



TEKLA[®] *potential³*

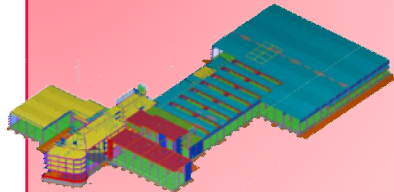
Tekla Structures and Autodesk Revit useful geometry exchange

General guidance: Updated: 2nd June, 2014
(New material is starred)



FROM Autodesk Revit Architectural to Tekla Structures





TEKLA
Tekla Engineer

Accurate
geometry


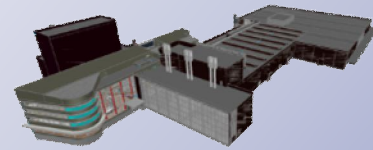
IFC Reference

IFC object
convertor

Common / revit /
user attribute info

IFC 2x3 (CV2)

Autodesk App
Revit IFC
exporter



Architectural
MEP
Contractor

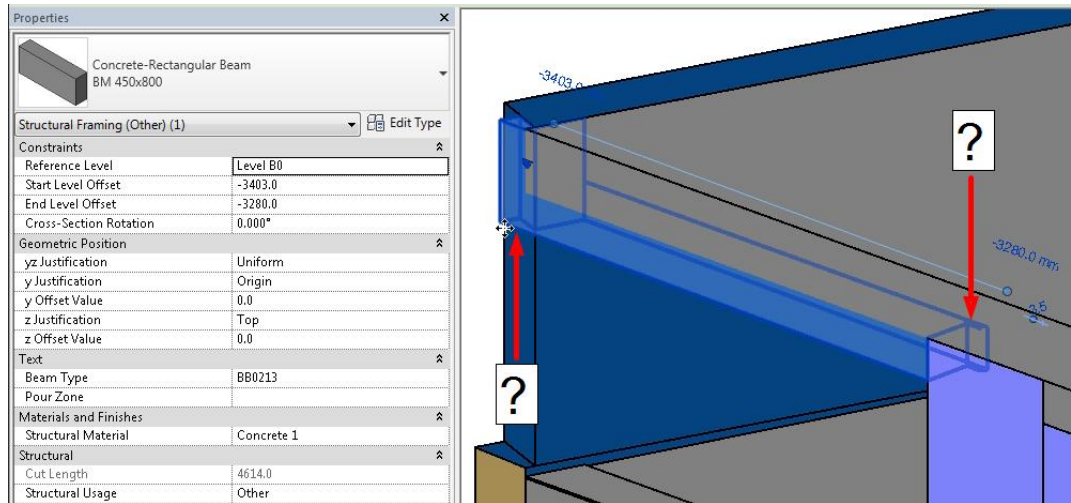
For
Collaboration



1. Autodesk Revit to Tekla Structures

Prepare Revit model

- > **Project Zero:** Create special SITE DEFINITION for export to IFC which places the Survey Point at a sensible point on plan (e.g. the crossing of Grid (A,1). Once export is done, return to standard Project SITE DEFINITION (Cartographic survey point etc)
- > Establish project share folder (ftp, etc.)
- > Establish coordination zones (by level, workset, IFC model names)
- > Export from same discipline as authored
- > **When you model, do so for accurate quantity take-off from model geometry as required by the QTO team. Don't model for drawing and schedule creation only.**



> Model for accurate quantity take-off from model geometry.

A model which has accurate attributes, but whose geometry does not reflect those attributes (e.g. volume of concrete in part, length of steel between nodes) is not ready for sharing with all members of the project team.

Quality of visible IFC object in Tekla

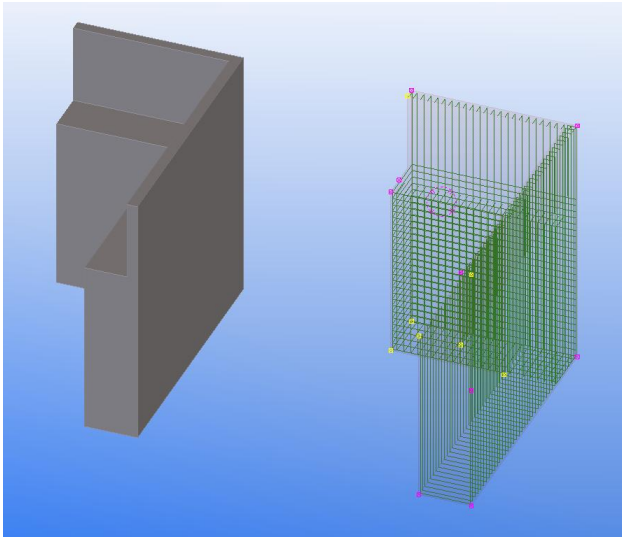
Object was created for drawing production. Limited use for wider design team



Depth of data available to create a Tekla Object

Poor. Object was originally created for purpose of drawings only



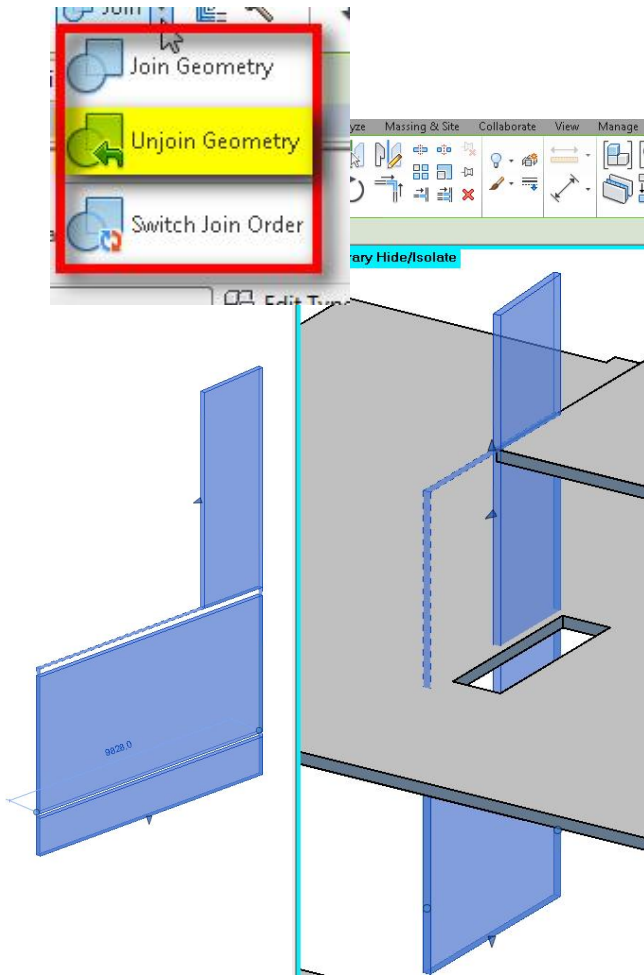


Revit IFC object

Data depth ok in this case; part reinforced in Tekla.

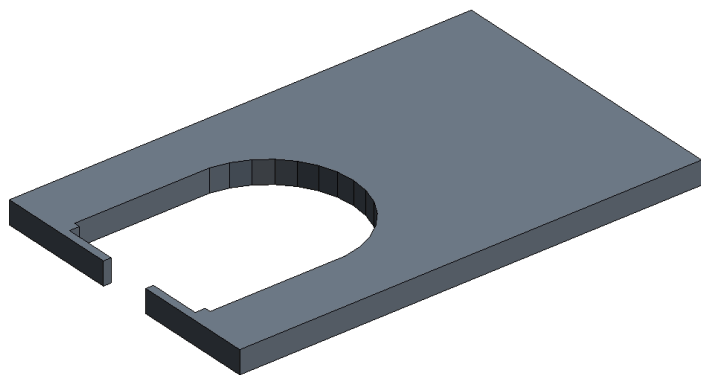
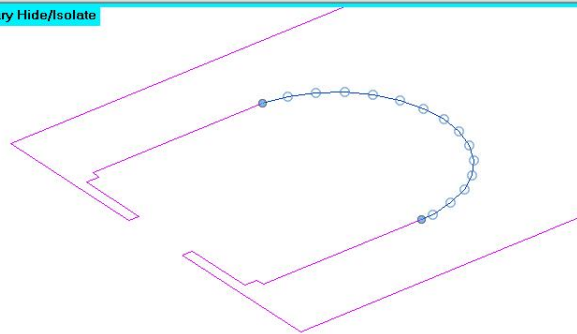
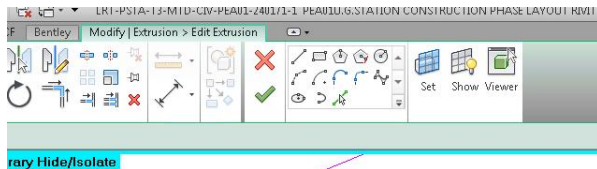
- > In-Place Families are time savers but only in the short term.
- > Use standard Family Categories and Types where possible

Quality of visible IFC object in Tekla	Depth of data available to create a Tekla Object
Excellent ●	Limited. Object may not always be created ●



