



Webinar acceleration sustainable construction - Materials

The Structural Design - Engineer
16 – 12 - 2020

Em. Prof .I.r. Cornelis S. Kleinman



Tunnel Maastricht





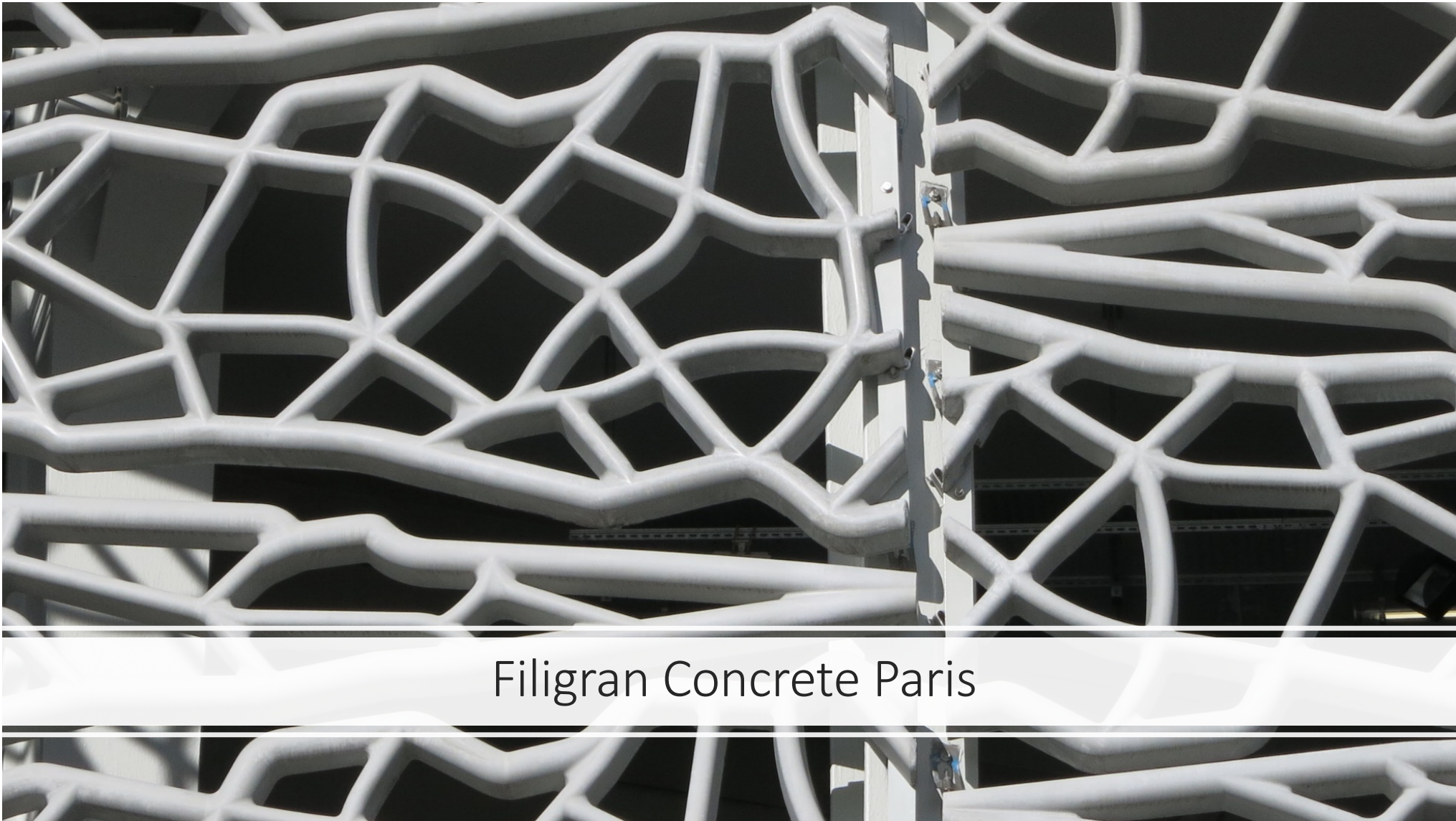
