BETONSUISSE

Gewölbt und Gestrickt

Die Eleganz formoptimierter Tragstrukturen

Dr. Matthias Rippmann – ETH Zürich

ETH Zürich BRG

Matthias Rippmann

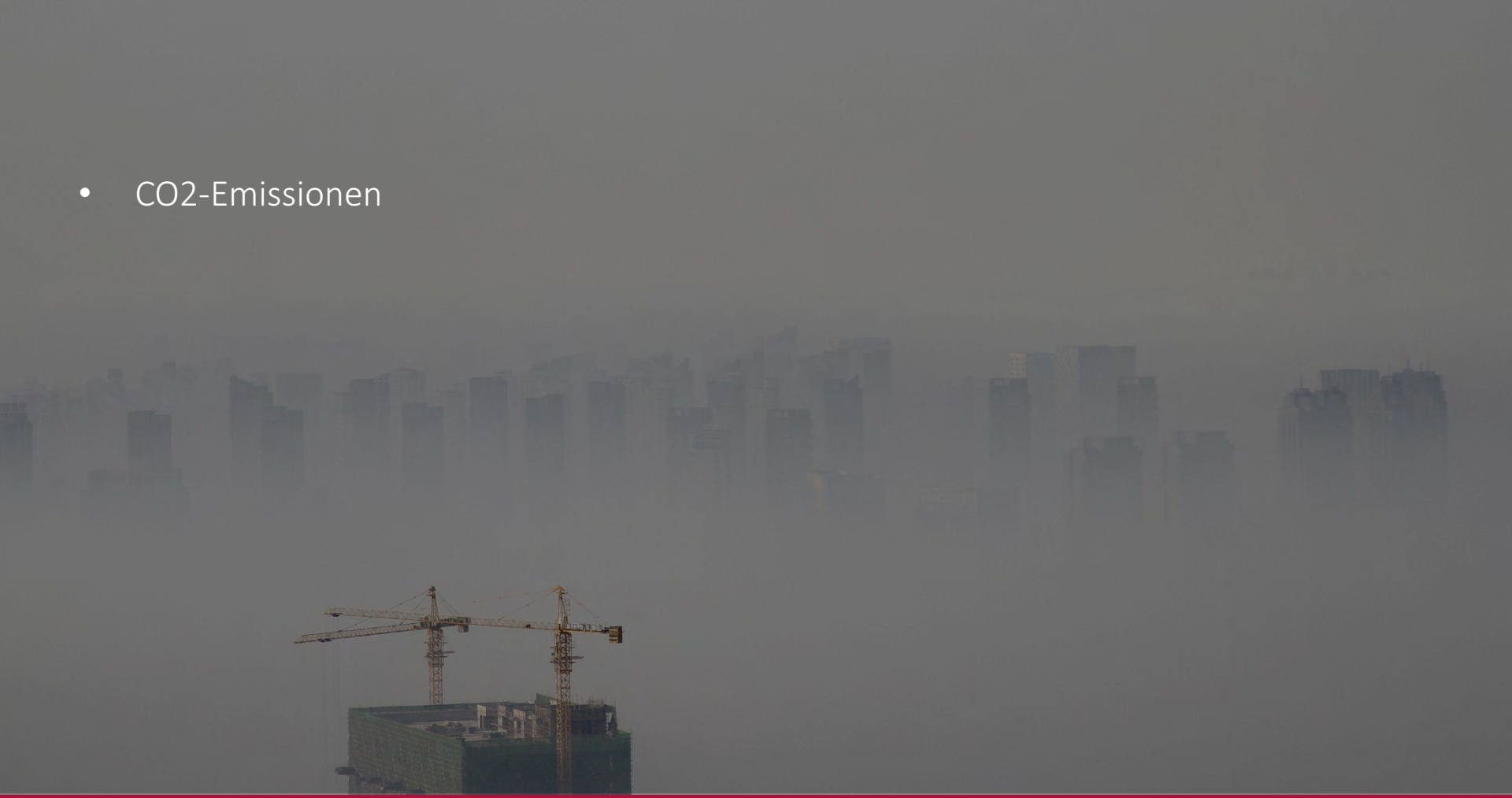
Dr. Matthias Rippmann ist Senior Researcher in der Block Research Group an der ETH Zürich.

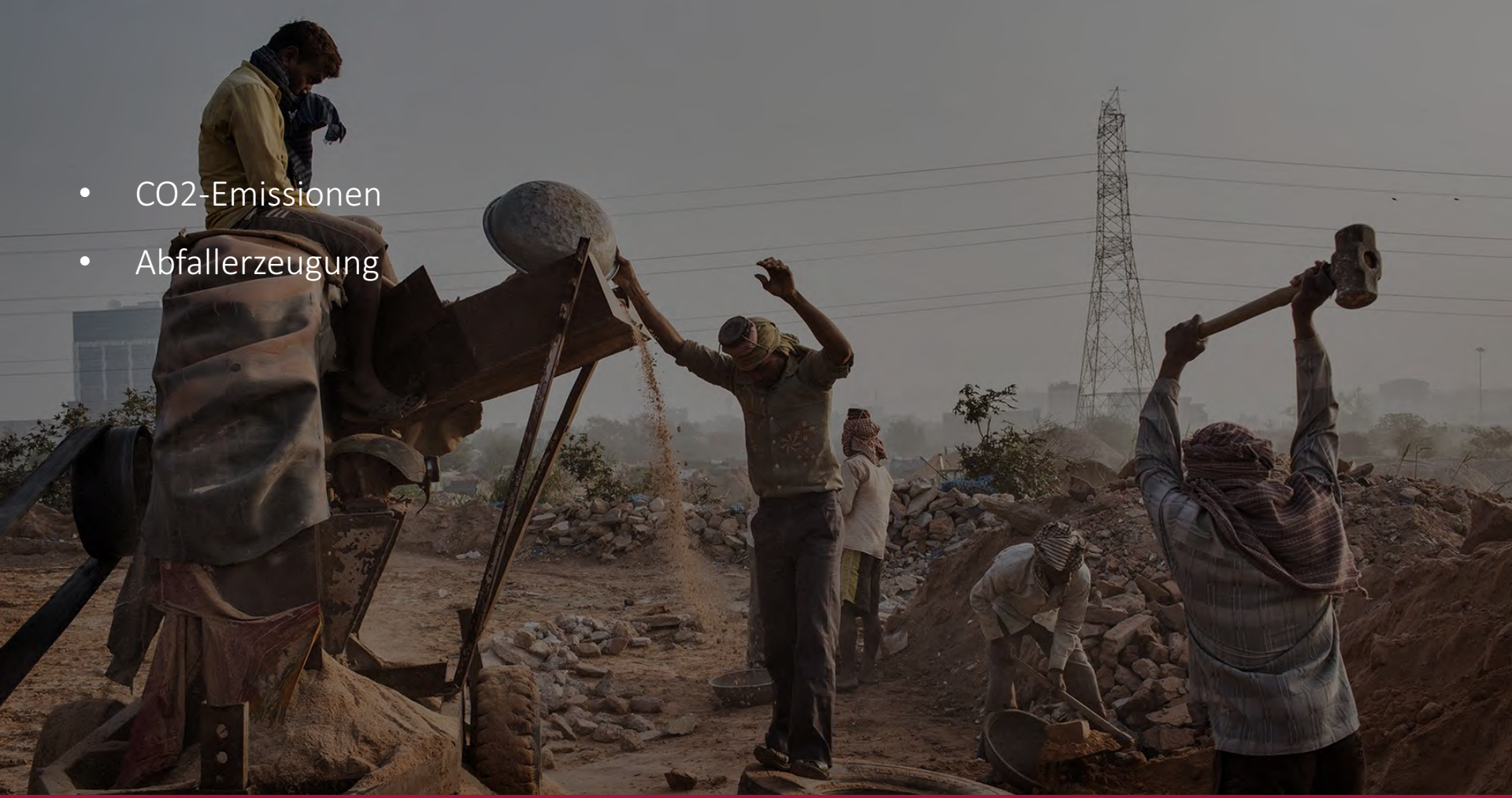
Er leitet und koordiniert interdisziplinäre Forschungsprojekte und Industriekooperationen im Bereich *ressourceneffizienter Tragstrukturen* und *innovativer Konstruktionstechnik*. Nach seiner Promotion auf dem Gebiet der digitalen Werkzeuge für den Tragwerksentwurf war er Postdoc und Mitglied des Lenkungsausschusses im Nationalen Forschungsschwerpunkt (NSF) Digitale Fabrikation an der ETH.

Vor seinem Doktoratstudium arbeitete Matthias Rippmann in Stuttgart bei Behnisch Architekten, LAVA, dem Institut für Leichtbau Entwerfen und Konstruieren (ILEK) und im Ingenieurbüro Werner Sobek.

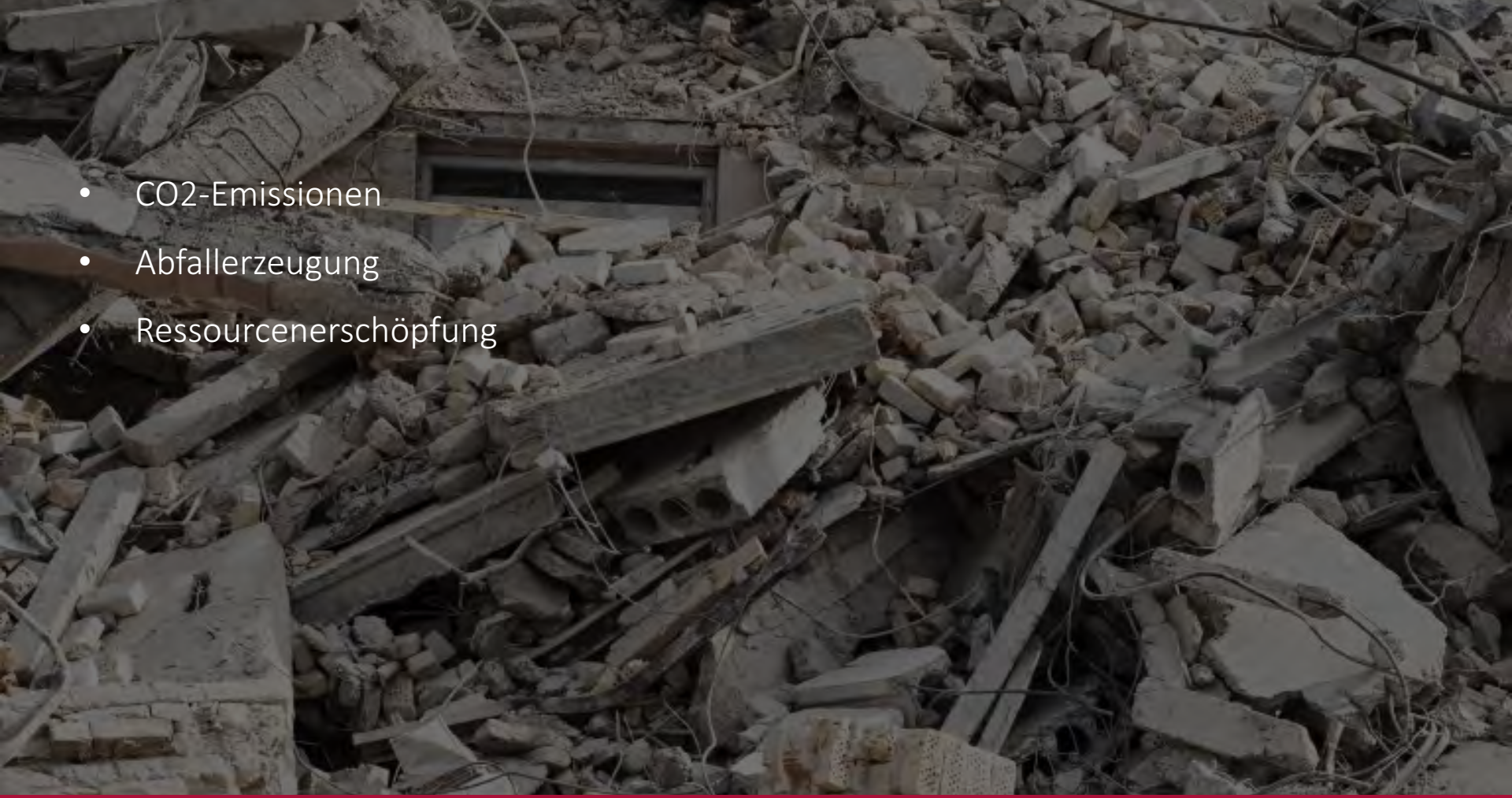
Er war 2010 Mitgründer des Architektur- und Planungsbüro ROK (Rippmann Oesterle Knauss GmbH), das sich auf computerbasierte Planung und automatisierte Fertigung spezialisiert hat.