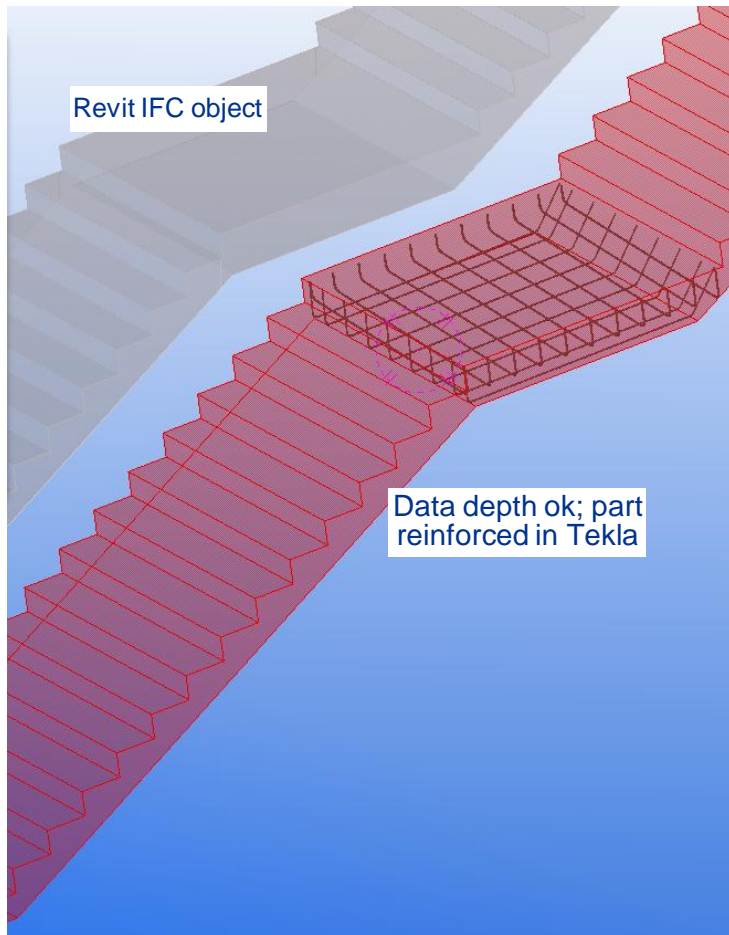
- > Avoid 'Joining' geometry in Revit where possible. Model each part as it would be constructed. E.g. A precast panel would not be three floors high.

Quality of visible IFC object in Tekla	Depth of data available to create a Tekla Object
Excellent ●	Possibility that profile reads incorrectly ●



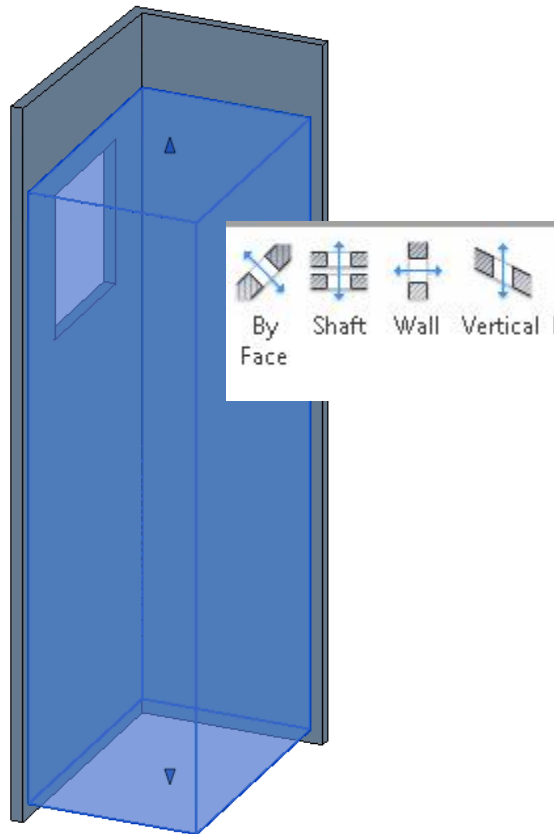
- > If possible, use curves only for filleting
- > Consider faceting / tessellating for large curved edges in profile object creation

Quality of visible IFC object in Tekla	Depth of data available to create a Tekla Object
Excellent ●	Mixed results. Tekla Structures has a 99 point limit on objects. Curves sometimes don't exchange ●



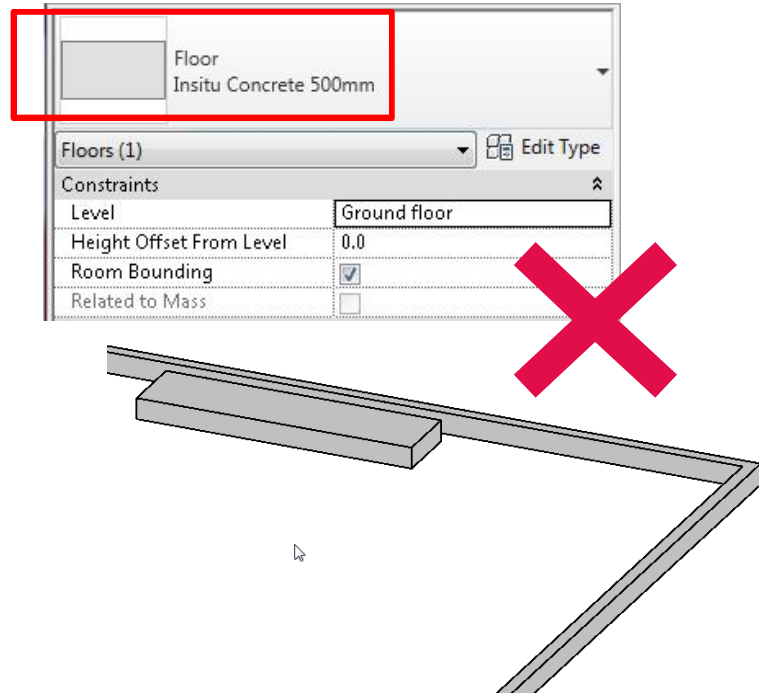
- > Export only concrete materials in Revit structural stairs (not nosings, kickplates, balustars etc)

Quality of visible IFC object in Tekla	Depth of data available to create a Tekla Object
Excellent ●	Sufficient but requires review ●



- > Consider modifying slabs by profile rather than using the Opening tool or void Family objects. A slab which has holes made in it's profile is much easier to understand in other software.

Quality of visible IFC object in Tekla	Depth of data available to create a Tekla Object
Excellent ●	Possibility that Revit profile reads incorrectly ●



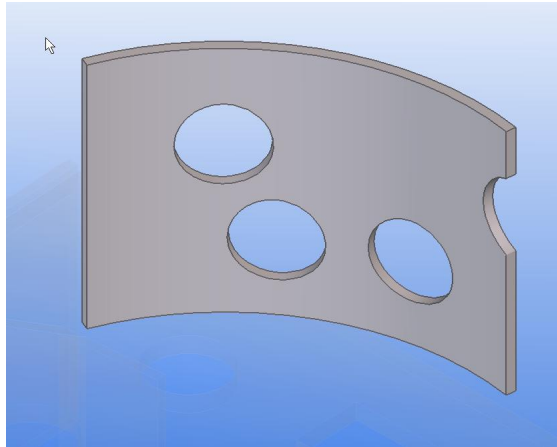
- > Use the correct Family category for the building part being modelled
- > Using the incorrect family causes confusion

Quality of visible IFC object in Tekla

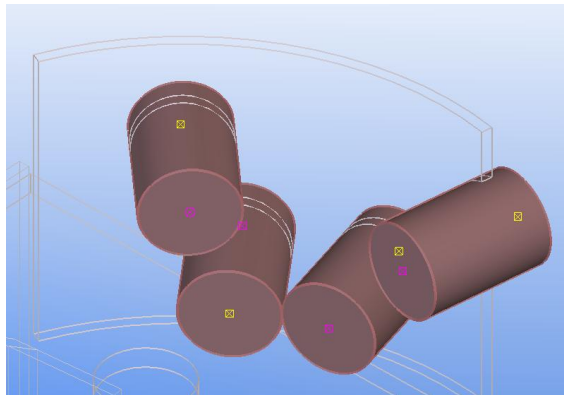
Excellent ●

Depth of data available to create a Tekla Object

Possibility that Revit profile reads incorrectly ●



- > Curved wall / beam elements with voids would require exporting as an individual IFC object in order to convert to a Tekla Structures object
- > Voids convert but massing does not

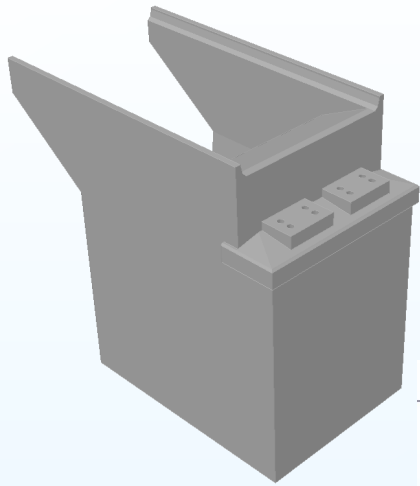


Quality of visible IFC object in Tekla

Excellent ●

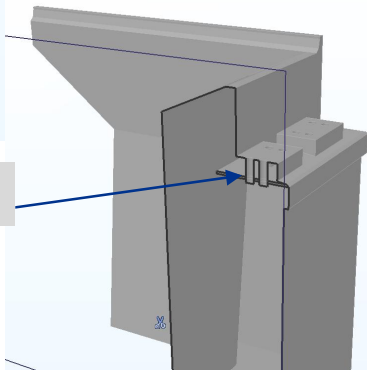
Depth of data available to create a Tekla Object

High possibility that Revit profile reads incorrectly ●



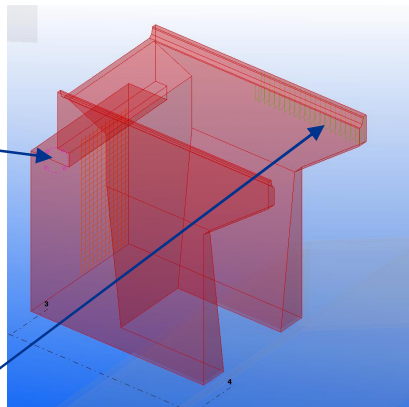
- > Concrete Autodesk Revit pier created by large number of voids and overlapping solid parts which don't make construction sense

What's this?



