TR20177

Solid Workflows for Concrete Bridge Design

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Learning Objectives

- Use of InfraWorks 360 as a bridge modelling and design tool
- Use of the integrated analysis and design tools and also Autodesk Structural Bridge Design for validation of prestressed girders
- Interfacing to Civil 3D to enable documentation
- Interfacing to Revit for documentation

Description

This class will cover the use of InfraWorks 360 as a bridge modeling and design tool in the context of a wider transportation project and explore a number of solid workflows to other bridge design and modeling products. You will learn, not only how to model concrete bridges in InfraWorks, but also how to make use of the Line Girder Analysis cloud service to quickly validate the girders against different design standards and to establish the required prestressing. You will learn how you can then simply open up the corresponding analytical model directly in Autodesk Structural Bridge Design for further refinement as well as to carry out more detailed analysis and design checks. You will learn how to open up the InfraWorks 360 model in Civil 3D enabling further refinements to the site. You will also learn how to create a Revit model with 1 click from the InfraWorks model to enable creation of structural drawings.

About the speaker

Andrew Manze is Autodesk's InfraWorks 360 Business Development Manager in EMEA. He has worked in the civil and structural engineering industry for over 30 years functioning both in industry and in the specialist construction software sector. After training as a structural engineer in the UK in the late 80's and working on a variety of unusual and novel international projects Andrew moved on to business development in the 3D modelling and structural analysis software field spending many years bringing innovative technology to the European and CIS regions. In later years Andrew has concentrated on the bridge analysis and design market getting involved with the rollout of the Eurocodes within engineering consultants in Europe.

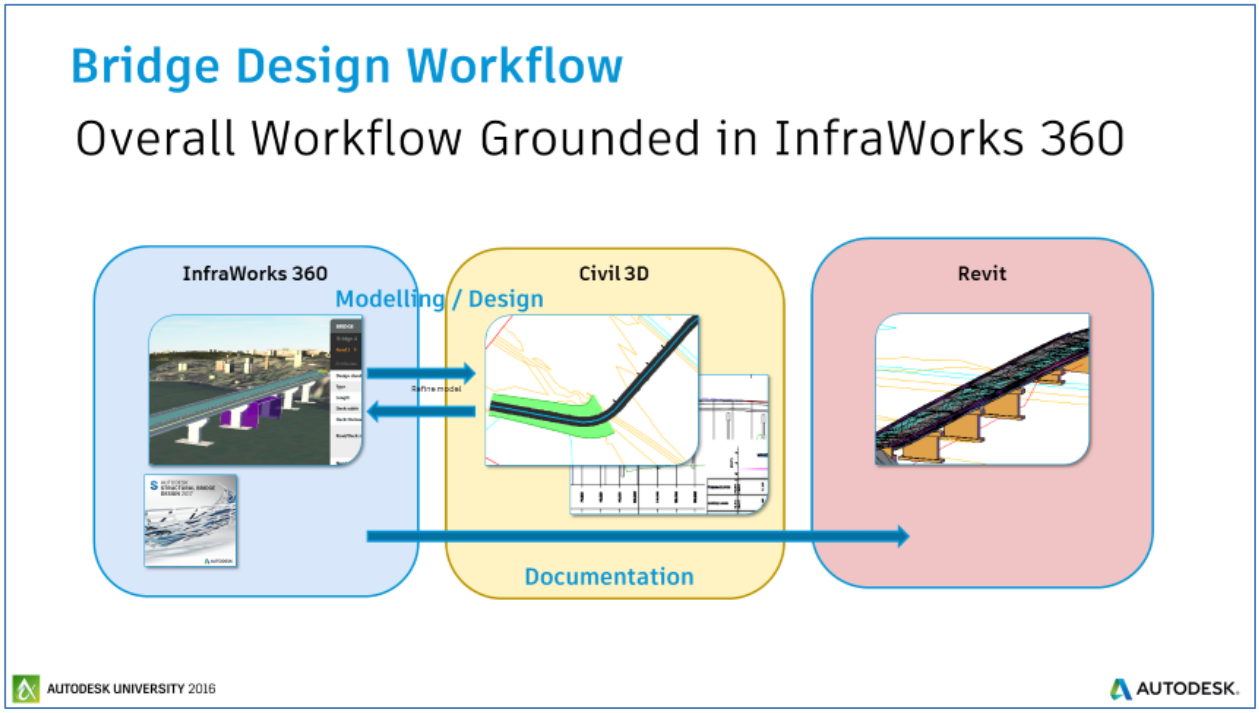
Overview

The InfraWorks 360 bridge modelling tools can be used to rapidly model realistic conceptual concrete bridge structures in the context of the project environment. Bridge components automatically sized by the heuristic rules can be adjusted at any time.

