





# Super Light Structures

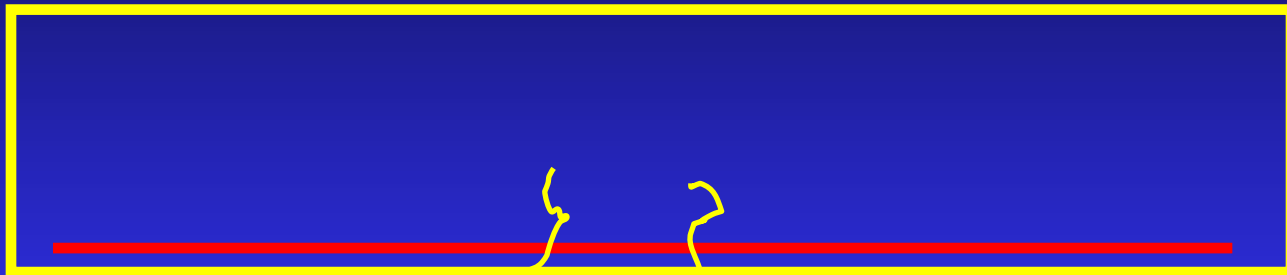


Design the future

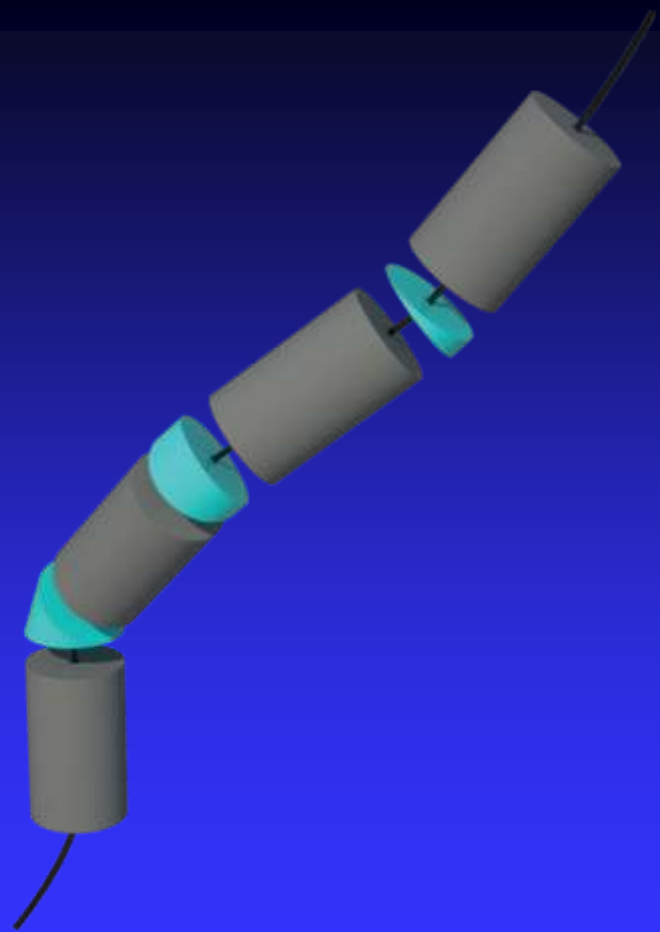
[www.abeo.dk](http://www.abeo.dk)

