

# New Lifting Bridge over Södertälje canal

Michael Thulstrup, Project Manager



## » Client, Civil Contractor and Consulting Engineer



Client: Swedish Trafikverket

Contract: Design and build

Contractor: MT Højgaard a/s

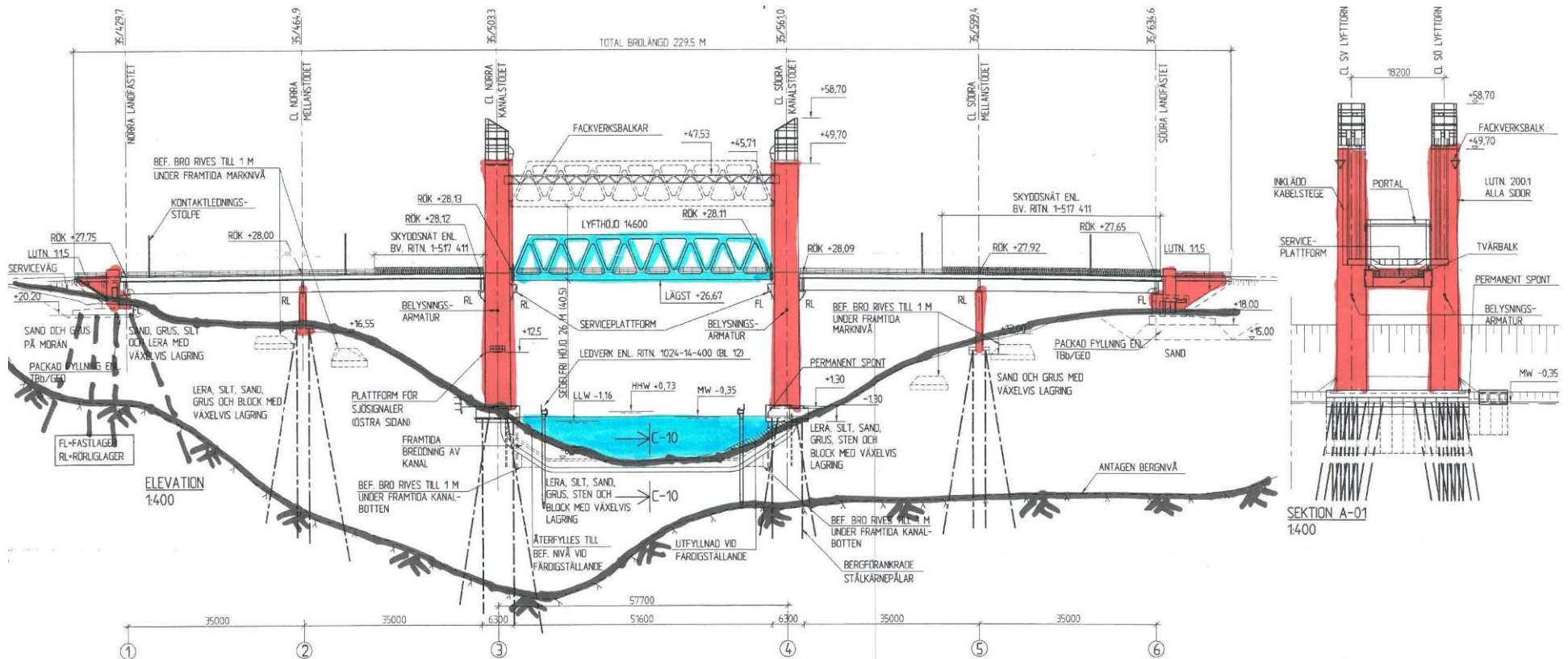
Consulting Engineer: Rambøll a/s

Construction period: 2006-2010/2011

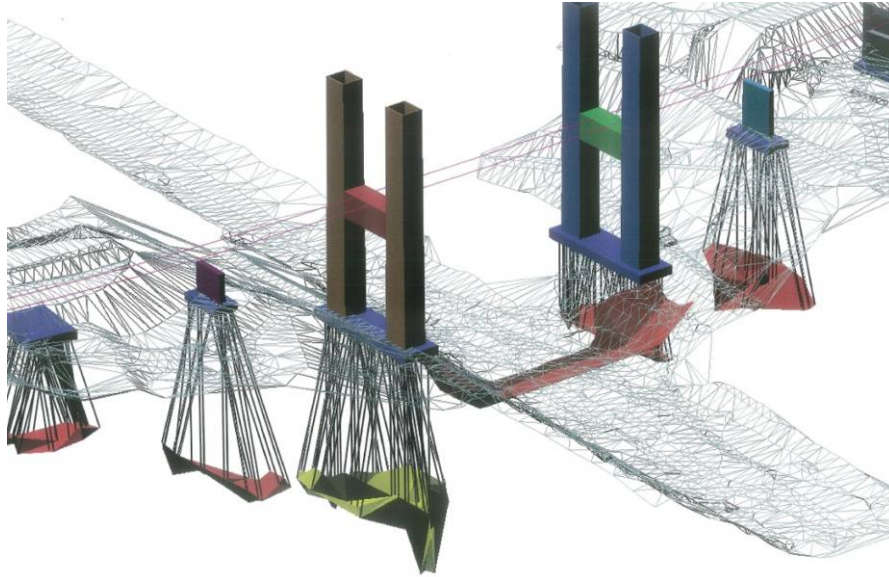




» **Multi-discipline Bridge with many challenging construction solutions**

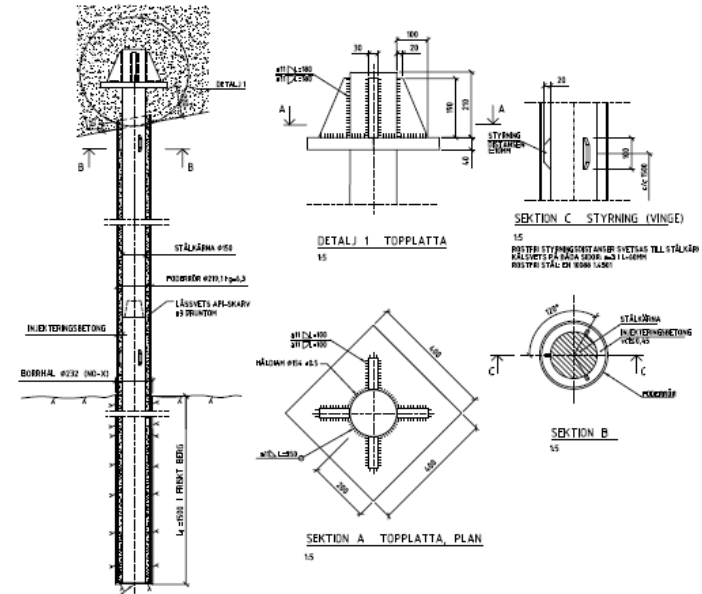


## » Foundation of the bridge



## Bored piles founded into bedrock

- Each pile group: 28-64 piles
- Length between 20m – 45m
- Total pile length more than 6800m



## Steel Core Piles

- 219.1mm x 6.3mm casing
- Ø150mm solid steel rod S355

## » Concrete Structures – “red concrete”



Visible concrete in red

