# Sharing of Implementation of Safety 2.0 – Kai Tak Sports Park

**29 AUG 2022**

啟德體育園
KAI TAK
SPORTS PARK

啟德體育園有限公司
KAI TAK SPORTS PARK LIMITED

協興 HIP HING
Member of NWS Holdings

POPULOUS

ASM GLOBAL
Parent Company of SMG

SPORTFIVE

ARUP

SKA LTD

ADI

STRI

# THE KAI TAK SPORTS PARK

# MAIN STADIUM

**50,000** SEATING CAPACITY

## Key Features

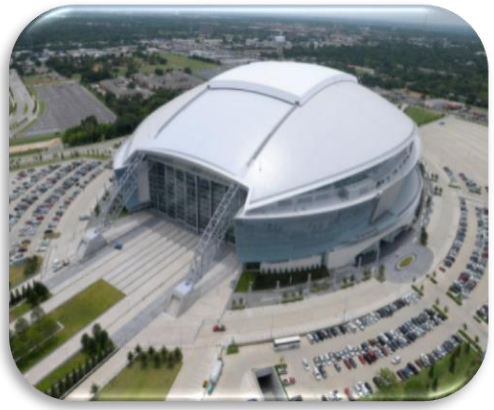
**Design**

- Long Span Steel Trusses
- Acoustically sealed retractable roof
- Cable-driven retractable roof mechanisation system

