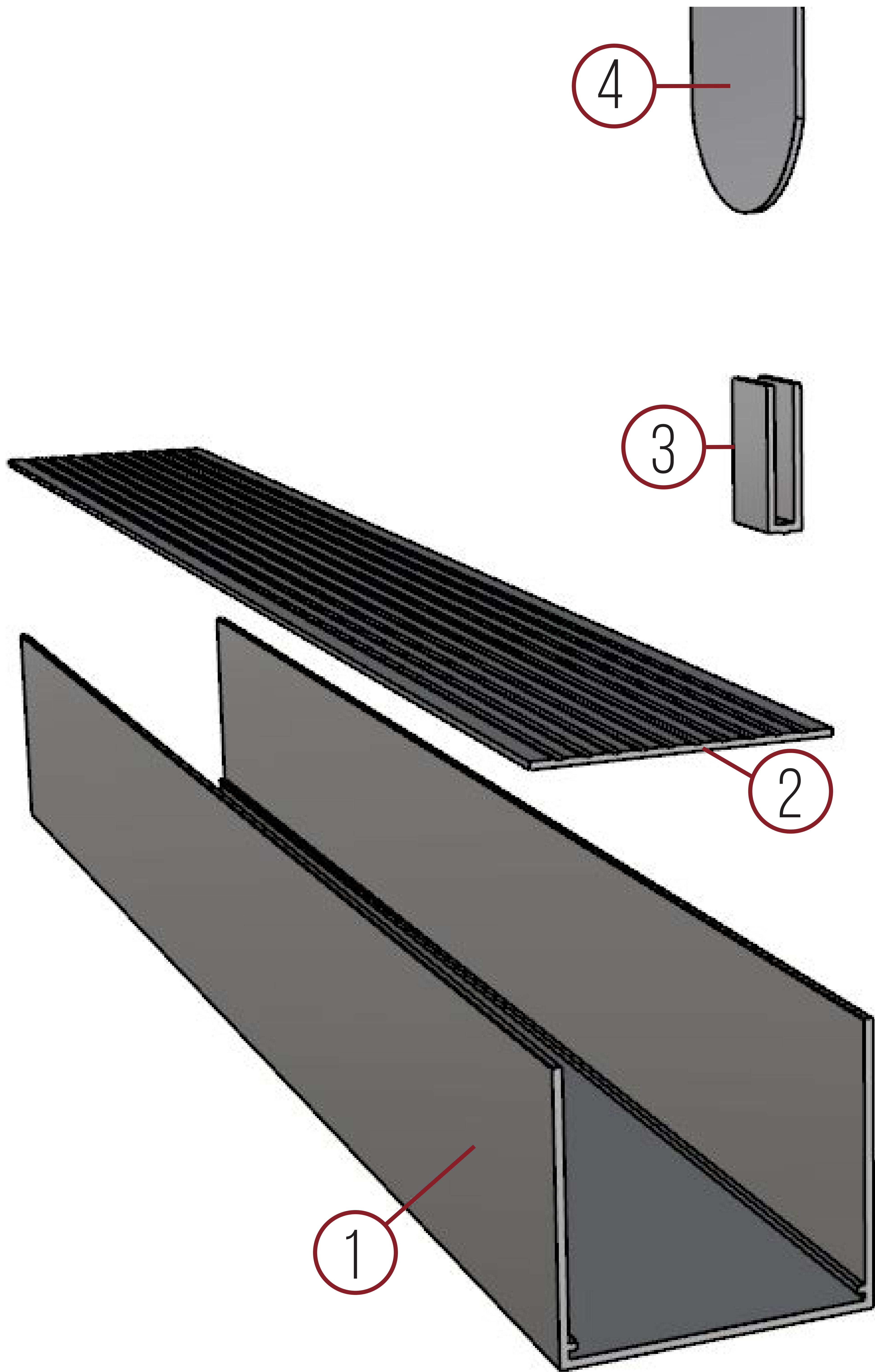
# 6. FINAL DESIGN



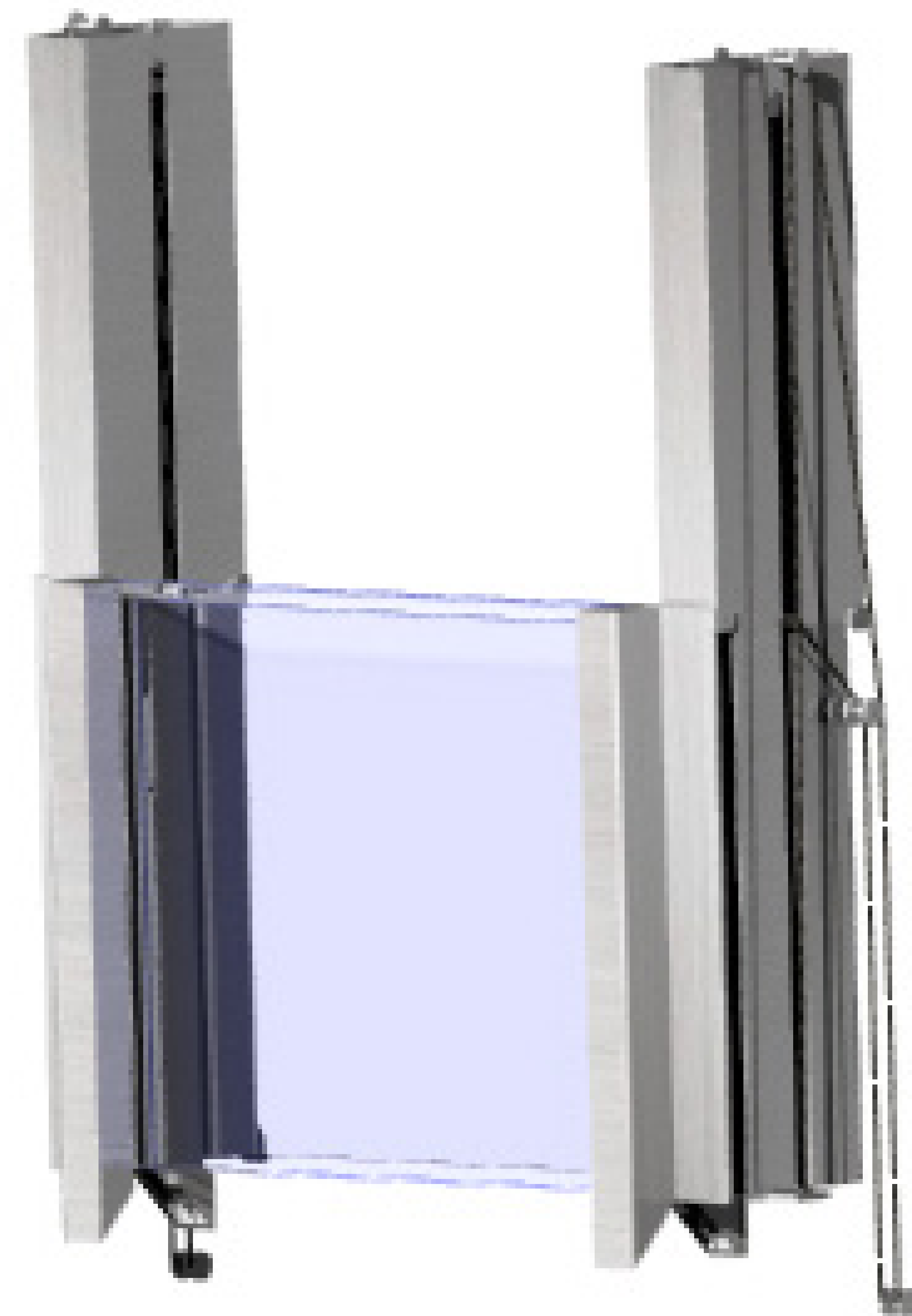
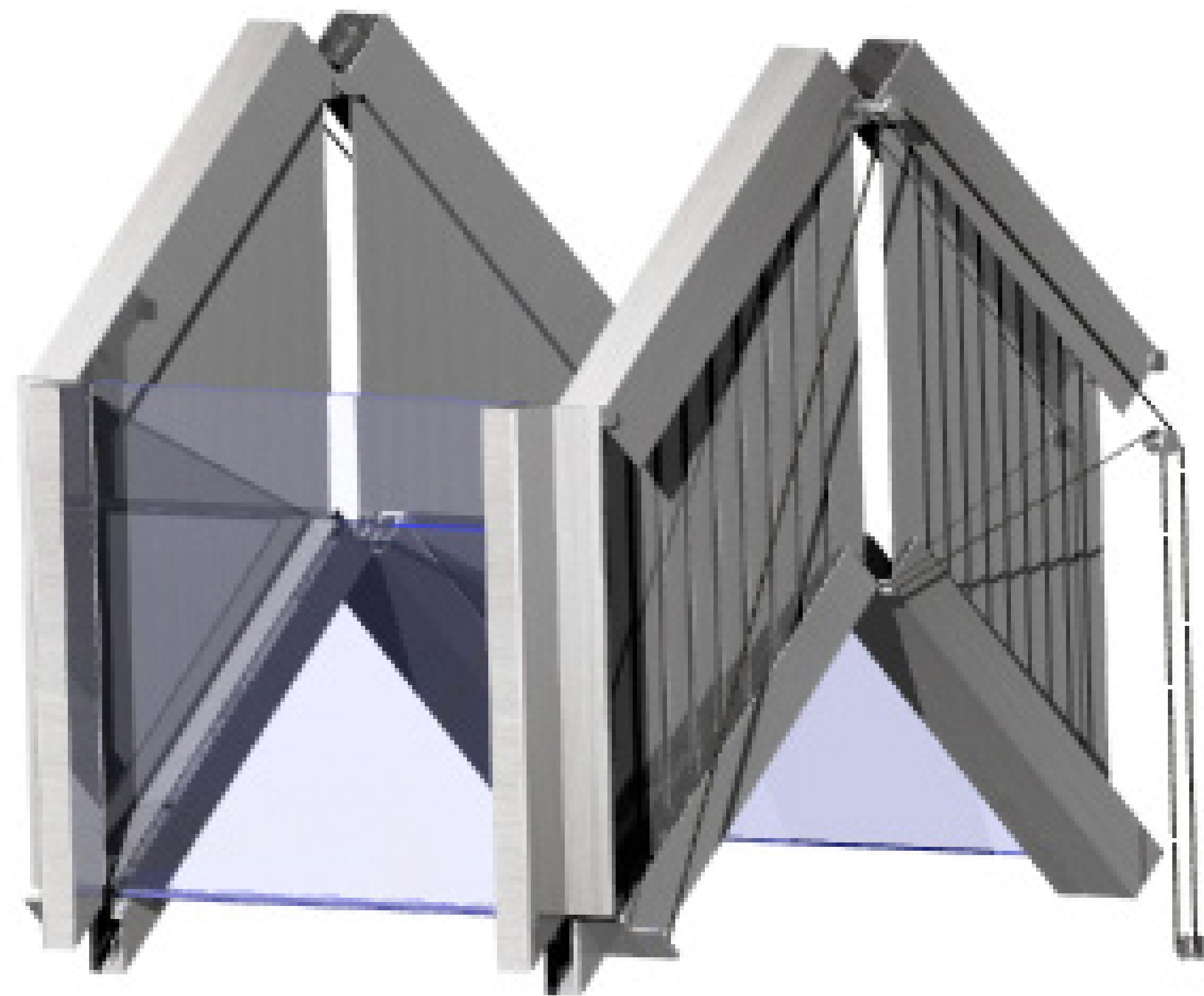