- Ironoxide pigment
- C35/45
- B500B reinforcement

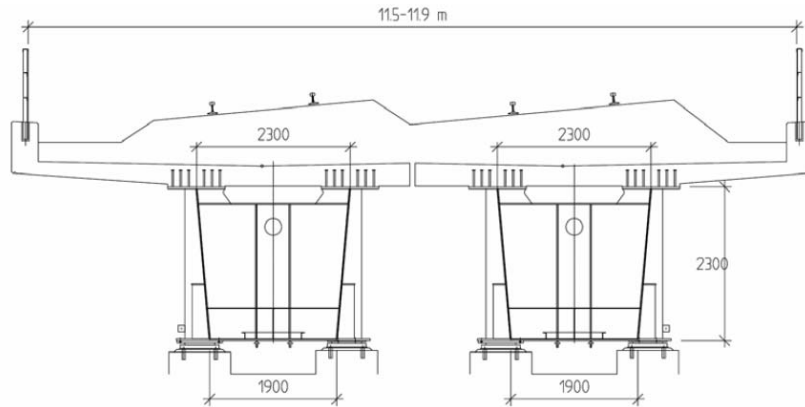
Pylon Structures

- 4 ea of 50m height
- 11 pours of 4.5m
- 4.0m x 4.6m inside
- Wall thickness from 550mm to 300mm



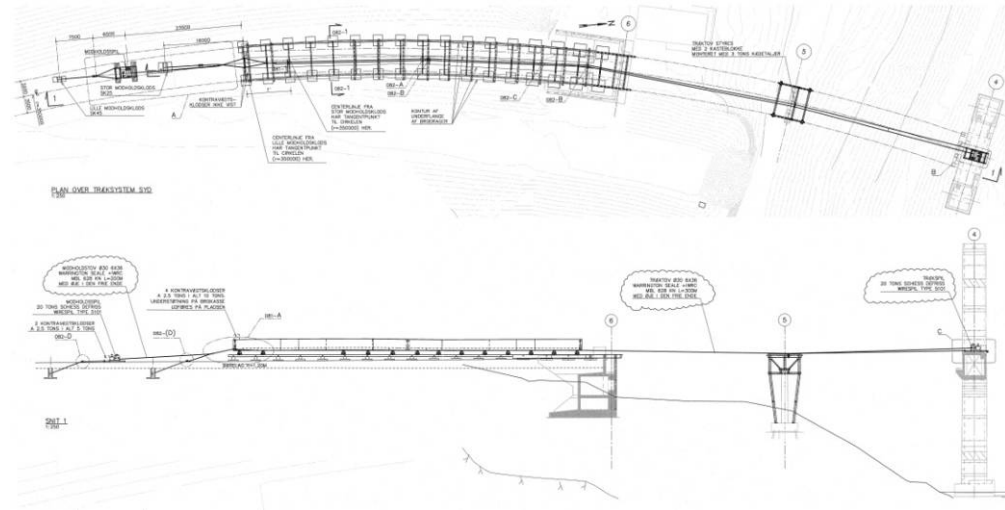


## » Approaching Bridges



- Box steel girders
- Interacting concrete decks
- Bridge span 2 x 35m
- Hybrid-girder – different material strength in flanges and webs
  - Girder webs & lower flange: S355
  - Upper flange partially S420
- Fabrication at Ruukki factory in Ylivieska, Finland
- Delivered to site by truck in sections of 2 x 28.5m and 1 x 18m

## » Approaching Bridges - Launching operation



- Launching setup for the north side approach bridge
- Launching commence from the north abutment structure
- Girders closing up on the intermediate pier