- CO2-Emissionen

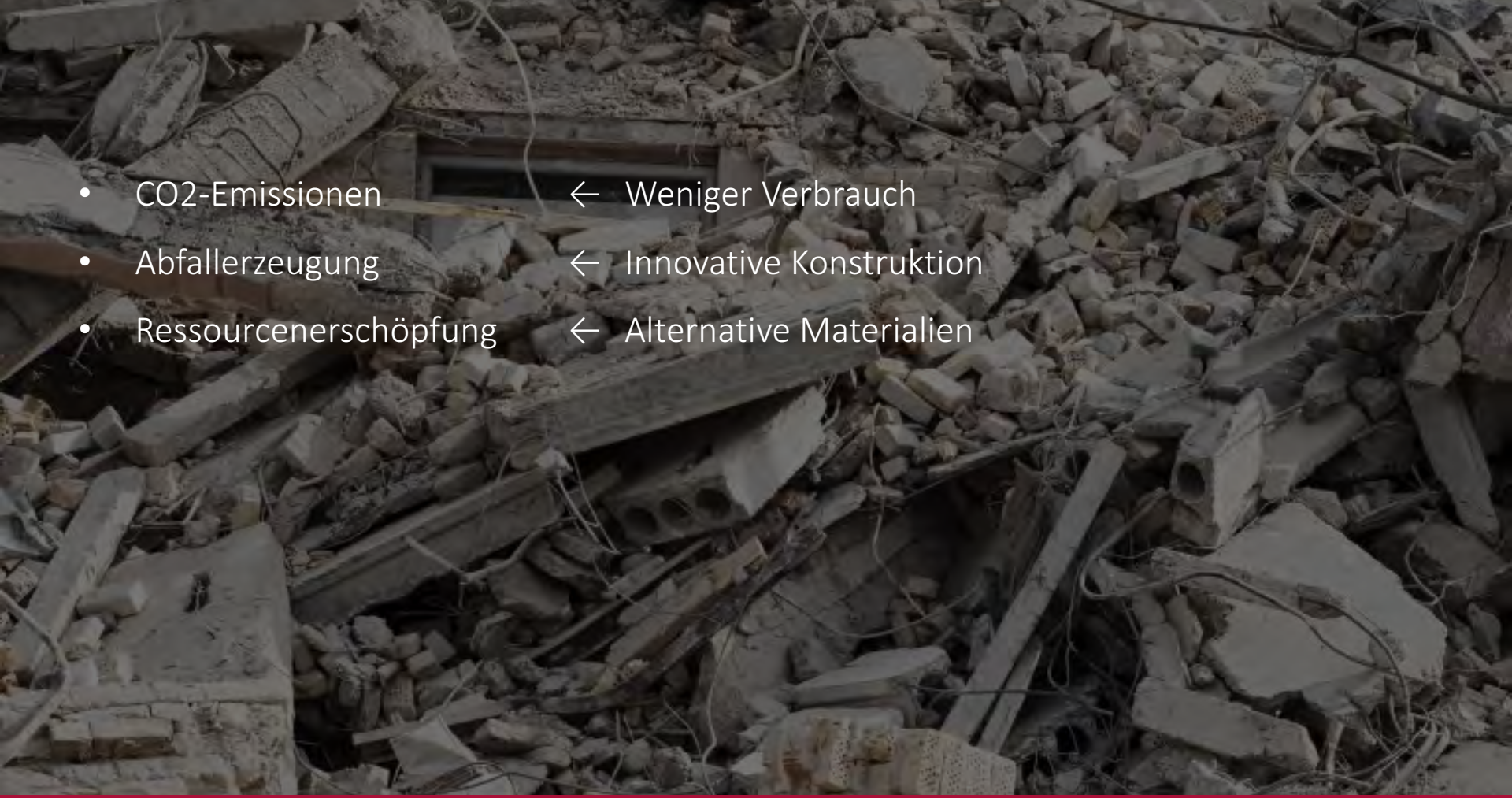




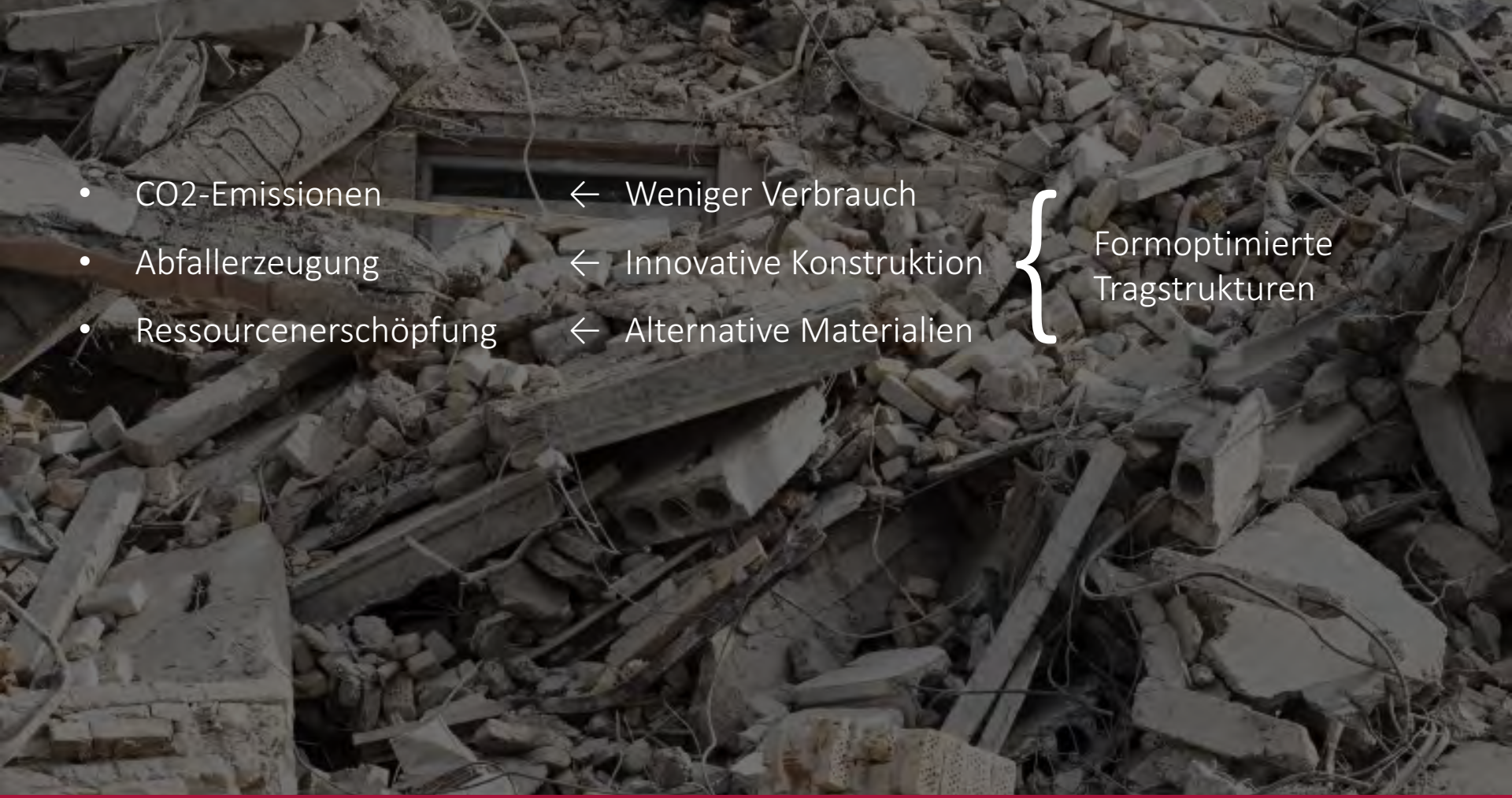
- CO_2-Emissionen
- Abfallerzeugung

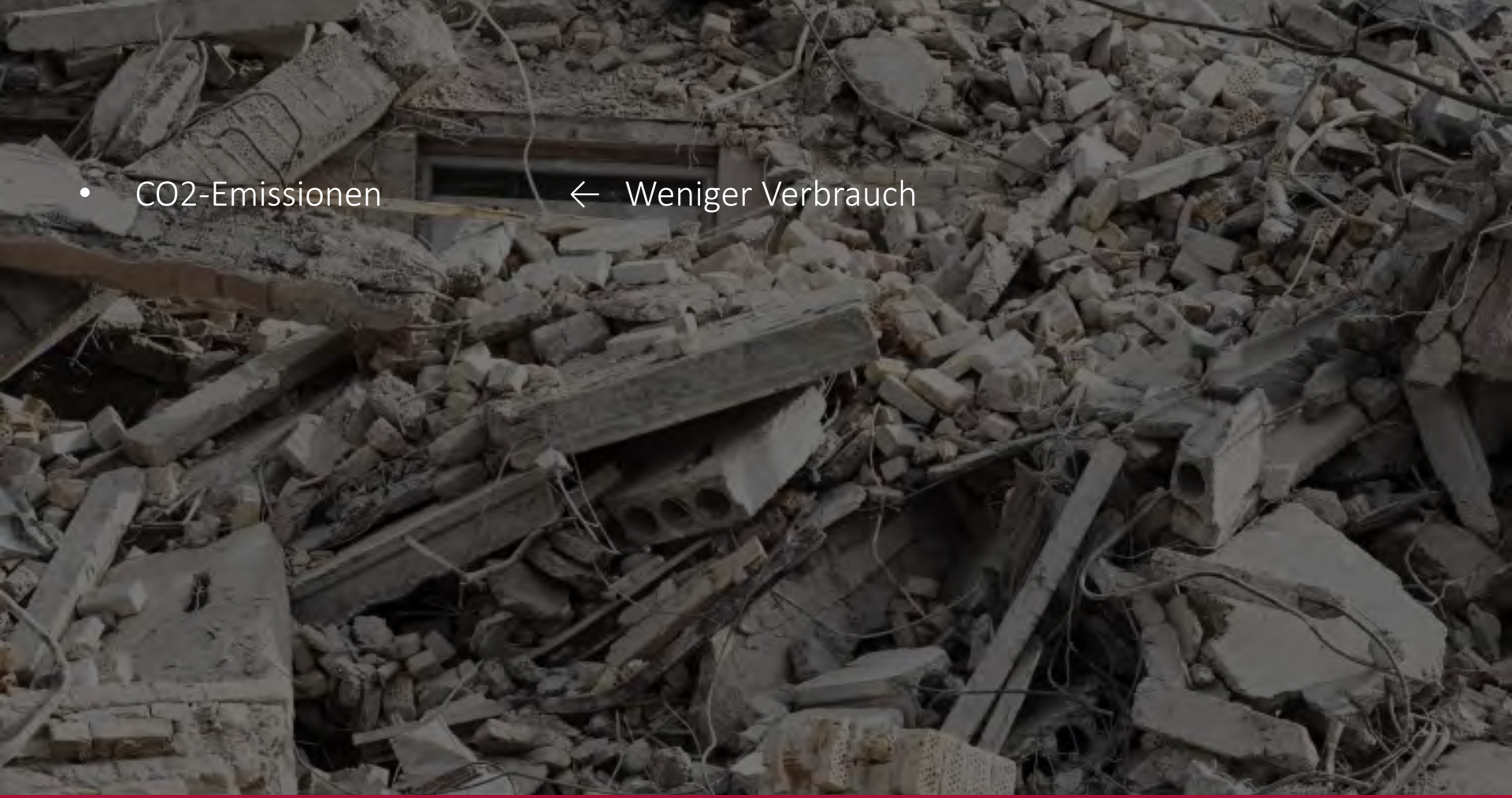


- CO_2-Emissionen
- Abfallerzeugung
- Ressourcenerschöpfung



- CO_2-Emissionen ← Weniger Verbrauch
- Abfallerzeugung ← Innovative Konstruktion
- Ressourcenerschöpfung ← Alternative Materialien

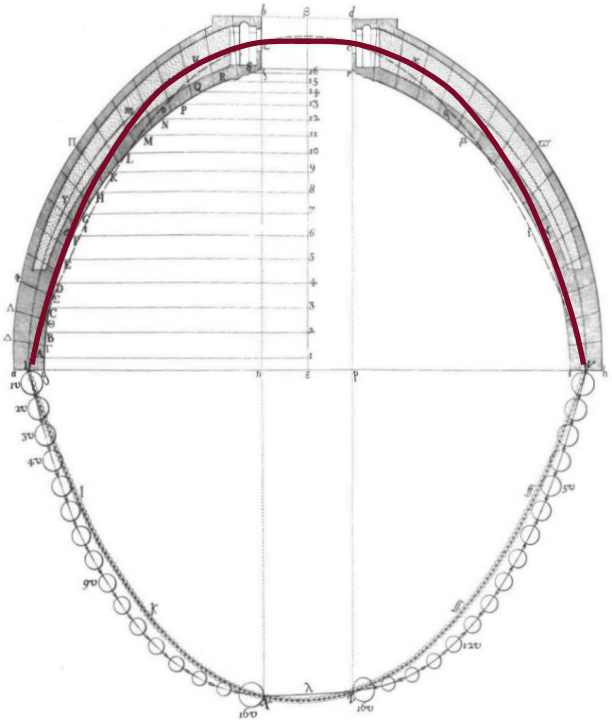

• CO2-Emissionen ← Weniger Verbrauch
• Abfallerzeugung ← Innovative Konstruktion
• Ressourcenerschöpfung ← Alternative Materialien
{ Formoptimierte Tragstrukturen

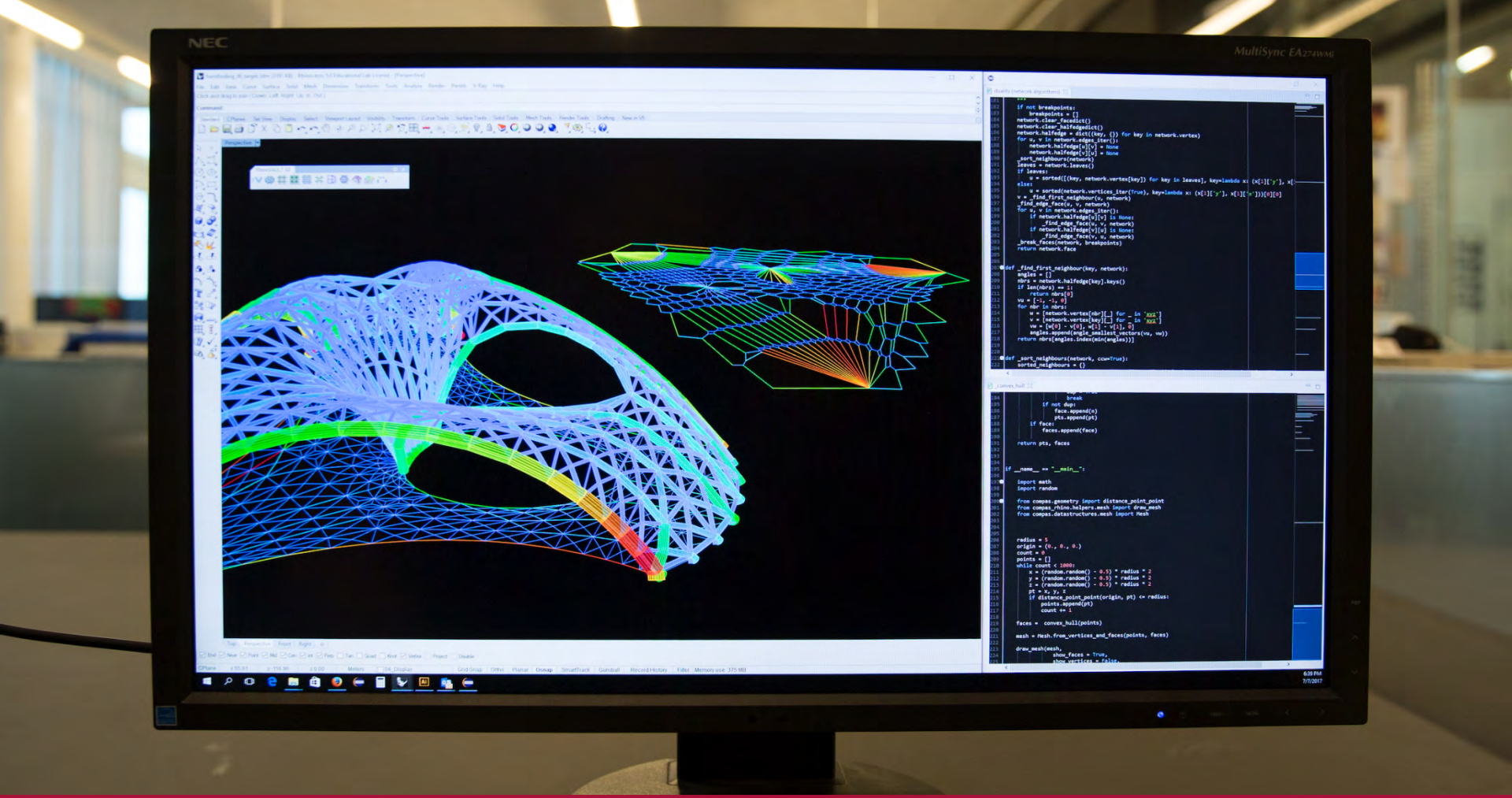


- CO_2-Emissionen ← Weniger Verbrauch

« As hangs the flexible line, so but inverted will stand the rigid arch. »

Hooke (1676)




NEC
MultiSync EA274WMi

Armadillo Vault

Venice Architecture Biennale 2016

Block Research Group, ETH Zurich

Prof. Dr. Philippe Block
Dr. Tom Van Mele
Dr. Matthias Rippmann
Edyta Augustynowicz
Cristián Calvo Barentin
Dr. Tomás Méndez Echenagucia
Mariana Popescu
Dr. Andrew Liew
Anna Maragkoudaki
Ursula Frick
Robin Oval
Nick Krouwel
Dr. Noelle Paulson

Ochsendorf DeJong & Block

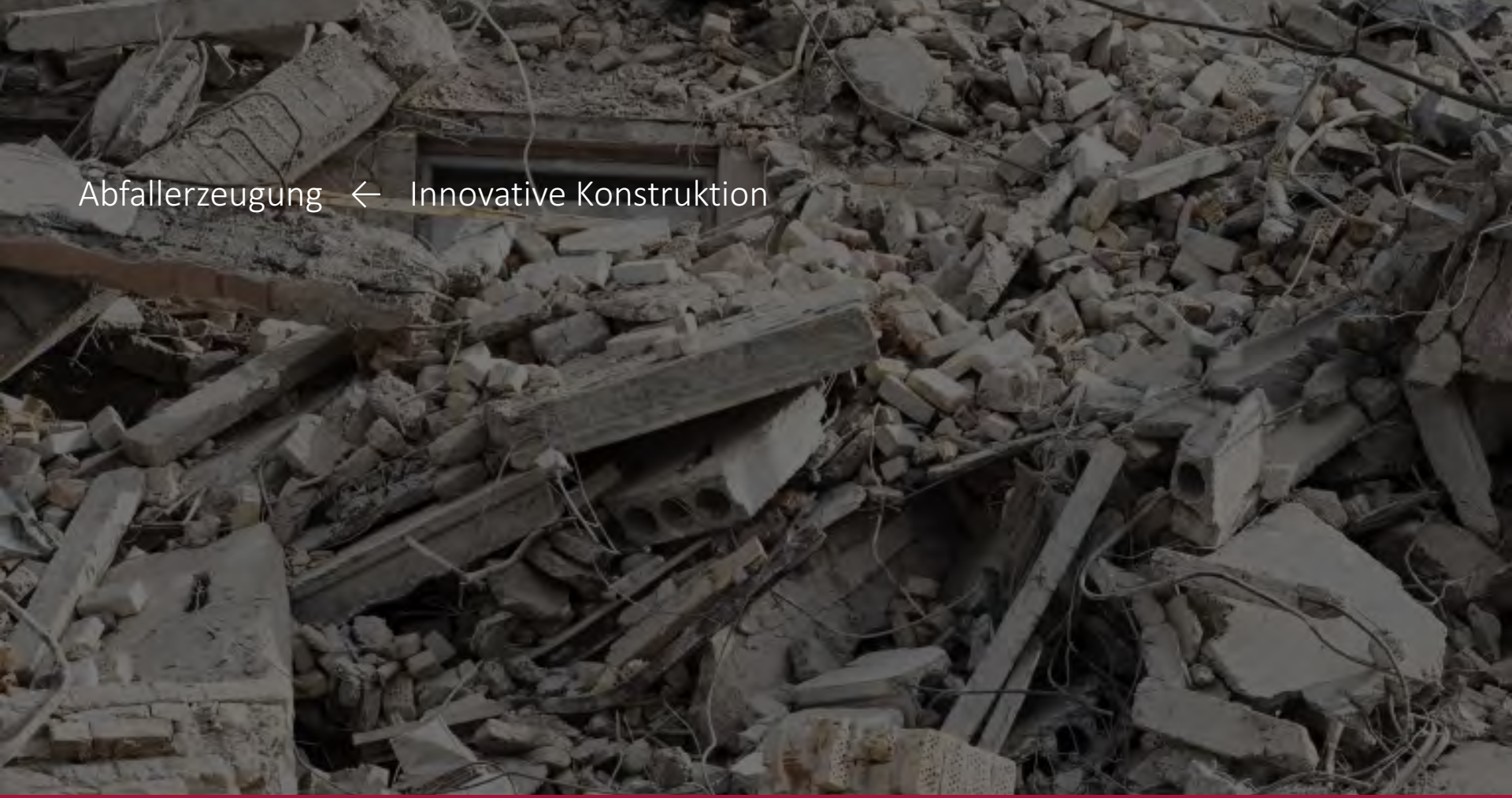
Prof. Dr. John Ochsendorf
Prof. Dr. Matthew DeJong
Prof. Dr. Philippe Block
Anjali Mehrotra

The Escobedo Group

David Escobedo
Matthew Escobedo
Salvador Crisanto
John Curry
Francisco Tovar Yebra
Joyce I-Chin Chen
Adam Bath
Hector Betancourt
Luis Rivera
Antonio Rivera
Carlos Rivera
Carlos Zuniga Rivera
Samuel Rivera
Jairo Rivera
Humberto Rivera
Jesus Rosales
Dario Rivera


1/3


Solar
Willkommen


Abfallerzeugung ← Innovative Konstruktion

NEST HiLo – Roof construction prototype

ETH Zürich, Switzerland, 2016 - 2017

Design and Engineering

Block Research Group, ETH Zürich
Supermanoeuvre
Bollinger+Grohmann
Mathematical and Physical Geodesy, ETH Zürich
Automatic Control Laboratory, ETH Zürich