**Construction**

- Adoption of BIM Technology and Digitalisation
- DfMA & Design for Safety

# Acoustically Sealed Retractable Roof

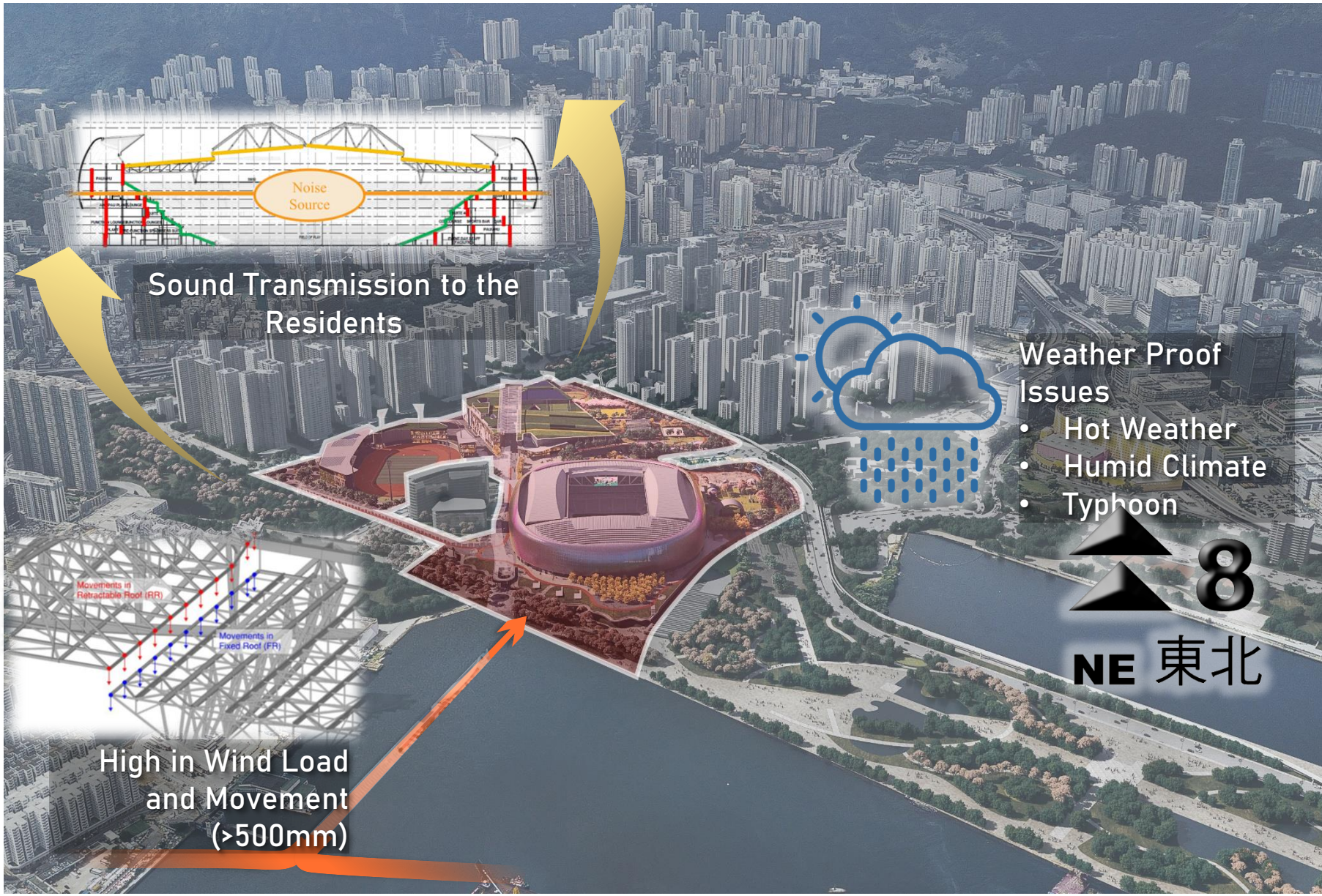


Dallas Cowboys (Texas) Stadium

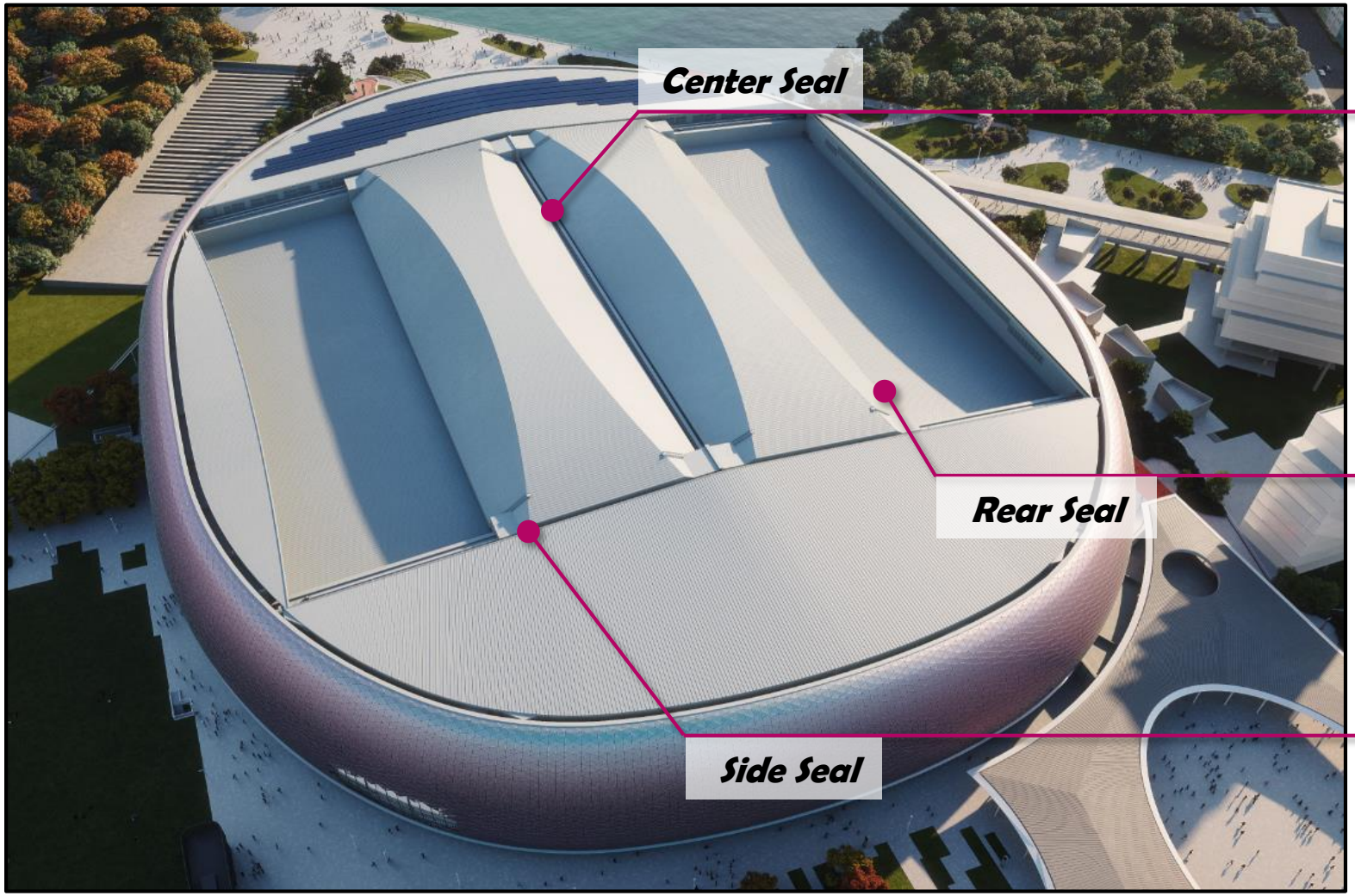
Moses Mabhida Stadium

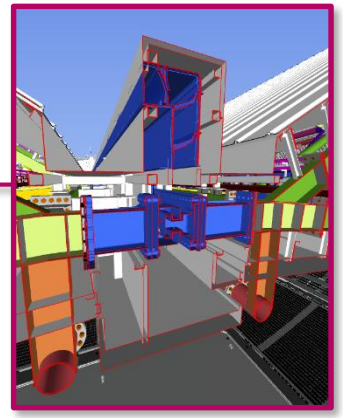
The Singapore National Sport Stadium

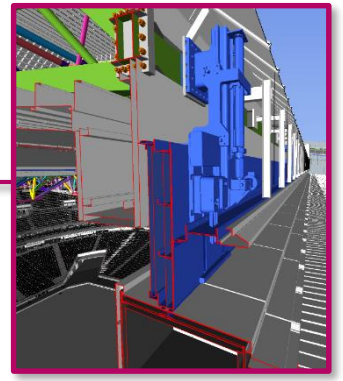
**SEALS SYSTEM AGAINST HONG KONG CONDITIONS**

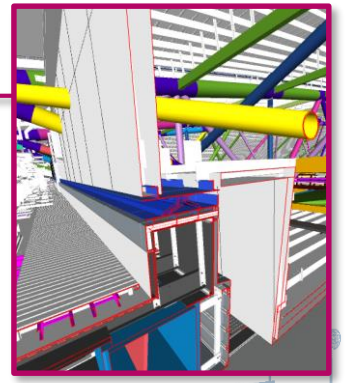


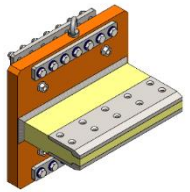
# Mechanical Seals System



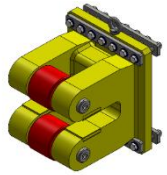





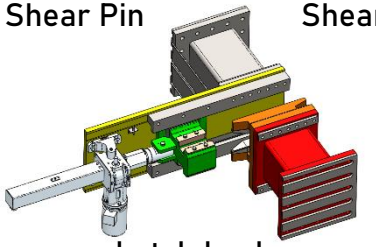




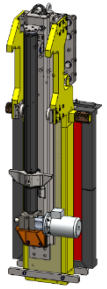
Shear Pin



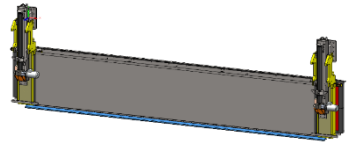
Shear Roller



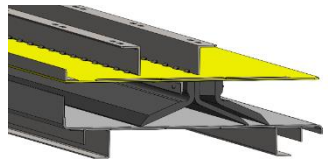
Latch Lock



Door Lift



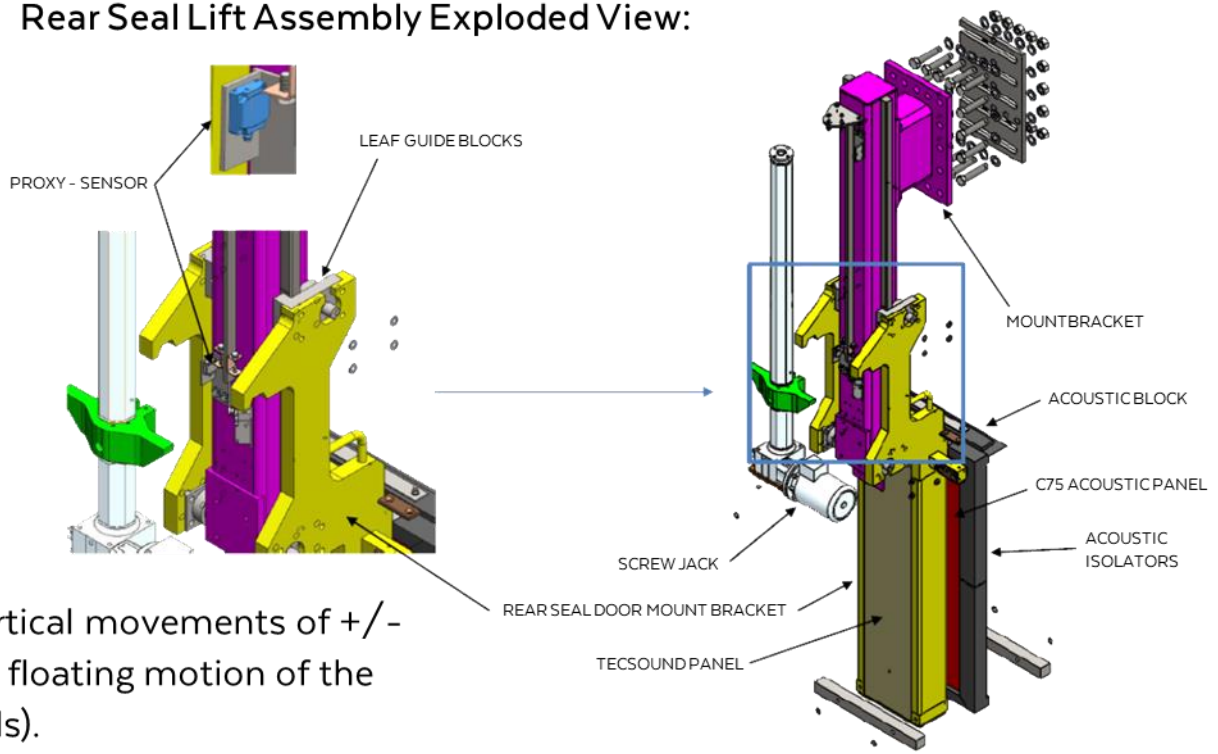
Door Panel



EPDM Lip

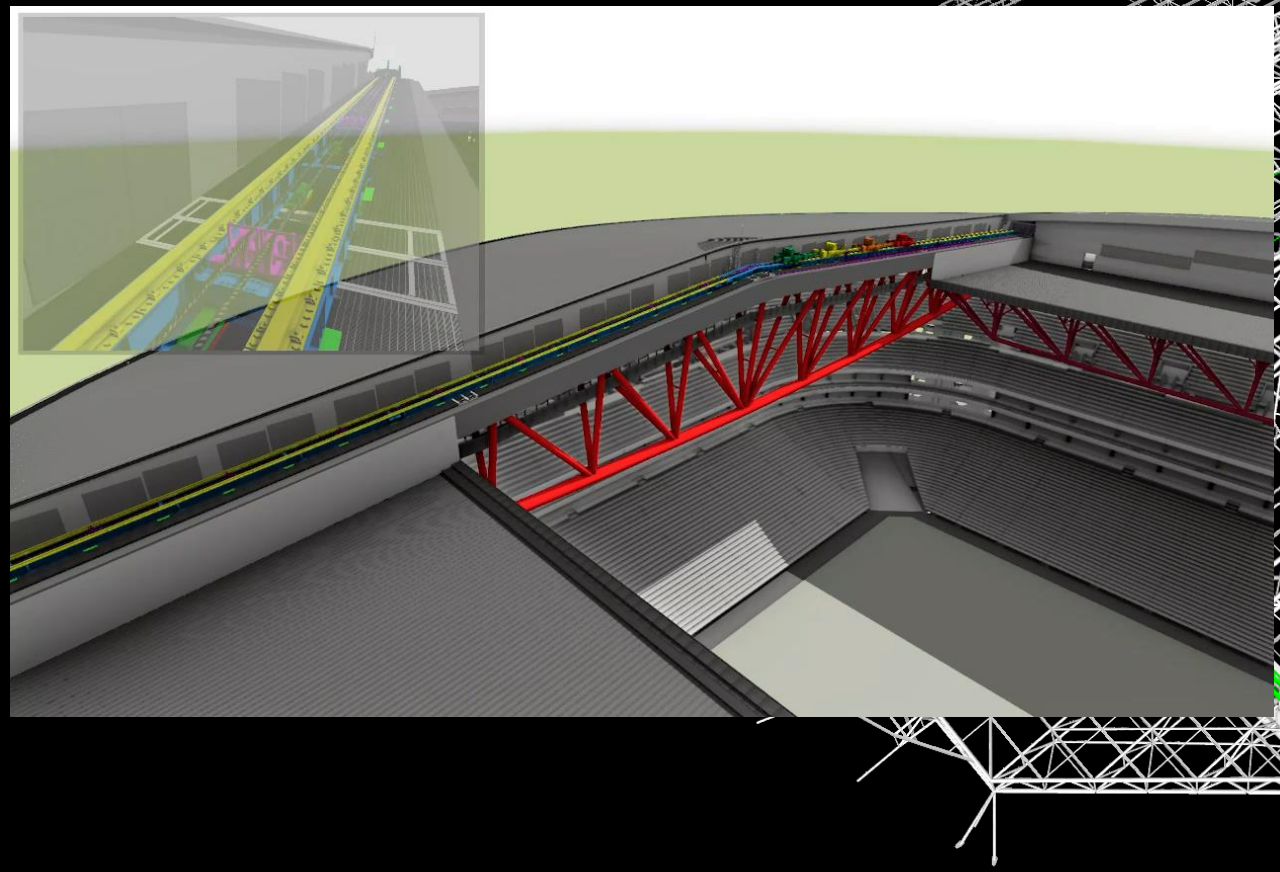
# Mechanical Seals System


Rear Seal Lift Assembly Exploded View:




To accommodate vertical movements of +/- 500mm through the floating motion of the door panels (rear seals).

# Main Stadium Retractable Roof System



Bogi

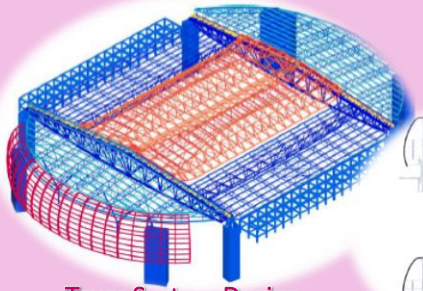
Energy Chain

Track Support Beam, Bearing & A150 Rail

Main Stadium Retractable Roof System

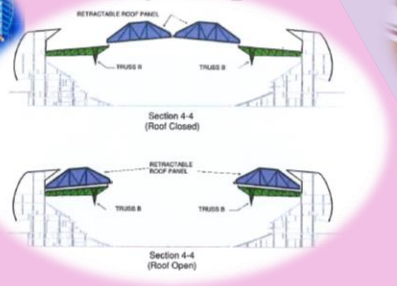
# Digital Technology Adopted

## 1 Design Optimization



Truss System Design

Retractable Roof Envelope Design

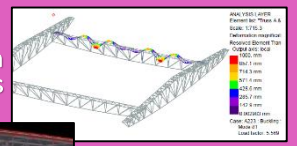



Design Parameters, Requirements ↓↑ Analysis & Simulation Result

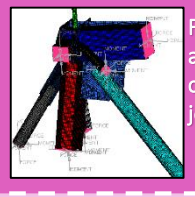
### Iterative Design Optimization

Wind action study with wind tunnel

Deformation Analysis



Design Review of Interfaces

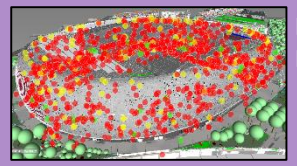
Finite element analysis for complex steel joints

## 2 Construction & Fabrication


Design Development

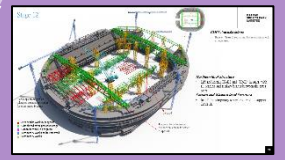
Construction Details & Shop requirements ↓↑ Inform for decision and risks management