## » Approaching Bridges – Lowering operation

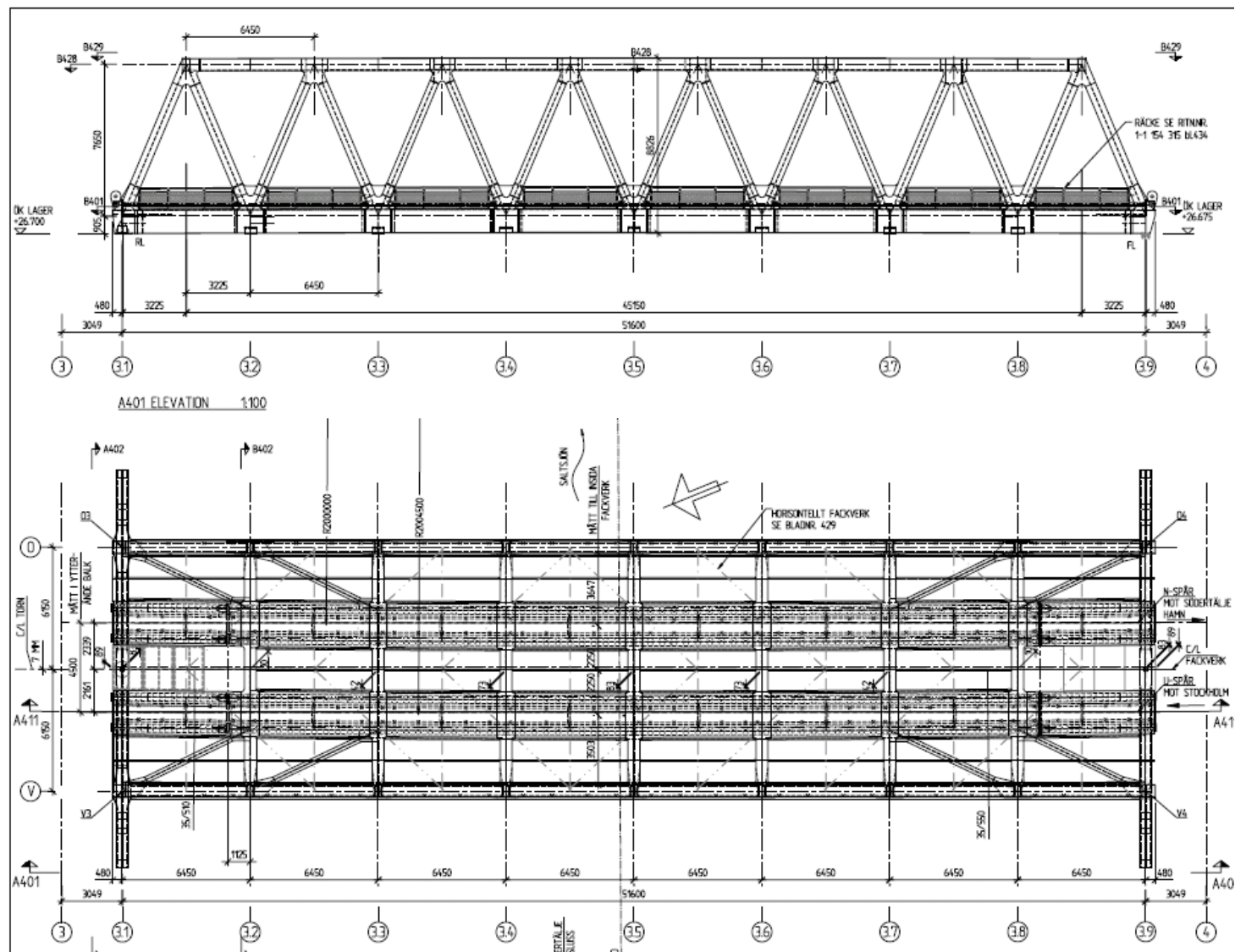


- Lowering equipment - “step by step”
- Bridge girders lowered to final level
- Ready for concreting