Strange parts removed

Reinforcement added

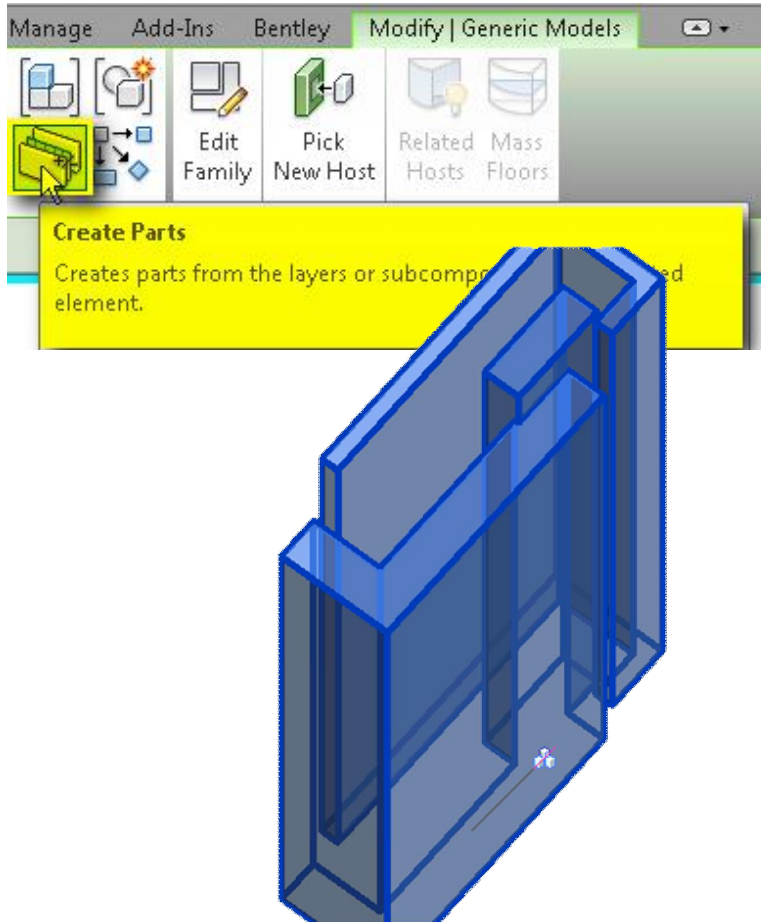


Quality of visible IFC object in Tekla

Excellent ●

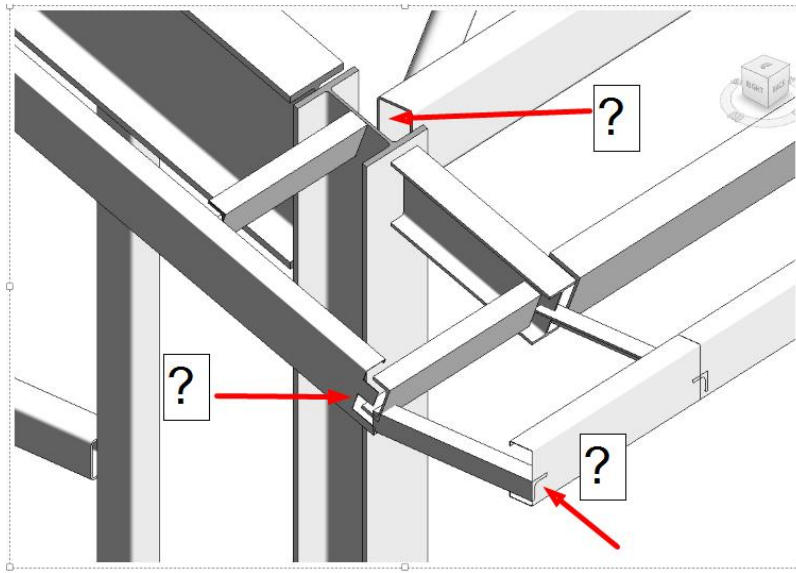
Depth of data available to create a Tekla Object

High possibility that Revit profile reads incorrectly. Import Shape or Import reference and use Convert IFC Object + BREP switch. Remove 'strange' geometries that don't make construction sense ●



- > Complex Family types are often good for drawing production only. They may convert to Tekla Structures objects but still would need refactoring to create a true BIM workflow to communicate with the factory floor.
- > Consider dividing these objects into parts before exporting, this may help in creating true production ready objects.

Quality of visible IFC object in Tekla		Depth of data available to create a Tekla Object	
Excellent	●	Possibility that Revit profile reads incorrectly	●



- > Revit cuts-back steel part not for constructability, but for drawing preparation.
- > If exporting steel for the purpose of detailing in Tekla Structures – the Revit steel beam Families may want to have their cutbacks removed at Family level
- > This may be done via a: Linked, **Copy**/Monitored and Family mapped file which is used just for this purpose

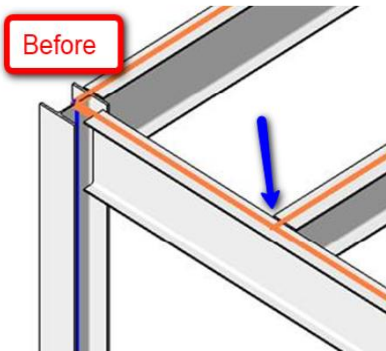
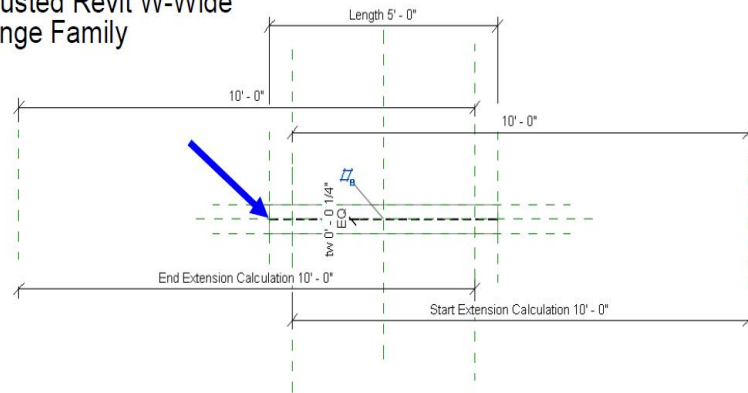
Quality of visible IFC object in Tekla

Lengths of steel are determined by drawing rules in Revit, not node to node lengths.

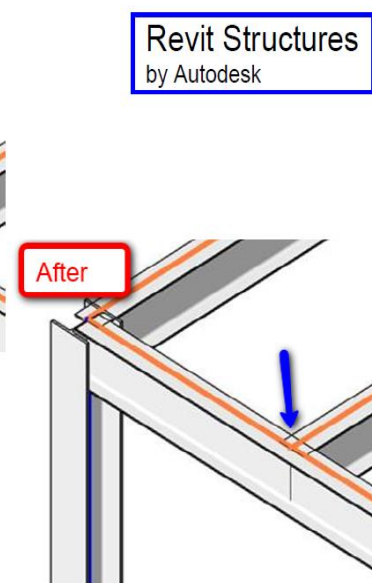
Depth of data available to create a Tekla Object

Profiles are correct, lengths of steel are drawing preparation lengths, not construction preparation lengths.

