

ES11025: BIM ready fabrication for 3D rebar cages.



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Comfort and Safety

- Emergency Exits
- Mobile / Cell Phones ➡ silent!
- 1 Hour Session
- Enjoy 😊

Class summary

- The industry needs to find a BIM workflow to link together the engineers, contractors and fabricators.
- As Building Information Modeling (BIM) adoption grows and general-purpose structural frame analysis software is being integrated with BIM workflows, connecting object-level design tools are not.
- There is an opportunity to drive BIM design information from these design tools in order to better streamline the different stakeholders to BIM workflows.
- GRAITEC's Revit-based software will bridge this gap between the designers, the contractors and the fabricators to get real benefit from BIM for RC structures
- IFC files: an opportunity?

Key learning objectives

At the end of this class, you will be able to:

- Start from an Autodesk Revit® model and see how to import and manage FEM results
- Complete design and reinforcement assumptions in Revit®!
- Get the 3D structural rebar, drawings and reports automatically produced in Revit®
- Enable the collaboration from engineering down to contractors and fabricators thanks to Autodesk A360®
- See how to link with Autodesk Navisworks Manager®
- See how to send this data to an IFC file

Introducing...



- **30 years** expertise developing CAD, BIM and Design solutions for **structural engineers and designers**
- **25 offices** in USA, Canada, UK, France, Germany, Italy, Czech Republic, Romania, Russia, Poland
- **Global coverage** with authorized reseller network
- One of the **biggest worldwide Autodesk partners**



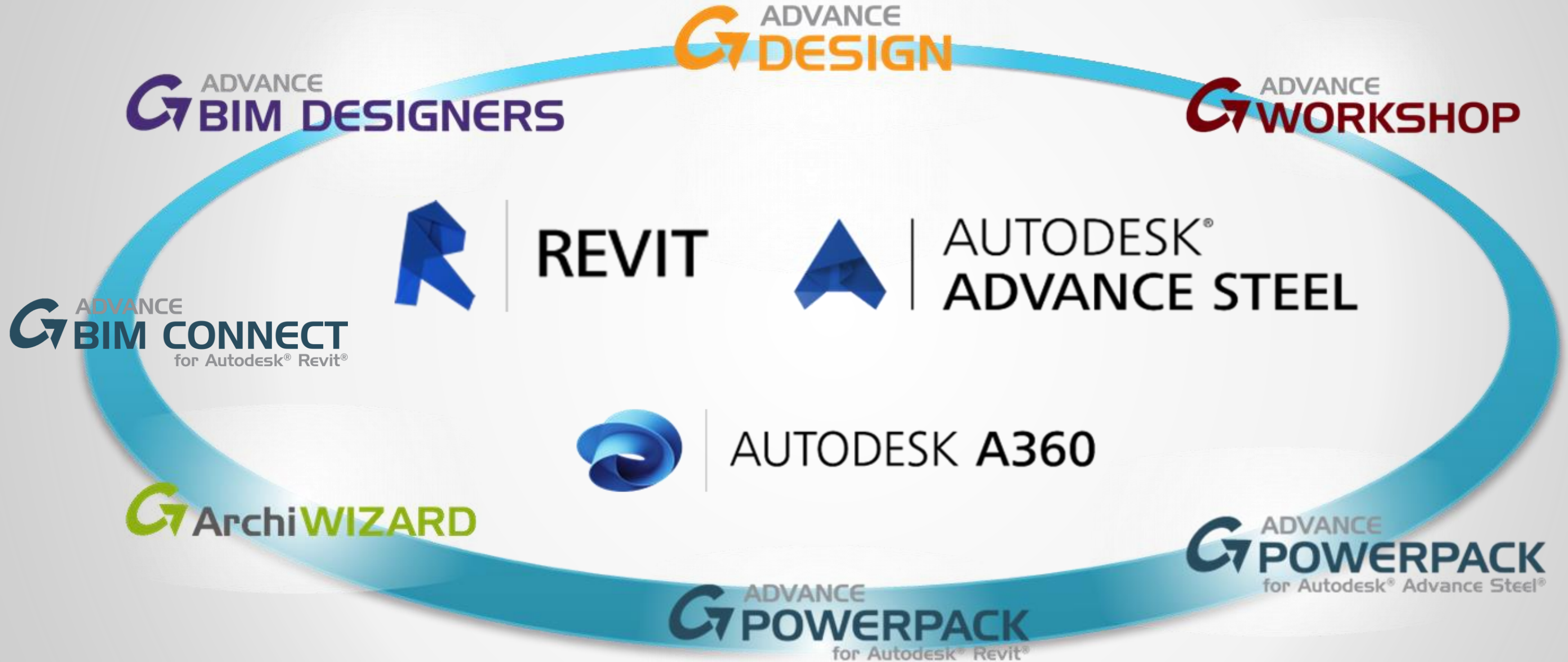


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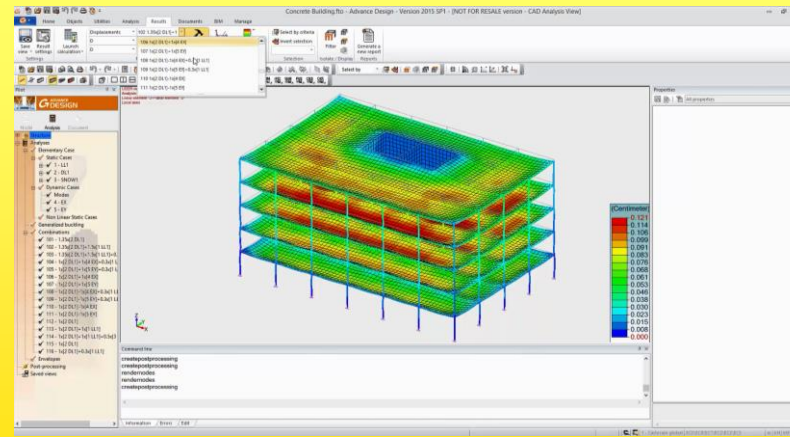
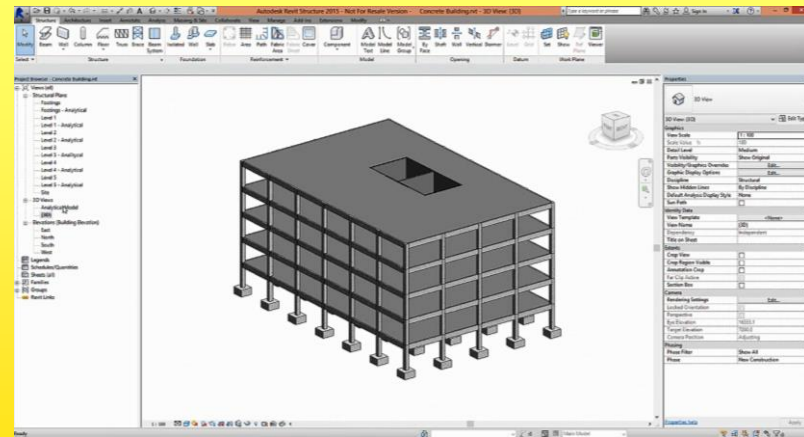
Workflows

Connected BIM Workflows

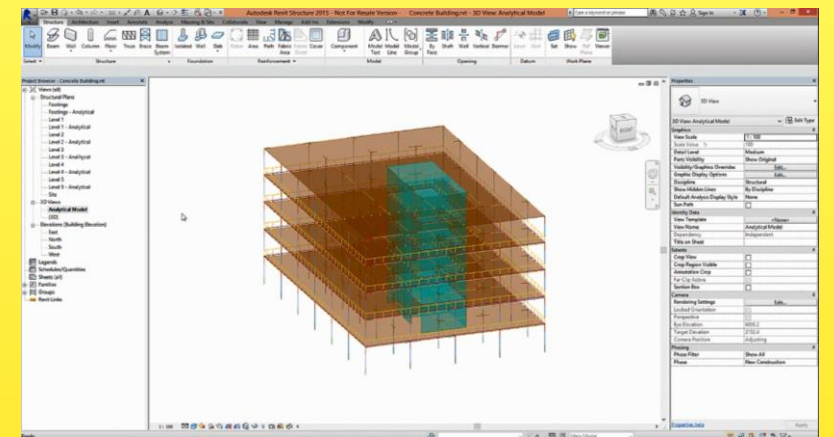
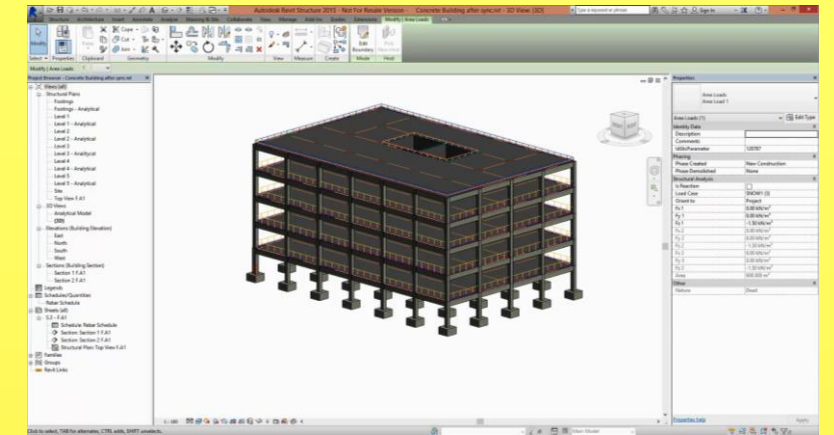


