SE6880: Integrated Concrete Design in Revit

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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
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)
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
Key technologies enabling structural engineering

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