AUTODESK UNIVERSITY

ES20581

Dive Deep into Revit Steel Connections and Advance Steel Export/Import/Sync Workflow

Jochen Tanger
Autodesk GmbH Deutschland

Stephanie Hörndler
Autodesk GmbH Deutschland

Learning Objectives

- Understand the best practice for the new and intelligent steel connections in Revit
- Learn how to distinguish between Revit and Advance Steel for steel connections, and know when to use which software
- Learn the exchange of connections and approval information with Advance Steel
- Learn how to use the latest workflow for steel building with Autodesk software

Description

In this class, you will learn and see all new improvements for Revit software regarding steel connections and the Advance Steel software plug-in for Revit software. With Revit 2017 software, you have very powerful parametric steel connections and approval status information that you can both export and synchronize with Advance Steel software for detailing tasks. This keeps the Revit model and the Advance Steel model always up to date, including detailed steel connection information. Experience the workflows that change everything with steel in Revit software and enhance the existing workflow with Advance Steel software even more! This session features Revit Structure and Advance Steel.

Agenda

- Design to Fabrication
- Installation
- Steel connections workflow
- Best practices for steel connections and the extension
- Steel connections outlook
- Connection exchange with Advance Steel
- Best practices for Advance Steel extension

Your AU Expert(s)

Jochen Tanger

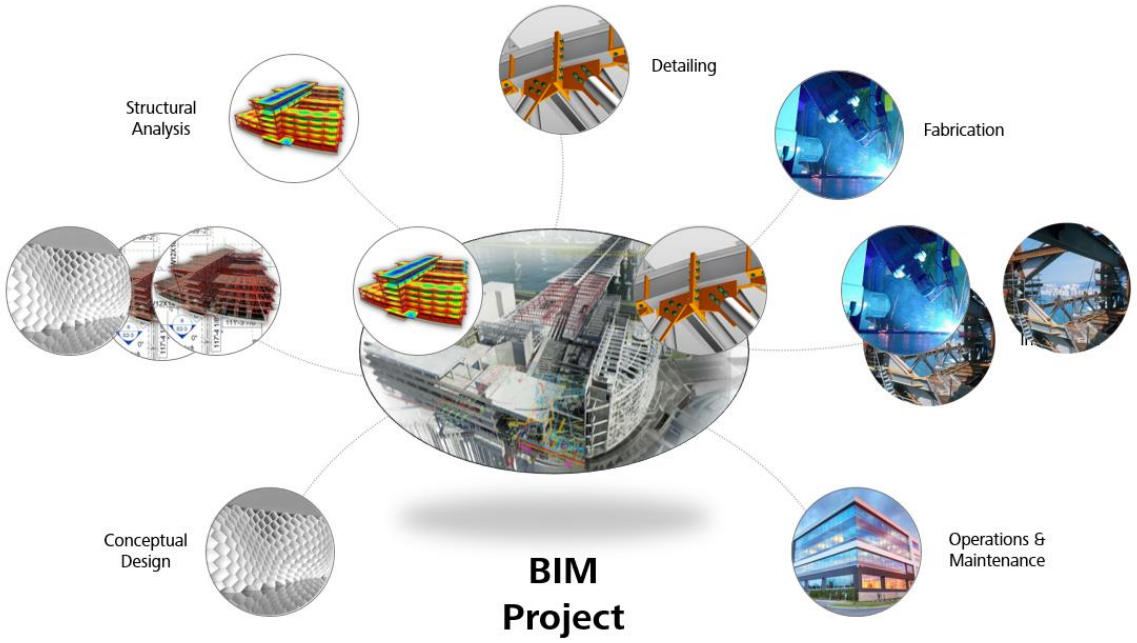
…is based in Munich, Germany, and has been working as a technical sales specialist at Autodes GmbH for almost 14 years. Since Autodesk decided to market Revit in Central Europe in 2004, he has been presenting, selling, training for, and providing support for it to resellers and customers. Today he is mainly responsible for the whole Building Information Modeling (BIM) process with all of its products and solutions. Jochen holds a Diplom-Ingenieur degree in civil engineering from the Leuphana University of Lüneburg.

Stephanie Hörndler

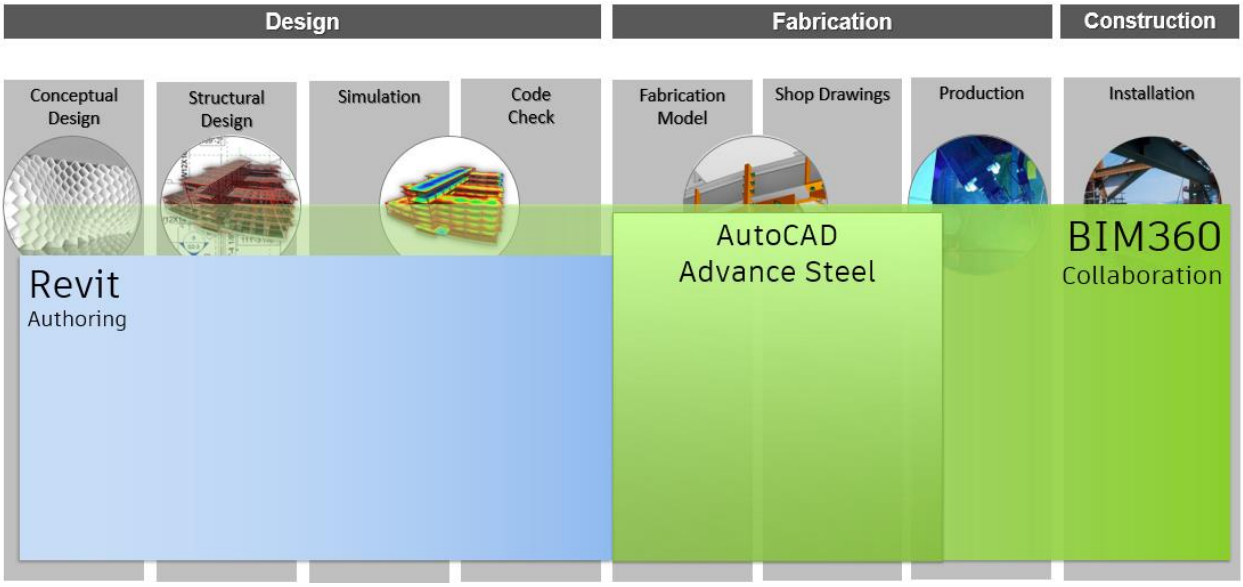
… is a Solutions Engineer for Structural Fabrication and Technical Specialist for Advance Steel software at Autodesk, GmbH. Previously she worked in a construction office as a steel detailer and structural engineer, then she worked at Graitec GmbH as Application Engineer for Advance Steel. Stephanie attended the university HTWK Leipzig, Germany, and she is a building engineer. Stephanie is based in Munich, Germany.

Design to Fabrication

We are seeing massive change in the industry in how teams collaborate and deliver projects better, including the structural trades.
Whether it is a building or industrial plant, the structural systems drive the schedule of the project.
Therefore if the structural designers, fabricators and builders can collaborate more effectively it can help improve the overall project schedule.

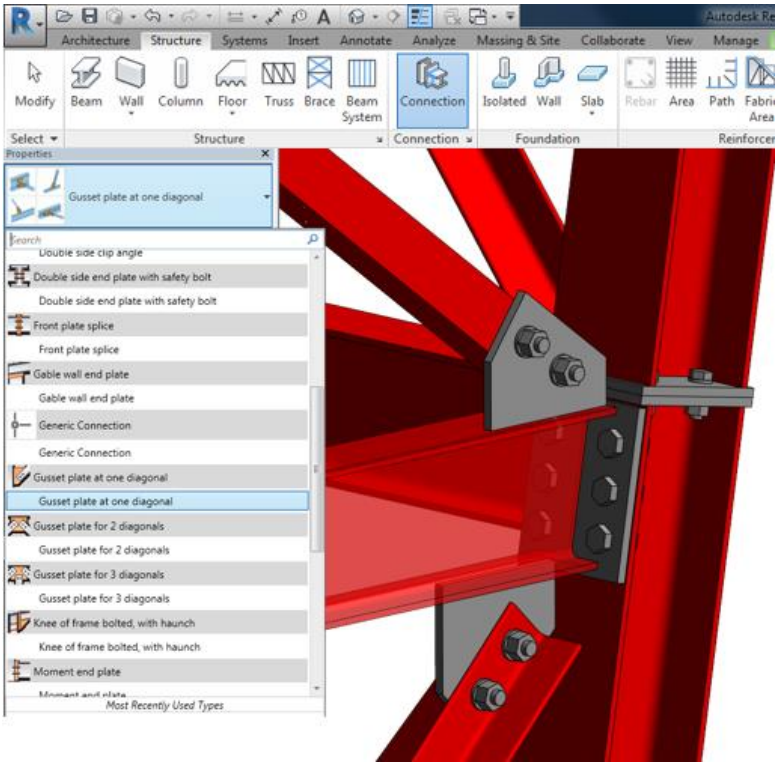


Product Positioning before Revit Steel Connections

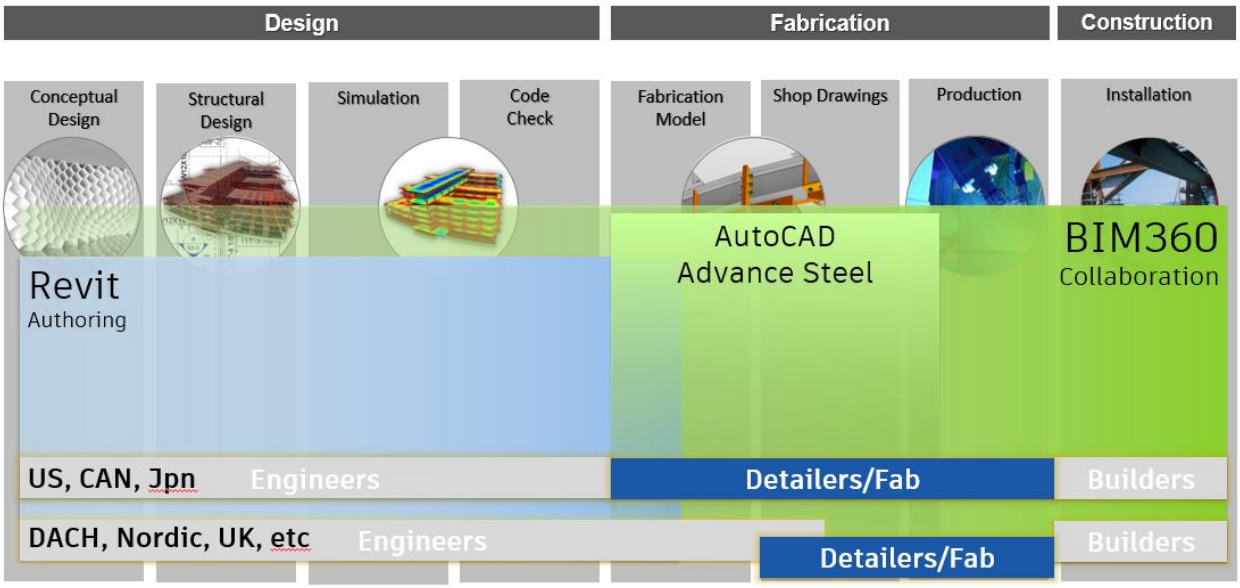


Steel Connections for Autodesk Revit®

- Parametric steel connections
  - Built-in steel connection design engine based on US and European codes.
- Model accuracy
- Complete design intent with standard connections
- Connections code check
- Communication enhancements



