

SE5099: Structural Steel Analysis Workflows with Plant Design Suite Ultimate

Jason Drew

Premium Support Specialist

Twitter: JDplant3D

Jad Dellel

Premium Support Specialist

Twitter: JD_RSA_RST

About the Speakers

Jason Drew

Product Support Specialist, Enterprise Support
Autodesk, Inc.

Jad Dellel

Product Support Specialist, Enterprise Support
Autodesk, Inc.

Class summary

In this class we will discuss workflows for structural steel analysis. The applications we will be working with:

- AutoCAD Plant 3D
- Revit Structure
- Robot Structural Analysis Professional
- Advance Steel
- Navisworks Manage

Key learning objectives

At the end of this class you will have:

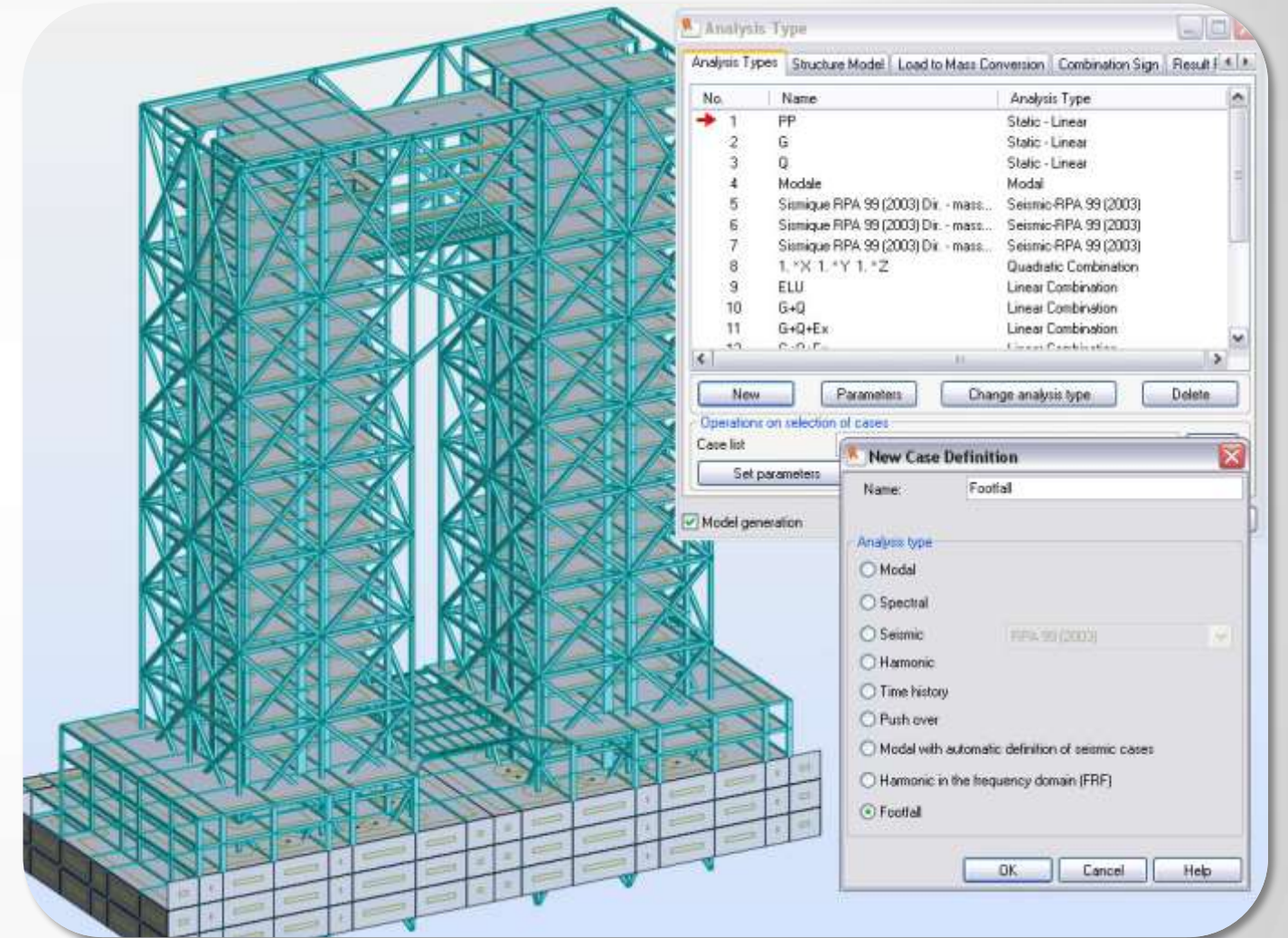
- An overview of five Autodesk products
- An understanding best practices for model interoperability with Autodesk Advance Steel, Revit, Robot, and Plant 3D
- The ability to perform structural analysis of steel structures with Robot Structural Analysis
- Understanding of collaboration between engineering disciplines with Navisworks

Overview of Applications

Robot Structural Analysis Professional



- Based on the FEM
- Multi-codes
- Multi-Analysis
- Multi-language
- Multi-material
- Bidirectional link with Revit
- Open and flexible API



Revit Structure



- Design and documentation system
- Create 2D / 3D views and drawings
- 3 disciplines Architecture + Structure + MEP