Construction

Marti [general contractor]
Bürgin Creations [concrete works]
Doka [scaffolding]

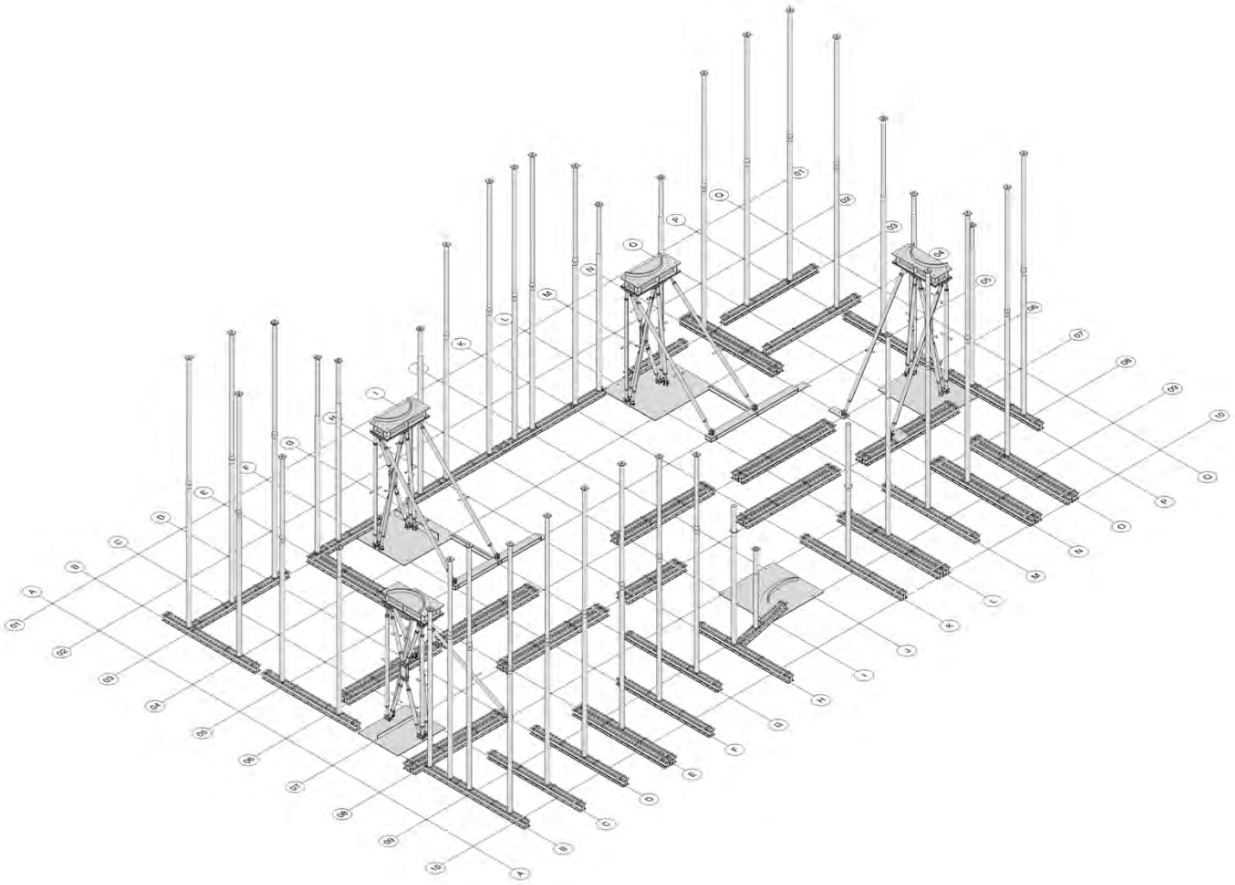
Documentation

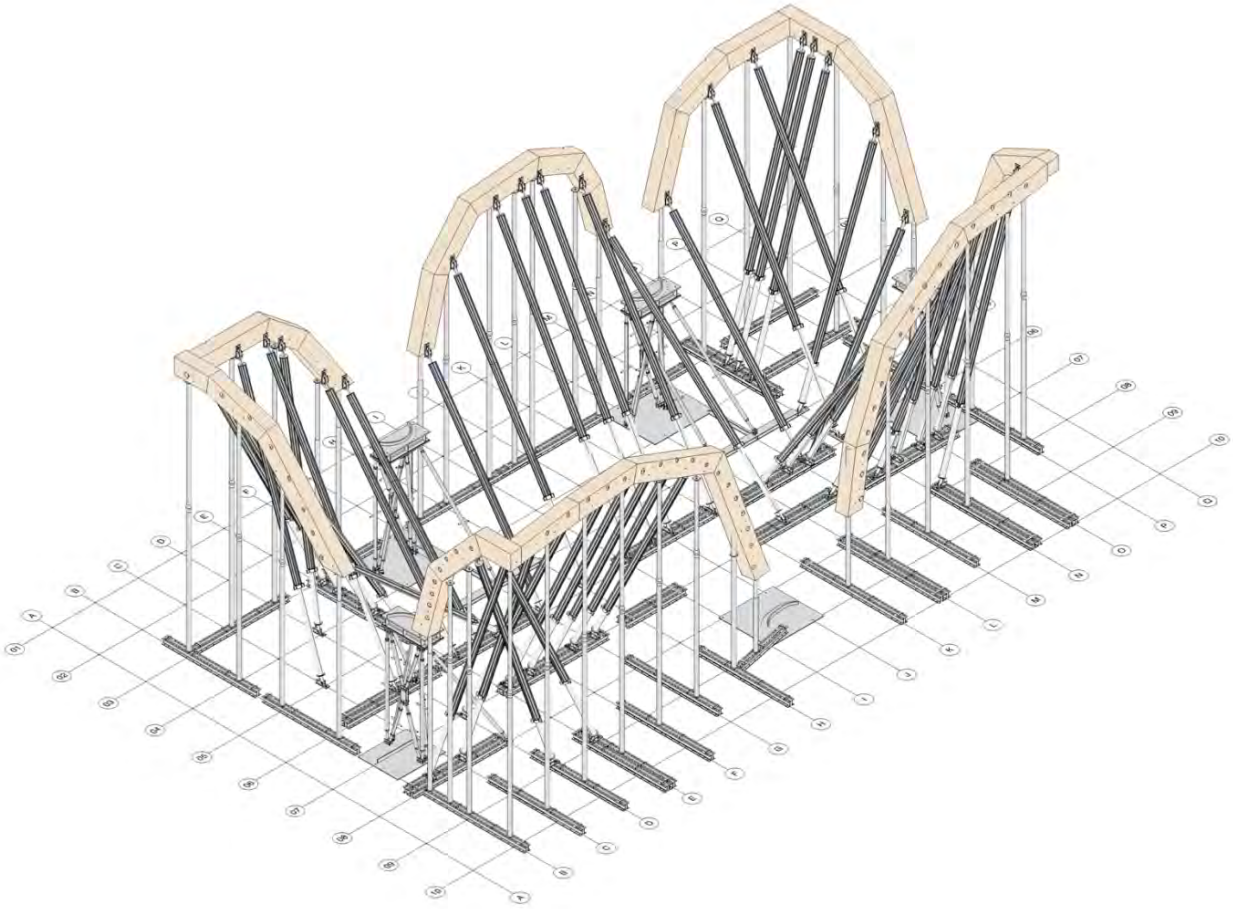
Naida Iljazovic
Mike Lyrenmann

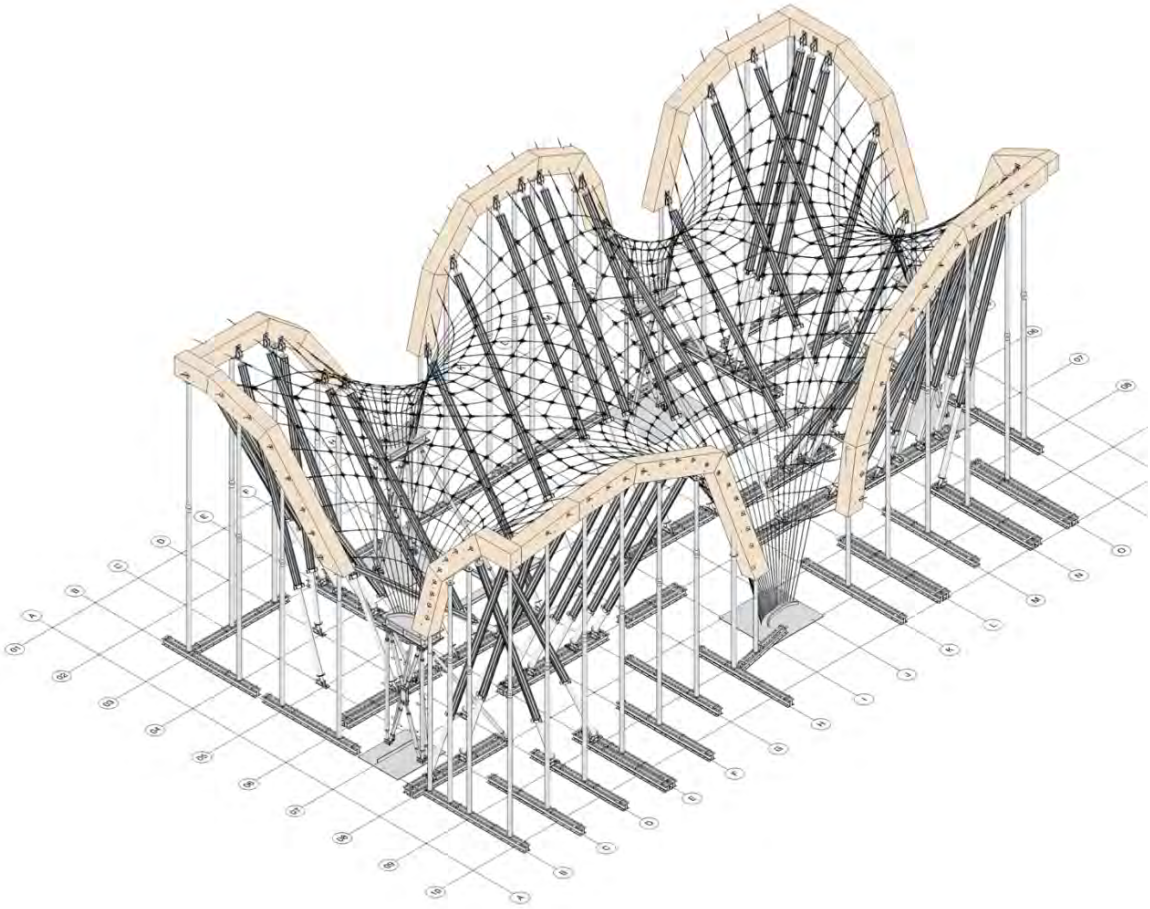
Fabrication

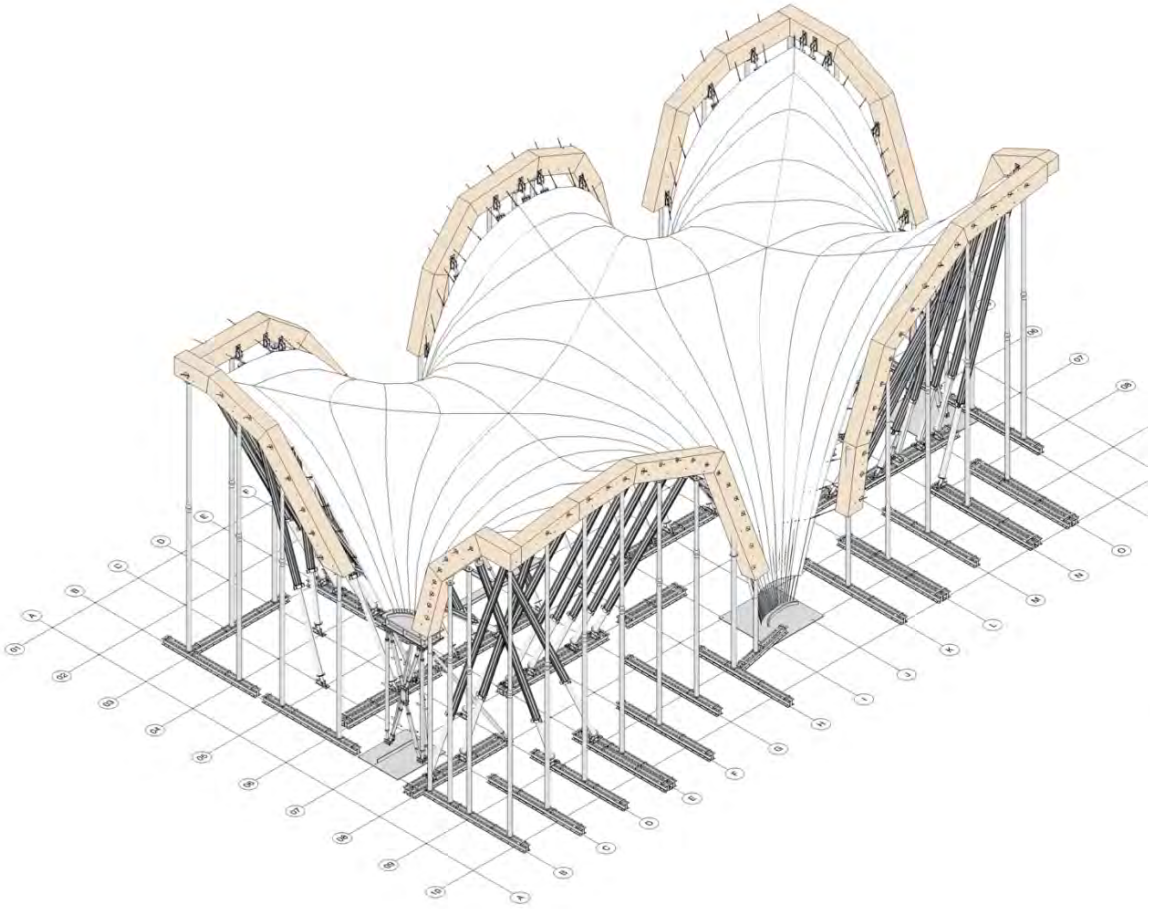
Jakob [cables]
Bruno Lehmann [rods + cable net components]
Blumer Lehmann [timber]
Dafotech [steel supports + plates]
Bieri [fabric cutting + sewing]

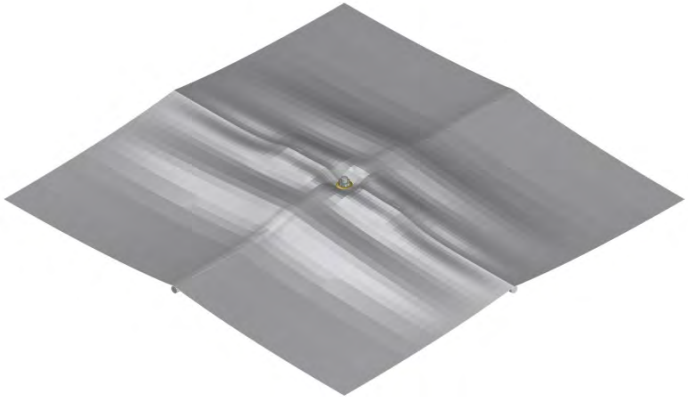
Sponsors
ETH Zürich
NCCR Digital Fabrication
Holcim Schweiz