Calatrava Milwaukee



Milwaukee



Museum Hamburger Bahnhof

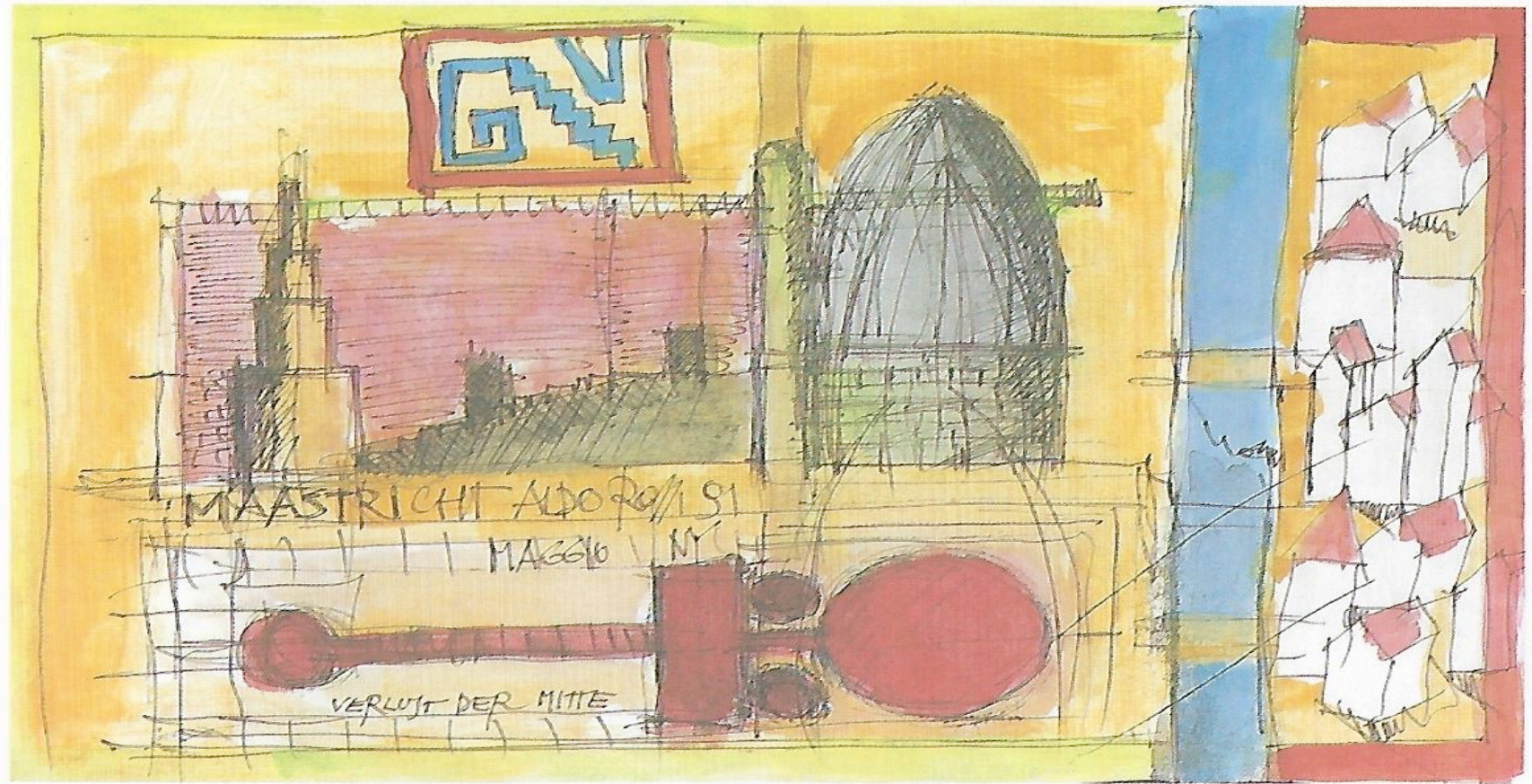


Filigran Concrete Paris



Museum Bonnefanten Maastricht

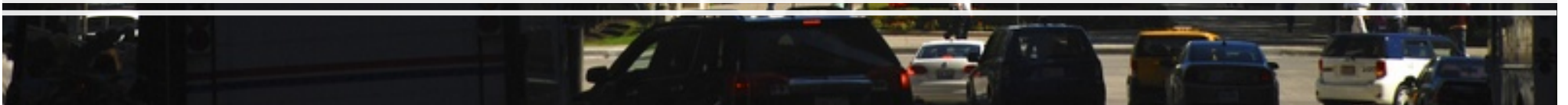