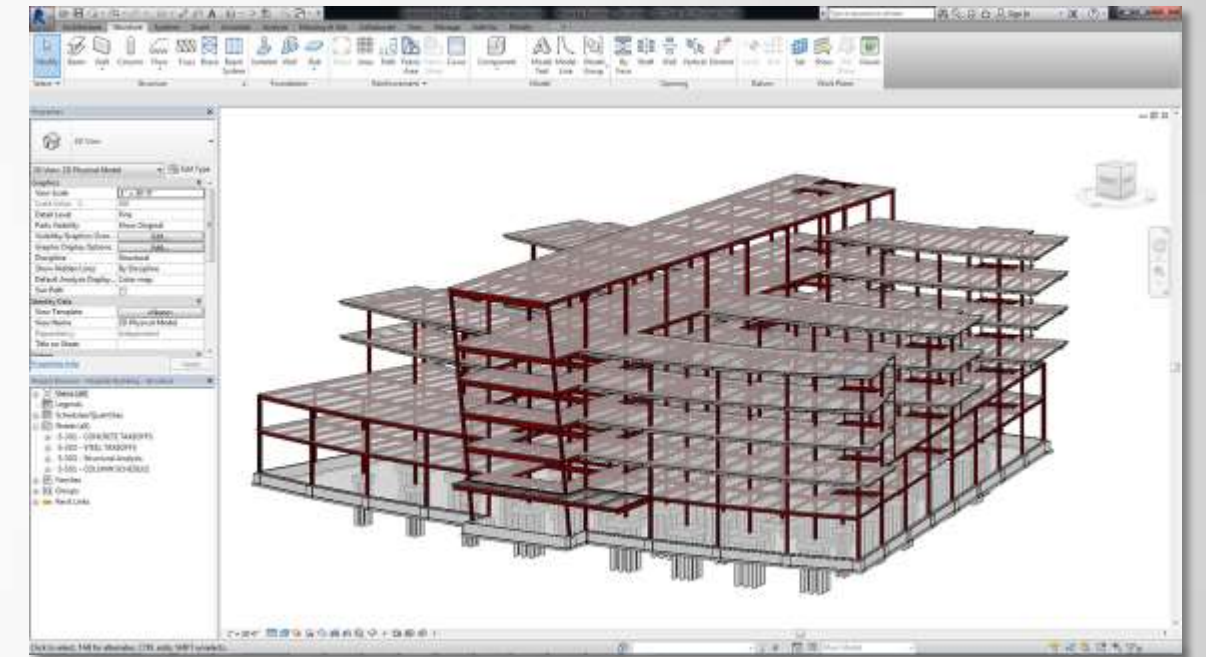
Design + Documentation



Design, drawings, schedules



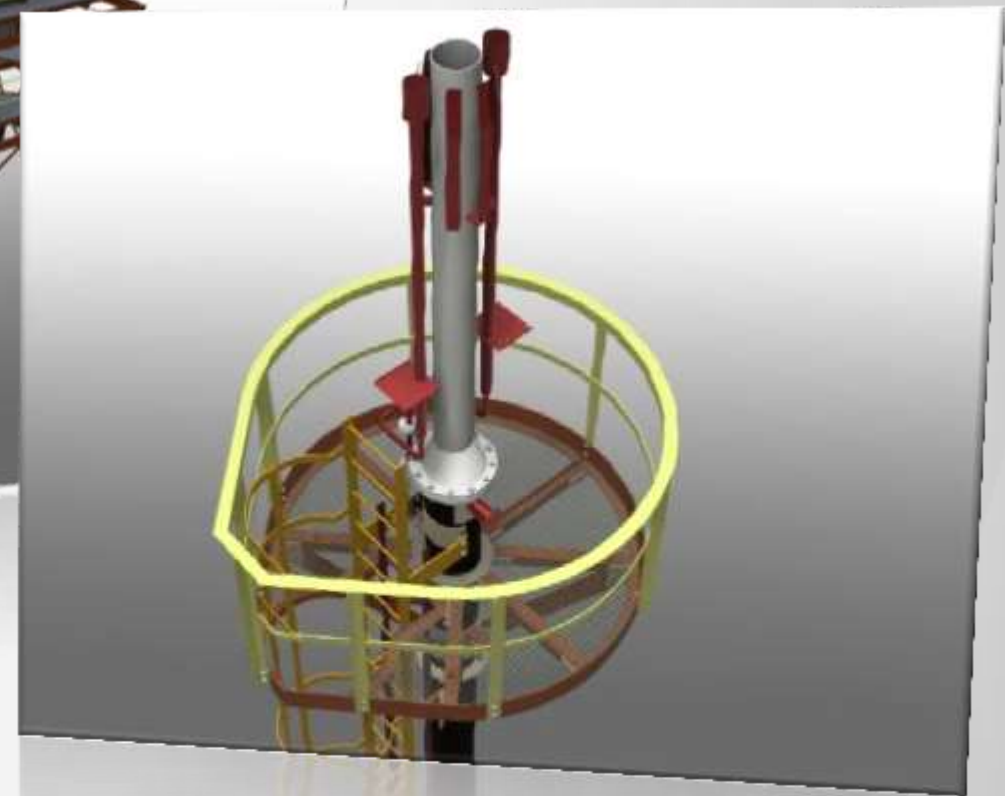
BIM



Autodesk Advance Steel



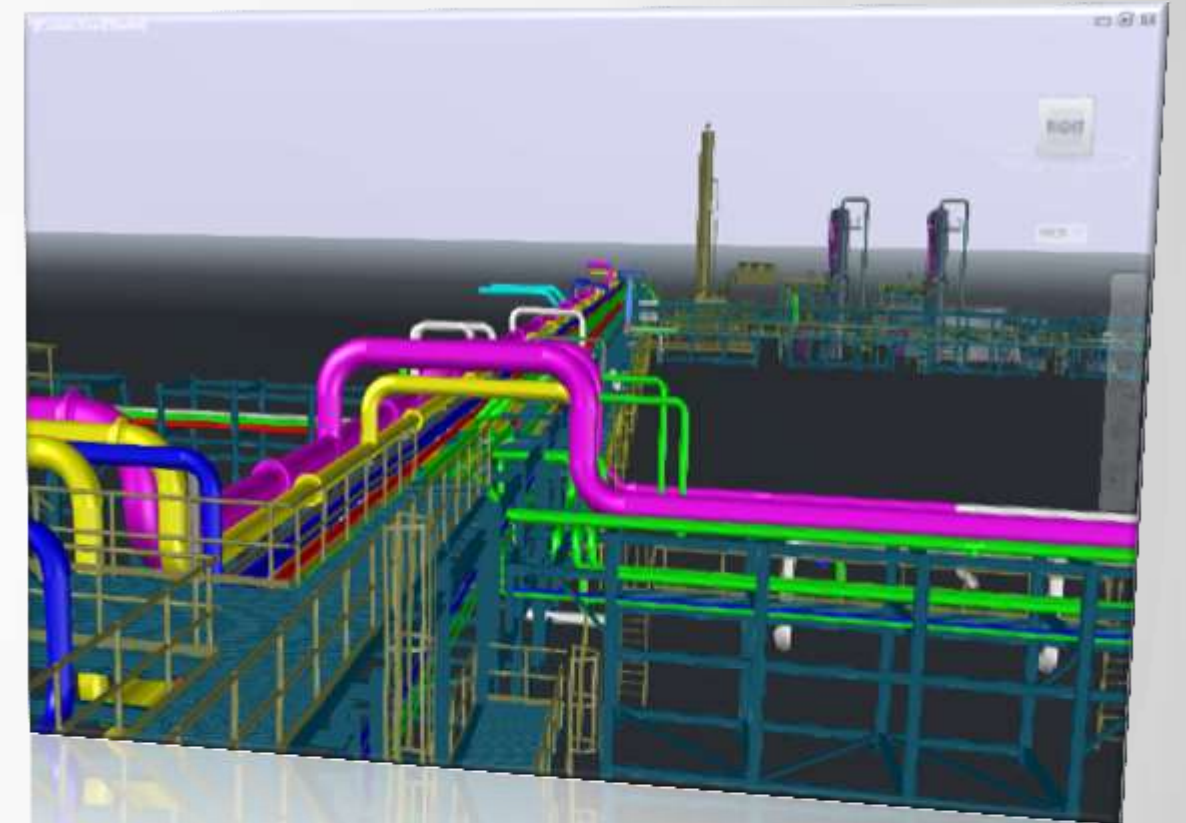
- Software for structural steel engineering, detailing and fabrication
- Modeling environment based on AutoCAD
- Applications for beams, sheet metal, cladding, grating, stairs, railings, plates, bolts, misc.
- Extensive connection library
- Automatic document creation
- Integration with Autodesk Revit



AutoCAD Plant 3D



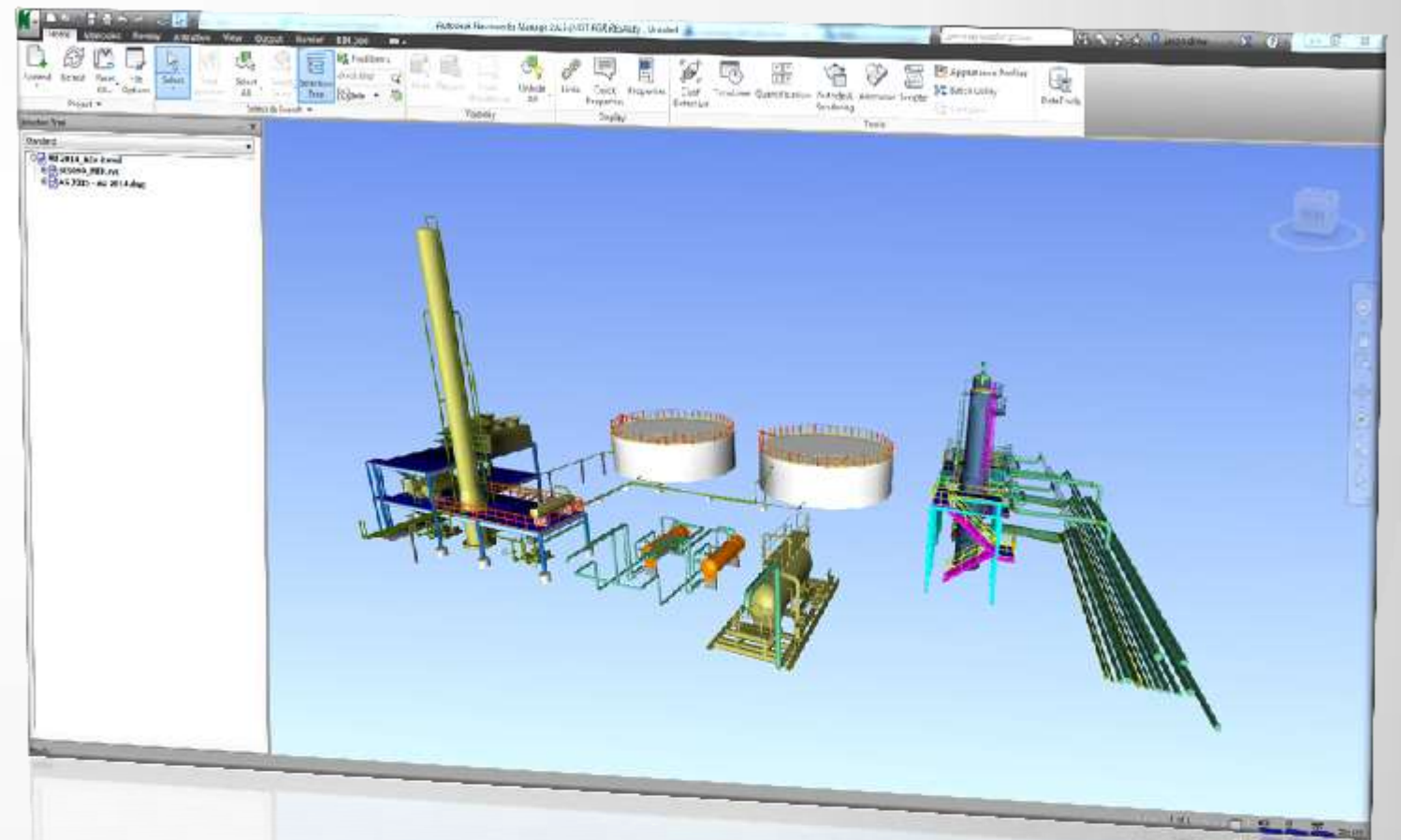
- Modeling environment based on AutoCAD
- Process pipe and P&ID design solution
- Equipment modeling
- Preliminary structural steel design
- Generate isometric drawings
- Generate orthographic drawings
- Customized project reports
- SQLite or Microsoft SQL Server database



Navisworks Manage

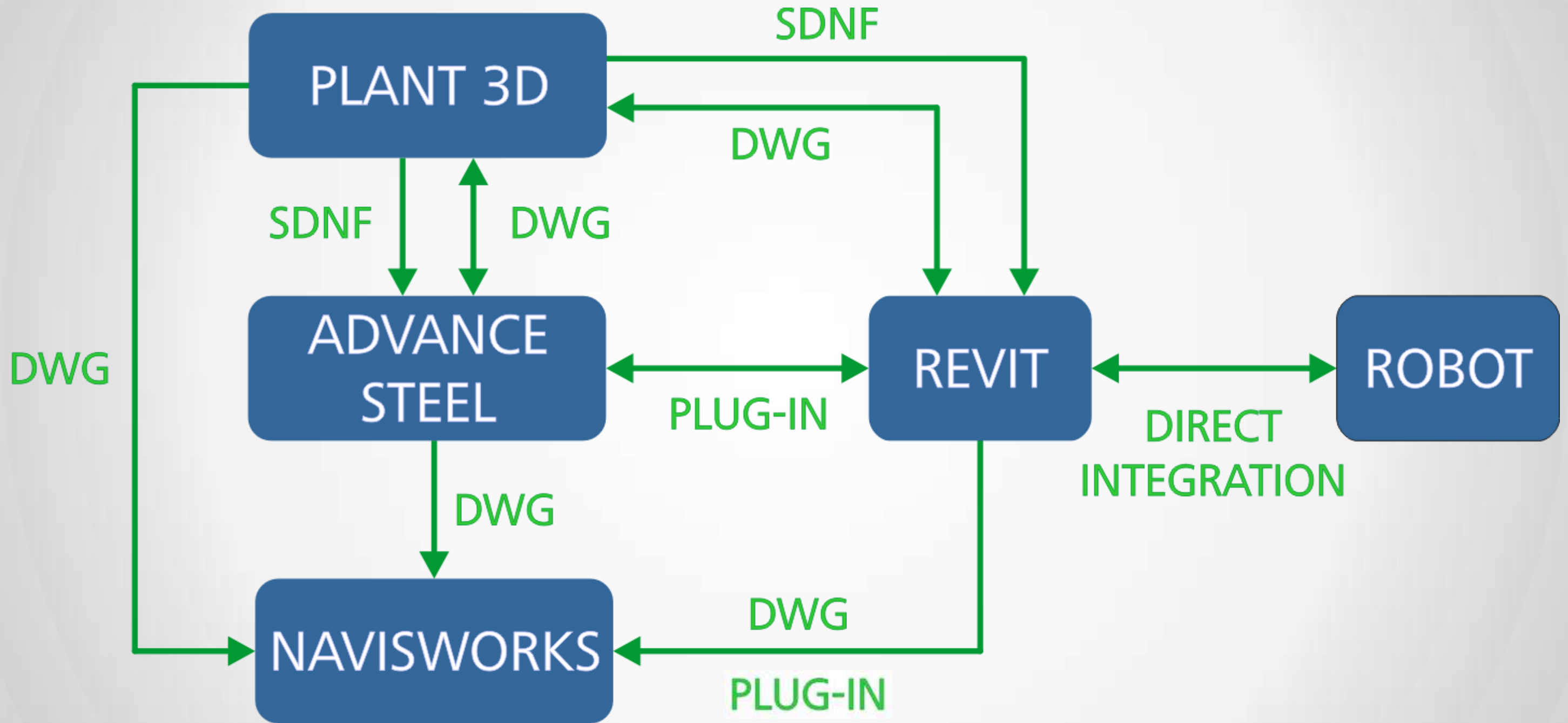


- 3D model coordination and review
- 5D simulation
- Clash detection
- Photorealistic rendering
- Integration with Revit



