

TR21478-R

## The Future of Making Bridges - The Journey

Rodney Page, Senior Premium Support Specialist, Autodesk Inc

Ara Ashikian, Senior Bridges Product Line Manager, Autodesk Inc

Drew Olsen, Senior Industry Strategy Manager for Transportation, Autodesk Inc

Bryan Otey, Engineering Director, Autodesk Inc.

### Learning Objectives

- Discover the best practices in creating a comprehensive bridge design solution
- Understand the identification, training, equipping, and supporting of the bridge design solution
- Learn about the different tools now—and in the future—for bridge design
- Learn how to use best practices in the design process with the latest Autodesk technology

### Description

The Future of Making Bridges is not so much about the destination, but the journey. This roundtable discussion focuses on that journey in the pursuit of a total end to end Autodesk® solution for design and implementation of atypical bridges. Attendees can learn and share their own experiences on their bridge journeys. Discover the best practices and limitations experienced on each other's journeys. Learn about the key to this solution is the ability for all software including InfraWorks, Revit, Project Kameleon and Structural Bridge Design to exchange and communicate data seamlessly with the goal of reducing production cost, compressing project timeline, mitigating risk and improving the overall quality of the end product.

Joining us in this exciting roundtable discussion will be Ara Ashikian—Bridges Product Manager. This session features InfraWorks 360. The roundtable discussion will be facilitated by Drew Olsen the Senior Industry Strategy Manager for Transportation, ISM-AEC & Cross-Industry Strategy and Marketing.



## Your AU Experts



Ara Ashikian is the Senior Product Line Manager for the Autodesk Civil Structures product development teams. Prior to joining Autodesk in 2013, he had over 20 years of experience as a bridge engineer and a software developer, working on a large number of bridge projects, including preliminary, detailed and construction engineering design aspects for a wide range of bridge types. These projects included the detailed construction engineering of the EG LNG suspension bridge in Africa, as well as for the New Bay Bridge (self-anchored suspension bridge in California), the detailed



Rodney Page is the Senior Premium Support Specialist for Enterprise Priority Support who joined Autodesk in 2010 where he's been responsible for working collaboratively and proactively supporting Autodesk software solutions and workflows for Autodesk's Global Engineering Enterprise Customers SMEC & GHD. Prior to this he has over 30 years of AEC/ENI Industry software experience with as a Structural Engineering Design Technician working for large consulting and manufacturing firms in various capacities including Designer, Drafting Manager and Product Designer. He has participated on major projects including the Pre-Stressed Concrete Girder Bridge at the Sydney International Regatta Center for the Sydney 2000 Olympic Games.



Drew Olsen is the senior Industry Strategy Manager for Transportation and is responsible for bringing industry influence into Autodesk's transportation strategic plan. He has been with Autodesk for nearly 2 years with over 16 years' experience as a transportation design engineer and project manager on large scale design-build projects.



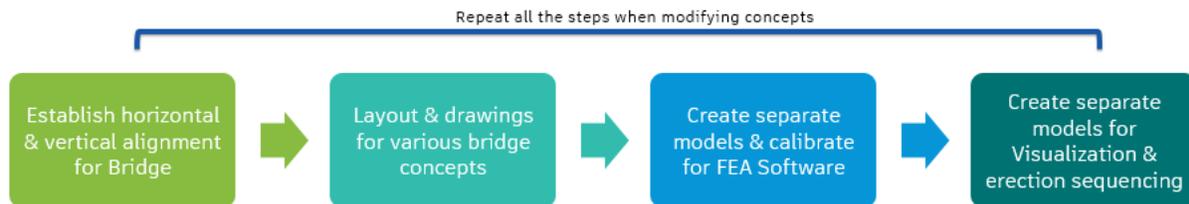
Bryan Otey has been with Autodesk for over 19 years. He was previously a developer for Softdesk for 9 years, a development manager at Autodesk, a QA director, and presently the Engineering Director for AEC Structures.

## Introduction

The Future of Making Bridges is not so much about the destination, but the journey. When developing this roundtable the decision was made to use the words "The Journey" in the title to recognize the fact that we are all on this journey together to achieving an end to end design solution for bridges. It also acknowledges the fact that we are at varying stages on that journey. Some of us are further along, whilst others are just starting out. Due to the variety and complexities surrounding bridges there is not a one size fits all approach, however we can all agree that the majority of bridges are usually of the overpass variety of design. This roundtable discussion focuses on that journey in the pursuit of a total end to end Autodesk® solution for design and implementation of the typical overpass bridge design. Join us in this free form open discussion. Remember we are all on this journey together.