Product Positioning after Revit Steel Connections



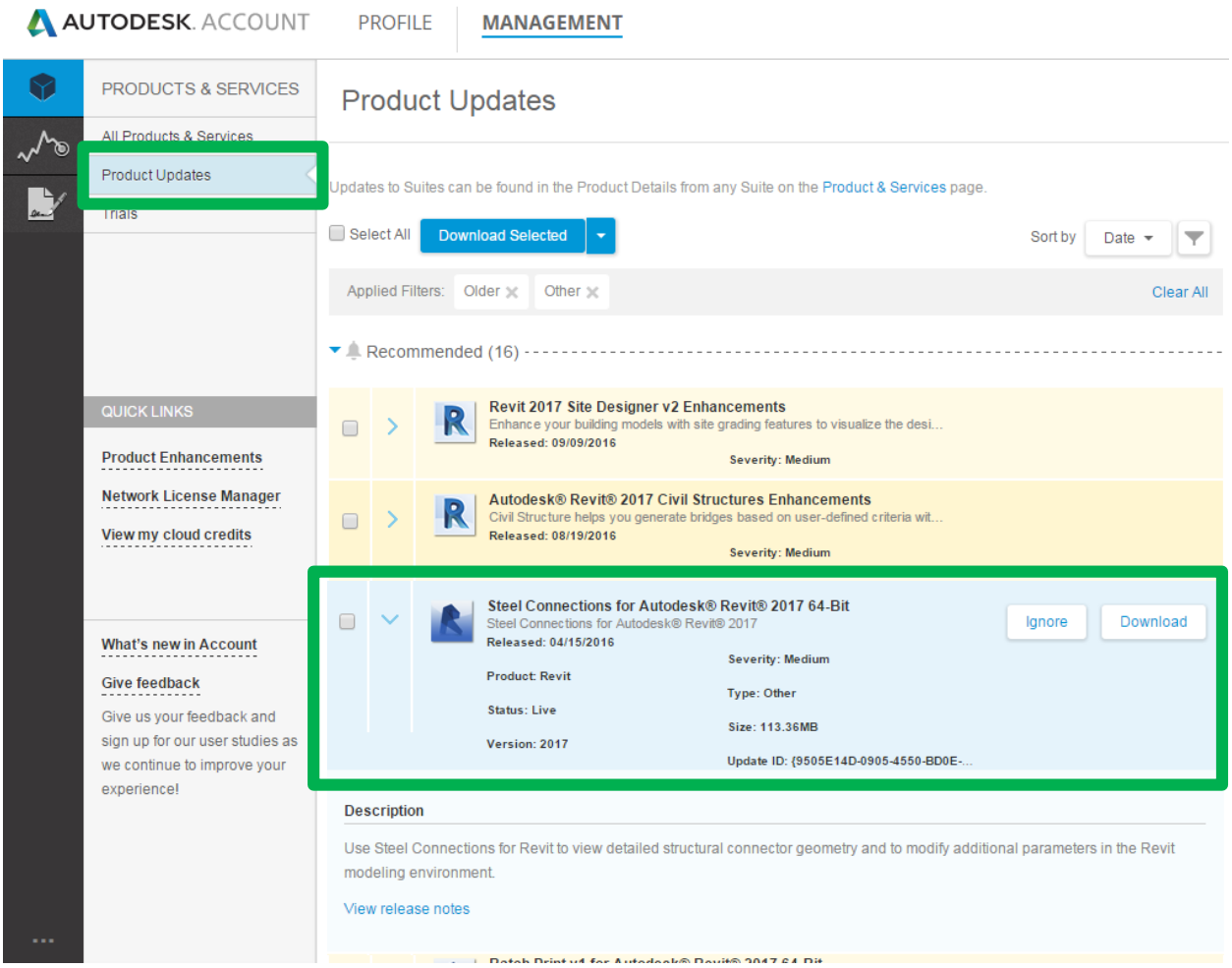
Installation

Installation for Autodesk Steel Connections for Revit

The Autodesk Steel Connections for Revit add-on is available for subscription users and currently is only available in the following languages:

- US English
- French
- German
- Polish

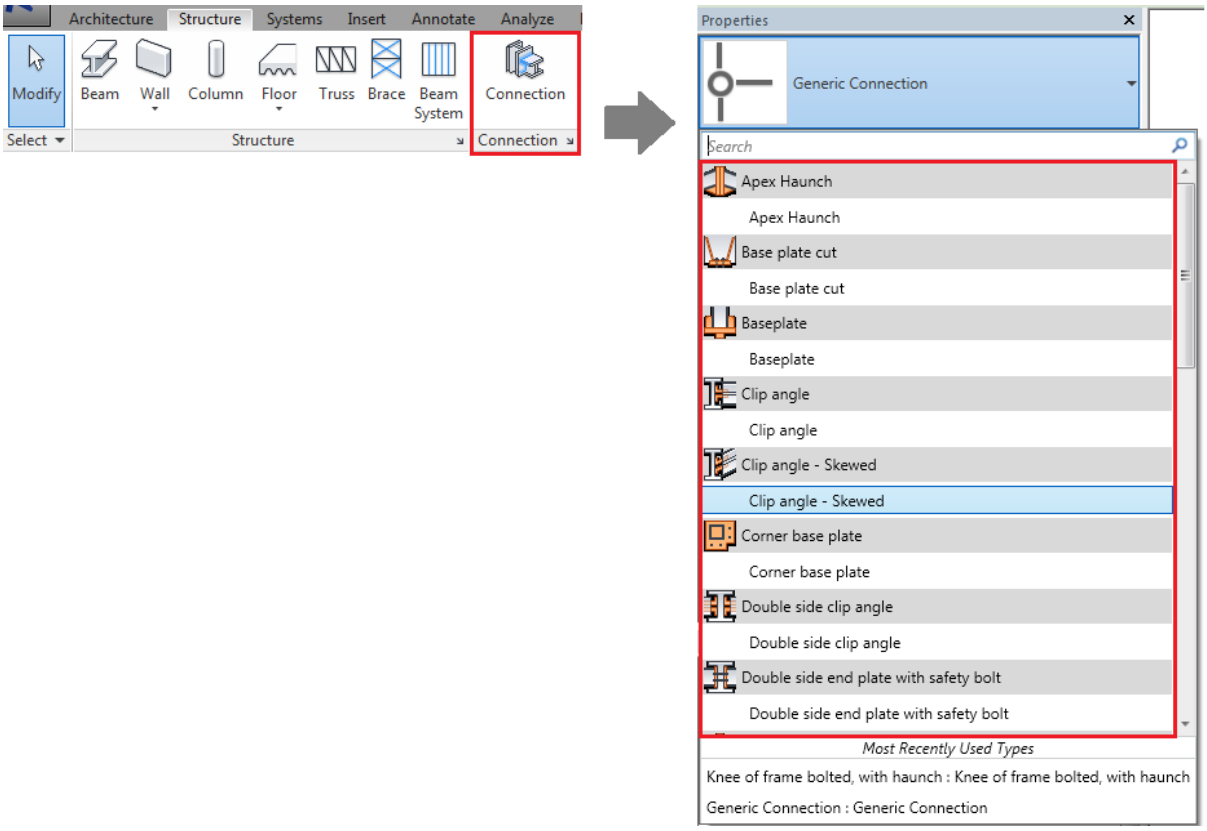
Search for the Autodesk Steel Connections for Revit Add-In in your Autodesk Account



In this video, we'll show how you can install the Autodesk Steel Connections for Revit 2017 from your Autodesk Account: https://knowledge.autodesk.com/support/revit-products/learn-explore/caas/video/youtube/watch-v-3czl1Zr80qQ.html

Install

Run the Autodesk Steel Connections for Revit installer to install the add-on. After the installation is complete, you may need to restart the Autodesk product to activate the add-on. When the add-on is installed, you have access to use the 22 available connections:

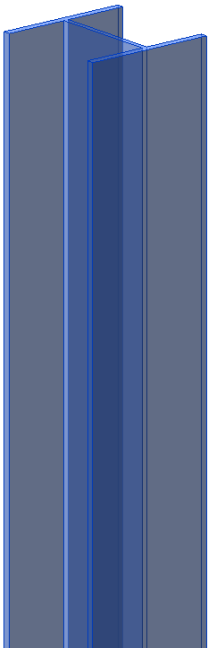


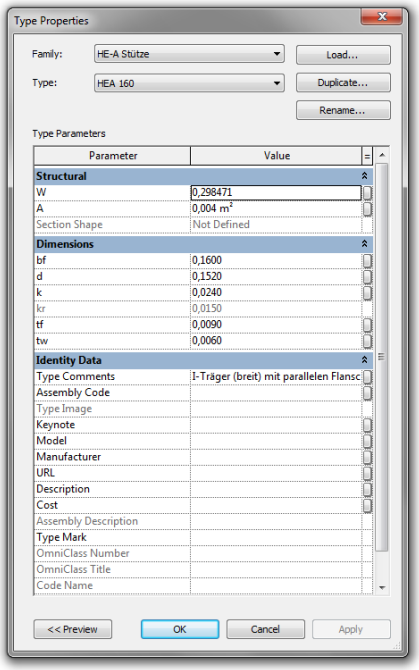
Structural engineering enhancements

- Accurate and Consistent Steel Content
- Industry Standards compliance
- Accurate Quantities for Steel BoM
- Extended for 2017: Eur ocode, ANZ, Germany, France, Poland, US, India

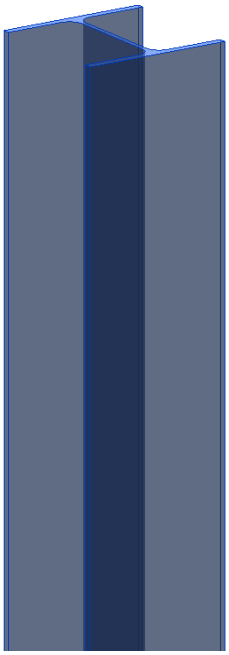
Changes from 2016 to 2017 structural engineering families:

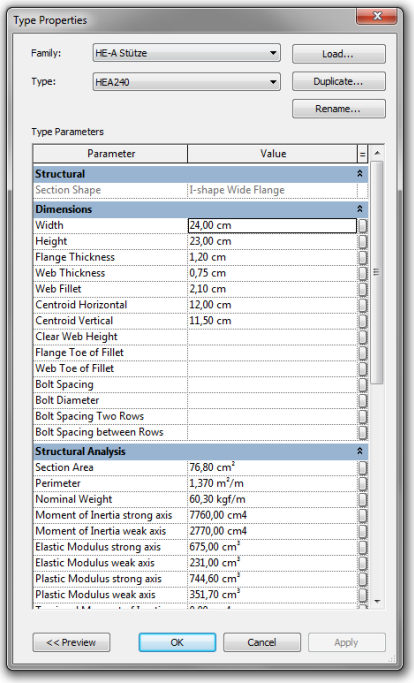
2016





2017

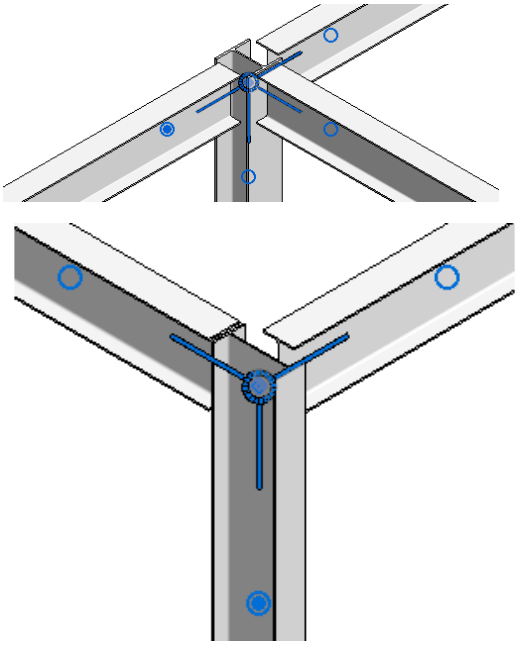


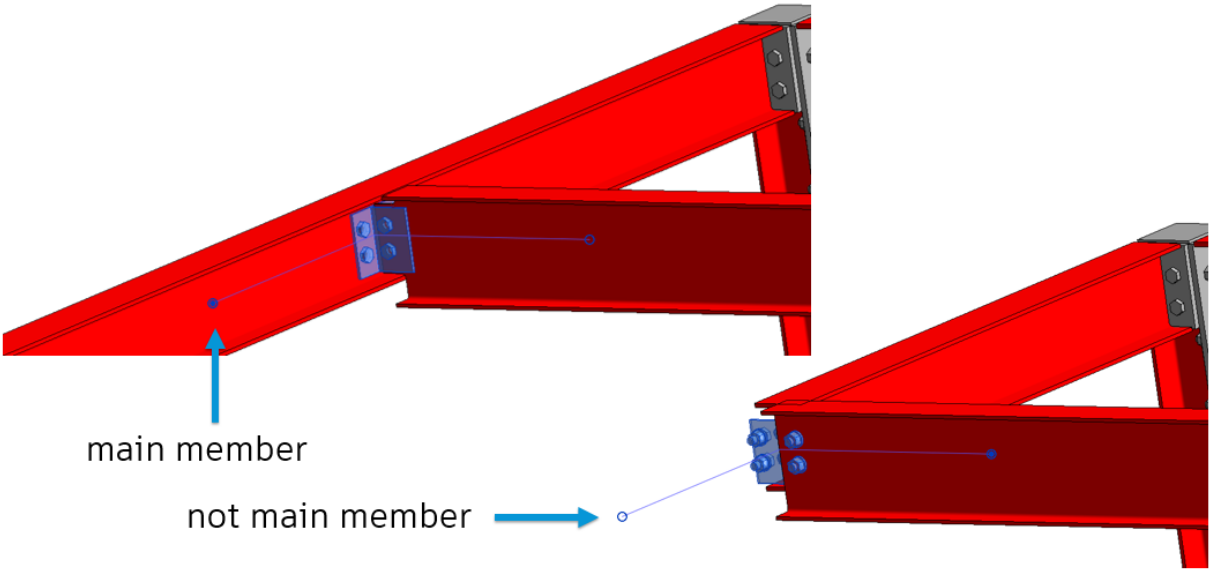


Steel connections workflow

Generic connections - Explanation

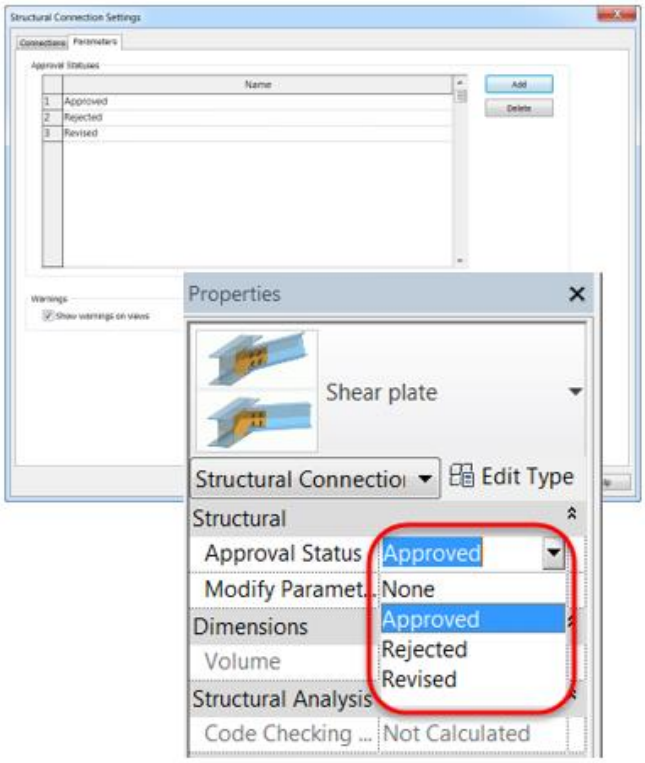
- What is it?
  - It represents the connection type as a symbol
- How does it look like?
  - t displays the joined and connected elements as a circle with line segments radiating out toward the connected elements
  - The filled circle shows which connected member is the main one
  - It can be changed by picking the empty circle
- Offers the following possibilities:
  - Exchange of connection information between structural engineers & steel detailers
  - Sharing approval information





Generic connections – Approval status

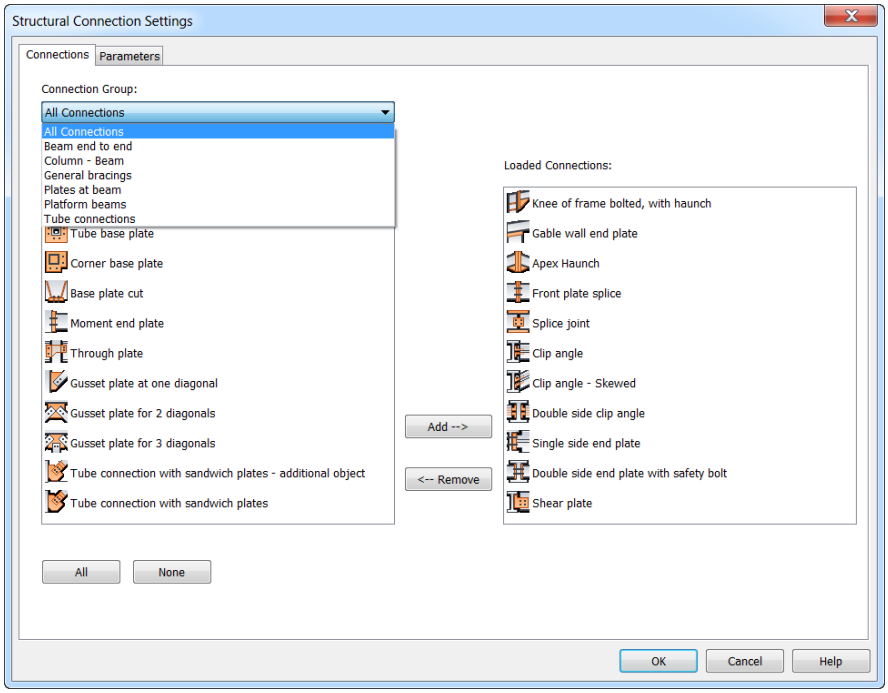
- Can be specified for each connection
- Customizable in “Structural Connection Settings”:
  - Add/delete buttons
  - E.g.
    - Approved
    - Rejected
    - Revised
  - Transferred to Autodesk Advance Steel ®
  - with the SMLX file format



Steel connections – Different types

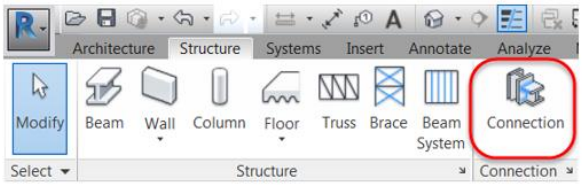
The Autodesk® Steel Connections for Revit® offers 22 parametric steel connections available in 6 groups:

- Base plate connections
- Column – beam
- Beam – beam
- Platform beams
- General bracings
- Tube connections



Steel connections – How to insert

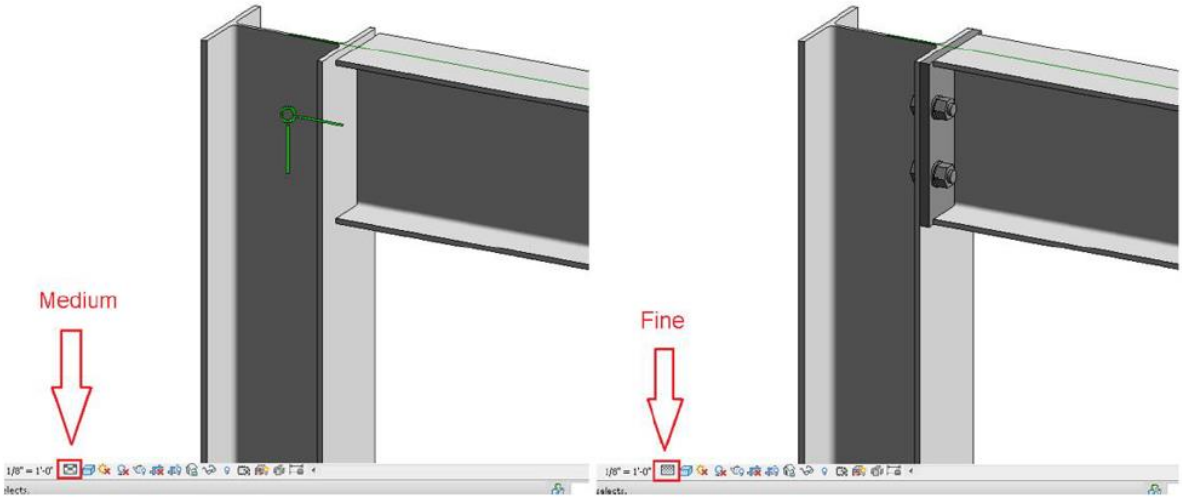
- Insert a steel connection:
  - Select members to be connected
  - Go to Structure tab, Connection button
  - Select one of the steel connections



Important: steel connections can only be inserted on new structural framing families