Adjusted Revit W-Wide Flange Family



Before



After

Cutbacks removed prior to exporting the model

Revit Structures by Autodesk

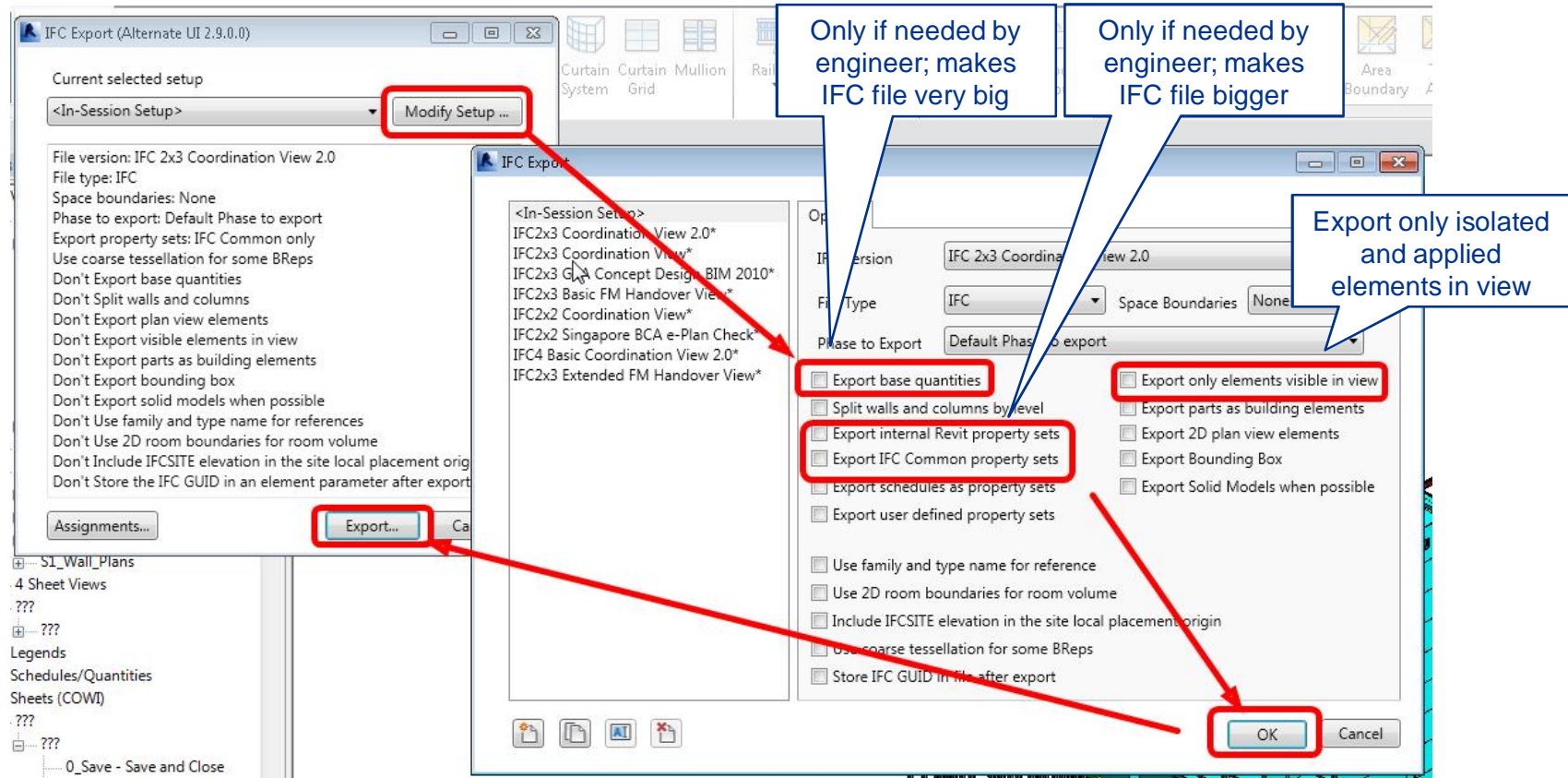
- > Exporting information from a model whose purpose was to create drawings (Autodesk Revit) to a BIM model (Tekla Structures) is fundamentally difficult. BIM model to BIM model is simple (Tekla Structures to Tekla Structures).
- > If exporting steel for the purpose of detailing in Tekla Structures – the Revit steel beam Families may want to have their drawing-ready cutbacks removed at Family level
- > This may be done via a: Linked, **Copy**/Monitored and Family mapped file which is used just for this purpose

2. Revit IFC export to Tekla



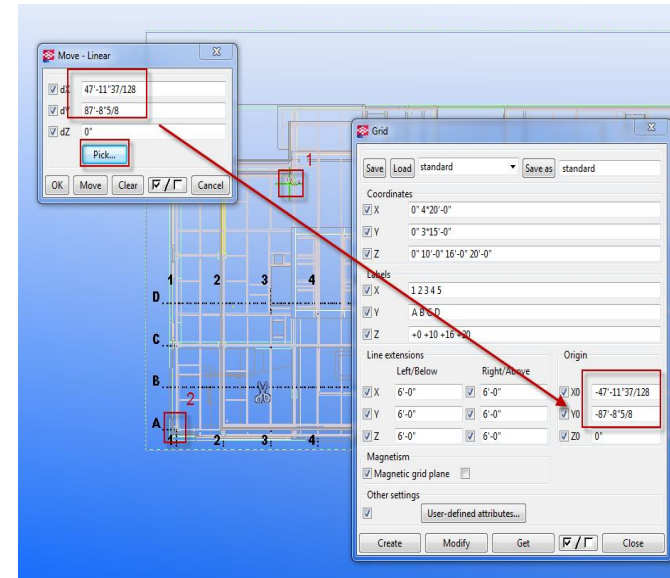
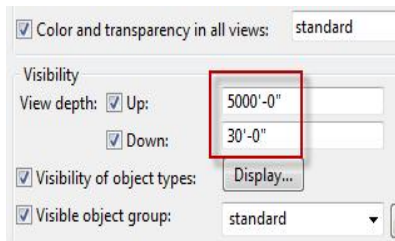
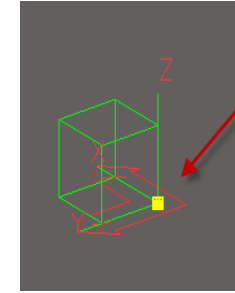
- > Use the Autodesk Open Source IFC exporter
- > This is the regularly updated Autodesk approved Open Source exporter which offers up-to-date improvements on the default IFC export capabilities of Autodesk Revit
- > Found for free on the Autodesk App Store
- > Also found here (same code): <http://sourceforge.net/projects/ifcexporter/>

2b. Revit export options (Open Source exporter)



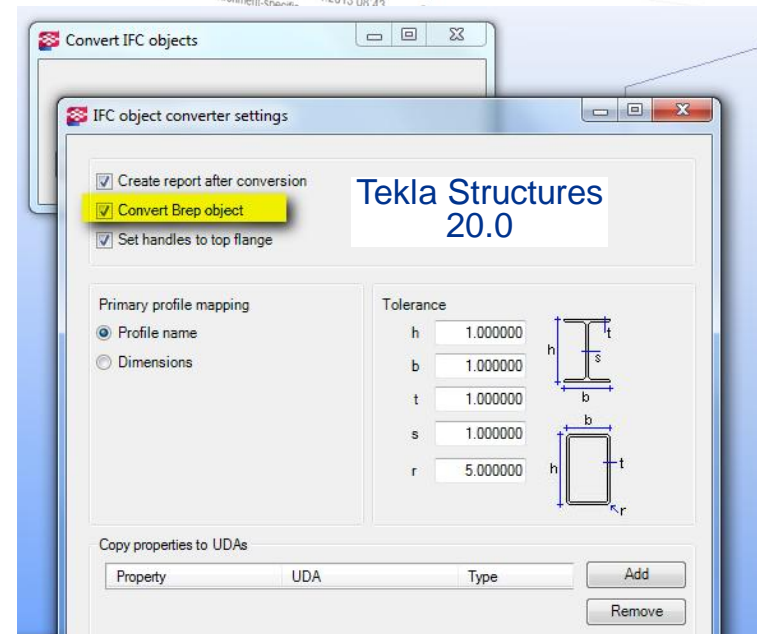
3. Tekla Structures import

- > Use relative file path
- > Insert reference model at 0,0,0 assuming that the Revit user understands how to use the SITE DEFINITION tool in Revit. If the file comes in far from origin – then they probably aren't clear on the use of Revit site location tools.
- > Fit work area
- > Modify grid offset
- > Subdivide
 - To use change management



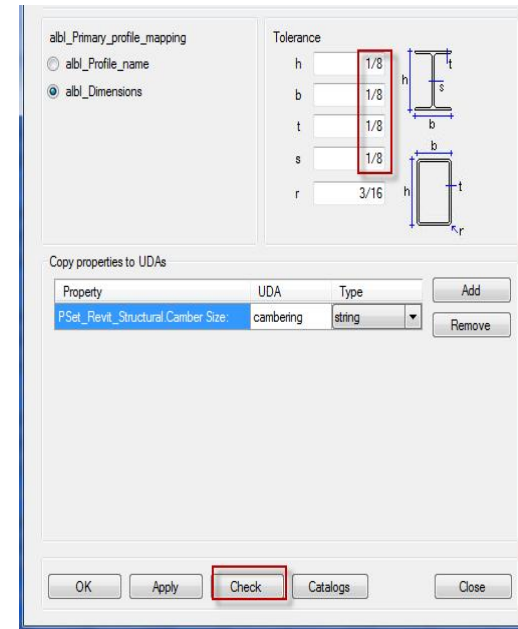
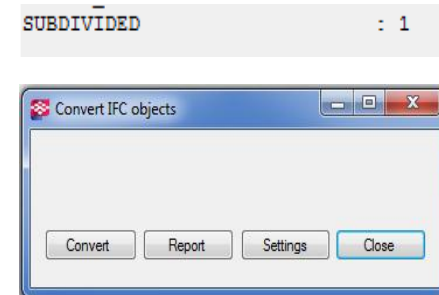
4. Convert IFC objects

- > IFC Object Converter
- > Converts only useful IFC reference objects into native Tekla Structures Objects. Less successful with models created for the sole purpose of making drawings.
- > Dependant on quality of reviewed IFC file. Models that were created for the purpose of GA drawings are unlikely to be of any use.
- > In TS20, conversion functionality is supported by a new BREP part import – which allows complex geometry to become **a type** of Tekla Structures native part



4a. Object Converter options

- > Open object converter
- > Set geometry tolerance
- > Check for correct shape and material mapping
 - Mapping from Revit to Tekla profiles is not extensive because the emphasis is on accuracy. Therefore, if an exact match is not found between the IFC object and the Tekla profile catalog a user profile is created which will exactly match the incoming profile – dimensions and ROTATION. *I emphasize Rotation since this data is often missing from the exported IFC file (eg Revit). See next page.*
- > If required; specify Revit property sets to copy to Tekla user-defined attributes



4b. Object Converter (TS 20.0)

- > About the logic of the IFC object converter (TS v.20.0):
- > Parametric profile used in IFC model (Full data set)
 - If profile with same name is found from TS profile catalog, it will be used.
 - Otherwise, check parameter values to found corresponding profile. If found, that will be used.
 - Otherwise, create parametric profile
- > Arbitrary profile used in IFC model (Limited amount of data)
 - If the object is not a linear member, an object with profile created.
 - If the shape is detected and found from TS catalog, that profile will be used. (The shape detection supports the standard types of hot rolled profiles.)
 - Otherwise, new profile is created
- > B-rep geometry used in IFC model (Shape data only)
 - Item import is used (results in Tekla object built by mesh co-ordinates).