### Construction & Fabrication BIM Model



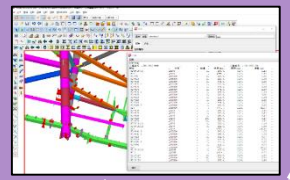
Issues Management

Multi-Disciplinary Coordination



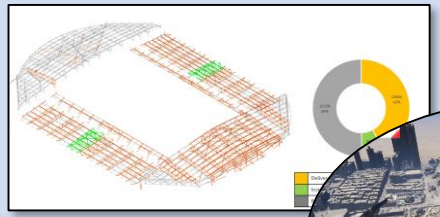
Construction Sequencing

Swept Path Analysis



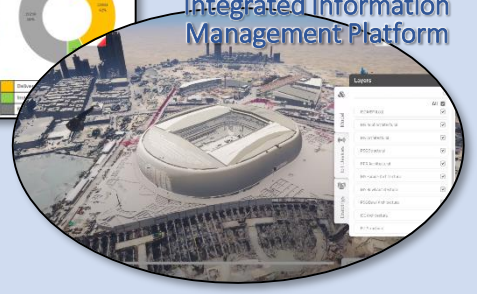
Materials Quantity Takeoff

## 3 Inspection, Testing, Commissioning & Operation



Works and Inspection Progress monitoring

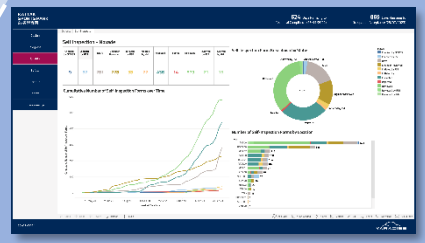
Integrated Information Management Platform



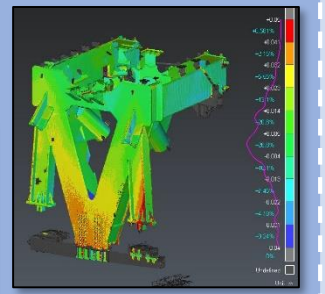
Progress capturing

Site Data (e.g. Point clouds, e-forms) ↓↑ Validation for information requirement fulfillment

### Inspection & Commissioning with BIM Model

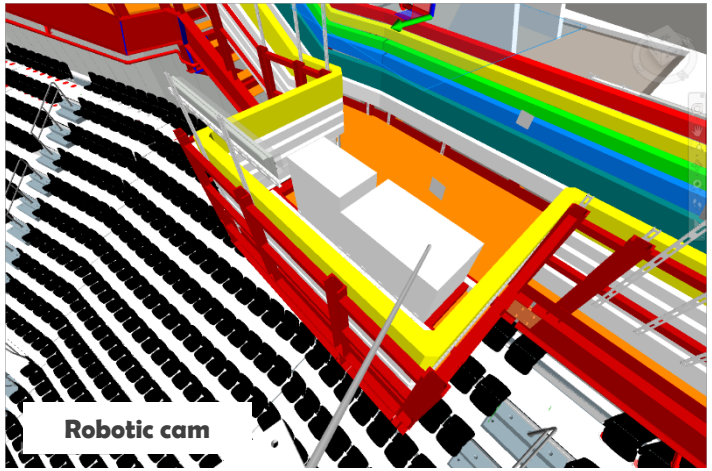


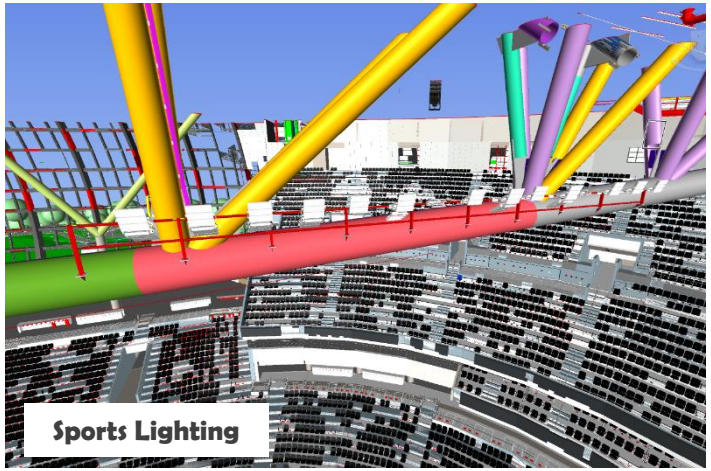
Progress Analytics

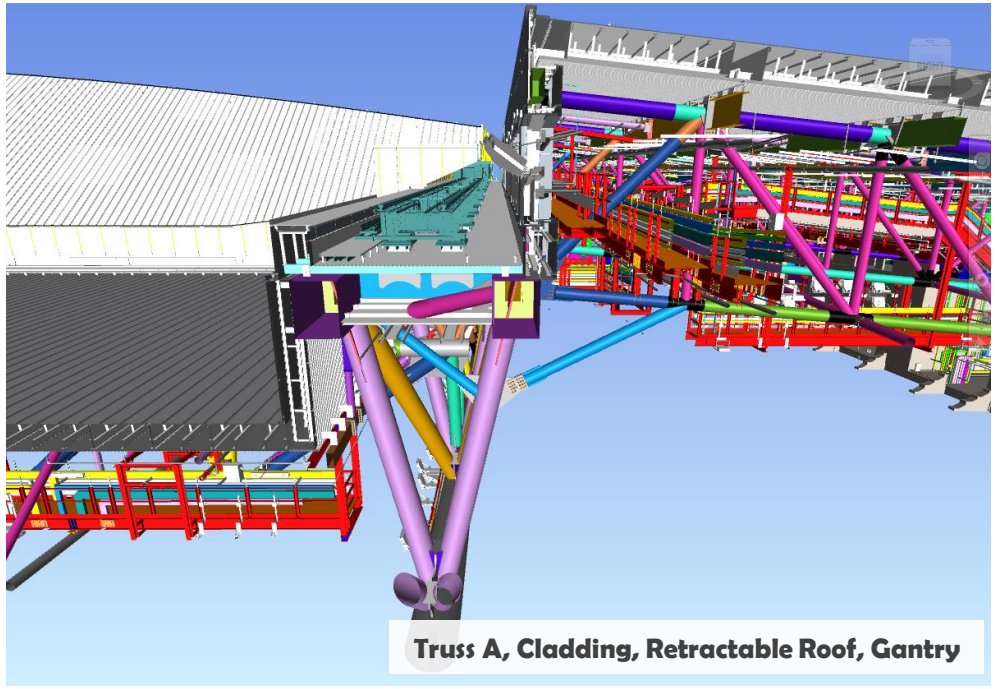


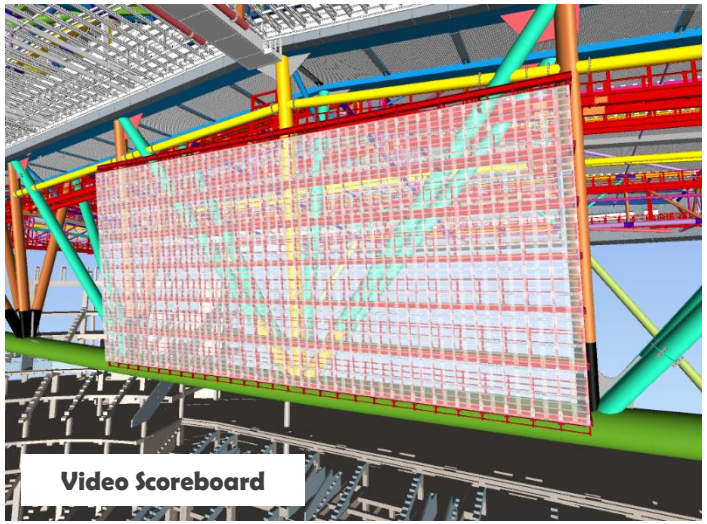
Reality Capturing and Deviation Analysis with laser scanning

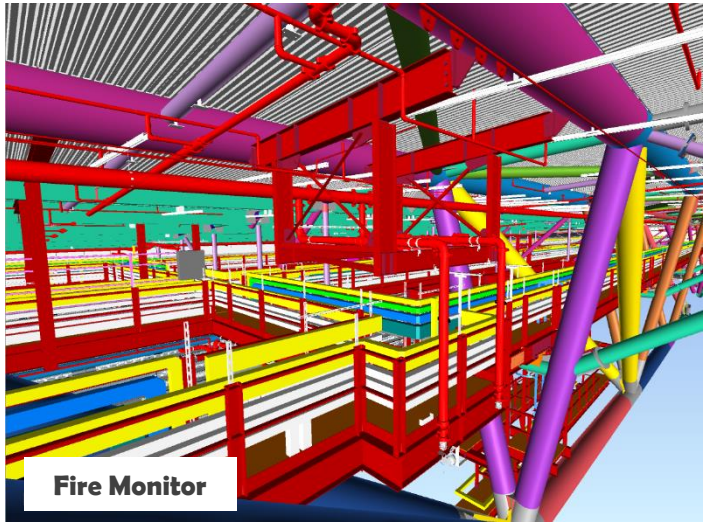
# Integrated Systems in Truss/Gantry by Adopting BIM Technology