Revit® ↔ Engineer

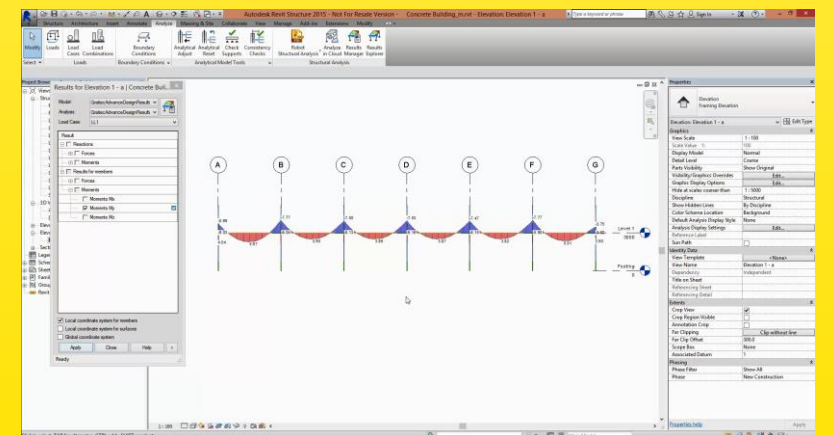
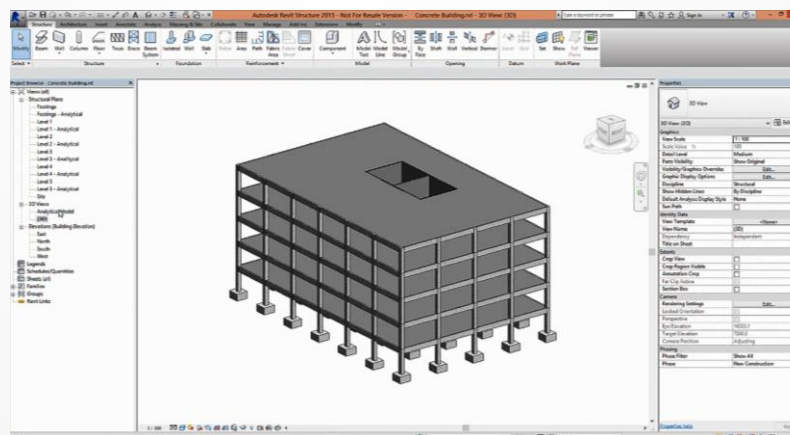
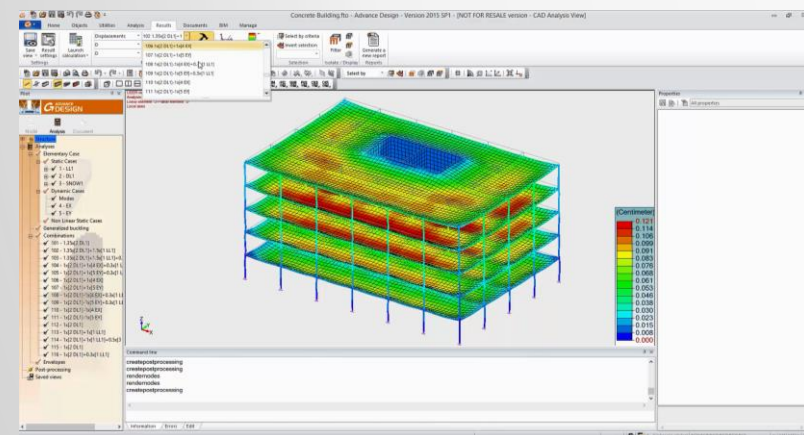
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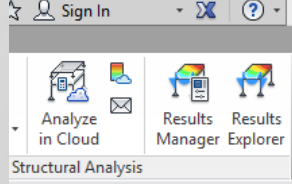
BIM