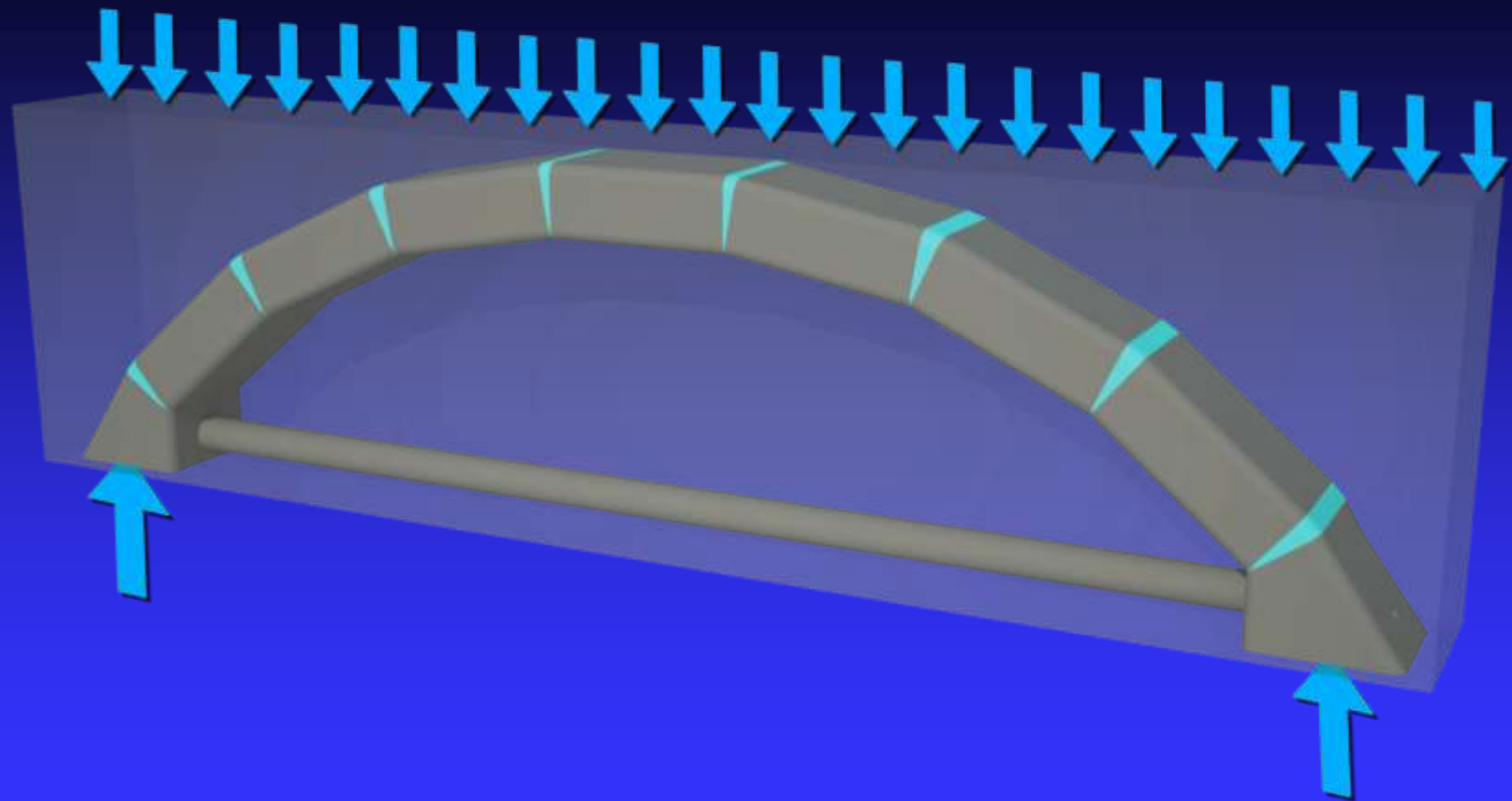
**abeo**<sub>aps</sub>











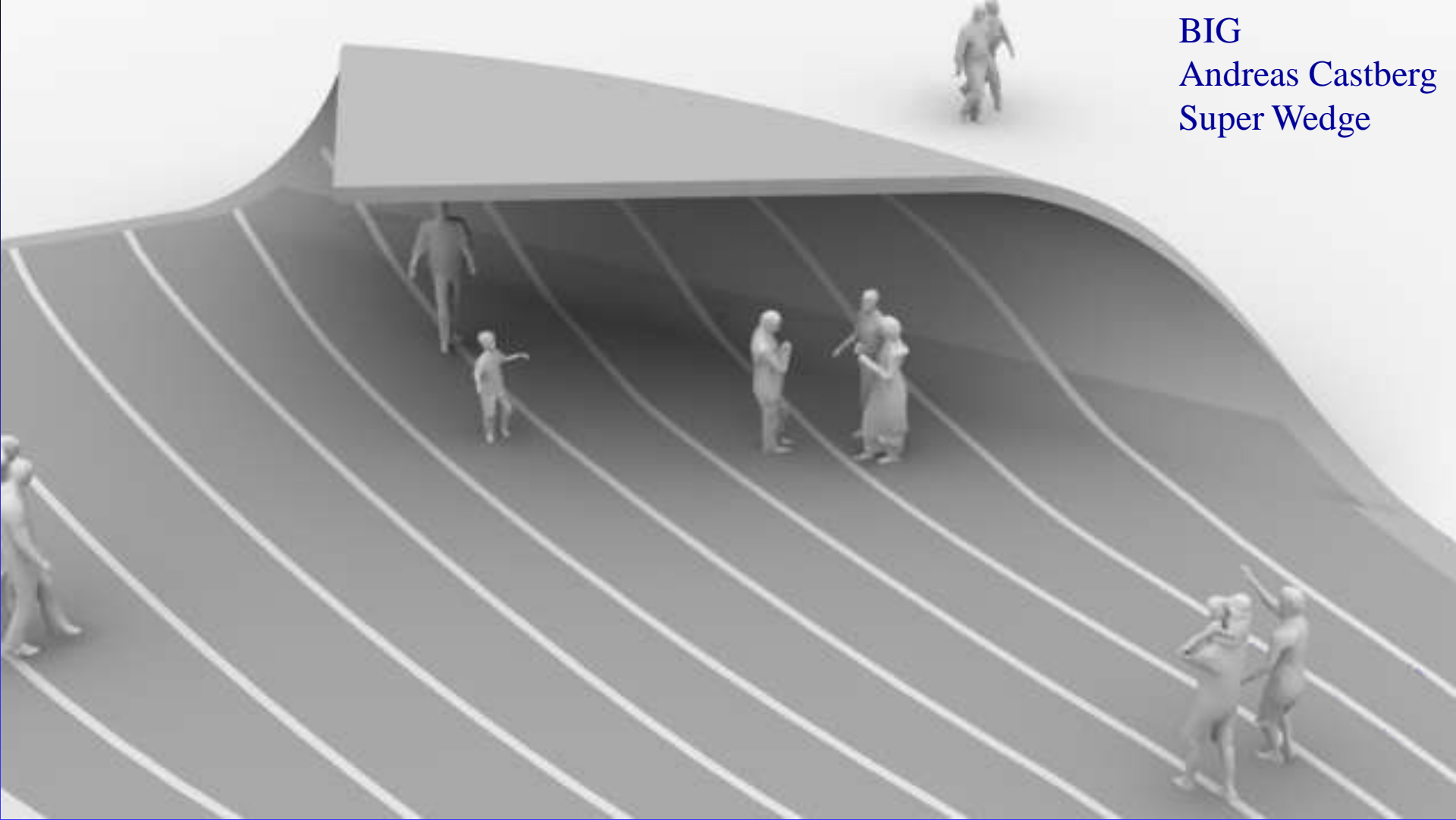






Grand Canyon of Oman  
Jacob Jul Sørensen  
Zahra Al Najafi

BIG  
Andreas Castberg  
Super Wedge





# CO<sub>2</sub>

## CO<sub>2</sub> emission

Building operation 40% ↘

Construction 10% ↗ ?

Concrete

Steel

Super-light

100%

500%

50%



The New York Times

## Abeo Thinks BIG for Its Superlight Structures

By CIARA BYRNE

Published: November 16, 2010

For a company which has only been in existence since June this year, Danish startup Abeo has been racking up the awards for rethinking an everyday construction material — concrete.