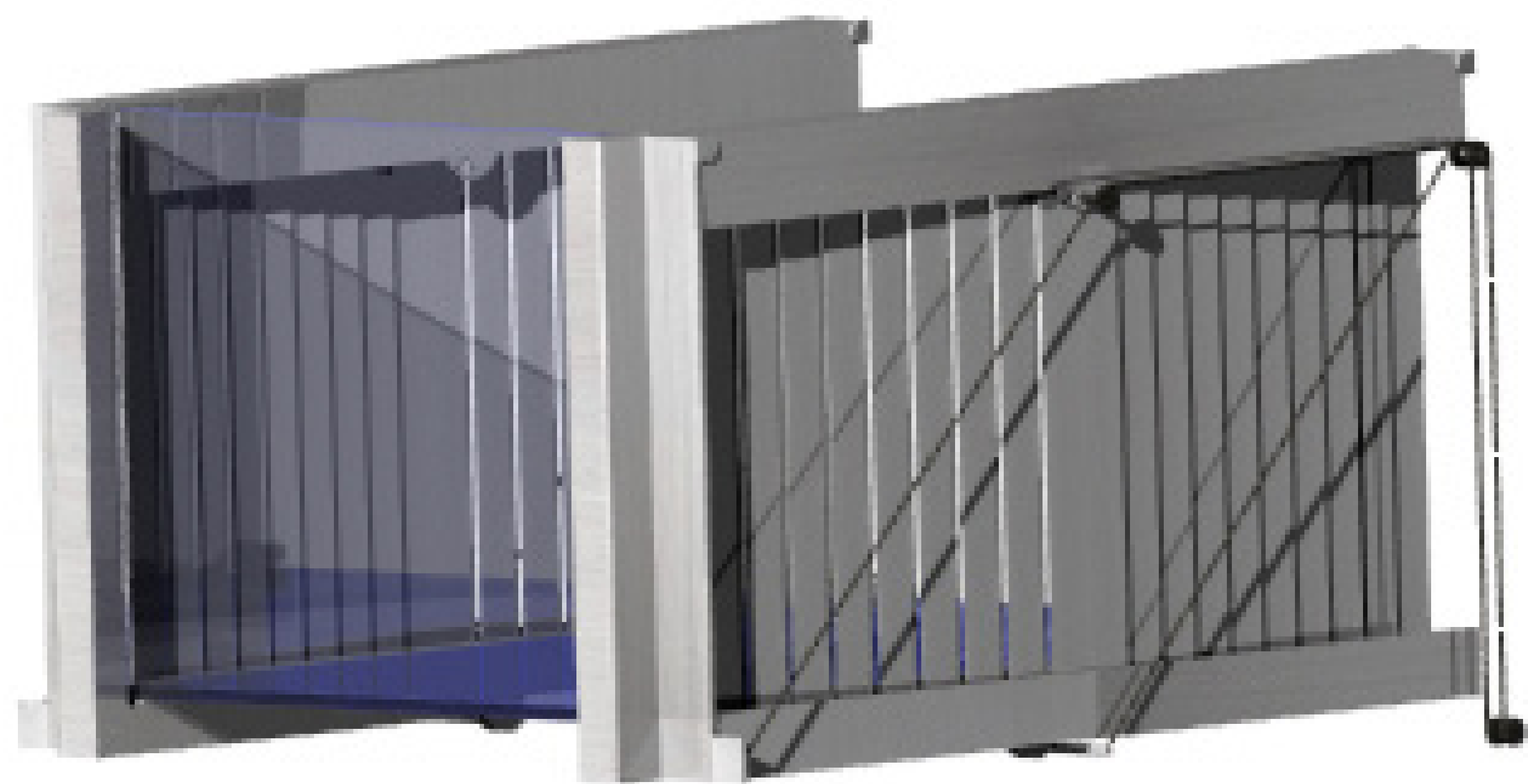




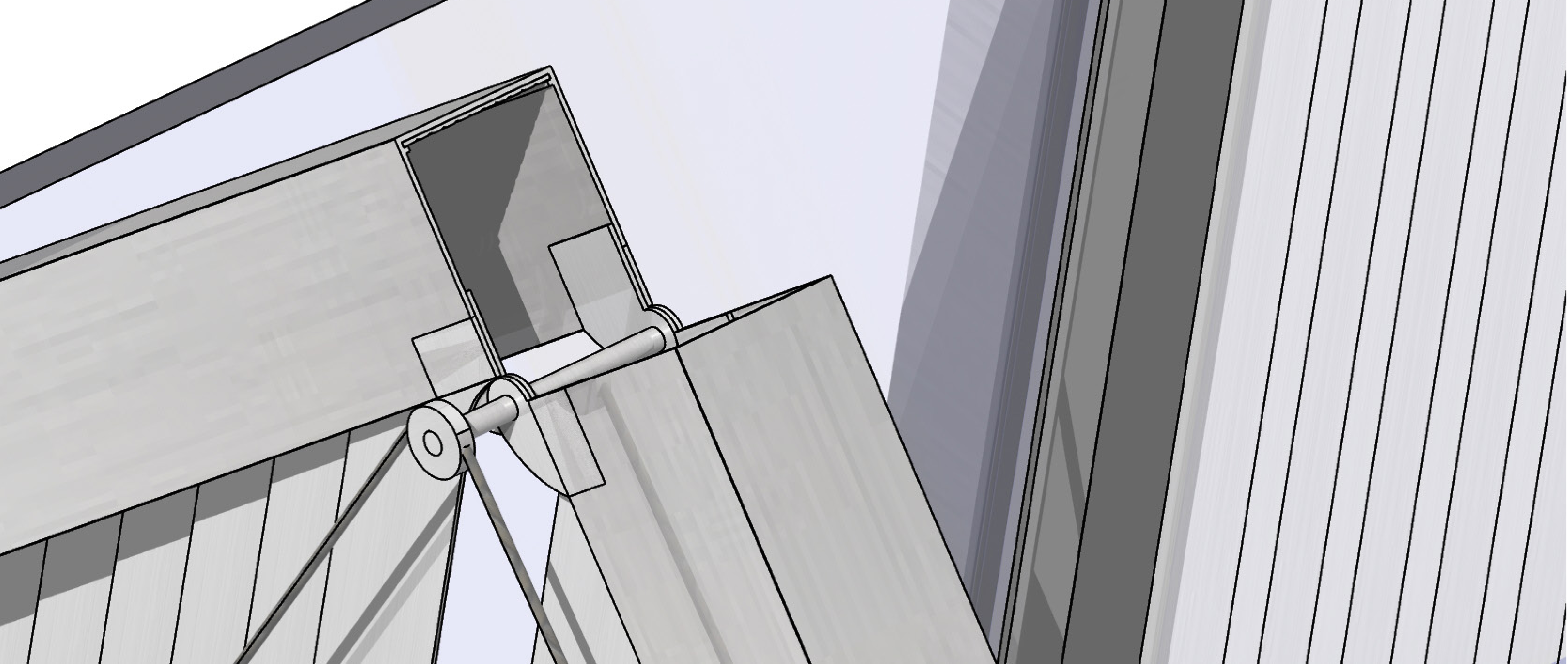
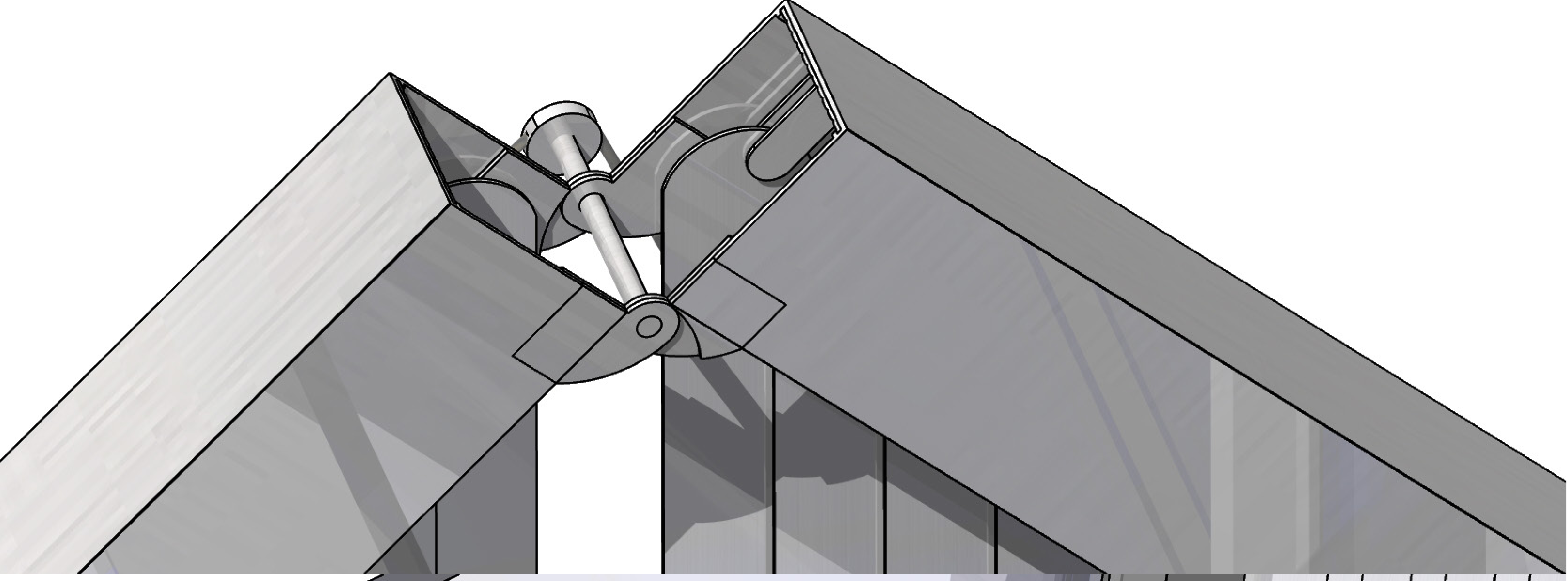
