



SE6880: Integrated Concrete Design in Revit

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Class summary

New tools are making **fully integrated concrete design** in Revit software a possibility today.

Learn about some of the new **tools and technologies** available to bring structural engineering directly into the world of Building Information Modeling (BIM).

We will discuss key aspects of Structural Analysis in **Autodesk 360** software, we will cover fundamentals of **analytical modeling** in Revit software, and we will look at an example of how **analysis data** can be harnessed inside of Revit software to **drive reinforced concrete design**.



Objectives:

- Describe the key technologies that enable integrated structural engineering
- Understand how to use Autodesk 360 Structural Analysis to drive downstream design
- Utilize Results Explorer in Revit to view and understand analysis results data
- Describe one or more examples of integrated design applications built on Revit
- Additional Objective: Talk about the elephant in the room (or why we're all here)

Format

- Talk
- Demo

About Me

- Structural engineer
- How I became interested in BIM
 - Tom Tyson: Effective Automation for Structural Design 1991
 - Practice.
- Strong desire to harness technology to advance industry
- Propensity for developing custom solutions to problems.
 - Excel
 - Pre-Revit Structure
- Autodesk Experience

Waxing Philosophical: The future of Structural Engineering

- Destabilizing Events
- State of the Profession
- The Case for Change

The Destabilizing Event of Our Time



The Destabilizing Event of Our Time



How did this change affect us?

- Forced people to reconsider how streets are used!

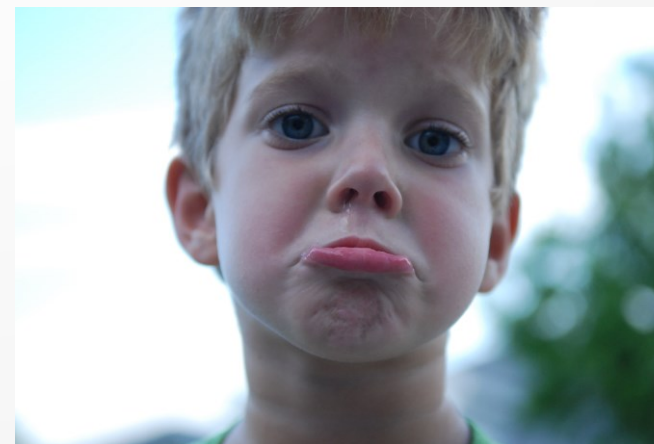


How did this change affect us?

- Uses of the Street circa 1920
 - Walking
 - Gatherings (Demonstrations, Celebrations)
 - Buying and Selling Food
 - Children Playing!
- Met with resistance
 - Safety concerns
 - Displaced users (walking, playing)
 - Concerned businesses (how will my customers reach my business?)
 - Cars were regarded as violent intruders in this common space

Evolution

- Led to new and evolving roles
 - Traffic officers
 - Traffic engineers
- Led to new regulations
 - Jaywalking laws
 - Traffic laws (speeding, defined moving violations, etc.)
- Led to the extinction of
 - Streetcars
 - Pedestrian street use
 - Play in the streets



The Benefits

- Vastly increased freedom of movement
- Expanded our reach
- Allowed development of the Suburbs
- Allowed us to think about and access travel differently
- Irrevocably changed the way we use streets.

Our Modern Day Destabilizing Event

- BIM
 - Forcing us to reconsider our workflows
 - Engineers Engineer and Drafters Draft... or do they?
 - Being met with resistance
 - Too expensive, not enough fee, too much detail, IP
 - Forcing us to consider and create new roles
 - Rise of the Director of Virtual Design
 - BIM Managers
 - New “regulations” evolving
 - Level of detail...
 - Division of work/model responsibilities
 - Offering us unprecedented opportunities



Evolution - till now

- Widespread adoption by engineering drafters
 - Obvious enhancement to coordination
 - Increase in speed/efficiency of drawing production
- Limited adoption by Engineers (view)
 - Lack of solid integration (how?)
 - Lack of integrated tools for engineers (why?)
 - Lack of focus on engineering workflows (what?)

The Case for Change

- We're Guilty
 - Of being too busy
 - Of being under increasingly tight deadlines
 - Of bearing the burden of ever increasingly verbose codes
 - Of being good at what we do (why change what works?)
- Most importantly
 - Of being hesitant to influence and/or direct the process of change

The Case for Change

- We have a lot to gain
 - Harness the three Cs
 - Reduce errors and omissions
 - Increase efficiency
 - Increase confidence
 - Increase our profit margin