Best practices for model interoperability

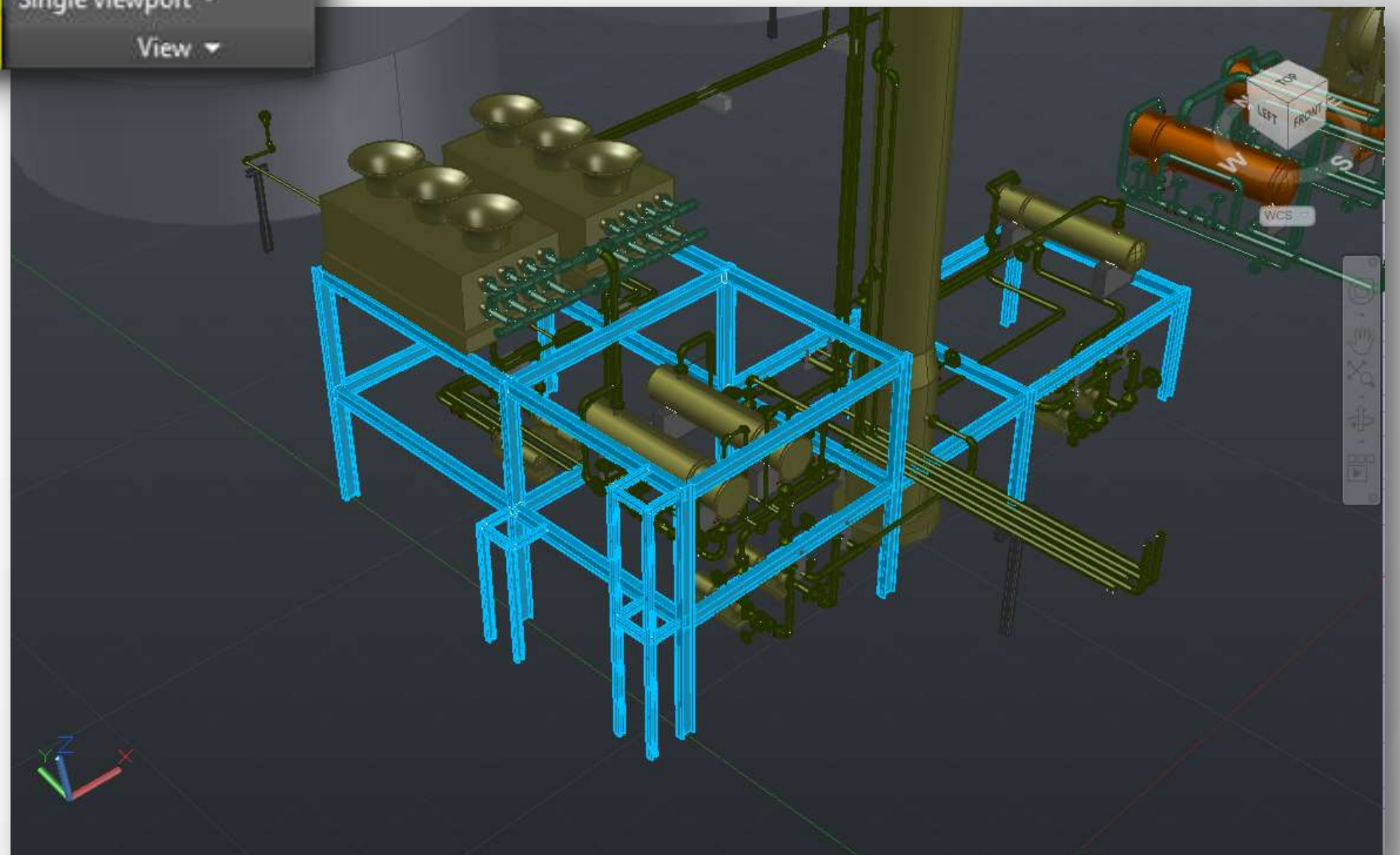
Workflow Diagram



AutoCAD Plant 3D



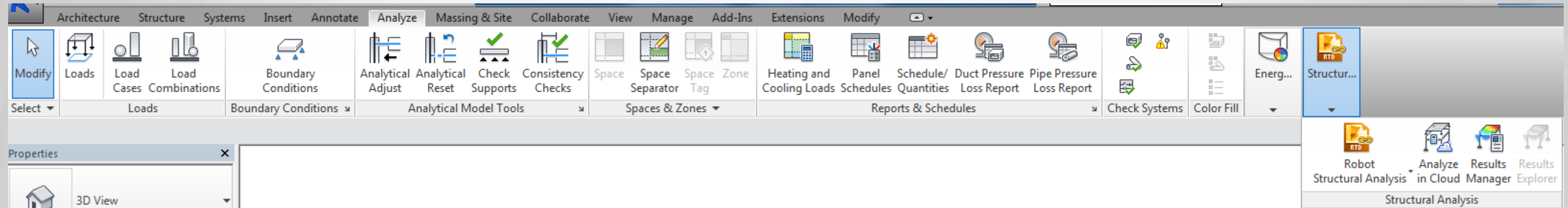
- Exporting steel to SDNF



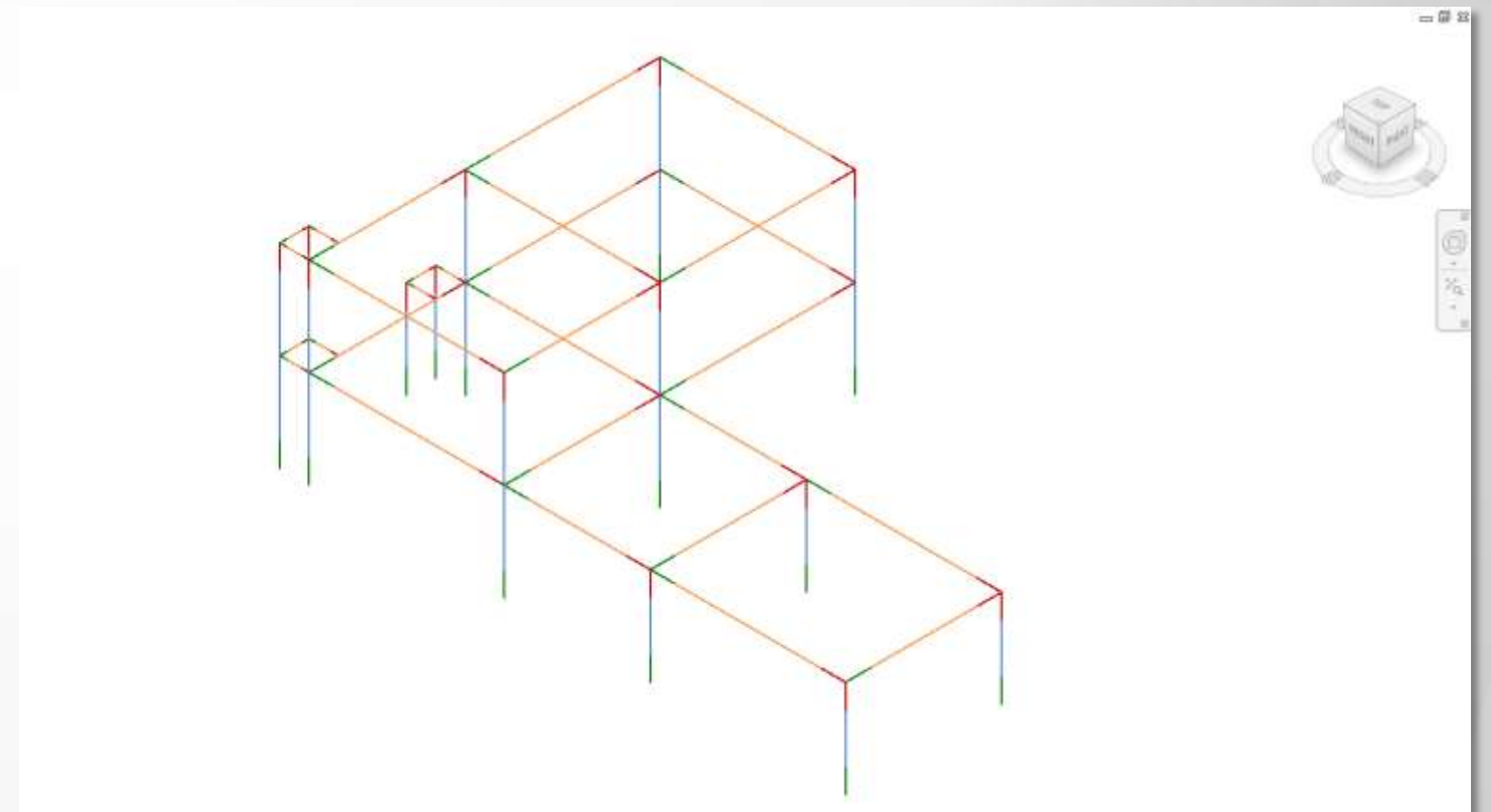
Live Demo

Plant 3D steel overview and export (SDNF) to Revit

Revit Structure

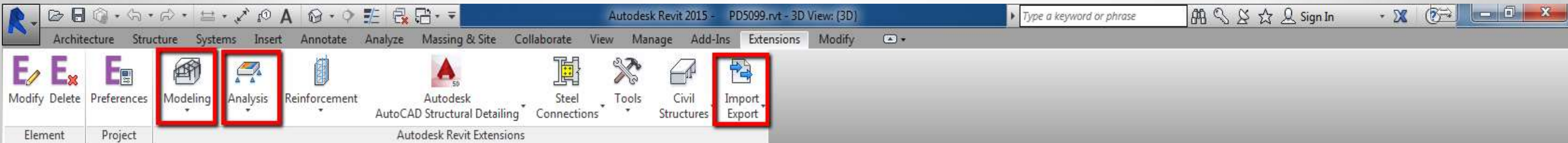
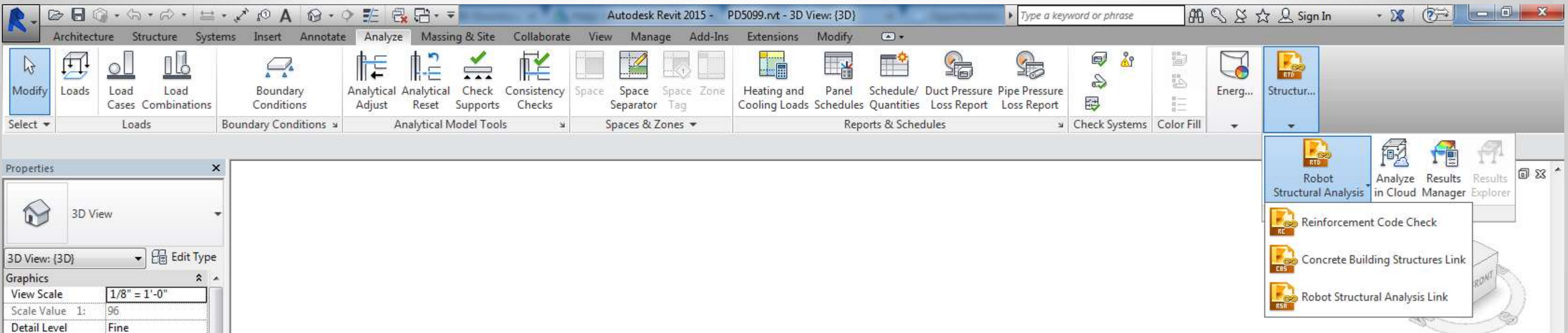
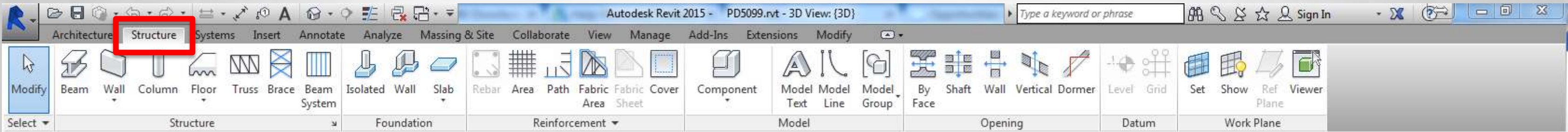