B



Get FEM results in Revit®

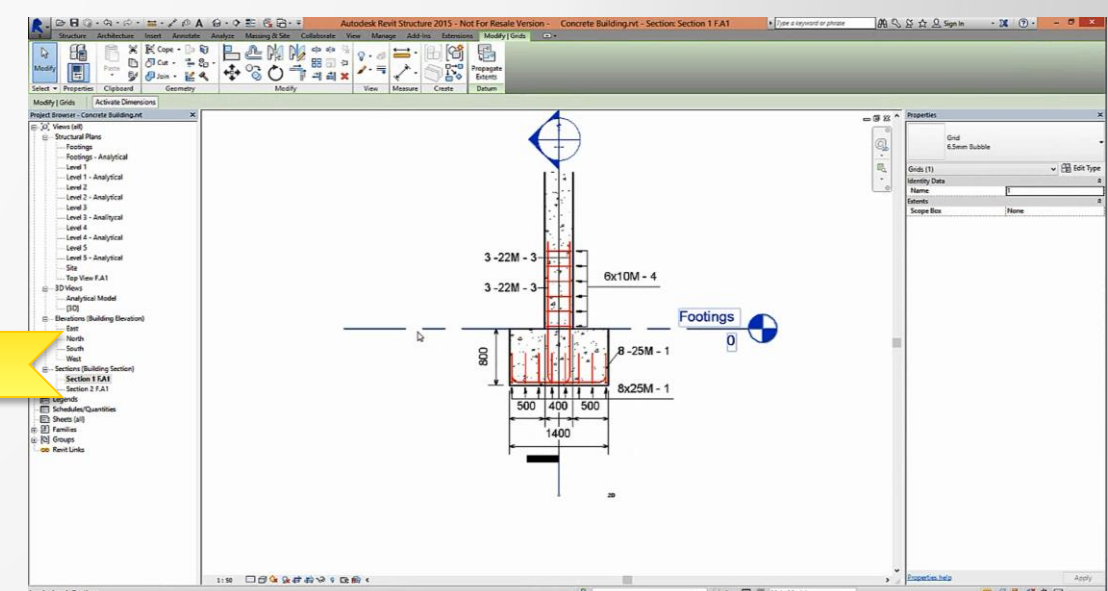
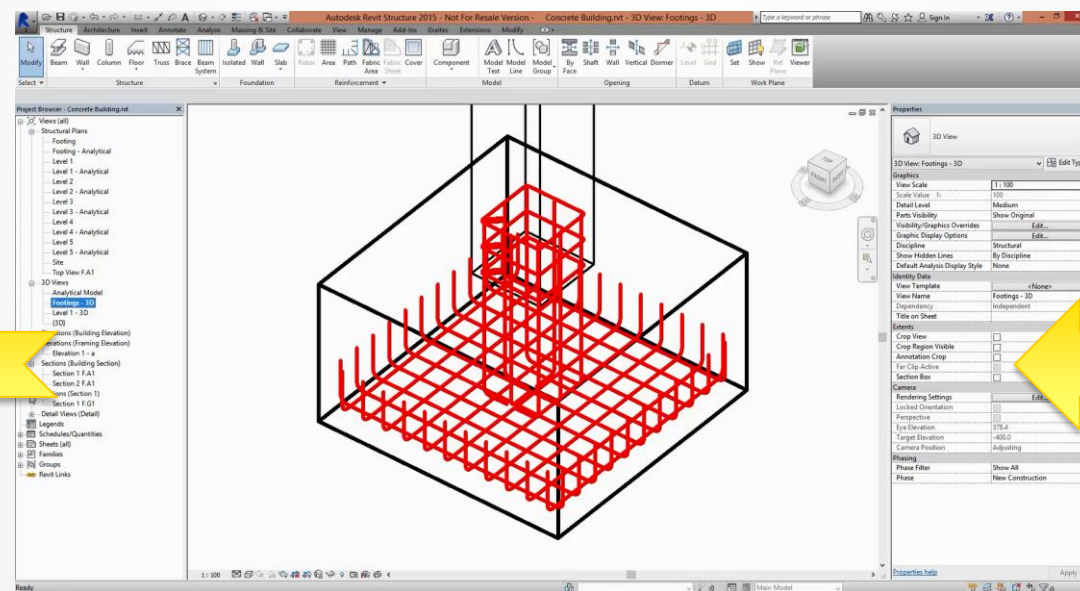
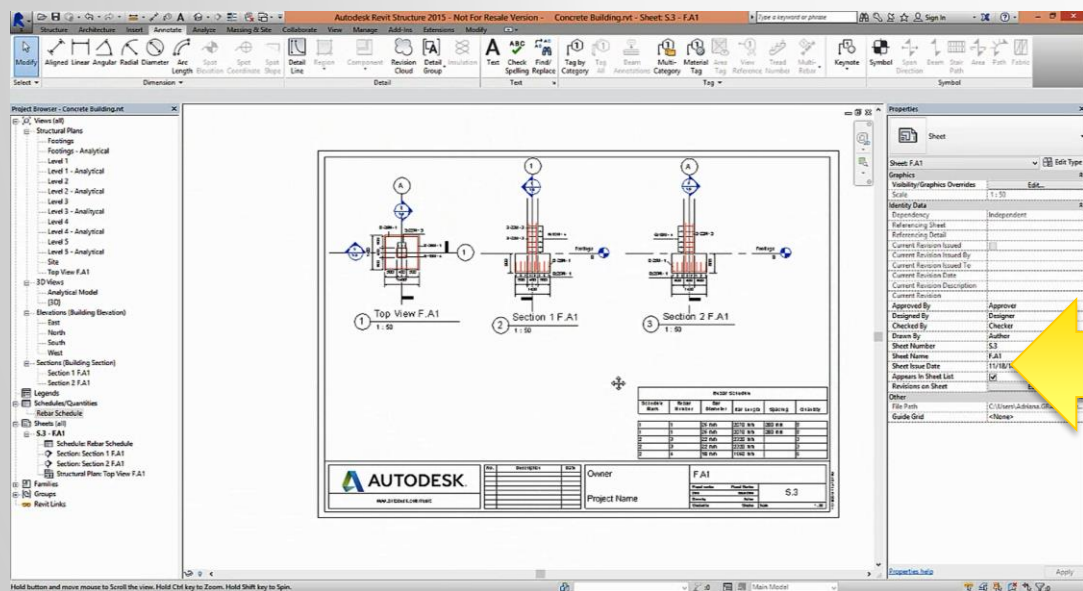
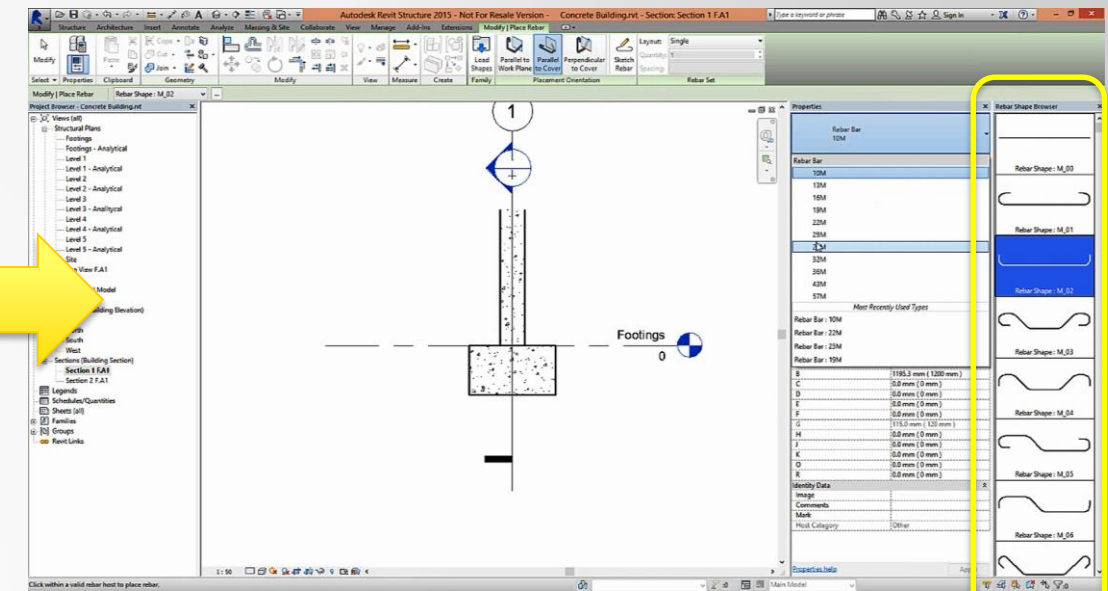
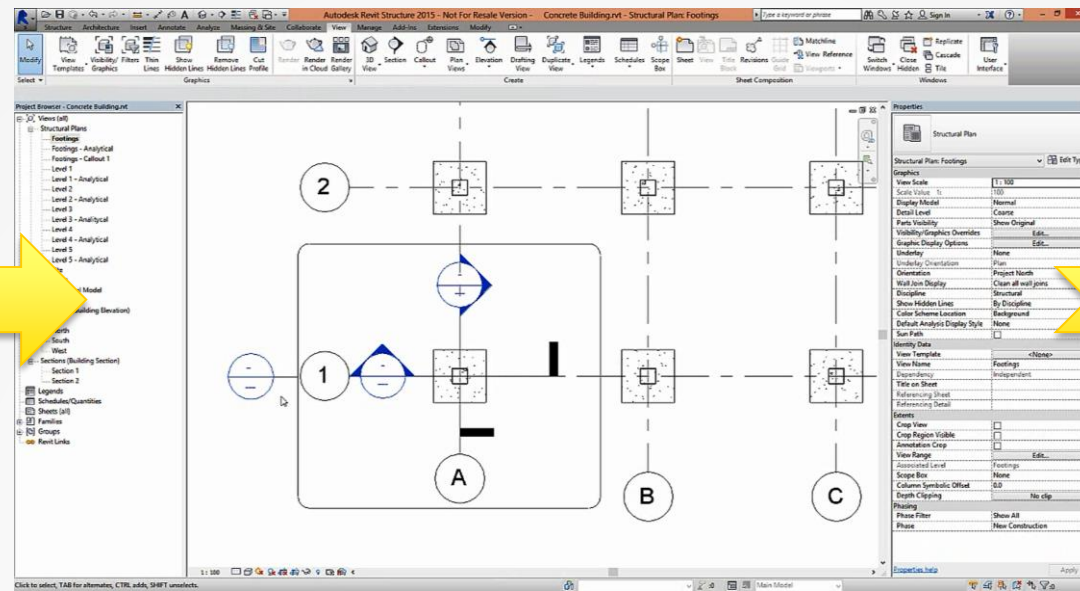
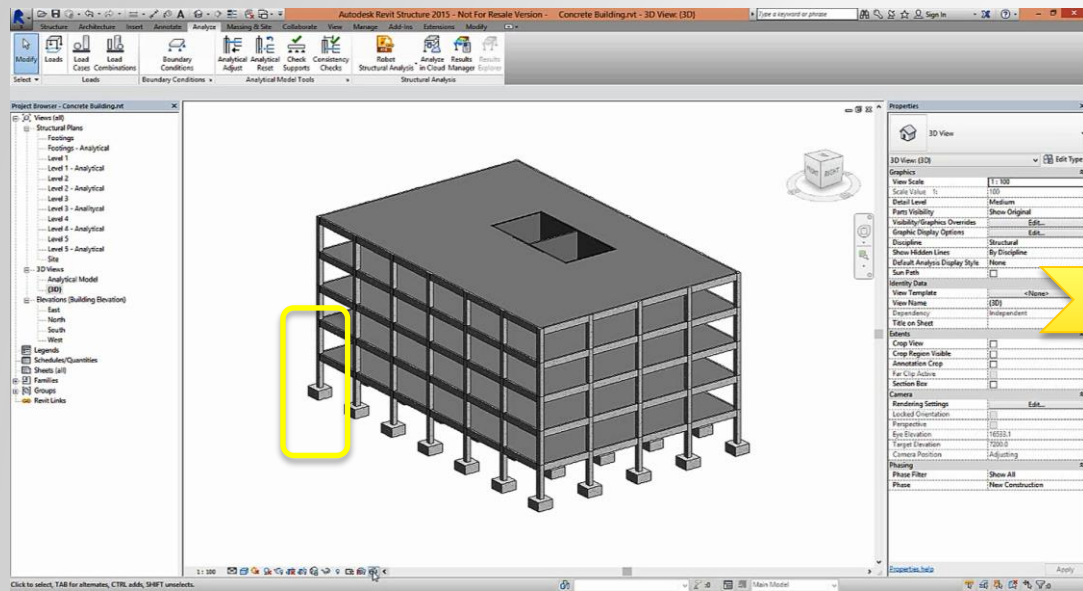


Getting FEM Results in Revit®

- Manually apply loads to Revit model
- Manage the analytical model within Revit®!
- Synchronization of model, loads & design changes
- Benefit from Autodesk Cloud services
- Connected and intelligent 'BIM Workflow' is already possible