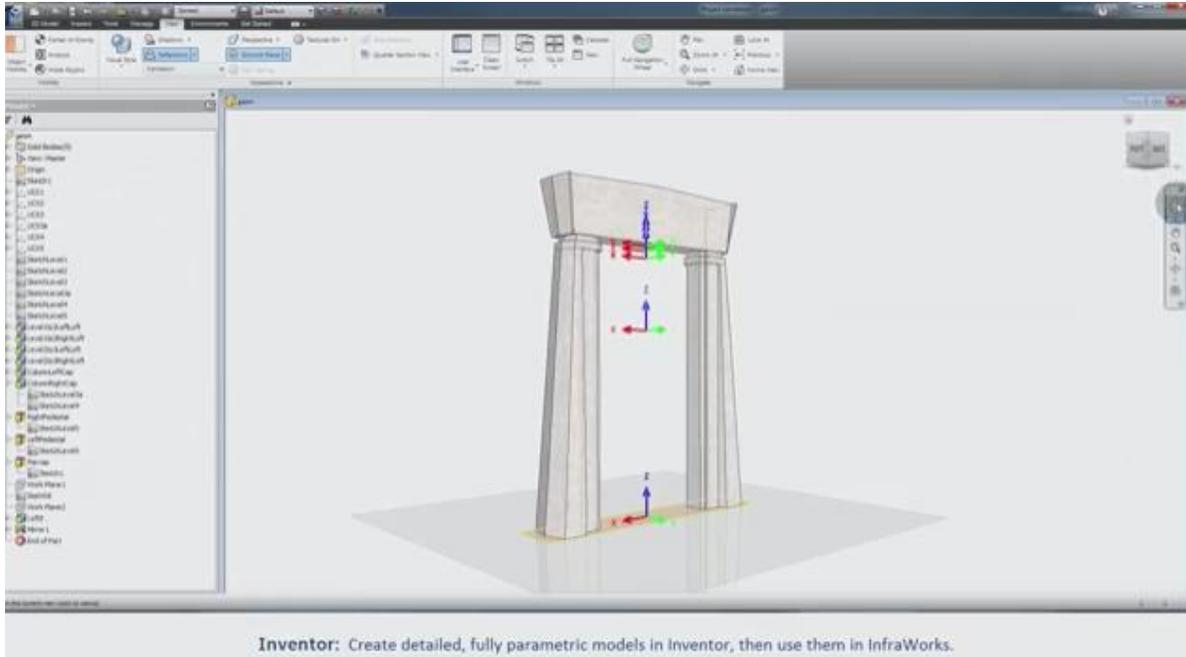
## Understanding the Present

But before we visit the future it is important to briefly understand the present that is the current bridge workflow employed by most customers. The workflow usually begins with establishing the horizontal and vertical alignment for the bridge using products like Civil 3D. The alignment is then transferred over to layout the various bridge concepts. A variety and combination of Layout and Drawing Tools are employed for this part of the workflow. The majority of customers utilize 2D software such as AutoCAD. Next a separate model is created of the bridge in the FEA Software such as Midas and Structural Bridge Design. Lastly a separate visualization model is created. Many of these tools have no BIM capabilities nor the ability to conceptualize their design rapidly. The steps are repeated over again when modifying your concept.



## The Future – Live Model Demonstration

Autodesk has been moving towards this end to end solution for some time now with acquisitions and development of key products for bridge design. Ara Ashikian the Bridges Product Manager will demonstrate and preview live an Infracore 2017.2 model containing multiple bridge designs from complex cable stayed designs through to the simple overpass bridge design. You will learn from this demonstration about the current Autodesk bridge design tools & workflows, which will help you to understand what can be currently done now and in the not so distant future. Don't be shy. Ask questions during this demo. This is your opportunity to provide your first hand impressions and feedback in this group discussion to influence and shape the future direction of the tools. The overriding goal of this roundtable is participation and information exchange by you the participants. We are hoping this will stimulate discussion within the group, however we also have an additional set of questions to ask you if required that are included at the end of this document.



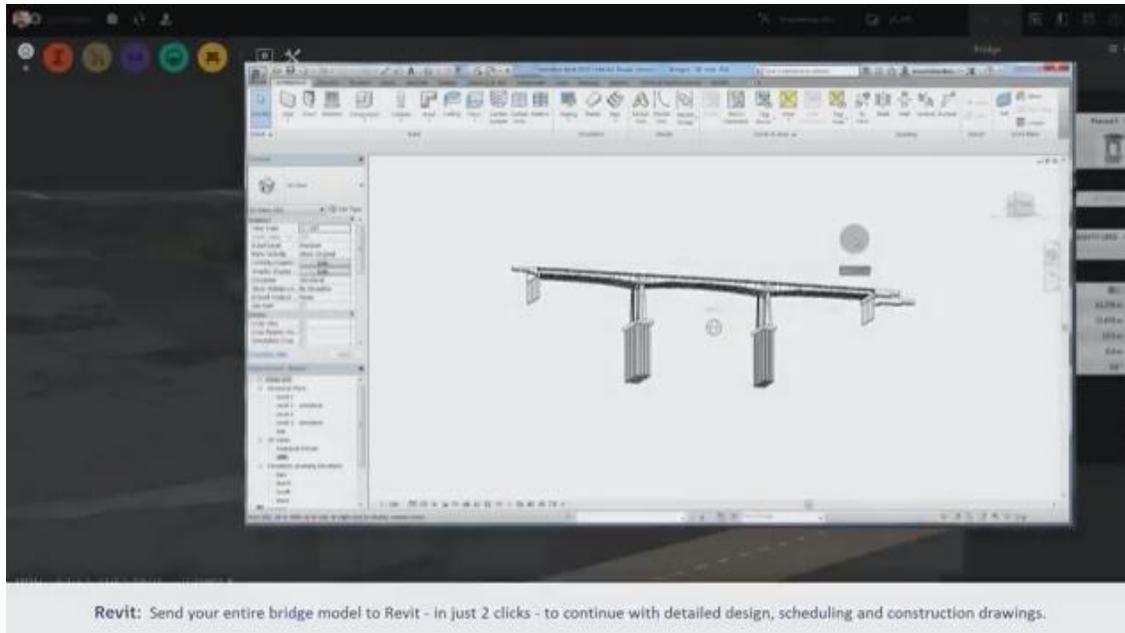
Learn how to create fully customized parametric bridge content utilizing Project Kameleon driven by the Inventor OEM and publish to Infracore for utilization on your bridge model.