5. Review converted model

- > Review report for correct conversion
- > Review color (by Class) for warnings
- > Review for model discipline
 - Swap handles as needed
 - accuracy
- > Load default settings
 - Modify except key values
 - Uncheck converted UDAs

TEKLA STRUCTURES Converted Parts

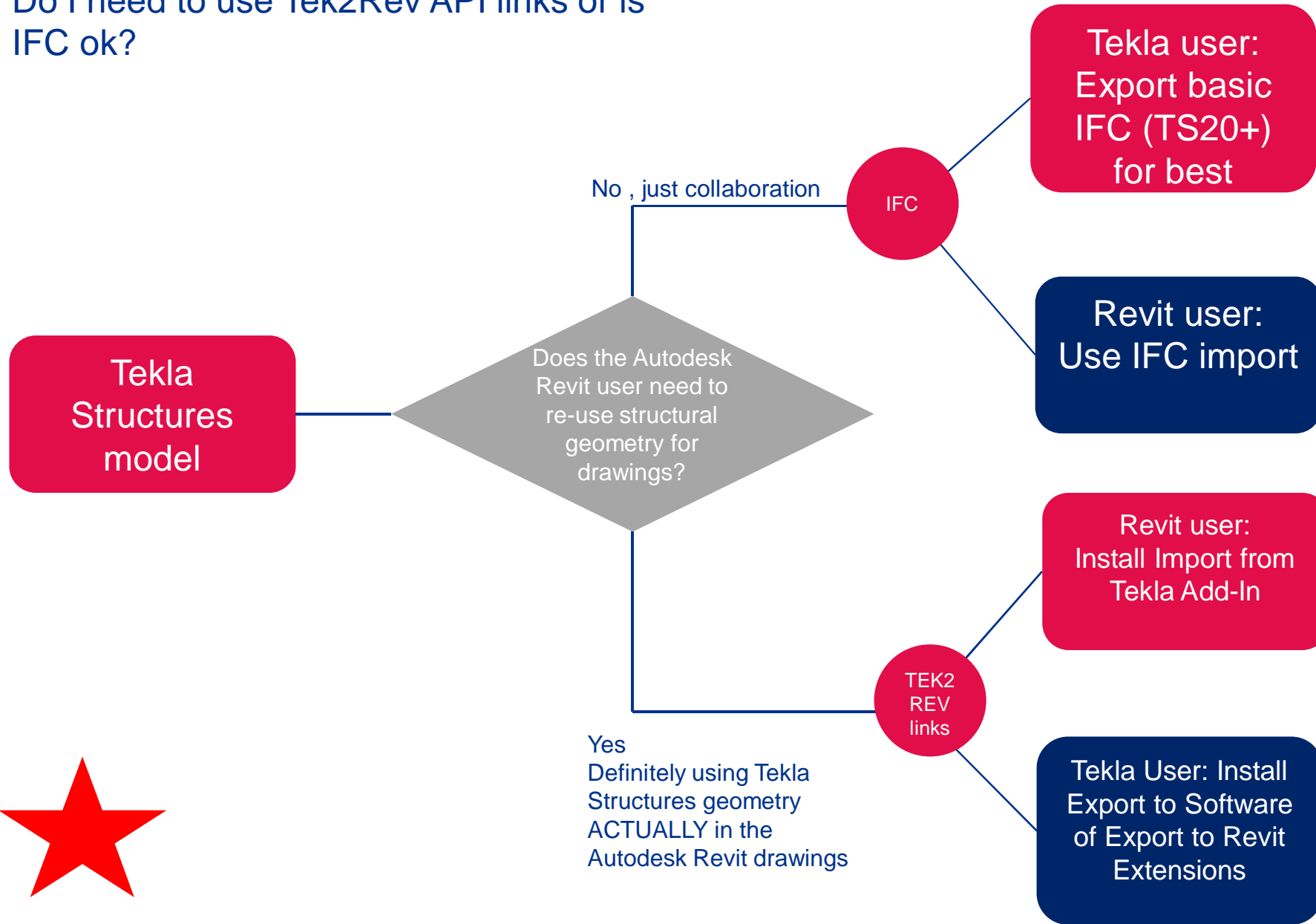
ID	Name	Profile	Initial profile	Class
Id: 44483	BEAM	800WB192	800WB192	990
Id: 44461	BEAM	800WB192	800WB192	990
Id: 43899	PANEL	6600*175	INTERIOR-175PRE	990
Id: 43846	PANEL	6600*175	INTERIOR-175PRE	990
Id: 43827	PANEL	6600*175	INTERIOR-175PRE	990
Id: 43858	PANEL	14328.4*175	INTERIOR-175PRE	990
Id: 43911	PAD_FOOTING	D750	750DIA	990
Id: 43892	PAD_FOOTING	D750	750DIA	990
Id: 44119	BEAM	HI298-5.5-8*149	310UB32	990
Id: 44112	BEAM	HI298-5.5-8*149	310UB32	990
Id: 44105	BEAM	HI298-5.5-8*149	310UB32	990
Id: 44314	BEAM	HI304-6.1-10.2*	310UB40	990
Id: 44000	BEAM	HI356-7.3-11.5*	360UB51	990
Id: 43979	BEAM	HI356-7.3-11.5*	360UB51	990
Id: 43972	BEAM	HI356-7.3-11.5*	360UB51	990

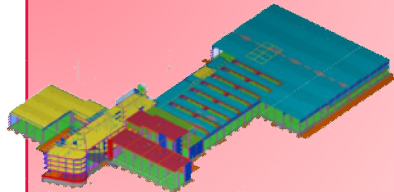
Class value	IFC object data	Converted object description
990	Parametric profile with a name	There is enough information in the IFC model to convert the object successfully.
991	Parametric profile without a name	Tekla Structures determines the name of the object based on the object's profile.
992	Arbitrary profile with a name	The profile of the converted object may be incorrectly rotated because there is no parametrized profile data in the IFC model.
993	Arbitrary profile without a name	The profile of the converted object may be incorrectly rotated because there is no parametrized profile data in the IFC model. The profile name is set to UNKNOWN.
994	B-rep piece with a name	The profile may be an extrema box due to the lack of profile data in the IFC model.
995	B-rep piece without a name	The profile may be an extrema box due to the lack of profile data in the IFC model. The profile name is set to UNKNOWN.

FROM Tekla Structures to Autodesk Revit Architectural / MEP



Do I need to use Tek2Rev API links or is IFC ok?





TEKLA
Tekla Engineer

Accurate geometry

IFC Reference

IFC object convertor

IFC export


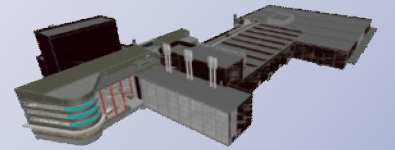
Common / revit / user attribute info

IFC 2x3 (CV2)