The integrated Line Girder Analysis and Design functionality can produce designs for the modelled girders and allow the designer to quickly arrive at a workable girder solution that can be modified and verified with the Autodesk Structural Bridge Design workflow.

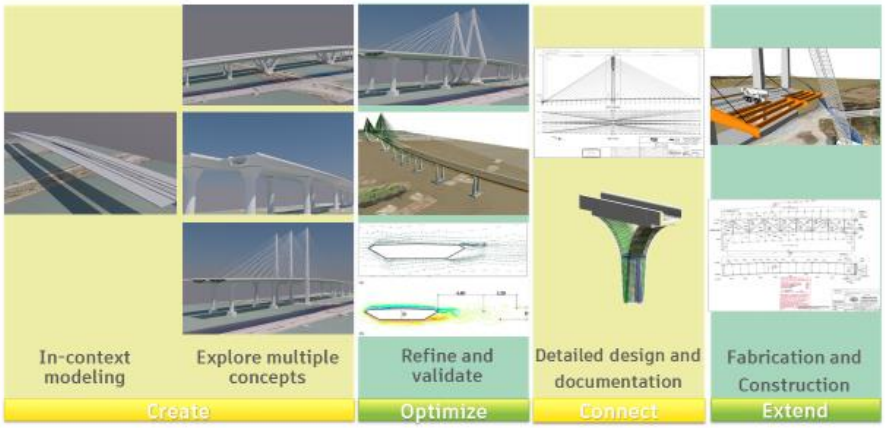
Representative quantities can be obtained which can be used to assist in early budgeting.

Workflows to both Civil 3D and Revit allows for the use of InfraWorks 360 modeling data further down the design journey of the bridge structure allowing changes to the surrounding grading, production of sheet sets, structural drawings and rebar detailing.



Bridge Design Workflow

Reimagined Workflow Grounded in InfraWorks 360



Quickly generate the Bridge Model in 3D from the start

Intelligent design

- Automatically generates detailed 3D model based on a typical design that a bridge engineer would choose using heuristic rules (Piers, girders, piles, bearings, etc.)

Parametric design

- As you change elements of the bridge design, the whole bridge updates (heuristics)

Modelling the initial Bridge Design

- Utilising an existing alignment or
- New alignment developed in InfraWorks 360
- Realistic Bridge modelled with Heuristic rules

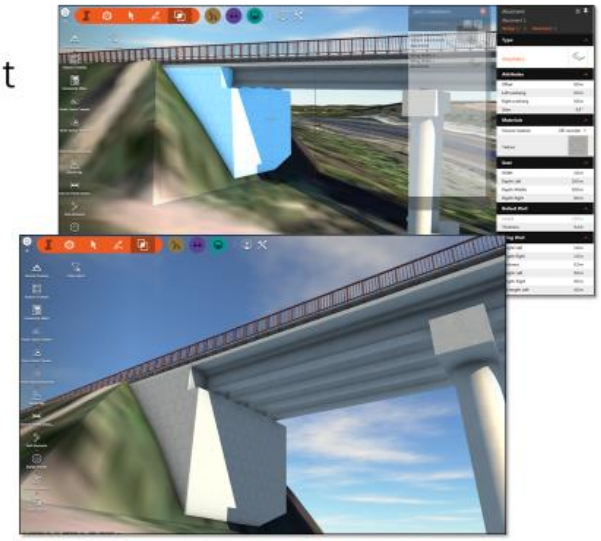
Modelling the desired road profile

- Specify a section of highway for the bridge profile configuration
- Select the road profile to be used (component roads preferred)

Specify the Supporting Structures

Piers and Abutments

- Select the type of abutment or wing wall
- Configure the dimensions and material accordingly



