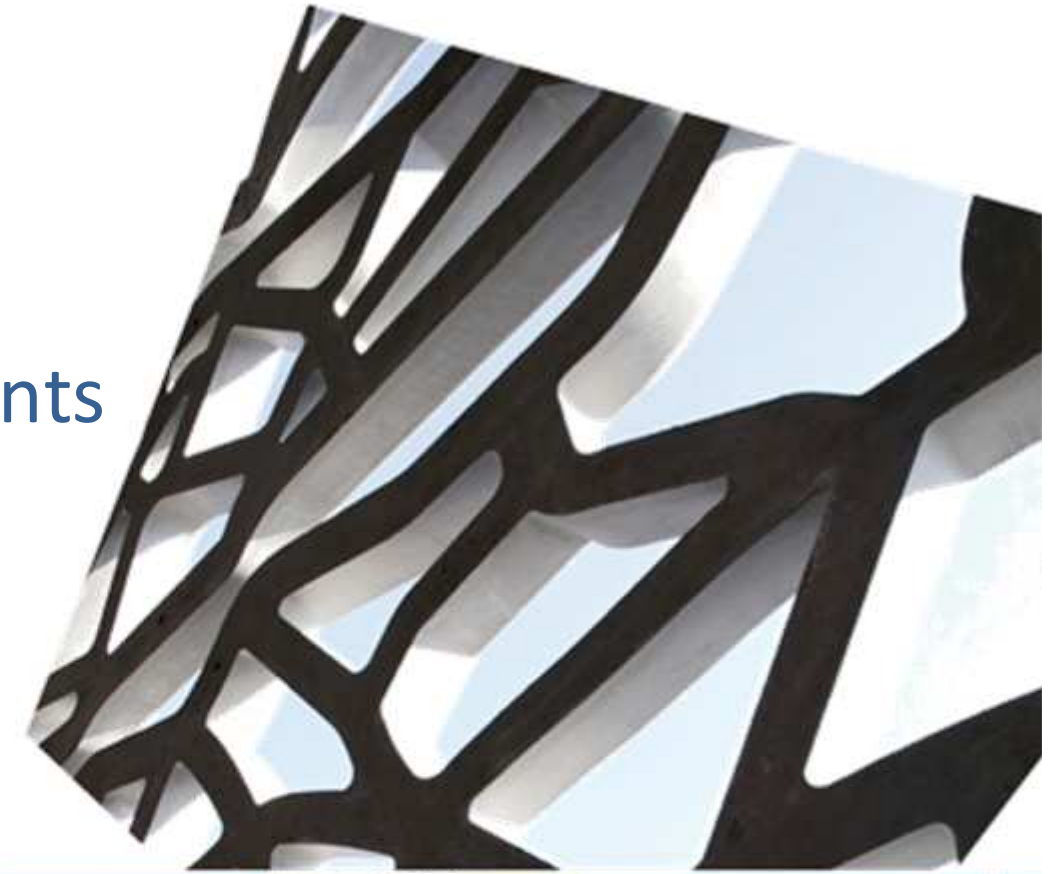
CONSOLIS

Overall usage of Precast Concrete Elements all over the world

Dr. Wim Jansze



International Conference on Precast Concrete Solutions, World Trade Center Bucharest, September 21st, 2017

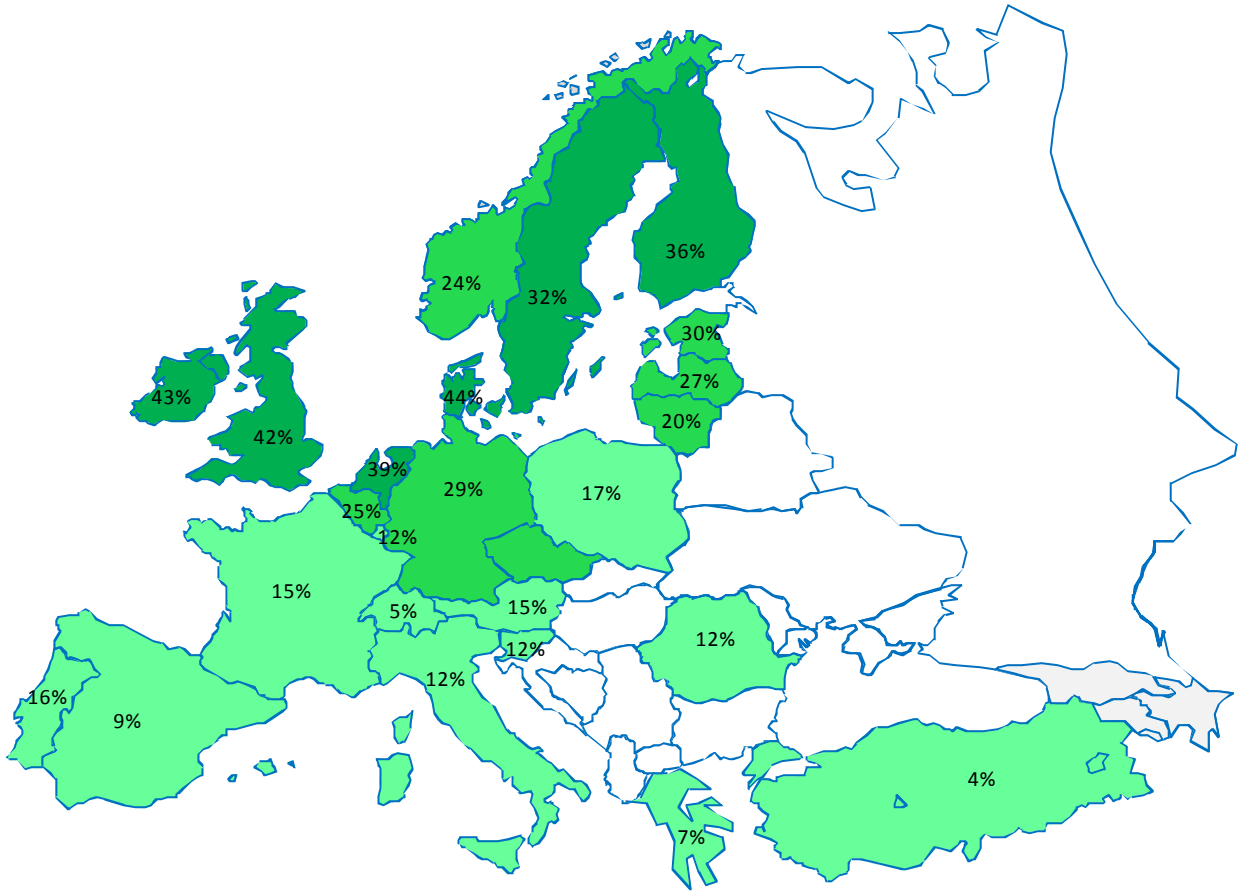
prefbeton

Organizația Patronală a Producătorilor de Prefabricate din Beton

Overall usage of precast concrete elements ...

... all over the world

Precast penetration in Europe



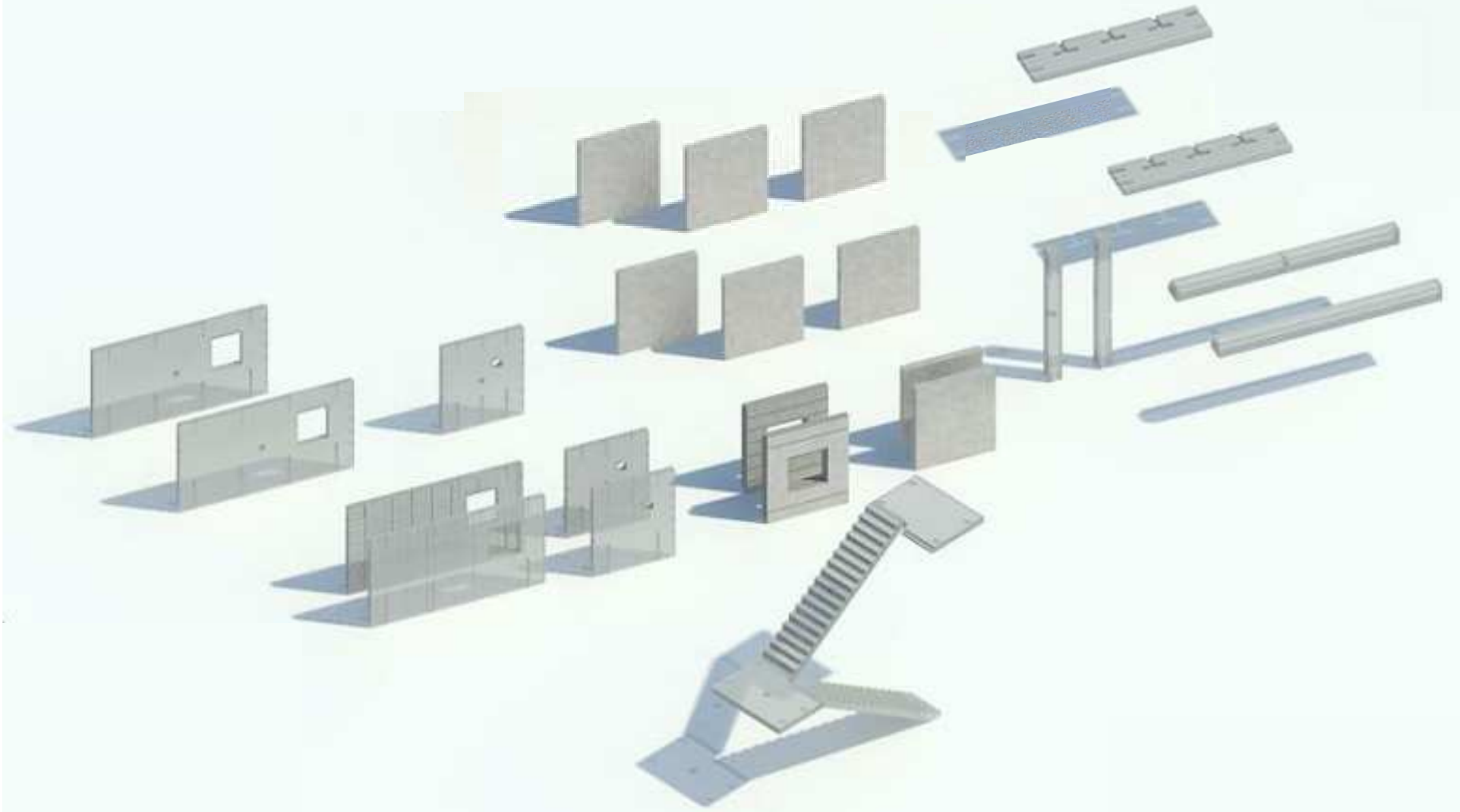
Proxy: % of cement end-use in precast [ton/ton]