Steel connections – Detail levels

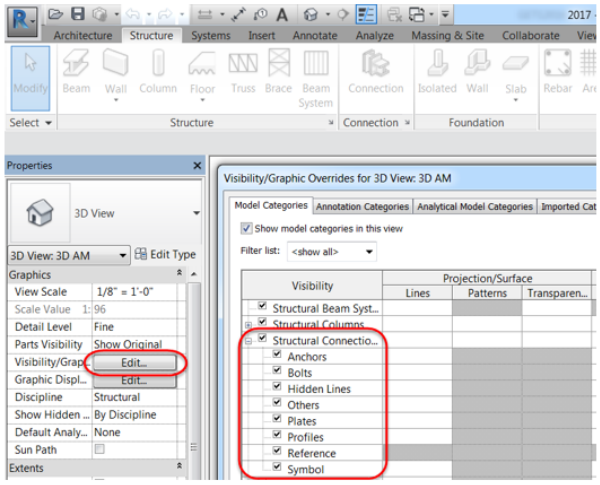
Different display at Medium vs Fine detail levels:



Steel connections – Visibility & Display

Control the visibility and graphic of steel connections model objects

- Visibility/Graphics Overrides dialog
- Structural Connection category
- Specific sub-categories:
  - Anchors
  - Bolts
  - Hidden lines
  - Others
  - Plates
  - Profiles
  - Reference
  - Symbol



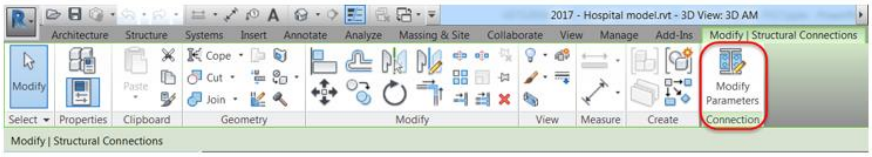
Steel connections – Modification

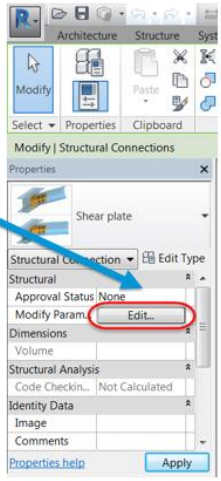
In the Properties panel:

- Modify parameters > Edit button

In the Ribbon:

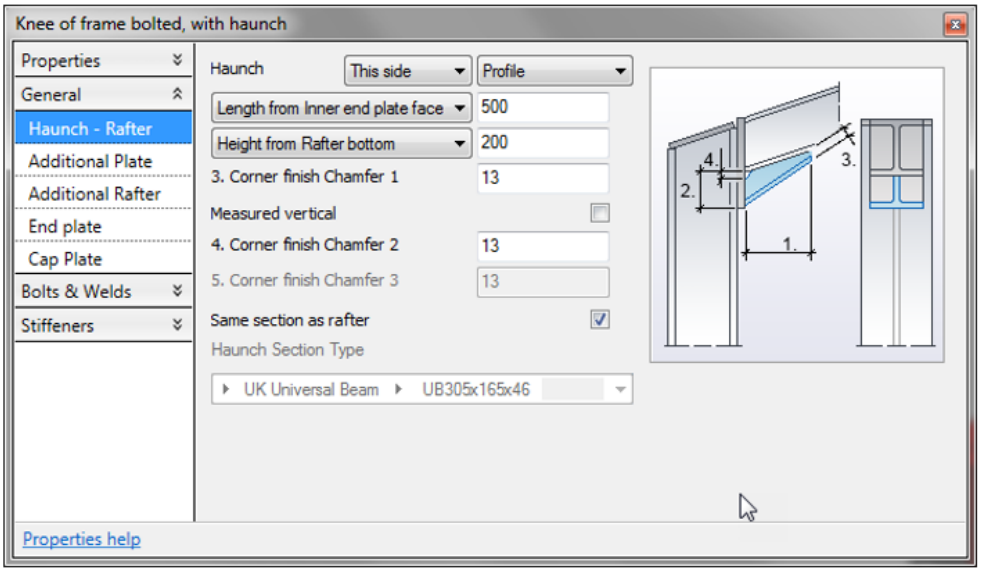
- Modify | Structural Connections > Modify parameters button



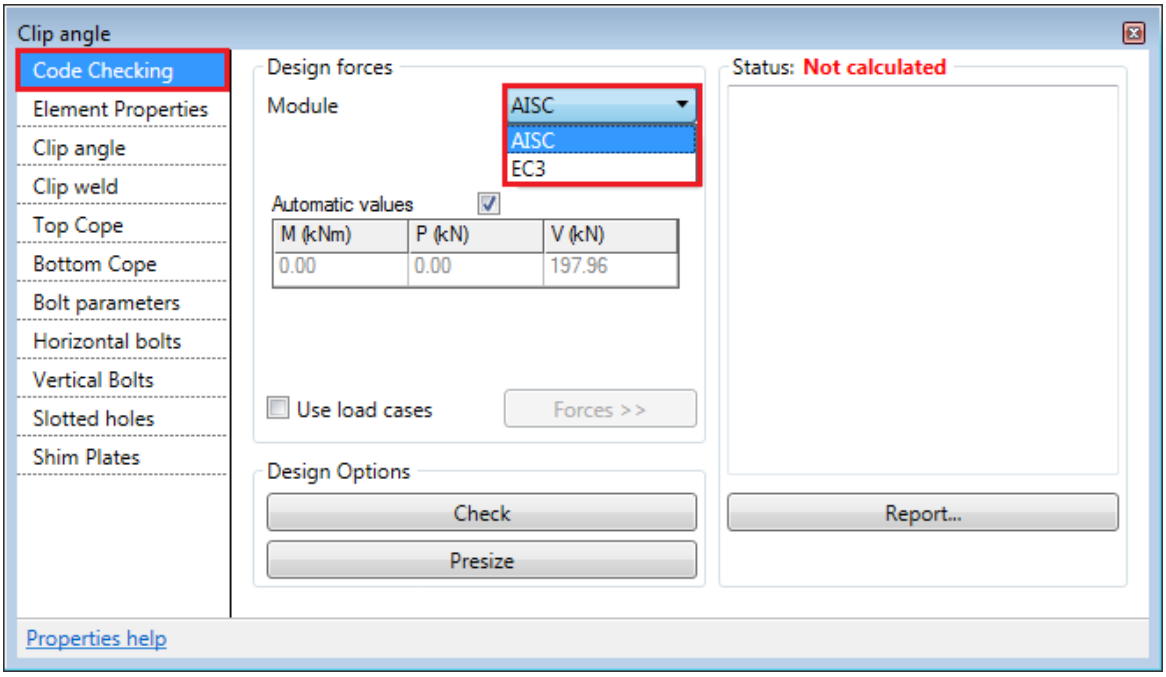


Important: multi-edit is not available with steel connections

Modify parameters adjacent to Advance Steel dialogues



Autodesk® Steel connections – Code checking

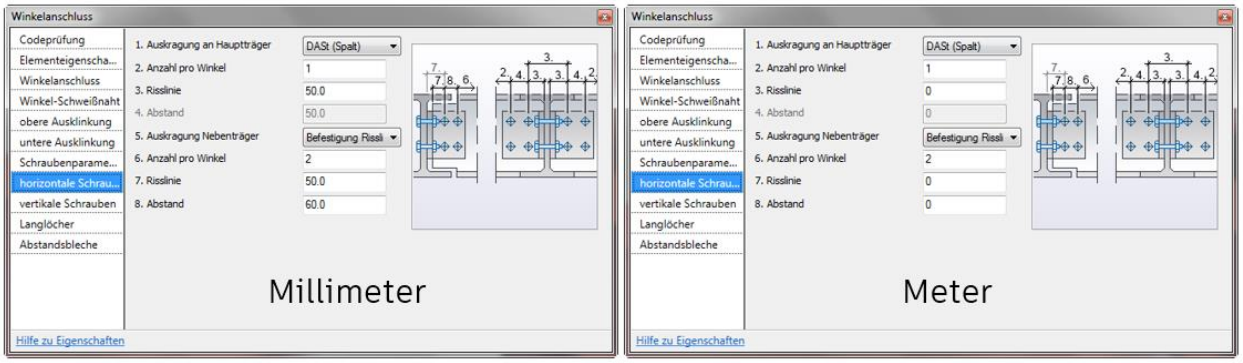


- AISC/EC3:
  - Check steel connections according to these standards
- Settings menu:
  - Options that control the report content
- Forces and moment used
  - Automatic values or Use load cases or Values entered manually

- Check or presize:
  - Choose if you want to verify or run an iterative process
- Code checking status:
  - Not calculated, Checking failed, OK Checked
- Generating a report:
  - Creates a document displaying all the verifications done

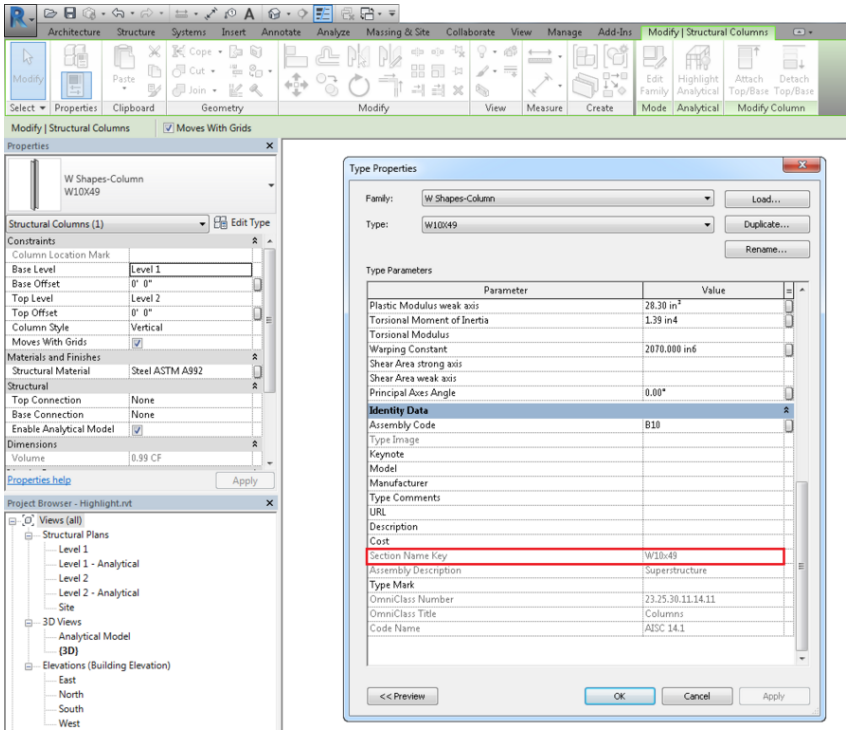
Best practices for steel connections and the extension

- Use „correct“ template

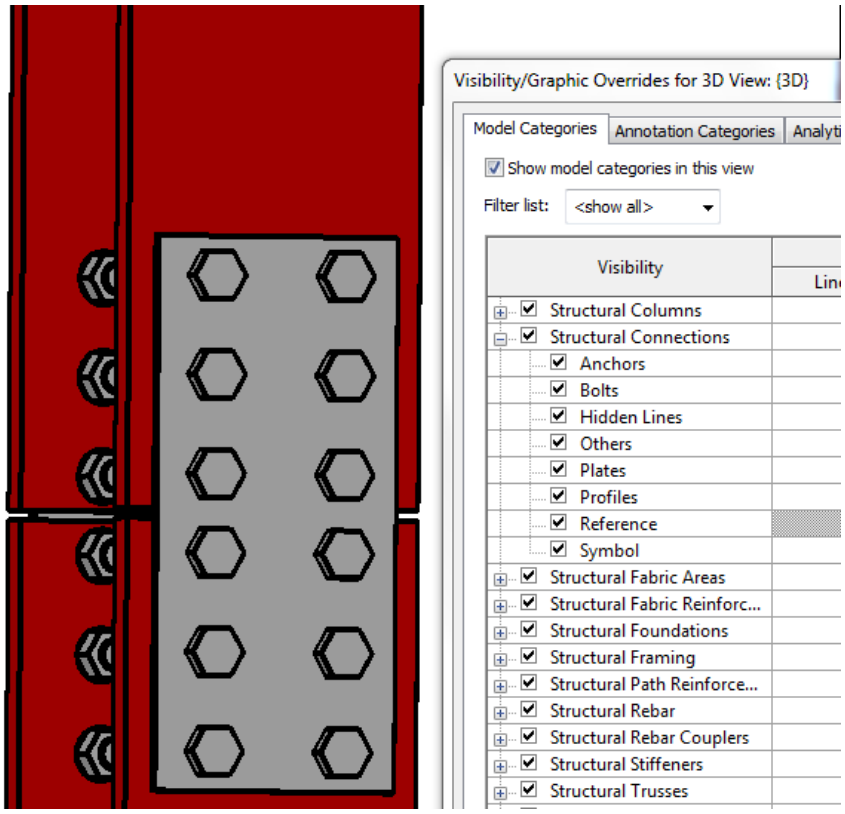


- UI-language of Revit - same as library language?