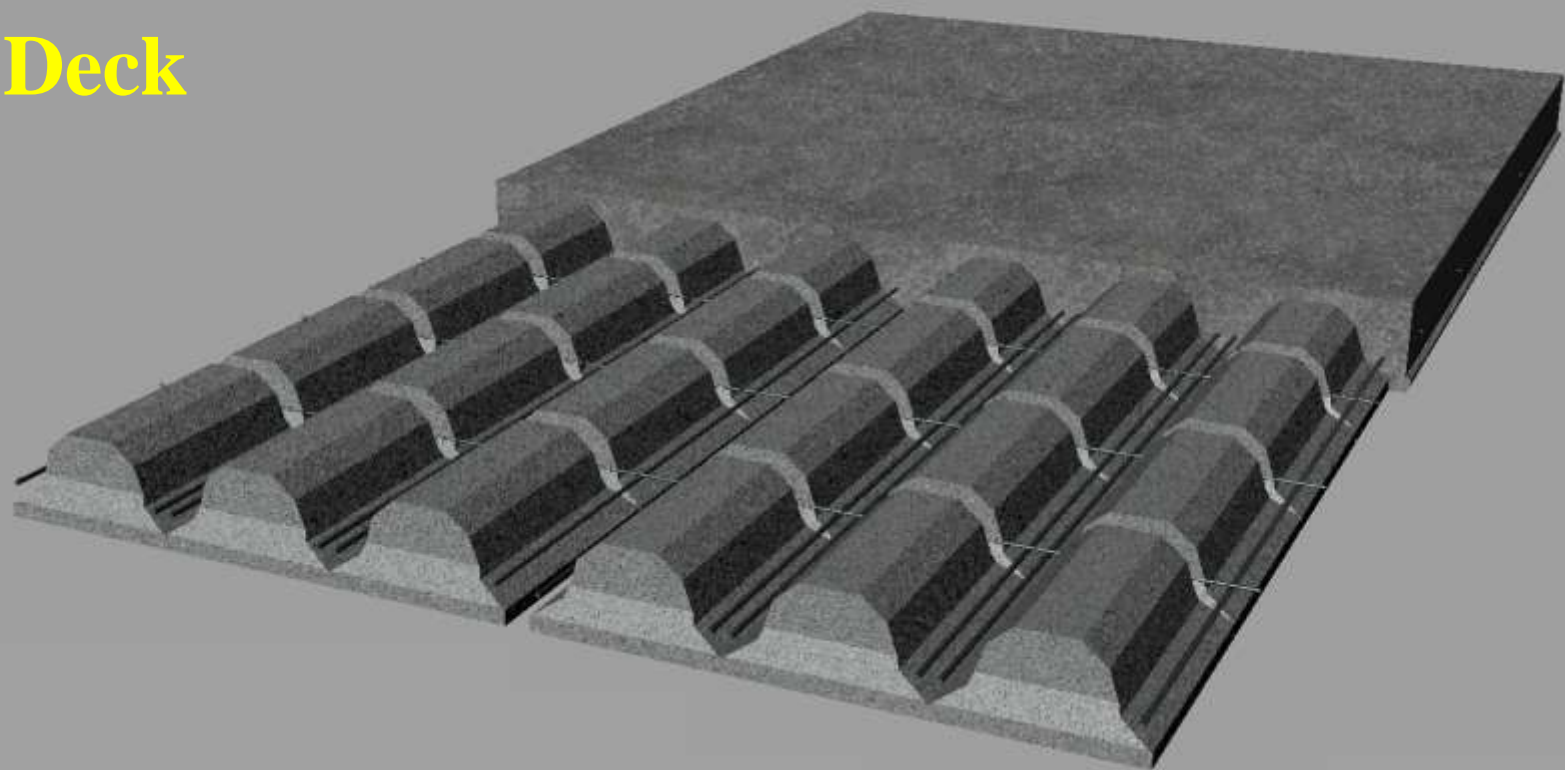
On the 17 November 2010 Abeo won the 'Cleantech Open Global Ideas Competition' in front of a crowd of 1200 international investors, experts and competitors.



**CLEAN  
TECH  
OPEN**

**2010 People's Choice  
Global Ideas  
Competition  
Winner**

# SL-Deck





# Design Parameters

## SL-Deck

Flexibility

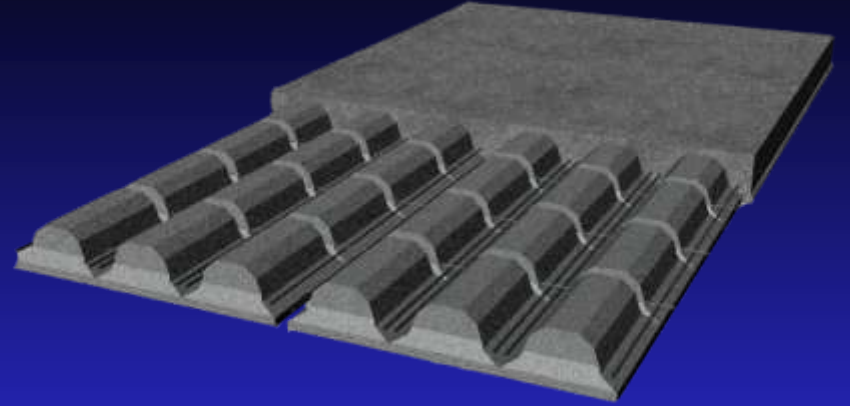
Fire Resistance

Sound Insulation

+

Super-Light General Benefits:

Small Weight, Long Spans, Clean Technology, Low Price







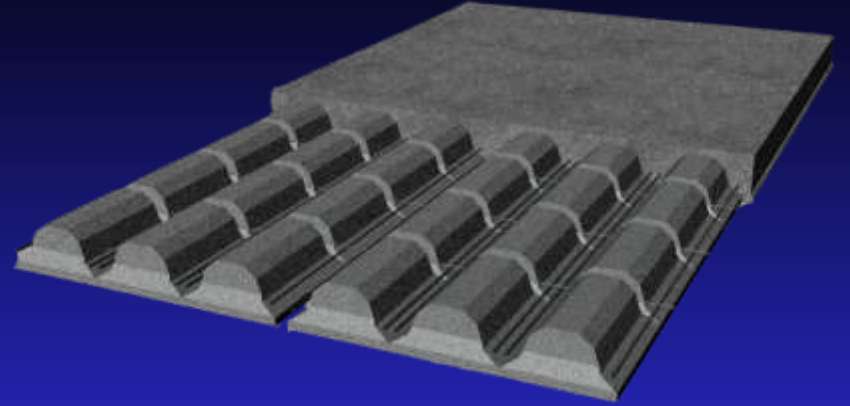


© 2011 TV2 Danmark A/S. Alle rettigheder forbeholdt.



# Flexibility

## SL-Deck



### Mass Produced

Standard width and thicknesses  
Minor details may deviate  
(As for present day elements)

Very Low Prices

### Standard Options

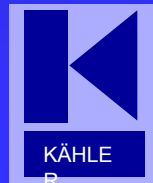
Standard width and thicknesses  
Fixed ends, Blade connections,  
Cantilevers, Etc, Etc, Etc,

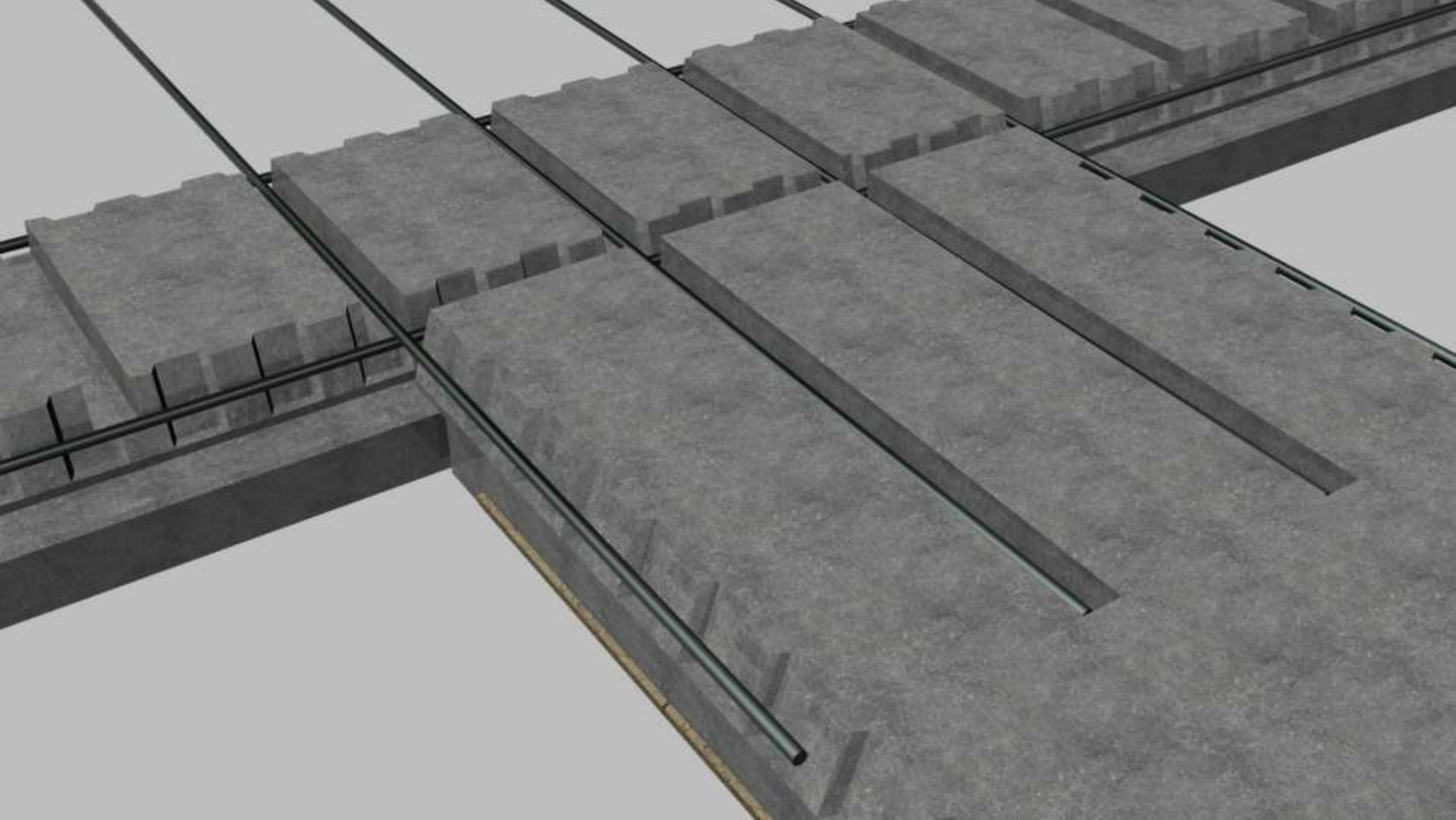
Small Extra Costs

### Taylor Made

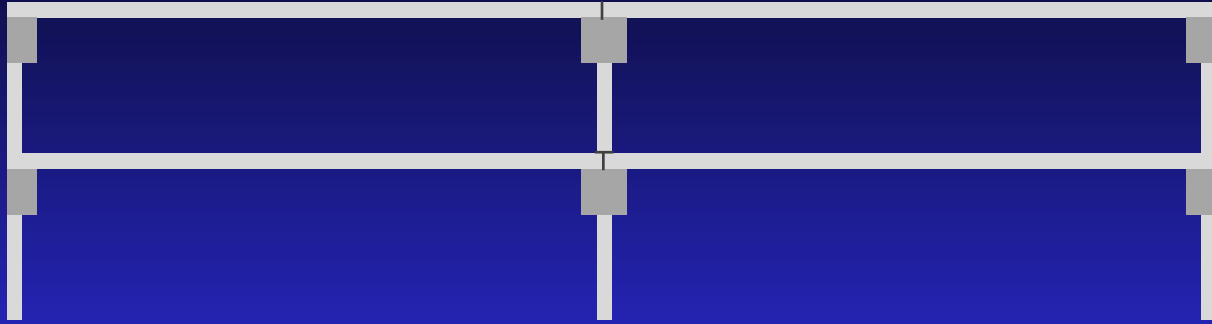
Free shapes  
Free detailings  
Elements or In-situ