Creating 3D rebar using out-of-box tools

Creating 3D rebar & drawings in Revit



Creating 3D rebar & drawings in Revit

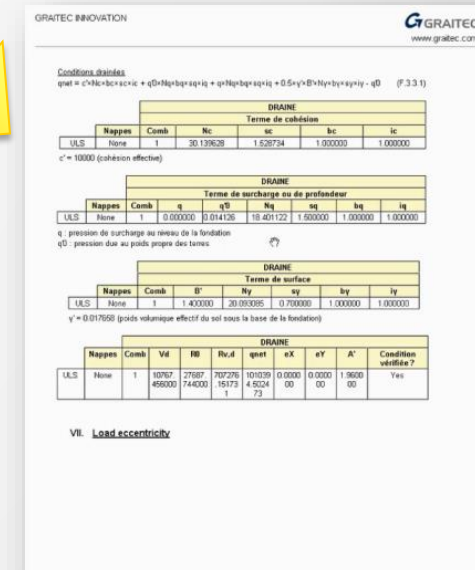
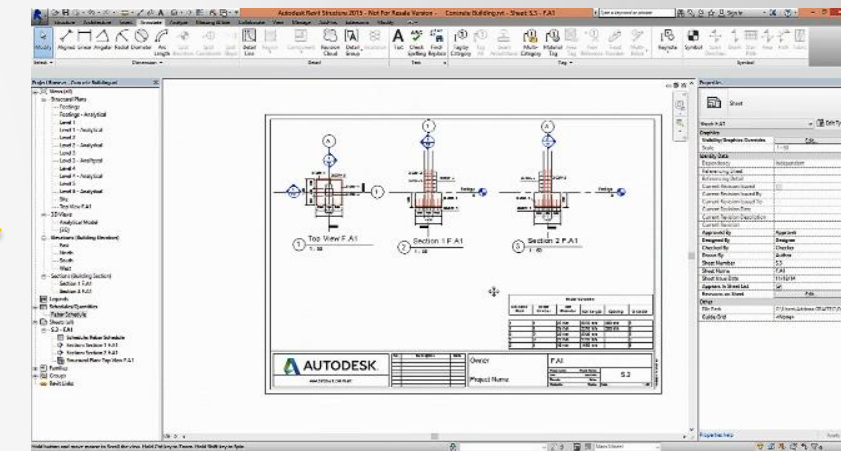
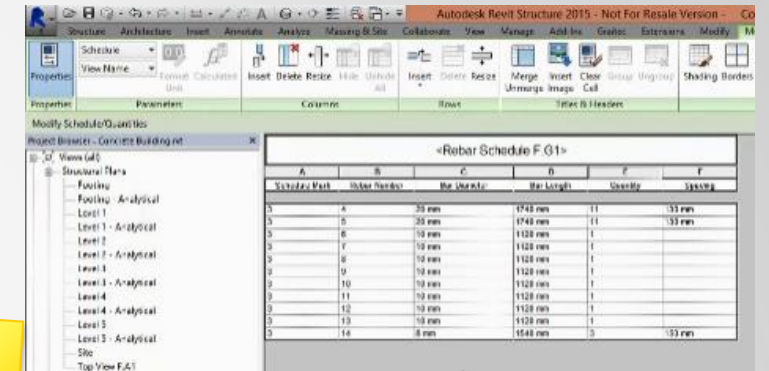
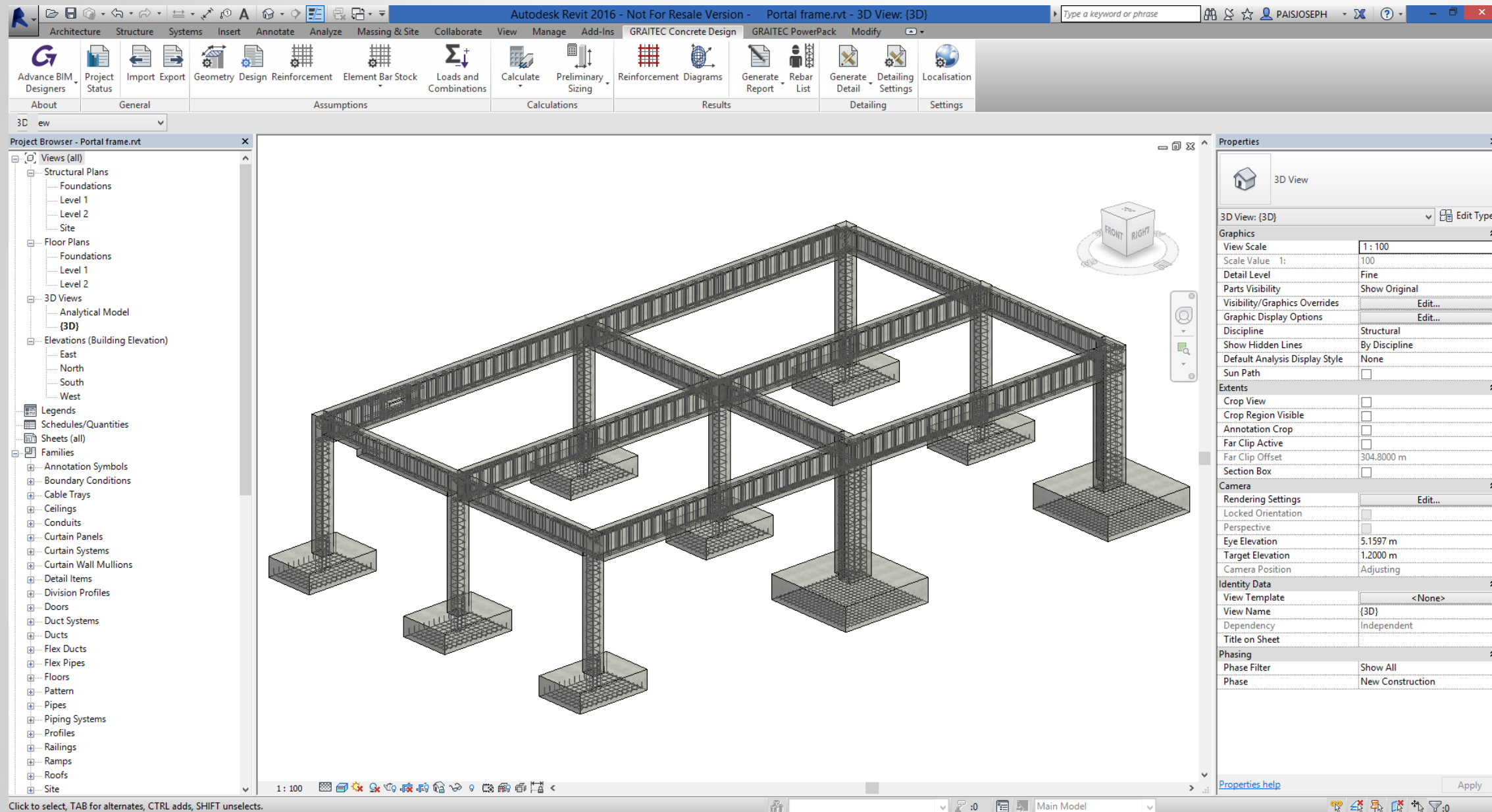
- Revit is a powerful tool for managing the analytical model (manually or automatically)
- New in 2015/2016 tools facilitate creation of 3D rebar
- Repetitive process for creating:
 - 3D rebar model
 - Drawing views
 - Sheet layouts
 - (even with 3rd Party Apps)
- Rebar results are independent of the engineers design!

Introducing GRAITEC RC BIM Designers...



SHOW TIME

Recap GRAITEC RC BIM Designers...



Recap - GRAITEC RC BIM Designers...

- Multiple Platform ⇔ Multiple Workflow ⇔ Multiple User scenarios
- Design capability integrated with Revit
- Local Design Codes and standards
 - Eurocodes + National Annex / US Codes / Canadian Codes / ...
- Automated design and creation of 3D Rebar based on 'actual' loads saved in the model for each element
- Standard & Customizable Design Reports
- Customizable Country Specific Defaults & Templates for Drawing Views and Sheet Layouts