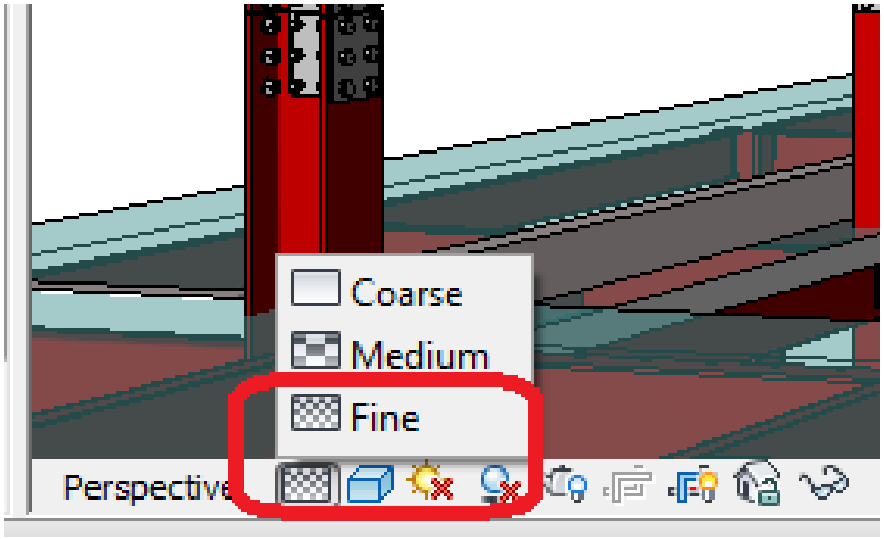
- Use certified families



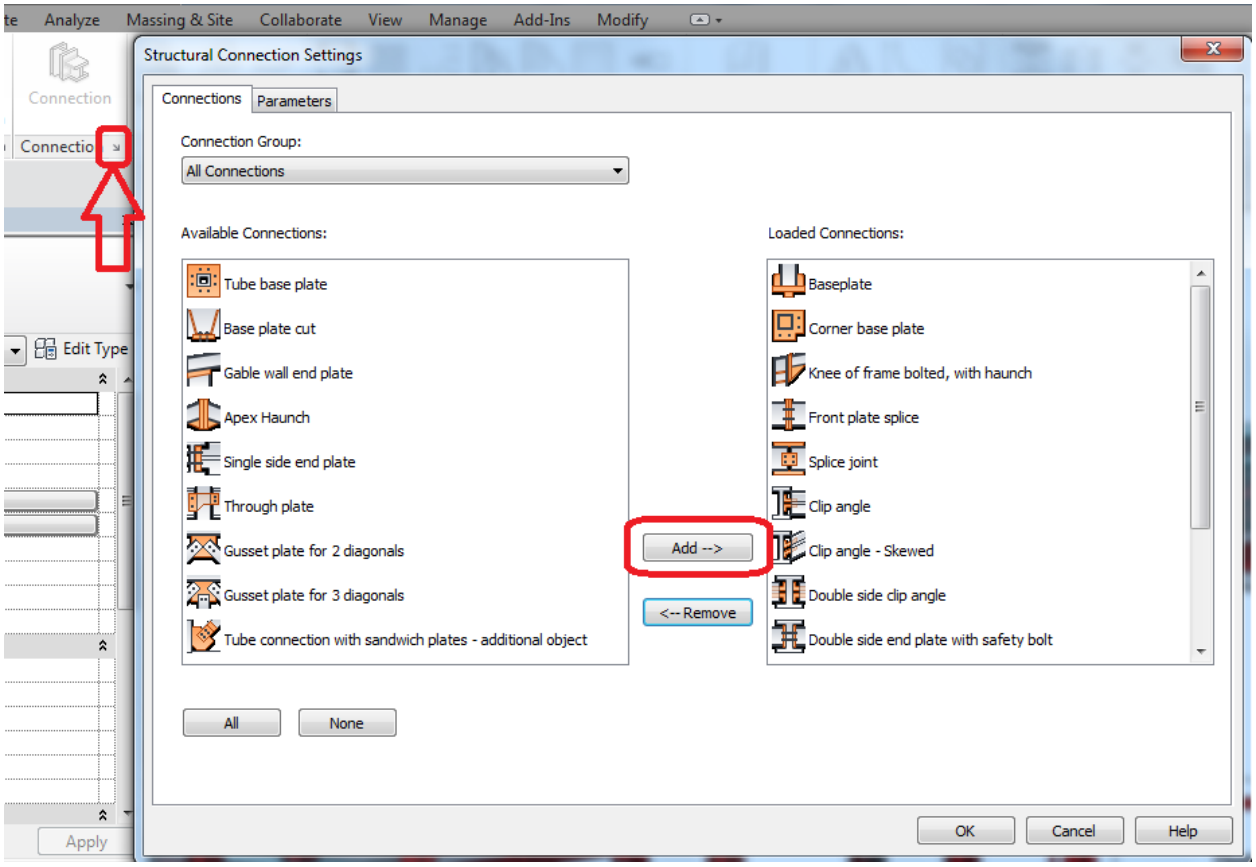
- Correct view settings?



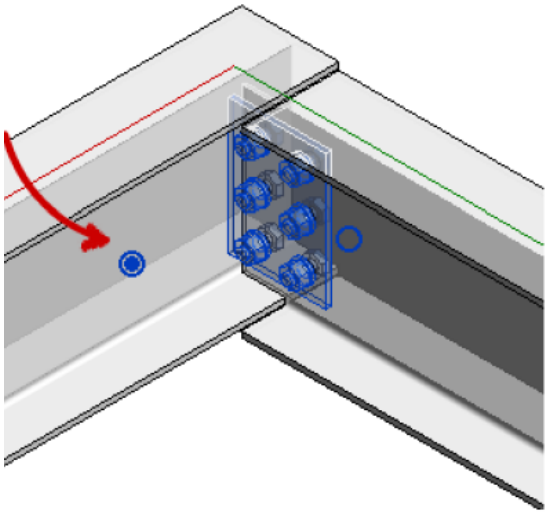
- Fine view?

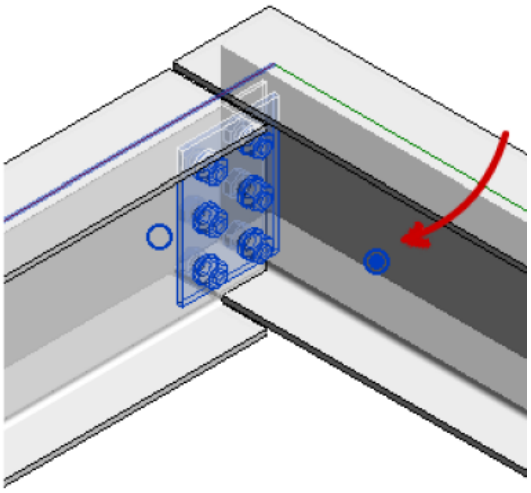


- Connections added?