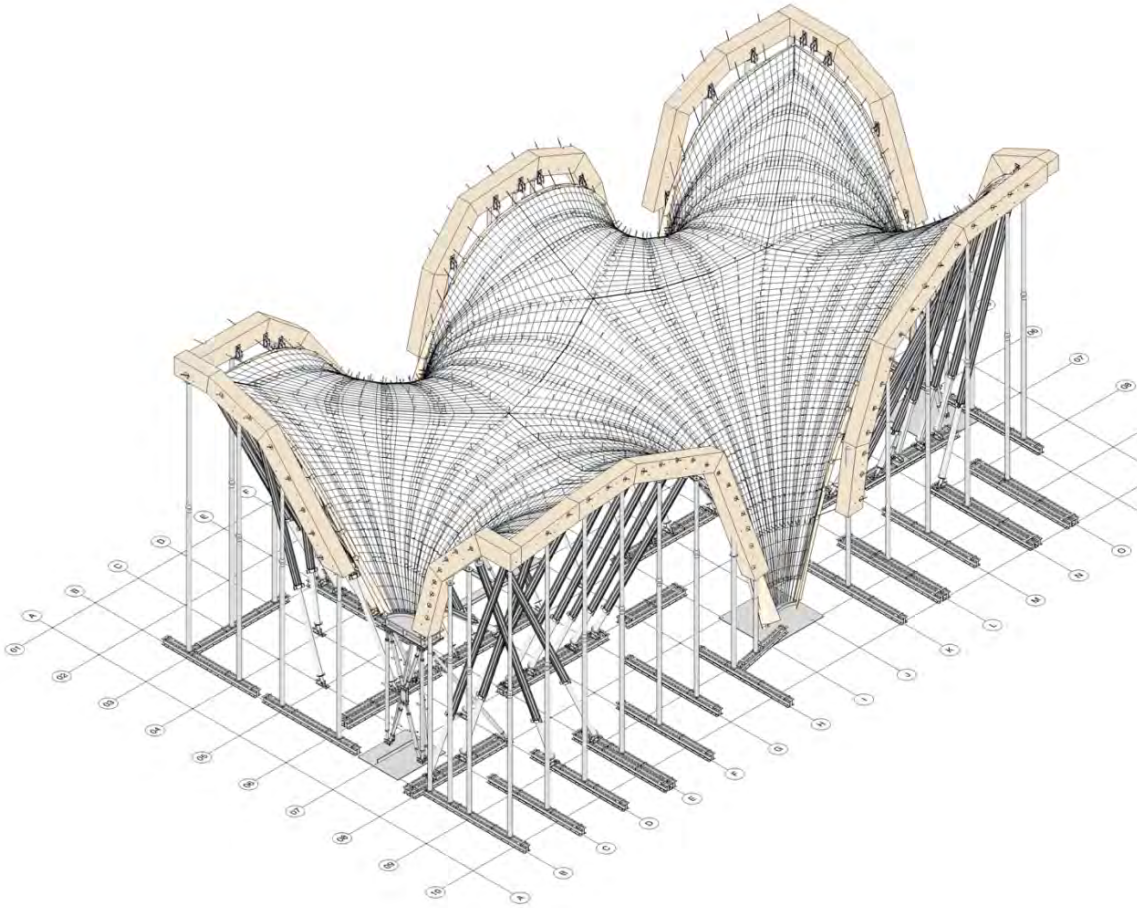


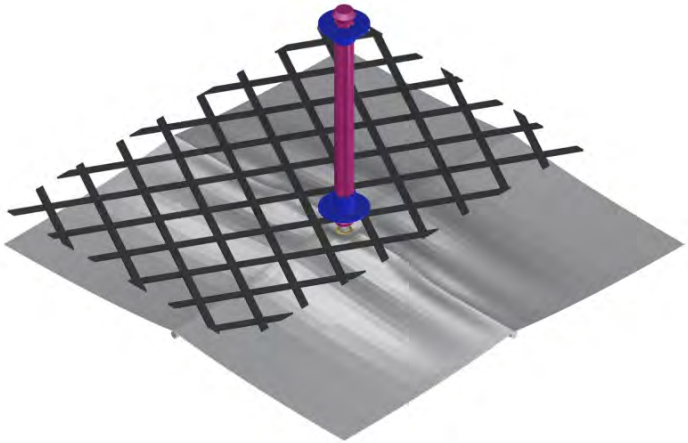


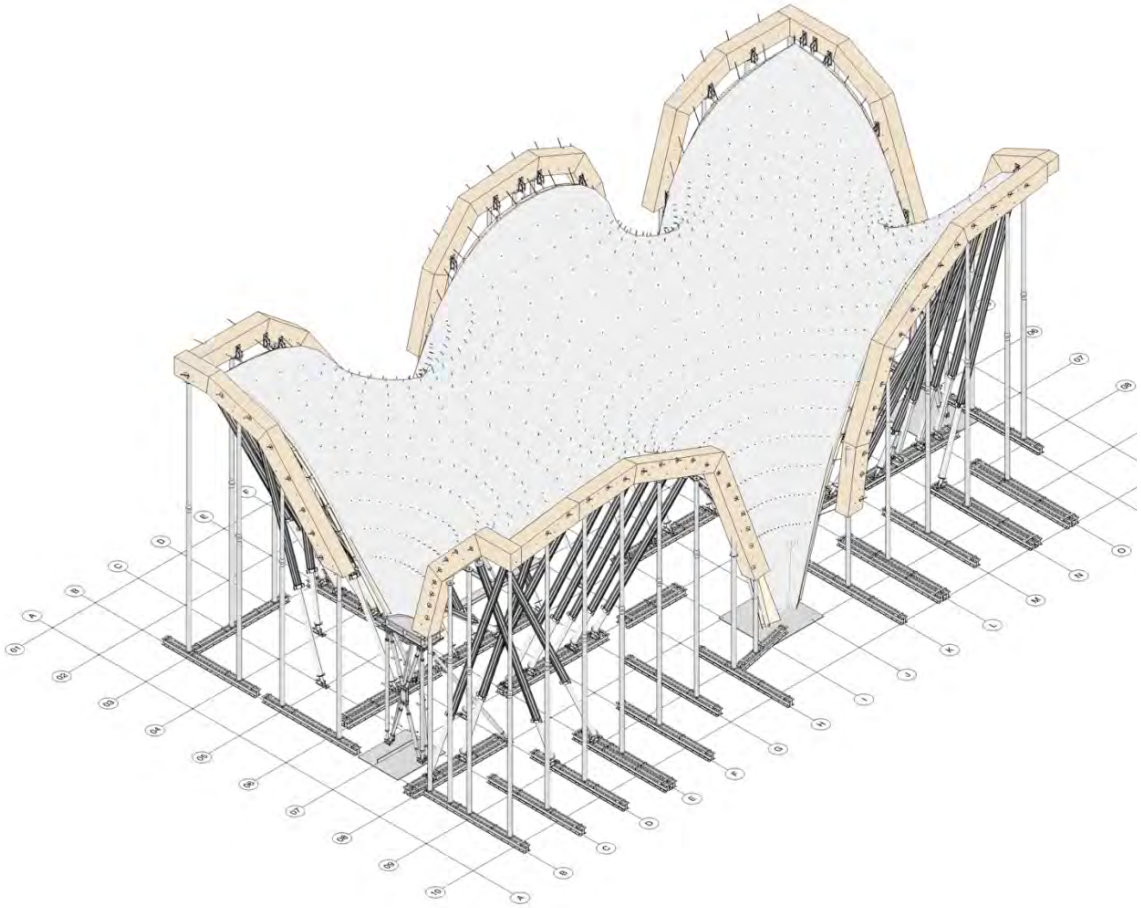


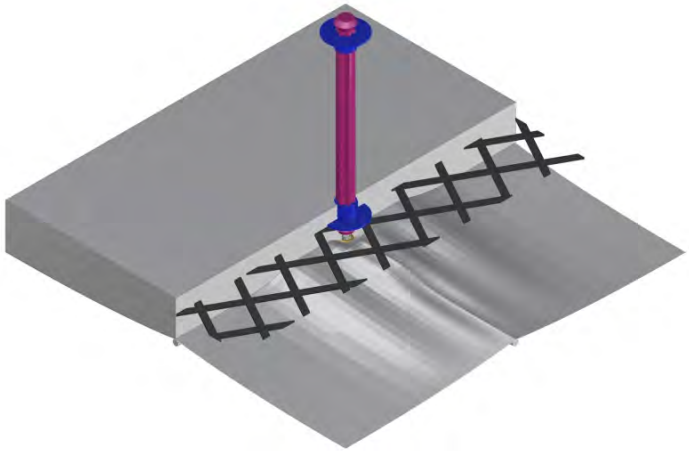


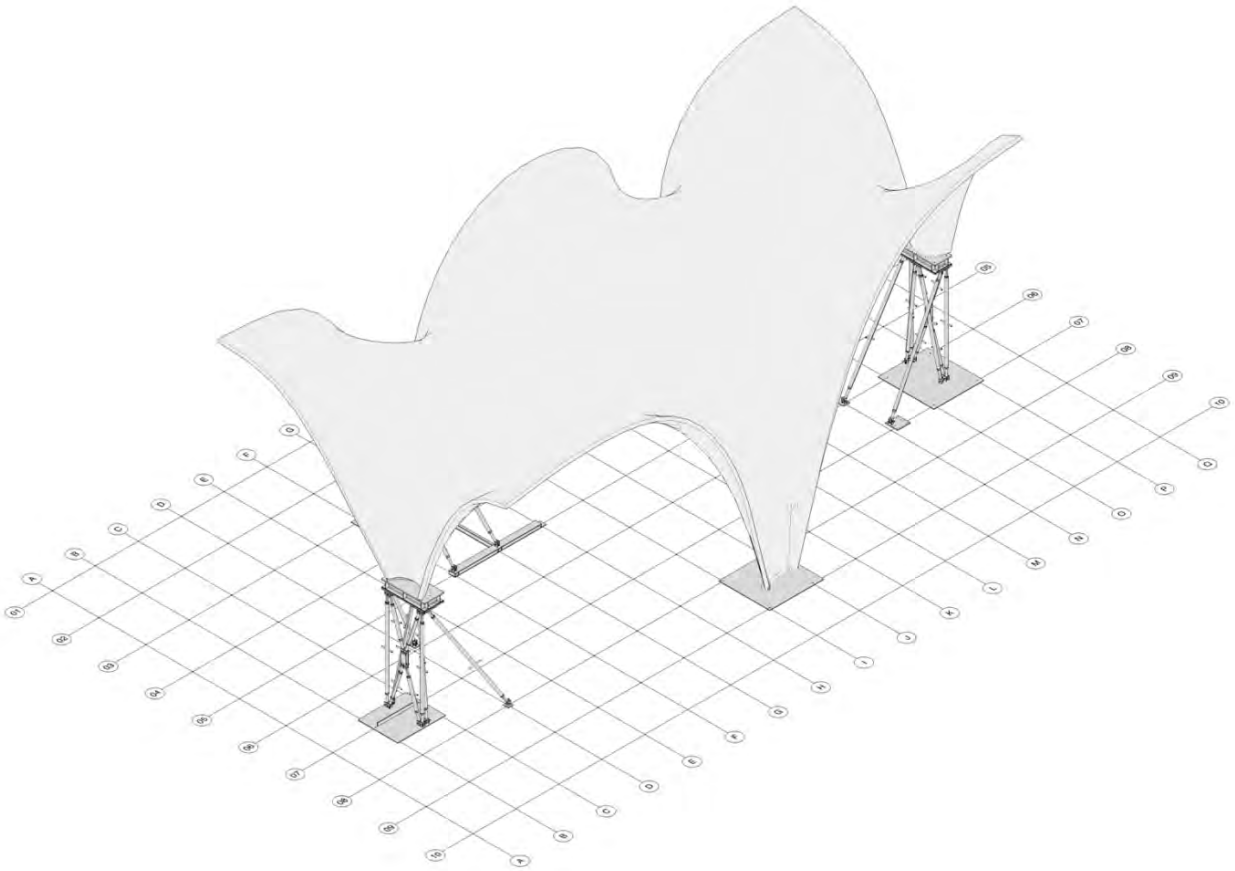


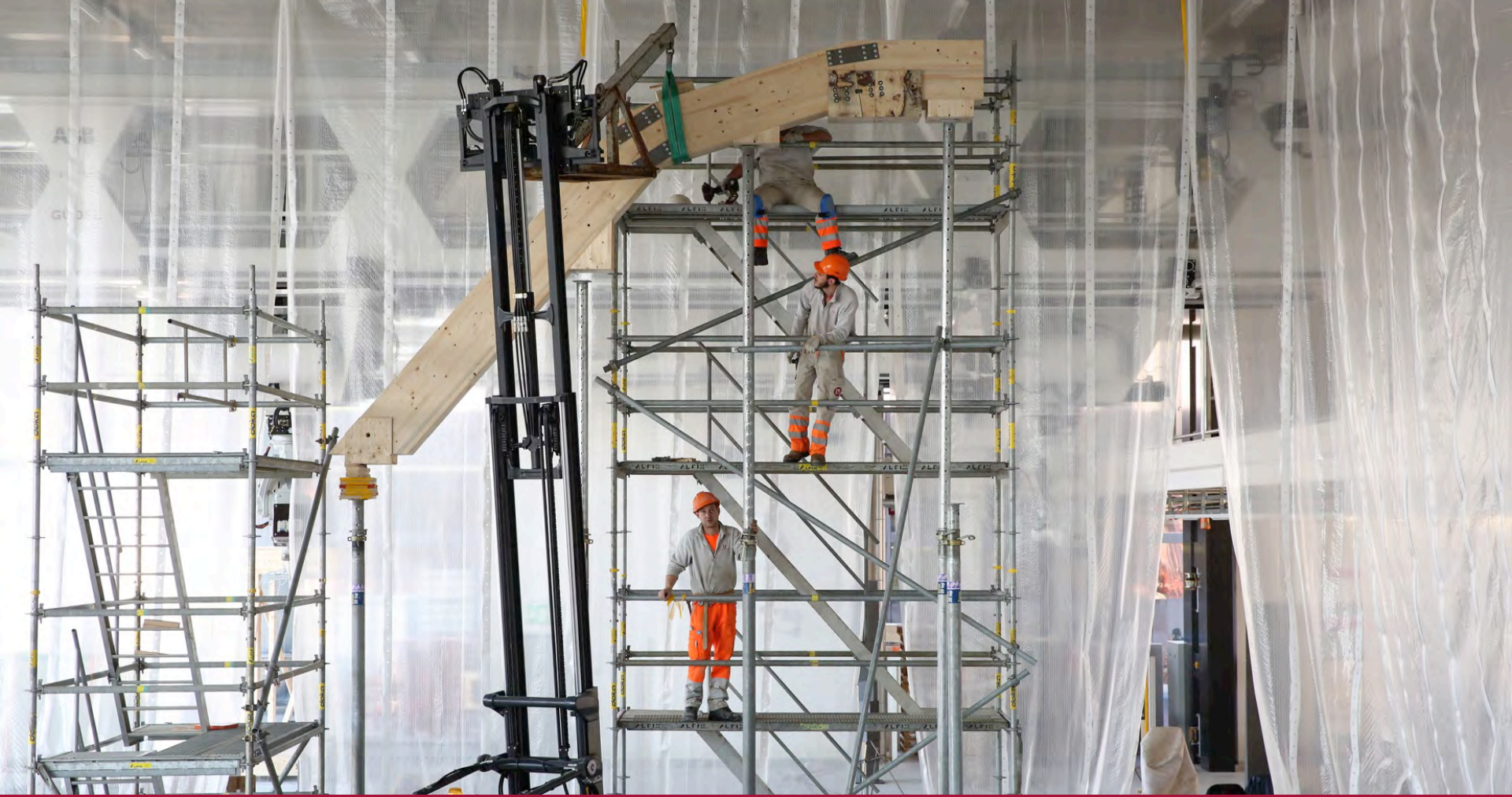


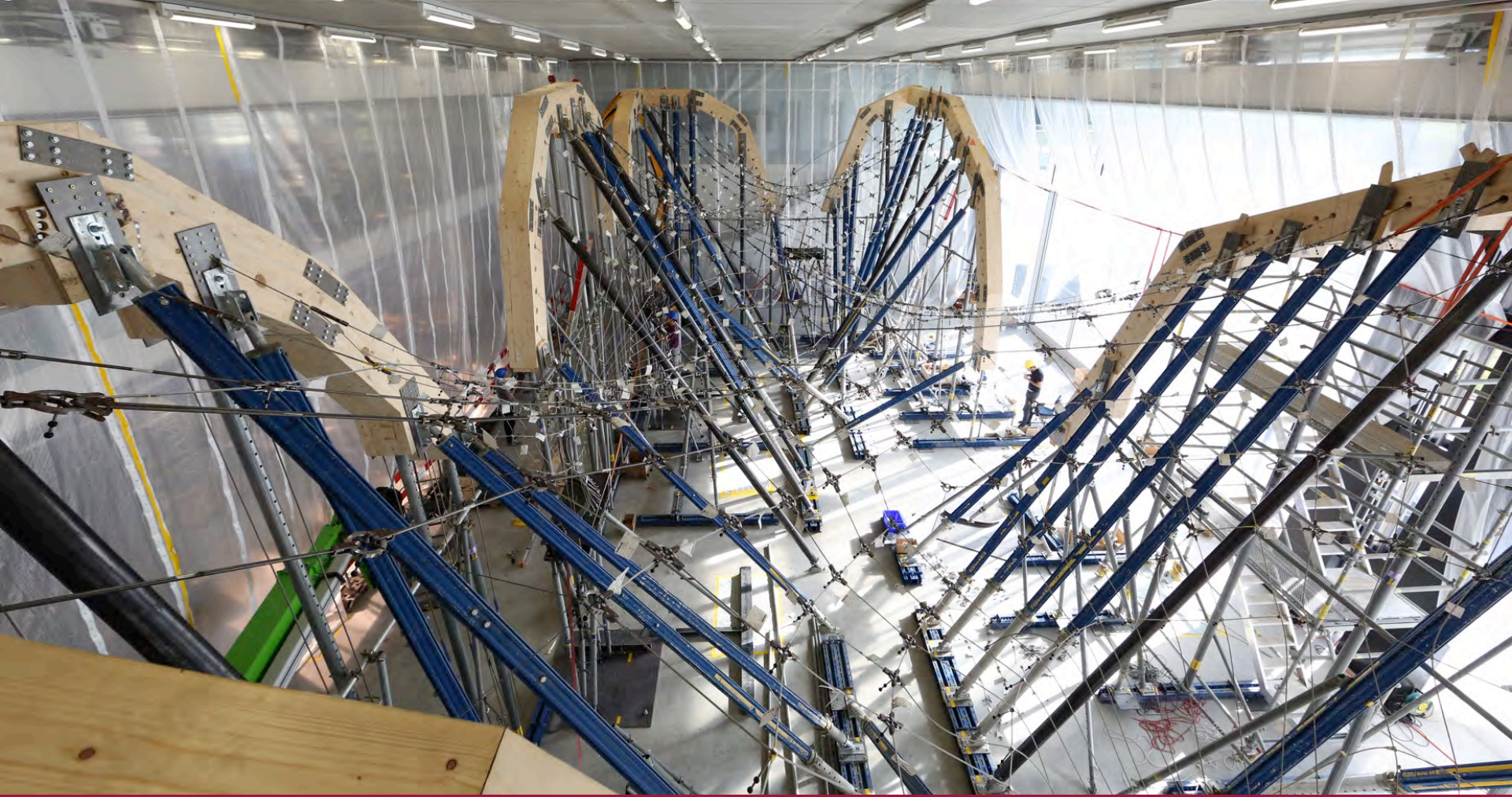


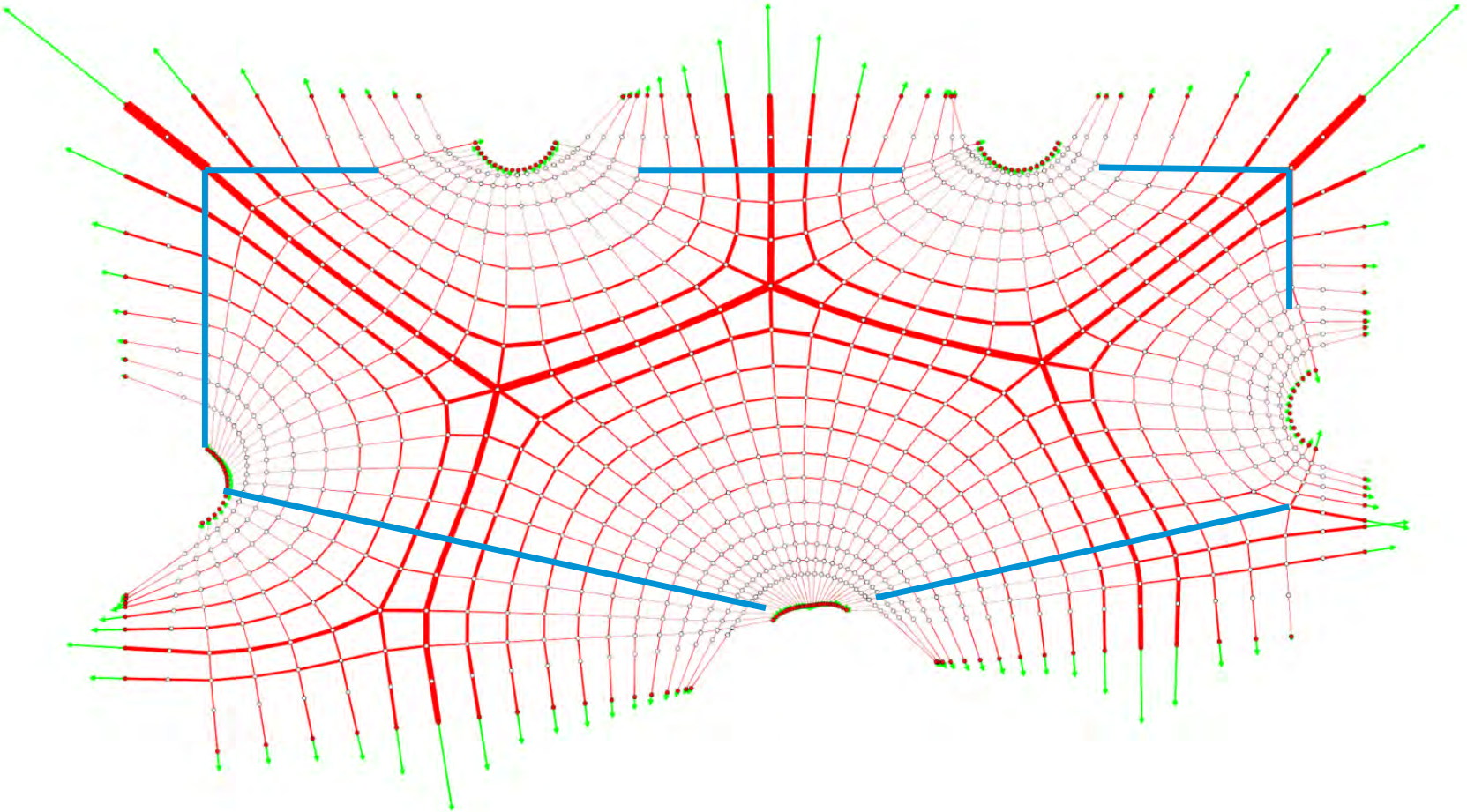