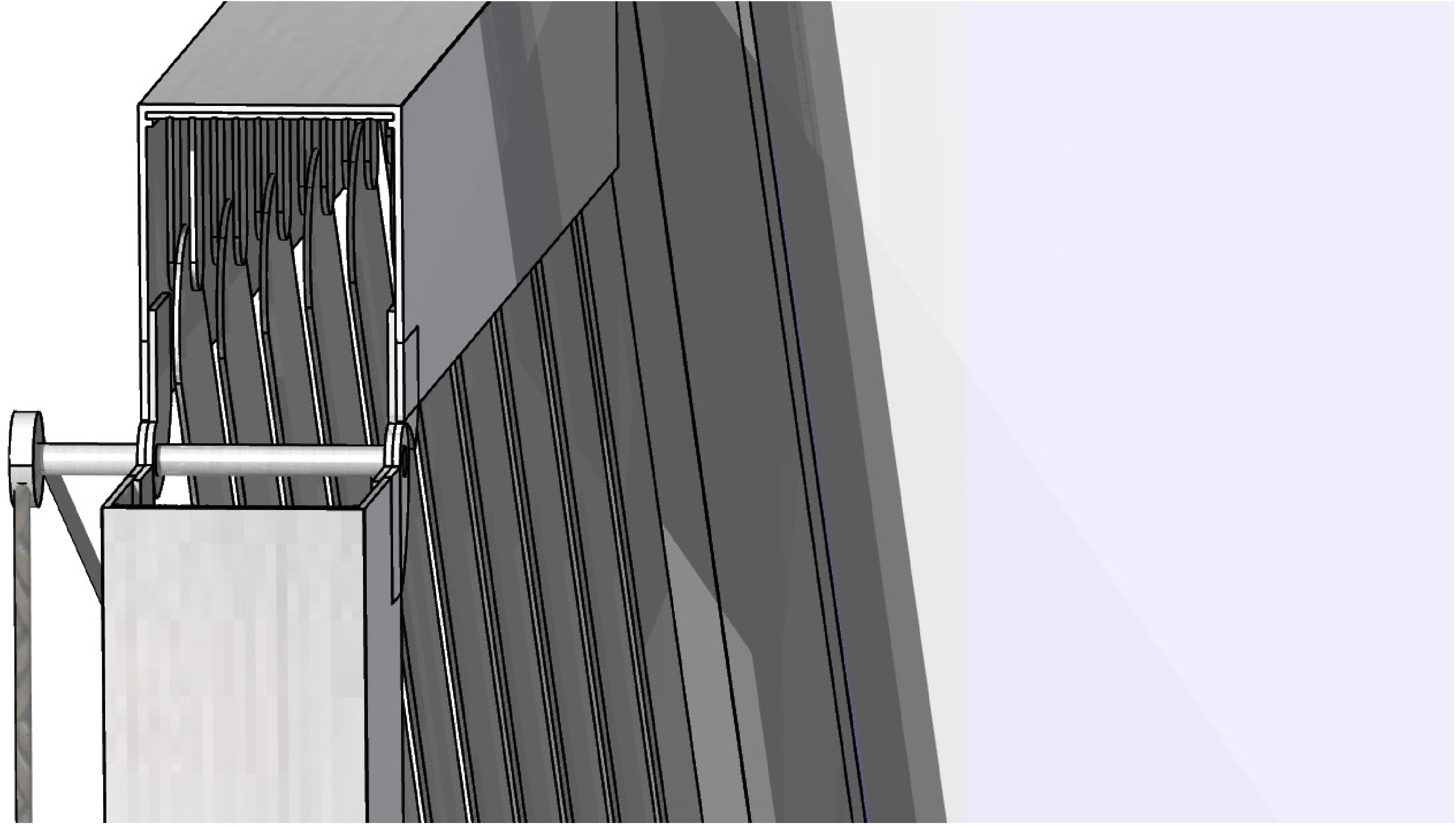
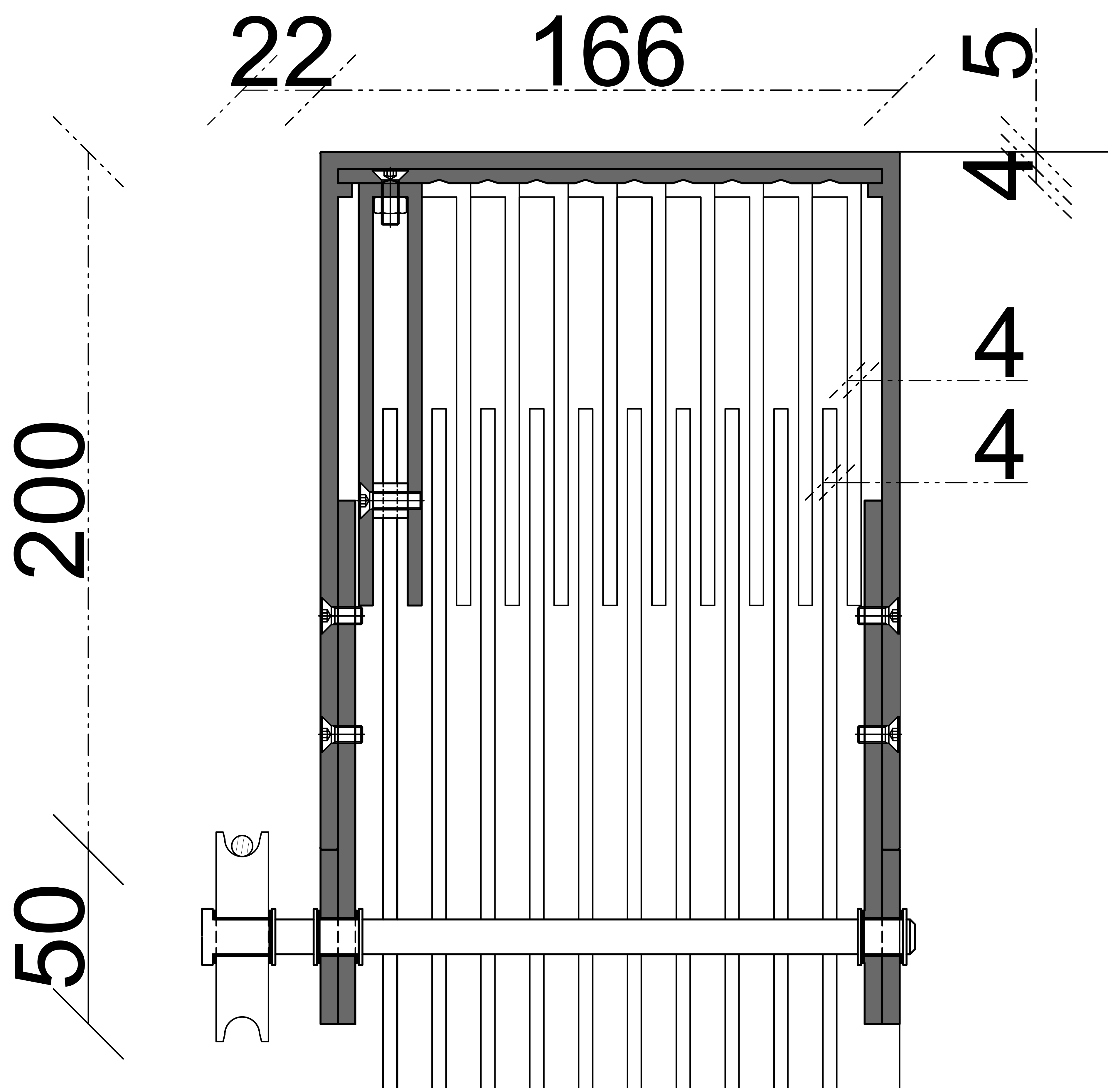




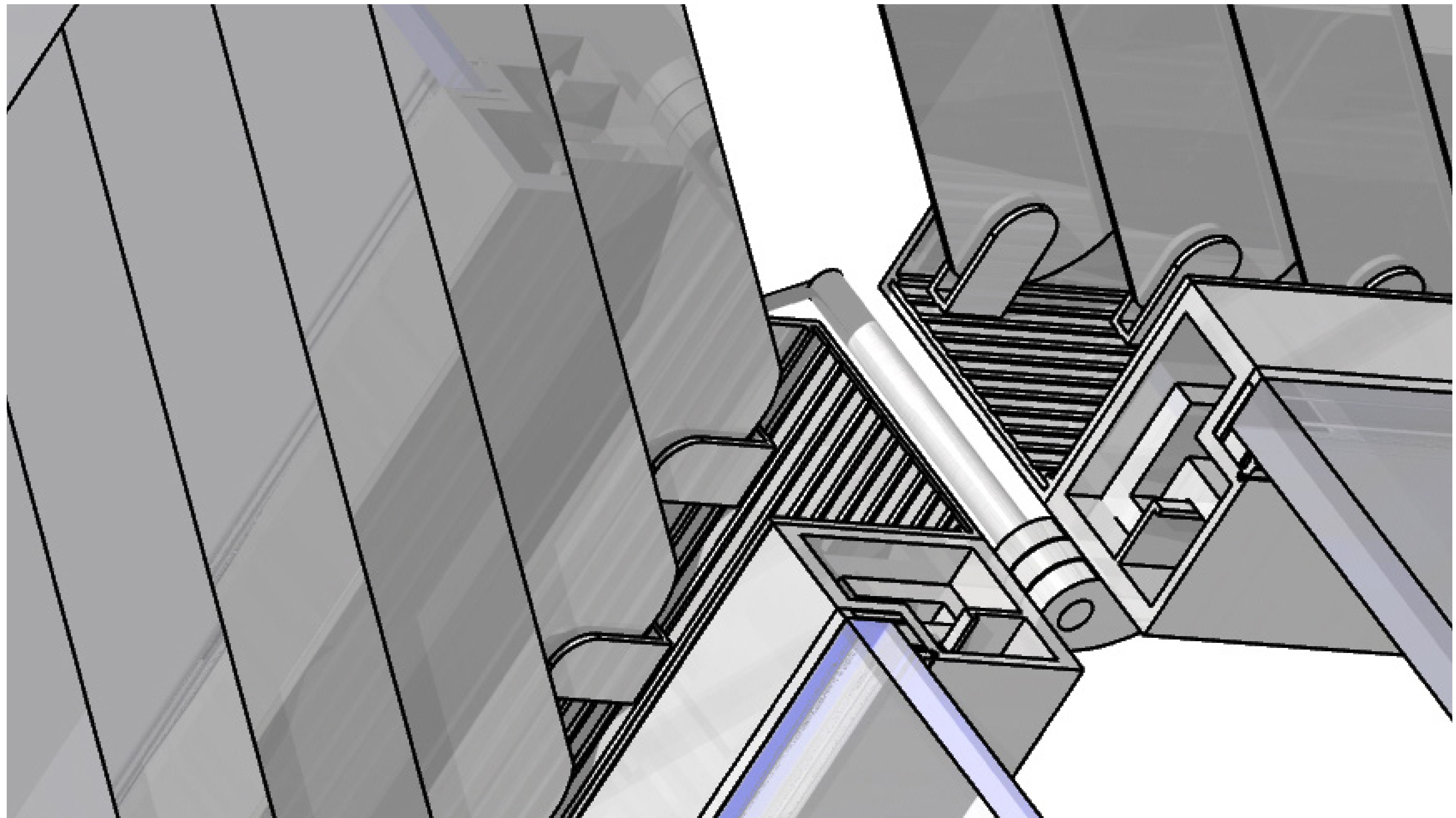