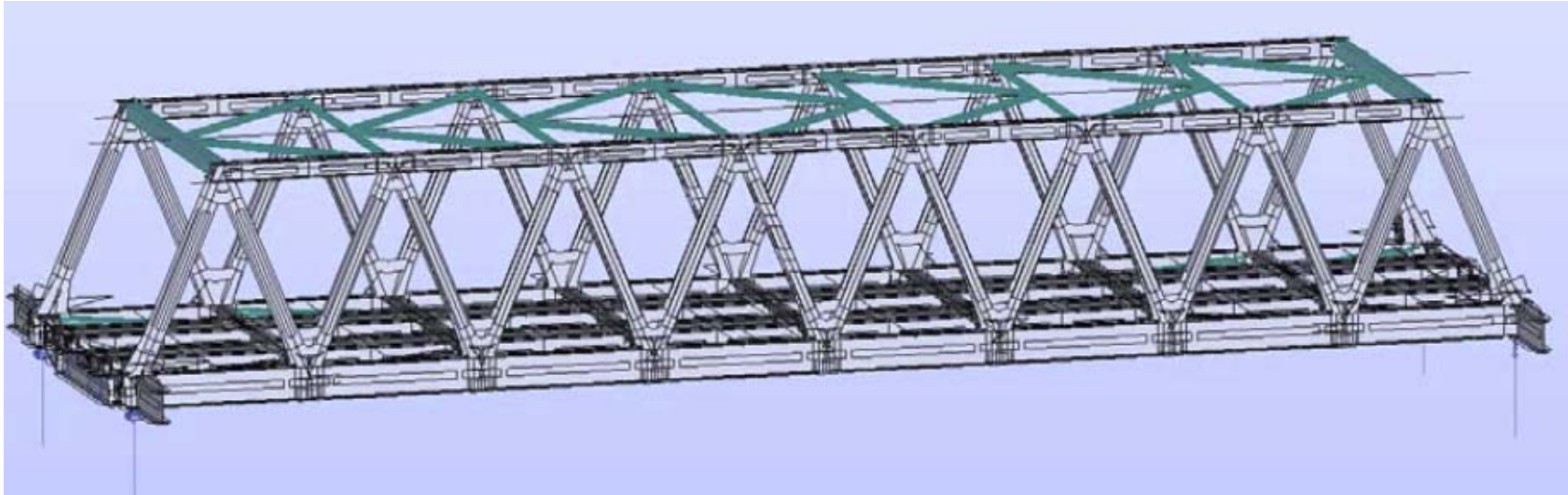


## » Lifting Bridge with machinery





## » Lifting Bridge - Design



- Truss girder bridge with length 51.6m and width of 12.3m
- Weight 420 tons



## » Lifting Bridge – Fabrication and delivery to site



- Fabrication in Vietnam, Ho Chi Mihn City
- Swedish standards: BRO 2004 / BV  
BRO 7 / BSK 99
- Danish supervisors at all time
- NDT
- Sections in movable sizes fabricated in workshop
- NDT before base painting
- Base paint before transportation to assembly yard at nearby harbour

## » Lifting Bridge – Assembly at harbour





## » Lifting Bridge – Transportation to Södertälje



- Transportation from assembly yard to quay side – 500m
- Multi wheeler
- Special cargo ship with direct transportation to Södertälje harbour
- Off-loading to barge in Södertälje
- Preparation for installation in December 2009

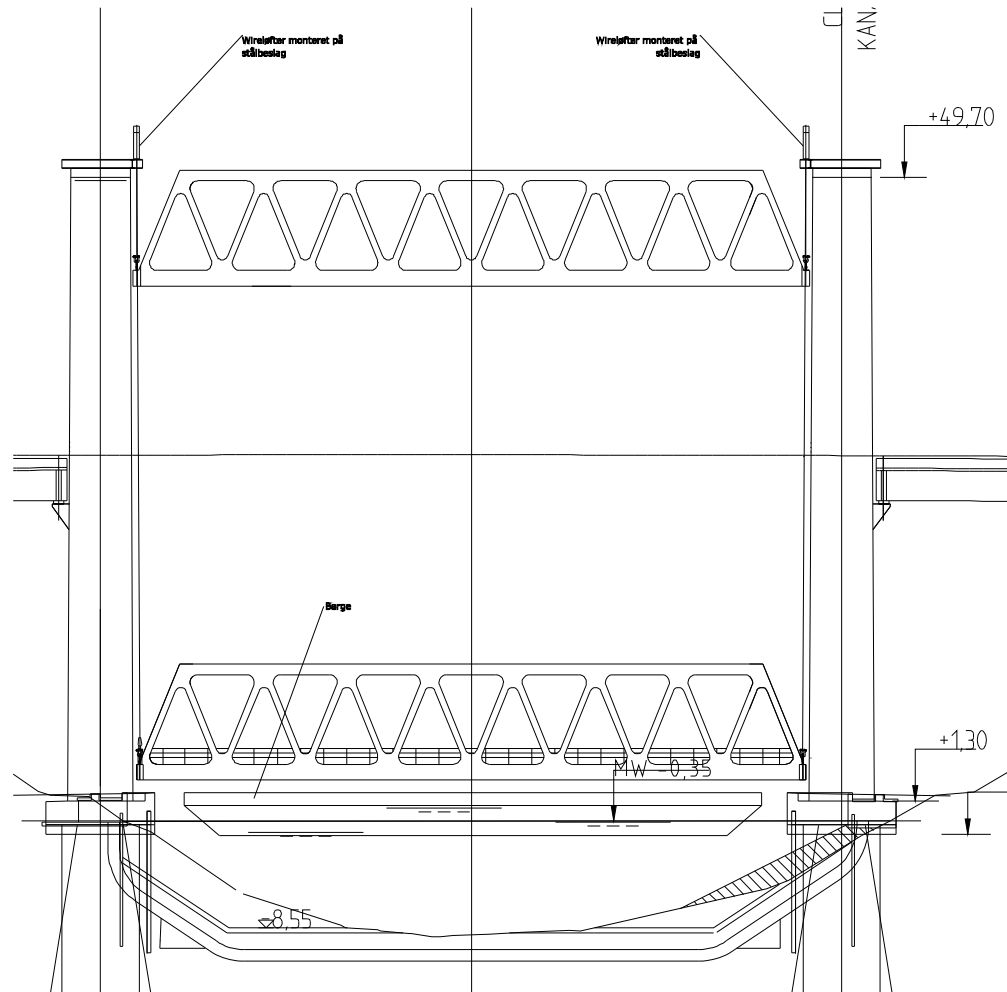






## Lifting Bridge - Installation

- Installation from barge positionen in-between the pylons
- Wirejacks positioned on top of pylons