No data | Low penetration | Medium penetration | High penetration

Country	Precast
Austria	15%
Belgium	25%
Bulgaria	no data
Croatia	no data
Czech Republic	30%
Denmark	44%
Estonia	30%
Finland	36%
France	15%
Germany	29%
Greece	7%
Hungary	no data
Ireland	43%
Italy	12%
Latvia	27%
Lithuania	20%
Luxembourg	12%
Netherlands	39%
Poland	17%
Portugal	16%
Romania	12%
Slovenia	12%
Spain	9%
Sweden	32%
United Kingdom	42%
Norway	24%
Switzerland	5%
Turkey	4%

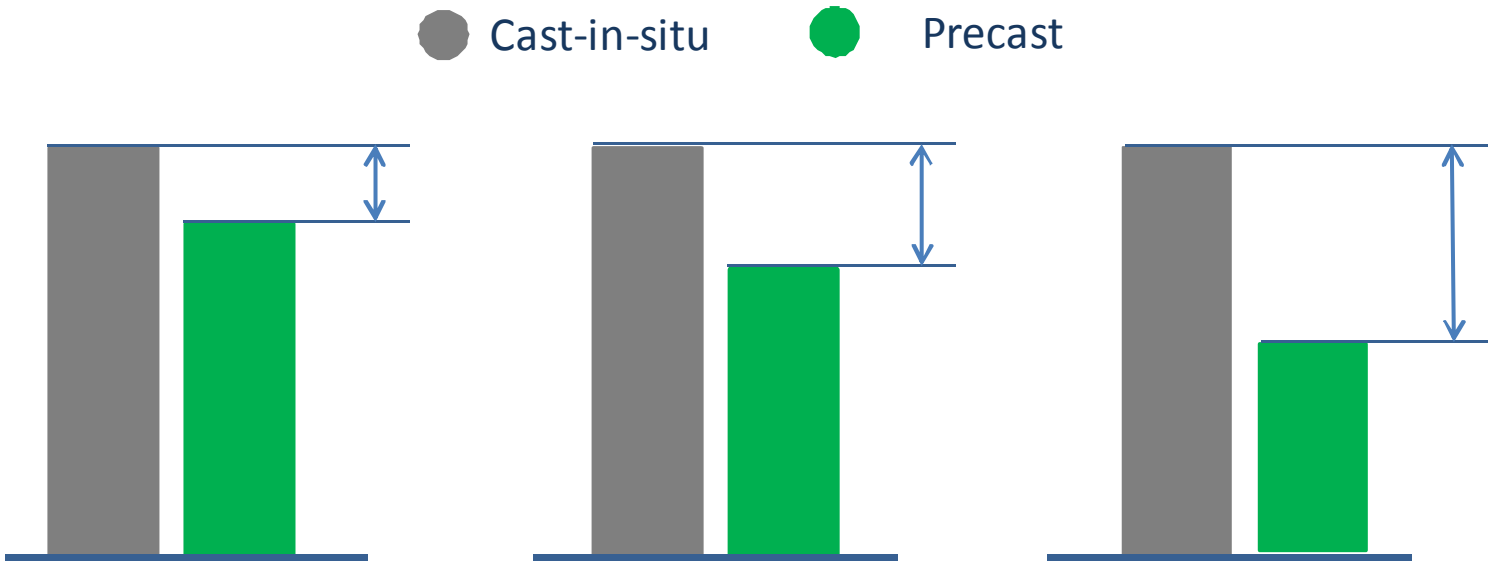
bibm

Precast concrete elements



http://revitaddons.blogspot.nl/2017/01/agacad-webinar-precast-concrete-solution.html

Advantages of precast concrete - financial



20% saving in concrete consumption

30% saving in steel consumption

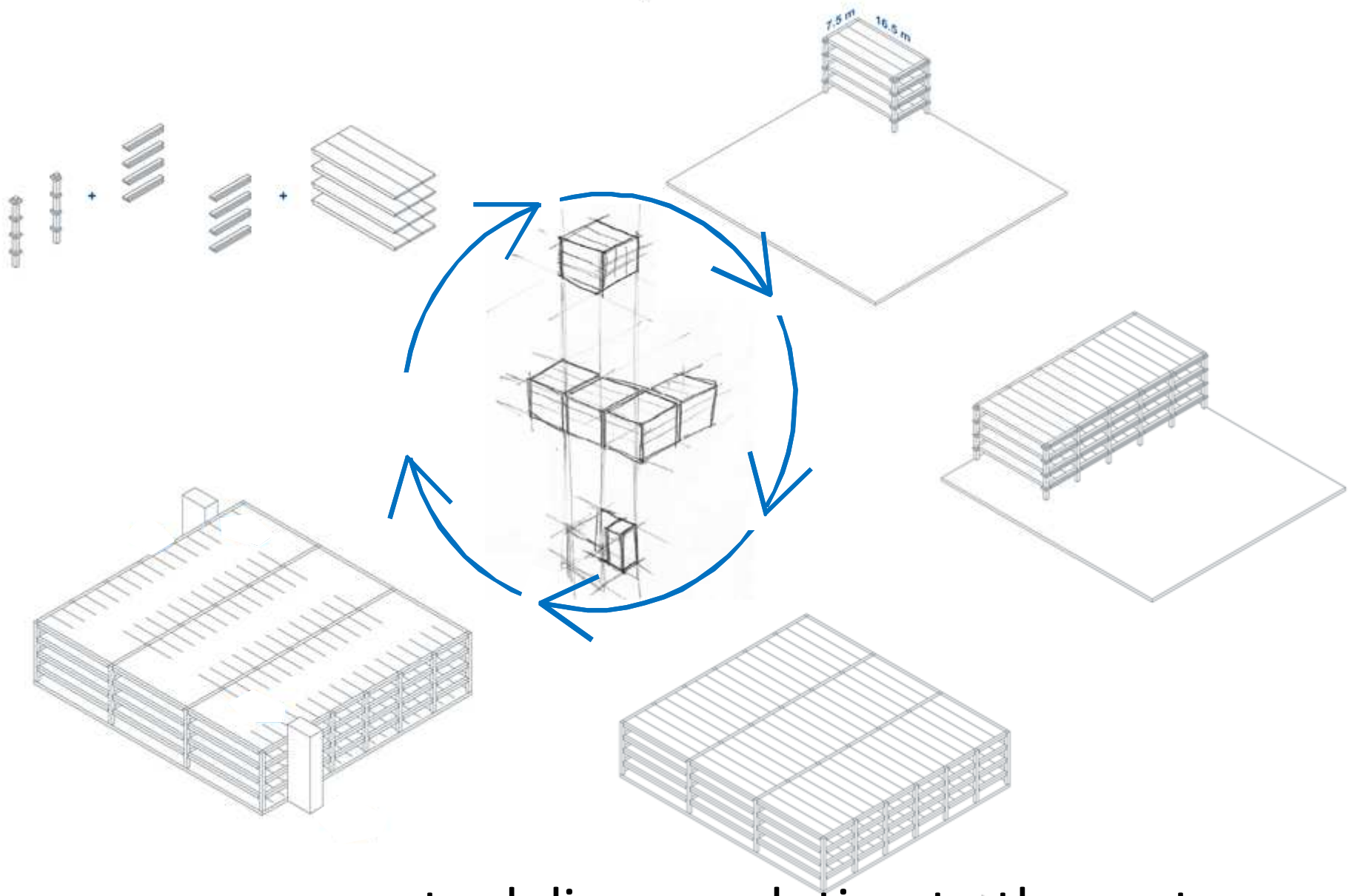
50% cut in the needed manpower

http://www.elematic.com/en/company/building-with-precast/

Advantages of precast concrete - technical

- **Factory-made products** meaning rational and efficient manufacturing processes, skilled workers, repetition of actions, quality surveillance, etc.
- **Optimum use of materials**, reuse of moulds, less waste material
- **Shorter construction time** - less than half of conventional cast in-situ construction
- Continuing construction in **wintertime** down to -20°C
- **Quality** of the people, the plant installations and equipment, the raw materials and operating processes, and the quality control of the execution.
- Opportunities for **good architecture** as almost every building can be adapted to the requirements of the builder or the architect.
- **Structural efficiency** with longer spans and shallower construction depths offering both flexibility and extended lifetime of buildings
- **Flexibility and adaptability** by using solutions which facilitate transformations without major interventions into the load-bearing structure.
- **Fire resistant structure** to 60 to 120 minutes and more
- **Environmentally friendly** way of building by better use of available building materials, production systems with a reduced environmental burden.