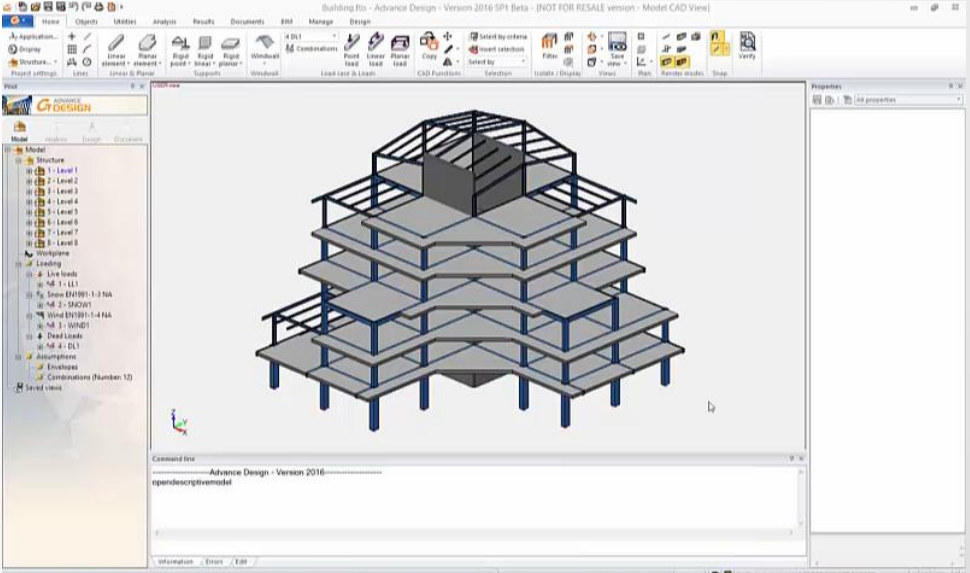
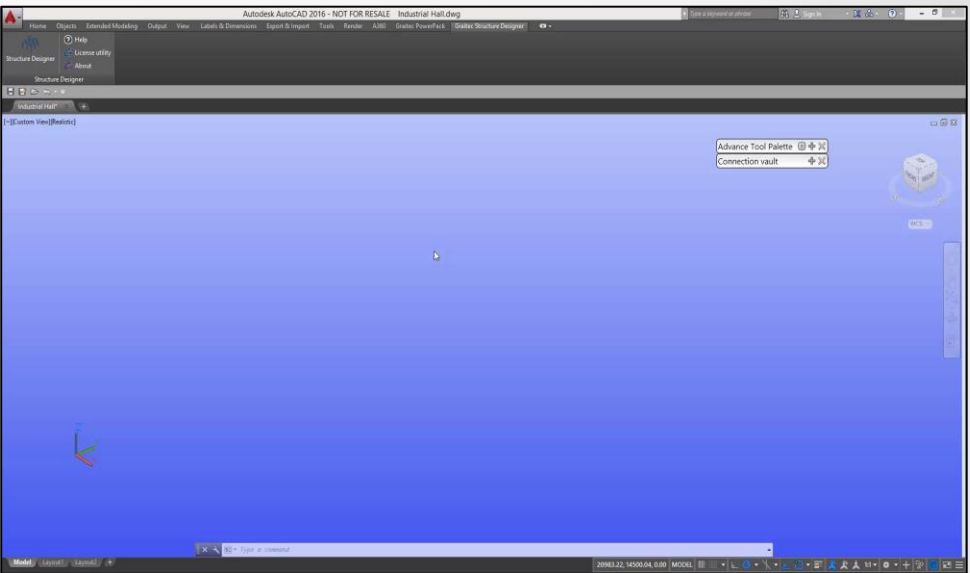
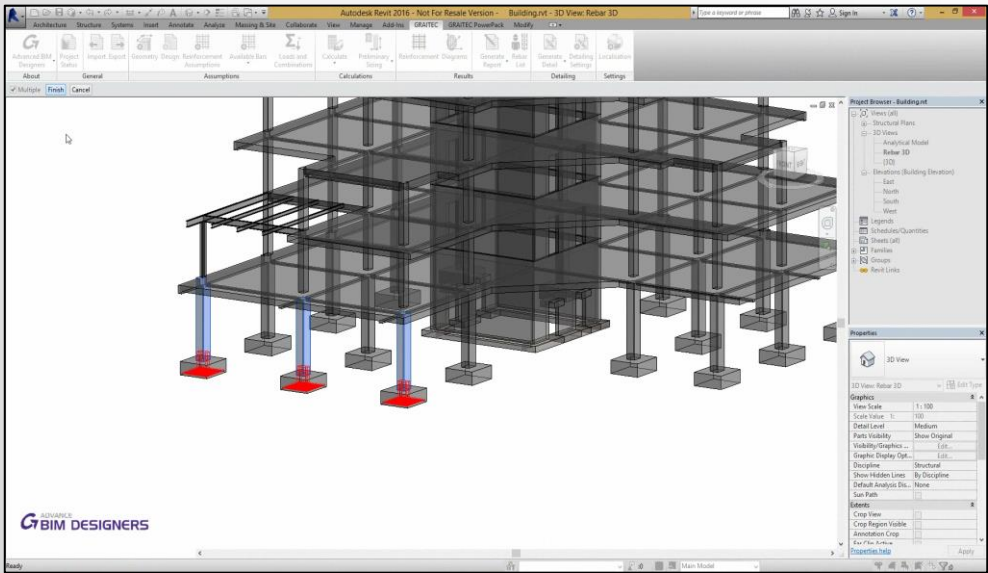
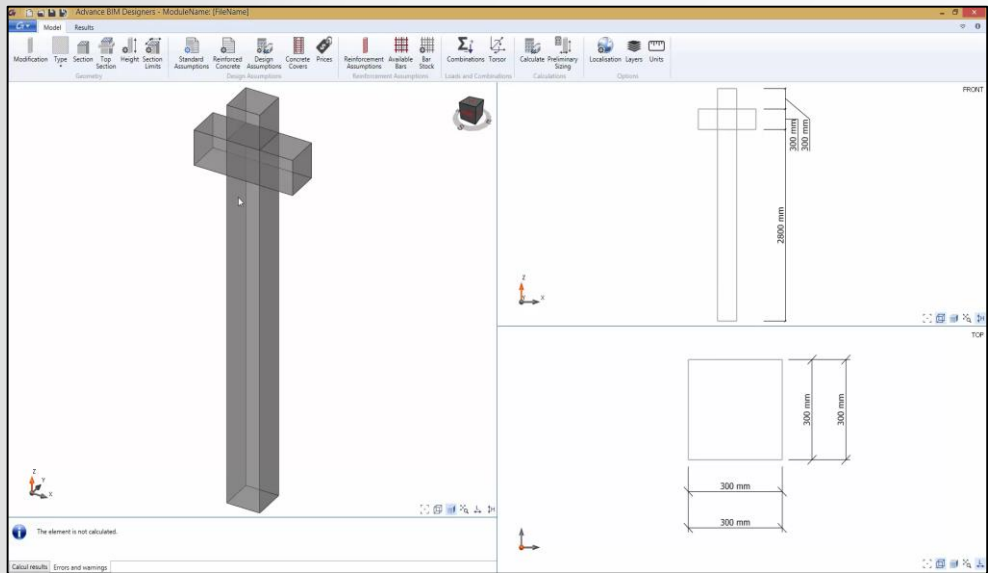
Multiple Platforms ⇔ Multiple Workflows