## » Positioning of bridge

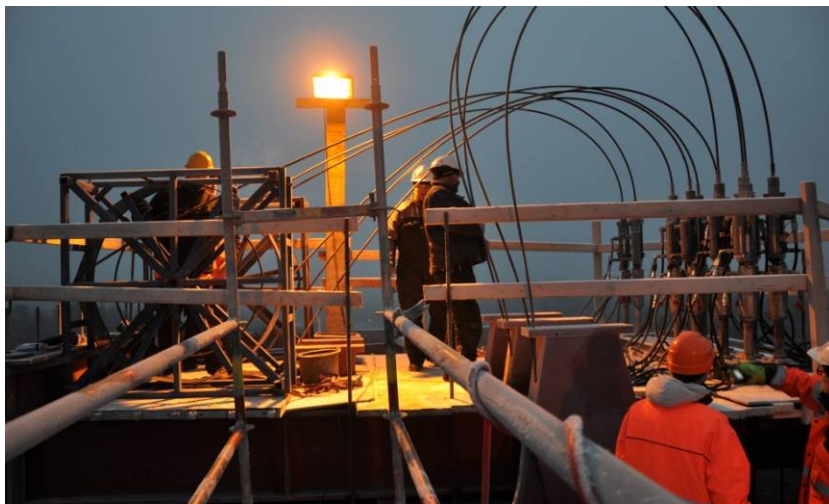


Barge with bridge transported in-between the pylons



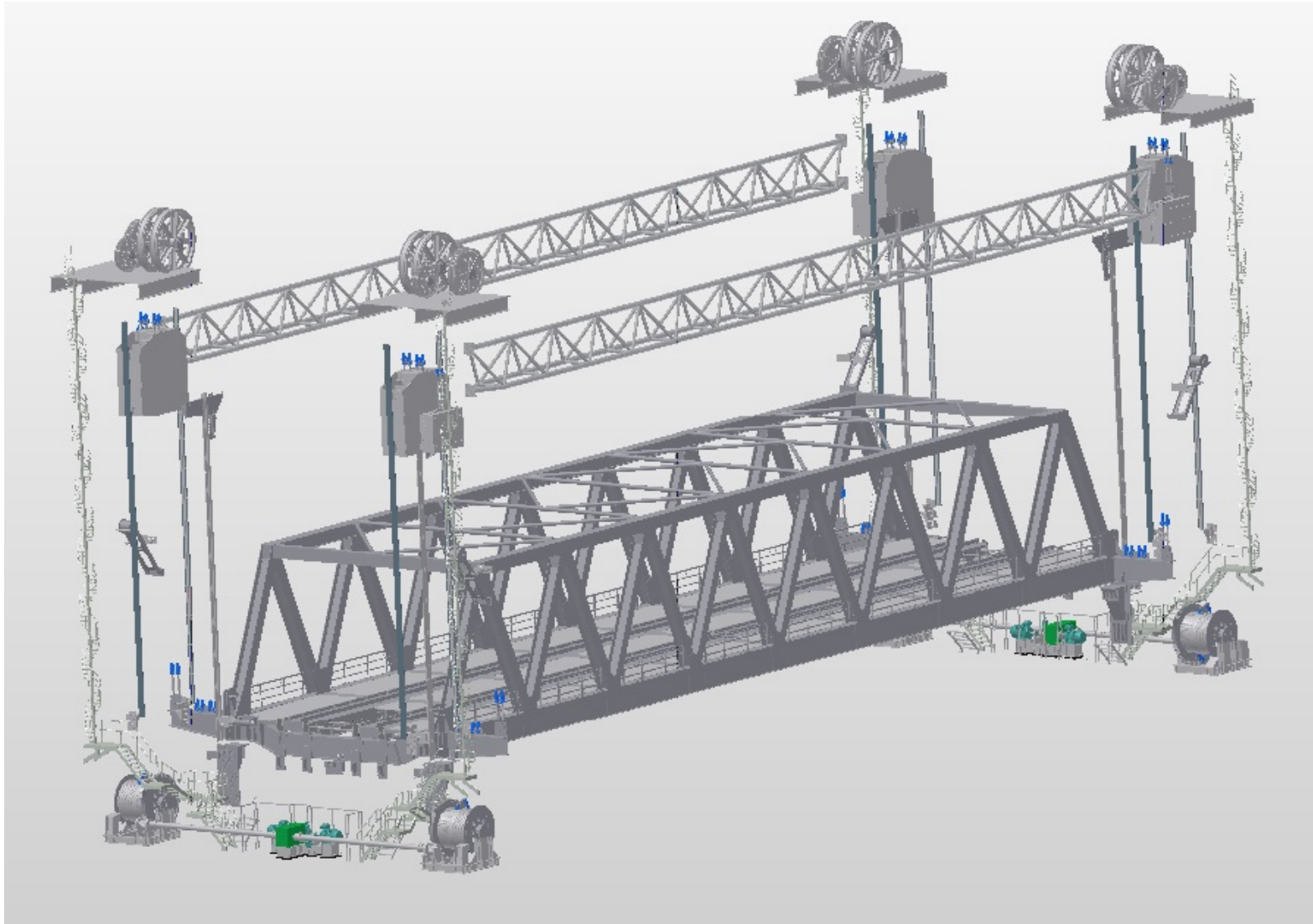
Lifting operation in process

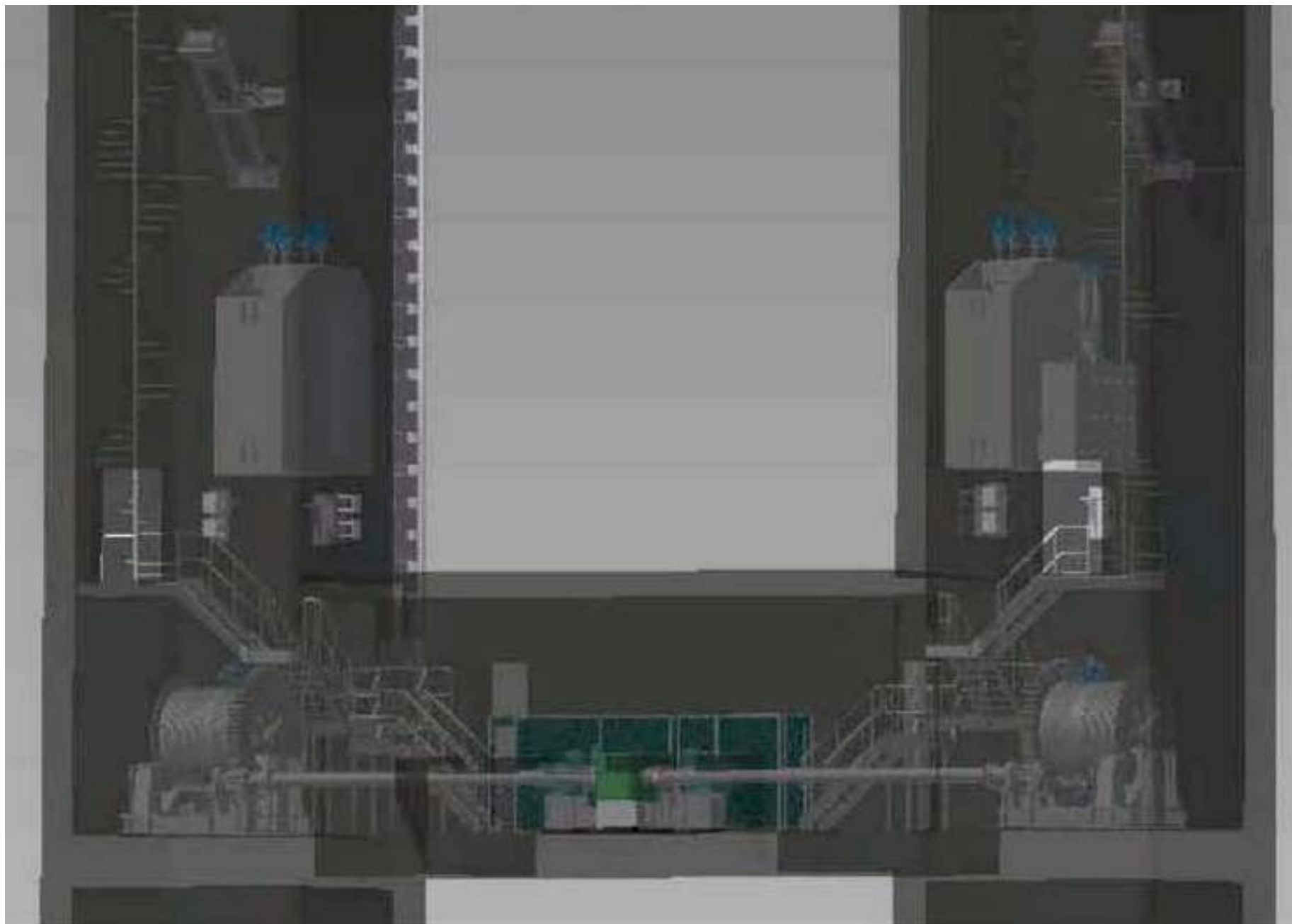
