BIM implementation in the construction of a complex intersection of utility tunnels

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Class summary

BIM implementation to improve the construction management of a complex intersection of utility tunnels in China.
Key learning objectives

At the end of this class, you will have a greater understanding about:

• BIM coordination in the construction of a complex intersection of a utility tunnel
• Field issue tracking and schedule management using Wechat program
• BIM applications in the construction management of a utility tunnel
• BIM implementation in China
Content

• Project Introduction
• Parametric Modeling
• Construction Review
• Clash Detection
• Collaboration Platform
• Schedule Management
• 3D Clarification of Construction Techniques
• Virtual Construction & VR Experience
• Quality Control
• Quantity Take-off
• BIM Applications in China
Project introduction
A comprehensive infrastructure enhancement project in southern China
Total length: 7.86 kilometers
Project cost: 1.9 billion yuan
Project introduction

Construction scopes

- Utility tunnel
- Elevated highway
- 4 bridges
- Rain water collector
- Auxiliary structures
Project introduction

Engineering challenges

- Numerous existing pipelines
- Many road Intersections
- Tight schedule
- Complex traffic control
Project introduction

Crossover of utility tunnel with sewage pipeline and river
Project introduction

Protection of the existing pipelines
Project introduction

Cofferdam construction
Project introduction

- Goals
  - The requirements of "Construction Quality Acceptance Specification"
  - The requirements to win the Qianjiang Cup
  - BIM application in construction and facility management

- Duration
  - 745 days for the total construction
  - 365 days for the construction of the utility tunnel
Project introduction

BIM processes
Parametric modeling
Parametric modeling

Troubles & solution

- Road modeling
- Tunnel modeling
- Elevated highway modeling

- Revit inconvenient
- Revit in combination with Civil 3D and Dynamo capable
Parametric modeling

Drawing the alignment and the profile
Parametric modeling

Drawing the alignment and the profile
Parametric modeling

Exporting the properties of points
### Parametric modeling

Delete redundant data

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Parametric modeling

Program in Dynamo
Parametric modeling

Resulted utility tunnel
Parametric modeling

Resulted elevated highway
Construction review
Construction review
## Construction review

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Construction review

The report of construction review
Construction review

Clash detection of auxiliary structures
Construction review

Clash detection of auxiliary structures
Clash detection
Clash detection

Pipeline modeling with secondary development
Clash detection

Existing pipelines
Clash detection
Clash detection
## Clash detection

### Item 1

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### Item 2 (Existing pipelines)

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### Clash results
Clash detection of auxiliary structures
Clash detection of auxiliary structures
Collaboration platform
Collaboration platform

Management on WeChat

- WeChat is widely used in China
- Programs can be instantly downloaded and stored on WeChat
- Precise management can be carried out with the WeChat program development
Collaboration platform

Sections

- Schedule management
- Field issue tracking
- Process management
Schedule management
Schedule management

- Construction planning
- Virtual construction
- On-site information collecting
- Data analysis and statistics
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**Construction planning**
Schedule management

4D simulation
## Schedule management

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## Backstage management

## Information collecting
Schedule management

Progress display in BIM 365
Schedule management

Progress display in BIM 365
3D clarification of construction techniques
3D clarification of construction techniques
3D clarification of construction techniques

Construction animation
3D clarification of construction techniques

Video of technique clarification
3D clarification of construction techniques
3D clarification of construction techniques
3D clarification of construction techniques

Constructability review
3D clarification of construction techniques

Model navigation on iPad
3D clarification of construction techniques

3D Printing
Virtual construction & VR experience
Virtual construction & VR experience

Cofferdam construction
Virtual construction & VR experience

Excavation of the utility tunnel
Virtual construction & VR experience

Traffic control
Virtual construction & VR experience

Virtual construction in Lumion and 3ds Max
Virtual construction & VR experience

Virtual construction in Lumion and 3ds Max
Virtual construction & VR experience

The construction process in a road intersection
Virtual construction & VR experience

The construction process in a road intersection
Virtual construction & VR experience

Immersive experience in fuzor
Virtual construction & VR experience

Immersive experience in fuzor
Quality control
Quality control

On-site quality inspection
Quality control

Information obtained by scanning the QR code
Quality control

Information obtained by scanning the QR code
Quantity take-off
Quantity take-off

Includes:

- Concrete in the utility tunnel

- Concrete and steel bars in the retaining walls
1. Apply materials with unique codes to the components that need measuring
Quantity take-off

- the codes of materials is from the price sheet.
Quantity take-off

Extract quantities from the model for each construction stage
**Quantity take-off**

Base on the quantities and the price sheet, make the estimates for each stage

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BIM applications in China
BIM applications in China

- Design institute
- Contractor
- Owner
- Government
Thank you!

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