pinpoint R1000
Leica

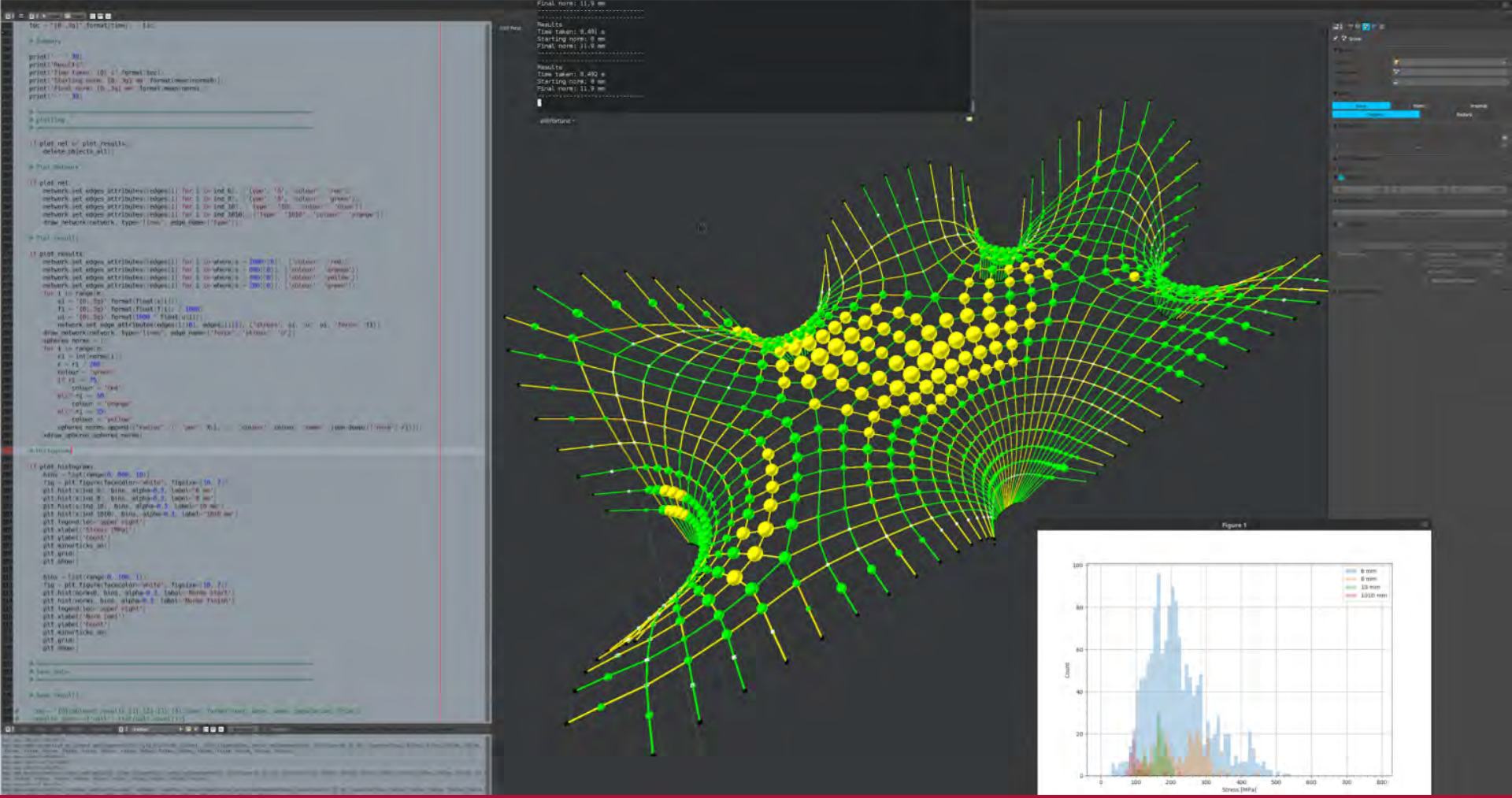
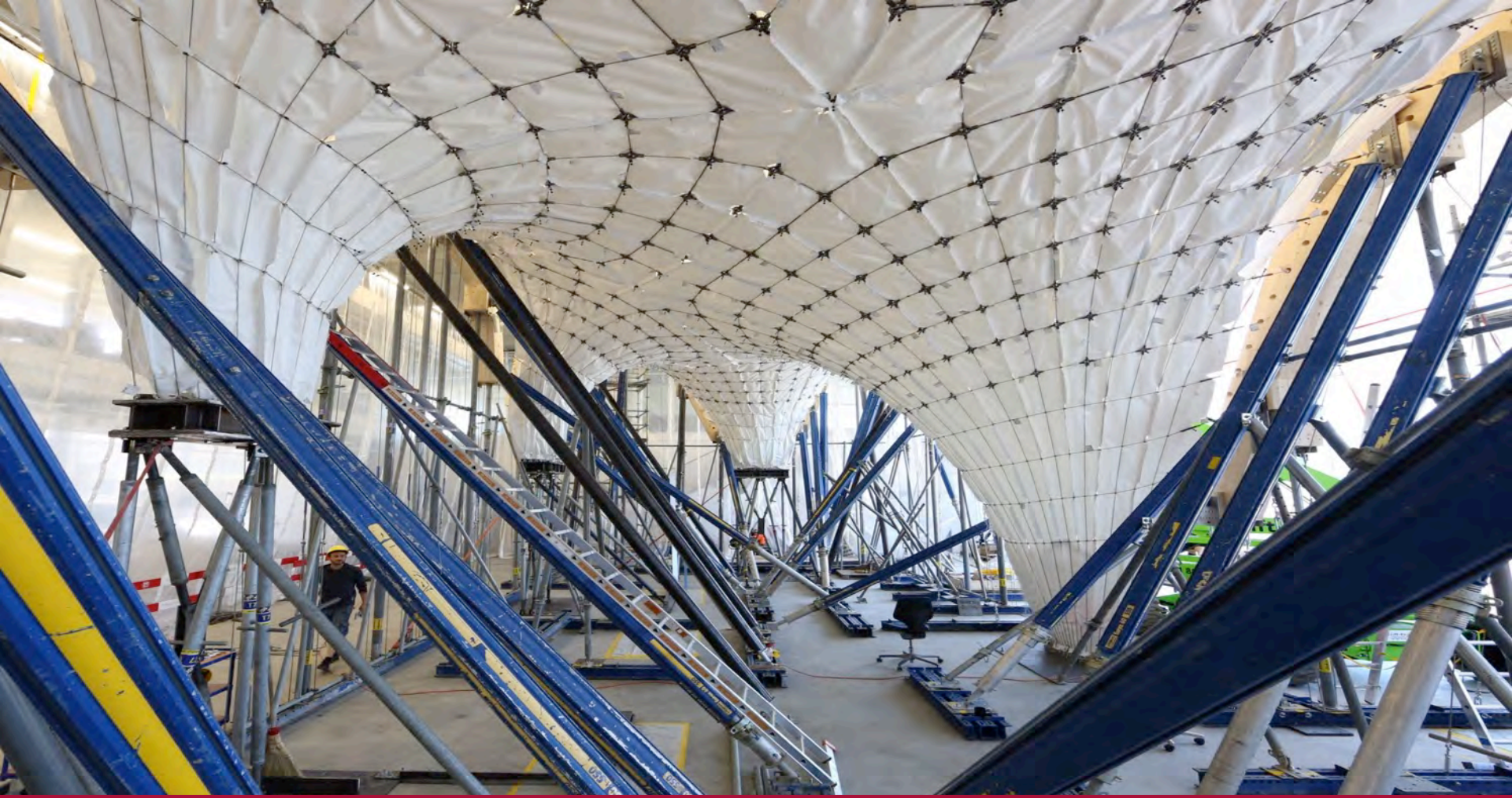
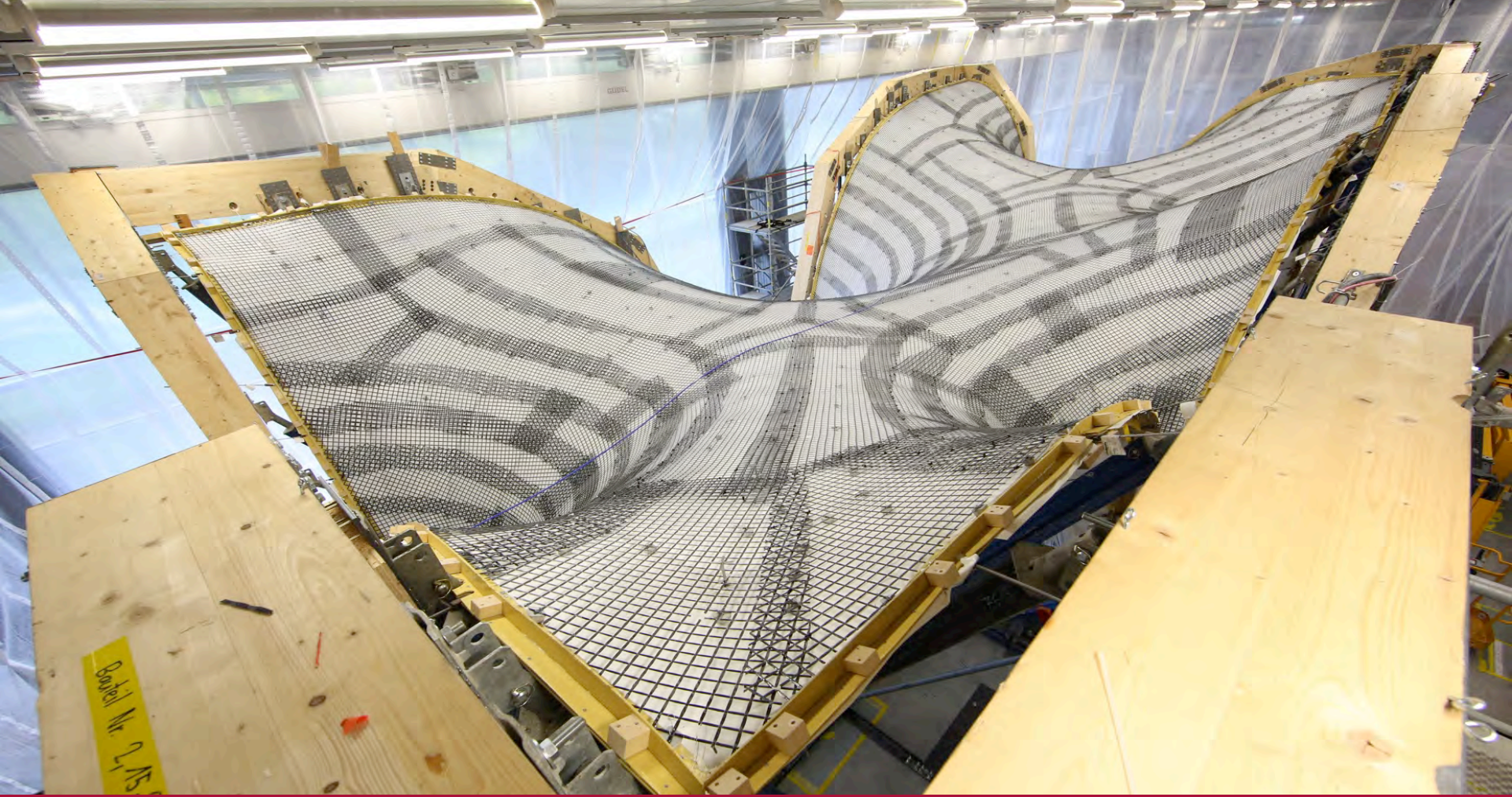

Final norm: 11.9 mm
Results
Time taken: 0.491 s
Starting norm: 0 mm
Final norm: 11.9 mm
Results
Time taken: 0.492 s
Starting norm: 0 mm
Final norm: 11.9 mm
Figure 1
0 mm
8 mm
15 mm
1010 mm
Count
Stress [MPa]