Double Prices





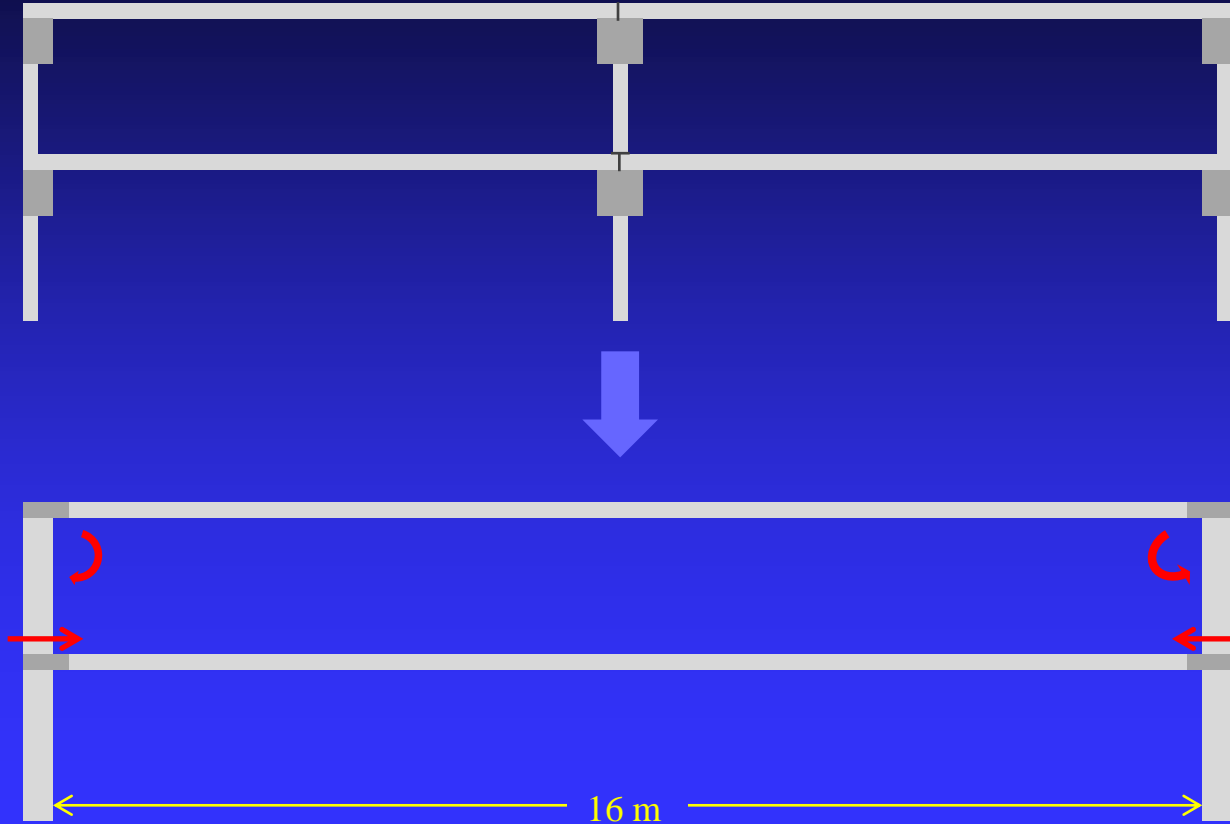
# Office Buildings



← 16 m →



# Office Buildings



# Mechanical Tests



Bending

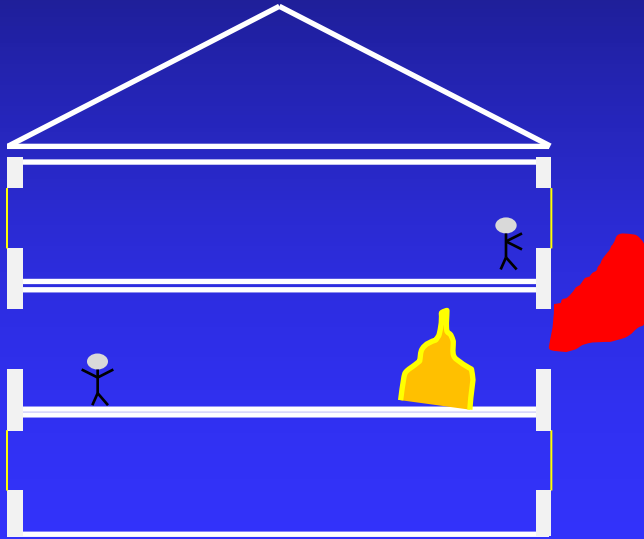


Pull-out

# Fire Resistance

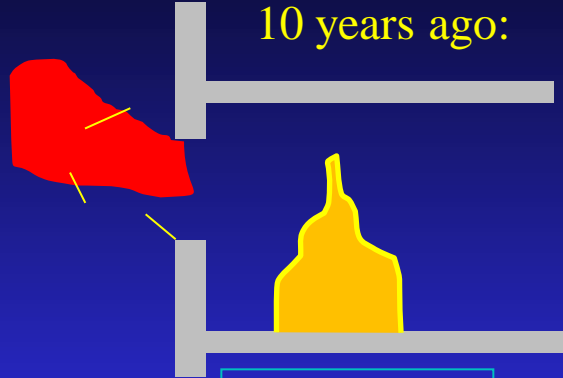
Requirements:

- R 120 min if  $\geq 12$  m up or
- Parametric fire ?