Precast – a modularity concept with standard elements …



… to deliver a solution to the customer

Infrastructure Solutions


Bridge beams - Netherlands


Beams – HSL SEA France

Water distribution - Switzerland


Bridge beams – Highway renovation - NL


Chelmsford Effluent Pipeline - UK


Water treatment - France


Cairo metro – Tunnel segments - Egypt


HSL SEA France


Pressure pipes – A9 motorway France

Building Non-Residential Solutions

Emporia Shopping Mall, Malmö, Sweden, MIPIM Award 2014

The Edge, World's most sustainable office building, Netherlands

MuCEM museum, Marseilles, France

Gdansk Arena Stadium, Poland

Offices, Statoil HQ, Oslo, Norway

Nagyerdei Stadium, Hungary

Building Residential Solutions

Graphic Concrete Facade, Finland,
Iconic Award 2014

Istaarn Residence, Denmark

Hotel Torni, Finland

Via University Campus, Denmark

Tuletornen Residence,
Low energy building, Sweden

Flooranaukio Residence, Finland

Rail sleepers and bearers




High Speed and Main Lines: ICE, Eurostar, TGV, Kenitra



Urban Transportation: Tramway, Underground, Intercity




Freight: Heavy haul and mining

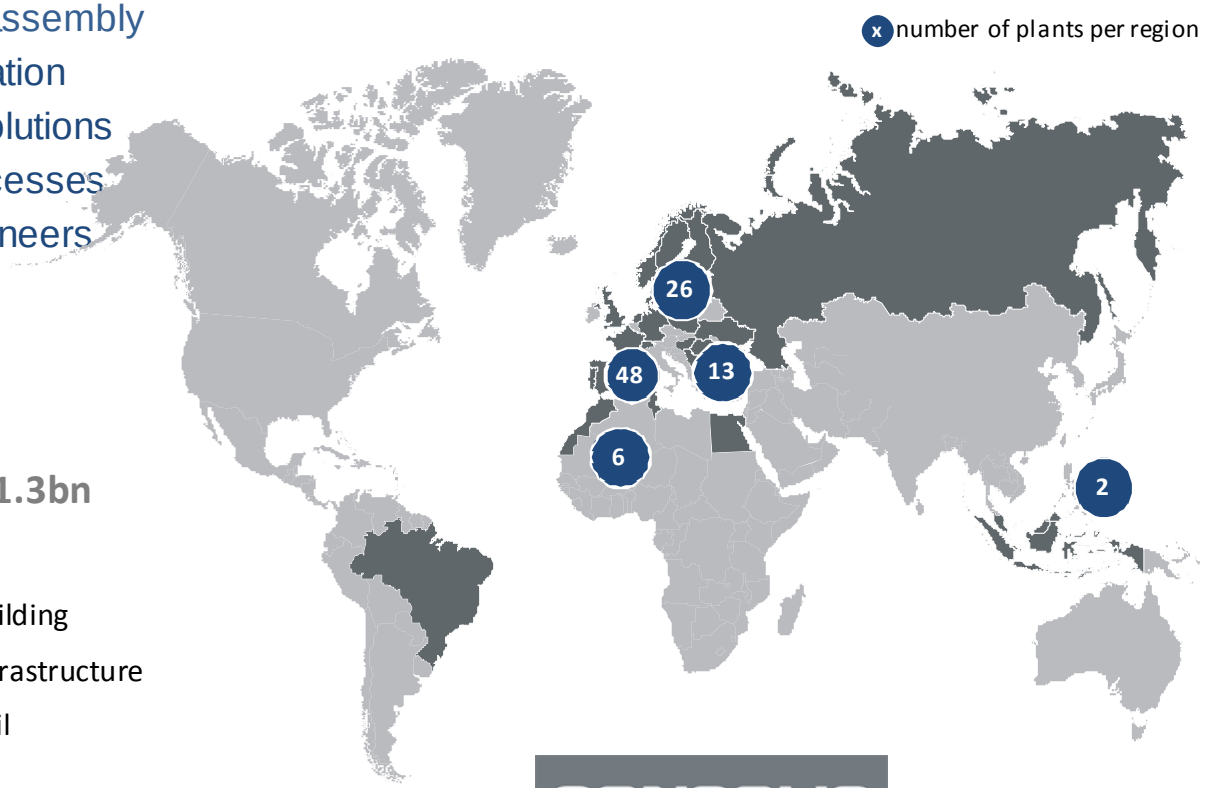


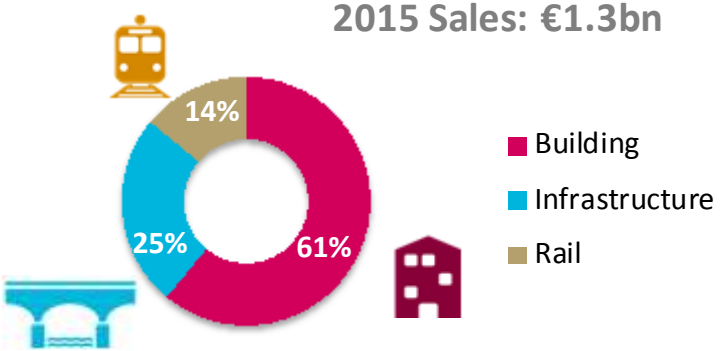


Bearers, Shallow depth twin block sleepers, Ladder track, Mono block sleepers, Twin block sleepers

Consolis is a global expert on precast concrete solutions serving the building, civil works and rail infrastructure markets

- Global footprint with a commercial presence in 30 countries
- Complete offer from design to assembly
- Strong history of product innovation
- Off-the-shelf and tailor-made solutions
- Digitalization of production processes
- 9,900 people of which 400 engineers



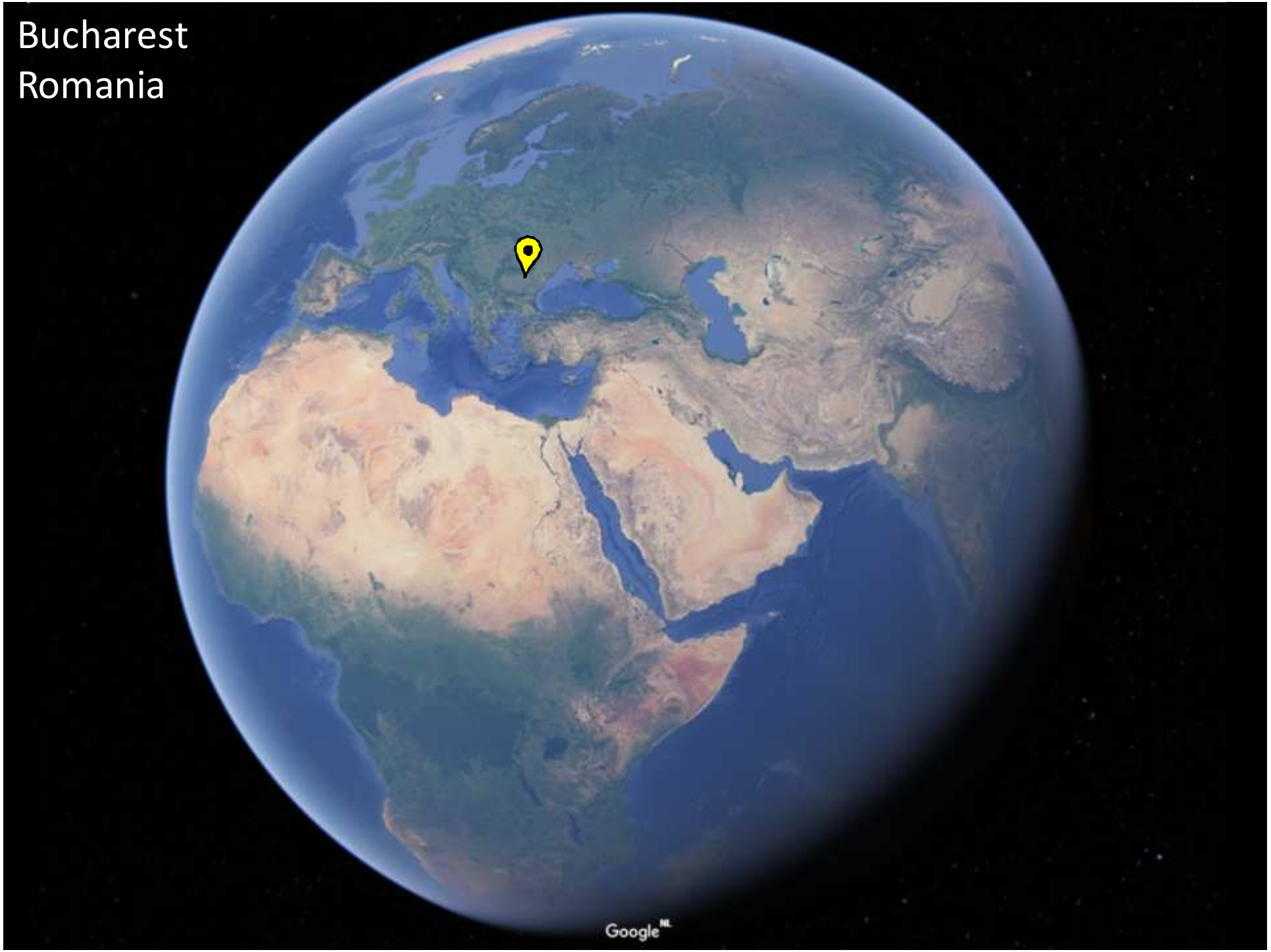


CONSOLIS

CONSOLIS
ASA

Overall usage of precast concrete elements ...

... all over the world


Bucharest
Romania
Google

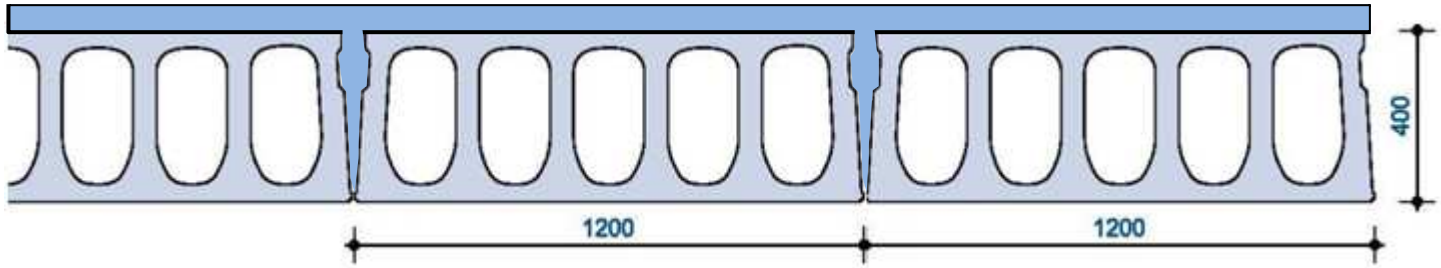

Schiphol Airport P3
Amsterdam
Netherlands
Google NL

Schiphol long-stay Car Park P3

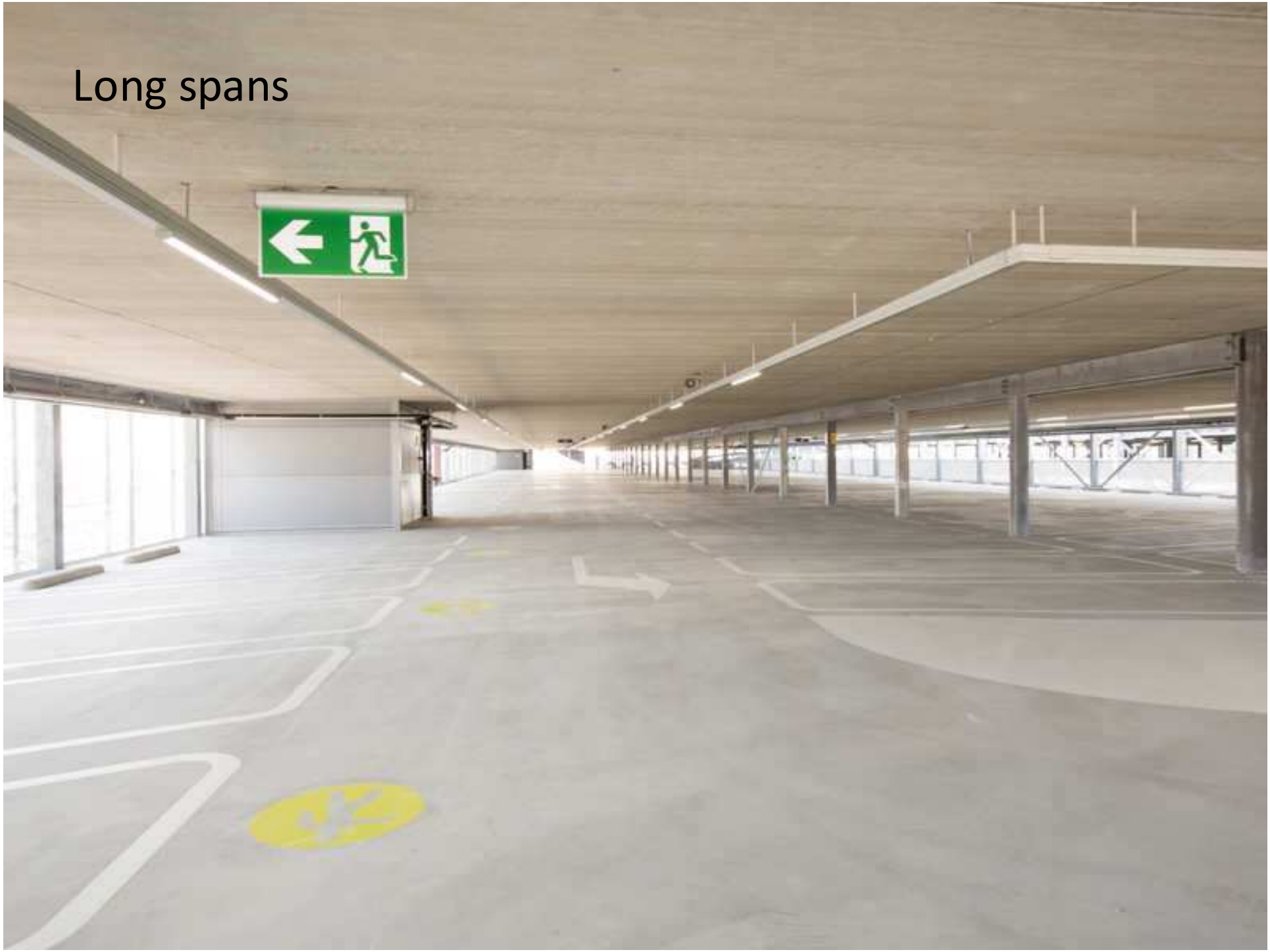
- The six-storey car park with steel structure was supplied with 47,500 m^2 of hollow core slabs for 2650 parking lots.
- The slabs were delivered on a tight schedule to specific areas. 840 m2 a day in 14 freights were constantly delivered to ensure minimum disturbance.
- Total assembly time slabs 13 weeks.
- Consolis VBI ensured timely production and smooth deliveries on an almost daily basis to respect the strict assembly schedule.