## » Lifting operation





## » Machinery





## » Winch and pulleys OD 1620, 2350, 3150mm

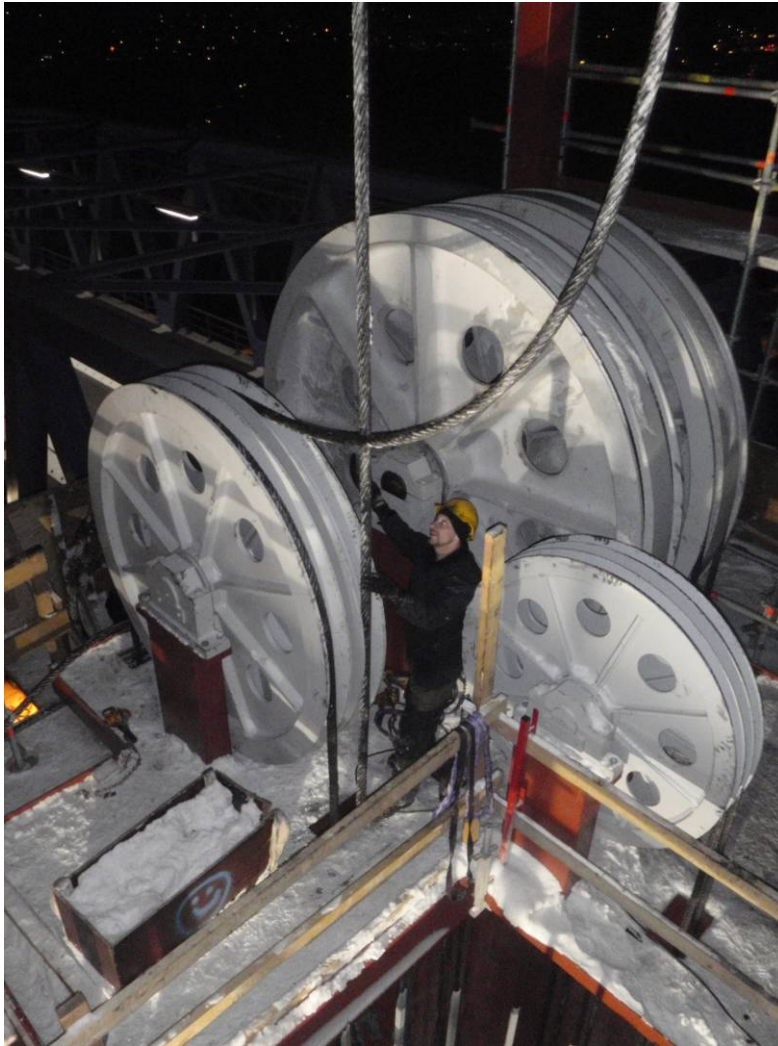




# Completed winch, counterweights and motor/gear ready » for installation in pylons

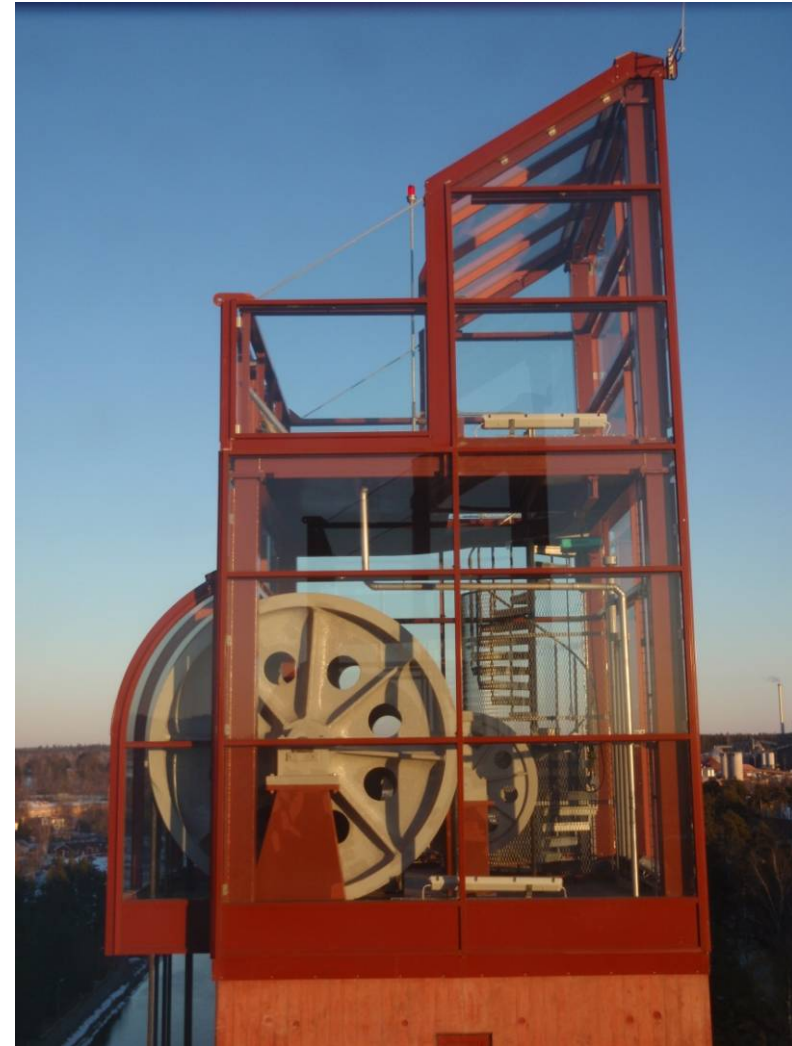