Museum - Verlust der Mitte



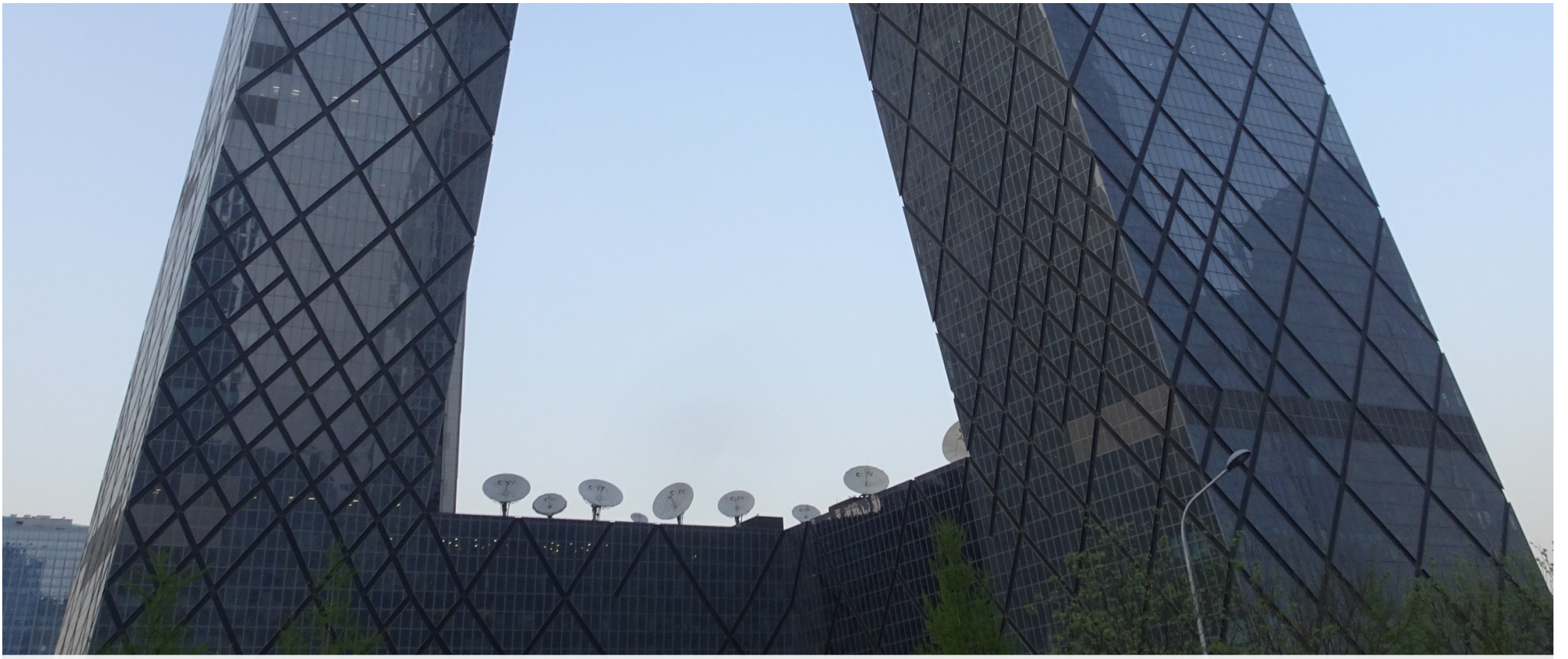
Gehry Chicago





Pudong Shanghai



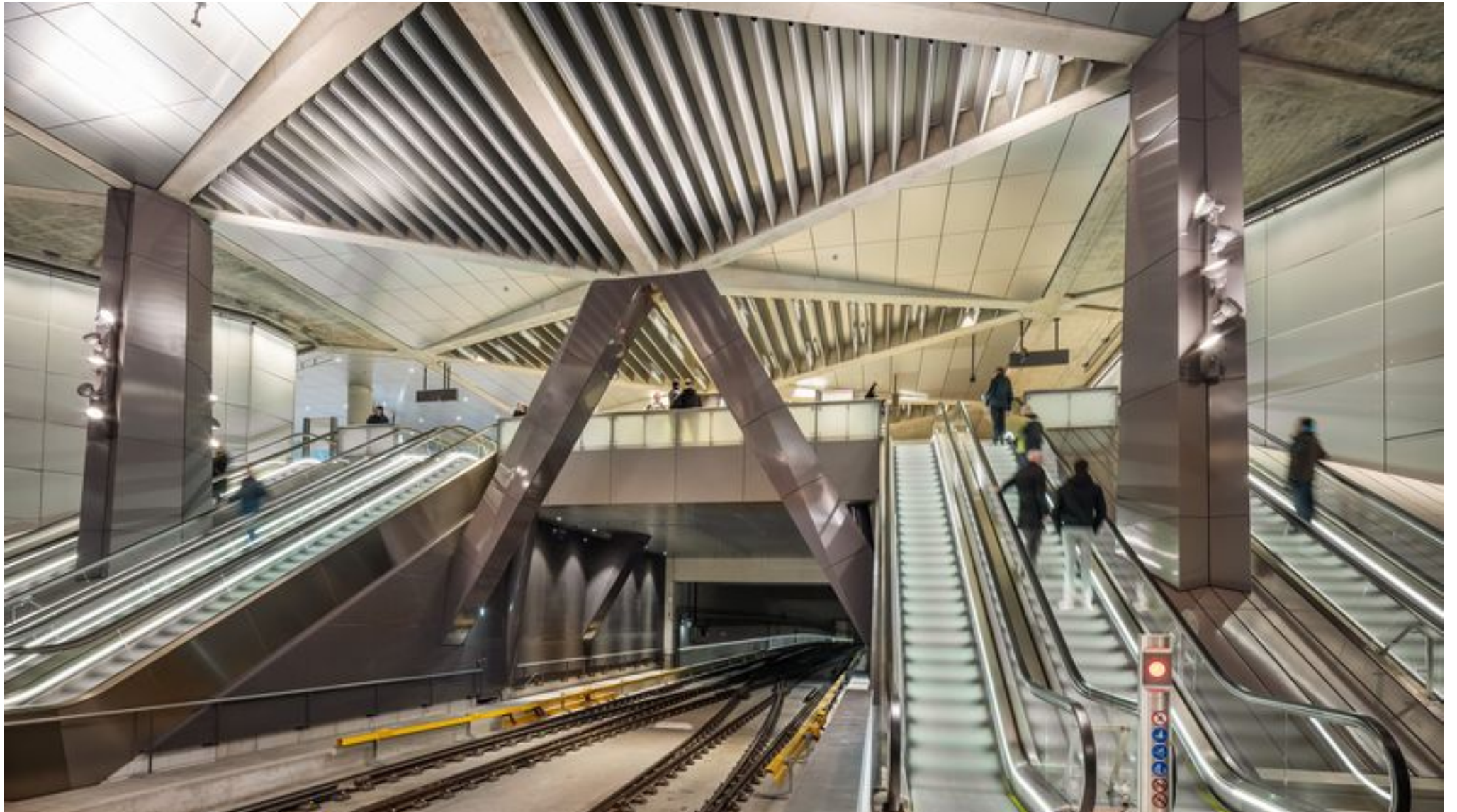


Beijing OMA

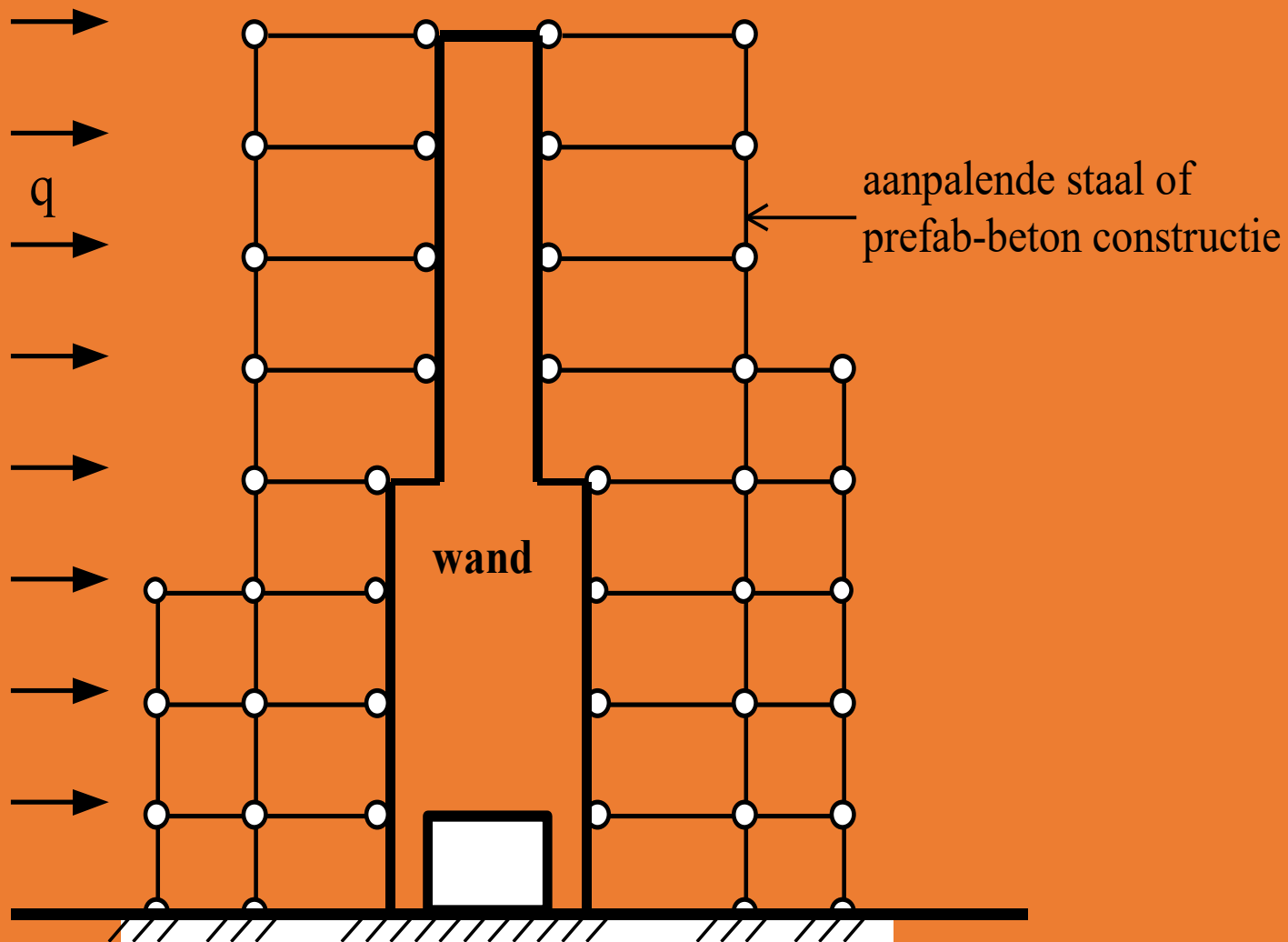