ABB
GÜDEL
ABB
GÜDEL
GÜDEL



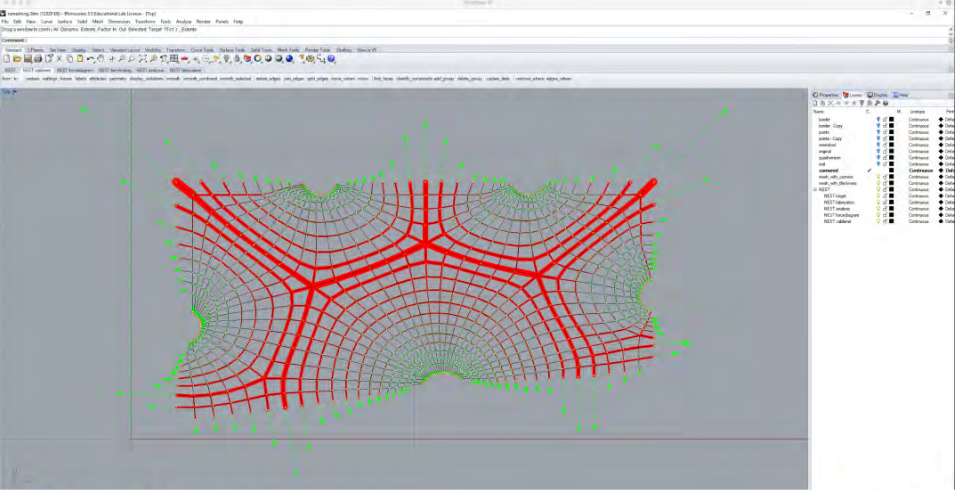


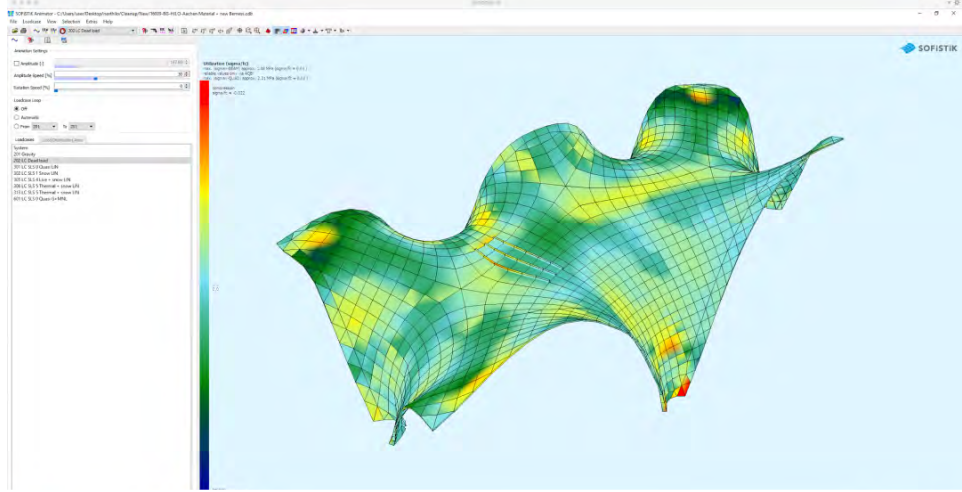
NEST HiLo Roof Prototype

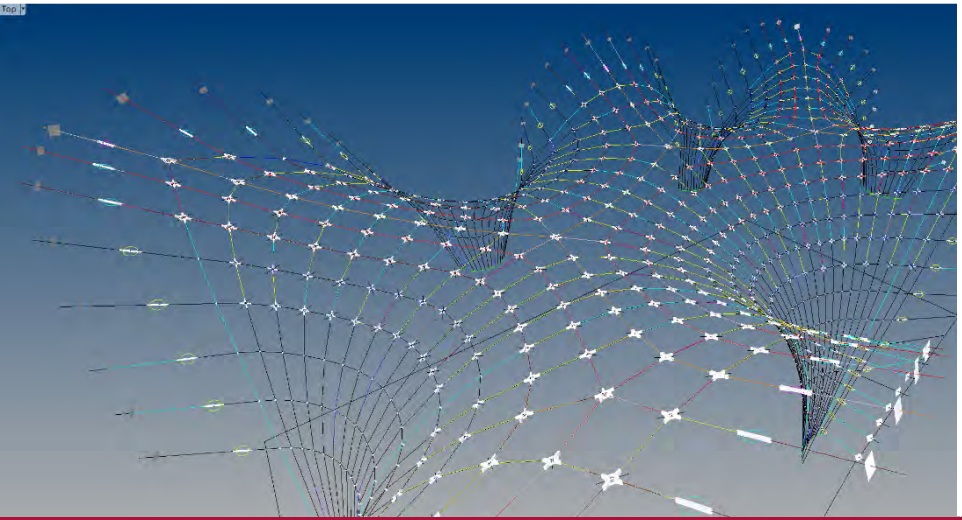
Zurich, Switzerland

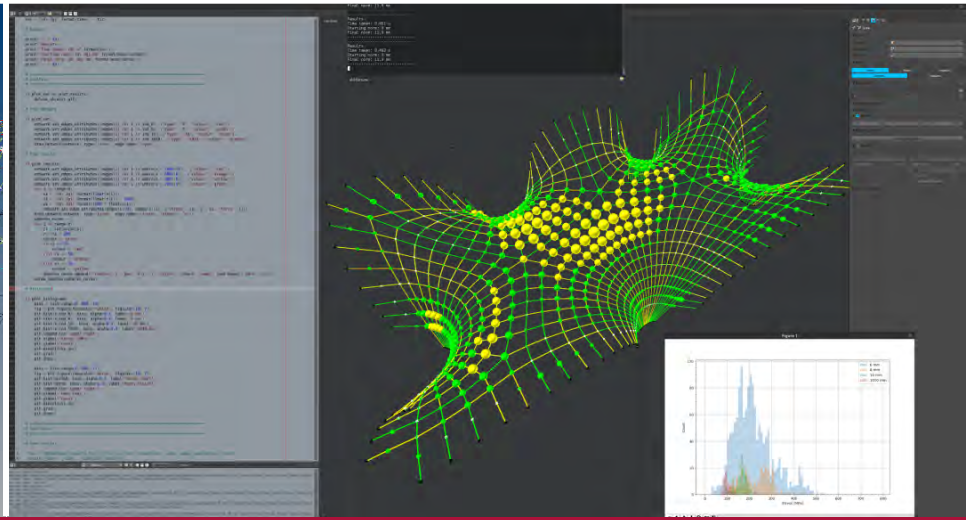
2016-2017

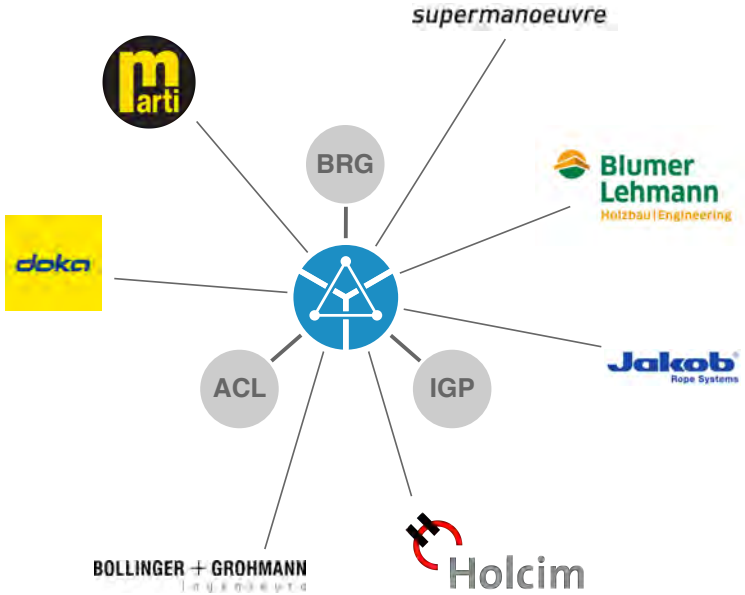
Block Research Group, ETH Zürich
with supermanoeuvre




SOFISTIK






supermanoeuvre
marti
BRG
Blumer Lehmann
Holzbau | Engineering
doka
ACL
IGP
Jakob
Rope Systems
BOLLINGER + GROHMANN
Holcim

?!


STEIGER
LIBRA 3.130

KnitCandela

MUAC, Mexico City, Mexico 2018

Design

Zaha Hadid Architects CODE:
Filippo Nassetti, David Reeves, Marko Margeta, Shajay Bhooshan, Patrik Schumacher

Block Research Group
Mariana Popescu, Matthias Rippmann, Tom Van Mele, Philippe Block

Structural engineering

Block Research Group
Andrew Liew, Tom Van Mele

Fabrication

Block Research Group
R-Ex

KnitCrete Technology

Block Research Group
Mariana Popescu, Tom Van Mele, Philippe Block

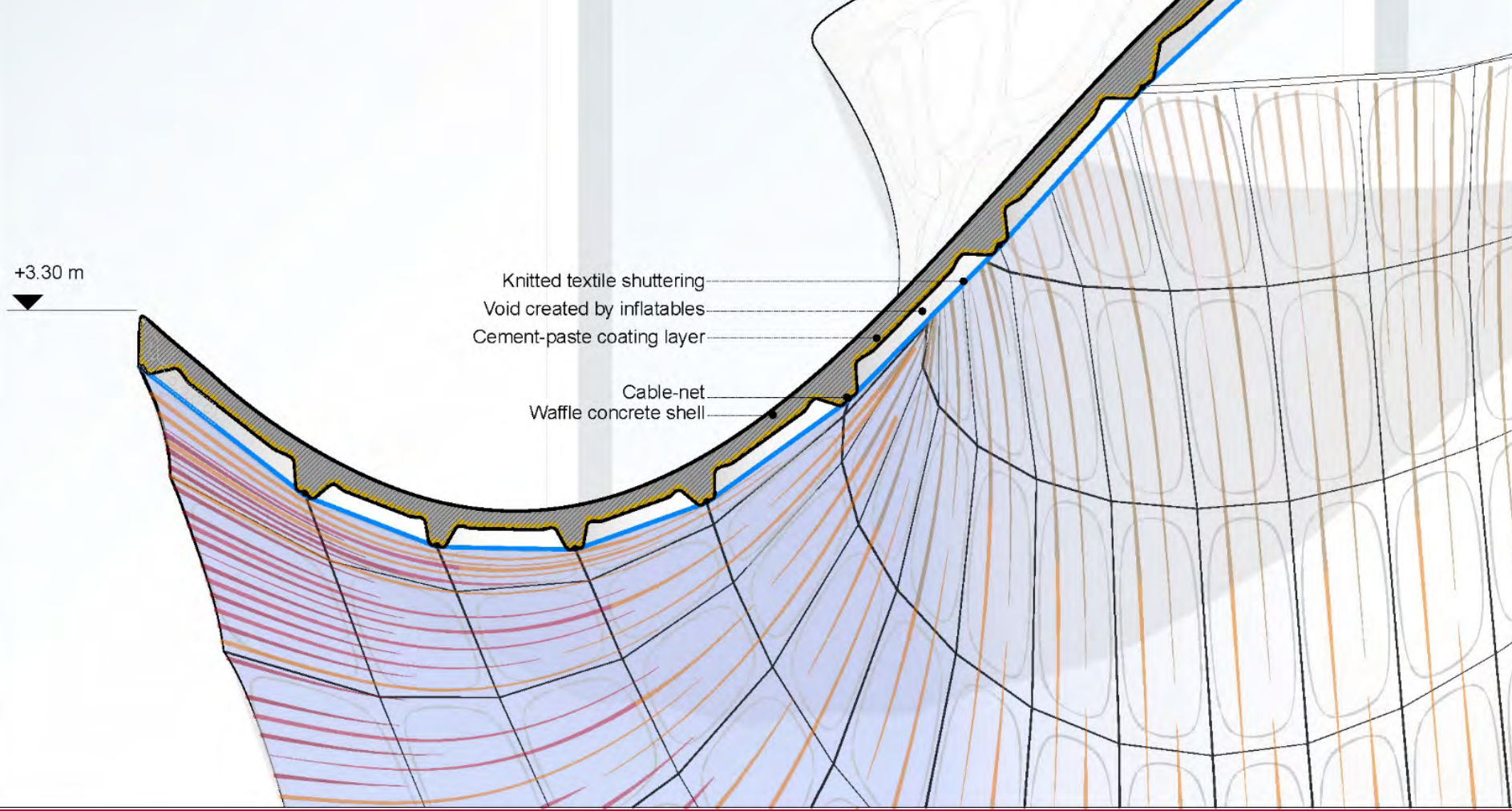
Physical Chemistry of Building Materials
Lex Reiter, Robert Flatt

Concrete development

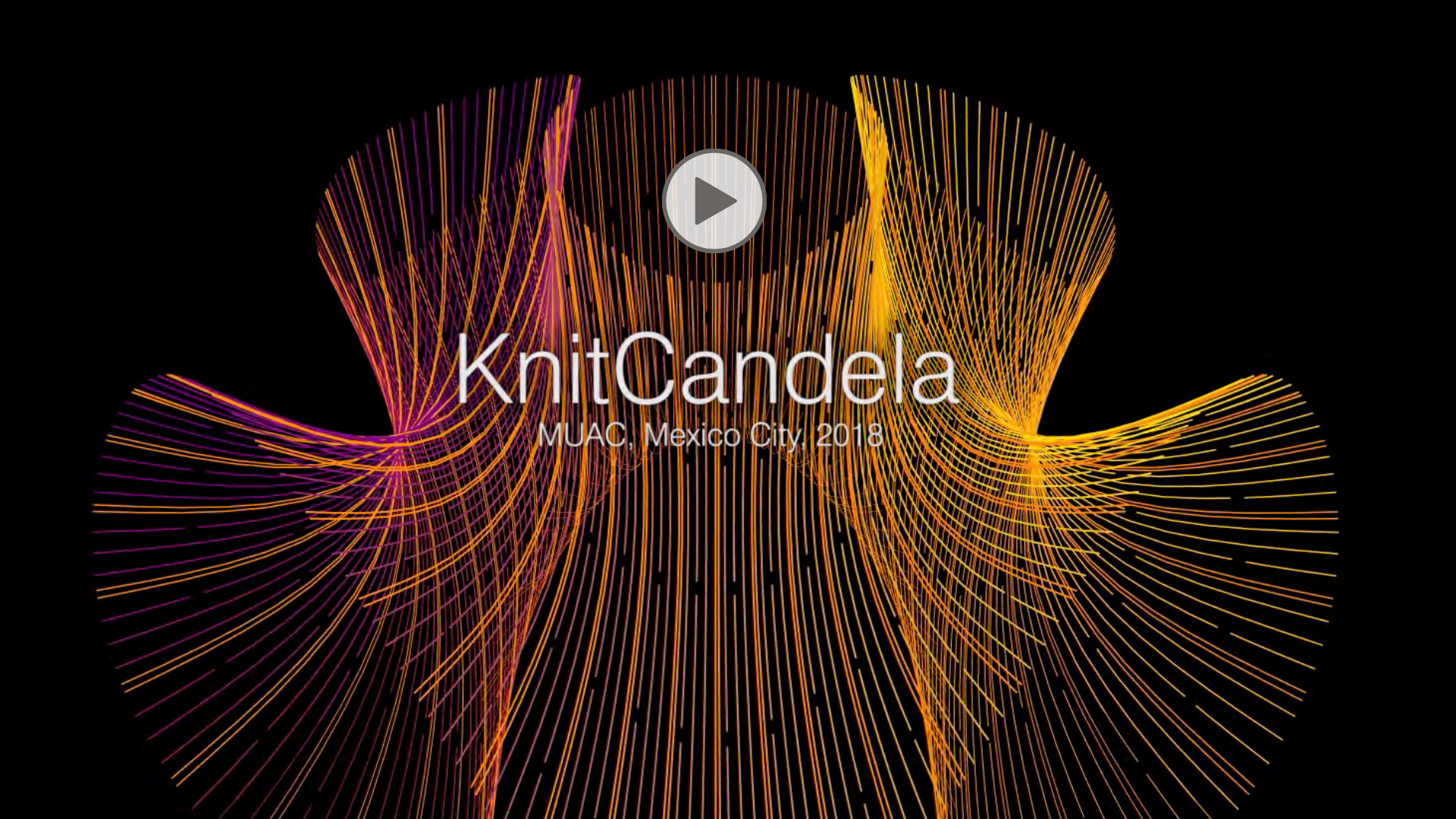
Holcim Mexico

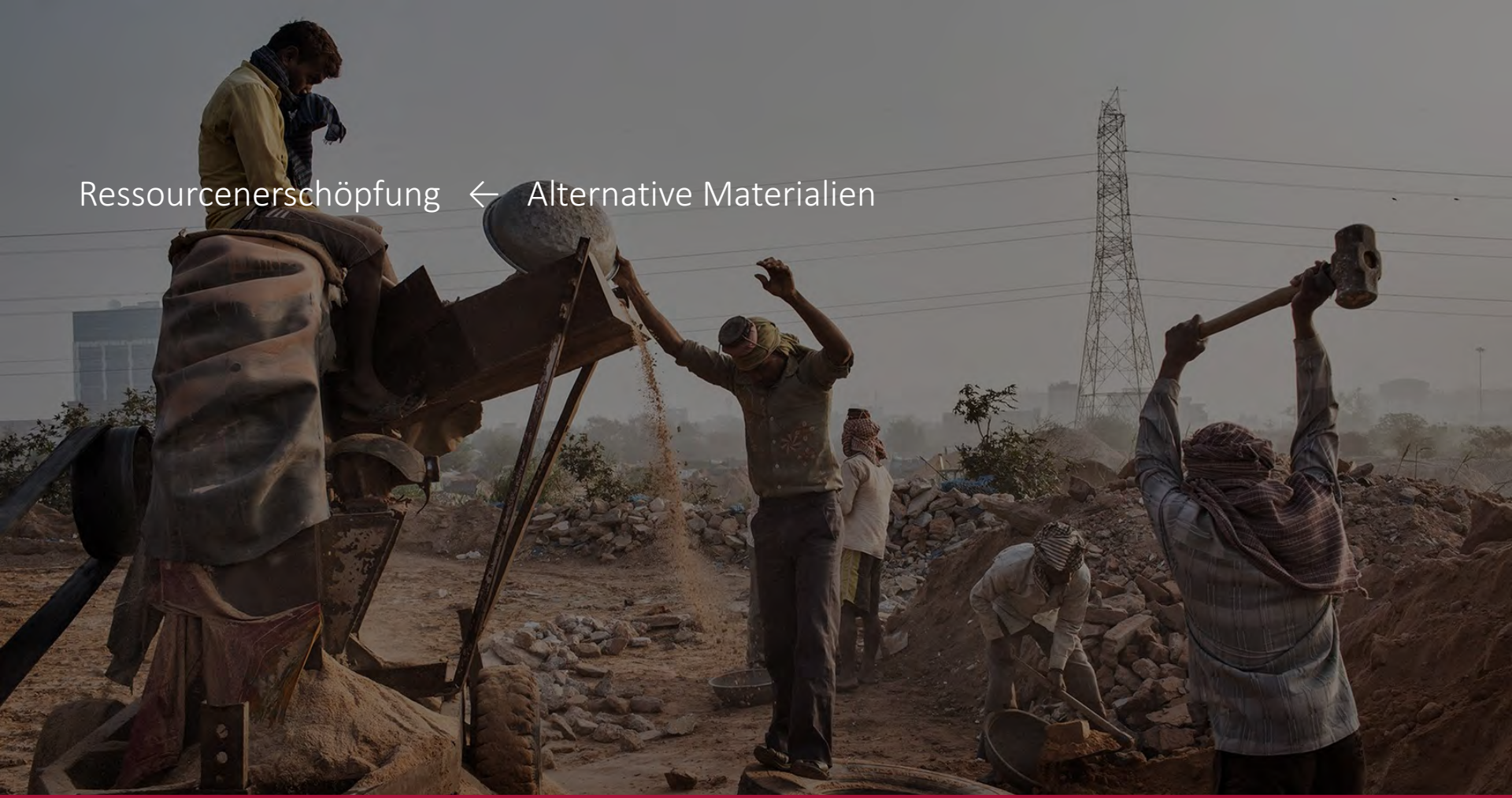
Site Coordination

R-Ex
Alicia Nahmad Vasquez

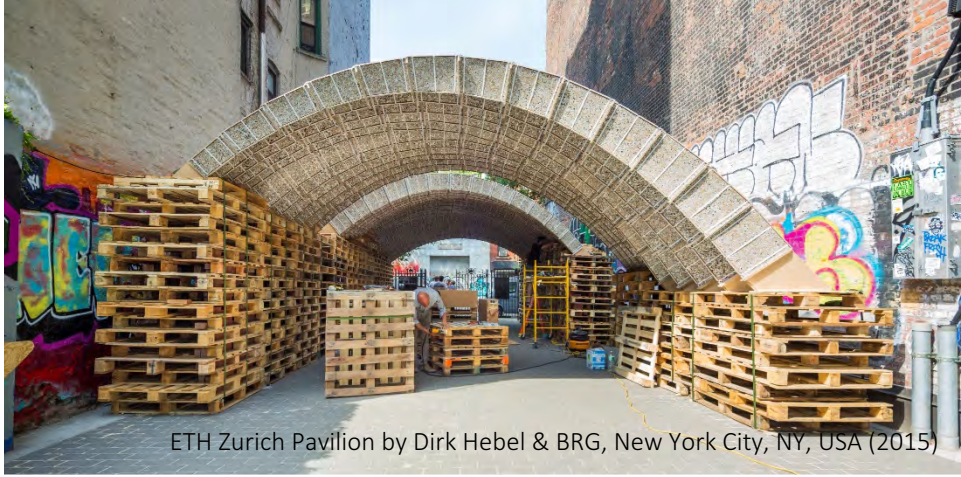

+3.30 m
Knitted textile shuttering
Void created by inflatables
Cement-paste coating layer
Cable-net
Waffle concrete shell