## » Wire pulley





## » Pylon top structure

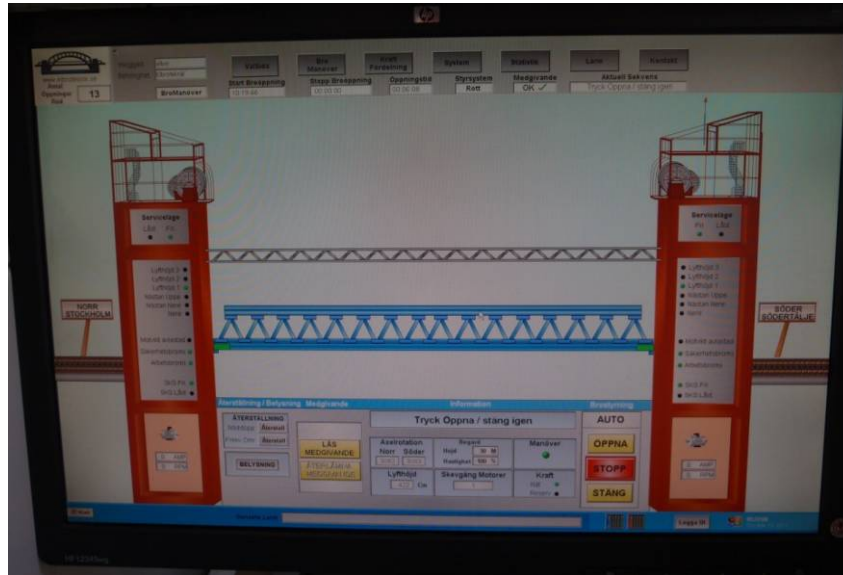




## » Machinery inside the Crossbeam



## » PLC system



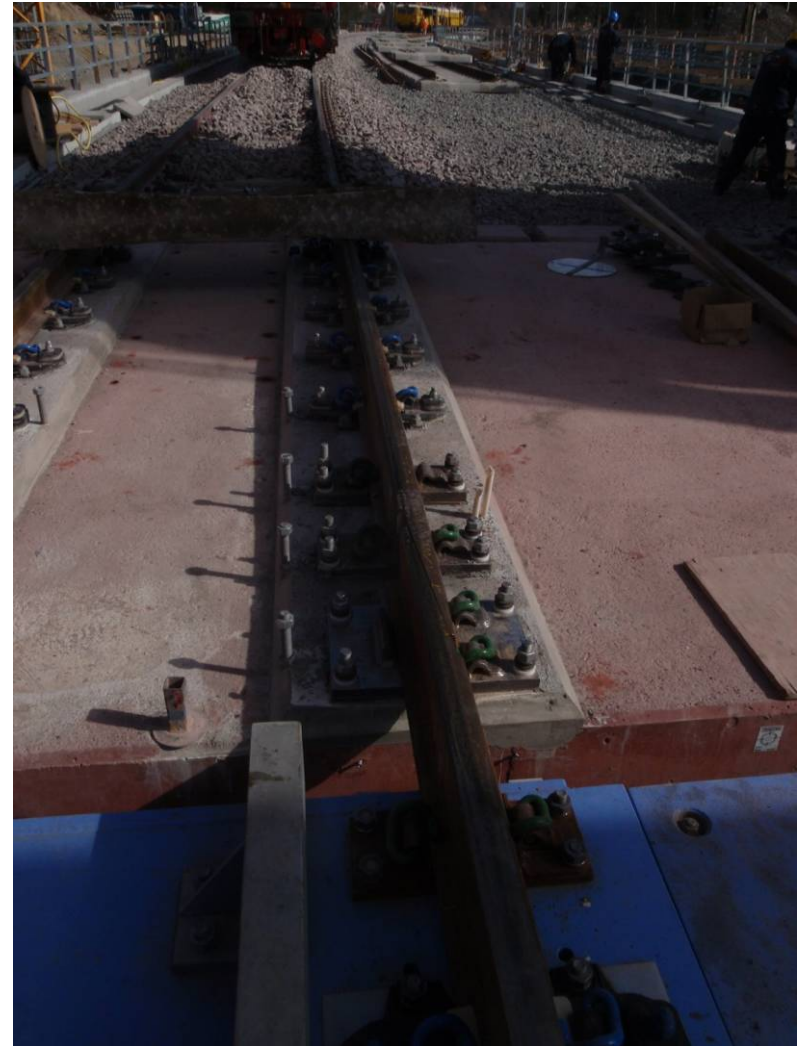
Controlsystem – redundant with red and blue system

