From Design to Fabrication: Using Revit, Robot Structural Analysis and Advance Steel

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About the speaker

Mihai Sandu

Mihai has been working in the construction industry for over 13 years, going through several branches of the industry, from working in the production of aluminum windows, construction cost estimations, junior project planner, construction work supervision and quality assurance engineer in the software industry. Joined Autodesk in 2013, through the acquisition of Graitec, he is currently working as a Sr.QA Analyst for one of the teams that develops Revit and Advance Steel features. He is specialized in structural modeling and detailing.
About the speaker

Catalin Lang

Former Autodesk customer, currently Autodesk employee, working in constructions field for over 19 years, going through several branches of the industry, from junior unskilled worker to formwork specialist, storekeeper, project coordinator, project manager, CAD designer, structural designer. Joined Autodesk since 2014 as Quality Analyst. Currently, Product Owner for one of the teams that develops Revit and Advance Steel structural features. He is specialized in structural modeling and detailing.
From Design to Fabrication: Using Revit, Robot Structural Analysis, and Advance Steel

Description

This class will cover the workflow between Revit, Robot Structural Analysis and Advance Steel software, from the design to the fabrication of a steel structure.
Class Summary

Learning Objectives

• **How to handle the analytical model in Revit**
  o Exercise 1: Adding Start\End Releases
  o Exercise 2: Adding Boundary Conditions
  o Exercise 3: Adding Loads, Load Cases and Load Combinations

• **Collaborate with Robot Structural Analysis to bring the analysis results in Revit**
  o Exercise 4: Analyze the structure in Robot and visualize the analysis results in Revit

• **Integrate structural analysis results in Revit steel connections workflows**
  o Exercise 5: Verify if a steel connection withstands the efforts from a specific Load Combination
  o Exercise 6: Propagate steel connections inside the project

• **Collaborate with Advance Steel and create the fabrication documents (NC, DXF and detail drawings)**
  o Exercise 7: Set up the export settings and transfer the model to Advance Steel
  o Exercise 8: Number the model, create detail drawings, NC and DXF files
Tips before we start

USED SOFTWARE:

- **Revit 2021**, build 21.0.0.383 20200220_1100(x64)
- **Robot Structural Analysis 2021**, build 34.0.0.7777
- **Advance Steel 2021**, build 25.0.611.0
- **Advance Steel Extension for Revit 2021**, build 39

CLASS HANDOUT

- Exercise models
- Video\Steps
- Links to other resources
How to handle the analytical model in Revit
Exercise 1: Adding Start\End Releases

Model: *Warehouse-Imperial-1.rvt*

Video\Steps: [https://autode.sk/30f0pER](https://autode.sk/30f0pER)

In this exercise you will add Start\End Releases to each analytical bar, inside the analytical model. This is important because you will specify the degrees of freedom at each bar end.

Steps:
- 1. Add Fixed Start\End Releases for Columns, Rafters, Main Beams
- 2. Add Pinned Start\End Releases for Purlins, Vertical Braces and Horizontal Braces
Exercise 2: Adding Boundary Conditions

Model: Warehouse-Imperial-2.rvt
Video\Steps: https://autode.sk/34j0dFV

In this exercise you will add Boundary Conditions at the bottom of all the Columns inside the model. This step is important because you have to specify the support conditions of the structure.

Steps:
• 1. Create fixed constraints at the end of the Columns from Grids A and C, inside the Analytical Model view
• 2. Create fixed constraints at the end of the Columns from Grid D, inside the Base view
Exercise 3: Adding Loads, Load Cases and Load Combinations

Model: Warehouse-Imperial-3.rvt

Video/Steps: https://autode.sk/2HLRaph

In this exercise you will add Load Cases, Loads and Load Combinations to your project in order to assess possible deformations and stresses in your design.

Steps:

1. Create Load Cases: Dead Load, MEP, SNOW and WIND Y
2. Create Line Loads for every Load Case on the Analytical Model
3. Create 3 Load Combinations and an Envelope
Collaborate with Robot Structural Analysis to bring the analysis results in Revit
Exercise 4: Analyze the structure in Robot and visualize the analysis results in Revit

Model: *Wharehouse-Imperial-4.rvt*

Video\Steps: [https://autode.sk/34bUlOy](https://autode.sk/34bUlOy)

In this exercise you will learn how to transfer the Revit model to Robot Structural Analysis, analyze the structure, transfer the analysis results back in Revit and then visualize them on the whole structure or by selection.

Steps:

- 1. Transfer the model to Robot
- 2. Calculate the structure in Robot
- 3. Transfer the analysis results and model back to Revit
- 4. Visualize the analysis results on structure and individual selection
Integrate structural analysis results in Revit steel connections workflows
Exercise 5: Verify if a steel connection withstands the efforts from a specific Load Combination

Model: Wharehouse-Imperial-5.rvt

Video Steps: https://autode.sk/3cJev6p

In this exercise you will determine what is the maximum Moment between the Rafters and Columns, find the associated Shear Force and Axial Force and design a Moment End Plate connection between the 2 members, using the Code Checking module inside Revit.

Steps:
• 1. Determine the max efforts from Envelope
• 2. Create a Moment End Plate connection between the Rafter and Column
• 3. Configure the steel connection geometry
• 4. Verify the steel connection at the efforts from the Load Combination
Exercise 6: Propagate steel connections inside the project

Model: Warehouse-Imperial-6.rvt

Video\Steps: [https://autode.sk/2GlYx60](https://autode.sk/2GlYx60)

In this exercise you will create a Base Plate Connection at the bottom of a column, a Double purlin splice plate connection between two purlins and a rafter and then you will populate the model with these connections using the Propagate command.

Steps:

• 1. Create Base Plate connection and then Propagate it in the project
• 2. Select the Moment End Plate and then Propagate it in the project
• 3. Create Double Purlin Splice Plate connection and then Propagate it in the project
Collaborate with Advance Steel and create the fabrication documents (DWG, NC, DXF)
Exercise 7: Set up the export Settings and transfer the model to Advance Steel

Model: Warehouse-Imperial-7.rvt
Video\Steps: https://autode.sk/34hb5Us

In this exercise you will learn how to set up the export settings in Advance Steel Extension for Revit add-on and transfer the model to Advance Steel software in order to create the fabrication data.

Steps:
• 1. Configure the Export Settings in Advance Steel Extension for Revit
• 2. Export the model to SMLX format
• 3. Open Advance Steel 2021 \ US version, and import the SMLX file in a new drawing.
Exercise 8: Number the model, create detail drawings, NC and DXF files

Model: *Wharehouse-Imperial-8.dwg*

Video\Steps: [https://autode.sk/3jxCvfj](https://autode.sk/3jxCvfj)

In this exercise you will learn how to automatically number the model using the “With Drawing Number” option, create detail drawings (Single Part and Assembly), explode drawings to DWG, plot drawings to PDF, create NC files and DXF files.

Steps:

- 1. Number the model using the "With Drawing Number" option
- 2. Create Single Part and Assembly drawings using Drawing Processes
- 3. Create NC files
- 4. Create DXF files