Favor de
mantener la
puerta cerrada


KnitCandela
MUAC, Mexico City, 2018

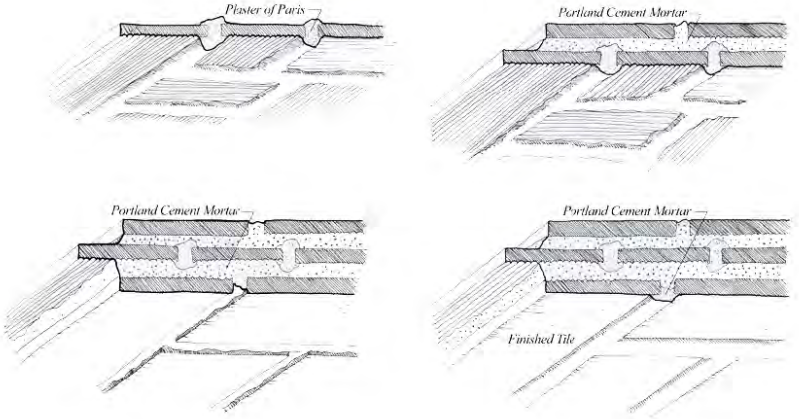

Ressourcenerschöpfung ← Alternative Materialien


MycoTree - Seoul Biennale by Dirk Hebel & BRG, Seoul, Korea (2017)


ETH Zurich Pavilion by Dirk Hebel & BRG, New York City, NY, USA (2015)


Self-supporting Formworks by BRG & DBT, Zürich, Switzerland (2018)

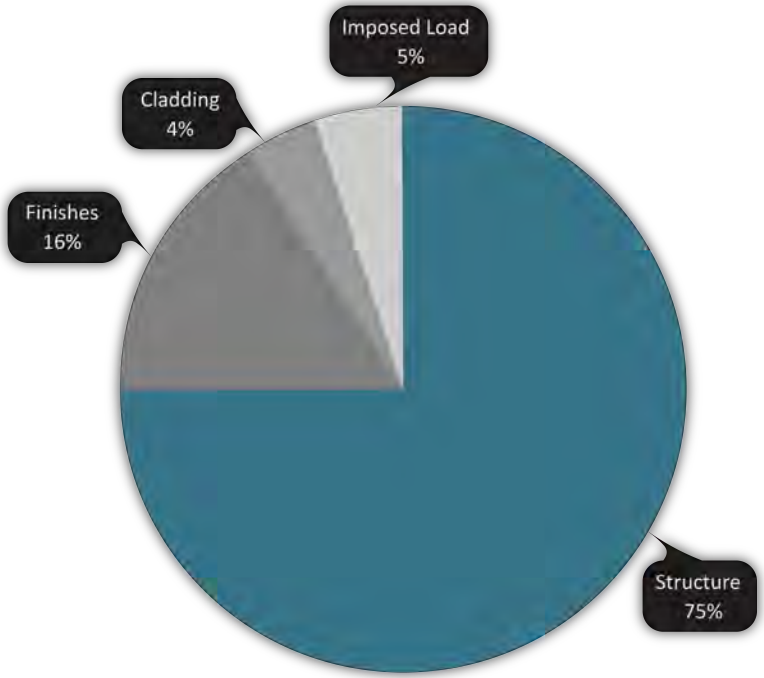

Droneport Prototype by Foster Foundation & BRG, Venice, Italy (2016)


Plaster of Paris
Portland Cement Mortar
Portland Cement Mortar
Portland Cement Mortar
Finished Tile