Schiphol P3 is a Car Park with hollowcore slab solution

- A typical hollowcore slab solution comprises of a 17 m span and a 400 mm to 500 mm slab is used, with structural topping of 50-70 mm
- For distributed vehicle load of 2,5 kN/m2 and choice of hollowcore 400 mm, a 50 mm cast-in-situ structural topping was applied to reach 17,5 m span
- In the floor there is need for longitudinal and peripheral reinforcement and joint casting



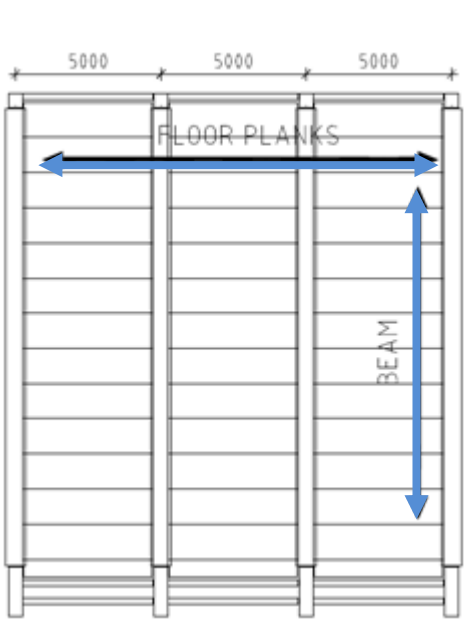
Long spans



Long spans - pPrecast floor elements lay-out direction

1. Floor planks

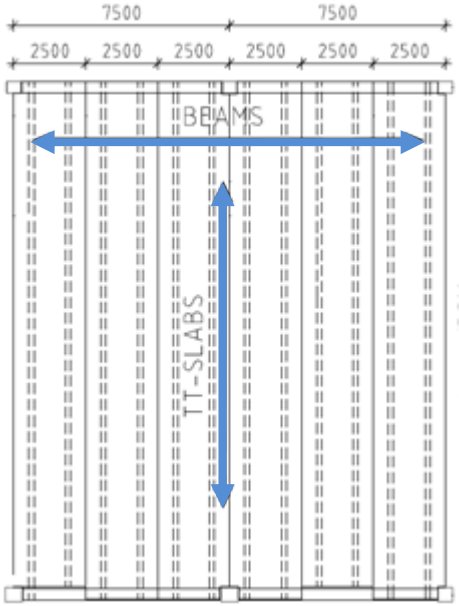
- Longitudinal slabs
- Transversal beams



- With topping
- Temporary support
- Selfweight 5,0 kN/m²

2. Ribbed floor elements

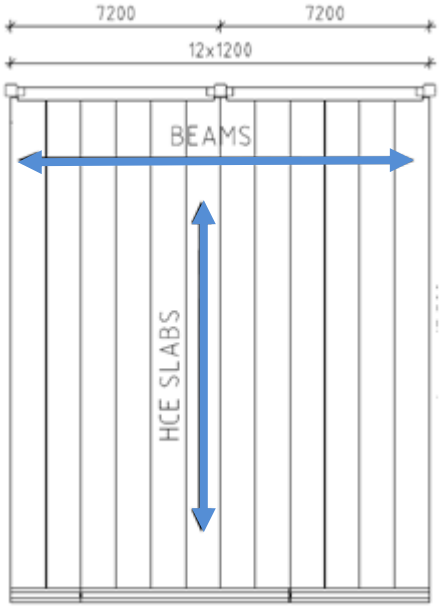
- Transversal slabs
- Longitudinal beams



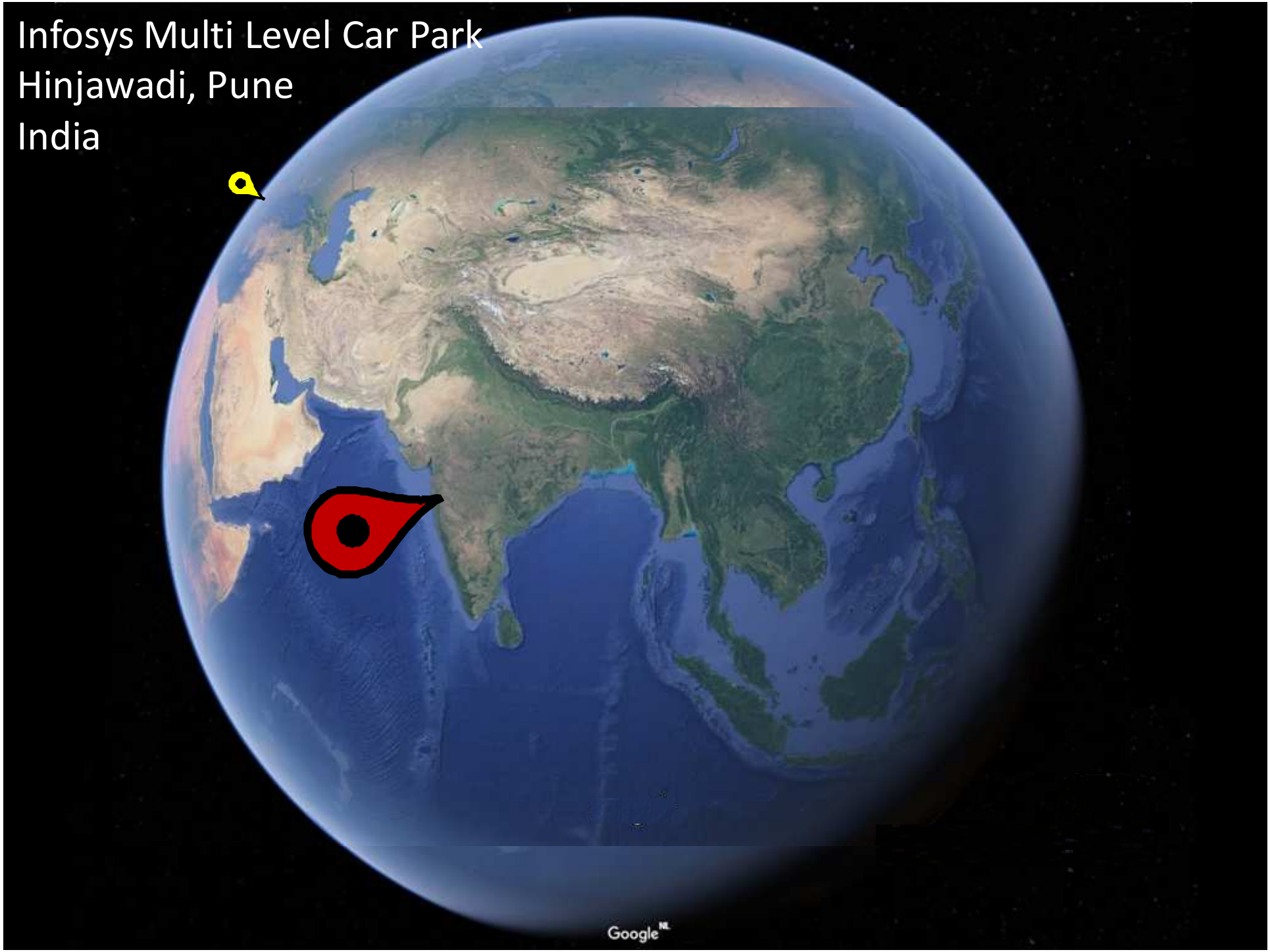
- With(out) topping
- No temporary support
- Selfweight 6,0 kN/m²

3. Hollow core slabs

- Transversal slabs
- Longitudinal beams



- With topping
- No temporary support
- Selfweight 6,7 kN/m²


Infosys Multi Level Car Park
Hinjawadi, Pune
India
Google

Infosys Multi Level Car Park

- Basement and 10 floors
- Parking capacity 1300 cars

Architectural facade by international design competition

.... The warmth of woven wool .... with sufficient mild sunlight

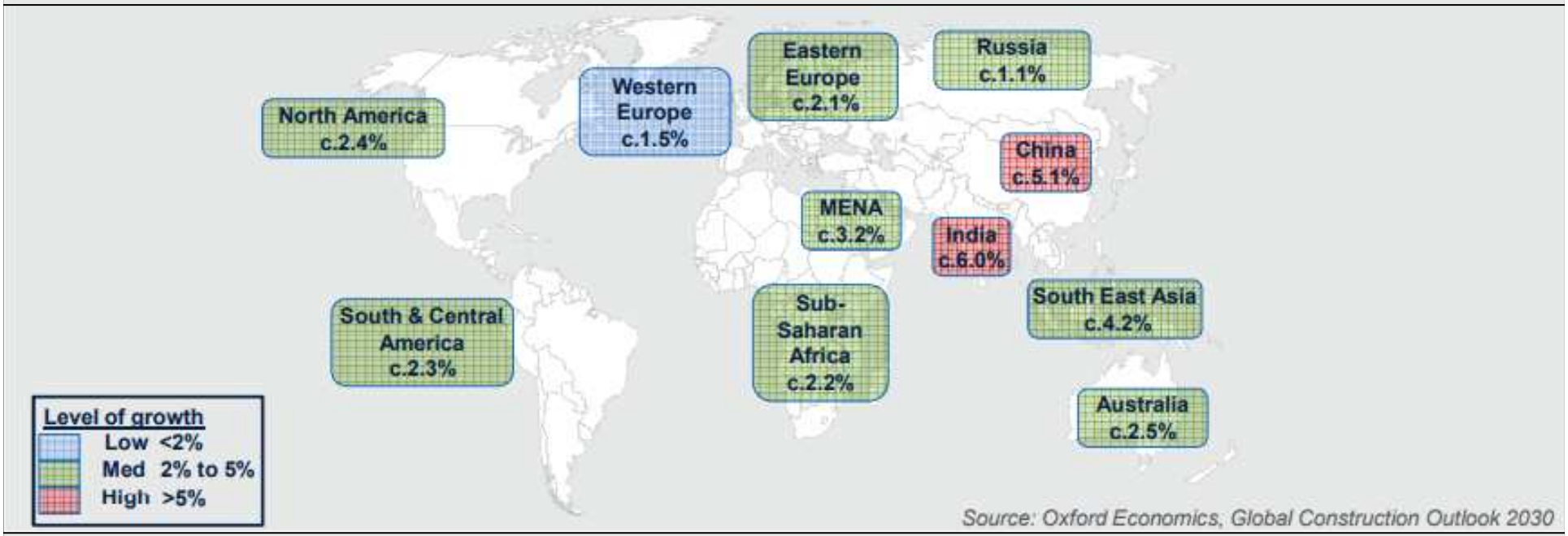
Precast elements

- Precast India produced 3500 elements in the plant 45 km from the site
- 16 m span precast TT slabs
- 15 m precast concrete columns
- Beams, hollowcore slabs, staircases
- 1300 facade elements of 7 m length (2,5 tons, assembly tolerance +/- 10 mm