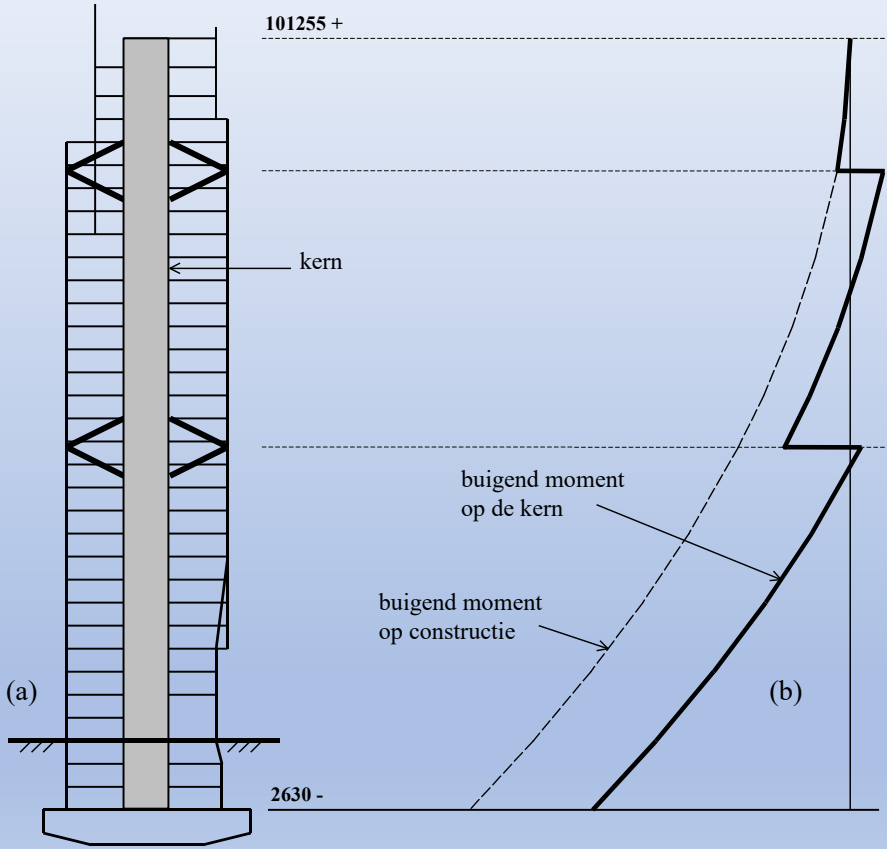
Elbphilharmonie Hamburg

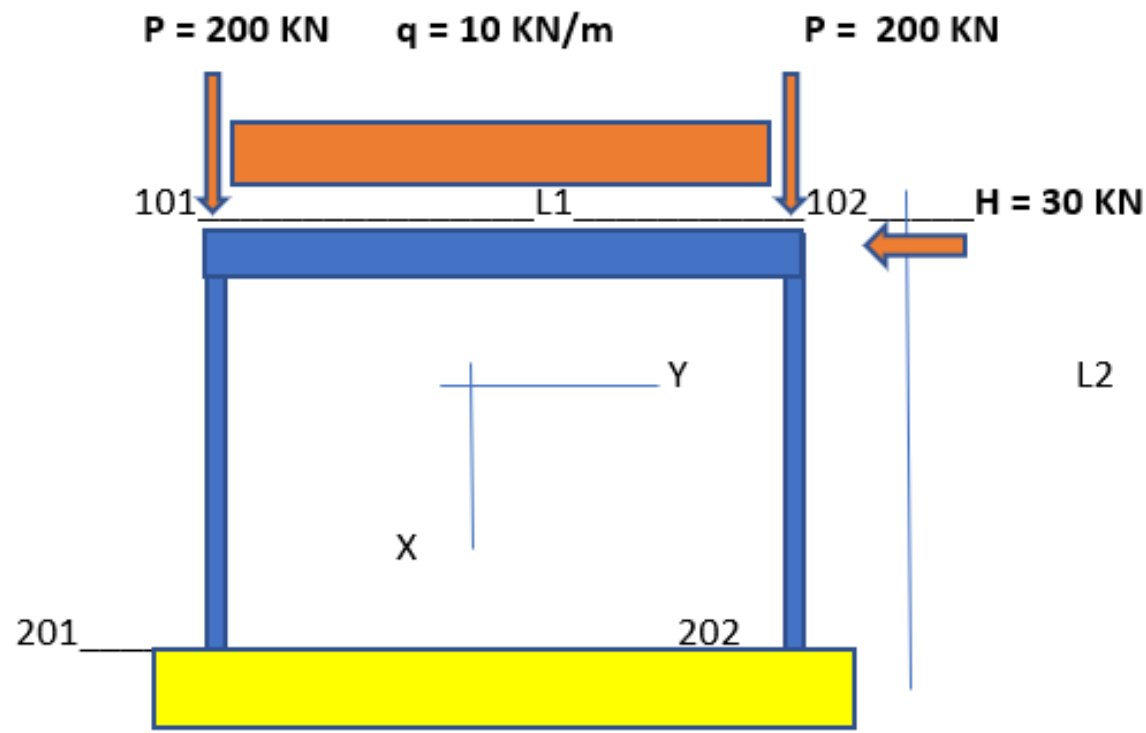


systems

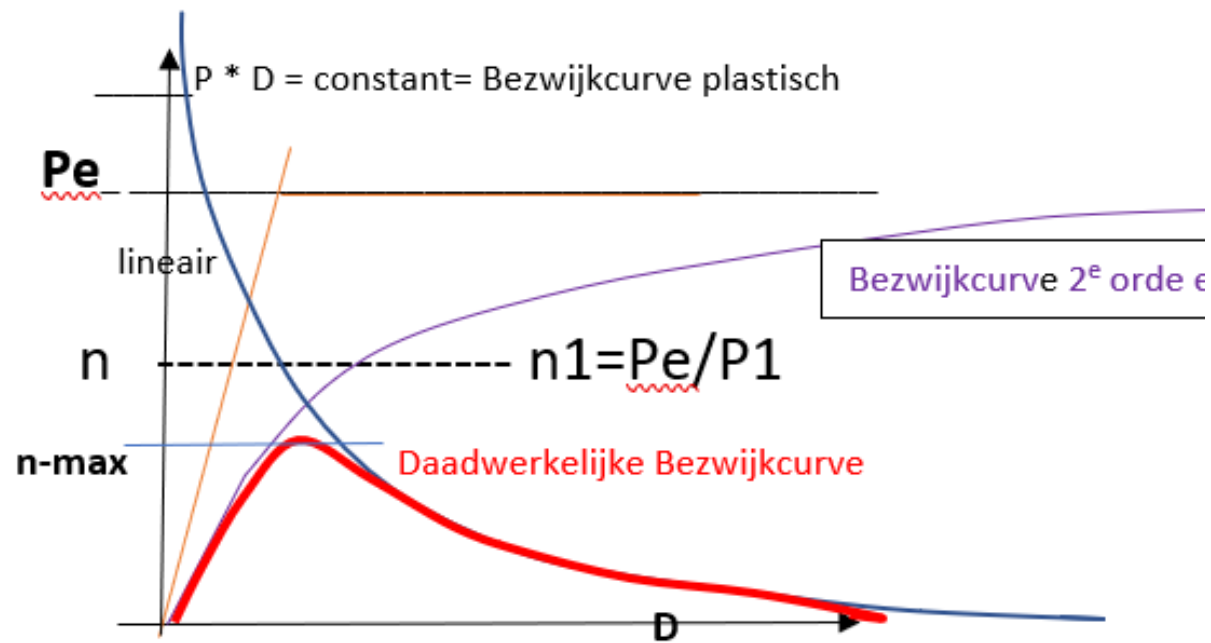


systems





Construction system



Construction
behaviour