Robotic cam

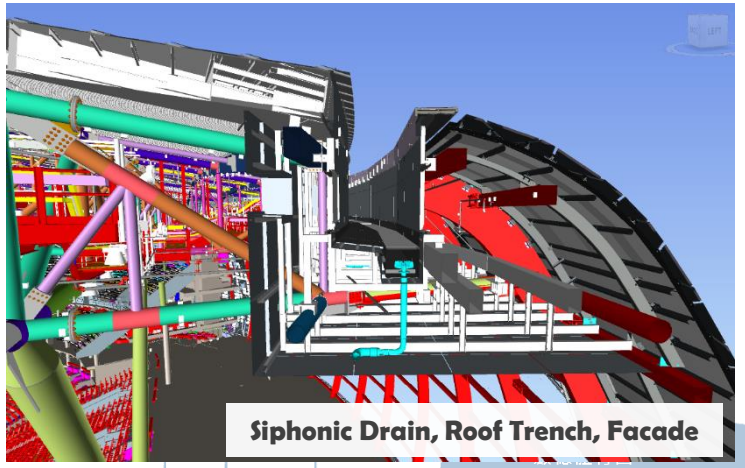

Sports Lighting


Truss A, Cladding, Retractable Roof, Gantry


Video Scoreboard


Fire Monitor


Line Array Speaker


Siphonic Drain, Roof Trench, Facade

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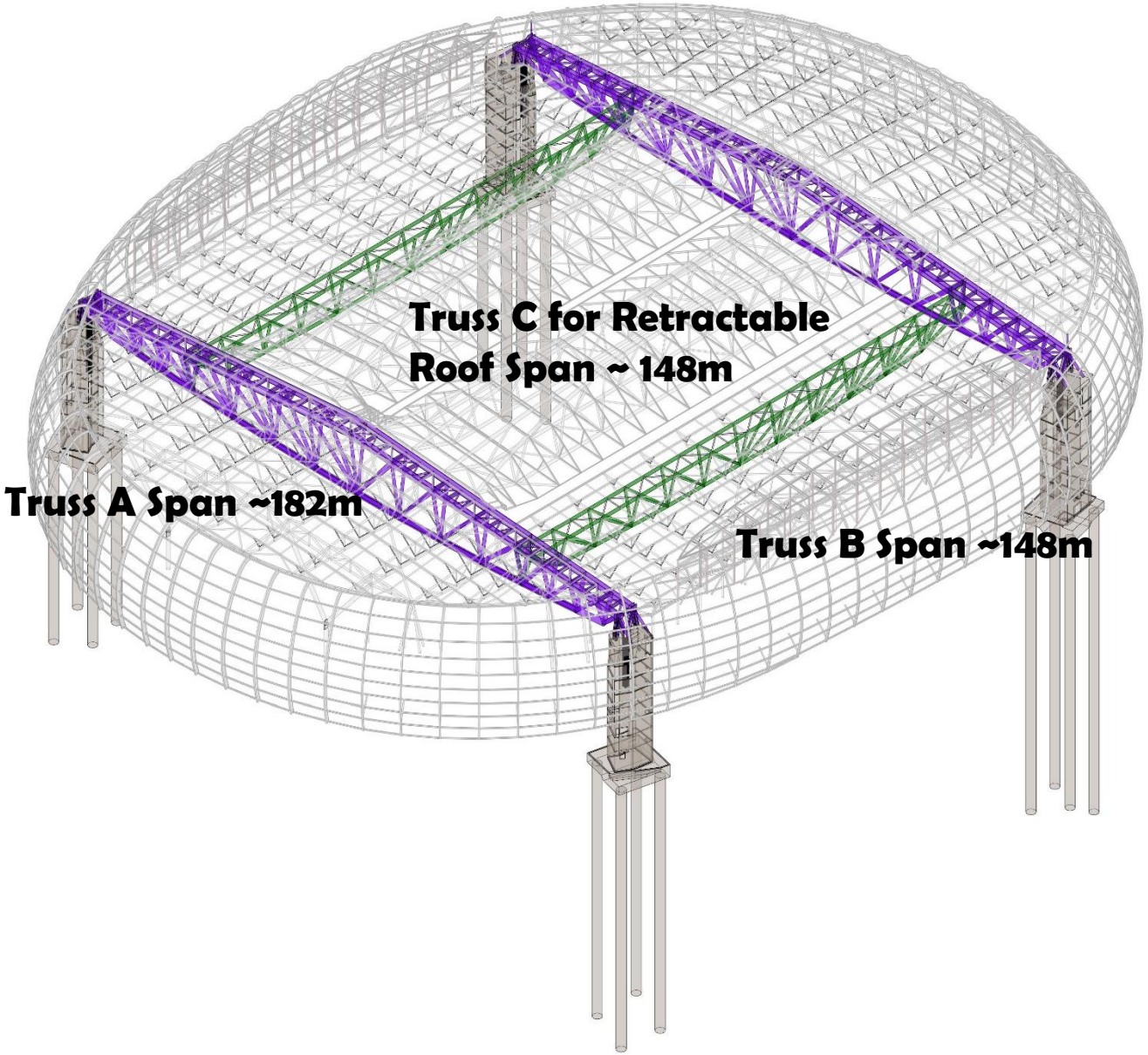
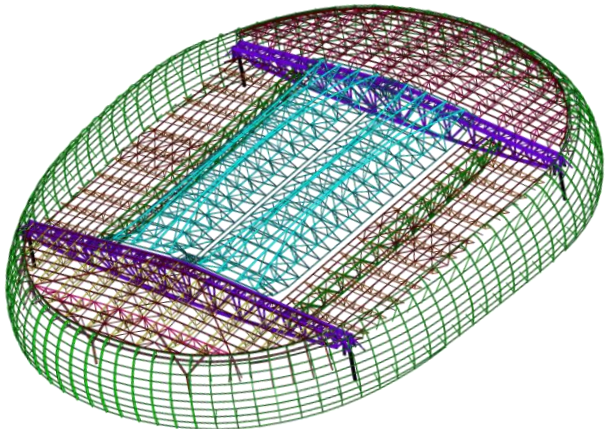
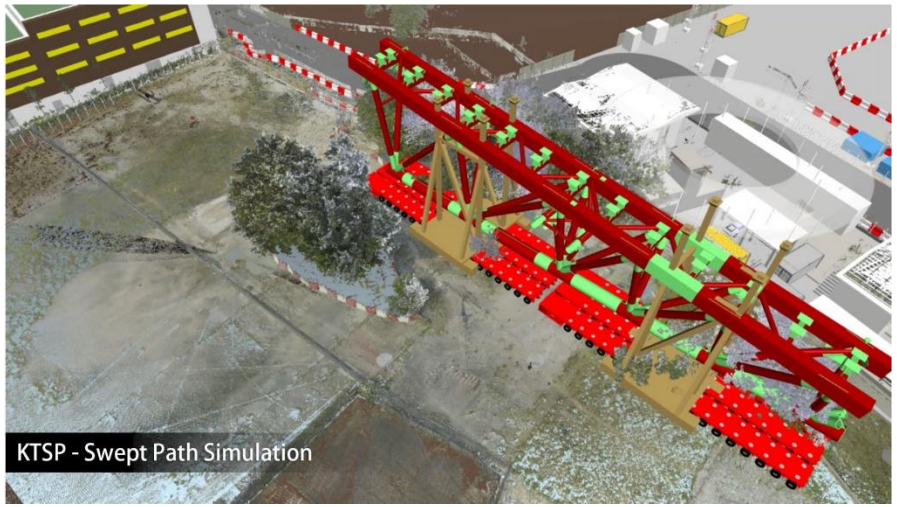
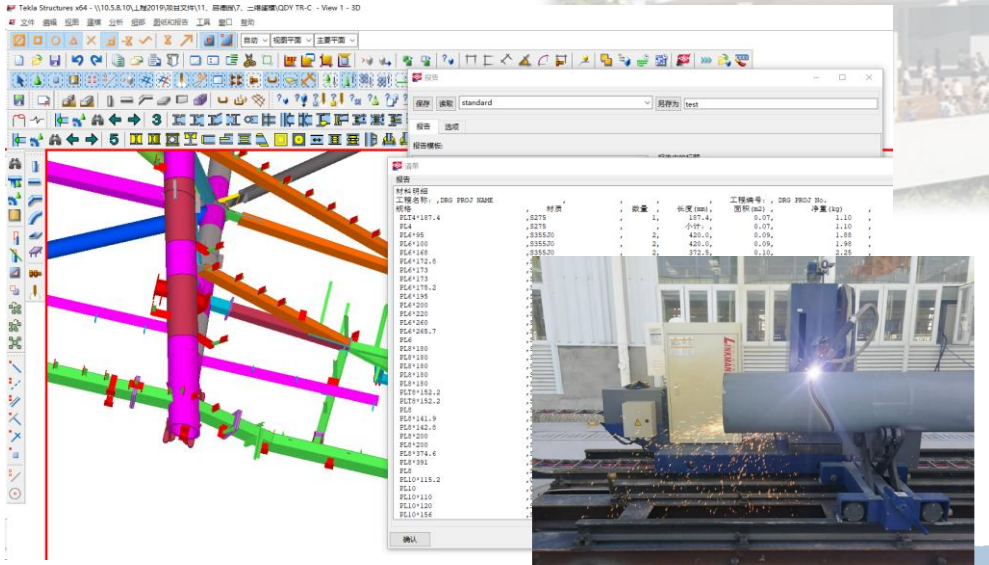
# Main Stadium Roof Trusses layout and Key Dimensions



# Main Stadium Roof Steelworks Construction Methodology and Erection Sequence ( CMES)

- ✓ **Truss A and B weigh 6,000 Ton**
- ✓ **Off-site fabricated in Southern China with digital cutting and welding facilities, delivered by barges in 10 segments**
- ✓ **Virtual Design and Construction for integrated systems design, staged construction analysis , delivery route/logistics planning, and erection simulation etc.**