Autodesk App
Revit IFC
exporter

Geometric accuracy

Basic IFC
import



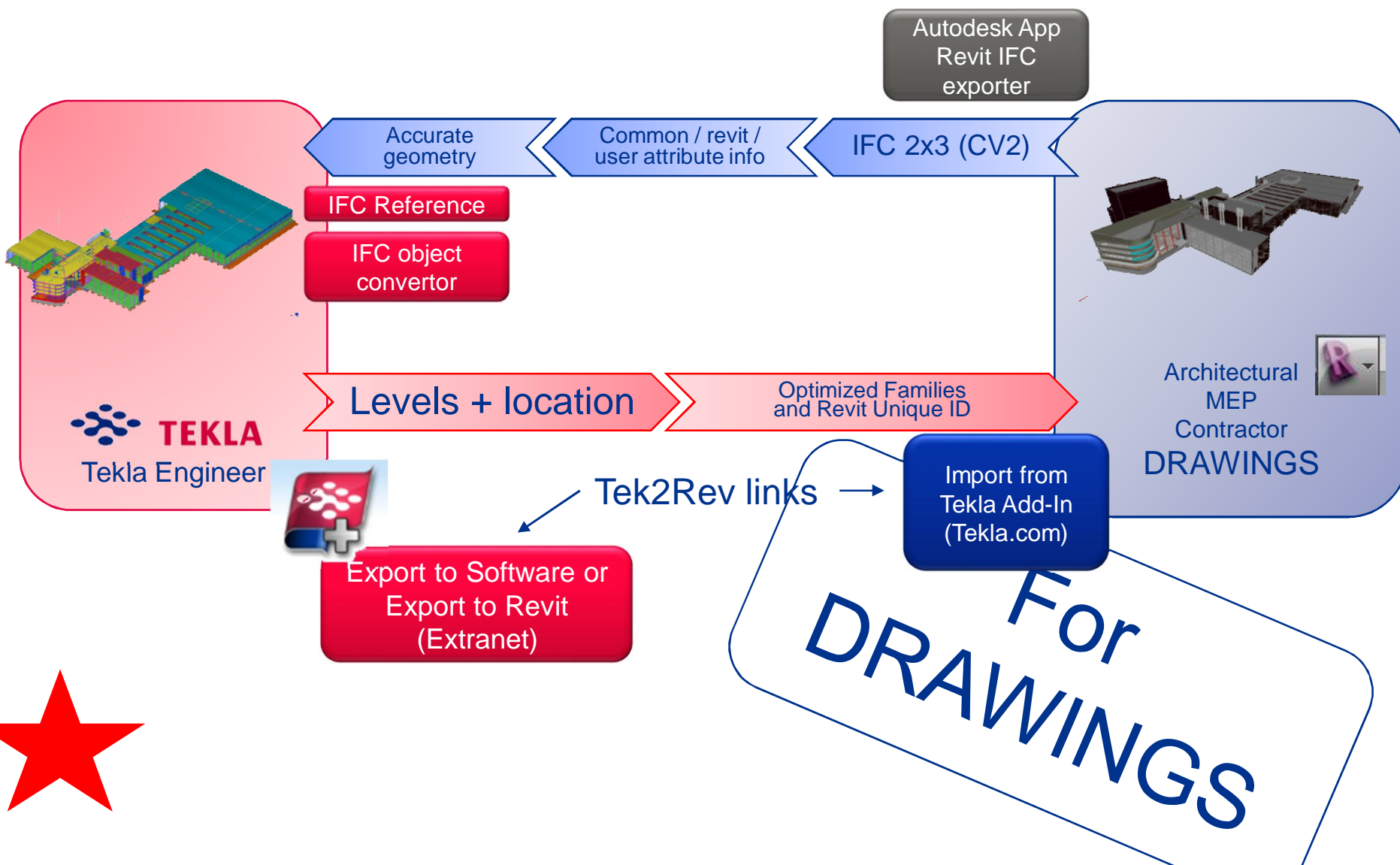
Architectural
MEP
Contractor

For
Collaboration



> STOP AND THINK

- > If you are not sending Structural Object information to the Autodesk Revit user for use in Autodesk Revit drawings, then you do not need to proceed any further because you only need to send them an IFC file (preferably from Tekla Structures 20.0 or above)
- > If you do not know what the Autodesk Revit user needs the structural information for, then, as the construction industry has always said “If in doubt, ASK”



Step 1

> Tekla Structures user downloads correct Extension

Export to Software (until April 2014 only)



Simplified IFC export with software specific settings to ArchiCAD, CADmep+, QuickPen and Revit.

Note: The latest Export to Revit versions can be found [here](#) (including 20.0).

Download here

Before Tekla Structures 20.0+

Export to Autodesk Revit [for ARCH/MEP drawings]



Simplified IFC export to Revit with software specific settings.

This export can be used with the [BIM Publisher](#) to set up (scheduled) exports of multiple models at once.

Export to Revit previously belonged to the [Export to Software](#) package.

Download here

Download version	Work environment	Language	Product version	File size	Modified	Downloads
200.3.3 x64	All	ENU	20.0	3064 KB	06 May 2014	187

General information

Extension type: Application
Industry segment: General
Quality: Experimental
Rating: ★★★★★ (0)

See more

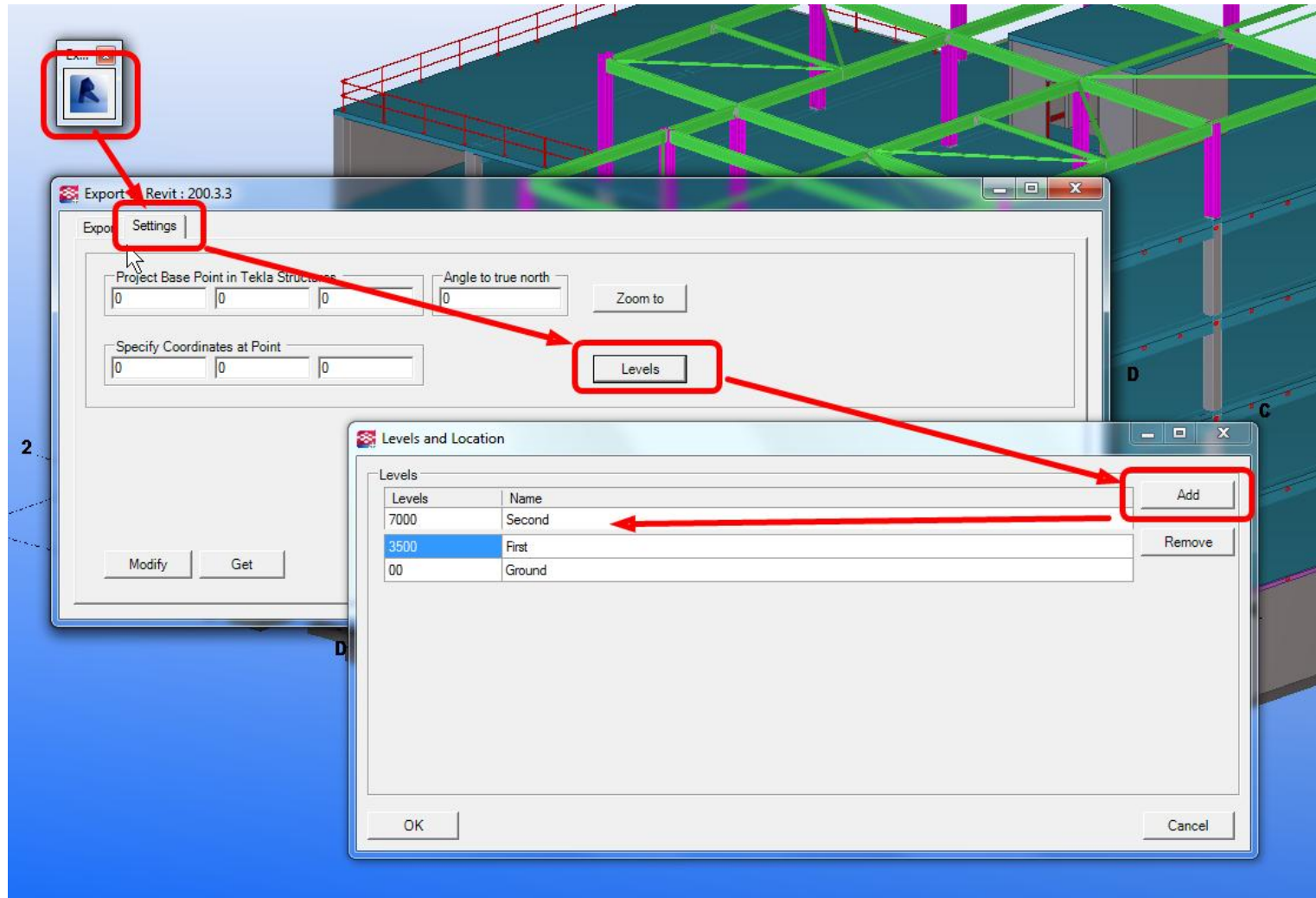
Type	Title	File size
	Quick Tekla<->ADSKRevit guide	63 KB

Use this set of two plug-ins (A Extension on the Tekla side, an Add-In on the Revit side) to create drawings ready information in Revit.

Tekla Structures 20.0+

Step 2

- > Prepare model; Export only what is needed.
- > Add levels



Step 3

- > Specify Cartesian co-ordinates
- > Specify 'Location at Point' if needed (City Co-ordinates)