Lifting system are CE marked



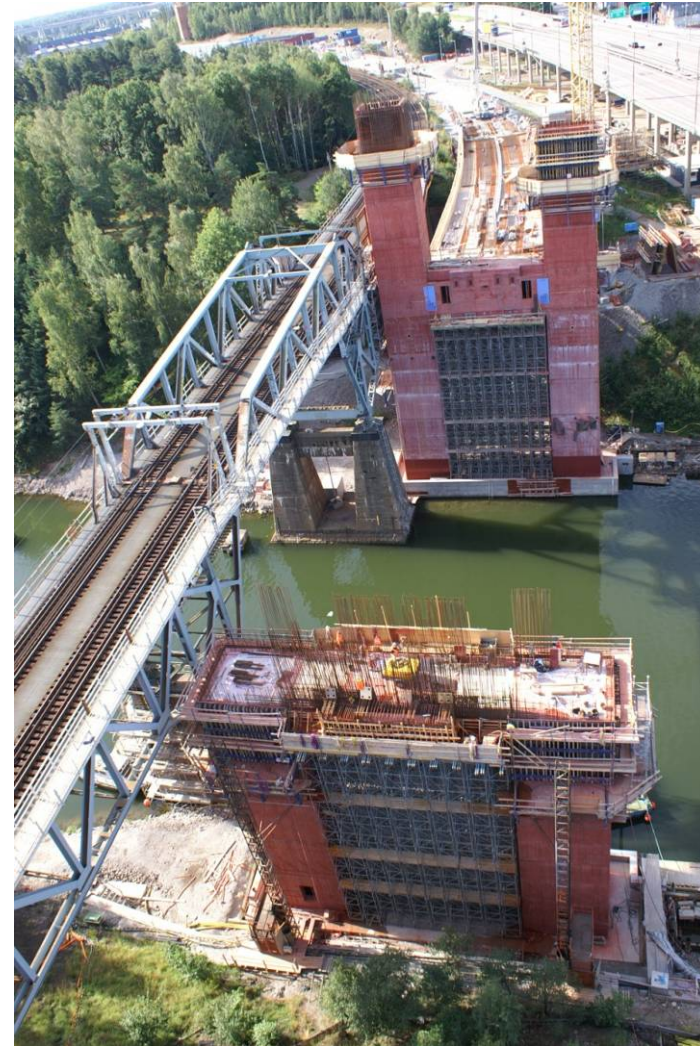


## » Interface between railway and structures





## » Bridge in operation since 11th of may



## » Movable Bridges in Södertälje

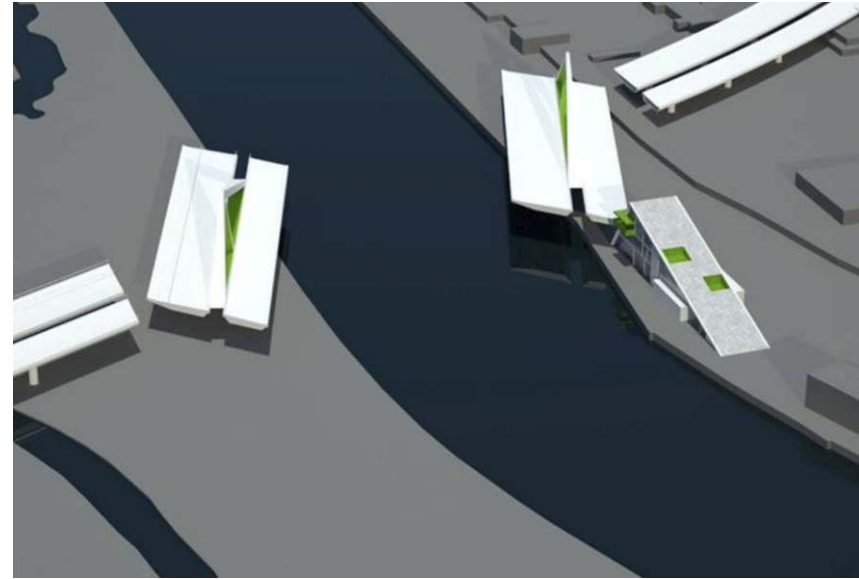




## » Next movable bridge for MT Højgaard



Odins Bridge in Odense



Largest double swing bridge in northern Europe