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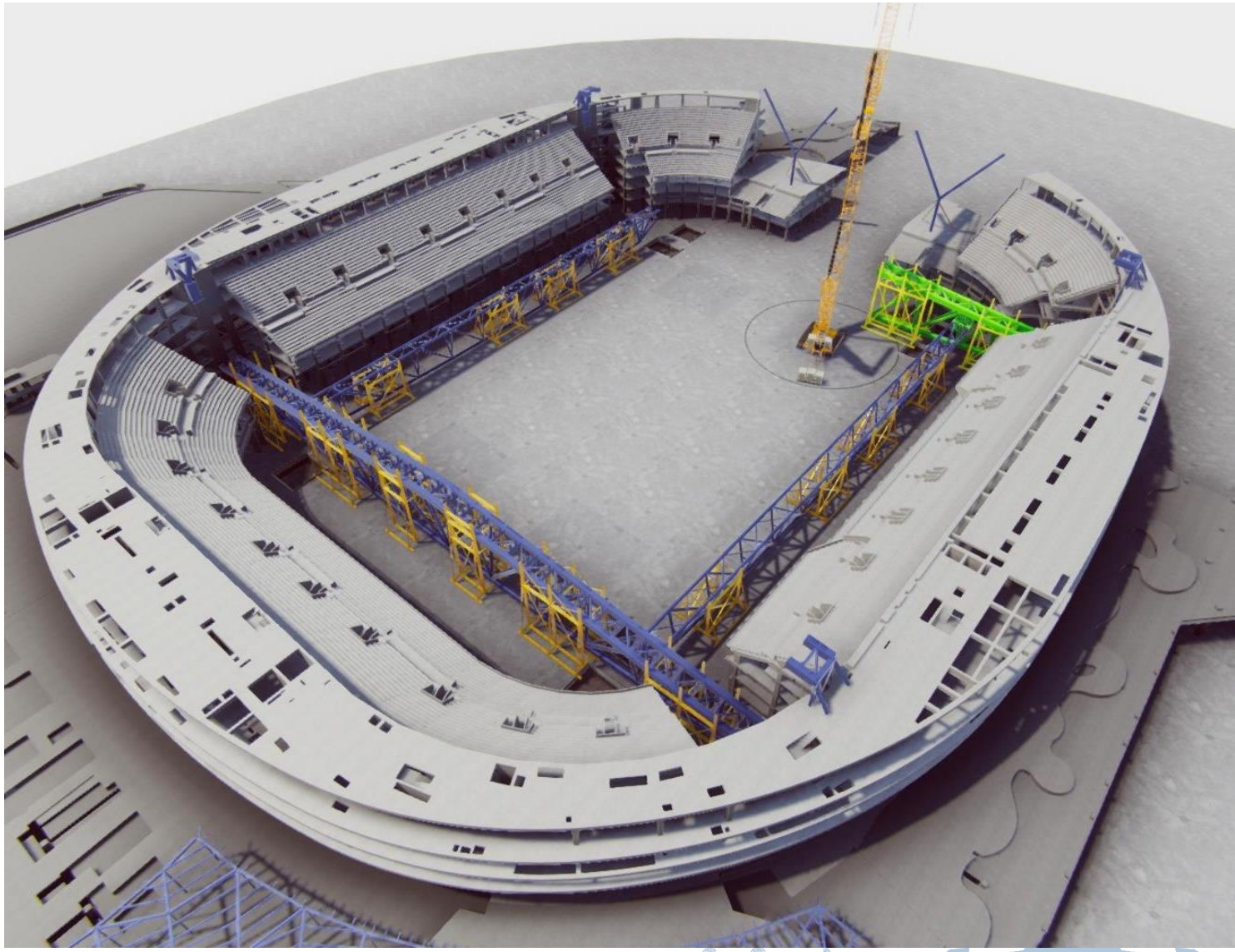
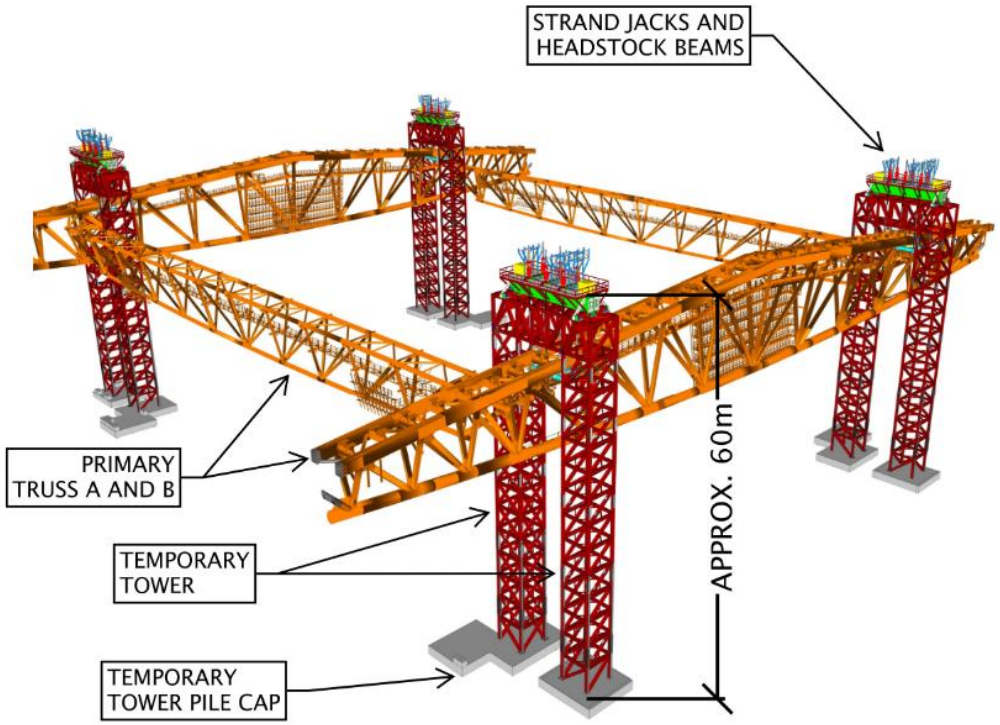
# Erection of mega truss by Heavy Lifting Systems

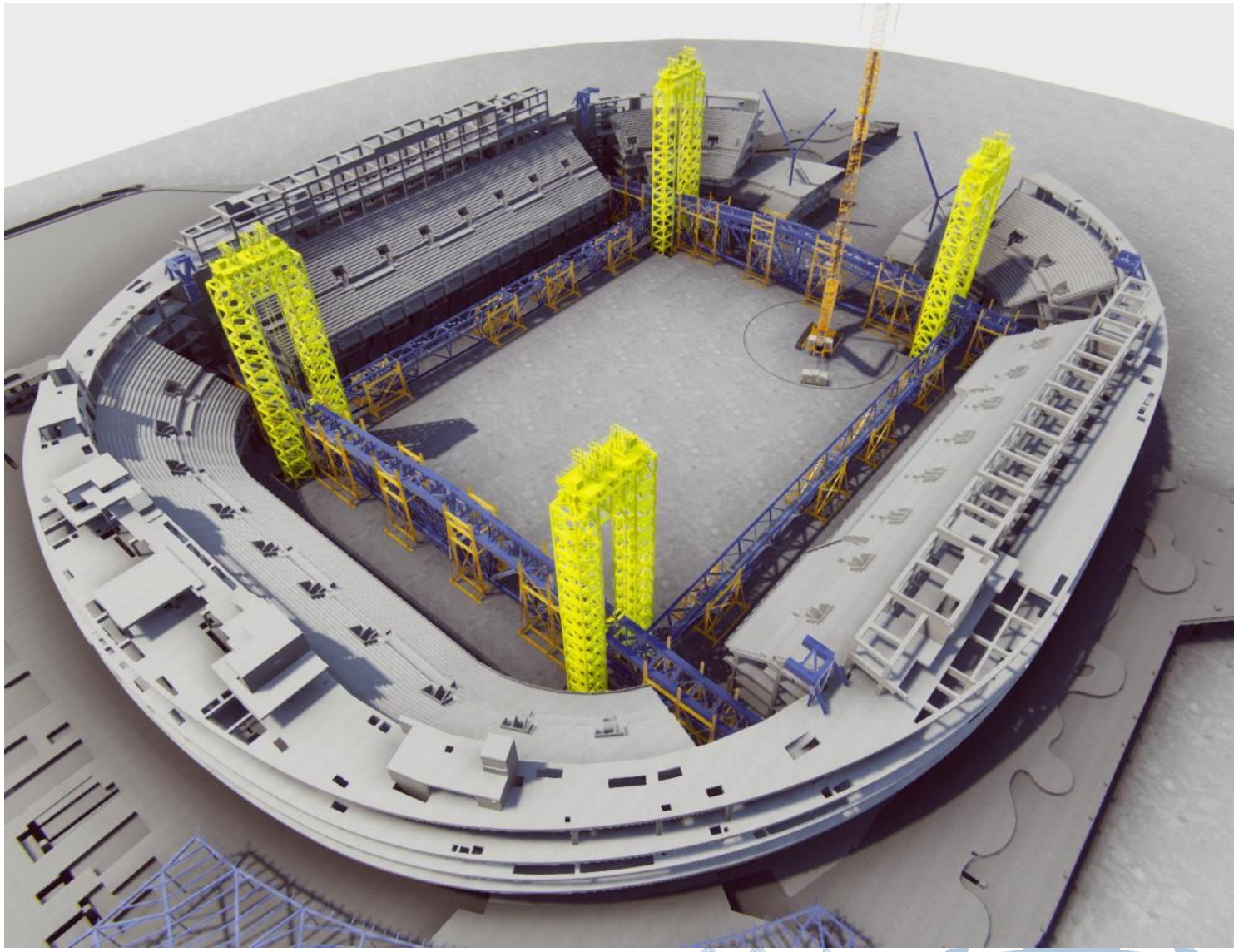
**Stage 1 - Primary truss A and B and associated gantries are pre-assembled by crawler cranes ( 1350 Ton, 750 Ton and 500 Ton) on the pitch**



# Erection of mega truss by Heavy Lifting Systems

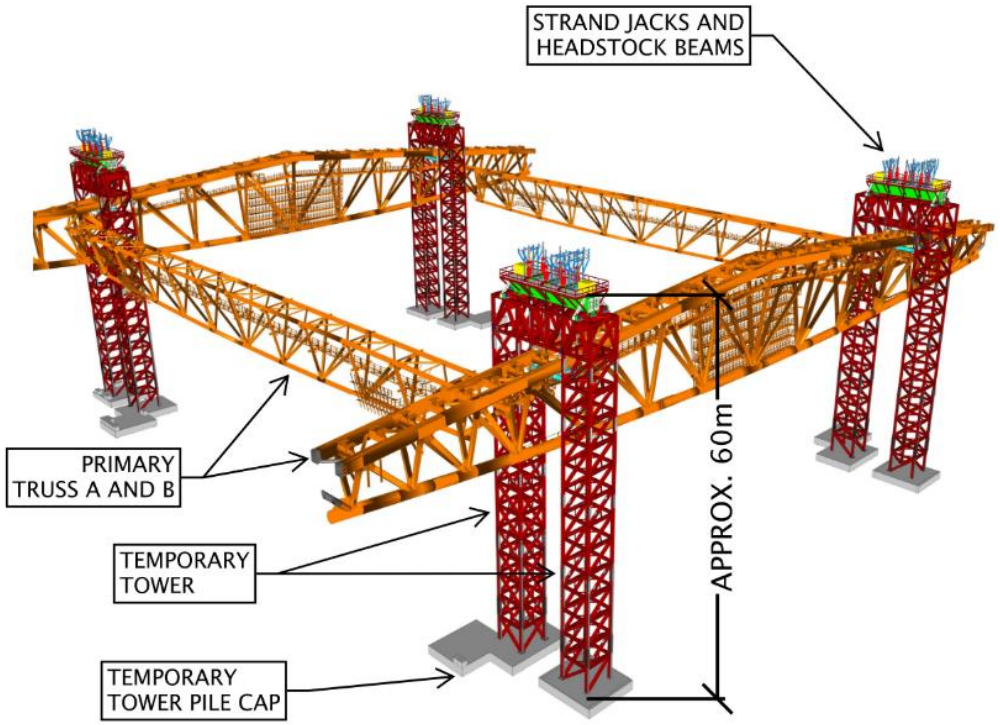
**Stage 2 - These trusses are lifted together from 4 locations by strand jacks supported atop temporary towers, under geometry control by digital survey method**