http://www.precastindia.com

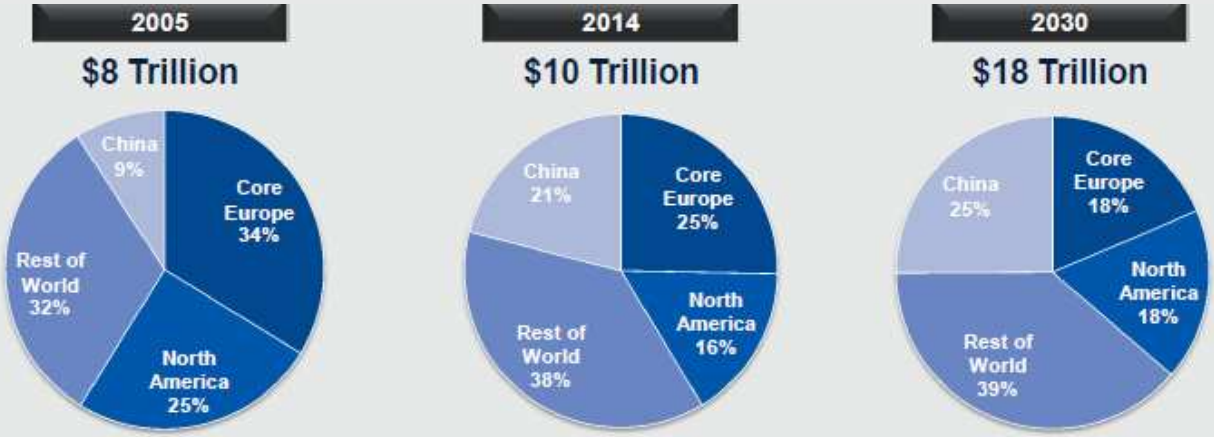
Growth in the India and China region

- Projected GDP Growth (avg 2014-2030)



Source: Oxford Economics, Global Construction Outlook 2030

- Global Construction Spend in 2030



Source: Oxford Economics, Global Construction Outlook 2030

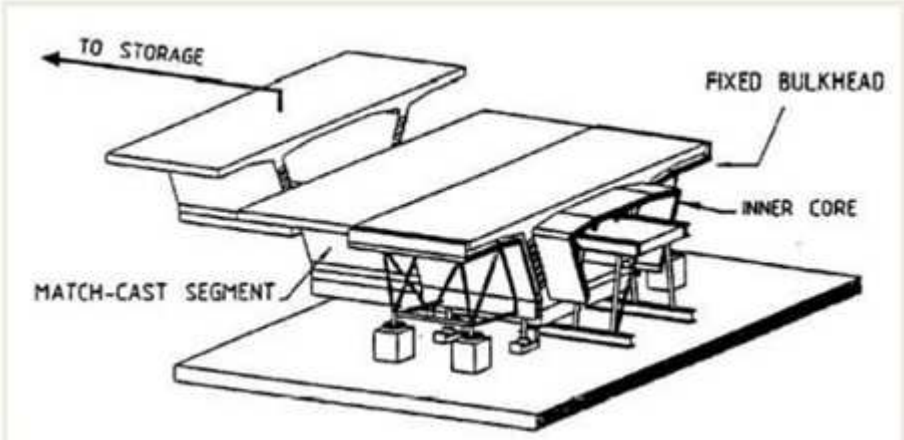

Wuhu Yangtze River Bridge
Anhui Province
China
Google

Industrialized construction

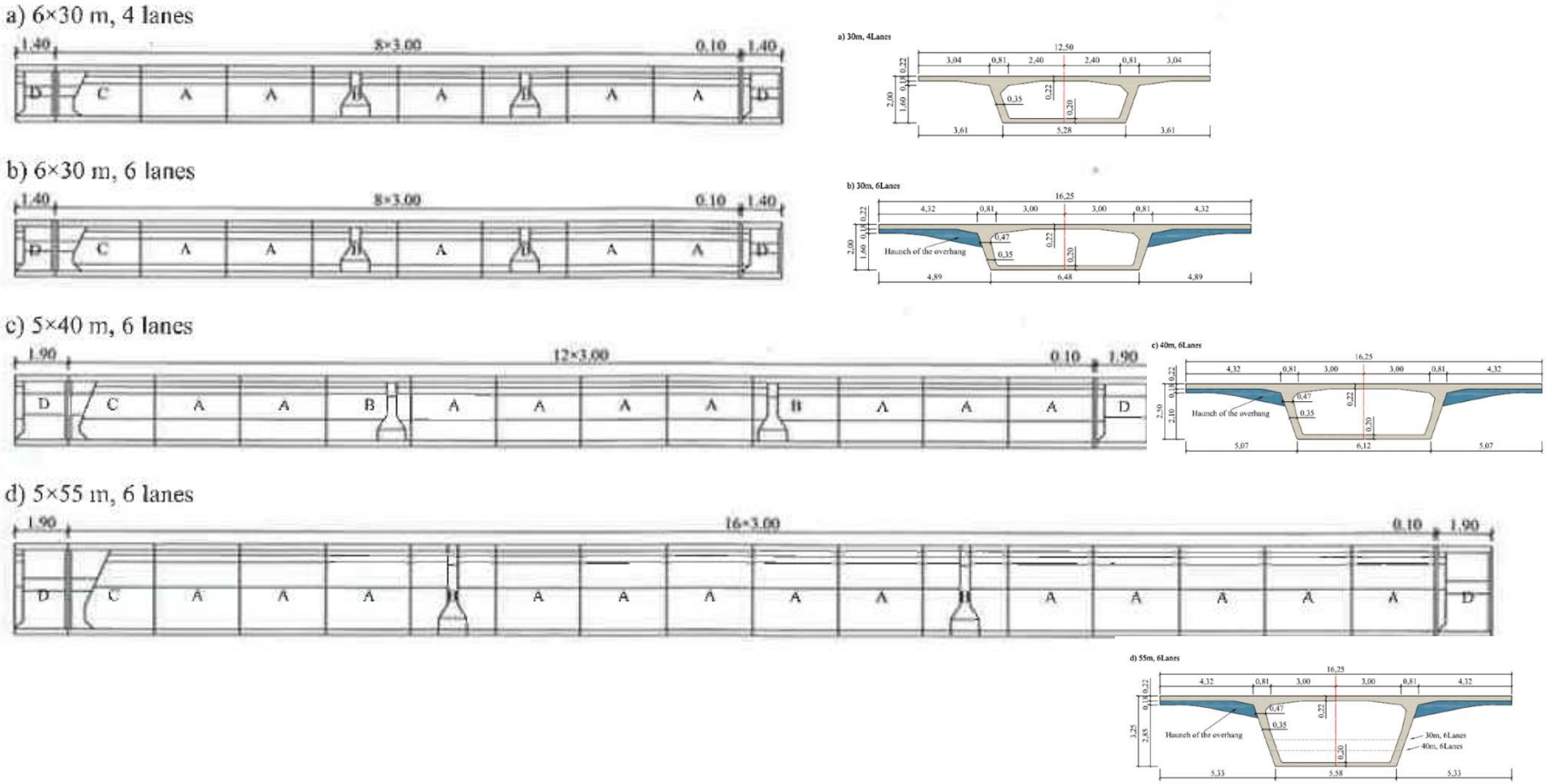
- Main objective was industrialized construction to shorten construction period of the 27 km approach bridges and connecting engineering
- Repetitive construction procedures of the Wuhu Yangtze River Bridge reduced costs and construction time about 10-20 % compared to traditional cast-in-place concrete girder scheme
- Only four types of bridge structures (20032 segments) are applied for all approach bridges, which is a good base for industrialization construction.
- Launching girder is used for the assembly of the precast segments

Short-line casting method

- The 20032 segments were cast in four casting yards with 90 casting cells
- Short-line method is used – a new segment is match-cast against the preceeding segment
- A cycle time of one standard segment per day per casting cell was achieved by steam curing



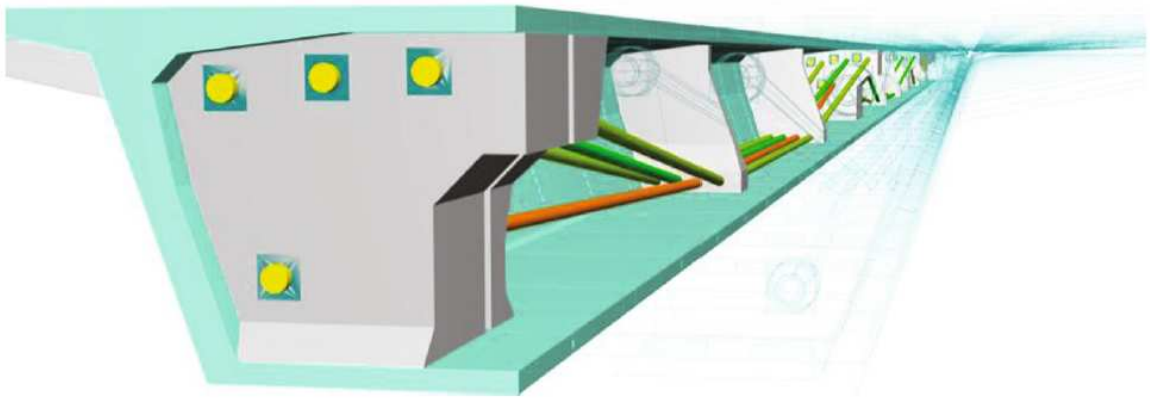
Strongly standardized segments



- Two types of cross sections of the main box girder are designed with widths of 12.5 m and 16.25 m,
- Three types of bridge spans of 30 m, 40 m, and 55 m are designed.

