

**Abstract ID:** AULON528

## How BIM enhances Bridge Design Capabilities?

**Abstract Topic:** Structural Engineering

**Description:** SYSTRA expertise in Bridge has started developing design capabilities for High Speed Railway line and for Elevated Metro line with the system integrated concept of the U shape viaduct. We are now designing bridge structures for all type of transport modes including long span bridges such as Chacao bridge in Chile or Road Causeway such as The Sheikh Jaber Al Ahmad Causeway in the gulf of Kuwait. With the newly acquire US based company IBT acquired in 2017, SYSTRA has reached in 2018 the 8th rank of the International ENR ranking for bridge engineering. This expertise is strategic to SYSTRA global capacity to deliver Mass transit or Rail infrastructure worldwide. That's why at the early stage of our BIM deployment we focused in developing internal solutions and design workflows that meet our clients' needs and enhance our design efficiency and quality. This class will give you a global view of our internal BIM program for Bridge by presenting our design solutions and project applications.

The ambition of this program is to increase the efficiency of our engineers and the robustness of our design when creating the bridge assets and is aiming to provide to our client a digital twin of their infrastructure that is fitted for use during operation & maintenance.

You will see how our bridge experts have embraced BIM in their design workflows from early stage to construction design using applications such as "BIM in One Click" for linear infrastructures or CABLOA for prestressing design.

We will also share our feedback on 3D reinforcement design using Revit and its Sofistik plugin for rebars detailing and how to increase the efficiency using design automation.

The end of the presentation will be dedicated to look ahead of us, exchanging thoughts around application of AI or Generative design to bridge and sharing our initiatives on how to use BIM models for operation & maintenance purpose using our HYPERASSET solution.

**Learning Objective 1:** How to improve design processes with BIM

**Learning Objective 2:** How to develop prestressing design using CIVIL 3D

**Learning Objective 3:** How to build an Asset Information Model of a Bridge

**Learning Objective 4:** How to implement BIM in detailed/execution design phase using Autodesk BIM tools such as Civil 3D

## Summary

## Part A: Systra Bridge Group & BIM 4 Bridge Program

### 1) SYSTRA Bridge Group

SYSTRA – Key Figures

SYSTRA Bridge Group

SYSTRA Bridge Projects & BIM

### 2) BIM for Bridge in SYSTRA

IBT acquisition + Project presentation: general design presentation + BIM uses + some models screenshots

- MMMP MECCA: Prestressing models + drawing production
- Chambal: Prestressing models + drawing production
- Chacao: Rebars model for complex areas + drawing production
- Subiyah: Prestressing models + drawing production
- Bogota: multidisciplinary BIM projects: quantities + design solution with BIM In One Click
- HS2: multidisciplinary BIM projects with challenging requirements from client + Prestressing models

## Part B: Improve Bridge Design Capabilities and Efficiency with BIM

Communication

2D Production

Multi-disciplinary BIM Coordination

Clash Detection

4D

BOQ/5D

6D: ecological footprint/carbon emission/waste management

Link between BIM Models and Calculation Models: steel design model, concrete design model and prestressing design model (Robot, Sofistik and ST1 links)

Digital Design Database: BIM models are the support to transmit design elements to client through design stages

## Part C: Bridge design innovative workflows using BIM

### 1) BIM for Linear Infrastructure: BIM In One Click

- Main Principles

- Applications and examples

## 2) BIM for Rebars Detailing

- Main Principles: standardization and Design automation
- Applications and examples

## 3) BIM for Prestressing: CablOA

- Main Principles
- Applications and examples

## Part D: BIM ongoing development and initiatives

1) HYPERASSET solution: Operation & Maintenance solution

2) Generative Design for Bridge

3) AI applied to Bridge Design