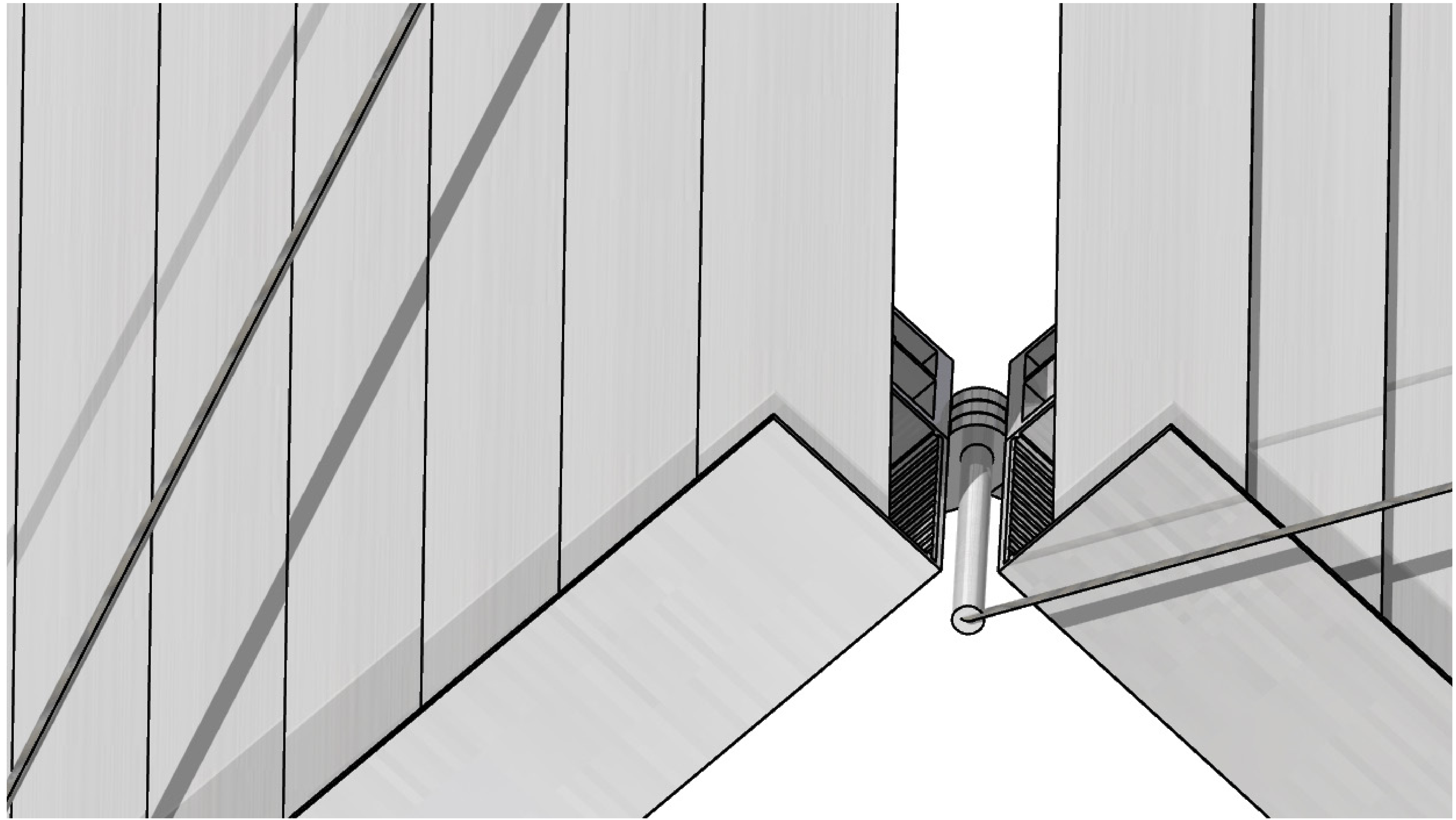
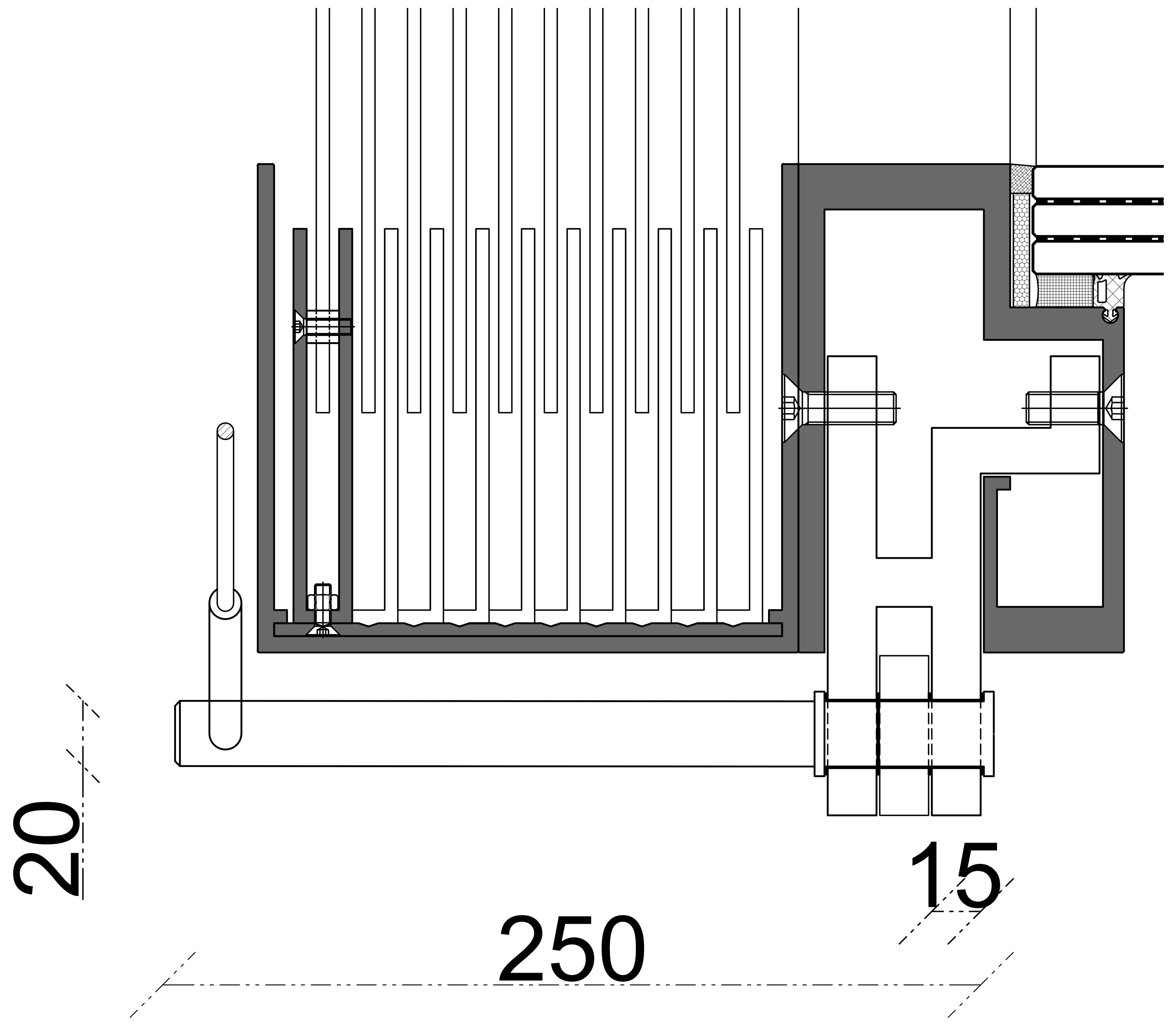




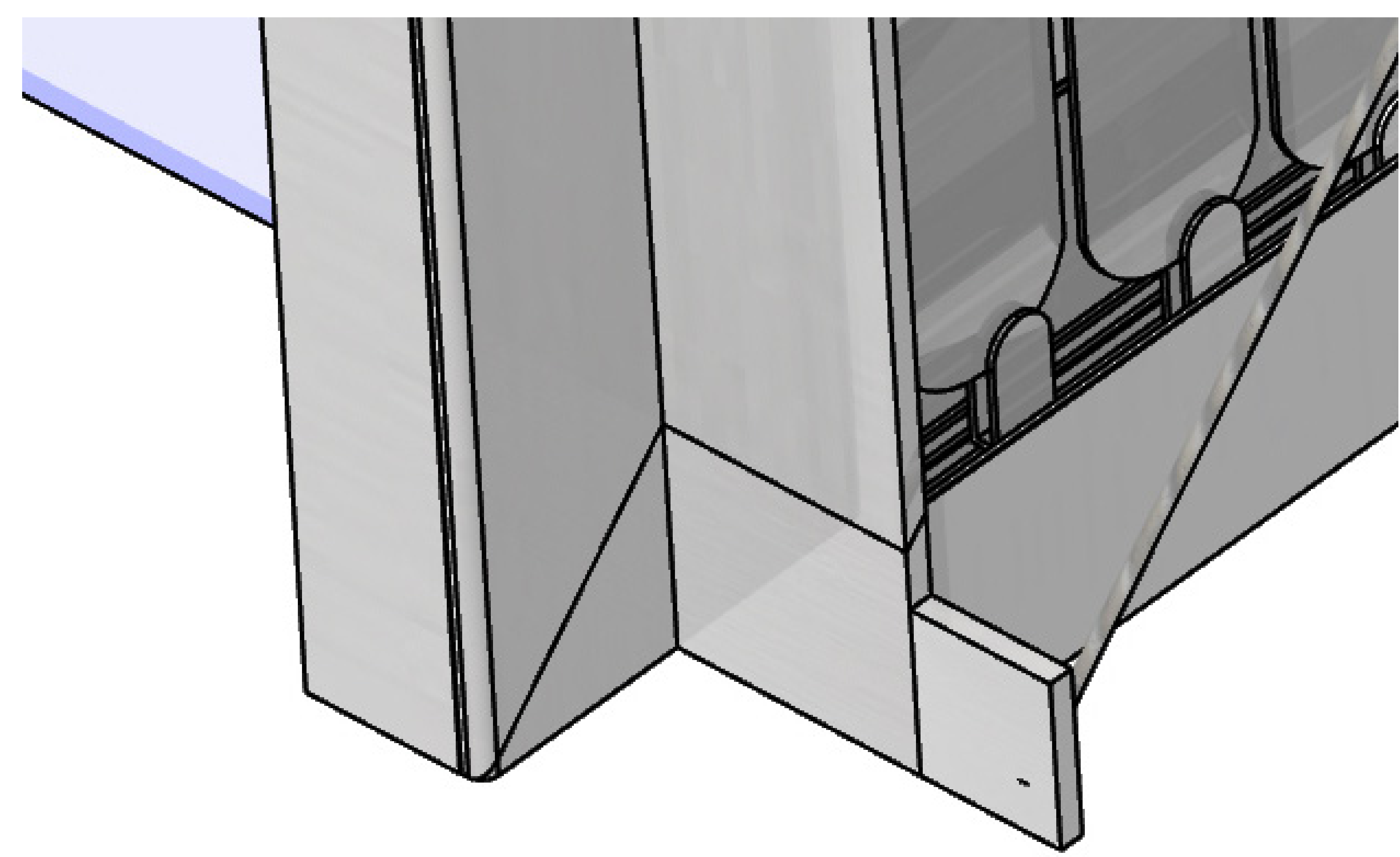