External prestressing

- The Wuhu Yangtze River Bridge is the first bridge in China that adopted the full external pre-stress technology.
- Cycle time of five days per span




Affordable Housing
Capetown
South Africa
Google

Current housing challenge


Affordable housing in South Africa
• Urbanization
• Suitable land shortages
• Housing back-log
• Local unskilled labour

Residential projects
Vilnius
Lithuania

Residentials in The Baltics

- Since 2004, *Betonika* provides a whole system of structural solutions intended for residential construction (new blocks of flats) that consists of precast:
  - concrete floor slabs
  - heat-insulated three-layer external walls
  - internal walls
  - stairs and landings
  - lift shafts
  - balconies
- External walls from precast concrete in blocks of flats are manufactured at the factory with insulation material. The thickness of insulation layer is chosen according to thermal resistance value wished by the customer. In addition, precast concrete walls have tightness and heat accumulation properties, therefore, to heat the building, less energy is consumed.
- Heating bills in block of flats, built from *Betonika's* precast concrete structures are among the lowest in Vilnius, for example, Pavilnionių st. 31 block of flats falls into a top five that have paid the least price for heating.

- The knowledge of the precast residential systems comes from a transfer of knowledge from Consolis Group.

Vilnius residentials

RESIDENTIAL BUILDING ANTAKALNIO PARKAS

GYVENAMOSIOS-KOMERCINĖS PASKIRTIES PASTATAS ATEITIES G.

RESIDENTIAL BUILDINGS EIKA NAMAI PILAITĖJE

RESIDENTIAL BUILDINGS "BAJORŲ DOMINIJA"

RESIDENTIAL BUILDINGS EIKA NAMAI PILAITĖJE

"Betonika" received a certificate of acknowledgment "For sustainable development 2011" for collaboration with "Eika"

RESIDENTIAL BUILDINGS EIKA NAMAI PILAITĖJE


RESIDENTIAL BUILDINGS EIKA NAMAI PILAITĖJE

RESIDENTIAL BUILDINGS EIKA NAMAI PILAITĖJE

More examples from Vilnius on residentials

RESIDENTIAL BUILDING SMILGOS

RESIDENTIAL BUILDING SOLOCITY

RESIDENTIAL BUILDINGS FROM LARGE-PANEL SLABS

DWELLING HOUSES IN PAŠILAIČIAI

More examples from Vilnius on residentials

RESIDENTIAL BUILDINGS IN PERKŪNKIEMIS

RESIDENTIAL BUILDINGS IN PILAITĖ (1)

RESIDENTIAL BUILDINGS IN PILAITĖ (2)

RESIDENTIAL BUILDINGS IN PILAITĖ (2)

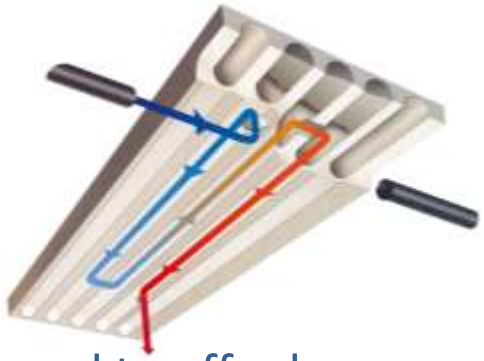

Tuletornen residence
Stockholm
Sweden
Google

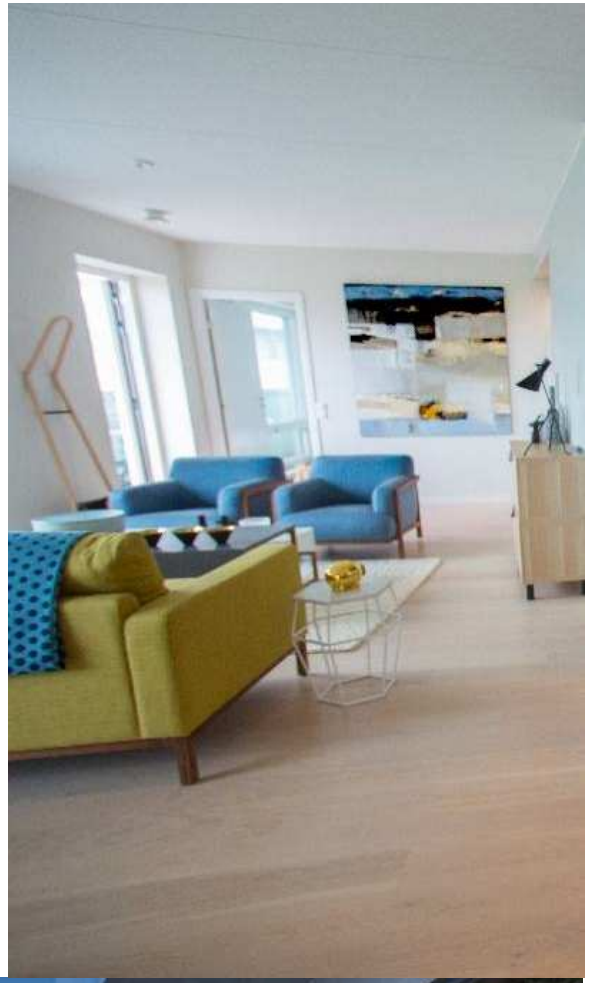
With its striking architectural design and 360° balconies, the Tuletornen residential apartment block in Stockholm offers substantial benefits in energy savings.

Tuletorget apartment in Stockholm, Sweden

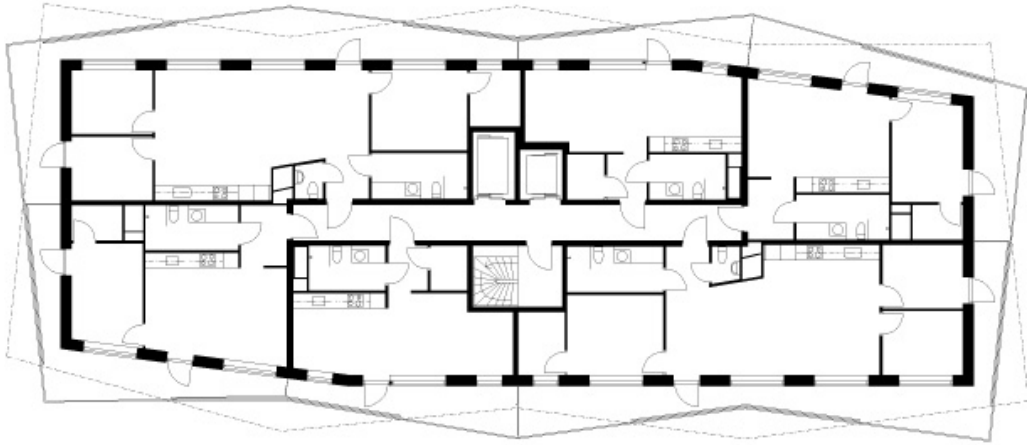
Building name	Client/ Developer	Sustainability scheme	Rating/ Score	Gross area (m2)	Completion year	Type of project	Location
Tuletorget	Wallenstam	-	-	15.500 (180 apartments)	2014	Residential + Shops	Sundbyberg, Stockholm, Sweden

TERMODECK®

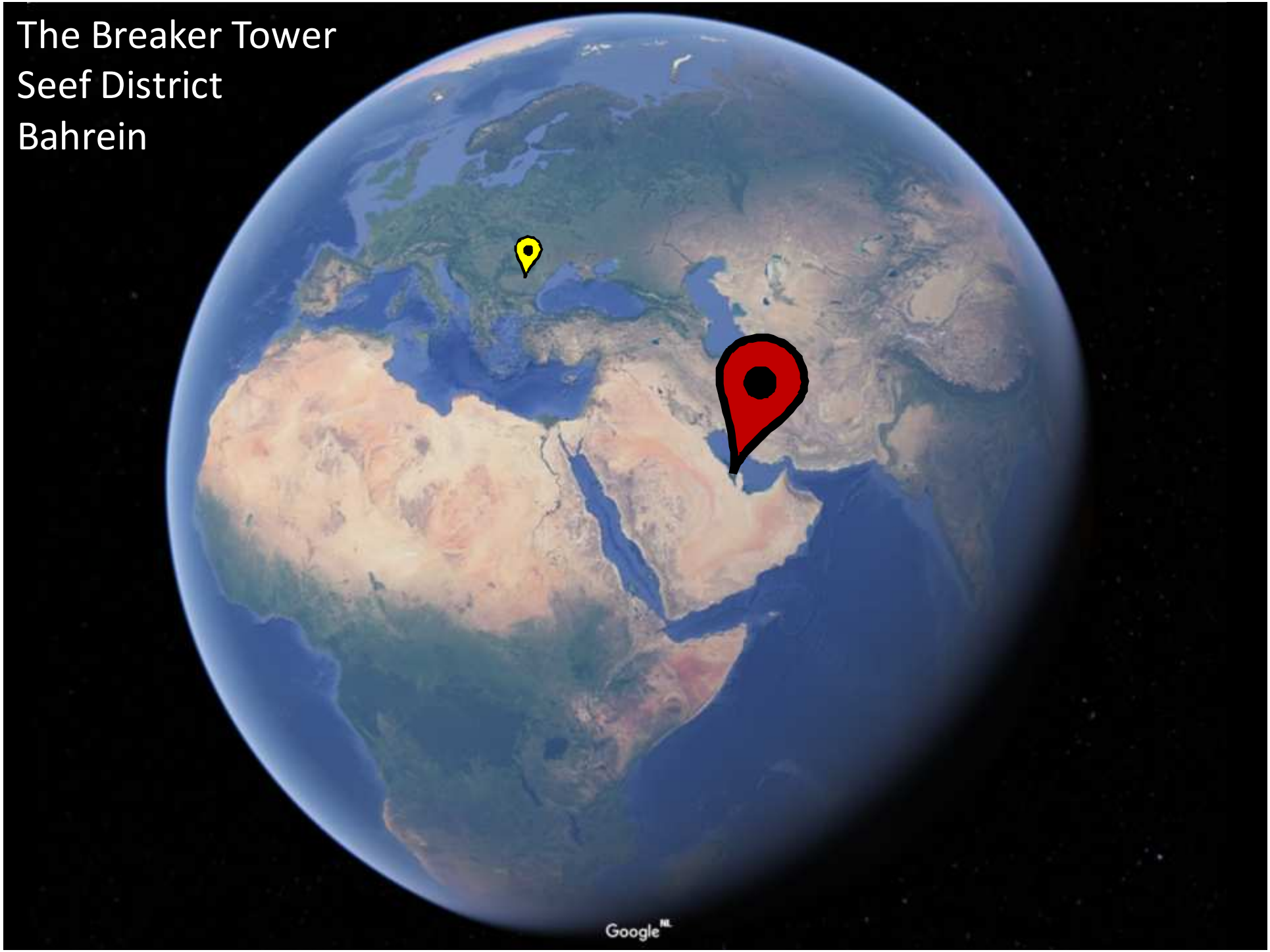




- High-tech concrete solutions were used to offer low energy consumption and high comfort for the building's residents.
- TermoDeck® precast hollowcore slabs store thermal energy, offering a constant ventilation, heating and cooling mechanism throughout the building.
- TermoDeck® is an energy efficient building solution using free energy to heat and cool the building delivering the comfort.