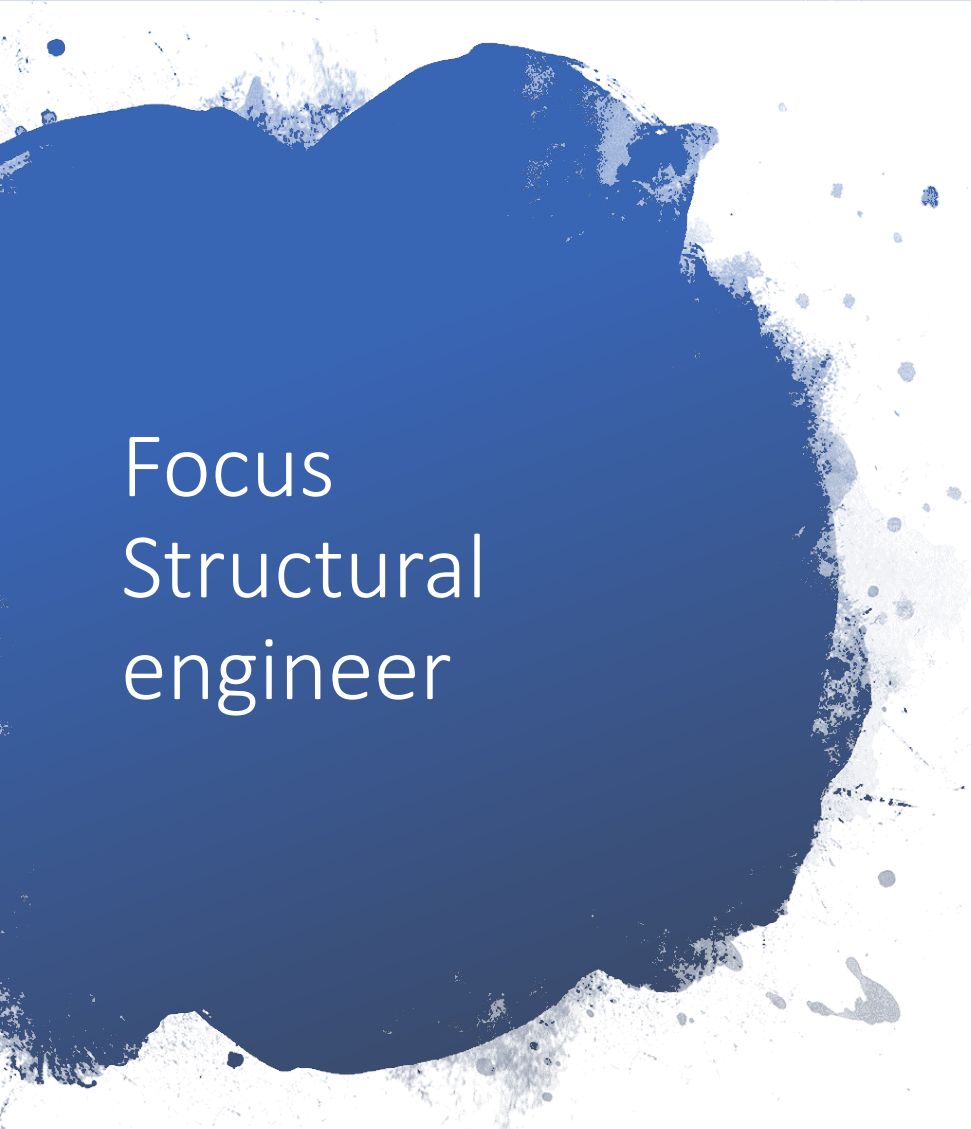


Focus
Structural engineer

* Mechanics &
Mathematics

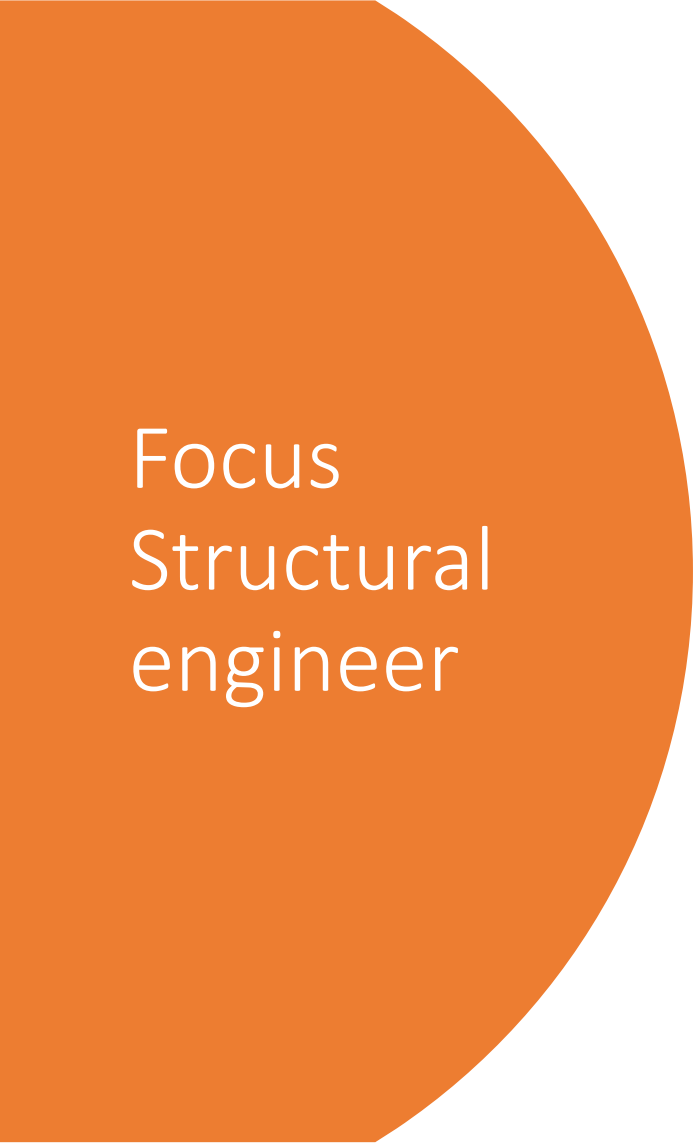
To deal with:

Strength
Stability
Stiffness




Focus
Structural
engineer