ADVANCE
G BIM Designers



ADVANCE
G DESIGN

Multiple Platforms ⇔ Multiple Workflows

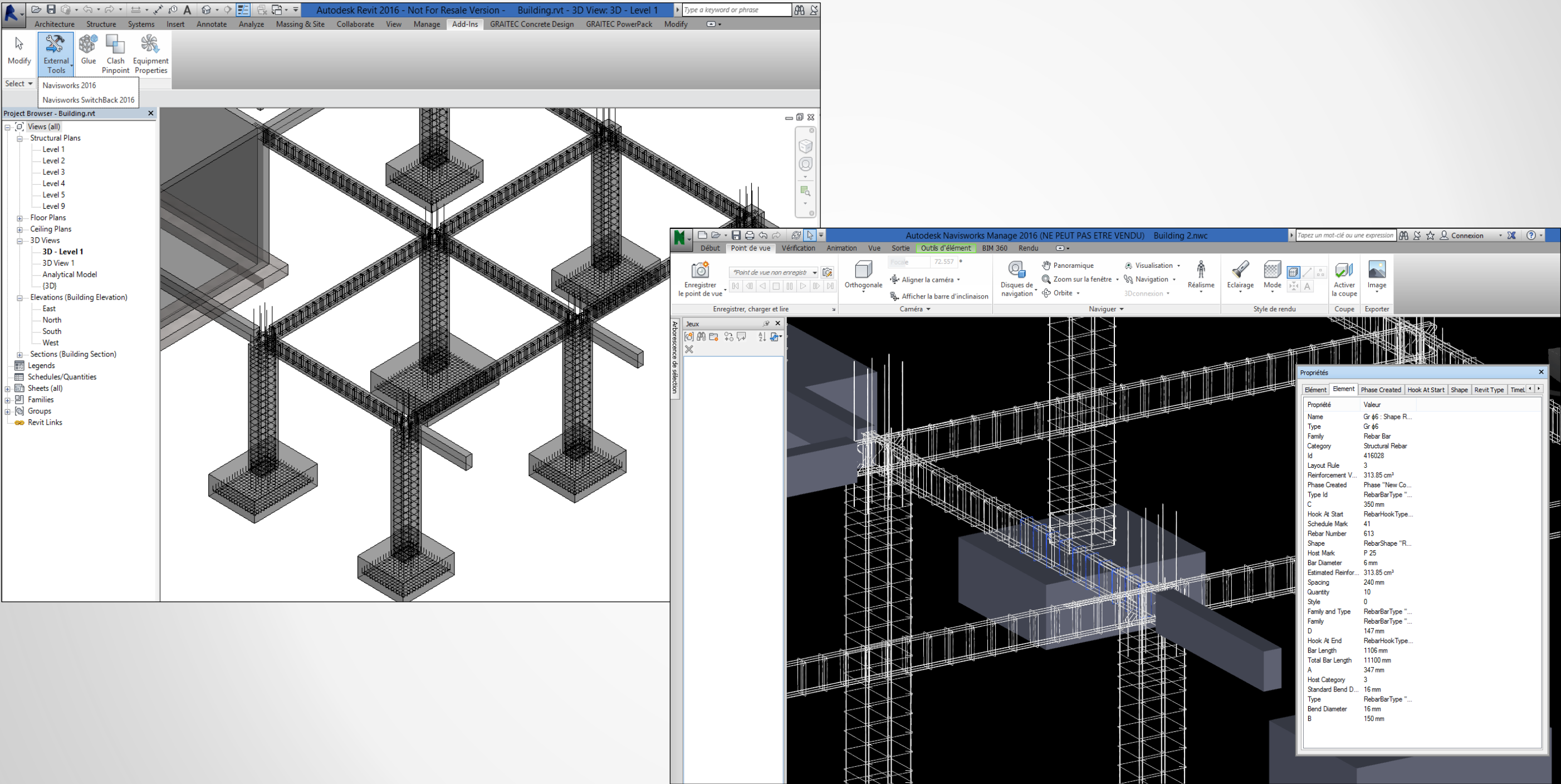


Link with Autodesk Navisworks® Export to IFC file for fabrication



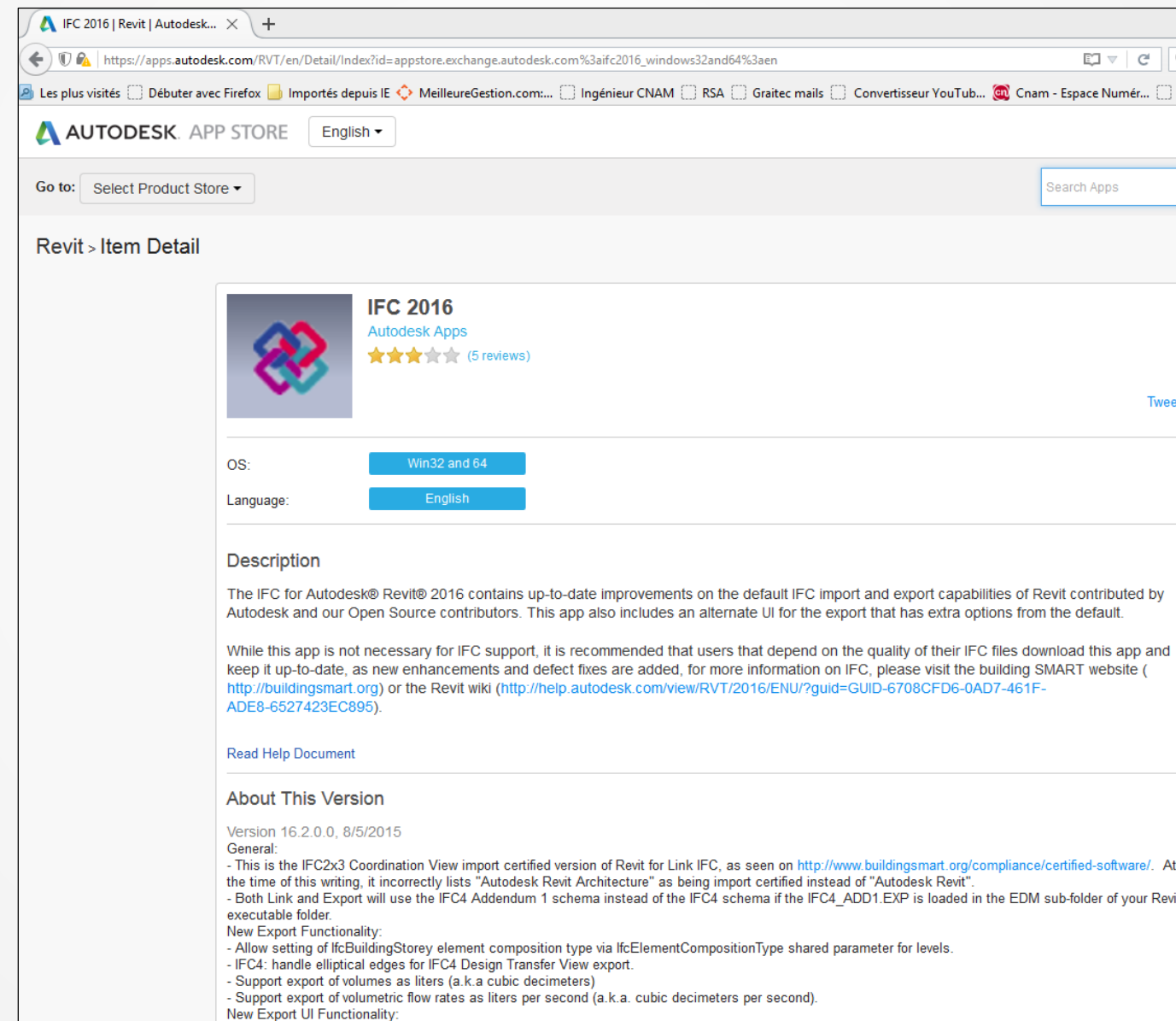
SHOW TIME

Recap - Link with Autodesk Navisworks®



Export to an IFC file

- Download and install the “IFC extension for Revit®



Recap - Export IFC for Rebar Fabrication

Autodesk Revit 2016 - Not For Resale Version - Building.rvt - 3D View: 3D - Level 1

Architecture Structure Systems Insert Annotate Analyze Massing & Site Collaborate View Manage Add-Ins GRAITEC Concrete Design GRAITEC PowerPack Modify

Modify External Tools Glue Clash Pinpoint Properties

Select External BIM 360

Project Browser - Building.rvt

Views (all) Structural Plans Level 1 Level 2 Level 3 Level 4 Level 5 Level 6

Floors Ceiling 3D

Elevation

Section

Legend

Schedule

Sheet

Family

Group

Revision

Schedule Properties

Fields Filter Sorting/Grouping Formatting Appearance

Available fields: Model O Partition Phase Created Phase Demolished R Reinforcement Volume Schedule Mark Shape Image Spacing Style Type Type Comments Type IfcGUID Type Image Type Mark

Scheduled fields (in order): Rebar Number Quantity Bar Diameter Bar Length Bend Diameter Hook At End Hook At Start Shape Total Bar Length

Select available fields from: Structural Rebar

Include elements in links

OK Cancel Help

<Rebar Schedule>

A	B	C	D	E	F	G	H	I
Rebar Number	Quantity	Bar Diameter	Bar Length	Bend Diameter	Hook At End	Hook At Start	Shape	Total Bar Length
27	32	10 mm	1790 mm	55 mm	Standard - 90 d	Standard - 90 d	14_52	30360 mm
28	16	10 mm	2390 mm	55 mm	Standard - 90 d	Standard - 90 d	14_52	38240 mm
29	2	10 mm	990 mm	55 mm	Standard - 90 d	None	Rebar Shape 1	1980 mm
30	1	10 mm	990 mm	55 mm	Standard - 90 d	None	Rebar Shape 12	990 mm
31	1	10 mm	990 mm	55 mm	Standard - 90 d	None	Rebar Shape 12	990 mm
32	2	10 mm	990 mm	55 mm	Standard - 90 d	None	Rebar Shape 1	1980 mm
33	1	10 mm	990 mm	55 mm	Standard - 90 d	None	Rebar Shape 12	990 mm
34	3	6 mm	1520 mm	20 mm	Gr Standard 13	Gr Standard 13	Rebar Shape 10	14400 mm
35	1	12 mm	3960 mm	66 mm	None	None	Rebar Shape 12	3960 mm
36	1	12 mm	3960 mm	66 mm	None	None	Rebar Shape 12	3960 mm
37	1	12 mm	3960 mm	66 mm	None	None	Rebar Shape 12	3960 mm
38	1	12 mm	3960 mm	66 mm	None	None	Rebar Shape 12	3960 mm
39	1	10 mm	3960 mm	55 mm	None	None	Rebar Shape 12	3960 mm
40	1	10 mm	3960 mm	55 mm	None	None	Rebar Shape 12	3960 mm
41	1	12 mm	1450 mm	66 mm	None	None	Rebar Shape 12	1450 mm
42	1	12 mm	1450 mm	66 mm	None	None	Rebar Shape 12	1450 mm
43	1	12 mm	1450 mm	66 mm	None	None	Rebar Shape 12	1450 mm
44	1	12 mm	1450 mm	66 mm	None	None	Rebar Shape 12	1450 mm
45	1	10 mm	1450 mm	55 mm	None	None	Rebar Shape 12	1450 mm
46	1	10 mm	1450 mm	55 mm	None	None	Rebar Shape 12	1450 mm
47	6	6 mm	2010 mm	16 mm	Gr Standard 13	Gr Standard 13	Rebar Shape 12	12060 mm
48	12	6 mm	2010 mm	16 mm	Gr Standard 13	Gr Standard 13	Rebar Shape 12	24120 mm
49	5	6 mm	2010 mm	16 mm	Gr Standard 13	Gr Standard 13	Rebar Shape 12	10050 mm
50	6	6 mm	520 mm	33 mm	Standard - 180	Standard - 180	Rebar Shape 12	3120 mm
51	12	6 mm	520 mm	33 mm	Standard - 180	Standard - 180	Rebar Shape 12	6240 mm
52	5	6 mm	520 mm	33 mm	Standard - 180	Standard - 180	Rebar Shape 12	2600 mm
53	16	10 mm	1940 mm	55 mm	Rebar Hook 90	Rebar Hook 90	14_52	31440 mm
54	16	10 mm	1740 mm	55 mm	Rebar Hook 90	Rebar Hook 90	14_52	31320 mm
55	2	10 mm	890 mm	55 mm	Standard - 90 d	None	Rebar Shape 1	1780 mm
56	1	10 mm	890 mm	55 mm	Standard - 90 d	None	Rebar Shape 12	890 mm
57	1	10 mm	890 mm	55 mm	Standard - 90 d	None	Rebar Shape 12	890 mm
58	2	10 mm	890 mm	55 mm	Standard - 90 d	None	Rebar Shape 1	1780 mm
59	1	10 mm	890 mm	55 mm	Standard - 90 d	None	Rebar Shape 12	890 mm
60	1	10 mm	890 mm	55 mm	Standard - 90 d	None	Rebar Shape 12	890 mm
61	3	6 mm	1980 mm	20 mm	Rebar Hook 135	Rebar Hook 135	Rebar Shape 10	5580 mm
62	16	10 mm	1940 mm	55 mm	Rebar Hook 90	Rebar Hook 90	14_52	31440 mm
63	16	10 mm	1740 mm	55 mm	Rebar Hook 90	Rebar Hook 90	14_52	31320 mm
64	2	10 mm	890 mm	55 mm	Standard - 90 d	None	Rebar Shape 1	1780 mm
65	1	10 mm	890 mm	55 mm	Standard - 90 d	None	Rebar Shape 12	890 mm
66	1	10 mm	890 mm	55 mm	Standard - 90 d	None	Rebar Shape 12	890 mm