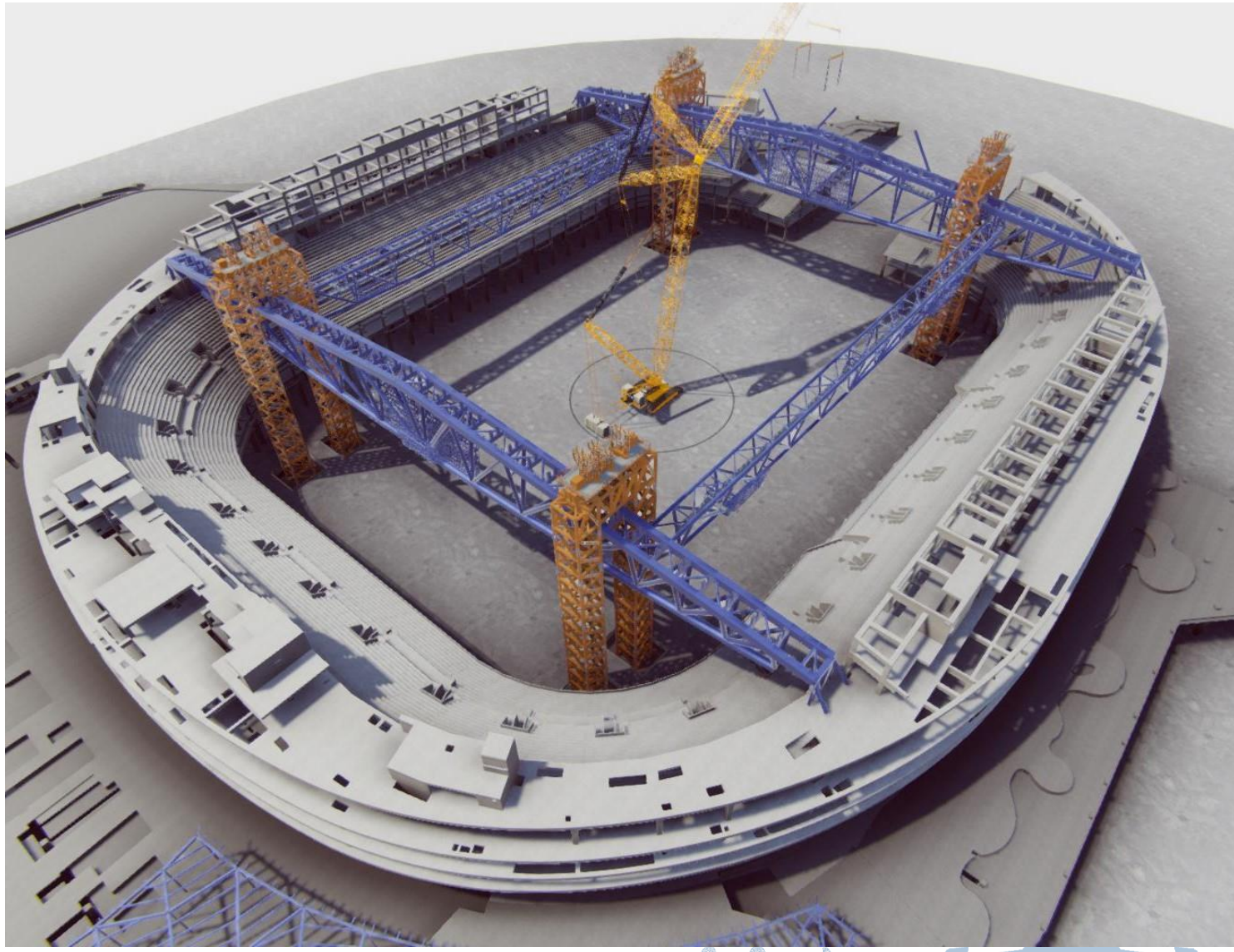


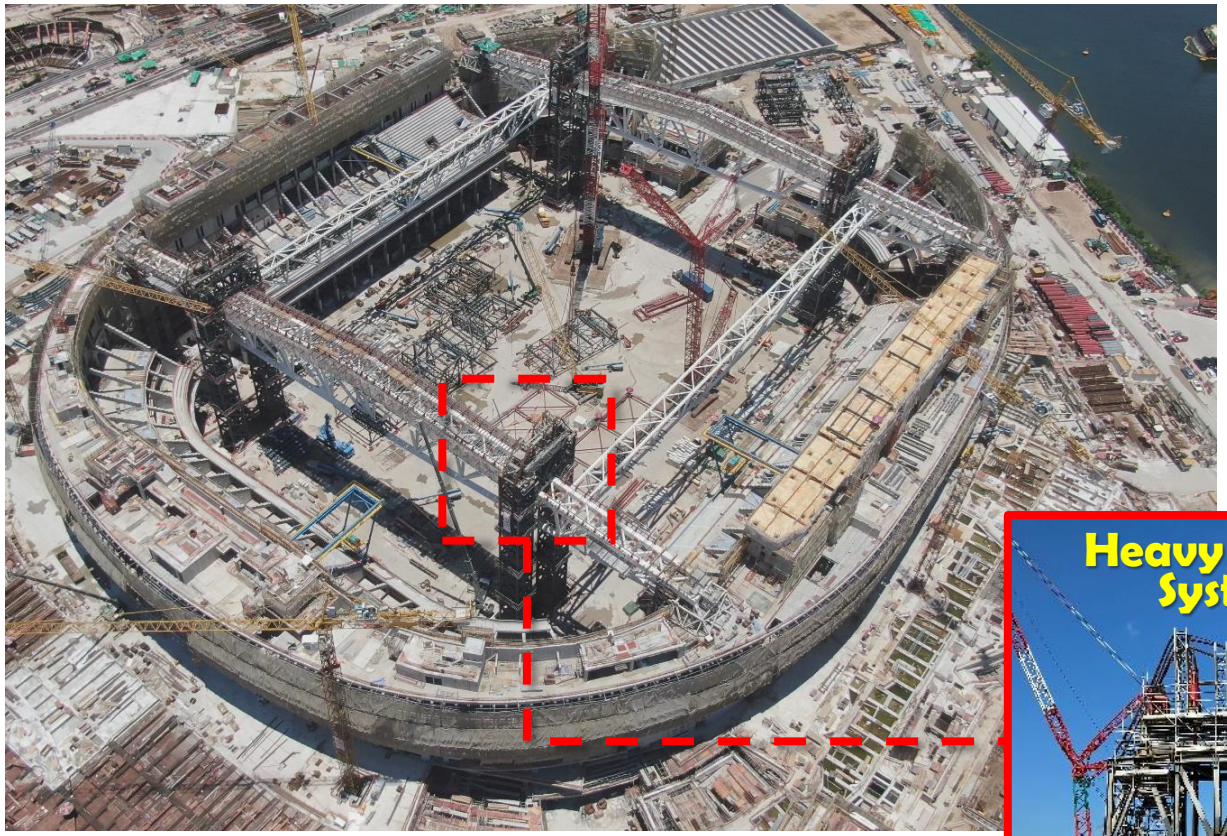
# Erection of mega truss by Heavy Lifting Systems