Construction of the apartments


The Breaker Tower
Seef District
Bahrein
Google

The Breaker – tallest precast building in the world

- Bahrein Precast Concrete scope of work for The Breaker was to design, produce, deliver and erect the precast concrete elements
- The elements included 2,593 shear walls, columns, beams, solid slabs and staircases; The floors included
- The floors included 21,165 m2 of 150-mm, 200-mm, 265-mm and 500-mm-thick hollow-core slabs;

- Bahrein Precast Concrete Company installed the last precast panel at a height of 150.165 m

The Breaker – tallest precast building in the world

High-rise building

High-rise buildings in the World

Geographical Distribution of High-Rise Buildings

Skyscrapers in Regions

#	Continent	Buildings	Percent
1	Asia	24,302	33.16 %
2	North America	22,863	31.20 %
3	Europe	13,114	17.89 %
4	South America	9,903	13.51 %
5	Oceania	2,244	3.06 %
6	Africa	859	1.17 %

(Tables source: Emporis Corporation April 2004)

Most Skyscrapers

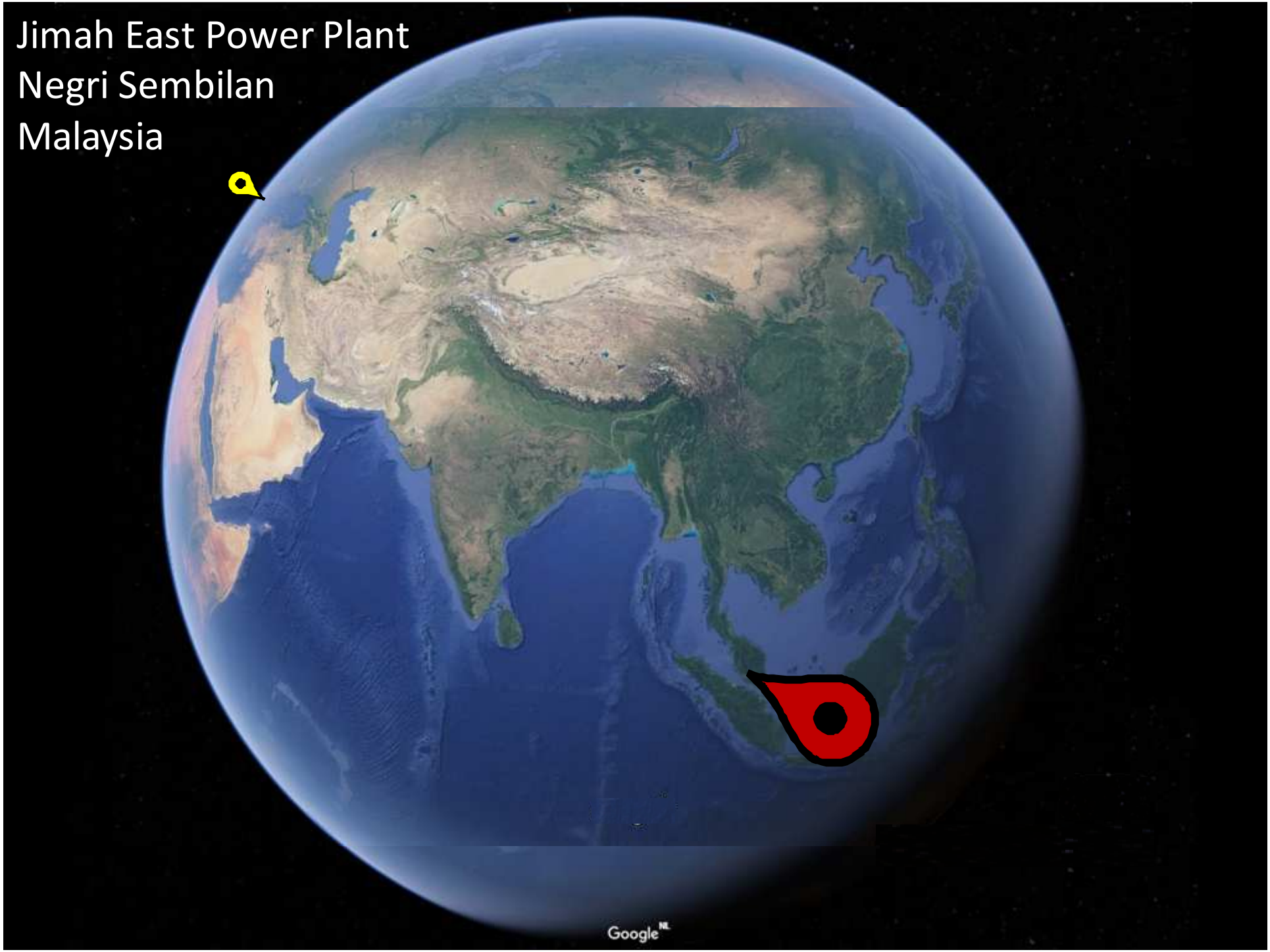
#	City	Buildings
1.	Hong Kong	7,254
2.	New York City	5,317
3.	Singapore	3,489
4.	Istanbul	2,090
5.	São Paulo	2,043
6.	Rio de Janeiro	1,854
7.	Toronto	1,582
8.	Tokyo	1,466
9.	Buenos Aires	1,410
10.	London	1,277
11.	Chicago	1,024
12.	Bangkok	706
13.	Osaka	685
14.	Sydney	652
15.	Caracas	650
16.	Milan	625
17.	Seoul	589
18.	Shanghai	523
19.	Kuala Lumpur	515
20.	Vancouver	501
21.	Madrid	500

- **London as example : 436 tall buildings in the pipeline**
  - **On average buildings have 30 storeys**
  - **60% buildings between 20 – 29 storeys => precast opportunities**
  - **Only 2% buildings > 60 storeys => landmarks (“human ego”)**


Crossrail
London
UK
Google

Crossrail project in London

- Crossrail - 58km single track railway line in London
- Specification sleepers -20 dB
- 63,000 sleepers type S312 installed
  - The design of the S312 sleeper involved predictive behaviour modeling and intensive laboratory tests carried out at SNCF
  - The sleeper integrates a complete, cost-effective maintenance solution, as well as vibration mitigation performance.
- 5,000 sleepers type HAS installed
  - The High Attenuation System is an integrated system dedicated to mitigating ground vibrations generated from rolling stock.
  - HAS tracks can be laid fast.

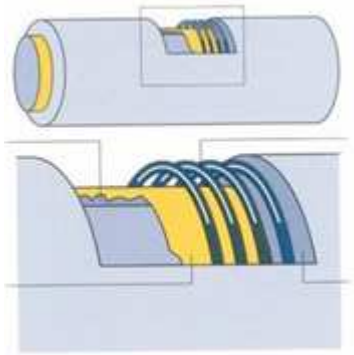

Jimah East Power Plant
Negri Sembilan
Malaysia
Google

3B Jimah East Coal Fired Power Plant

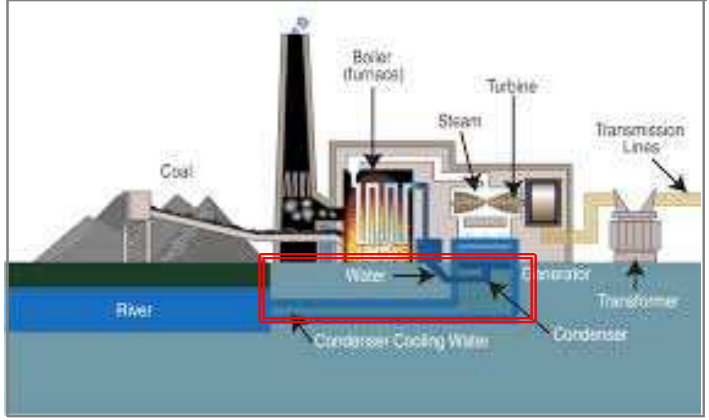
- Powerplan 100km South of Kuala Lumpur
- Ultra Super Critical coal-fired power generation 2.000 MW
- Two units of 1.000 MW
  - 2018 Nov : Commercial Operation 1st Unit
    2019 May : Commercial Operation 2nd Unit

Reinforced Cylinder Concrete Pipes (RCCP) for the power plant water cooling system

RCCP

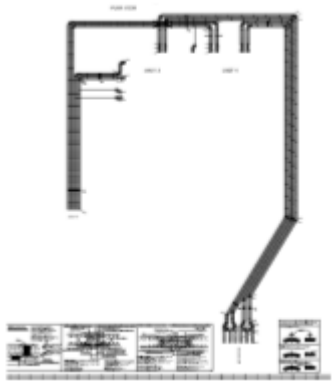


Water Cooling System



Piping system

3B JIMAH Piping Layout



RCCP as per EN 639 - 641	
Project length	4,600m
Project key diameter	3,500mm
Number of pipes	1,560
Working pressure	4,5bar (max. working pressure 5,5bar)
Estimated production time	12 months

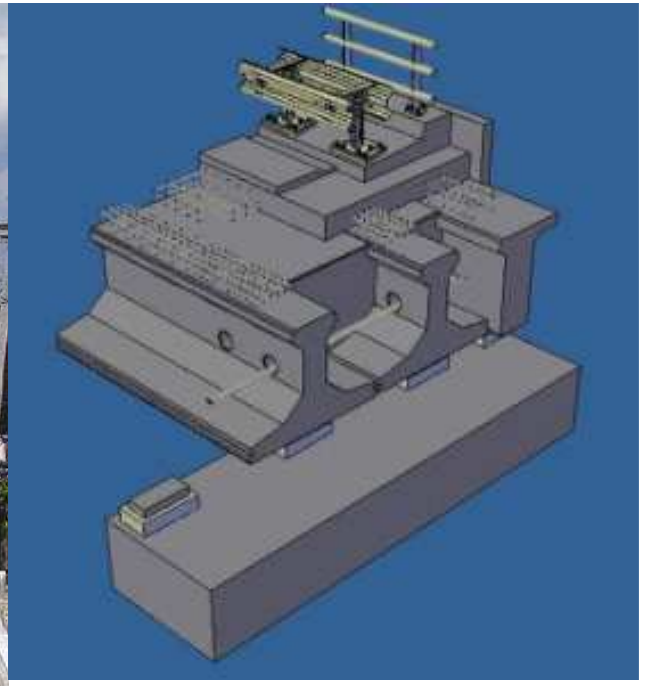

CONSOLIS


Carolina Bridge
Carolina
Suriname
Google

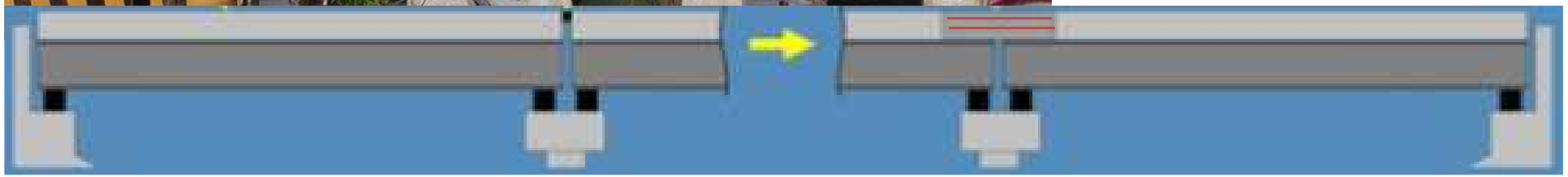
Carolina bridge crosses the Surinameriver