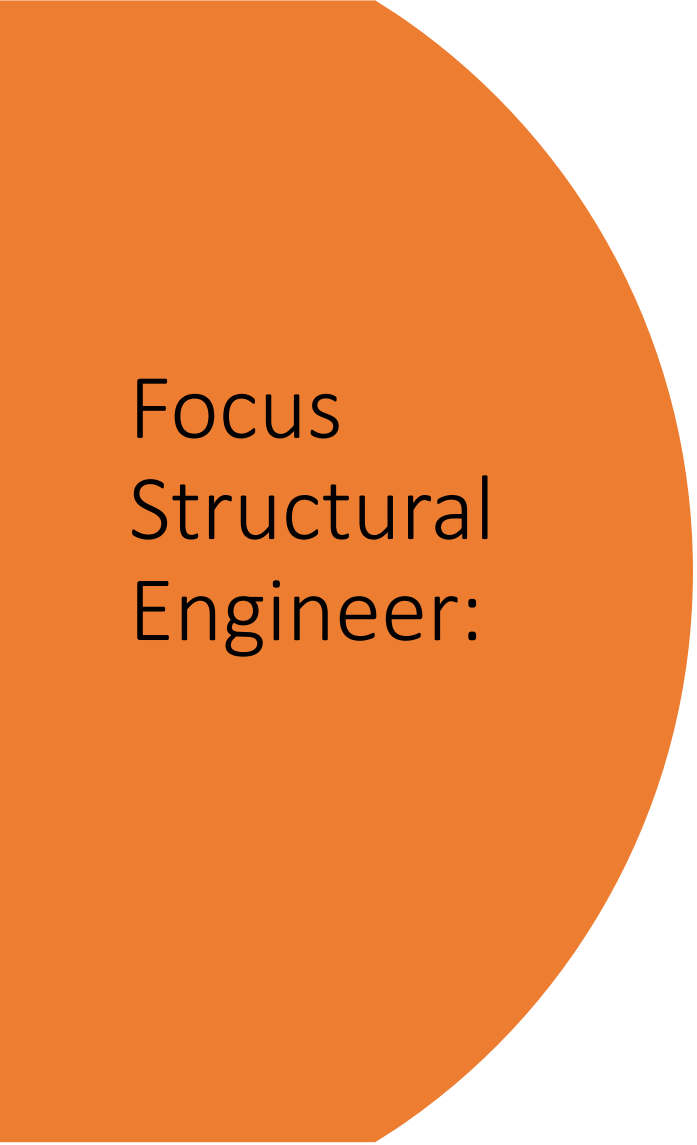
- In order to make his calculations he needs to know:
 - Material properties for:
 - Compression
 - Tension
 - Shear
 - Torsion
 - Modulus of Elasticity
- Dealing with:

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Focus
Structural
engineer

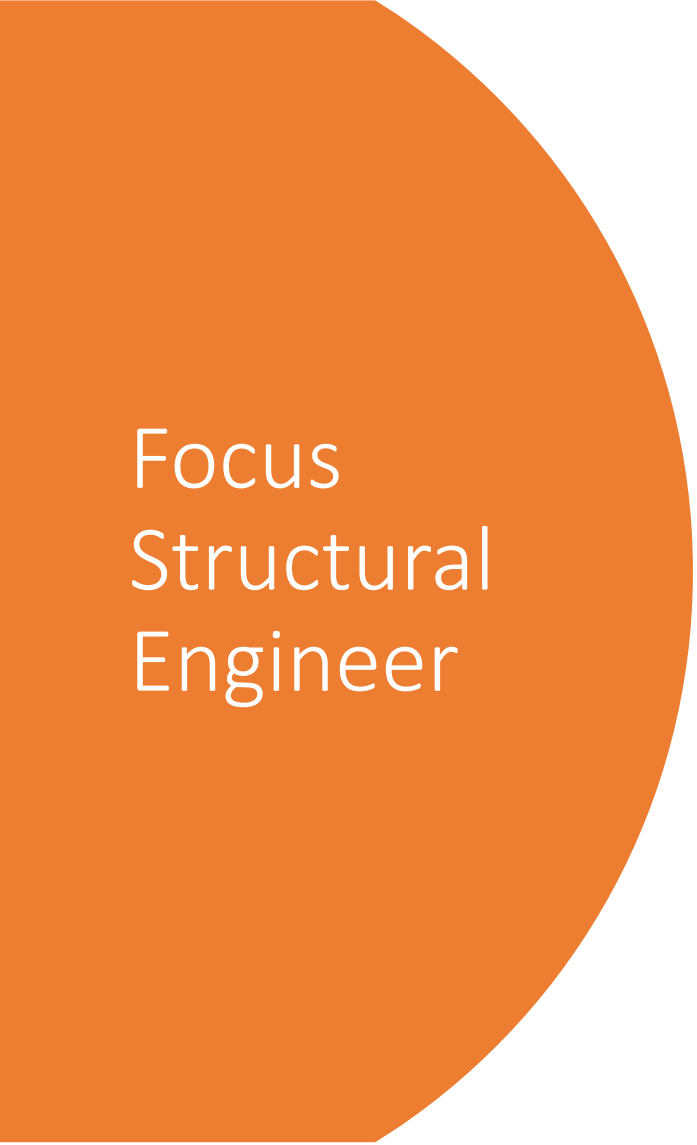
Material Behaviour

- Bond stresses
 - Shrinkage
 - Creep
 - Relaxation
 - Environmental Aggression
 - Cracking
 - Safety statistics
 - Fire resistance
 - Ductility
- 
- A decorative yellow dashed line in the bottom right corner of the slide, consisting of several curved segments.


A large orange shape on the left side of the slide, consisting of a vertical rectangle on the left and a quarter-circle on the right.

Focus
Structural
Engineer:

- Temperature problems in concreting
 - Fatigue strength
 - Resistance for freezing and thawing
 - Curing
- 
- A yellow dashed arc in the bottom right corner of the slide, consisting of several short, curved segments.



Focus
Structural
Engineer

- Lightweight concrete
 - “Normal” concrete
 - High strength concrete
 - Ultra Highstrength concrete
 - Fibre 1 concrete
 - Fibre 2 etc. Concrete
 - Self compacting concrete
 - Pre-tensioned concrete
 - Post-tensioned concrete
- 



Considering already

- Life cycle analysis
- Recycling materials
- Recycled concrete aggregate
- Recycling building elements
- Reinforcing existant Buildings