The Physical Model



The Analytical Model

Revit Structure

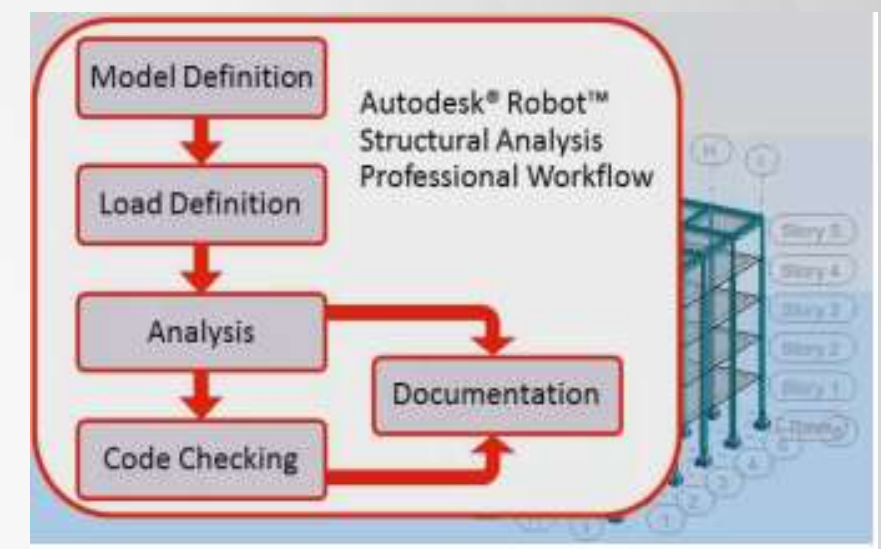
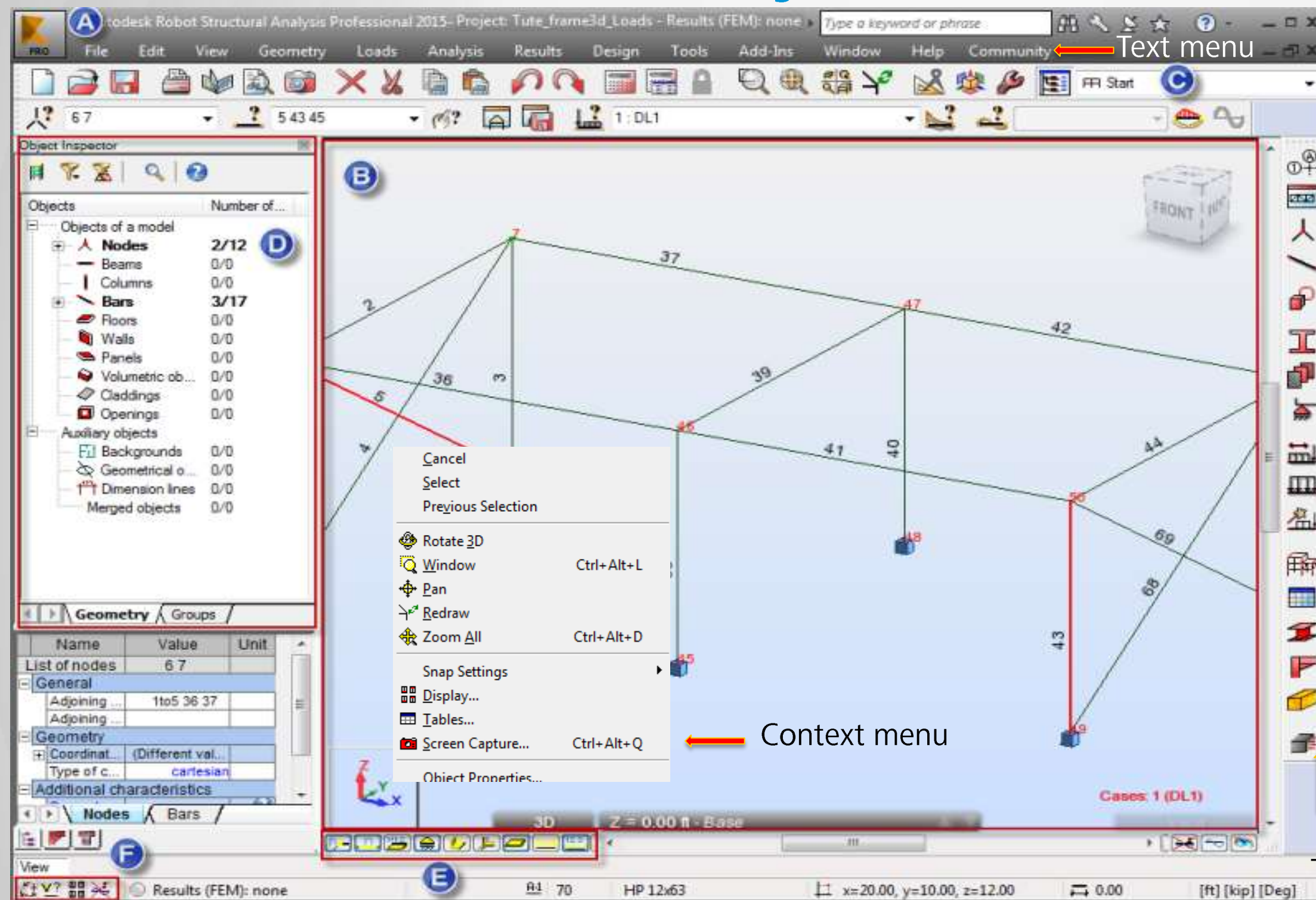


Live Demo

Revit Structure overview and integration with RSA

Structural analysis of steel with Robot Structural Analysis

Robot Structural Analysis Professional

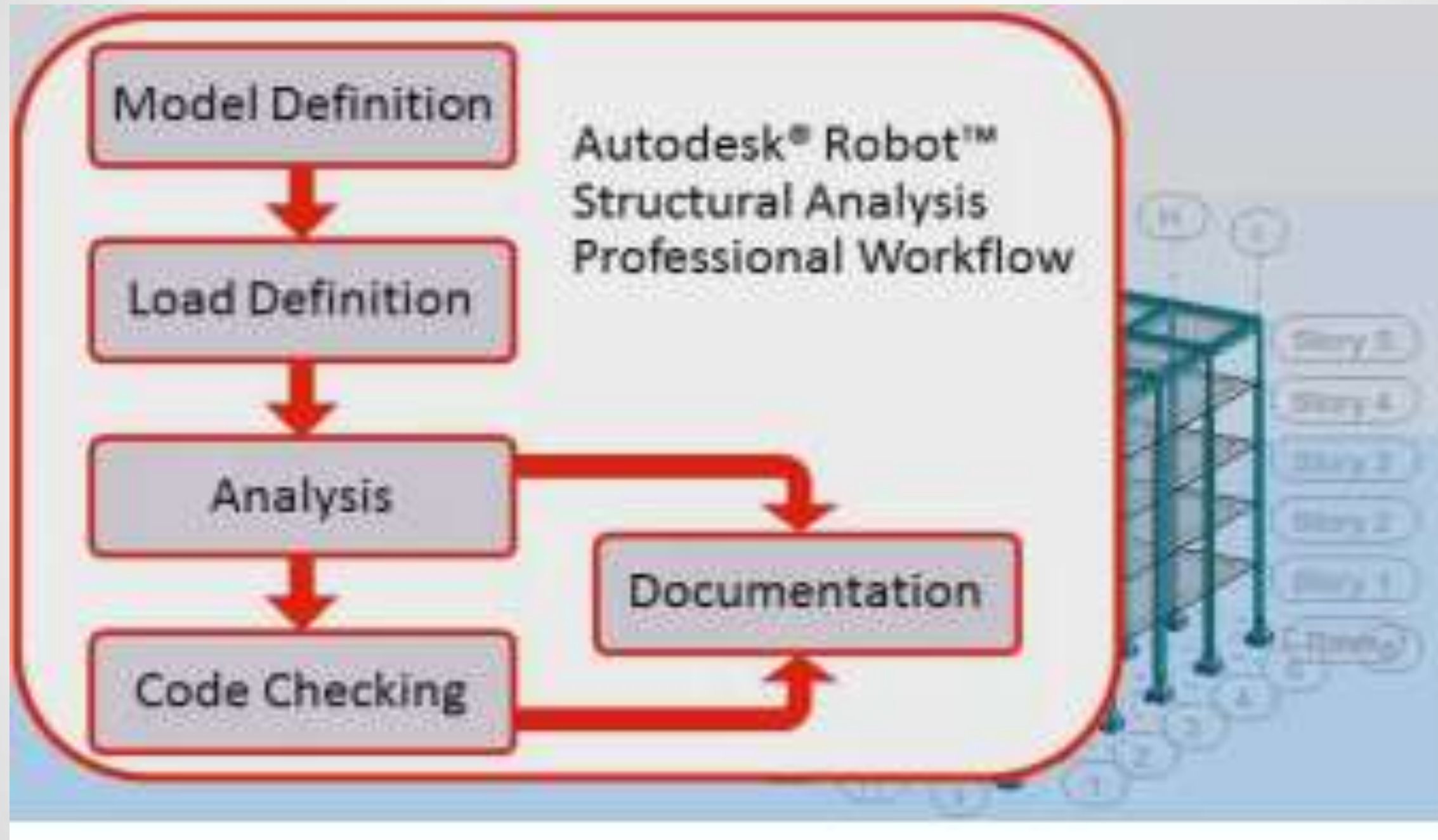


- A. Title bar
- B. Drawing area
- C. Layouts
- D. Object inspector
- E. Views
- F. Quick launch buttons