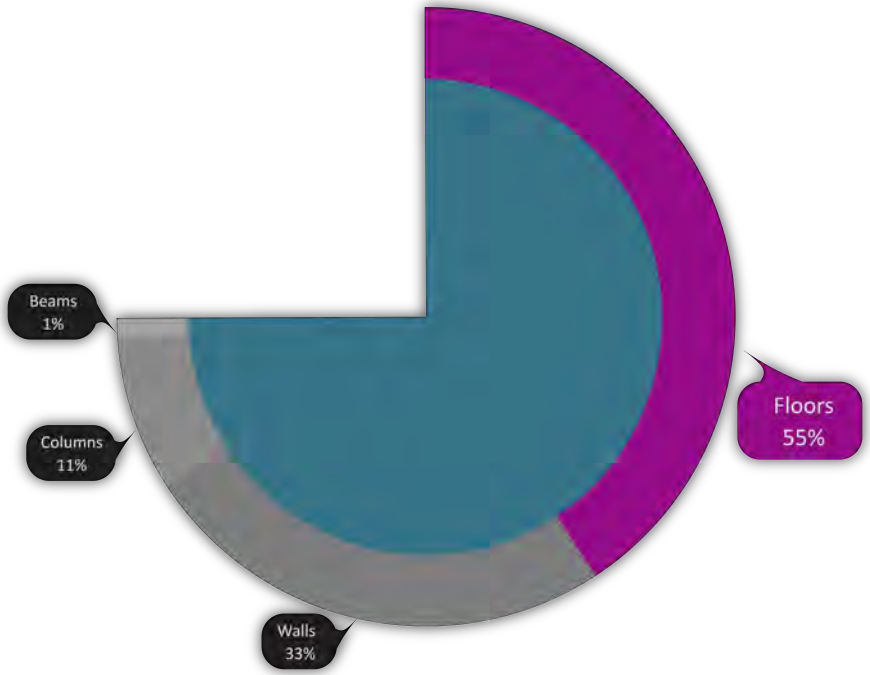

NORMAN
FOSTER


COMPAS
rV rhinoVAULT

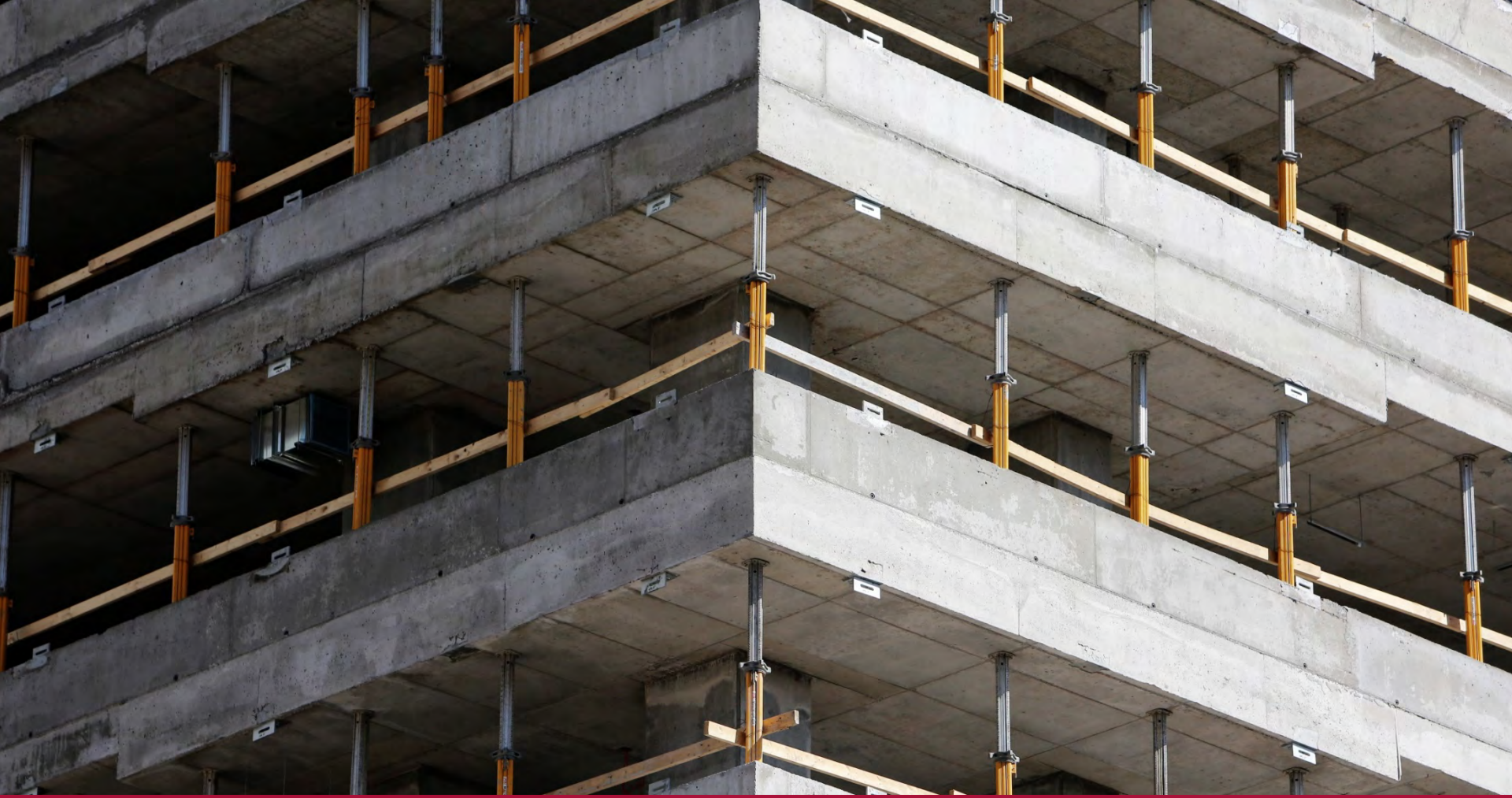

Sha Tin
沙田
8
Tsim Sha Tsui & Hong Kong
尖沙咀及香港
3
3
2B
GET IN
LANE
選定

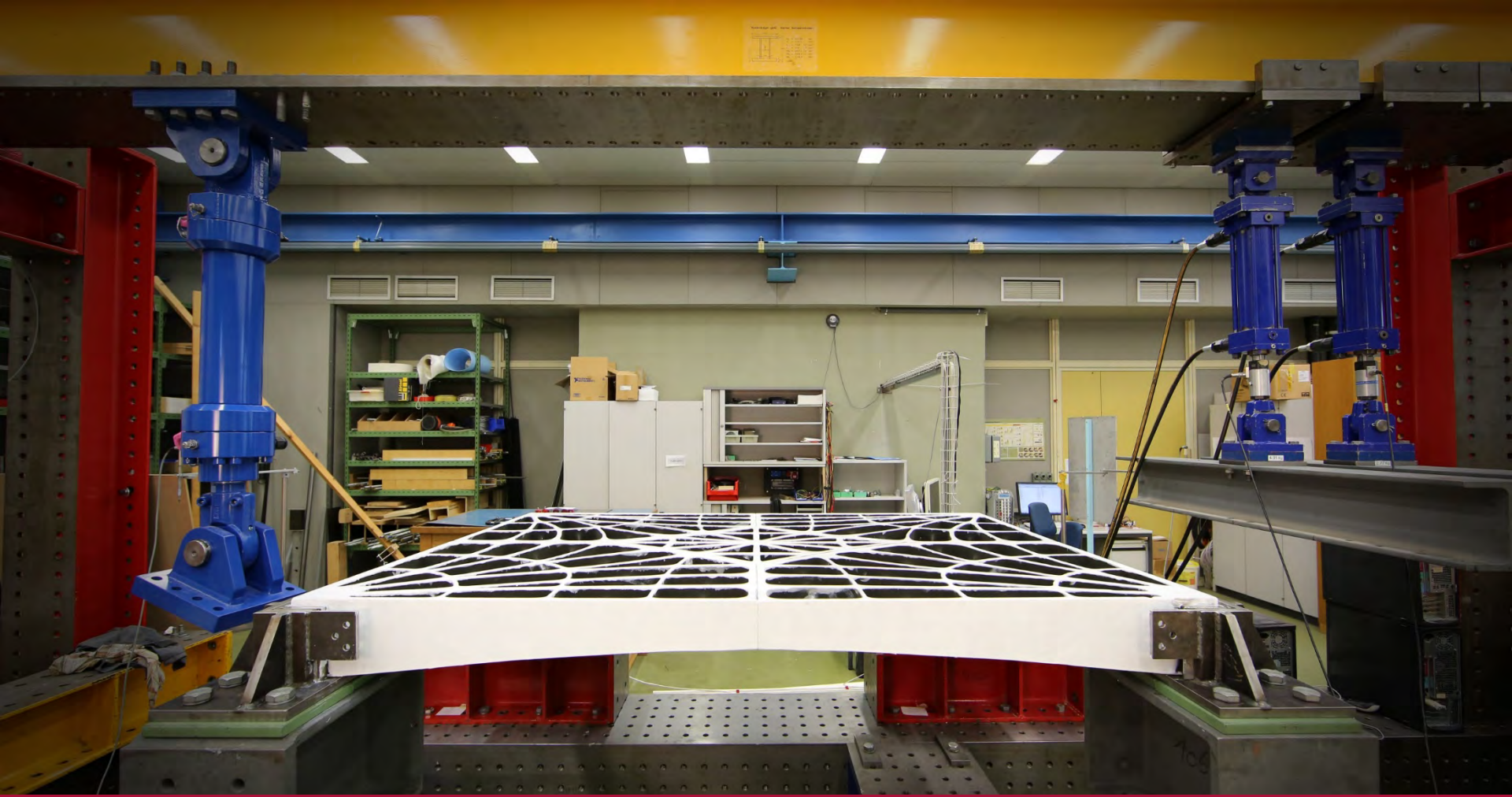


Gewichtsanteile je Bauteilkategorie

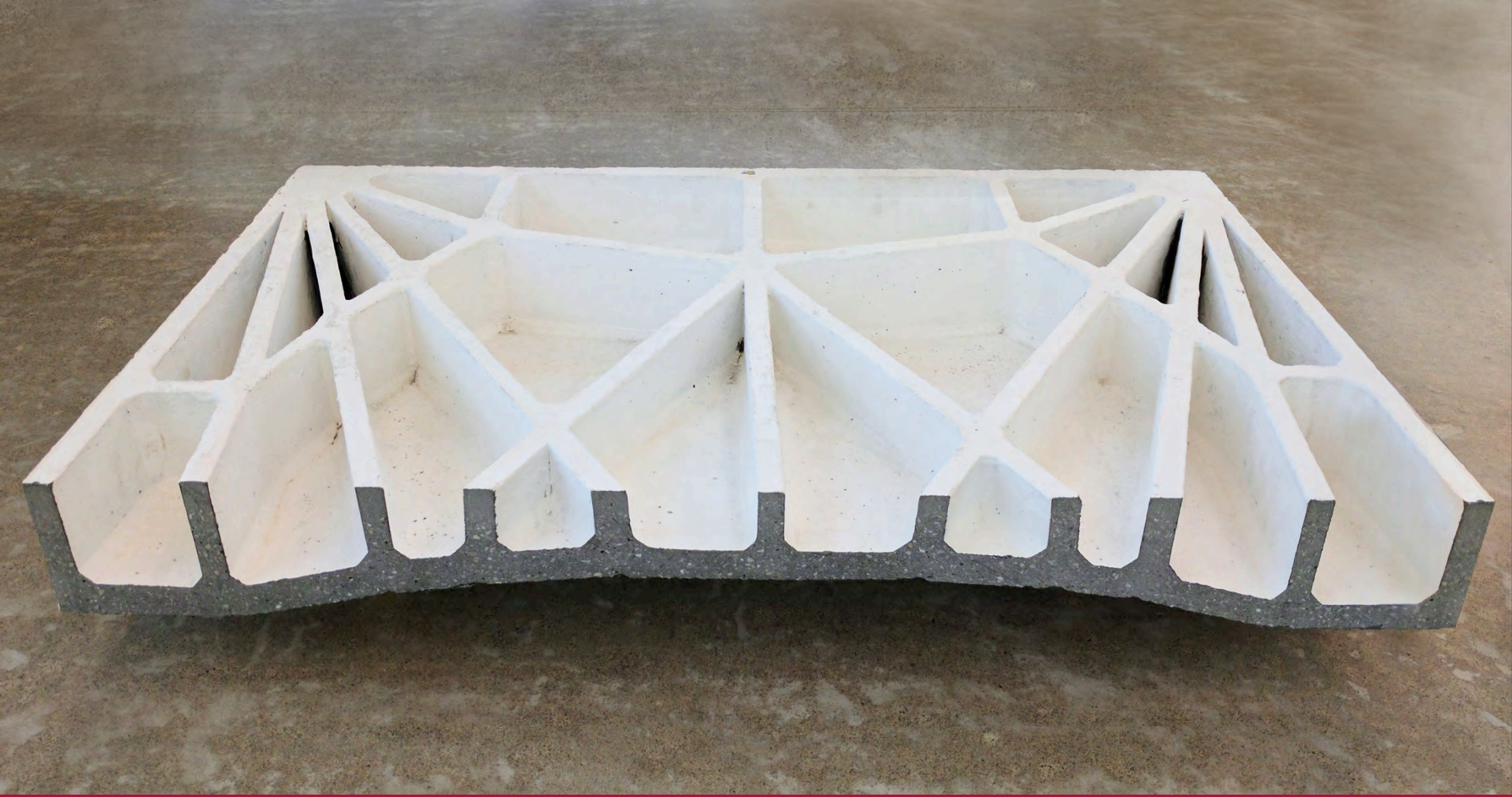


Gewichtsanteile je Tragstrukturelement





Bis zu 70% weniger Material

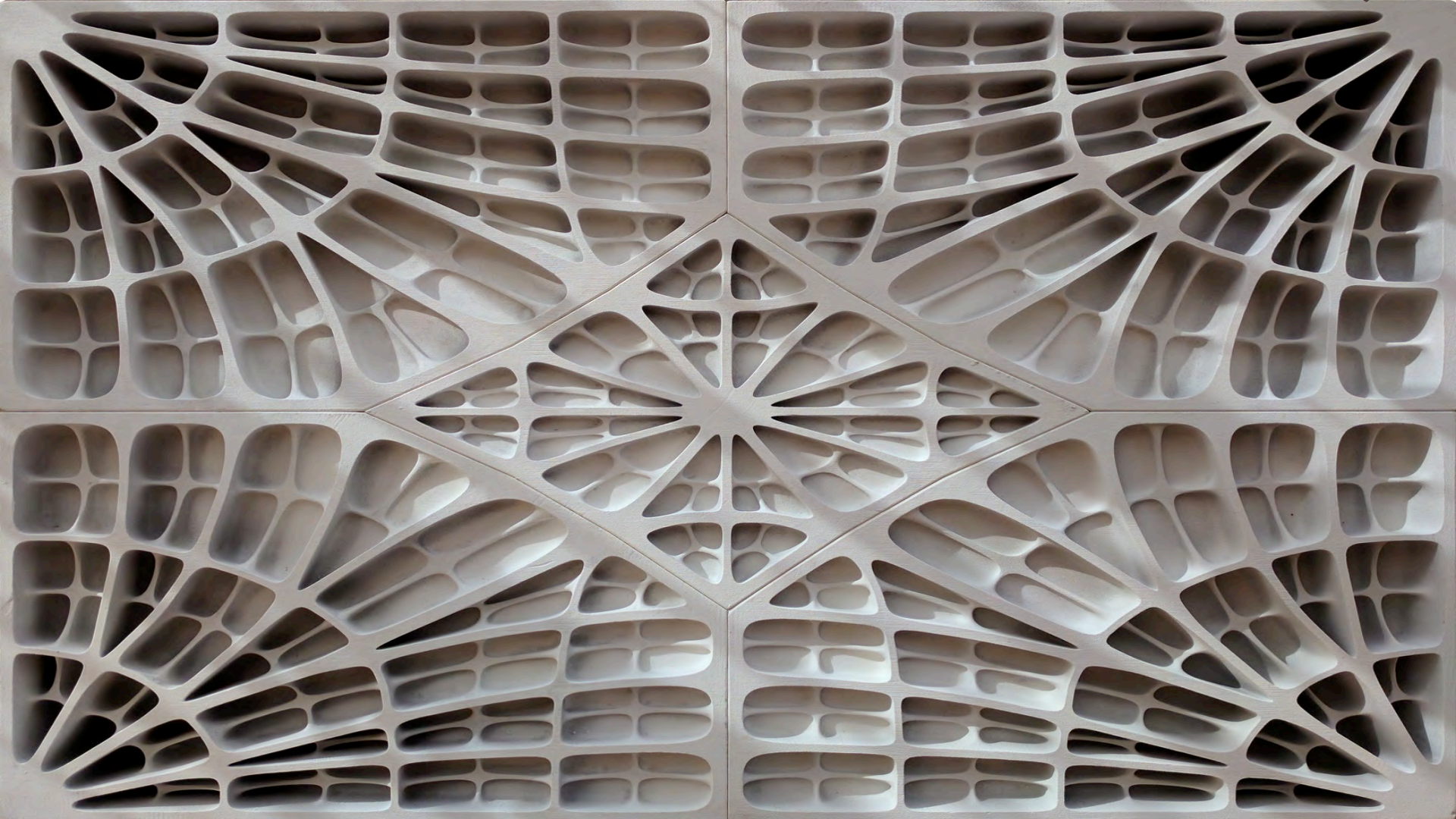


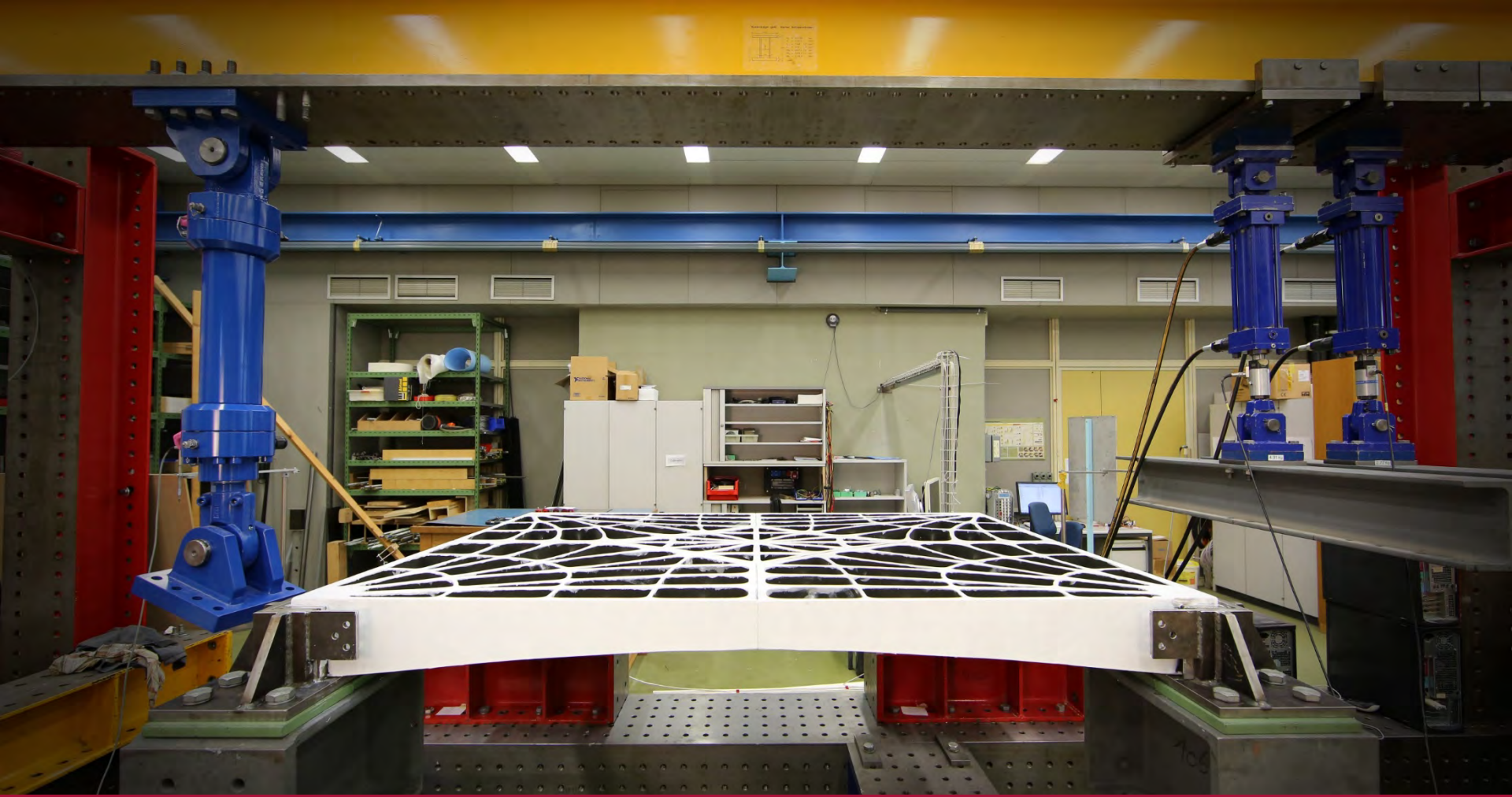

CNC DYNAMIX

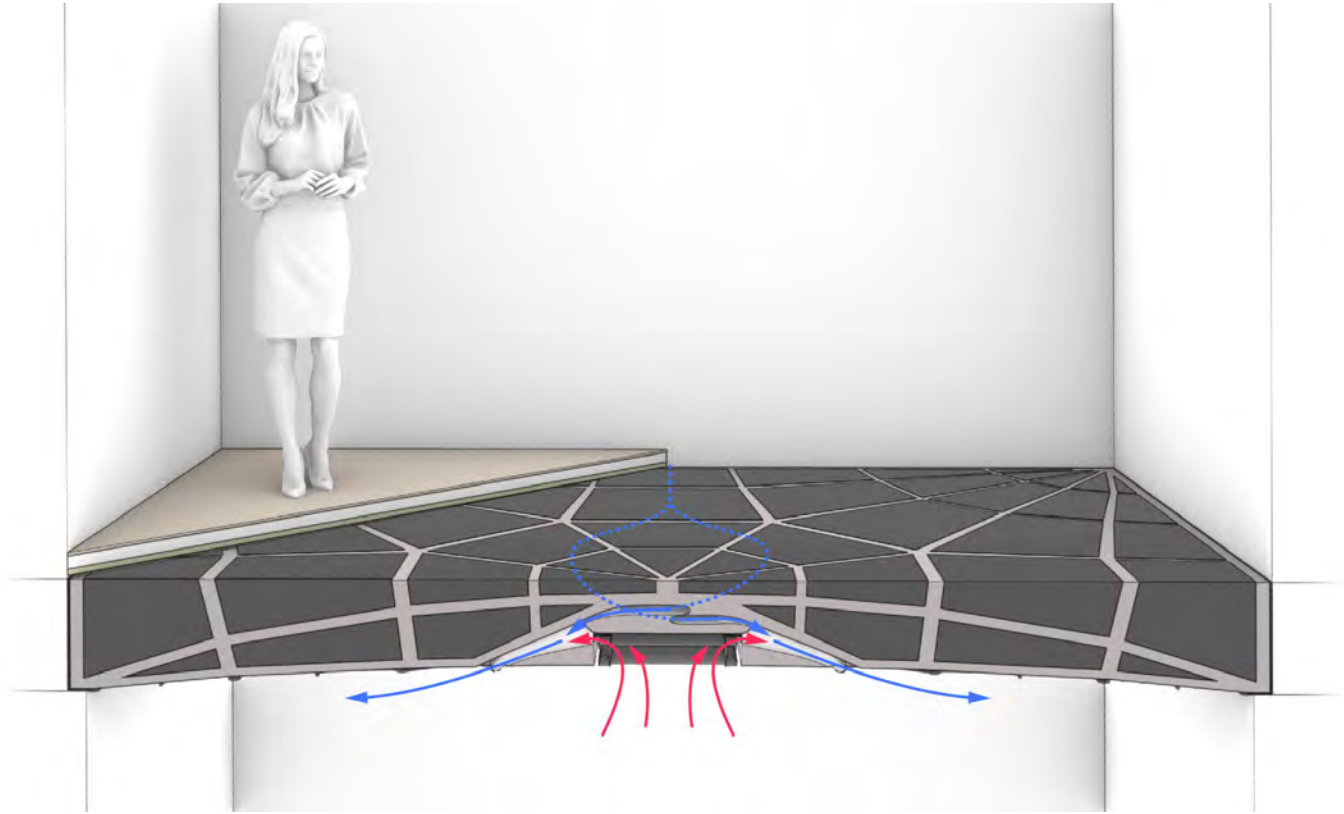
15th International Architecture Exhibition
La Biennale di Venezia

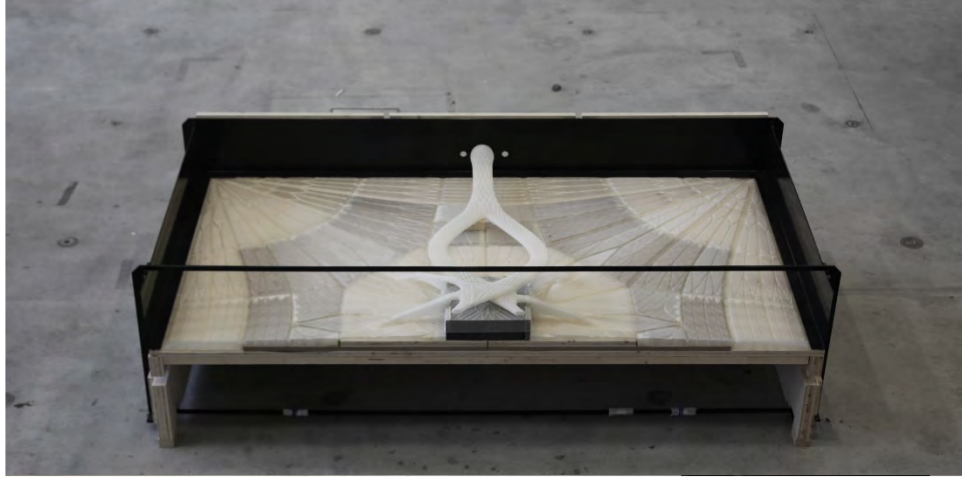
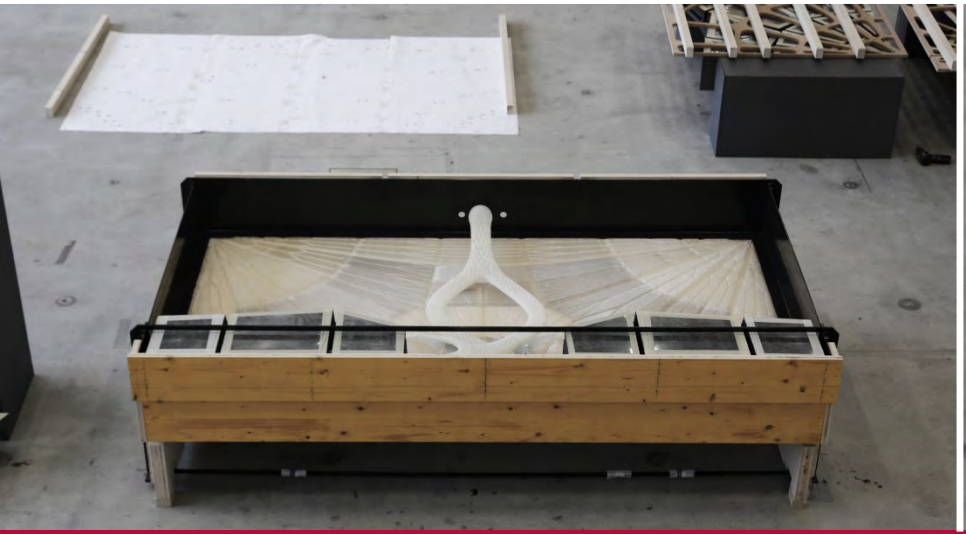
Funicular Shell Floors
Beyond Bending

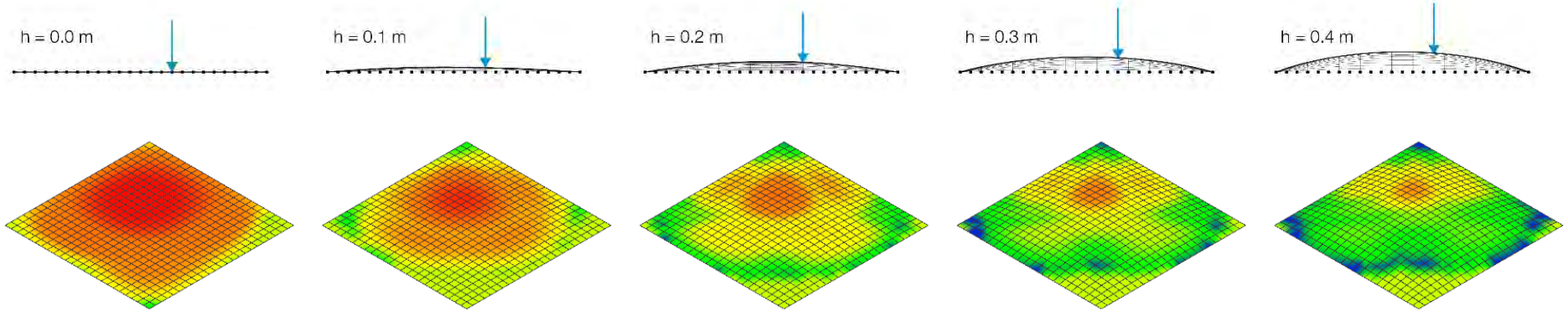
Block Research Group
ETH Zurich









h = 0.0 m
h = 0.1 m
h = 0.2 m
h = 0.3 m
h = 0.4 m


Freq.54 Hz
-26.39
-19.43
-12.54
-5.65
1.24
8.13
15.02
21.91
28.8
35.69