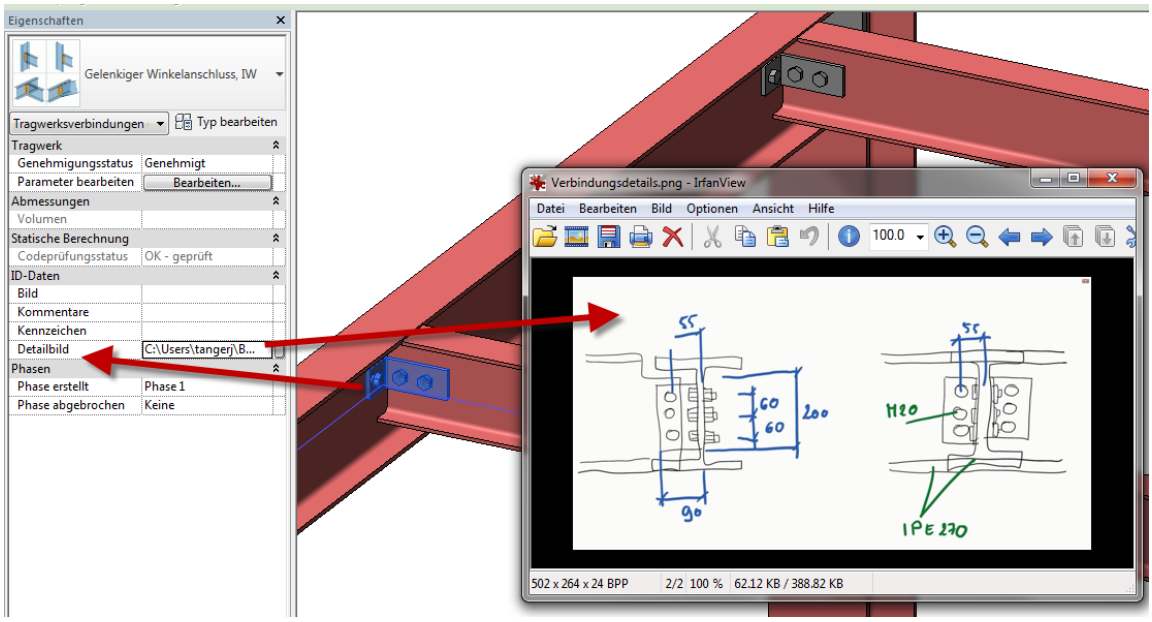


- Main framing element



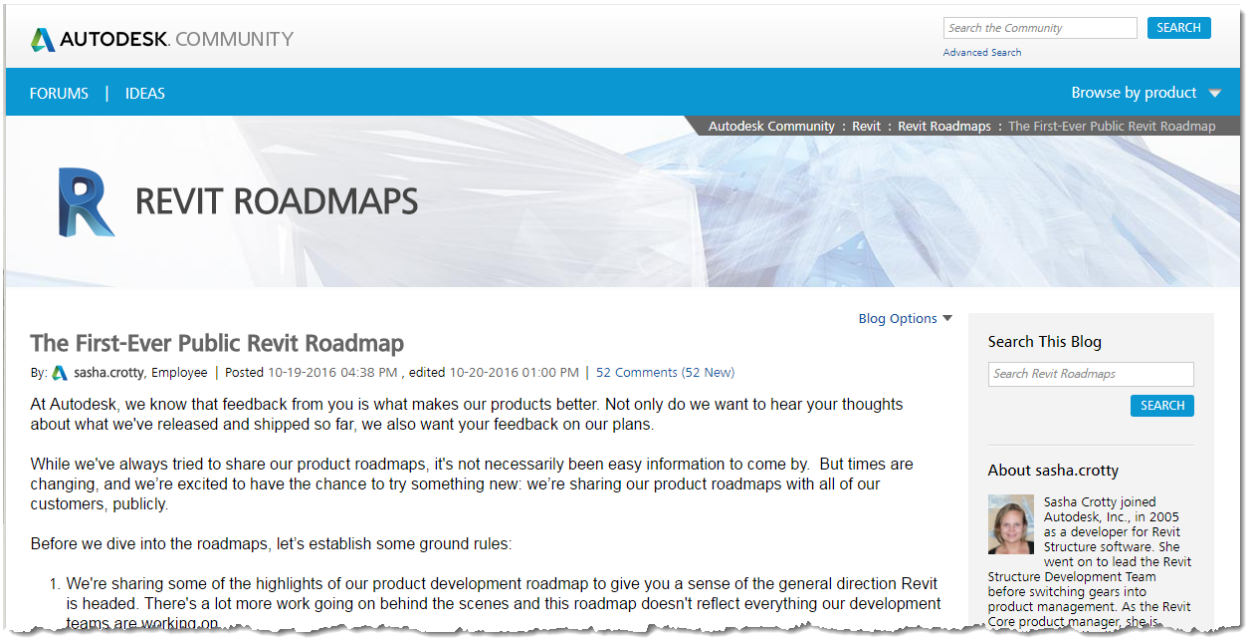


- Detail pictures inserted with URL parameter?



Steel connections outlook

http://forums.autodesk.com/t5/revit-roadmaps/the-first-ever-public-revit-roadmap/ba-p/6633199



STRUCTURE

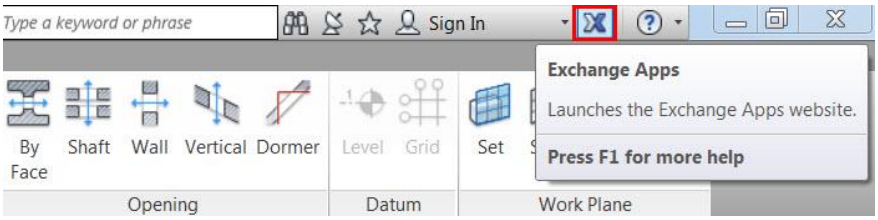
This part of the roadmap is focused on structural workflows from Design to Fabrication, supporting the key construction methods for Steel, Reinforced Concrete, and Precast Concrete.

In this space, Revit is considered as a multi-material modeling and documentation authoring environment to capture both Design-intent and Fabrication execution as appropriate.

Connection exchange with Advance Steel

Download

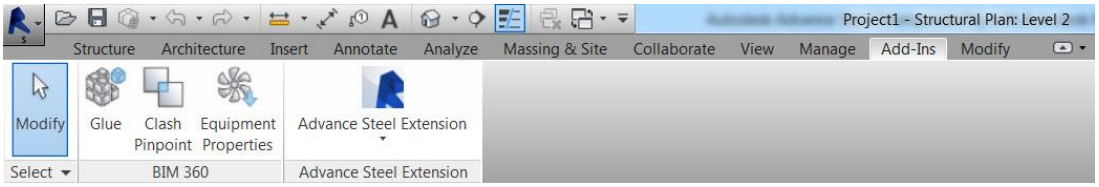
Check system requirements for the extension, download it from Autodesk Exchange Apps, and run the installer.



- The extension installation requires a 64-bit version of Windows.
- The Advance Steel 2017 Revit Extension is only compliant with Revit 2017
- The Advance Steel Revit Extension installation routine uses the Autodesk Setup installer.

Installation

Download the Advance Steel 2017 Revit Extension installer from Autodesk Exchange Apps and run the .msi to install it. After the installation is complete, you may need to restart the Autodesk product to activate the extension. When successfully installed, the Advance Steel 2017 Revit Extension panel is displayed on the Add-Ins tab in the ribbon.



To uninstall the Advance Steel 2017 Revit Extension, close the Autodesk product if you are running it:

1. Download the installer from Autodesk Exchange Apps, simply rerun it and click the *Uninstall* button.

Or

2. Uninstall it from *'Control Panel\Programs\Programs and Features'* (Windows 7 / 8 / 8.1) or *Add/Remove Programs*, just as you would uninstall any other application from your system.

http://help.autodesk.com/view/RVT/2017/ENU/?guid=GUID-DFDA3364-7D00-4CCC-898E-0EA2AC3C84D7

What's New in Advance Steel 2017 Revit Extension?

- **Transfer and synchronize structural connections**: Starting with this version, you can transfer structural connections between Revit and Advance Steel, using the extension. See Structural Connection Transfer and Synchronization.
- **Transfer and synchronize grids**: Starting with this version, you can transfer grid elements between Revit and Advance Steel, using the extension. See Grid Transfer and Synchronization.
- **The synchronization dialog works with Project Units**: Starting with this version of the extension, the synchronization dialog works with the units and tolerances set in the Revit Project Units dialog. See Advance Steel - Revit Synchronization.
- **New Export based on View Settings option**: This new option was added in the Settings dialog. See Export Based on View Settings.
- **New command graphics**: New images were added for each command in the Advance Steel Extension ribbon. See About Advance Steel Extension for Revit.
- **Removed the IFC export / import option**: The IFC format option used for export and import was removed from this version of the extension. You can export or import this type of format, using the IFC Link built in Revit.
- **Removed the *Update section mapping to import* option** from the Settings dialog.
- **Renamed the CIS2 format**: The "CIS2" format was renamed to "CIS2 Fabrication" to eliminate confusion about the CIS2 export format the extension can transfer, as, generally, the CIS2 format can be either analytical or fabrication.
- **Changed the ID GTC assigning mechanism**: Groups and assemblies are no longer deleted when a model from Revit is exported to . smlx . The ID GTC Parameter is no longer displayed in the Properties menu. The new mechanism does not allow duplicate IDs to be generated in the model.
- **Added new mapping lines compatible with country specific Revit families**: New mapping lines were added, in order to be compatible with the new Revit families from the Germany, France, Poland, and India country folders. The Revit 2017 library contains new steel framing and steel column families for Australia, Germany, France, India and Poland. This new version of Advance Steel Extension for Revit can use the family based section mapping when transferring these profiles between Revit and Advance Steel.
- **Added new entries for the section mapping using rules system**: These entries were added for the new families in the US Imperial, US Metric, UK, Australia, Germany and France Revit country folders. The regular expressions are more restrictive and cover all profile types and names. The entries were added in both the GTC_Profile_Conversion and Profile_Exports_Convertion tables of the GTCMapping2017.mdb database, between key 0 and key 1000.
- **The Revit synchronization dialog highlights the selected element in the canvas**. See Advance Steel - Revit Synchronization.
- **Analysis results are exported with selected parts**: Analysis results are also exported when exporting only selected parts of a Revit model via .smlx. See Analysis Results Transfer from Revit to Advance Steel.

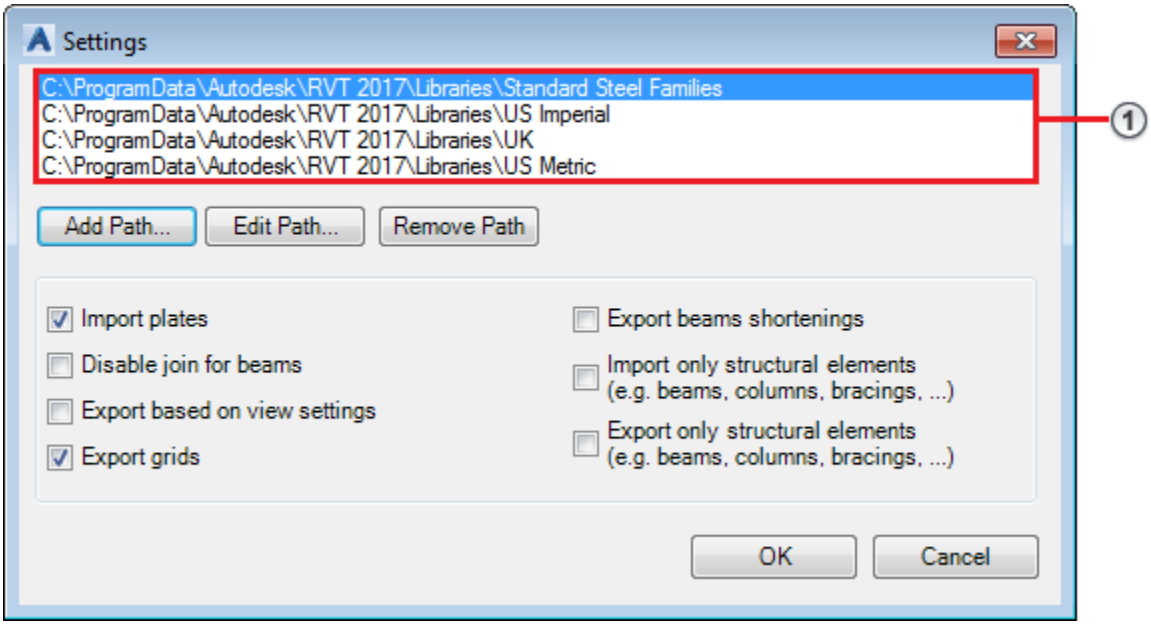
- **The Import and Synchronization commands can import Read Only .smlx files**.

http://help.autodesk.com/view/RVT/2017/ENU/?guid=GUID-E7F2CCB1-07D4-44D6-AC4F-2D038F788355

Settings and export

Specify options to import and export elements between Advance Steel and Revit.