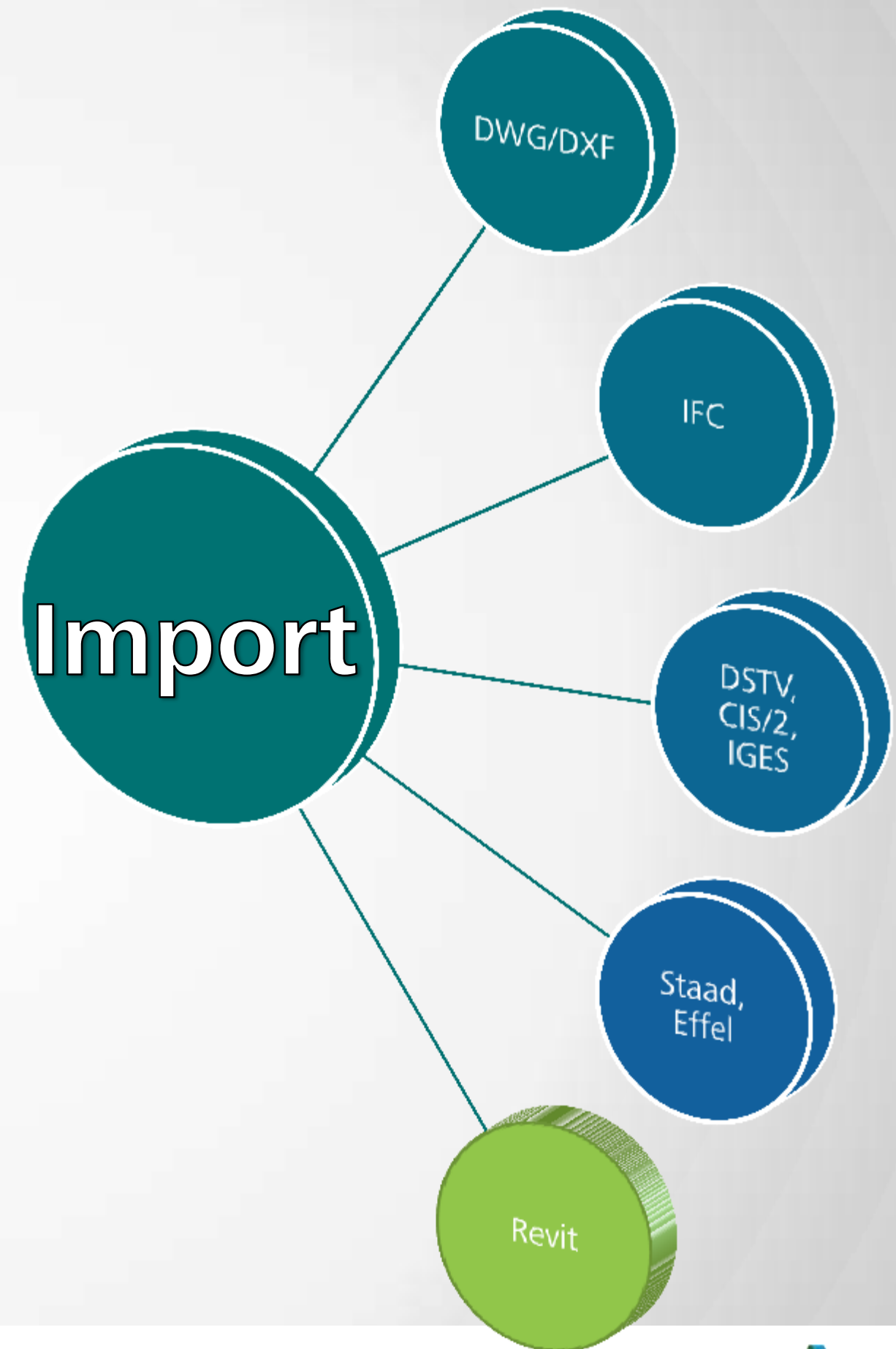
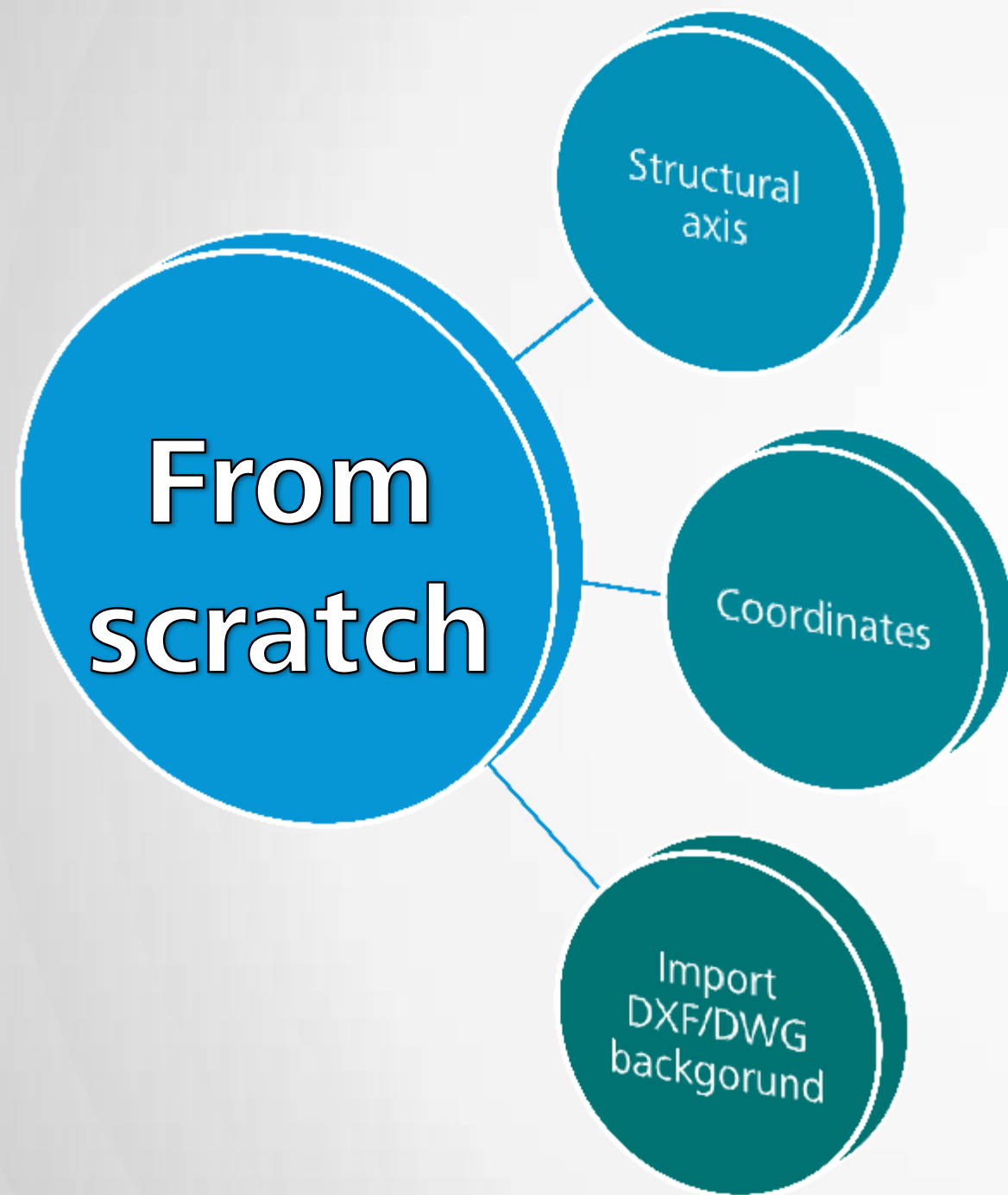
Text menu
Toolbar context menus

Toolbar

RSA - Workflow



RSA - Model definition



RSA- Load definition

Load Types

Case description

Number: 6 Label: SEIS1

Nature: seismic

Name: SEIS1

Add Modify

List of defined cases:

No.	Case name	Nature	At
1	DL1	dead	St
2	LL1	live	St
3	WIND1	wind	St
4	WIND2	wind	St
5	SN1	snow	St
→ 6	SEIS1	seismic	St

Delete Delete all

Close Help



Load Definition

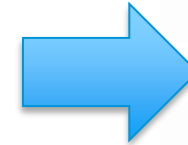
Case No: 2 : LL1
Selected:

Self-weight and mass

Node Bar Surface

Apply to

Apply Close Help



Uniform Load

Values

p (kip/ft) (Deg)