Export to Revit : 200.3.3

Export Settings

Project Base Point in Tekla Structures

300 20 65

Angle to true north

0

Zoom to

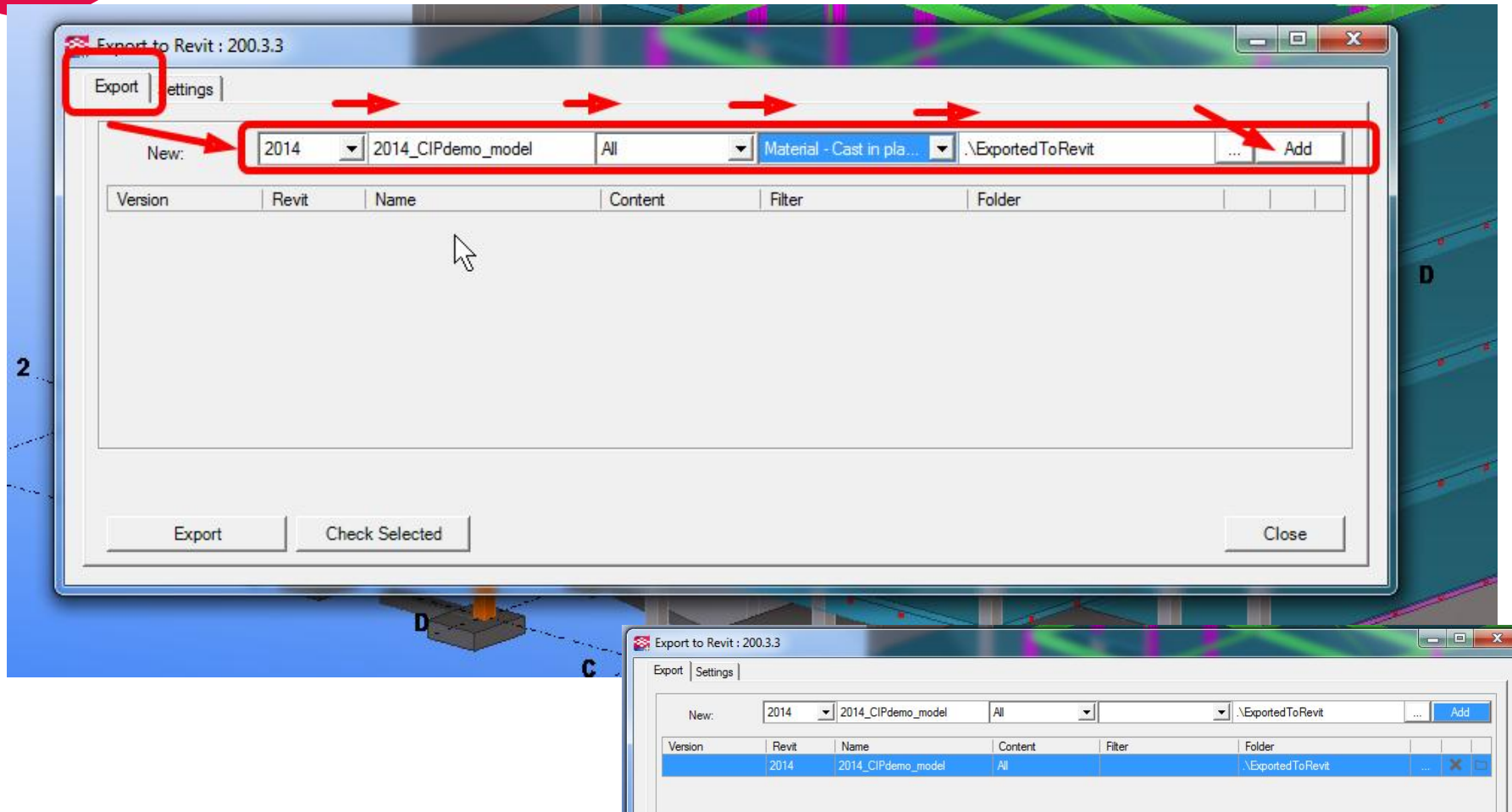
Specify Coordinates at Point

0 0 0

Levels

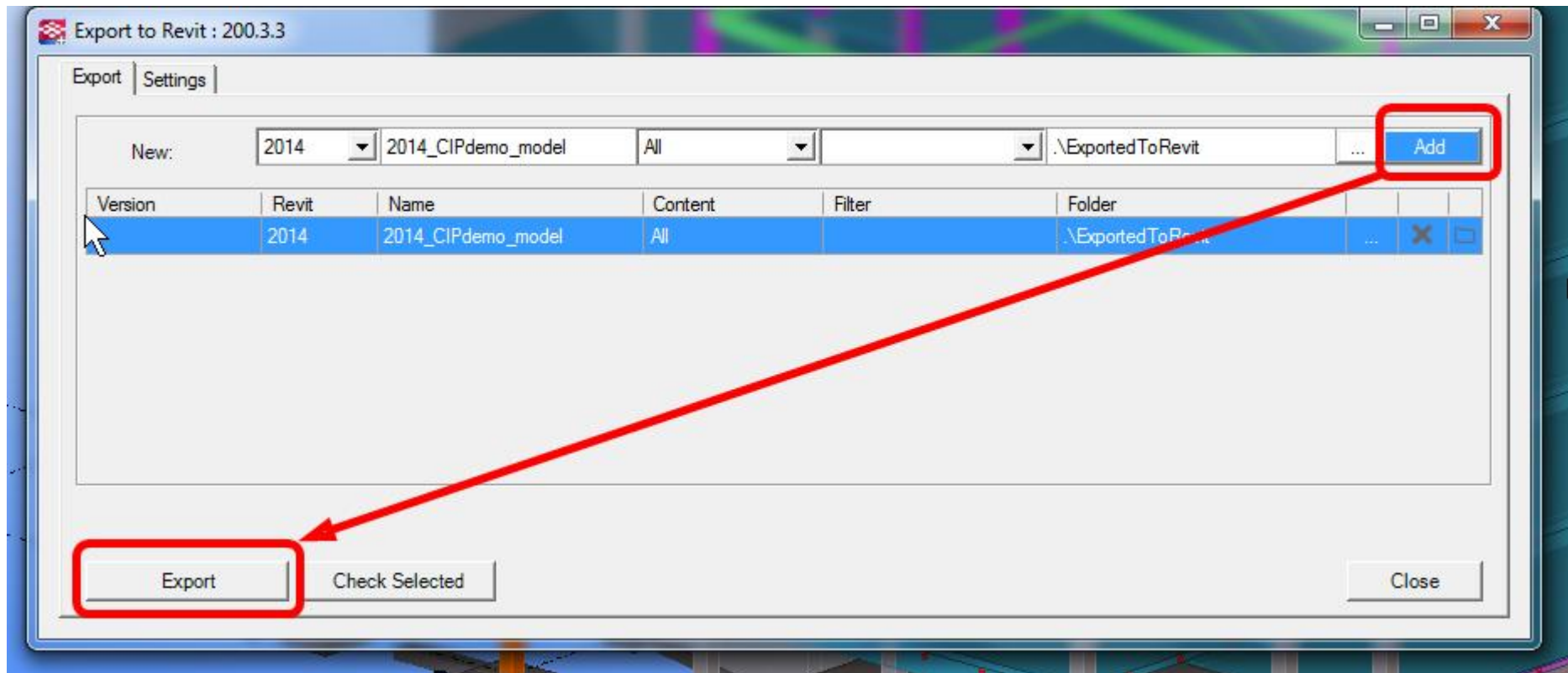
Step 4

- > Specify Revit version, name of file, content (All, selected, by filter), export path and then Add.



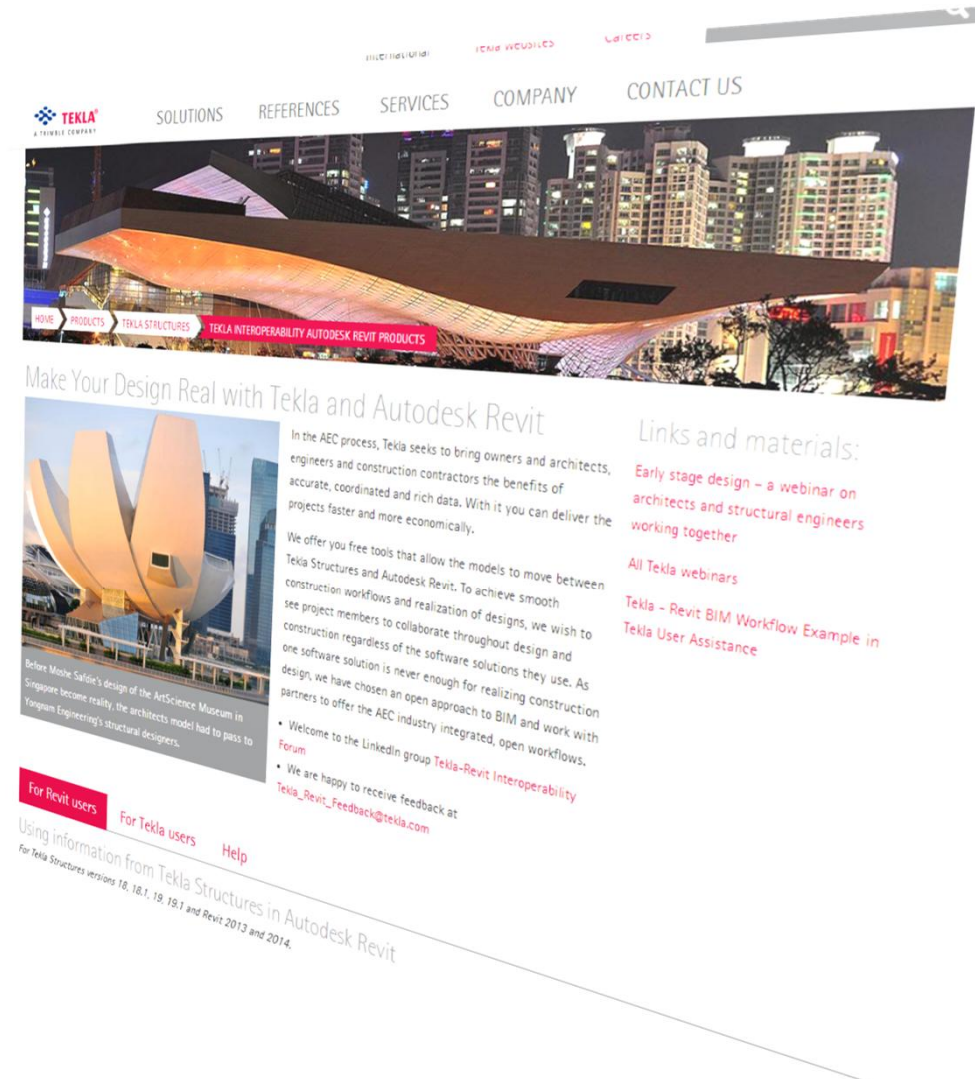
Step 5

- > Then export
- > The filter set specified will be exported
- > This may take time depending on the amount of information you wish to export