A new company Prescrete established

- 30 bridges project initiated by the government
- Prescrete founded - equipment of bankrupt German precaster was acquired
- Installed at a greenfield area in outside air
- Knowledge transfer via the University of Suriname and Spanbeton



- Prestressed foundation
- ZIP-system
- Jointless bridge



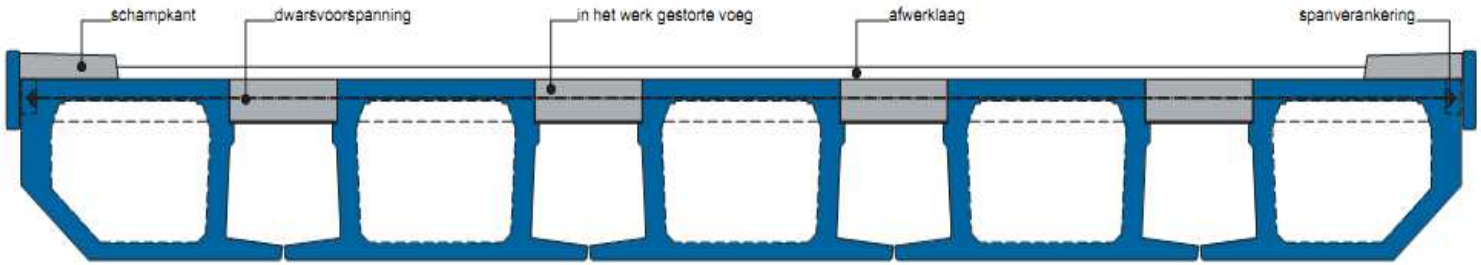

Length 556 m
Width 12,40 m

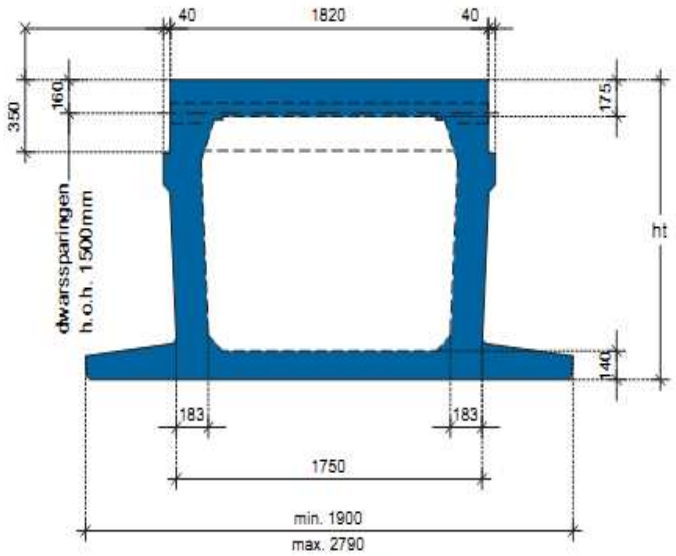

Westrandweg
Amsterdam
Netherlands
Google NL

Westrandweg Amsterdam

Boxbeam solution - PIQ

PIQ

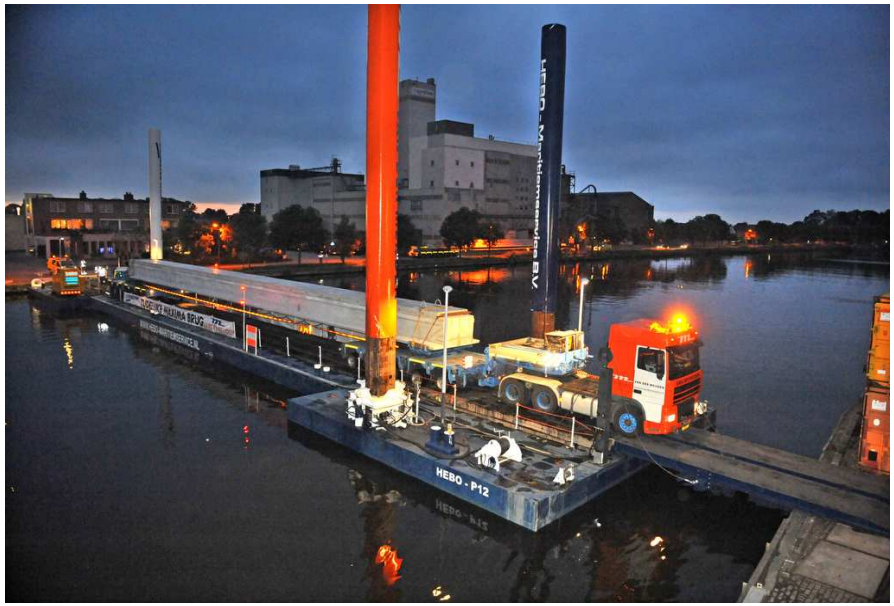




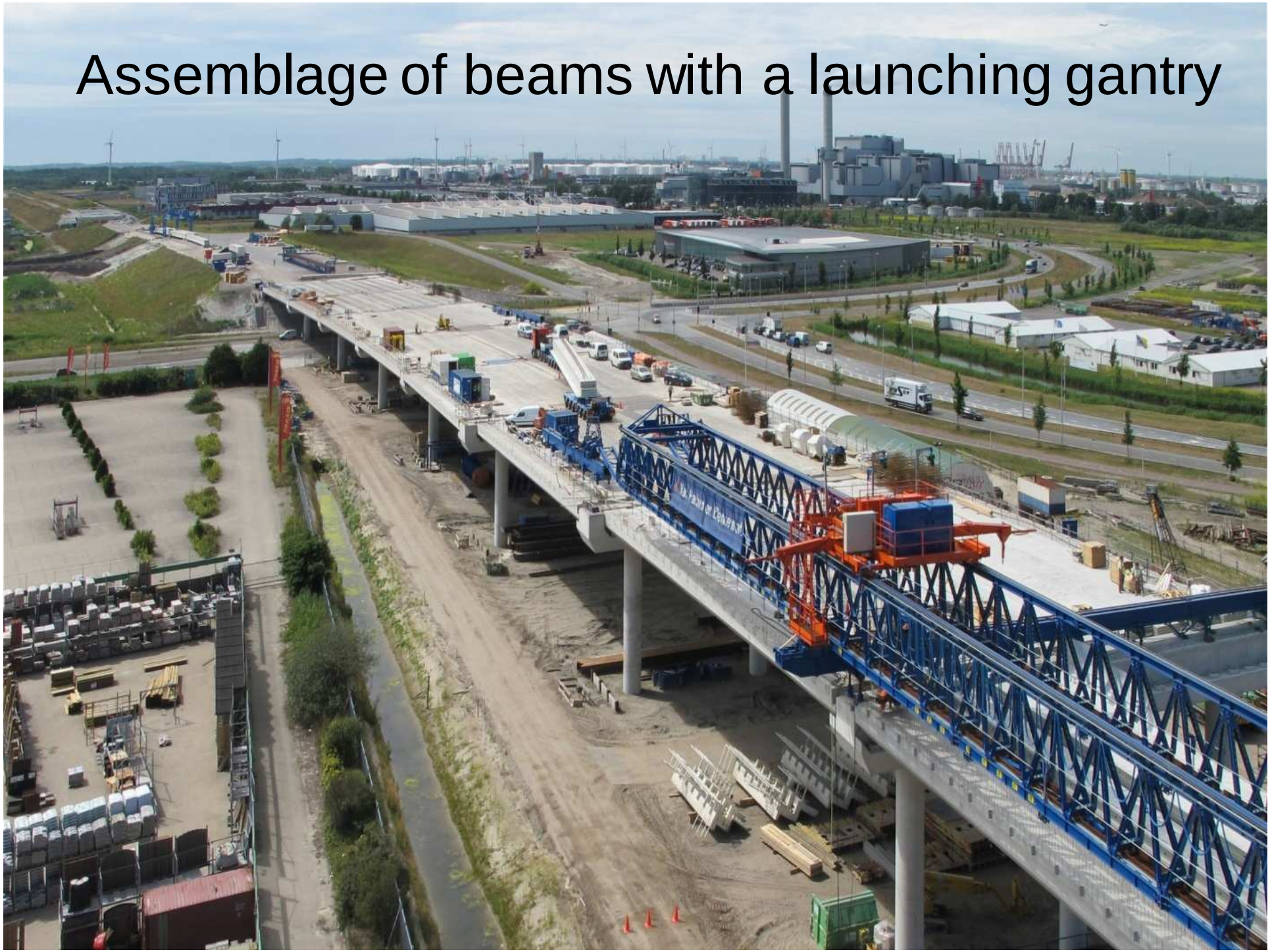
PIQ 1200 t/m 1450

PIQ boxbeams in production in 2 mould lines

Every night 2 beams were transported to the stockyard on the site



Assemblage of beams with a launching gantry



Assemblage of beams with a launching gantry

Horizontally curved boxbeams

In Westrandweg

Precast concrete bridges in The Netherlands

Overall usage of precast concrete elements ...

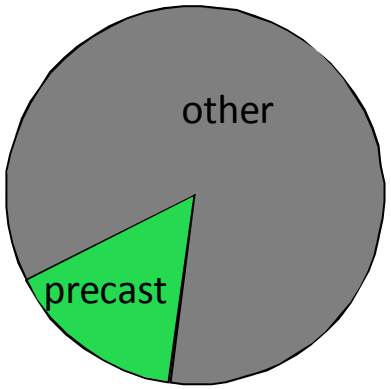
... all over the world

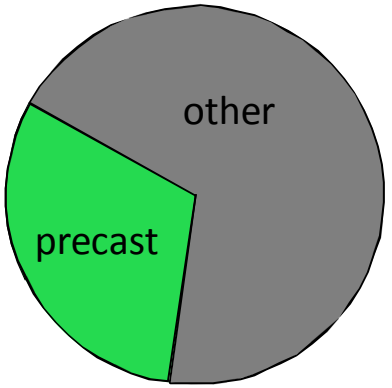
Conclusion

Make the piece of cake bigger for all precasters by innovating with precast systems in the Romanian market – ample of good international examples on all products

prefbeton

Organizația Patronală a Producătorilor de Prefabricate din Beton





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Thank you