X: 0.00 0.0

Y: 0.00 0.0

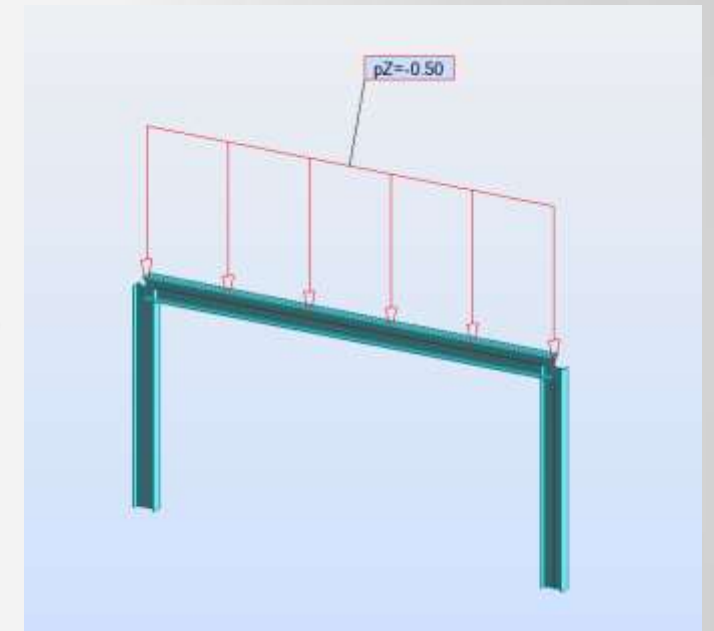
Z: -0.5 0.0

Coord. system: ☒ Global ☐ Local

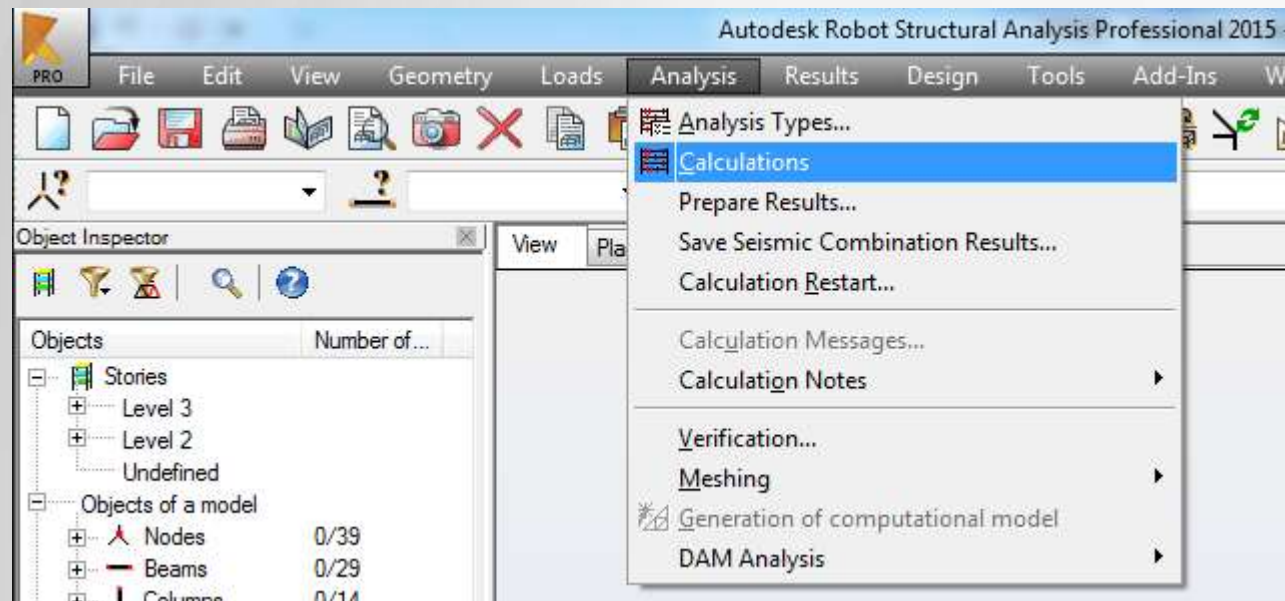
☐ Projected load

☐ Loads on eccentricity

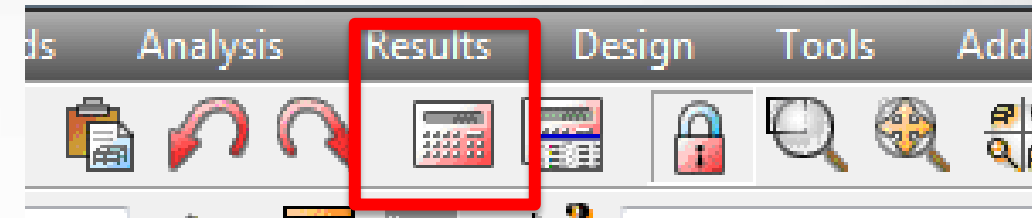
Add Close Help



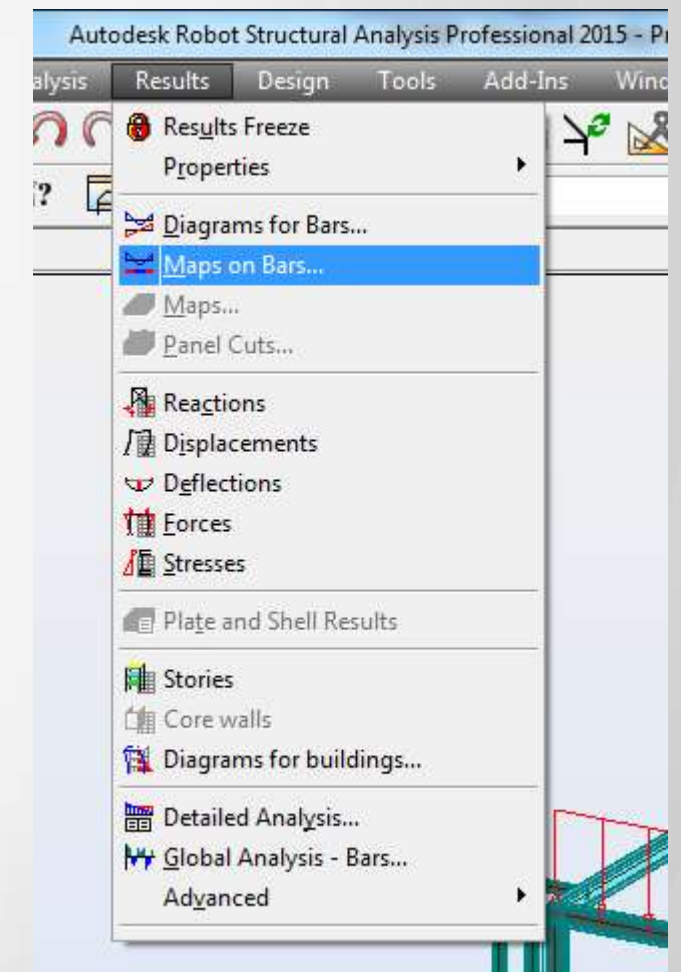
RSA - Analysis



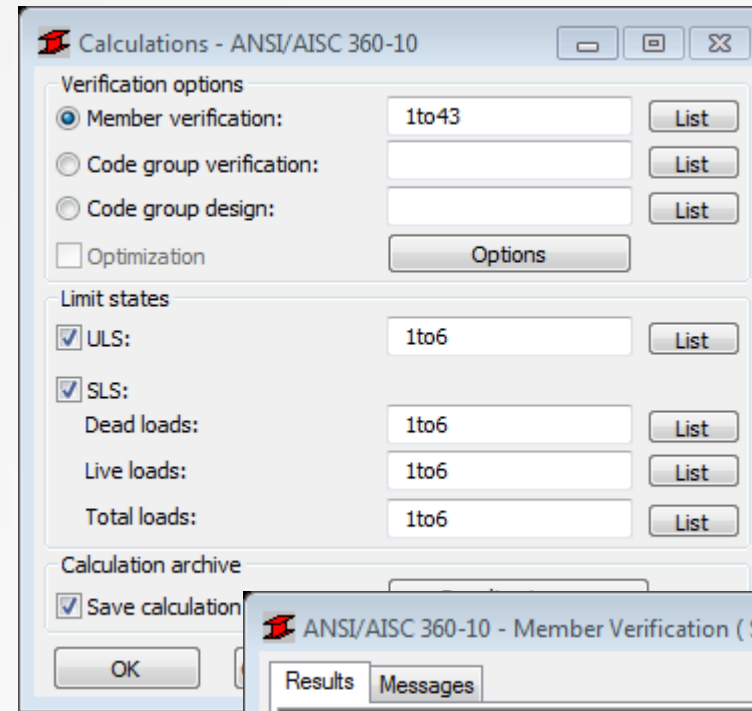
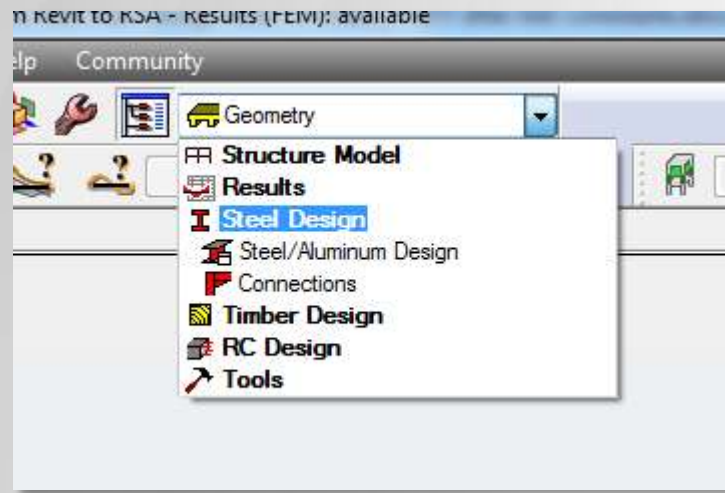
OR



Get results!



RSA- Code checking



Get results!



The results window shows a table of member verification results. The table has columns: Member, Section, Material, Lay, Laz, Ratio, and Case. The results are as follows:

Member	Section	Material	Lay	Laz	Ratio	Case
1 RevitColGravity	W 12x30	STEEL	46.12	157.93	0.06	2 LL1
2 RevitColGravity	W 12x30	STEEL	46.12	157.93	0.06	2 LL1
3 RevitColGravity	W 12x30	STEEL	46.12	157.93	0.04	1 DL1
4 RevitColGravity	W 12x30	STEEL	46.12	157.93	0.03	1 DL1
5 RevitColGravity	W 12x30	STEEL	46.12	157.93	0.03	1 DL1
6 RevitColGravity	W 12x30	STEEL	46.12	157.93	0.04	1 DL1
7 RevitBeam_7	W 12x40	STEEL	46.85	123.62	0.02	1 DL1
8 RevitBeam_8	W 12x40	STEEL	37.48	98.90	0.01	1 DL1
9 RevitBeam_9	W 12x40	STEEL	46.85	123.62	0.02	1 DL1
10 RevitBeam_10	W 12x40	STEEL	46.85	123.62	0.02	1 DL1
11 RevitBeam_11	W 12x40	STEEL	46.85	123.62	0.02	1 DL1
12 RevitBeam_12	W 12x40	STEEL	37.48	98.90	0.01	1 DL1
13 RevitBeam_13	W 12x40	STEEL	46.85	123.62	0.02	1 DL1
14 RevitBeam_14	W 12x40	STEEL	46.85	123.62	0.21	2 LL1
15 RevitBeam_15	W 12x40	STEEL	37.48	98.90	0.01	1 DL1
16 RevitBeam_16	W 12x40	STEEL	46.85	123.62	0.02	1 DL1
17 RevitBeam_17	W 12x40	STEEL	46.85	123.62	0.02	1 DL1
18 RevitBeam_18	W 12x40	STEEL	46.85	123.62	0.02	1 DL1
19 RevitBeam_19	W 12x40	STEEL	37.48	98.90	0.01	1 DL1
20 RevitBeam_20	W 12x40	STEEL	46.85	123.62	0.02	1 DL1

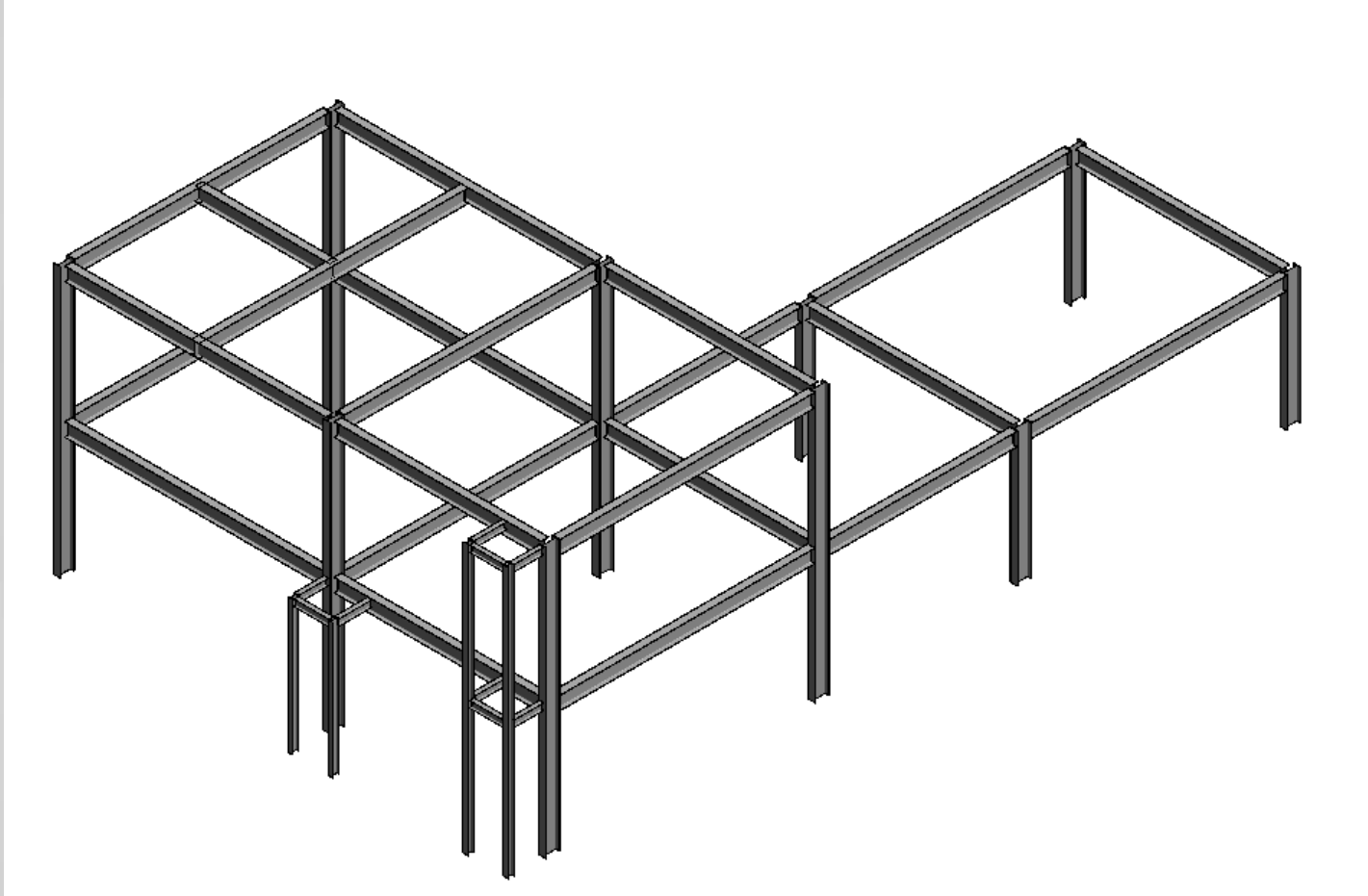
On the right side of the window, there are buttons for 'Calc. Note', 'Close', and 'Help'. Below these are buttons for 'Ratio', 'Analysis', and 'Map'. At the bottom right, there is a section for 'Calculation points' with the following values: Division: n = 3, Extremes: none, Additional: none.