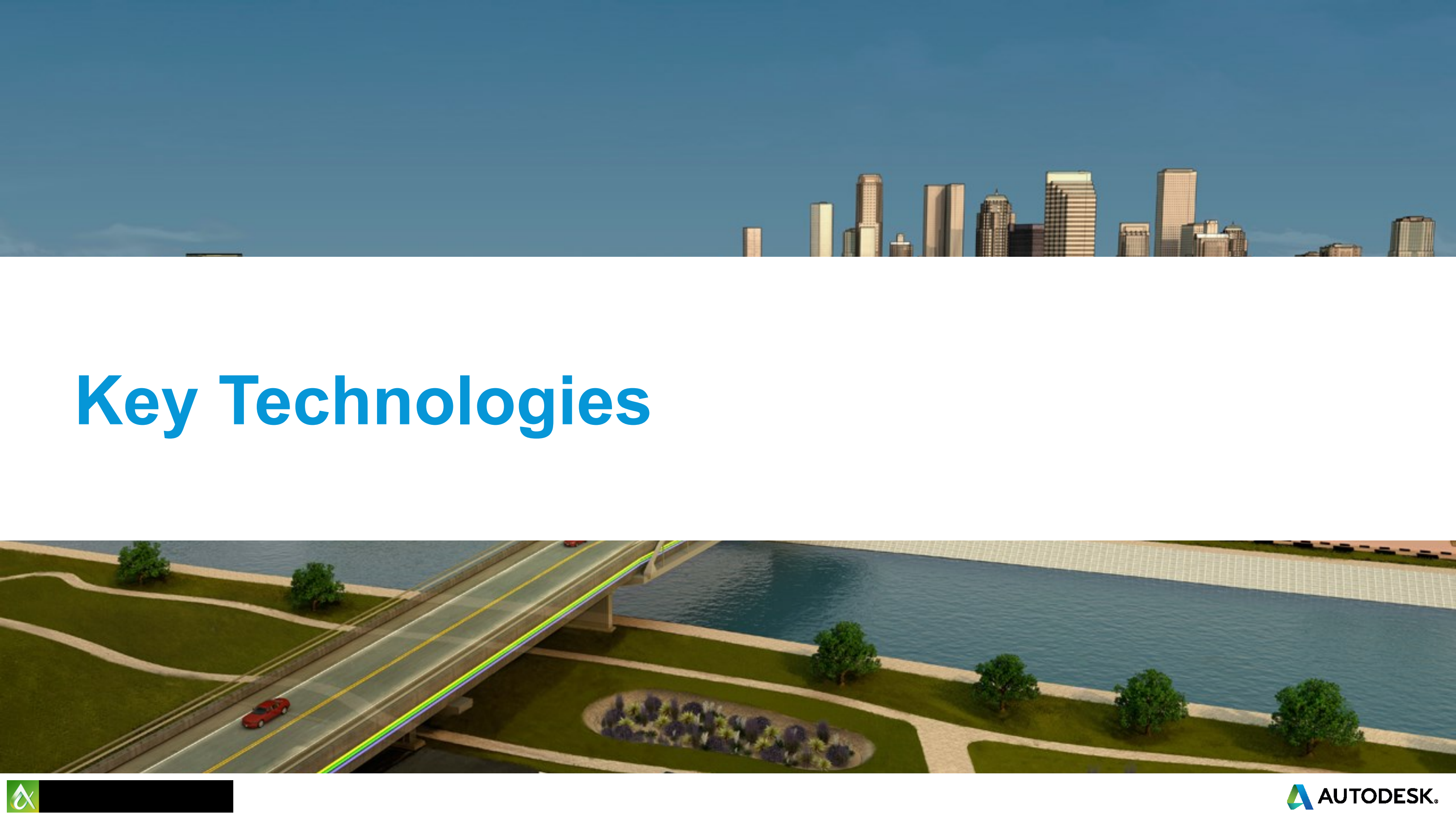
The Case for Change

- We can take charge of and drive technology
 - We've already been doing this (on a small scale)
 - Some very useful tools were originally developed by structural engineers
 - Democratization
 - Development Eco-System



Autodesk Technologies for Structural Engineers

- Leading the charge
- Driving capabilities for full integration of engineering workflows:
 - Analytical idealization
 - Structural analysis
 - Results visibility
 - Enabling engineering workflows (code checking/design)

An aerial view of a multi-lane highway bridge crossing a wide river. The bridge has a rainbow-colored light strip along its side. A red car is driving on the bridge. The riverbank is landscaped with green grass, trees, and a small garden bed. In the background, a city skyline with several tall buildings is visible under a clear blue sky.

Key Technologies

Key technologies enabling structural engineering

- Analytical model in Revit
- A360 Structural Analysis
- Results Package Support
- Revit API
- Analysis Visualization Framework
- Revit Code Checking Framework

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- **Analytical model in Revit**
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A horizontal strip at the top of the slide showing a city skyline with various skyscrapers under a clear blue sky.

Analytical Model and A360 Structural Analysis



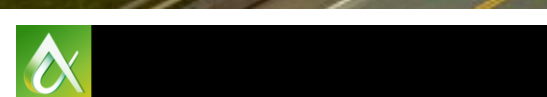


Results Management and Exploration



The image is a composite. The top portion shows a city skyline with several tall skyscrapers against a clear blue sky. The bottom portion shows an aerial view of a multi-lane bridge crossing a wide river. The bridge has a rainbow-colored line along its edge. On the left side of the bridge, a red car is visible. The riverbanks are landscaped with green grass, trees, and a small garden bed with purple flowers. The title "Integrated Concrete Design in Revit" is centered in the white space between the two images.

Integrated Concrete Design in Revit



Encouragement

- Learn more about programming
 - (Revit API, Dynamo, C#, etc.)
- Robot API – Results Access/Dynamo
- Learn more about the Code Checking Framework
- Participate!
 - Reach out to the ecosystem (advisory panels)
 - Help shape the tools you want to use