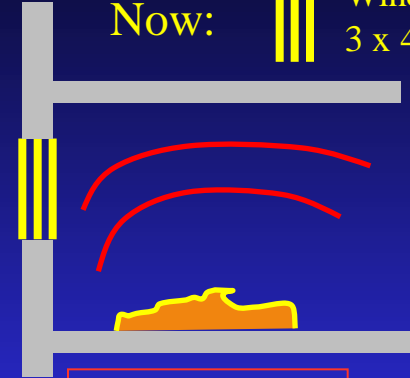
# Fire Resistance

## Parametric Fires in Modern Danish Buildings



$O = 0.08 \text{ m}^{1/2}$   
 $q = 200 \text{ MJ/m}^2$   
 $b = 1160 \text{ W s}^{1/2}/\text{m}^2\text{C}$

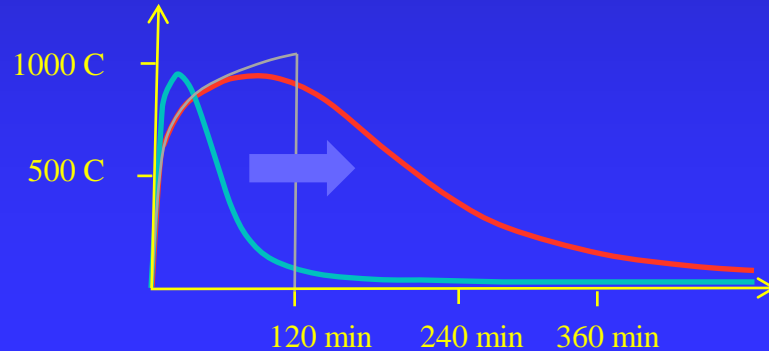
Windows  
1,5 mm 6 kg



$O = 0.02 \text{ m}^{1/2}$   
 $q = 200 \text{ MJ/m}^2$   
 $b = 600 \text{ W s}^{1/2}/\text{m}^2\text{C}$

Windows  
3 x 4 mm 50 kg

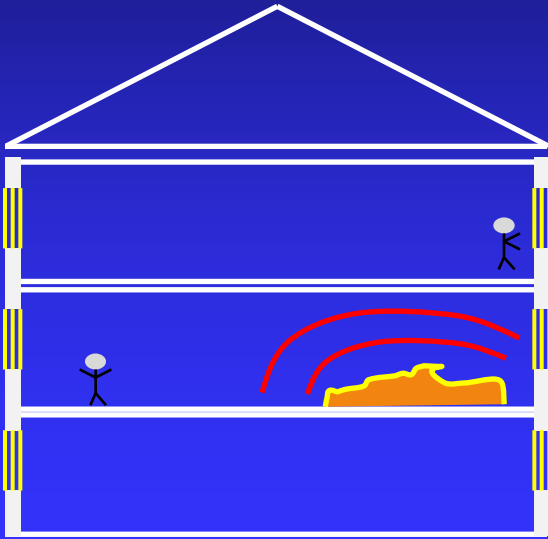
## Temperature-Time Curves



# Fire Resistance

Requirements:

- R 120 min if  $\geq 12$  m up or
- Parametric fire > R 120 min

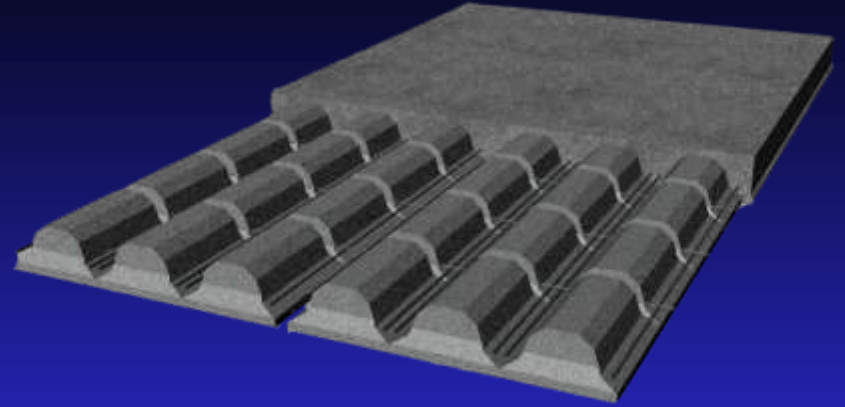
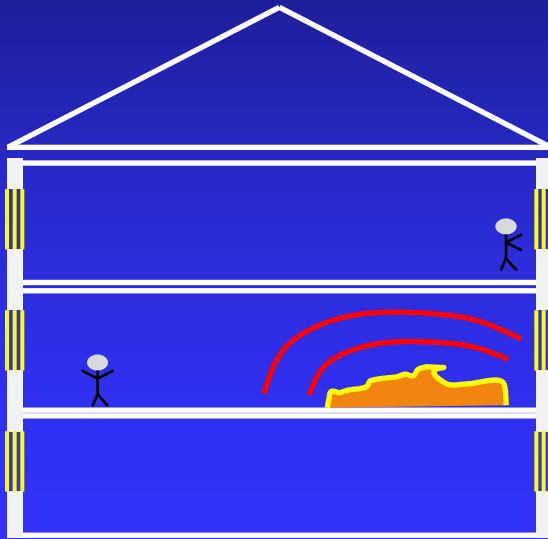




# Fire Resistance

Requirements:

- R 120 min if  $\geq 12$  m up or
- Parametric fire > R 120 min



## SL-Deck

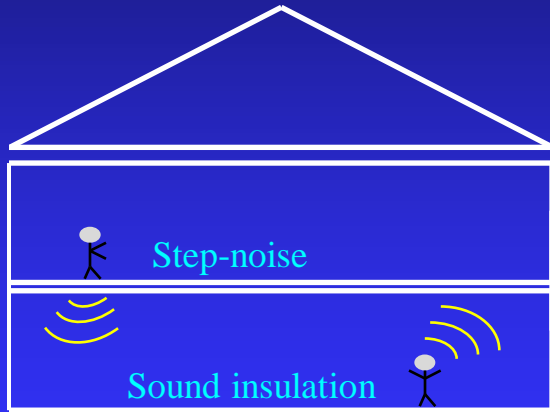
- R 120 min for  $17.6 \text{ kN/m}^2$
- R 240 min for domestic load
- Parametric fires anywhere




# Acoustics

New requirements:

- Sound insulation  $\geq 55$  dB
- Step-noise level  $\leq 53$  dB





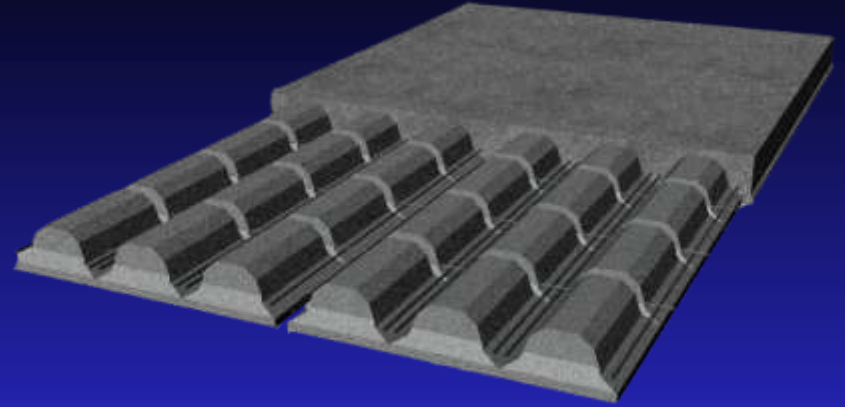
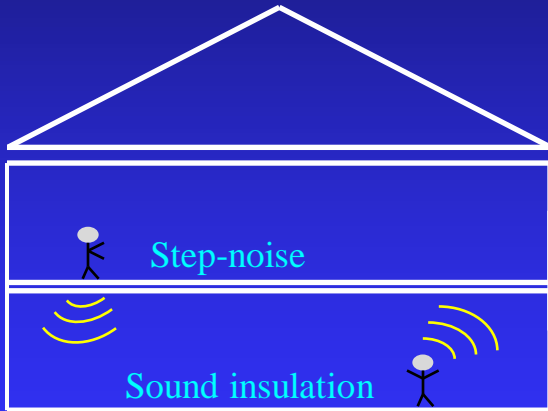


**Sound Test  
SL-Deck 215 mm  
DTU Electro  
2011-05-03**

# Acoustics

New requirements:

- Sound insulation  $\geq 55$  dB
- Step-noise level  $\leq 53$  dB



## SL-Deck

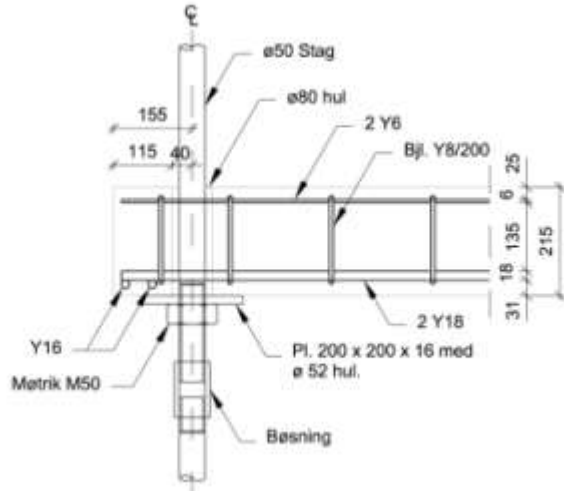
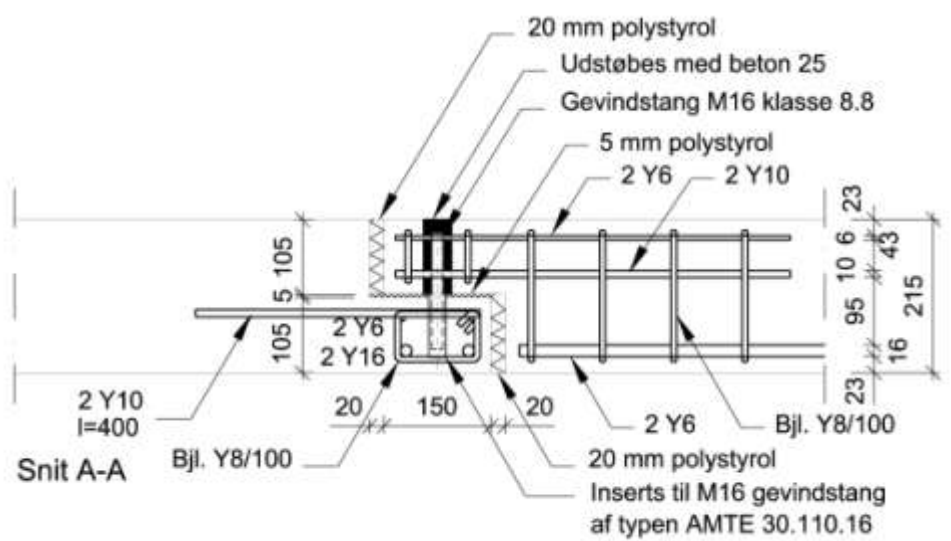
- **55 dB** insulation at **289 kg/m<sup>2</sup>**  
(Where 440 kg/m<sup>2</sup> is needed for other decks)
- Step noise:  $80 - 32 = 48$  dB < 53 dB OK