Live Demo

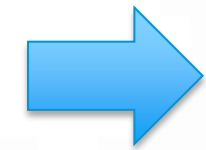
Revit to RSA and structural analysis

Revit to Advance Steel

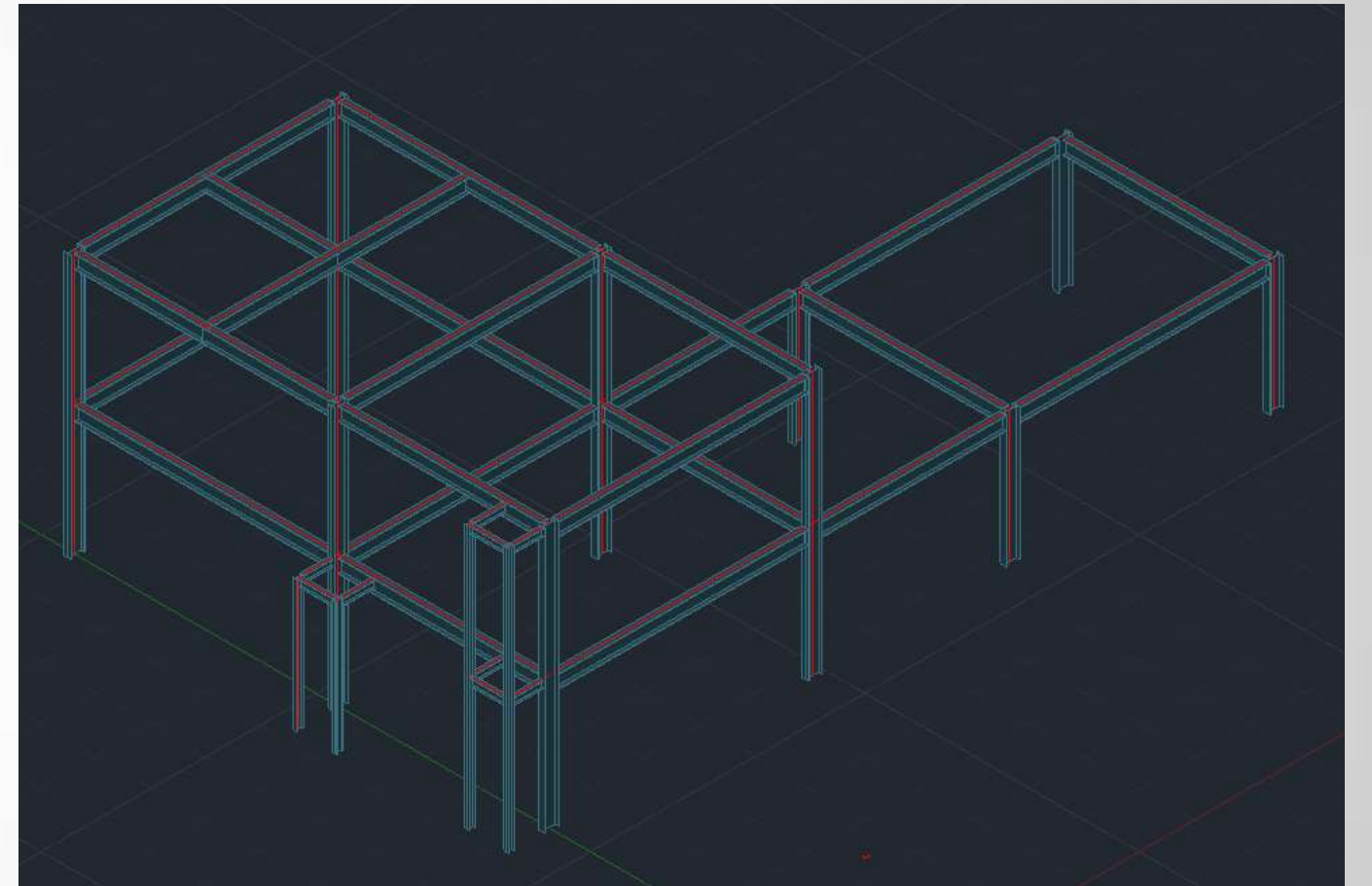
Advance Steel Extension



Revit



.GTCX

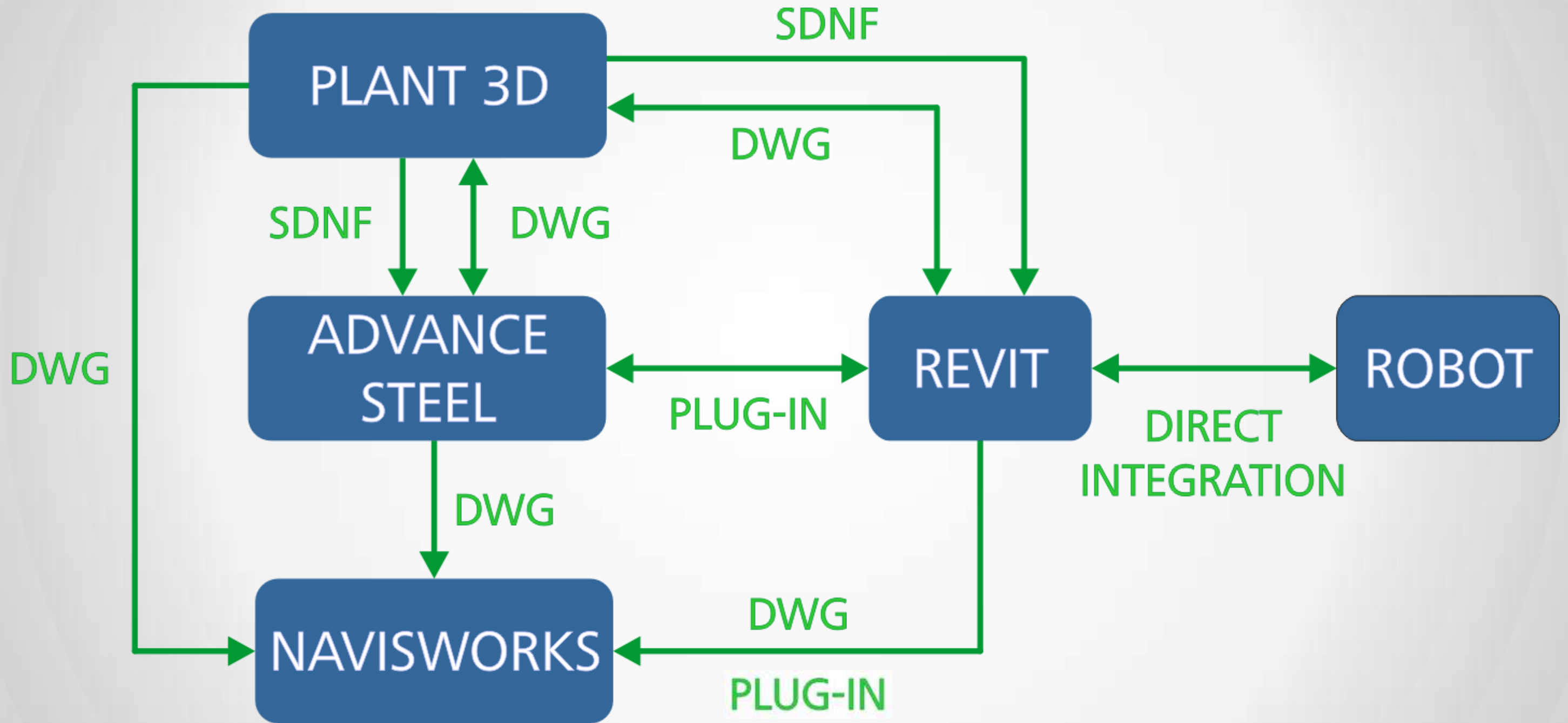


Advance Steel

Live Demo

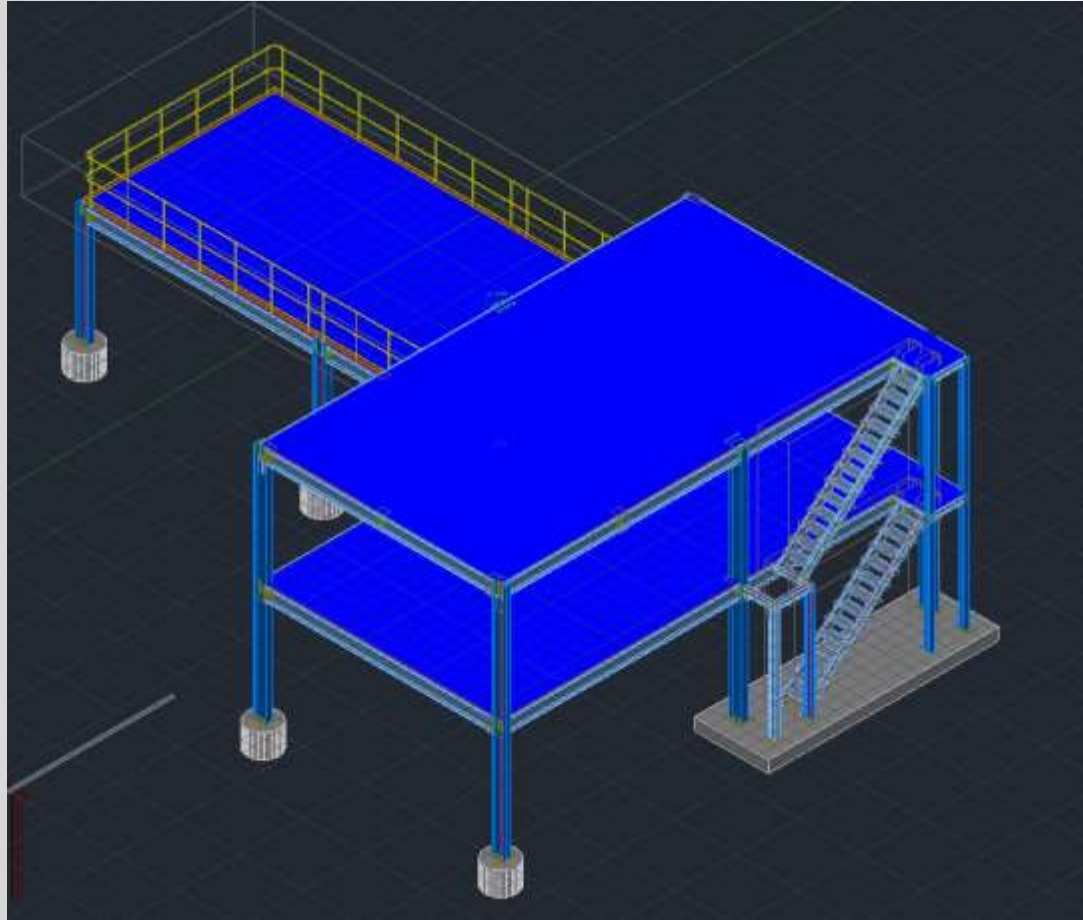
Revit to Advance Steel with AS Extension