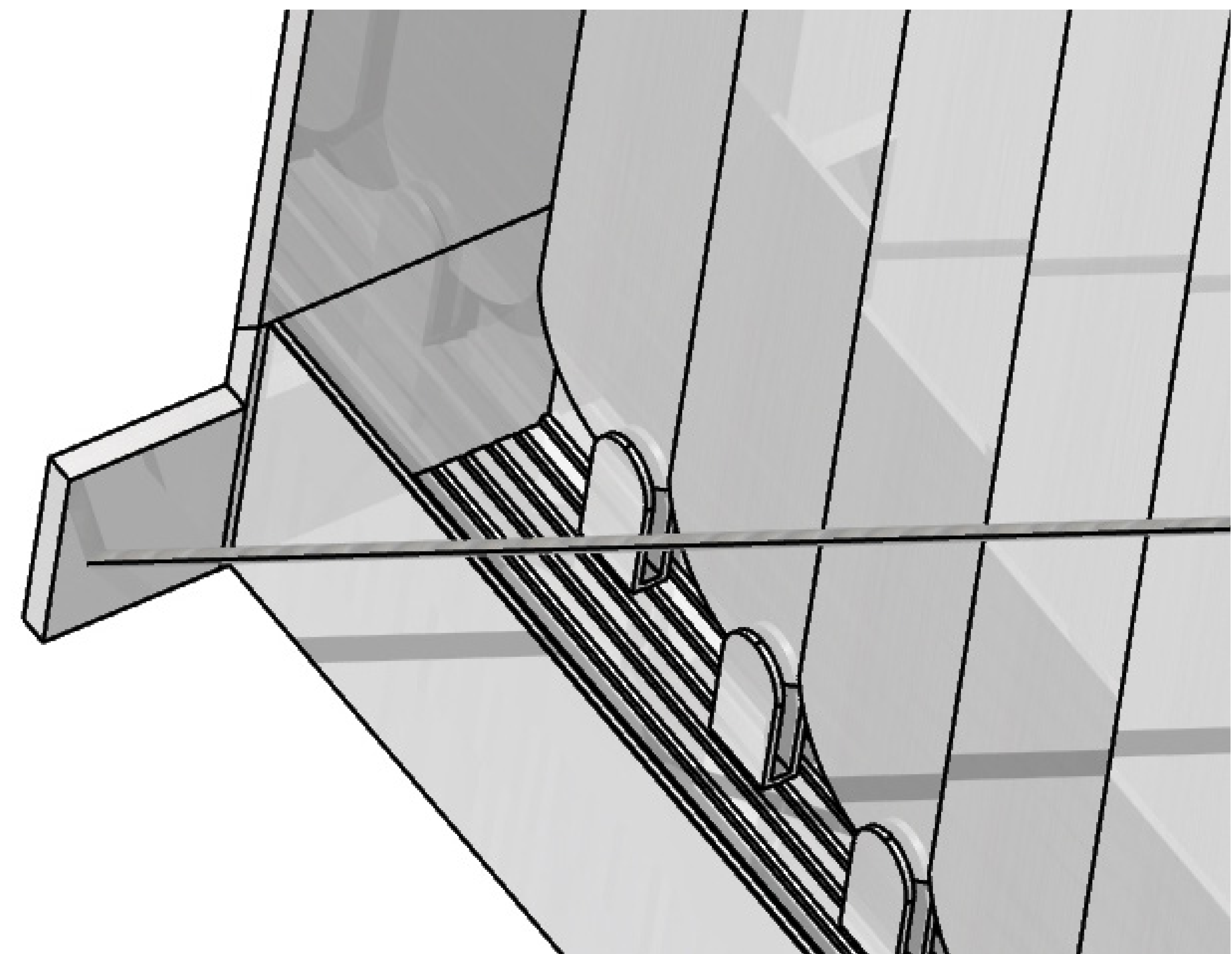
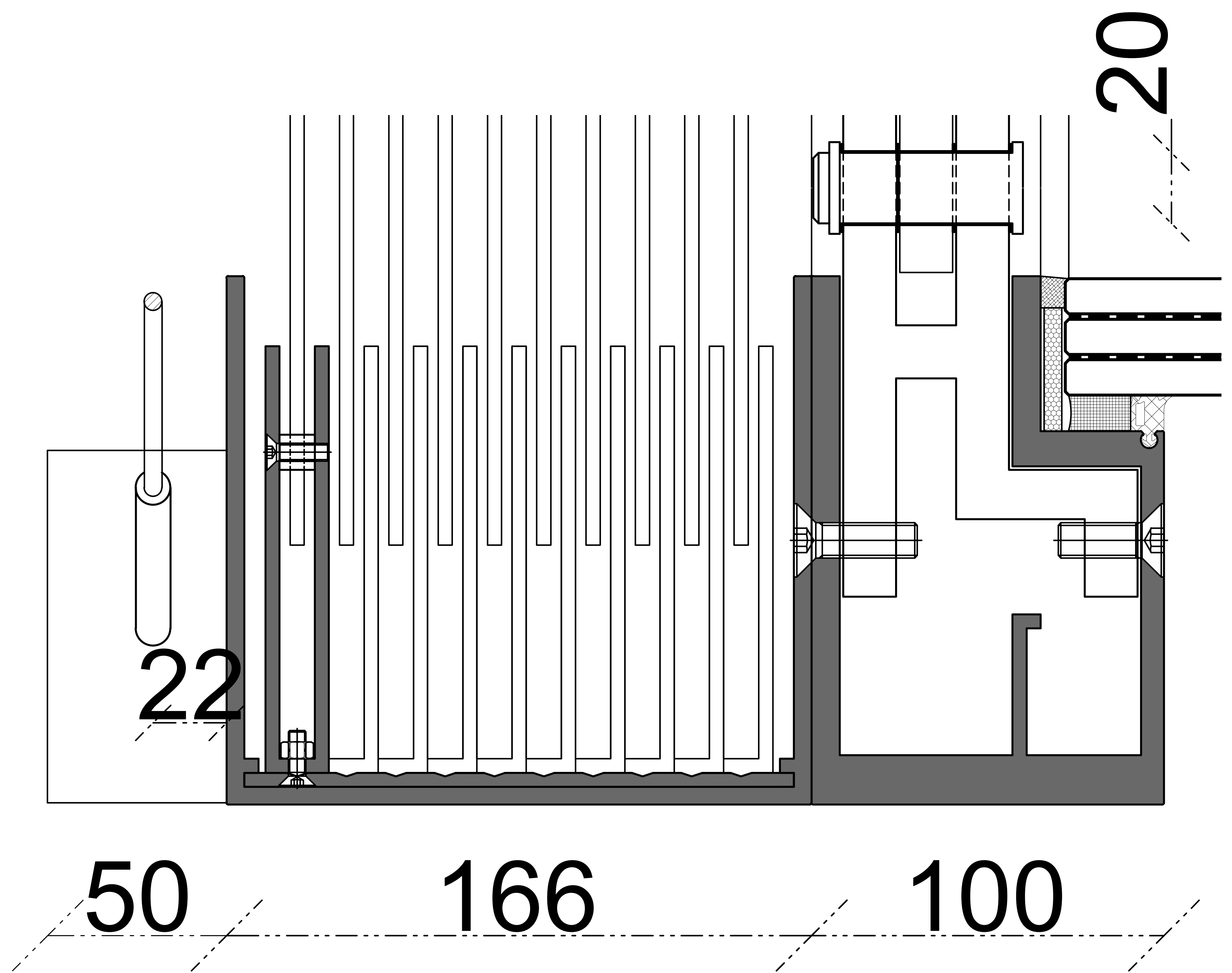




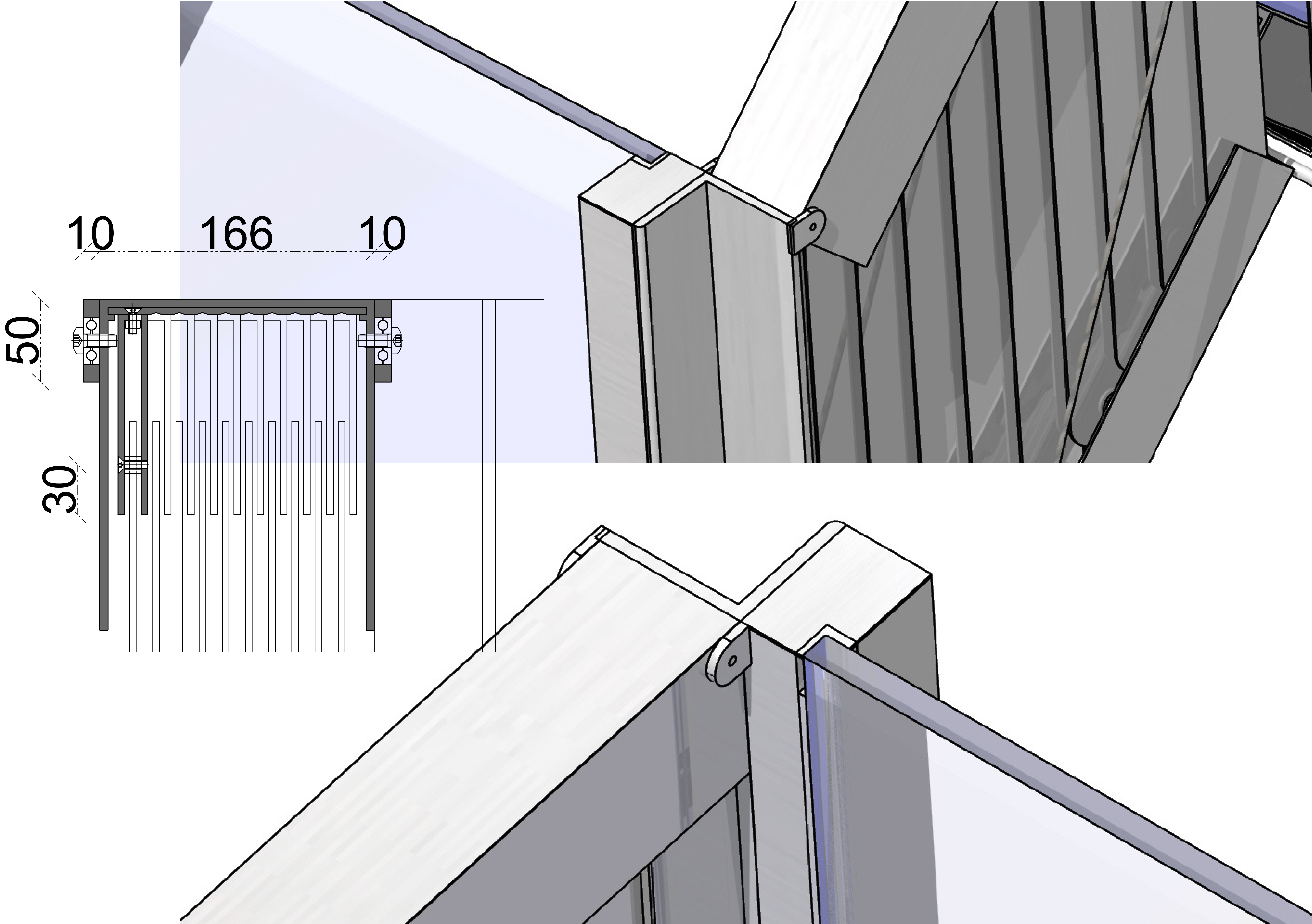