Solibri Model Viewer - Building with rebar

File Model Checking Communication Information Takeoff

3D

Model Tree

Building with rebar

Default

Building.b.1

Level 1

Column

Footing

Reinforcing Bar

Slab

Wall

Level 2

Beam

Column

Reinforcing Bar

Slab

Wall

Level 3

Level 4

Level 5

Level 6

Level 7

Level 8

Info

Reinforcing Bar - 1.267

Identification Location Quantities Profile Relations Classification Hyperlinks Ifc Dimensions

Pset_ReinforcingBarBendingsISOCD376Common

Rebar Schedule

Property Value

Bar Diameter 6 mm

Bar Length 2.01 m

Bend Diameter 16 mm

Hook At End Rebar Hook: Gr Standard 135.00°

Hook At Start Rebar Hook: Gr Standard 135.00°

Quantity 5

Rebar Number 337

Shape Rebar Shape: Rebar Shape 12264

Total Bar Length 10.05 m



Recap – IFC and Autodesk Navisworks® for Rebar Fabrication

- Supports multiple workflow scenarios
- Streamlined BIM workflow from Engineer to Fabrication (erection)
- Apply an effective project review solution to all your projects!
- Enable coordination, construction, simulation, optimized schedules, clashes, interferences detection...
- Navisworks connects multiple data sources: AutoCAD® applications, Revit®, 3DS Max®, Bentley Microstation®, ArchiCAD®...
- Ready for when Steel Fabricators move to models to drive rebar fabrication

Harnessing the power of A360!

A360® platforms (just the beginning)

Solutions	A360 VIEWER	A360 DRIVE	A360 TEAM
Customer needs	Visualization, sharing and communication	Individual cloud storage and sharing platform	Project team collaboration platform
Storage		5GB (25GB if existing Subscription)	10 GB / member (pooled at Team level)
Platform (localized)	Web (not localized)	Web (localized)	Web (not localized) and mobile apps (iOS & Android-localized)
Main features	Upload from desktop, Dropbox, Box and Google drive View 3D et 2D models Print Share model (1 month link validity) Discussion	Access from AutoCAD, Inventor, 3DS Max Integrated to AutoCAD 360 Organized data (versioning) Object properties (from the model) Comments on files / models Automatic synchronization desktop – cloud Activity history Update alerts	Collaboration on projects Messages, project calendar, polls, wiki pages Organized data (versioning, tags) Search and comment the objects from the model Manual synchronization with A360 DRIVE Activity history Update alerts Box, Dropbox and Buzzsaw integration for mobile apps
Professional Viewer (LMV): Large Model Viewer for more than 100 file formats (including Revit models).			

A360®





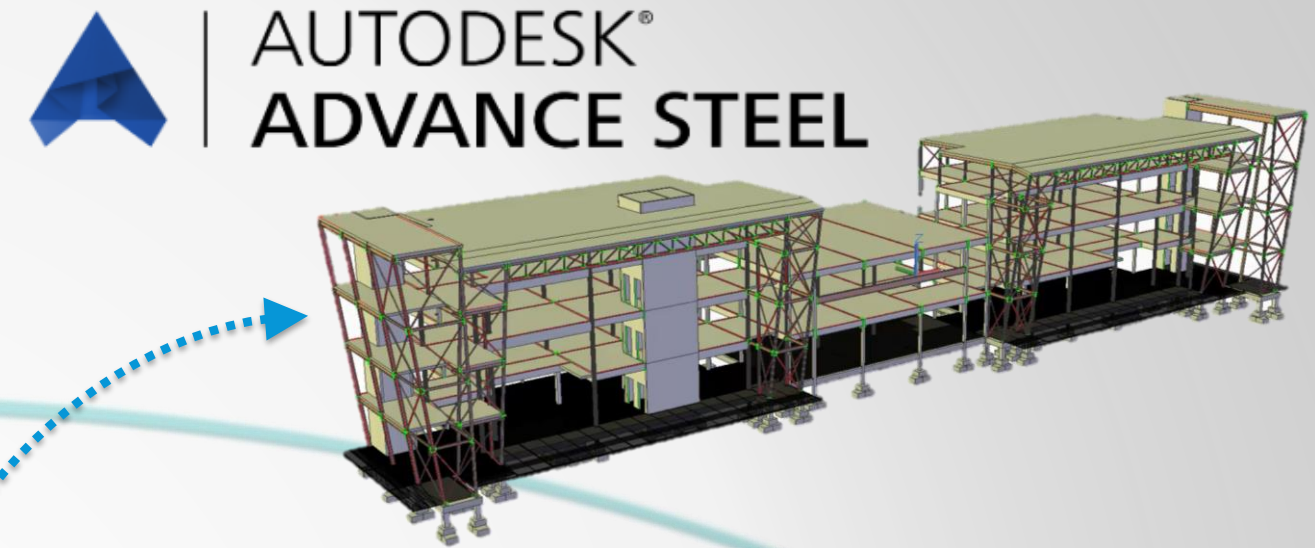
SHOW TIME

Recap – Harnessing A360®

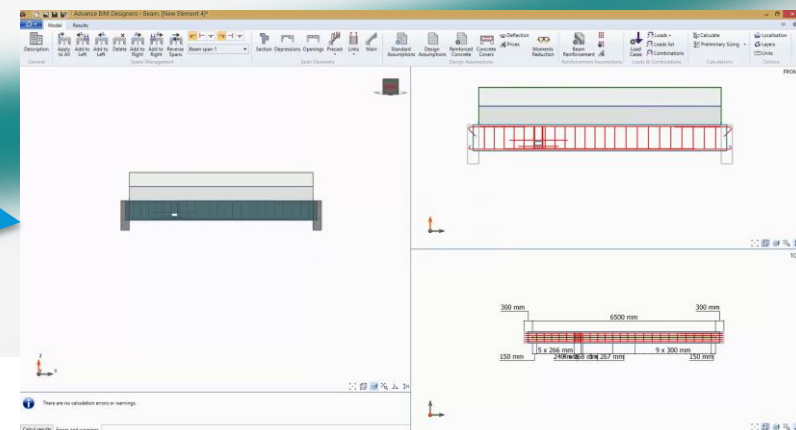
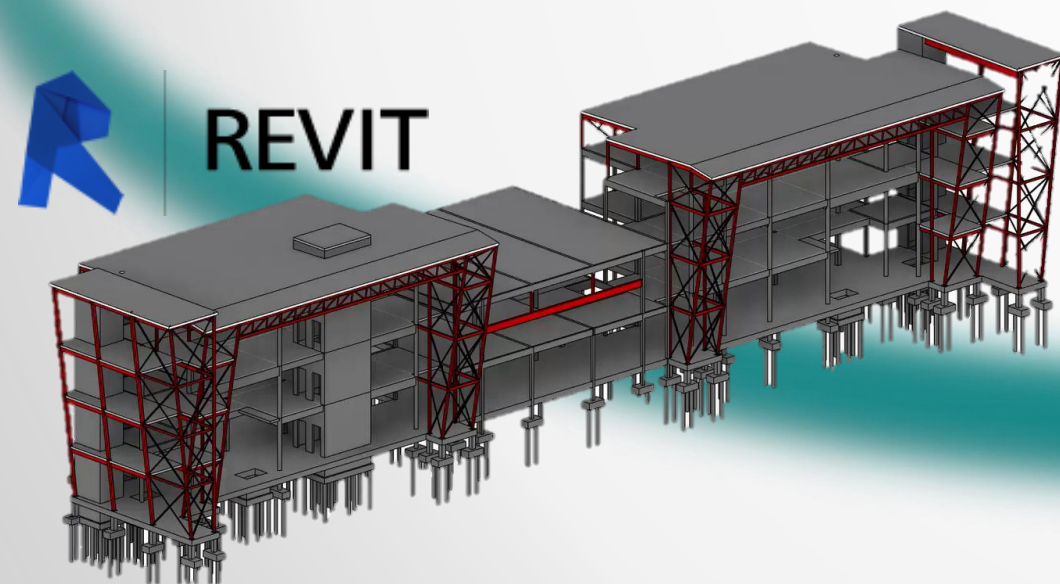
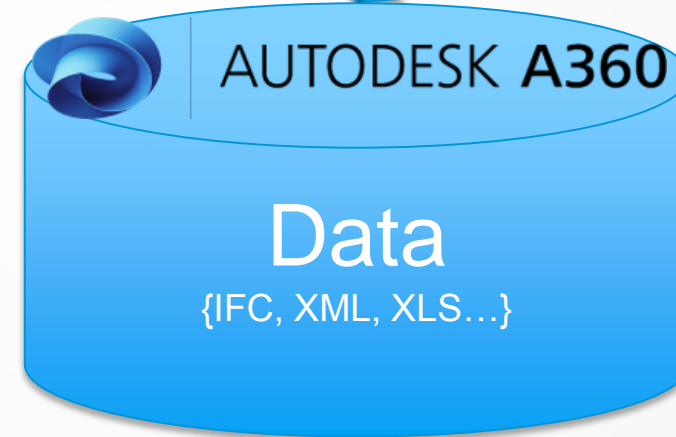
- Easily store and share your data with all stakeholders with A360 Drive®
- Dedicated functionalities in Revit® to publish in A360®.
- Manage project activity in the cloud with A360 Team®
- Access your data from different devices: computer, mobile, tablet...
- Streamlined intelligent BIM workflow
- Automate downstream processes... document creation