You can access the *Settings* dialog in the **Add-Ins** tab > **Advance Steel Extension** panel in the ribbon and find the following options:

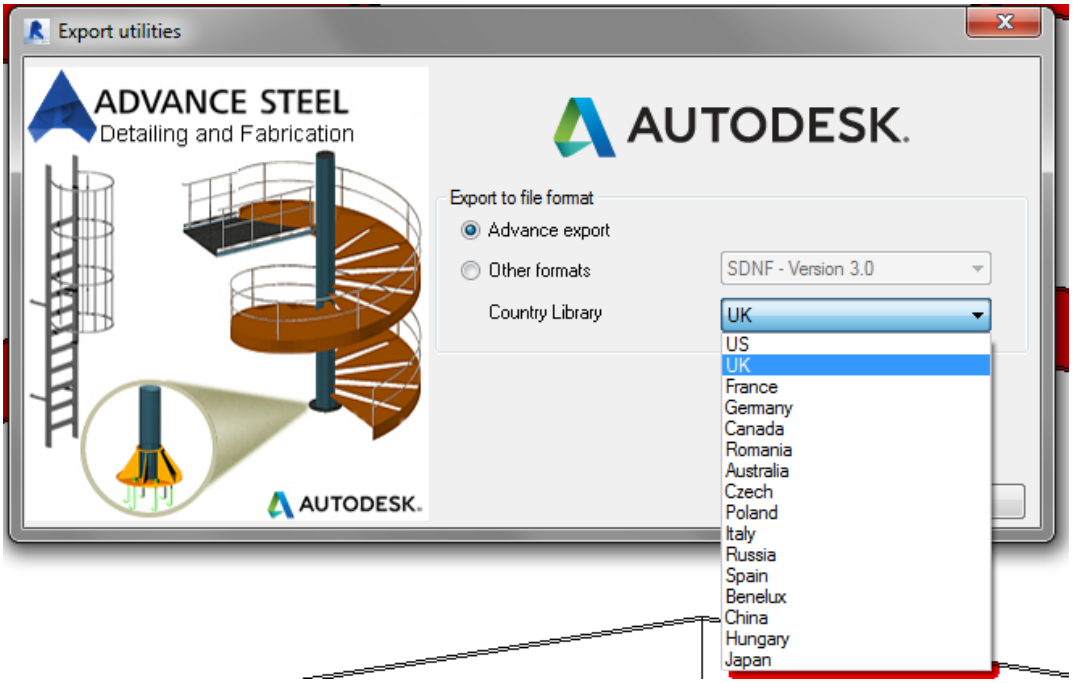


① - Path configuration for Revit library - Steel section definitions

- **Import plates -** Allows the import of Plate objects in Revit.
- **Disable join for beams -** Disables the automatic Revit joint for steel beams during import .
- **Export based on view settings -** Allows the export of objects, using the Revit view settings. → **New in 2017**
- **Export grids -** Allows the transfer of grid elements. → **New in 2017**
- **Export beam shortenings -** Exports shortenings to Advance Steel for beams joined automatically by Revit.
- **Import only structural elements** and **Export only structural elements -** Turns the *import/export of only structural elements* (beams, columns etc.) on or off.

http://help.autodesk.com/view/RVT/2017/ENU/?guid=GUID-F6E92AB4-02D3-4F1C-A337-C54E77588244

Extra Tip:
The *Country Library* option has no influence in the export file any longer as the mapping is being done automatically with the existing pre-settings and databases.



Section & Material Mapping

Section mapping is important while transferring via SMLX because it resolves the differently named sections between software.

The mapping database is *GTCMapping2017.mdb* and it can be found in C:\ProgramData\Autodesk\Advance\Data. The database is installed in a Program Data folder and can be accessed and edited with any database editor and the Management Tools Table editor.

Mapping can exist as:

- **1 to 1 mapping**, where each section size is mapped individually.
- **Rule based mapping**, where a certain rule (using tokens) will allow the mapping of an entire class in one definition line.

A deep dive description about section and material mappings with concentrating on the databases, etc. you can find in the handout of our AU 2015 session and in the help file:

http://au.autodesk.com/au-online/classes-on-demand/class-catalog/2015/advance-steel/msf9800#chapter=0

http://help.autodesk.com/view/RVT/2017/ENU/?guid=GUID-434D1E71-64BD-4891-B834-A03E948687DF

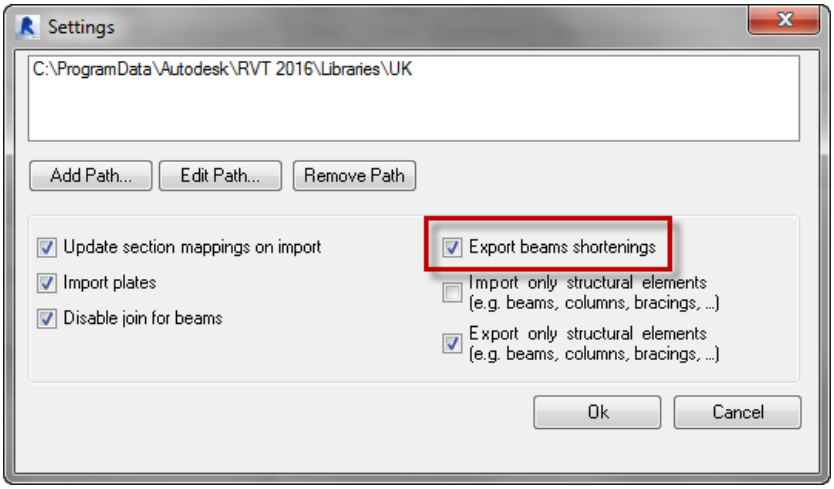
Best practices for steel connections and the extension

Advance Steel extension

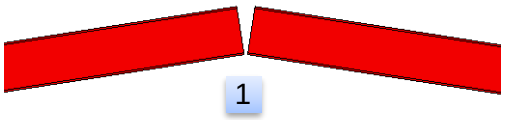
Revit Model – Shortenings

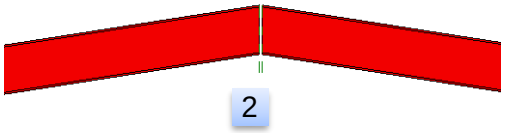
What are the differences between exporting the beam shortenings and not exporting them?

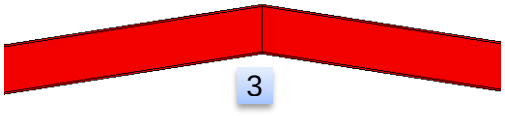
Export shortenings:



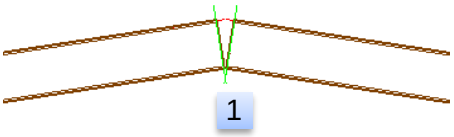
Revit

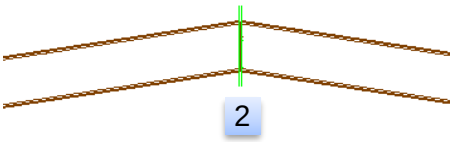


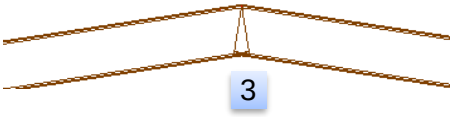


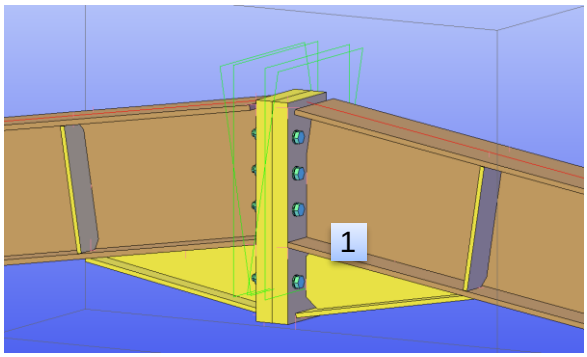


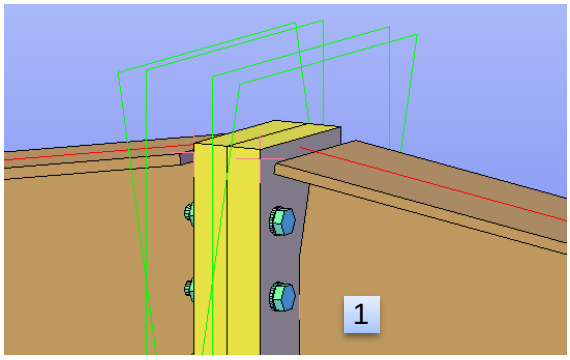
Advance Steel

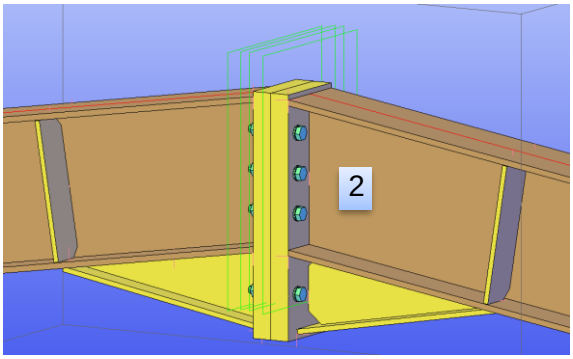


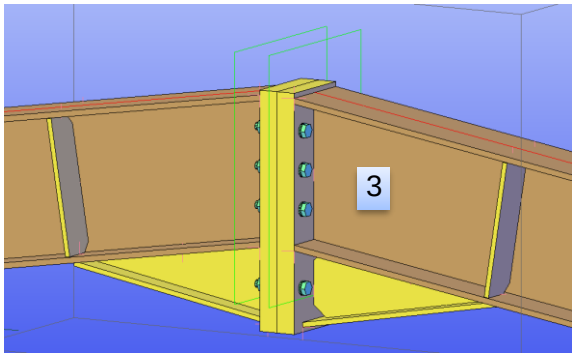






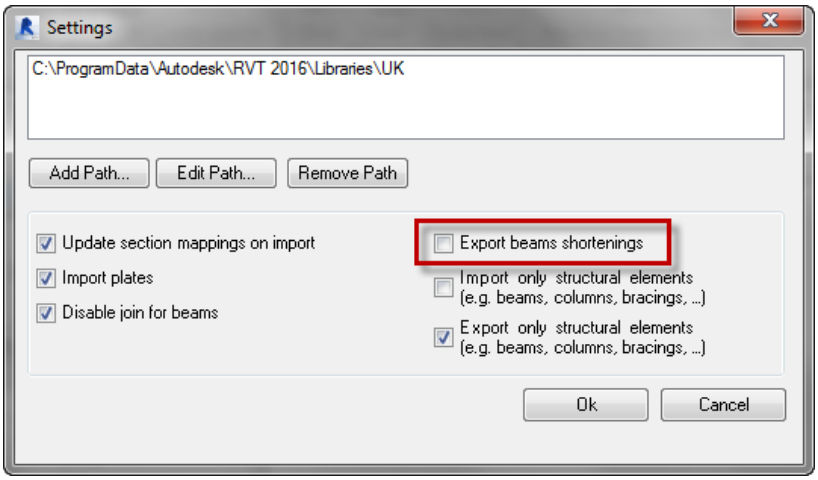




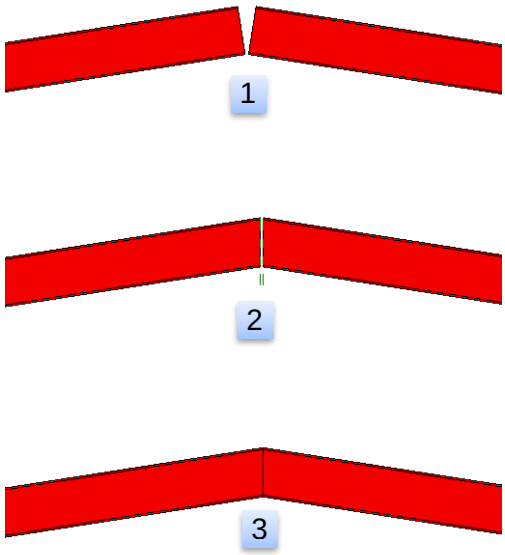


➔ Conclusion: Revit exports shortenings that are recognized and used in Advance Steel, but will lead to problems for a lot of steel connections as they use their own shortenings that will overlap with the existing ones from Revit.