Specify the Supporting Structures

Piers and Abutments

- Modify number of piers and reposition if necessary
- Modify style and geometry

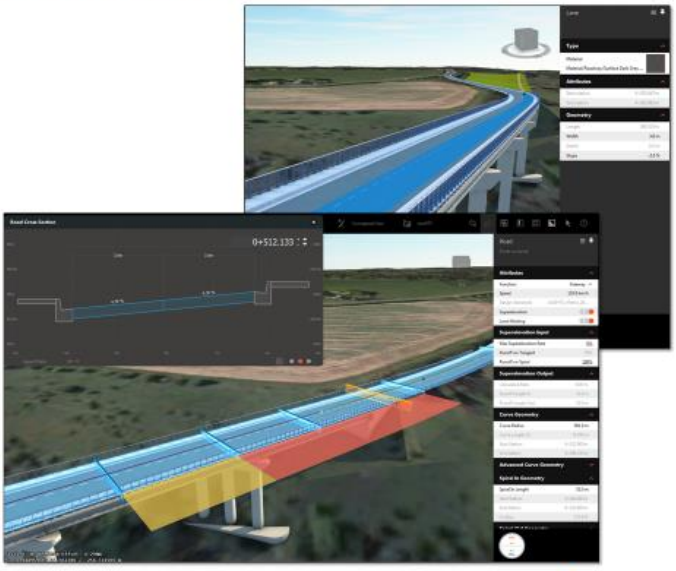
Specify the Supporting Structures

Piers and Abutments

- Pier foundation types can also be modified
- Style, geometry, piling can all be modified

Bridge Deck and Superelevation

- Tools for modifying and reviewing the deck easily
- Specify Superelevation
- Deck conditions for analysis, continuity, etc.



Prestressed Concrete Girders

- International catalogue of concrete girders
- Variety of geometric types
- Section geometry can be adjusted along the length of the girder

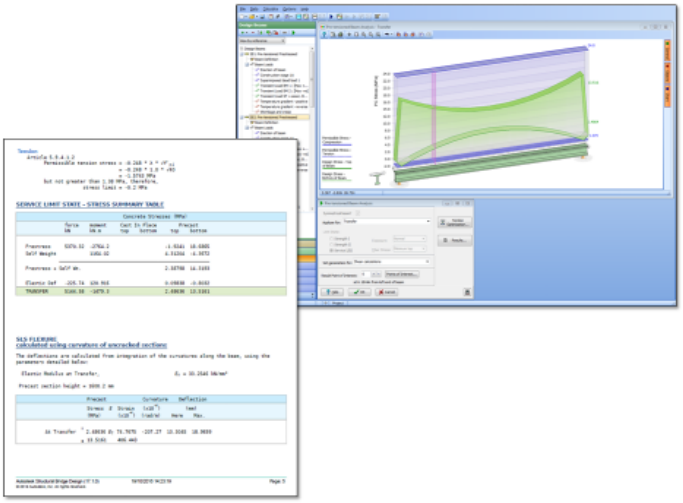
Prestressed Concrete Girders

- Line Girder Analysis
- Code compliance checking
  - AASHTO LRFD
  - AS5100
  - British Standards
  - Eurocodes
  - New Zealand

Prestressed Concrete Girders

Workflow to Autodesk Structural Bridge Design

- Complete analysis and design system for deck type bridges
- Transfers relevant structure with girders, material, etc.
- For further design / investigation



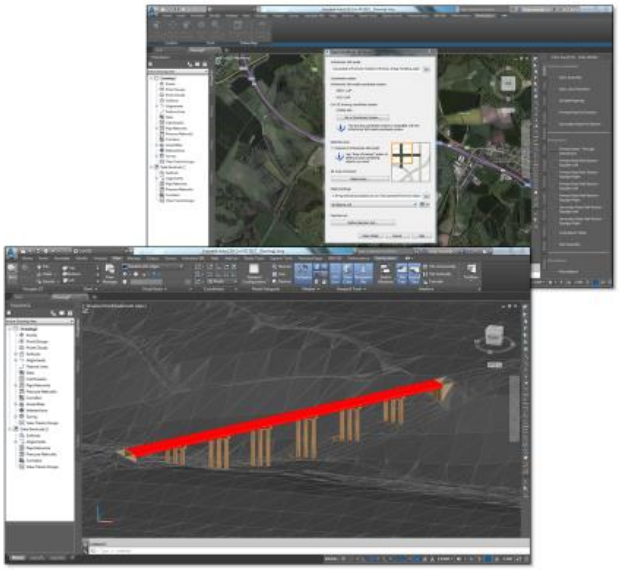
Quantities

- Gain insight into quantities at an early stage
- Available as we are modelling
- Broken down for constituent components

Workflow to Civil 3D

Documentation

- Open InfraWorks 360 models in Civil 3D
  - Continue with detailed design and documentation
- Attached Civil 3D drawing as a data source in InfraWorks 360
  - Continue designing and visualising without losing work



Workflow to Revit

Documentation

- Right click the bridge – "Send to Revit"!
- Revit content is automatically built and Revit application opened
- Continue forward to detailed design and documentation