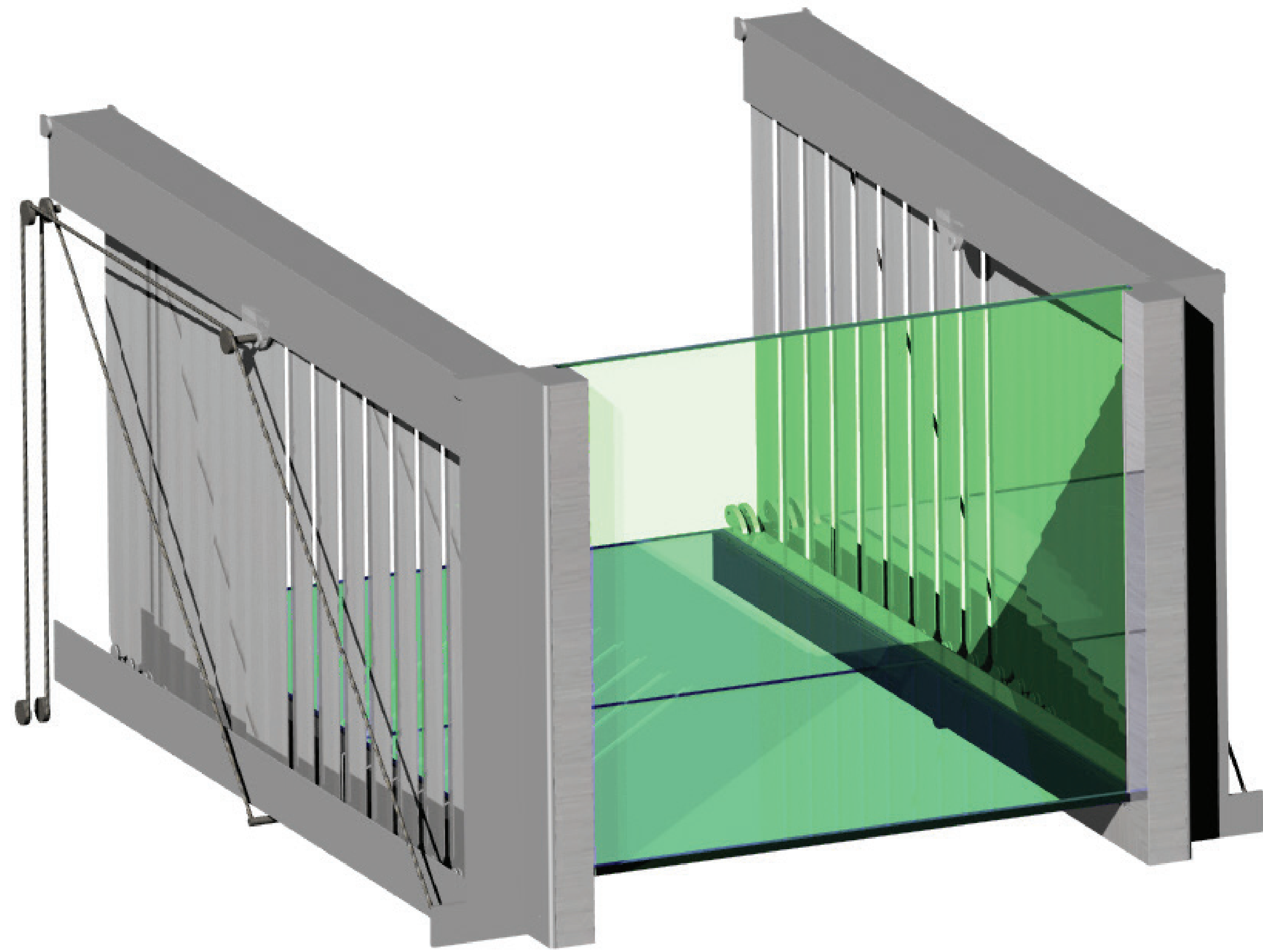
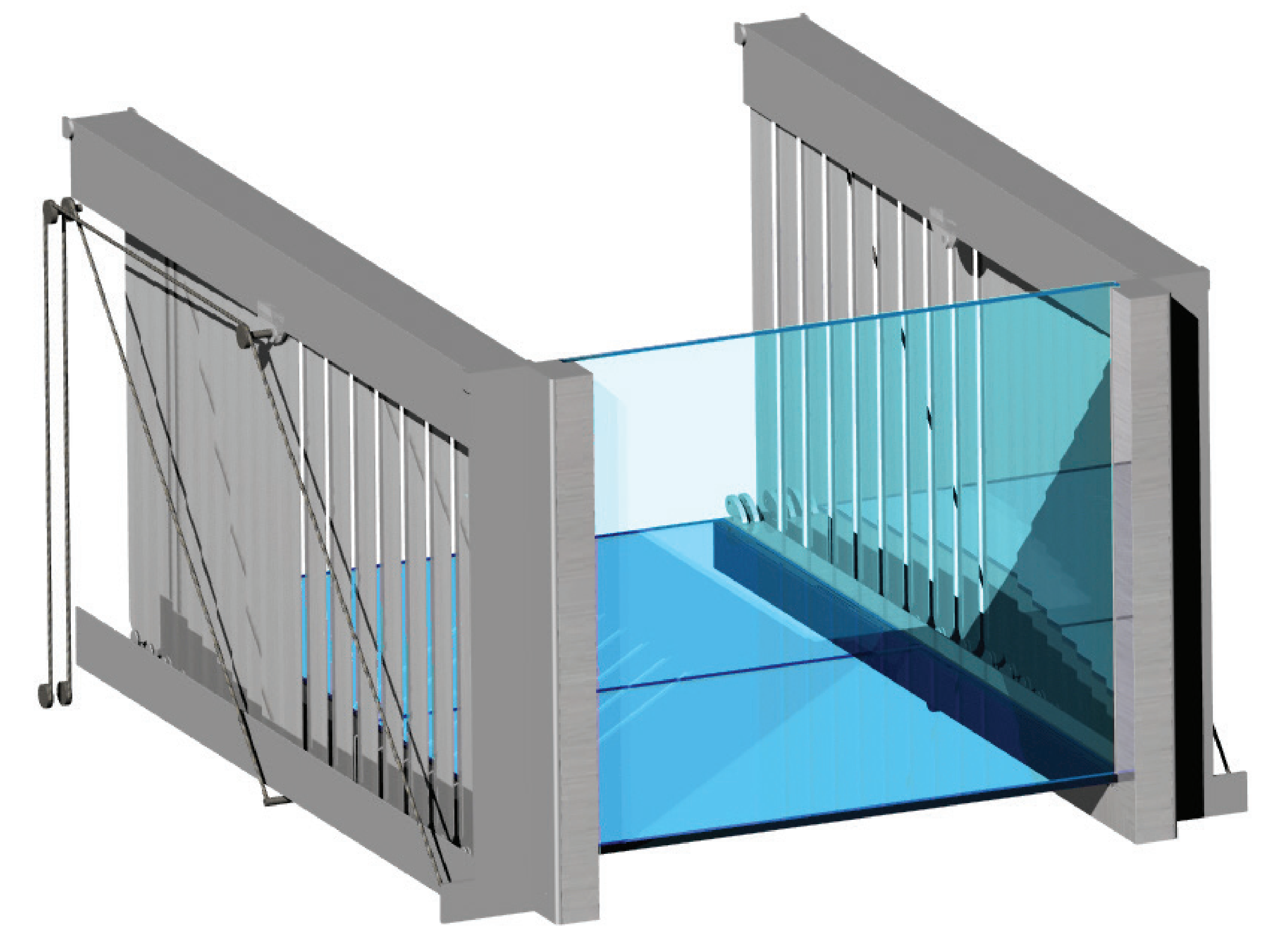
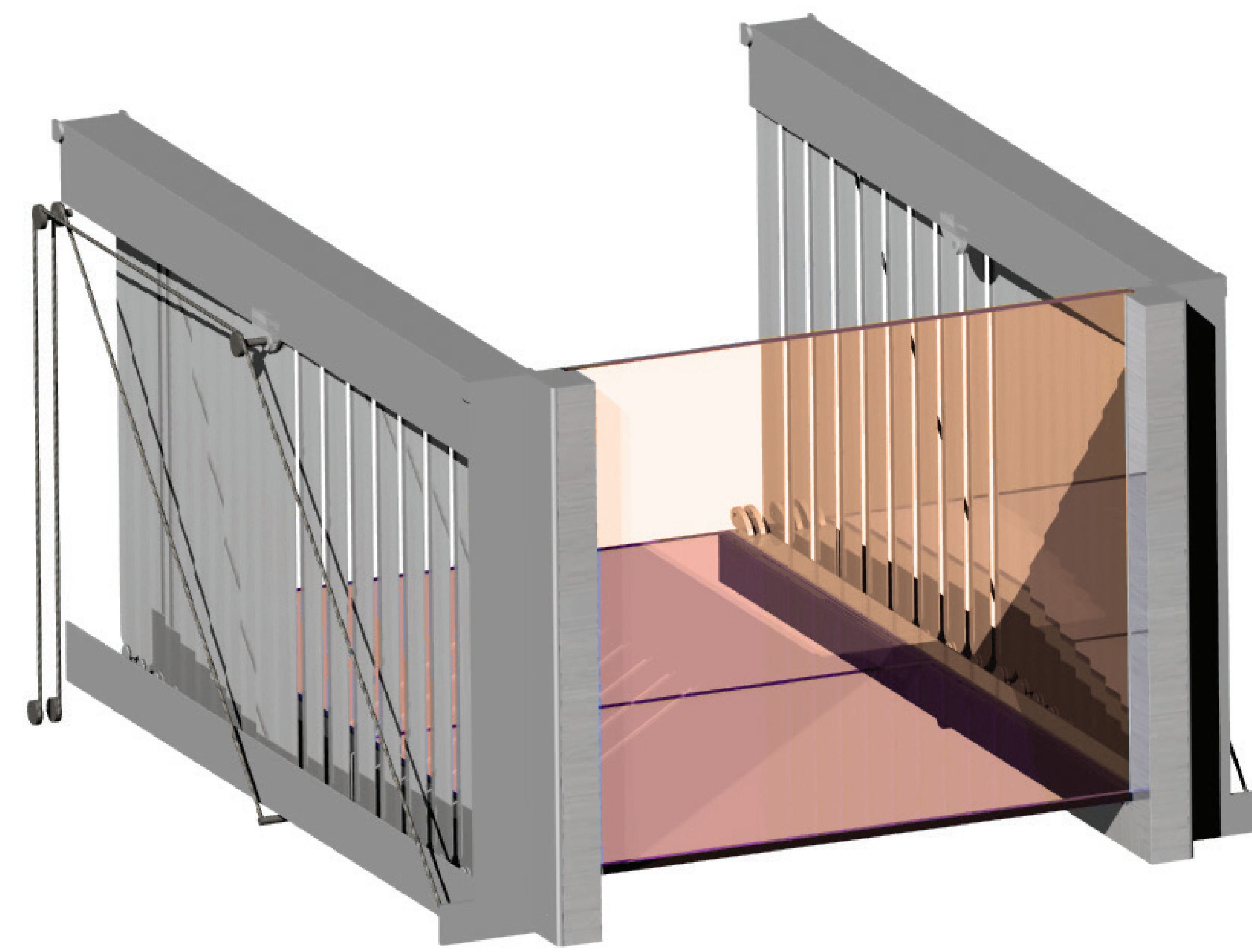