**Stage 3 - Temporary towers remain in place to provide restraint until permanent bracing system has been installed**

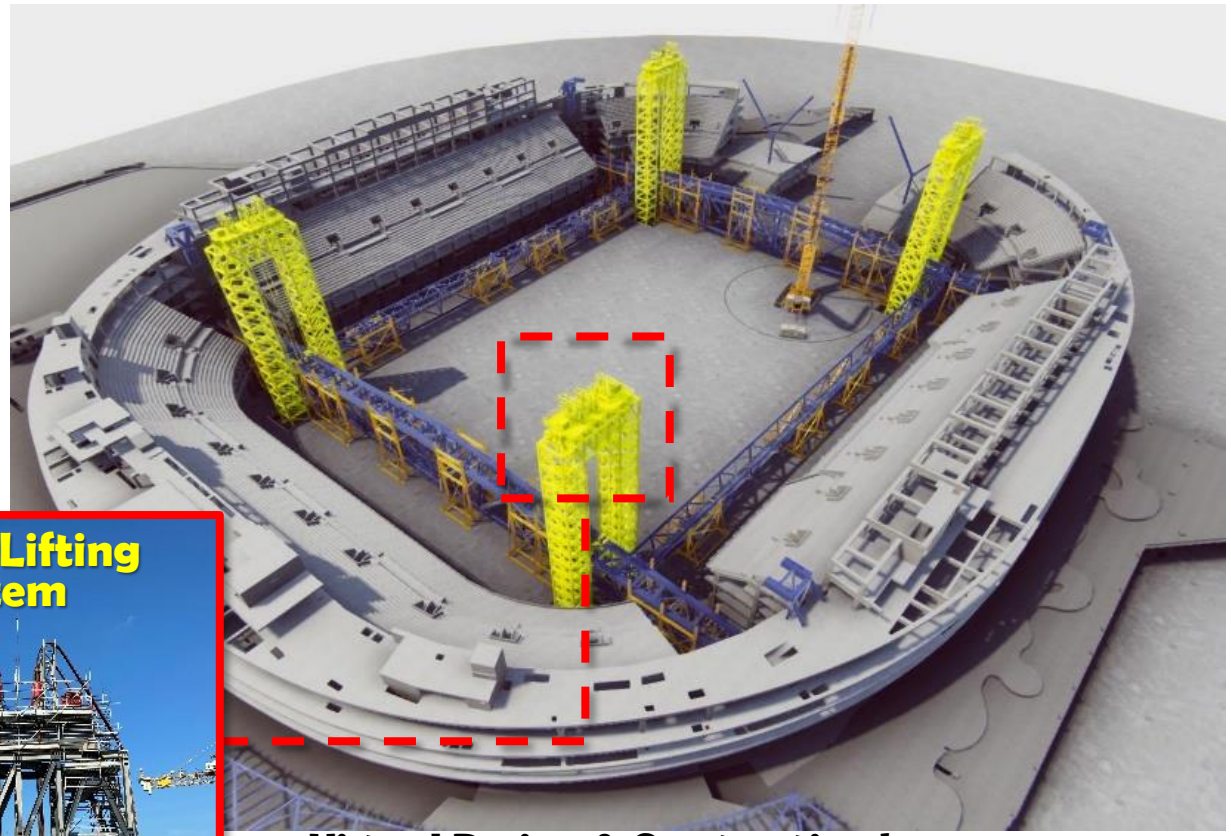


# Heavy Lifting System : Lifting Frame and Strand Jack

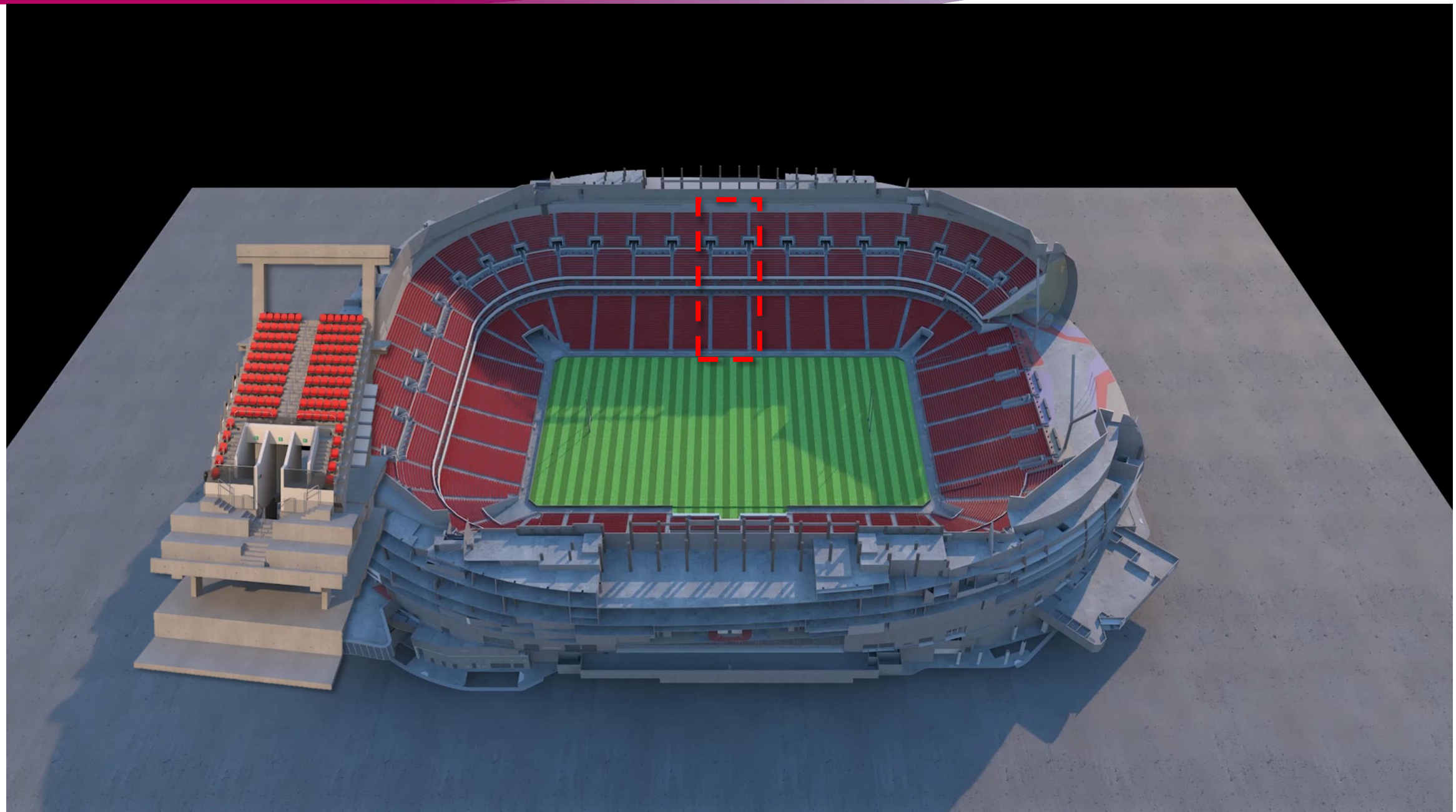


Roof Steel Trusses Ready for Lifting in May 2022

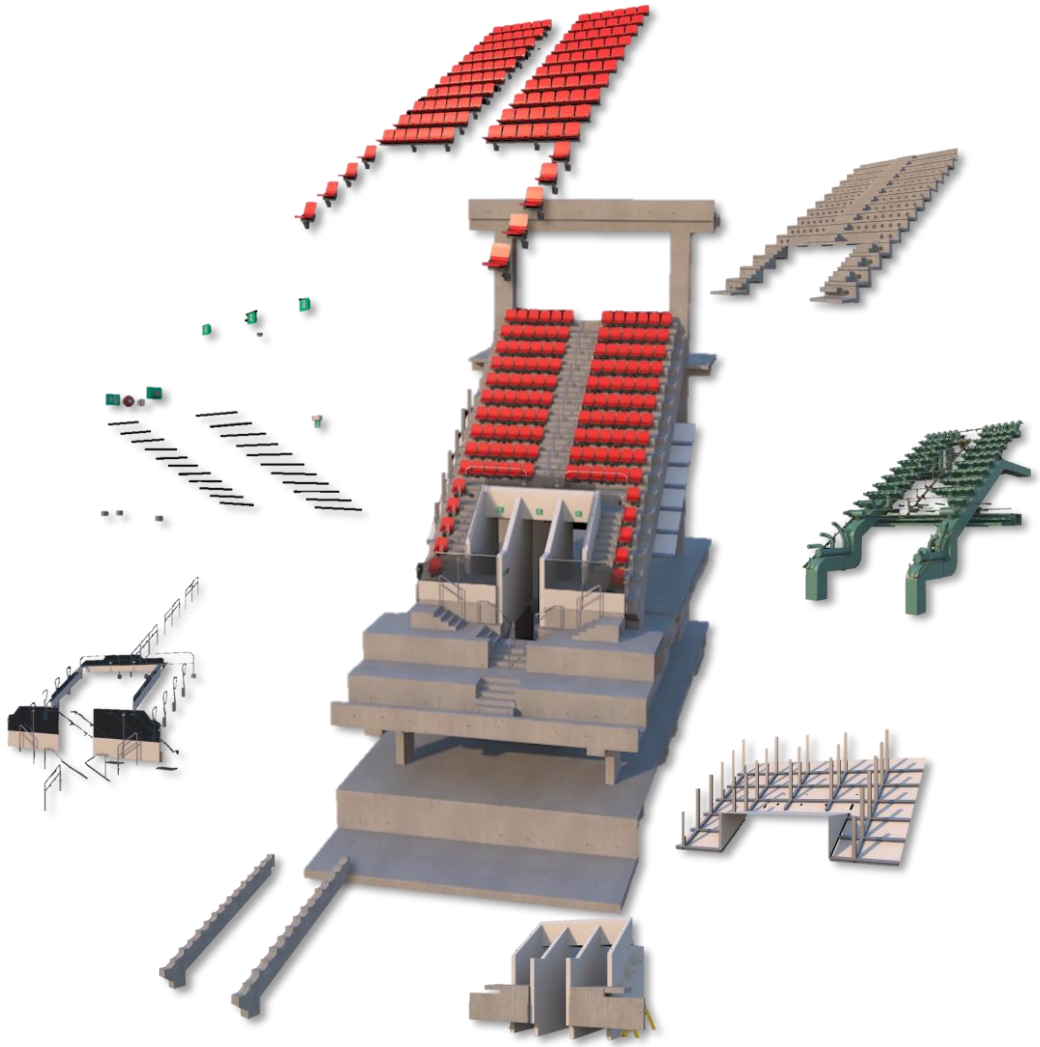
Virtual Design & Construction by BIM

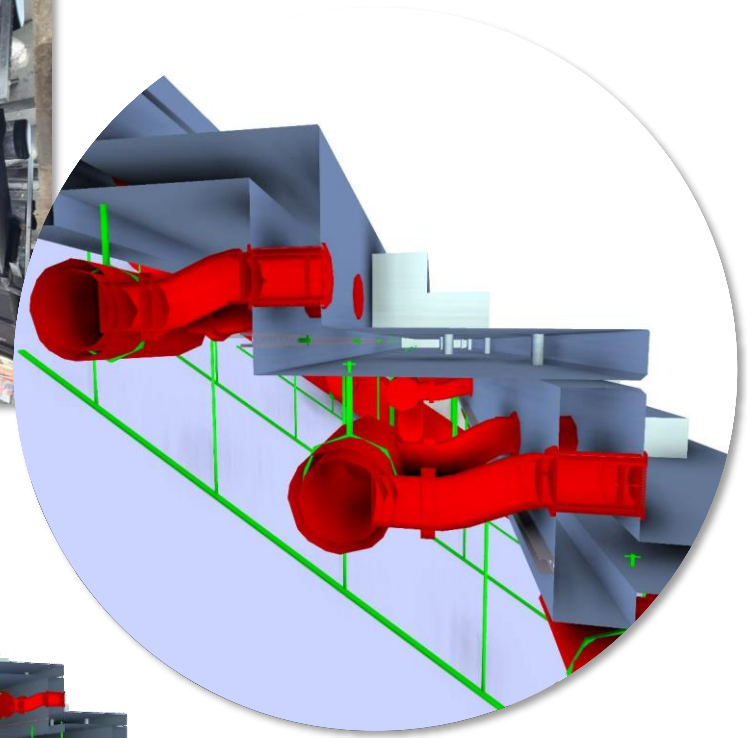
# Integrated Bowl Seating DfMA

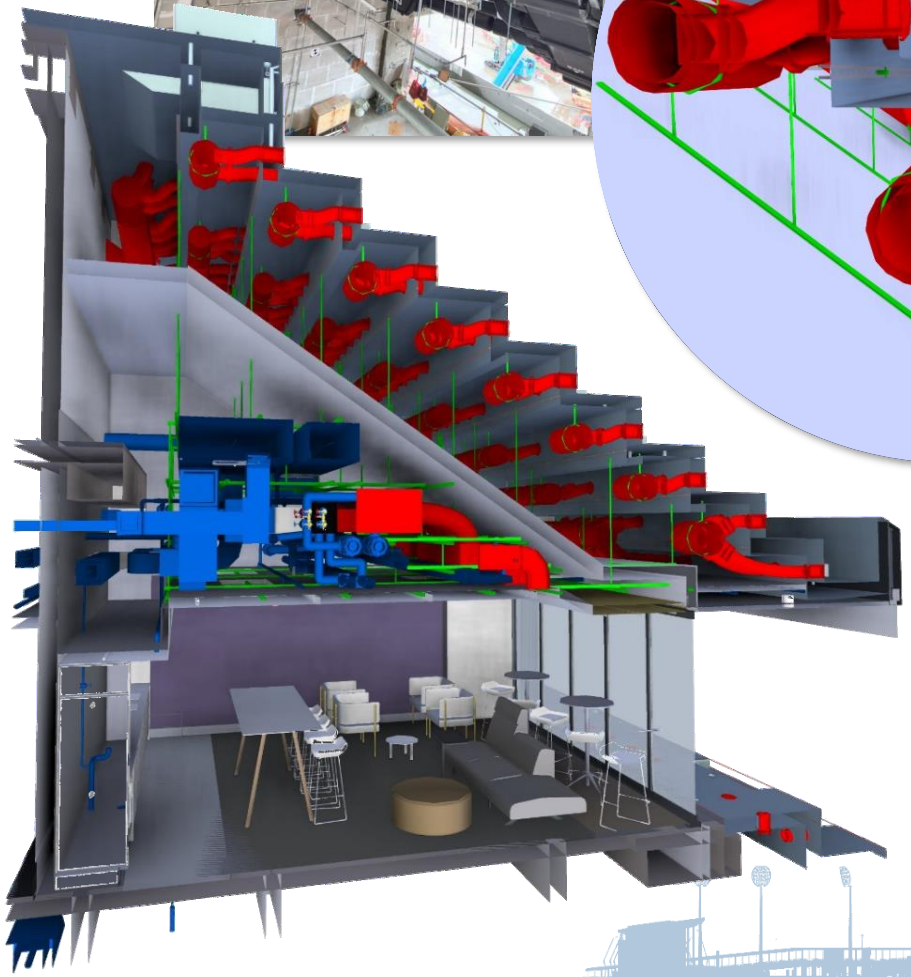