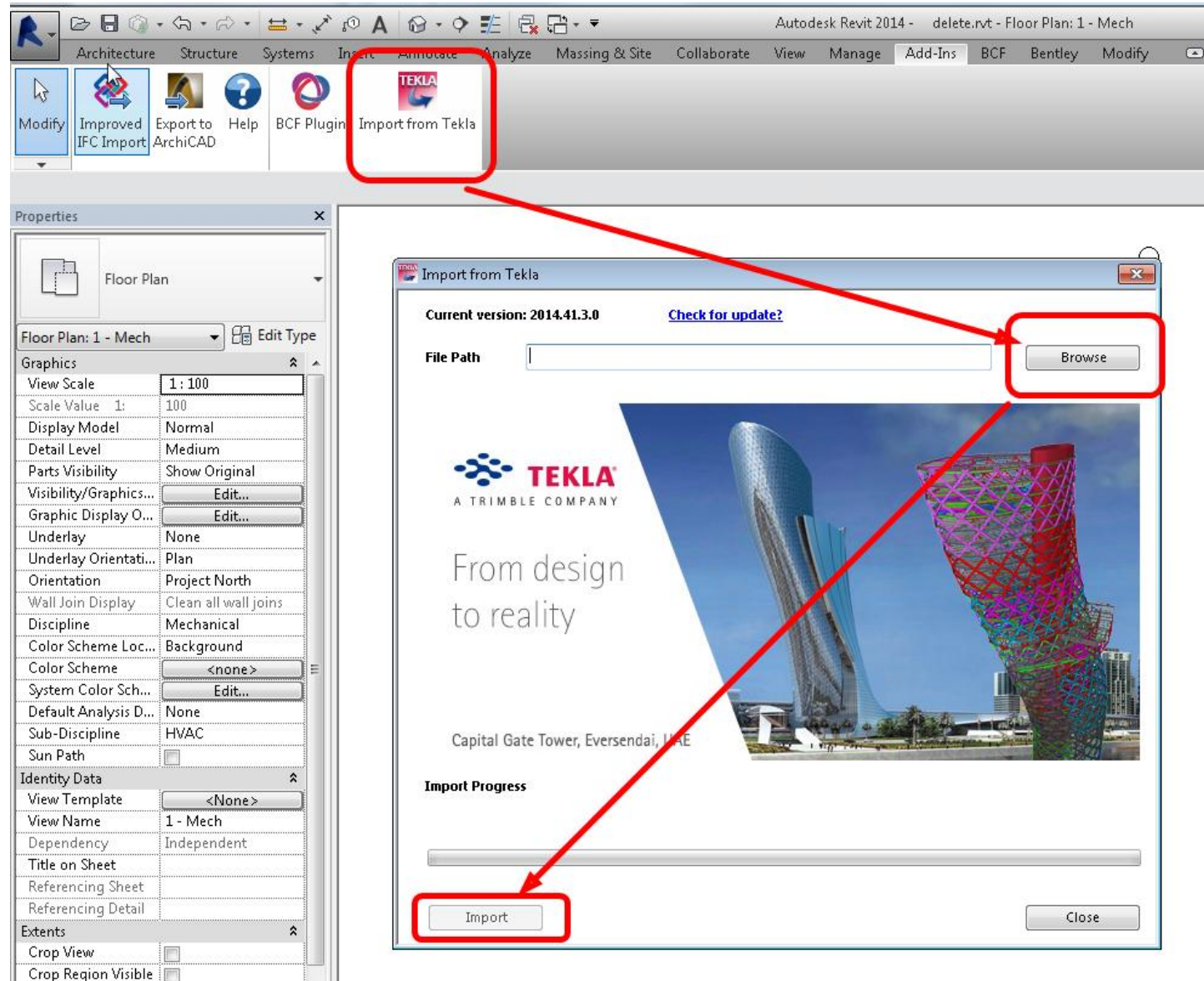
Step 6

- > Autodesk Revit user
- > Install Import from Tekla (for Drawings) from Tekla.com
- > <http://www.tekla.com/products/tekla-structures/tekla-interopability-autodesk-revit-products>



Step 7

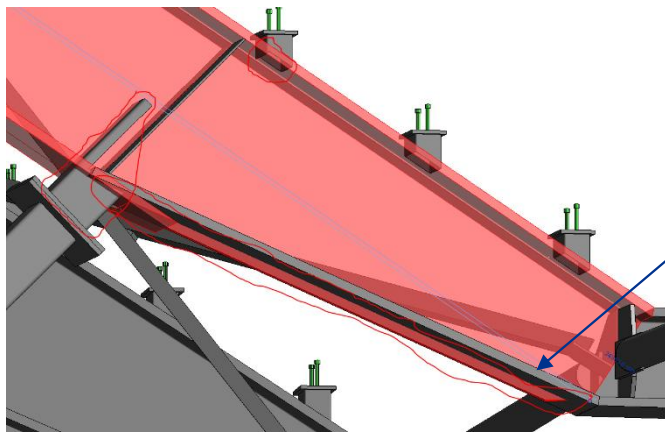
- > Run Add-In
- > Browse for file sent by Tekla Structures
- > Import the file
- > NOTE: depending on the complexity of the Tekla Structures files, the import process will focus on accuracy of Family rendering and make take a matter of hours to complete.



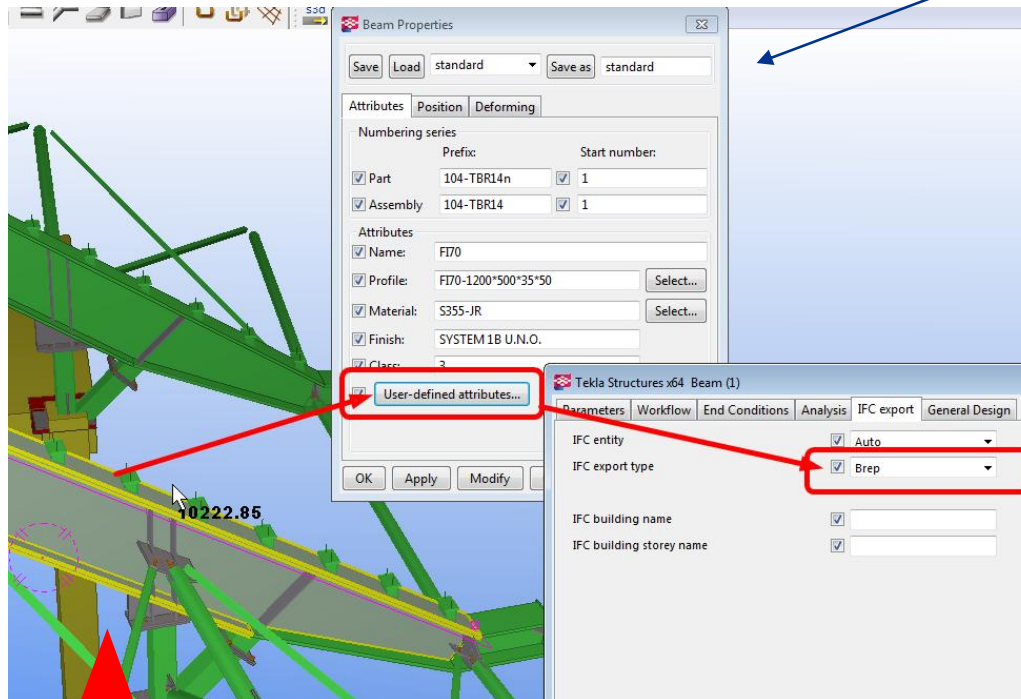
Tek2Rev links

Work-a-rounds



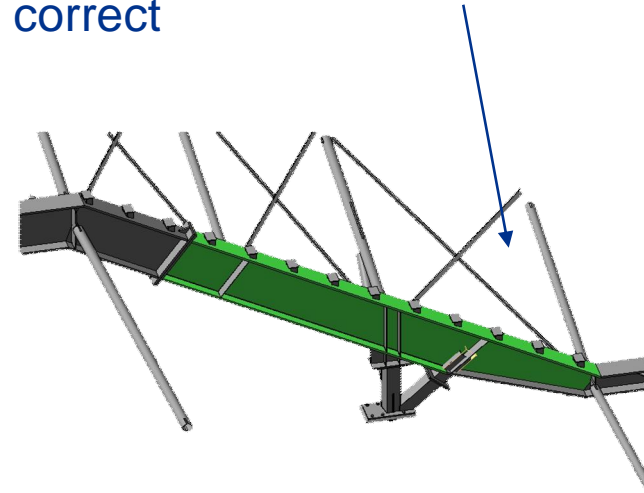


1. Geometry was failing in Autodesk Revit because of weakness in Revit void API rendering



2. In Tekla Structures, force the element which is not appearing correctly to BREP

3. Result in Autodesk Revit will be an In-Place family but is most likely correct



Contact:

Tekla_Revit_feedback@Tekla.com

And in the email say:

Tekla Structures version
Extension name and version

Autodesk Revit version
Add-In name and version

Ultimate goal (e.g. drawings – what kind, showing what,
please provide a sample of what you hope to achieve)