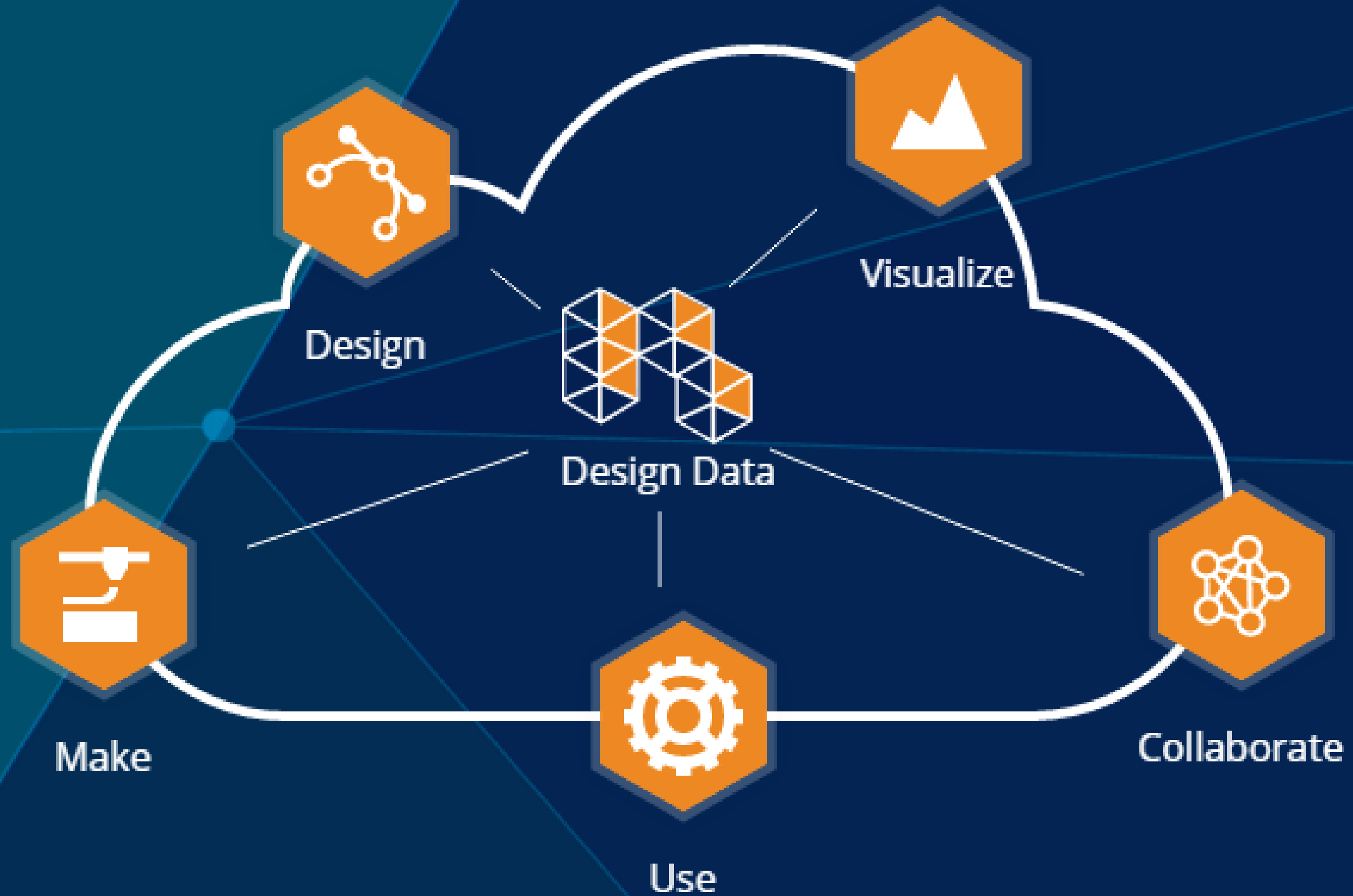
Connected BIM Workflows

Data(bases) linked to Models



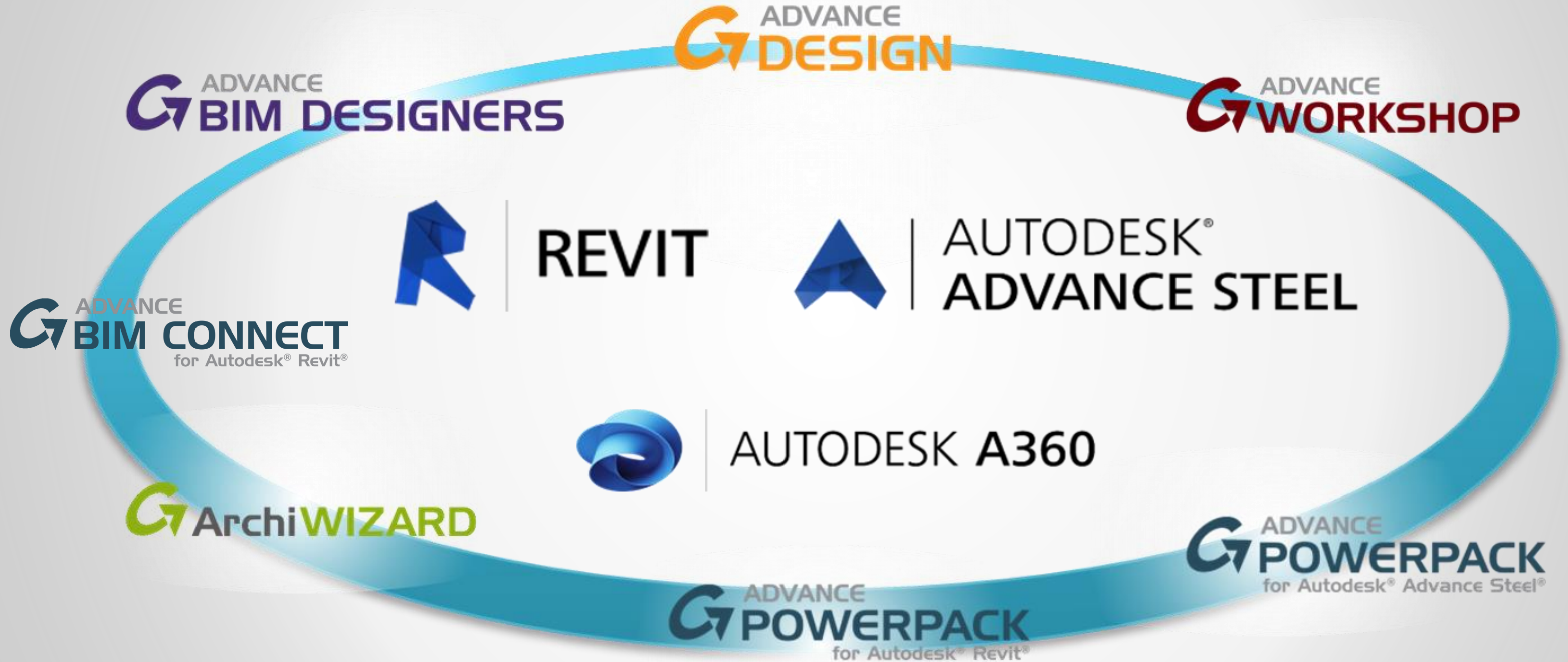
- In the near future...





Conclusion

Take advantage of connected BIM Workflows



GRAITEC BIM Designers promote disruptive changes to the industry: intelligent BIM workflows

- Analysis results are part of the BIM model
- Engineers can take design decisions (Country code driven) in the Design environment (Revit)
- Engineers, Detailers, Contractors, Fabricators communicate via a Model, not drawings...
- You can apply different BIM workflows
- Take advantage of Cloud services for documents, models, collaboration...



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Q&A



Session Feedback

- Via the Survey Stations, email or mobile device
- Best to do it right after the session
- Instructors see results in real-time