# Integrated Bowl Seating DfMA

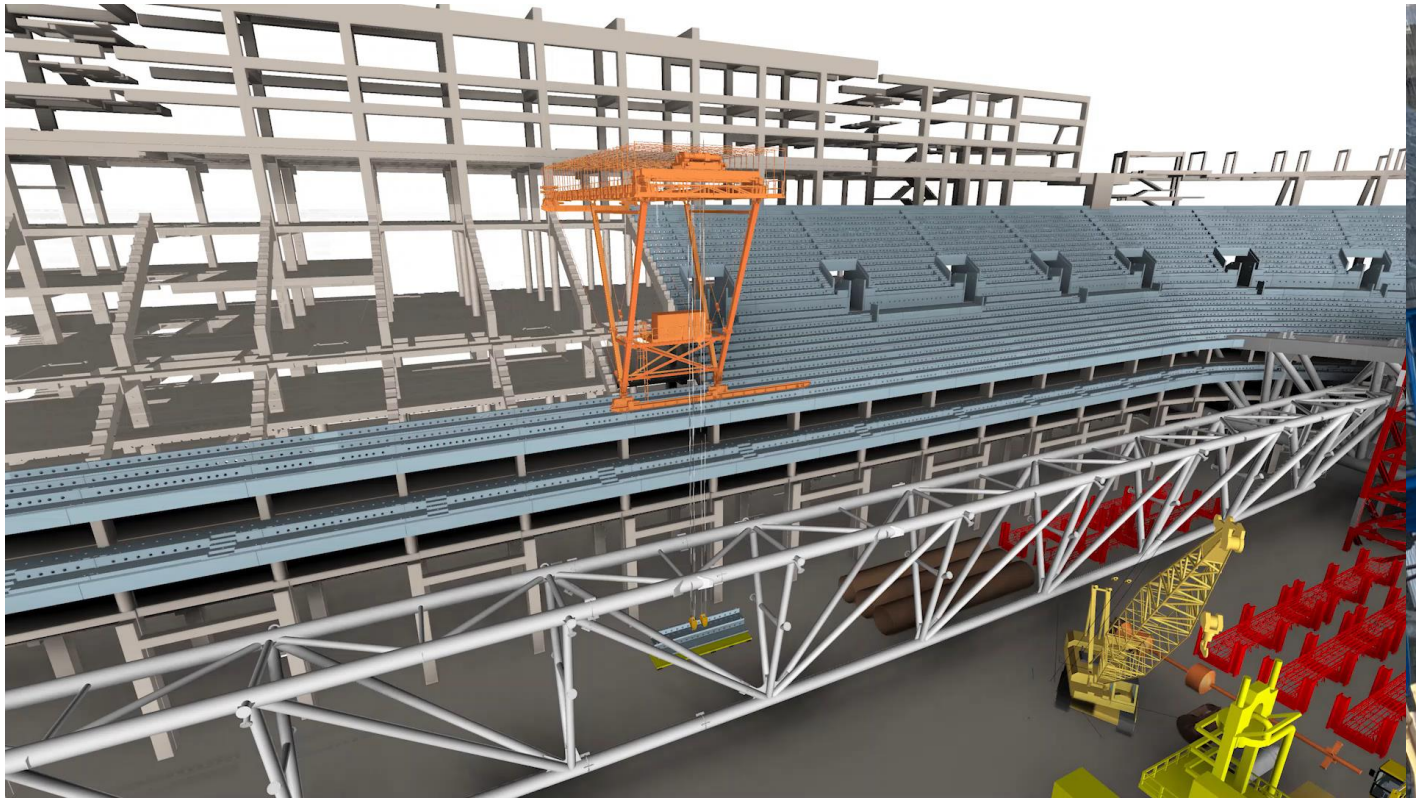
## 10. Furniture Placement and Diffusers





# Bowl Seating Installation by Mechanised Travelling Portal Gantry



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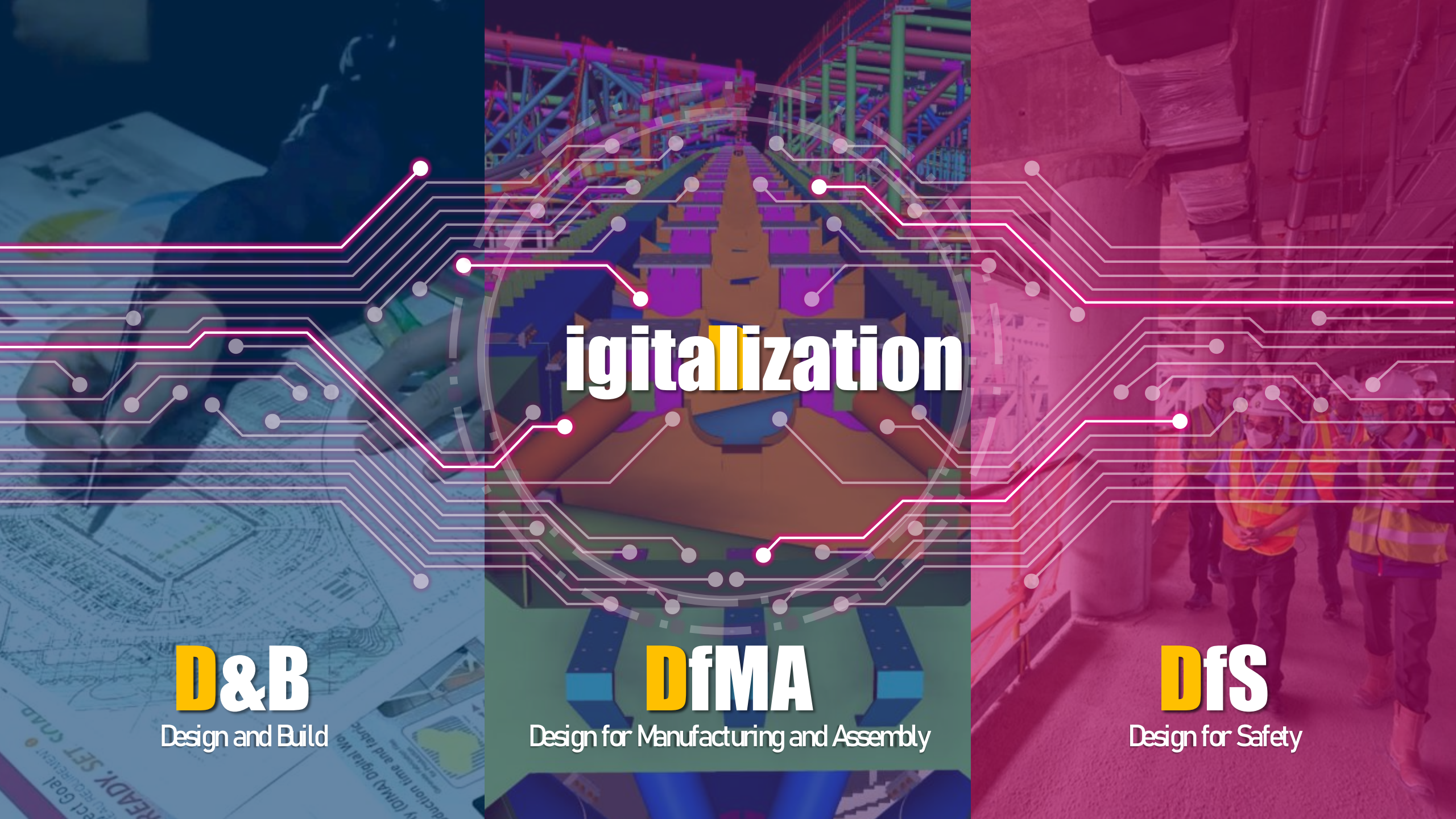
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D&B
Design and Build
DfMA
Design for Manufacturing and Assembly
DfS
Design for Safety


Thank you