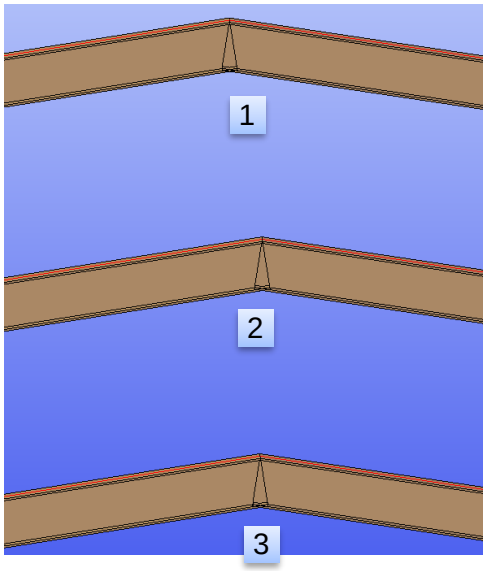
Export NO shortenings:



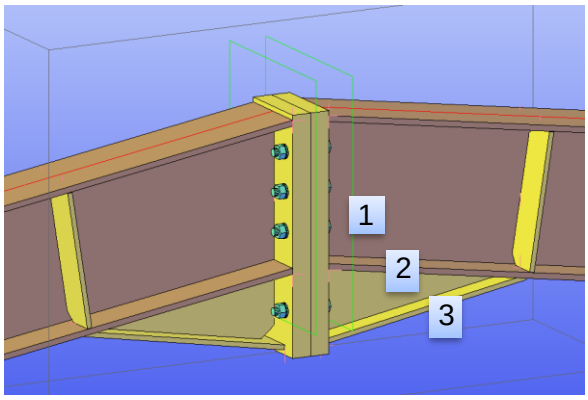
Revit



Advance Steel



Advance Steel



➔ Conclusion: *Export beams shortenings* option off should be the default one for the exchange of Revit with Adcance Steel

Plates (within joints) & Holes

Advance Steel plates are imported in Revit as *plate families*.

In order to import plates in Revit, you need to perform the following in the Settings menu:

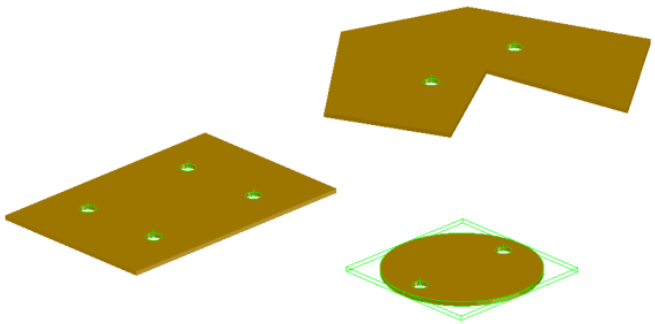
- Check the Import plates option.
- Uncheck the Import only structural elements (e.g. beams, columns, bracings,...) option.

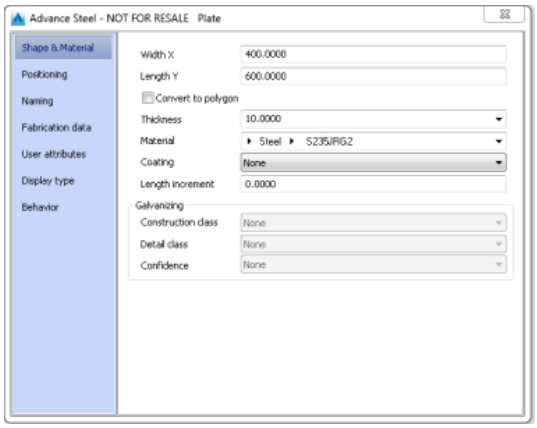
These plates are imported back in Advance Steel as *plate objects*.

The images below display a model in Advance Steel that contains a rectangular, polygonal and circular plate. The model was transferred to Revit and then was sent back to Advance Steel through .smlx. The plates are imported in Advance Steel as plate objects.

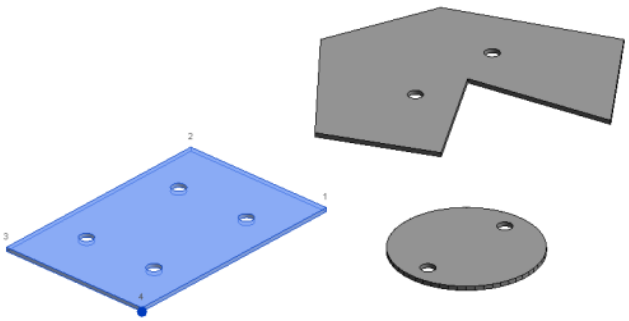
Note: Circular holes on plates are transferred between the 2 applications.

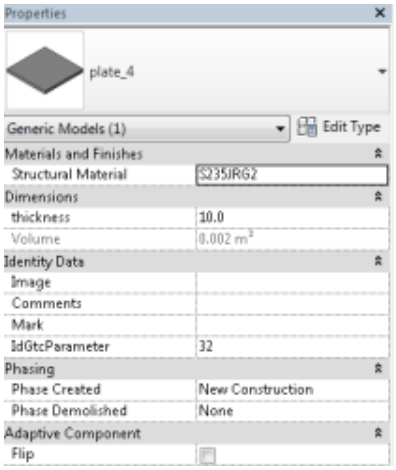
Advance Steel Model



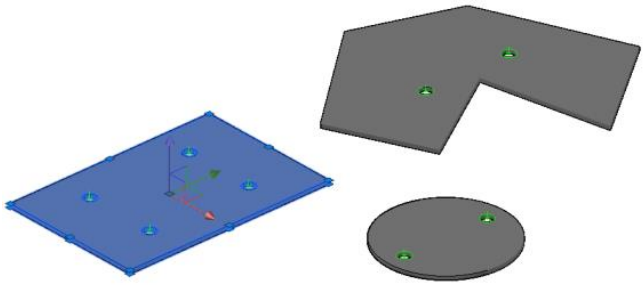


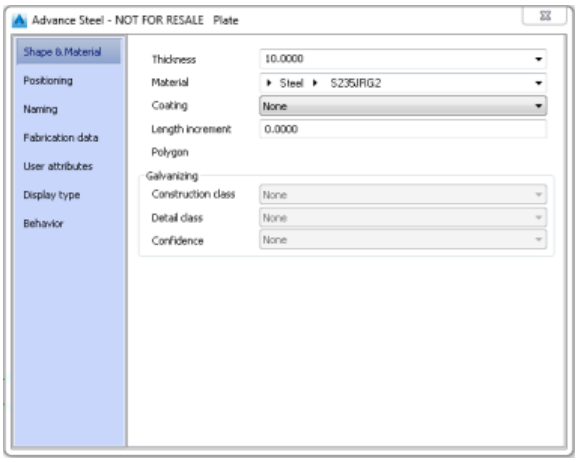
Revit Model





Advance Steel Model (imported through .smlx)





Synchronize plates in Revit
The following plate modifications can be synchronized in Revit:

- Position
- Shape
- Thickness
- Material

In order to display the above mentioned capabilities, a model from Revit was exported and then imported in Advance Steel. Here several connections were modeled between the structural elements. After this step, the model was exported again, this time from Advance Steel, and the plate objects were synchronized in the initial Revit model.

More details and examples for the above workflow you can find in the handout of our AU 2015 session:

http://au.autodesk.com/au-online/classes-on-demand/class-catalog/2015/advance-steel/msf9800#chapter=0

Transferred Elements (.smlx)

You can transfer numerous elements from/to Revit to/from Advance Steel, such as levels, steel beams, plates, wood, concrete elements, grating, some connection elements, some beam features and some plate features. All element transfers are dependent on the feature extent and limitations of each application (Revit and Advance Steel). For more detailed information on transferred elements see the table below:

CLASS	OBJECT TYPE	REVIT TO ADVANCE STEEL	ADVANCE STEEL TO REVIT
General	Level	✓	✓
	Grid	✓	✓
Steel Beams	Beam	✓	✓
	Column	✓	✓
	Compound beam	**X**	✓
	Welded beam	**X**	✓
	Tapered beam	**N/A**	✓
	Curved beam	✓	✓
	Poly beam	**N/A**	✓
	Folded beam	**N/A**	**X**
	Aluminum beam	**X**	✓
Plates	Rectangular plate	✓ **(AS-Revit-AS)**	✓
	Polygonal plate	✓ **(AS-Revit-AS)**	✓
	Circular plate	✓ **(AS-Revit-AS)**	✓
	Folded plate	**N/A**	✓
	Twisted folded plate	**N/A**	✓
	Conical folded plate	**N/A**	✓
Wood	Timber beam	✓	✓
Concrete elements	Wall	✓	✓
	Polygonal wall	✓	✓
	Slab	✓	✓
	Polygonal Slab	✓	✓
	Concrete beam	✓	✓
	Concrete curved beam	✓	✓

CLASS	OBJECT TYPE	REVIT TO ADVANCE STEEL	ADVANCE STEEL TO REVIT
	Concrete column	✓	✓
	Isolated footing	✓	✓
	Continuous footing	✓	✓
Grating	Standard grating	**N/A**	✓
	Bar grating	**N/A**	✓
	Variable grating, rectangular	**N/A**	✓
	Variable grating, polygonal	**N/A**	✓
Connection elements	Bolts	**X**	**X**
	Anchors	**X**	**X**
	Shear Studs	**X**	**X**
	Welds	**N/A**	**X**
	Holes	✓ **(AS-Revit-AS)**	✓ **(only on plates)**
Beam features	Shorten	✓	**X**
	Contour	✓	**X**
	Cope	**N/A**	**X**
	Weld preparation	**N/A**	**X**
	Corner cut	**N/A**	**X**
	Cope (from Revit)	✓ **(only shorten)**	**N/A**
Plate features	Shorten	**N/A**	✓
	Contour	**N/A**	✓ **(only polygonal)**
	Weld preparation	**N/A**	**X**
	Corner cut	**N/A**	✓
Structural analysis results	Torsor (N,V,M)	✓	**X**

Legend:

✓ - present in the source application, is imported in the target application (limitation)

X - present in the source application, is NOT imported in the target application

N/A - NOT available in the source application

✓ **(AS-Revit-AS)** - transfer from Advance Steel to Revit and back to Advance Steel

Help for Advance Steel 2017 Revit Extension

You can get a lot of great information about the Advance Steel - Revit File Transfer within the Revit Help itself:
http://help.autodesk.com/view/RVT/2017/ENU/?guid=GUID-237FBEA0-B287-46C6-80B6-116FABD20A68