CARBON

FOOTPRINT

Save
The Earth



Carbon print

Badly in need for

- Low Carbon print Cement
- Less Cement
 - Substitutes
 - Additives

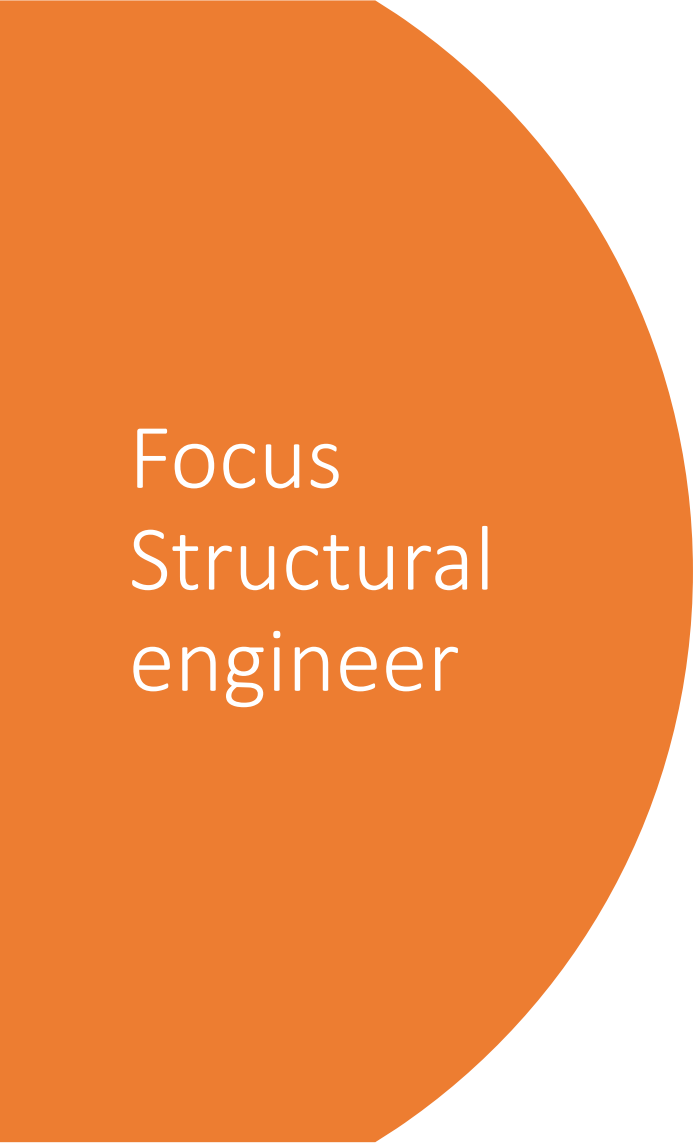
BUT




- The Structural Engineer needs INPUT about all mentioned
 - Material properties
 - Material behaviour

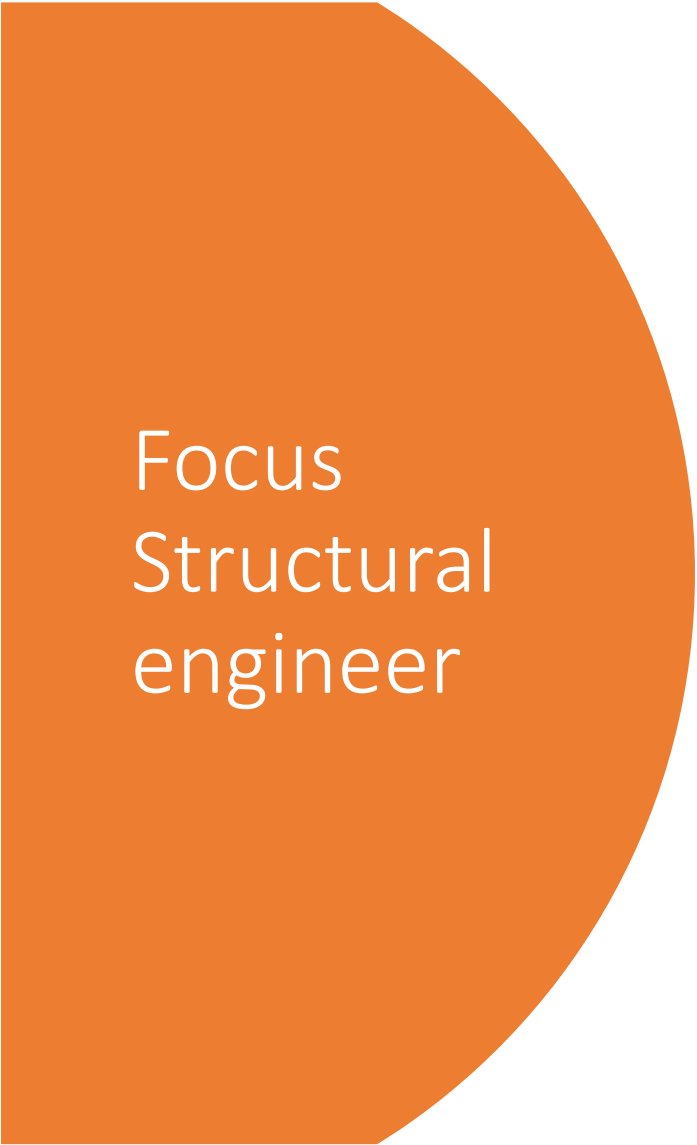
In a way he is used to
and are now specified in the
Codes.

Such as:

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Focus
Structural
engineer

- Material properties for:
 - Compression
 - Tension
 - Shear
 - Torsion
 - Modulus of Elasticity
 - Dealing with:
- 
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Focus
Structural
engineer

Material Behaviour

- Bond stresses
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Imago

structural
Engineer

	ontwerpend constructeur	coördinerend constructeur	hoofd- constructeur	deel- constructeur	engineering- coördinator
Maken constructief ontwerp	■		■		
Bewaken constructieve samenhang		■	■		
Detailengineering deelconstructies				■	
Inhoudelijke coördinatie/toetsing detailengineering		■	■		
Procesmatige coördinatie detailengineering					■

How it is
Mostly
Organised

Madness

How it
should be

- Stuctural Design
- Controlling

Constructive
Coherence

- Detail Elements
- Controlling

Detail-engineering
Execution
Materials

Structural
Engineer



Detail
Engineer





The structural engineer is able to cope with all aspects regarding the carbon footprint

He determines:

- The structural dimensions
- The steel quality
- The concrete quality
- The desired strength in time



carbon footprint

The structural engineer is able to cope with all aspects regarding

- the carbon footprint

But:

he needs the tools to do so



Therefore:

!!!!!!! Invest in research !!!!!

FOR NEW CONCRETES
NOW

!!!!!!! Support Pilot Experiments !!!!!
NOW



STRUCTURAL ENGINEER



You are the best



Better than all the rest