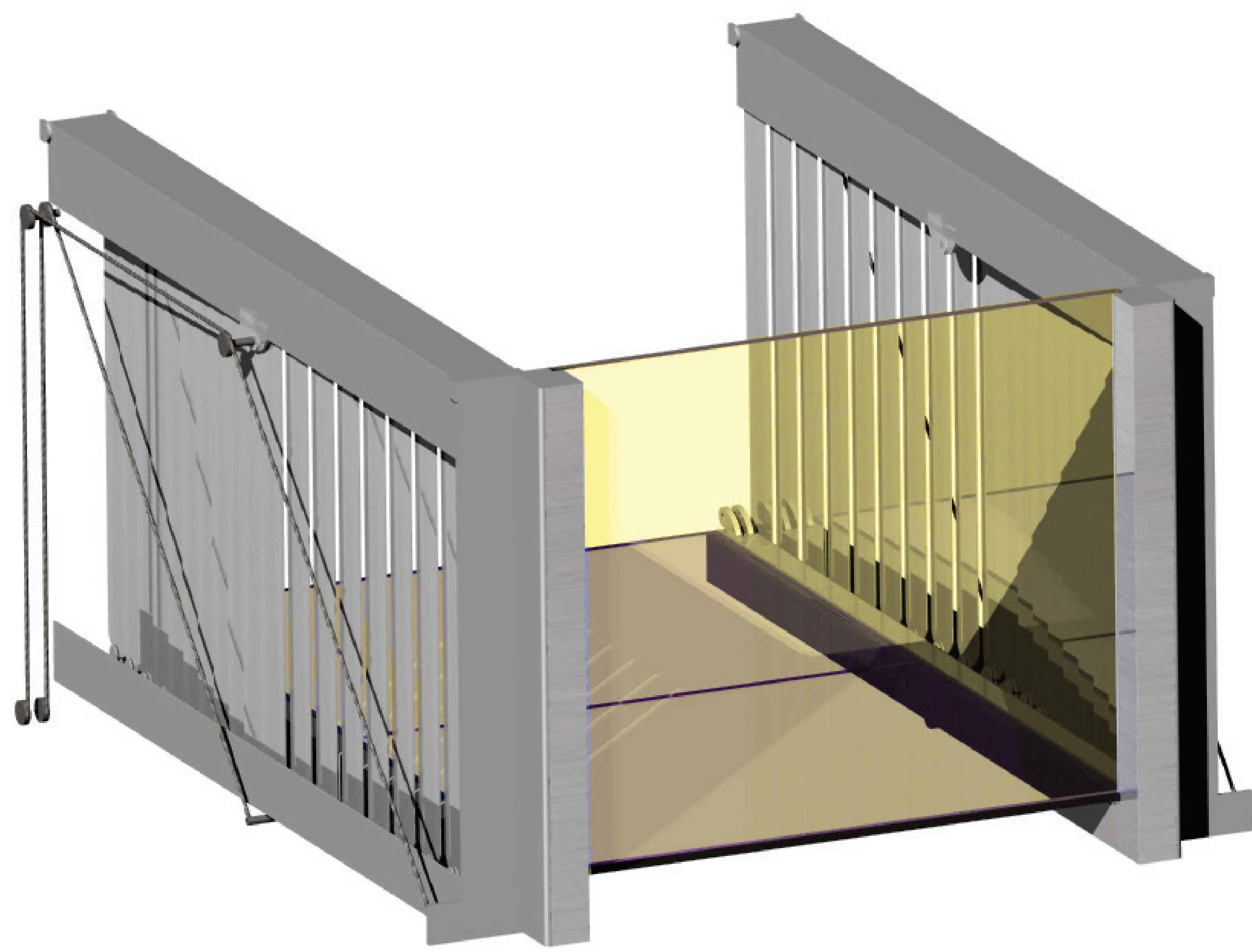




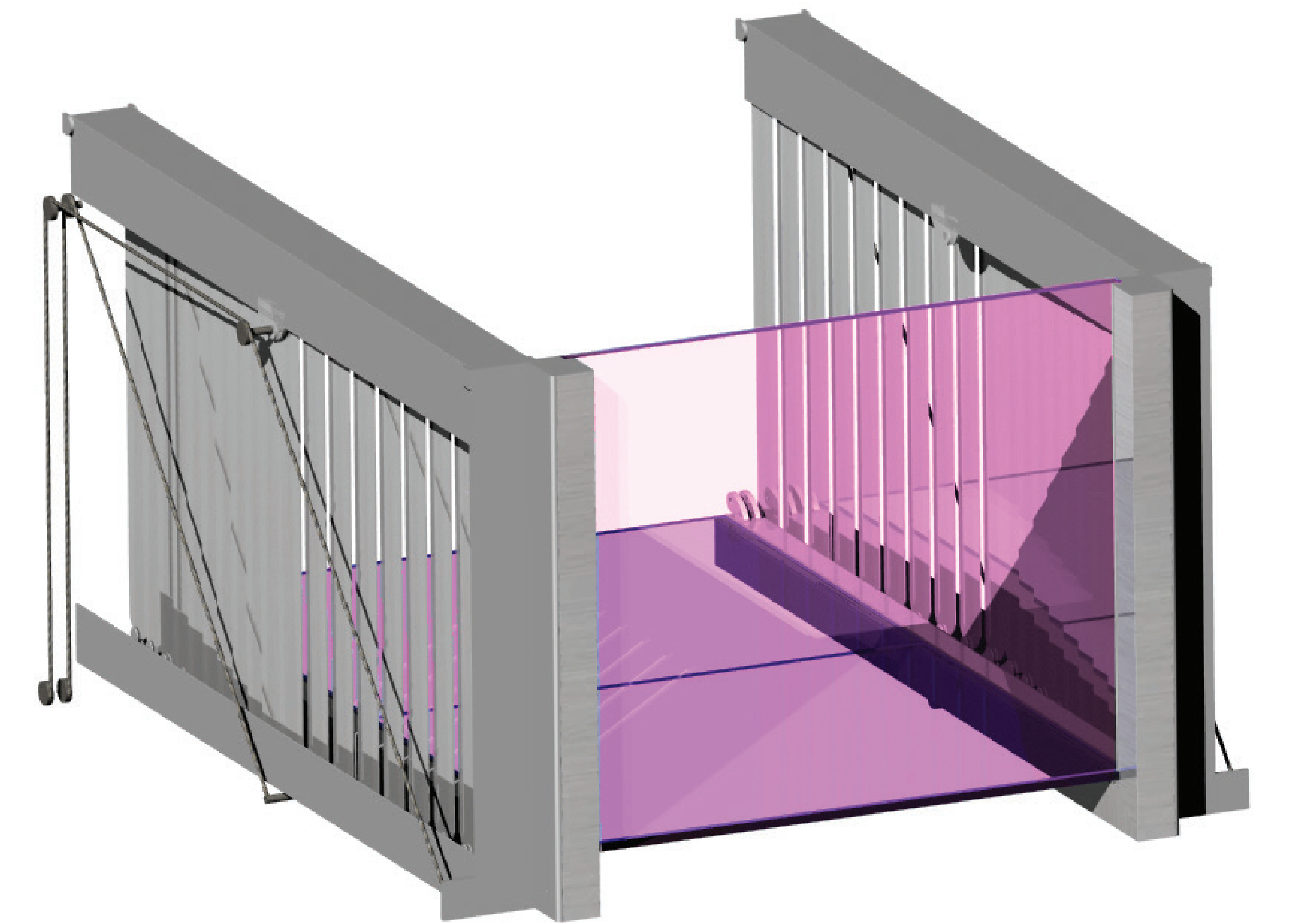
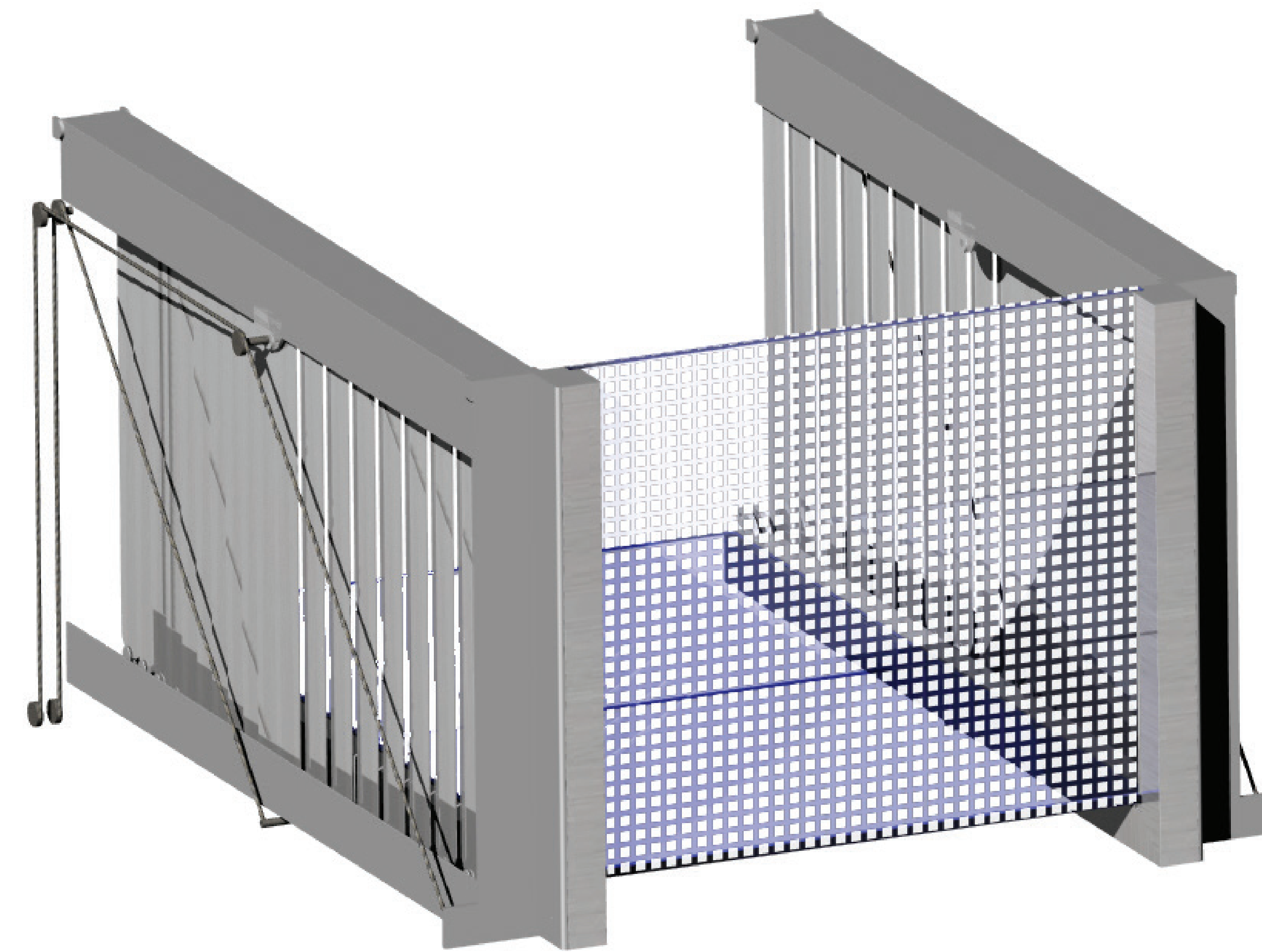