### **Influence & shape the future**

As valued and highly skilled members of industry this is your opportunity to provide your firsthand impressions and feedback in this group discussion to influence and shape the future direction of the tools.



Learn how to conceptualize your bridge design rapidly in InRoads including the validation of the bridge design and use the cloud to analyze and optimize the bridge design through a range of options to deliver the best possible solution. Finally we will demonstrate sending the InRoads model out to Revit for detailing.



Learn from your peers and share your industry experience on this journey.

## Conclusion

The future is happening now with the tools to design and document bridges in one seamless end to end workflow. Investigate the Autodesk bridge tools and discover how they can fit into your current and future workflows. To find out more visit this site [Improve your bridge design process today](#). Thank you for attending this roundtable discussion.

## Roundtable Questions

**Below are a standard set of questions that may be asked during this roundtable depending on availability of time especially during the live model demonstration. The overriding goal of this roundtable is participation and information exchange by the participants. If this happens we've achieved our objective.**

### Tools & Workflows

The use of different tools across the bridge project life cycle has its own challenges especially in the reliable exchange of data. There are multiple file formats across all products utilized in the bridge workflow. The key is to have smooth interoperability between products with Bi-directional links.

1. What tools and workflows are you currently utilizing to deliver your bridge projects?
2. What limitations, challenges and pain points are you discovering?
3. What best practices have you discovered?

### Documentation

Another key challenge is the delivery of documentation to a quality and standard that meets industry and regulatory requirements. There can be a tendency to over model when it is not really necessary. In some instances 2D Families are sufficient. A balance has to be struck between this 3d and 2d modeling.

1. How do you deliver 2D representation of the 3D bridge model including standard 2D Families currently?
2. What is the quality & standard of documentation required to meet your unique regional industry and regulatory specifications? Does it deliver the most realistic layouts and quality documentation in a limited timeframe?
3. Do the current tools and workflows meet the requirements? If not where do they fall short and how do you currently work around this?

### Modelling

Modelling of the relationship of bridge elements to each other such as precast pre-stressed concrete girders can be complex including the modelling of reinforcement in complex geometry and pre-camber in girders.

1. What challenges do you face with modelling?
2. How do you manage to model complex bridges with curved decks incorporating cross fall and vertical camber?
3. What are your requirements for modeling reinforcement?
4. Where there is repetition in the bridge elements such as girders do you model reinforcement for a typical one or do you model them all?



### **Simulation and visualization**

Streamline design workflows and work more interactively with what truly exists on your project site. The engineer needs to be brought in much earlier during the concept phase. They can validate the bridge design and use the cloud to analyze and optimize their bridge design through a range of options to deliver the best possible solution.

1. What do you think of the feasibility of inserting the Engineer much earlier in the conceptualization phase?
2. Is it dependent on who owns the concept phase of the project? Sometimes this is owned by another stakeholder and is out of their control?
3. What advantages could it deliver for your bridge project?
4. Would it save time and money including and quicken the flow from preliminary to detailed design?

### **BIM**

In April 2016 the Federal Highway Administration of the US Department of Transportation investigated and prepared a report for Bridge Information Model Standardization. <https://www.fhwa.dot.gov/bridge/pubs/hif16011/hif16011c.pdf> . The current Industry Foundation Classes (IFC) Structure primarily focuses on Buildings. There is a requirement for IFC Bridge specific entities. These new IFC entities for export and import of bridge structures will need to be tested and certified similar to what has been achieved for buildings. The IFC Version management needs to be improved.

1. What are the current expectations for BIM Deliverables for your projects?
2. If you are delivering BIM what amount and type of information do you incorporate?
3. Does this have an impact on model performance?
4. IFC was designed for Building Information initially, but plans are underway for incorporation of bridge components. How do you workaround this for bridges at present?

### **Training & Equipping**

The bridge design solution workflows utilize a variety of products and tools with their own unique user interface (UI) including functions and features. E.g. Infracore training for engineers. Revit fundamentals training for AutoCAD 2D users moving to parametric tools.

1. How do you identify, train, equip and support your staff in an efficient and cost effective manner?
2. What has been your experience with the interoperability between the various tools?