DTU 324  
Christensen & Co  
Grontmij

# Detailing

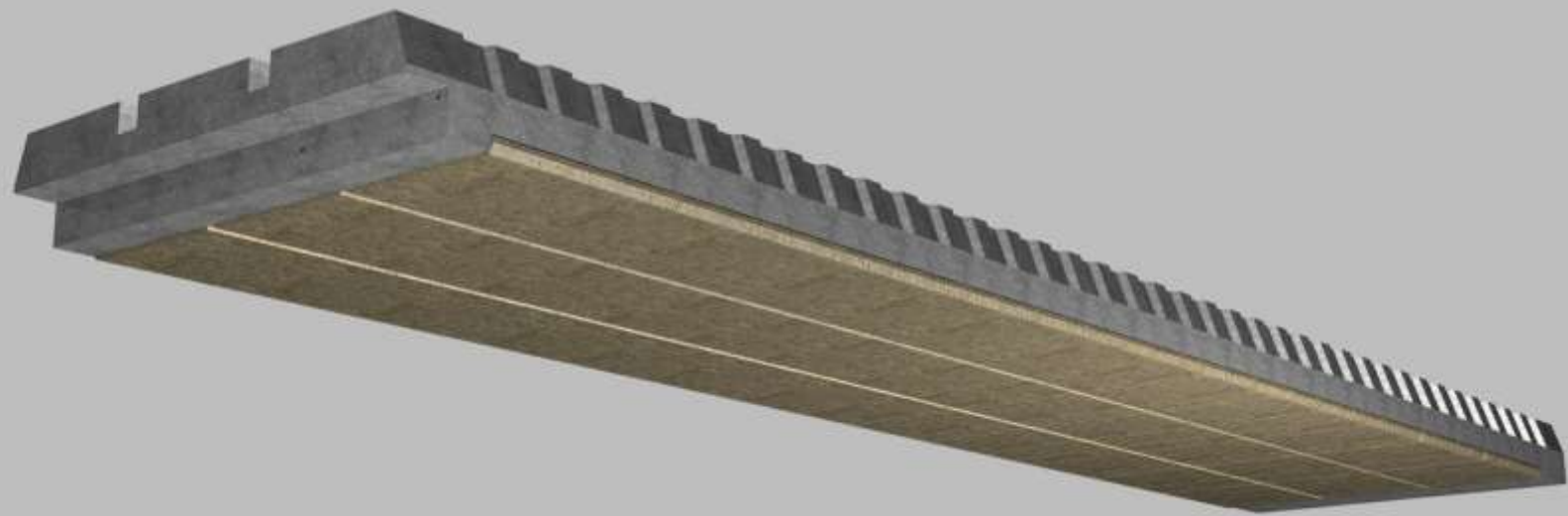
DTU 324

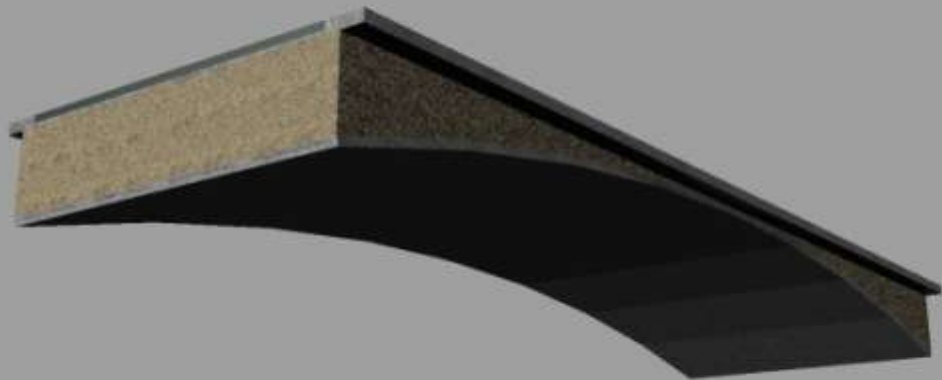
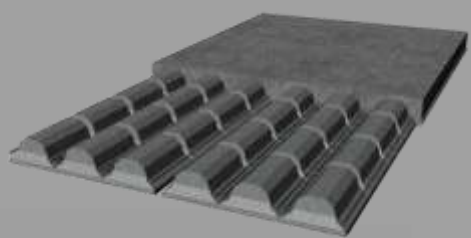


abeo a|s

Grontmij











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BIG





**BIG**  
Werner  
Sobek

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**BIG**  
The Battery

# Advantages

## SL-Deck

Great Flexibility

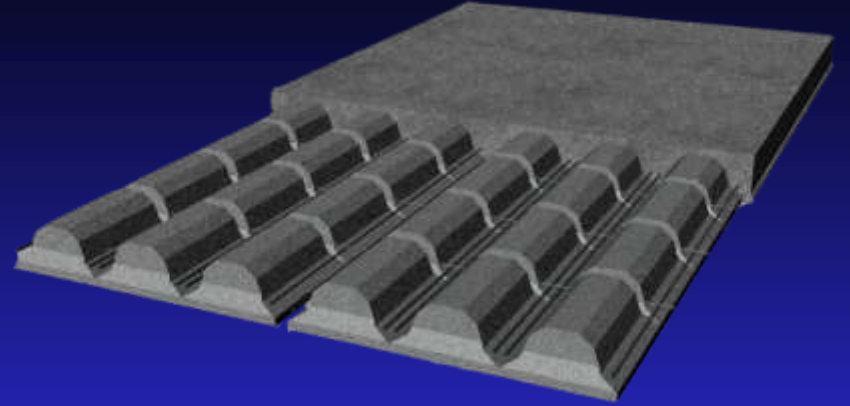
Fire Resistance 240 min

Sound Insulation 55 dB

+

Super-Light General Benefits:

Small Weight, Long Spans, Clean Technology, Low Price





**The End**



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