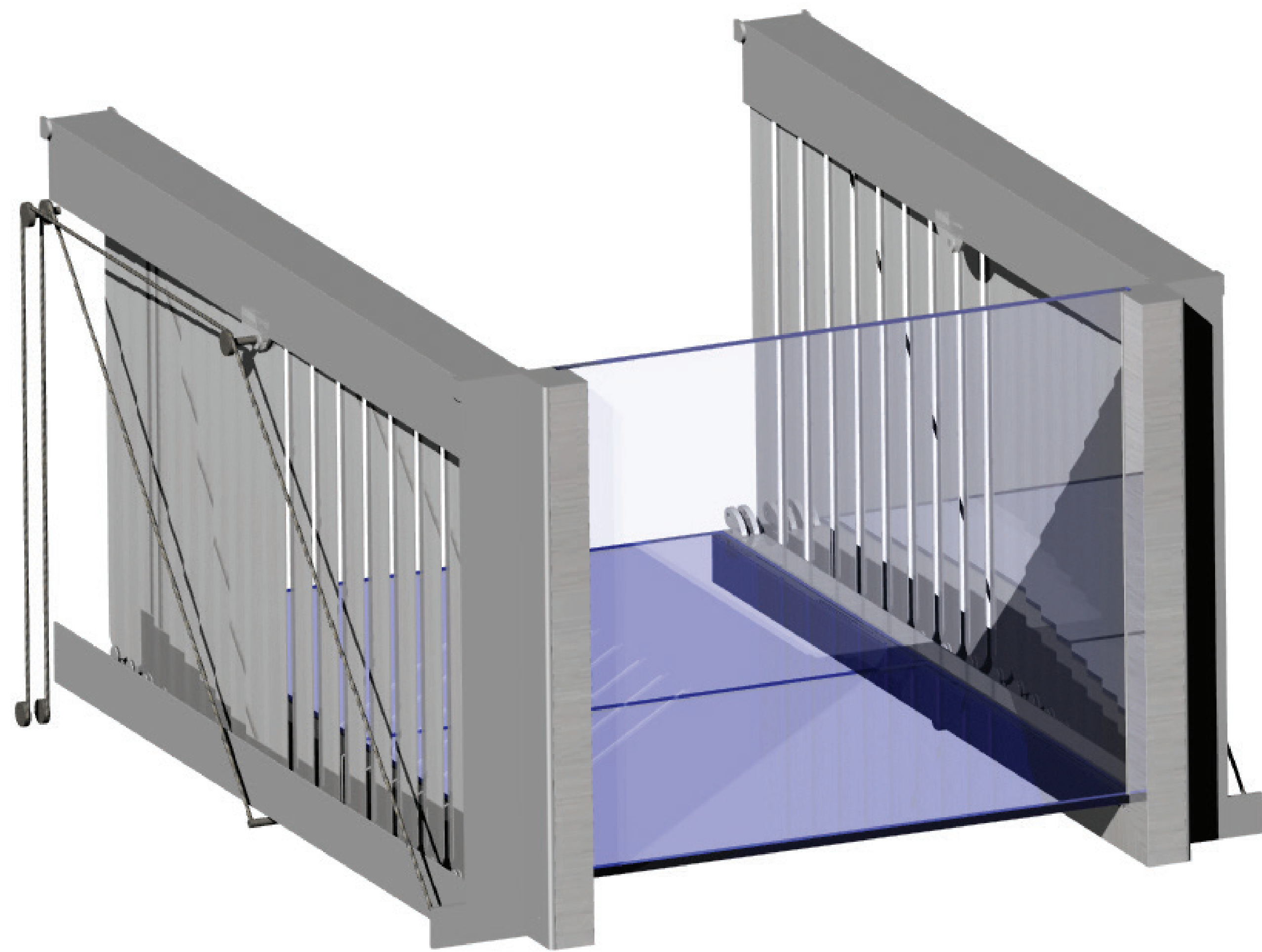
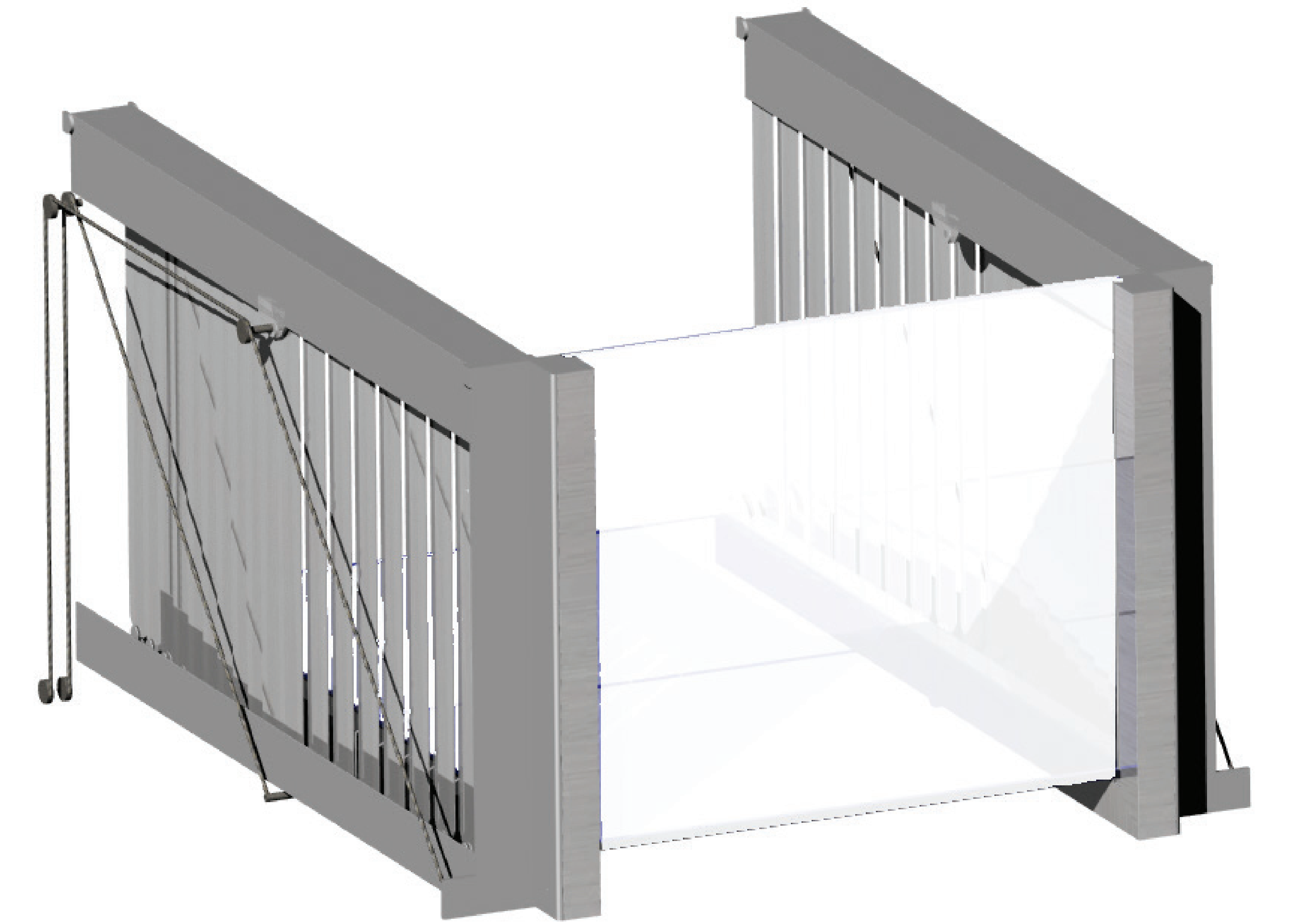








**GLASS**





# RECOMMENDATION





# CONCLUSION