Workflow Review

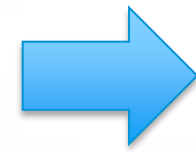


Advance Steel to Plant 3D

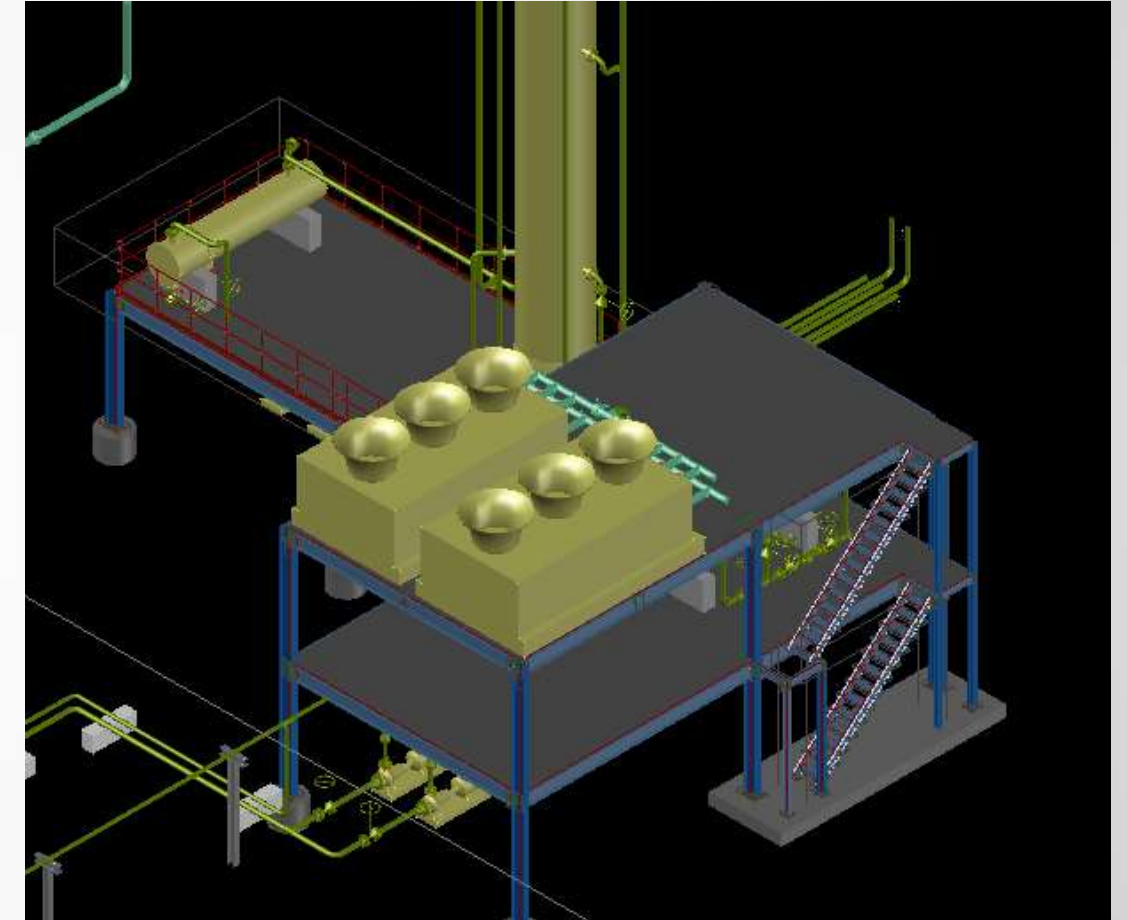
Advance Steel integration with Plant 3D



Advance Steel



.DWG



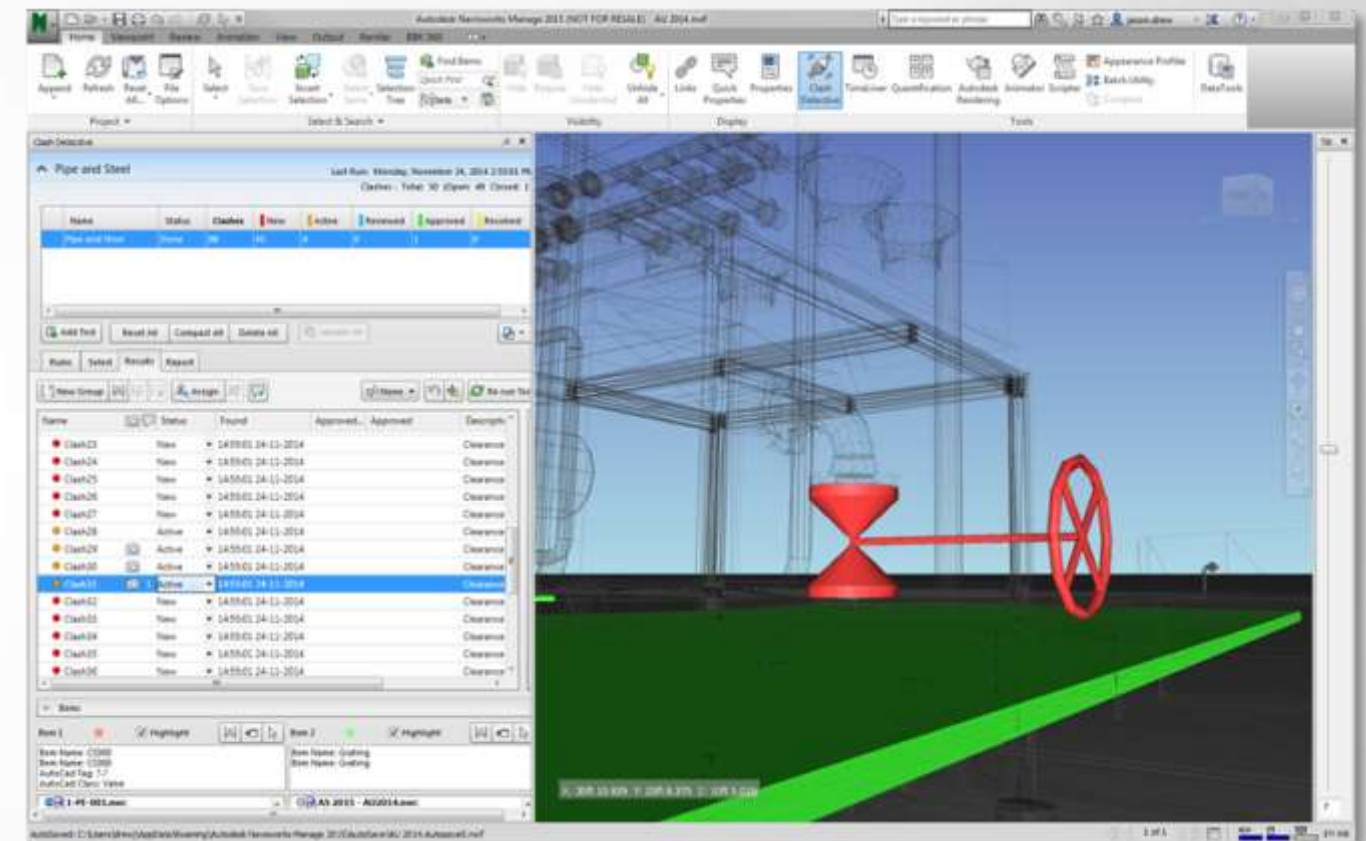
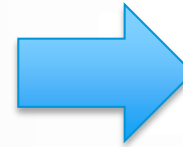
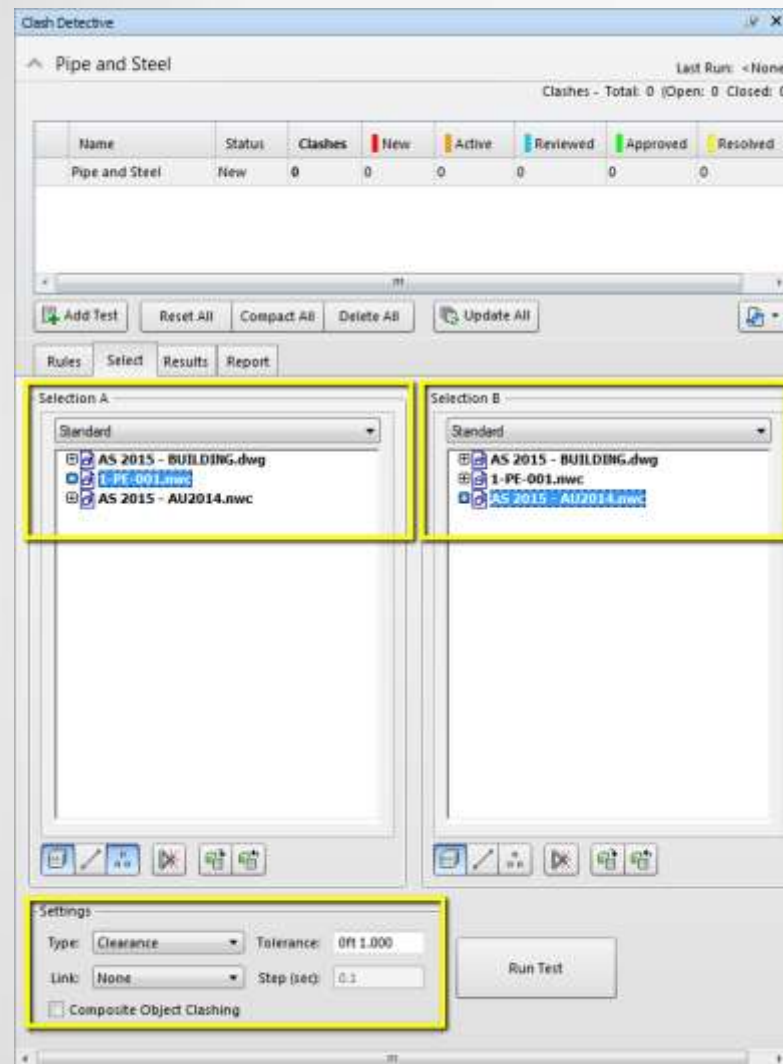
Plant 3D

Live Demo

Advance Steel DWG to Plant 3D project

Collaborate between engineering disciplines with Navisworks

Navisworks Manage Clash Detection



Live Demo

Navisworks clash detection

Session Feedback

- Via the Survey Stations, email or mobile device
- AU 2014 passes given out each day!
- Best to do it right after the session
- Instructors see results in real-time





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