

Tekla Structures and Autodesk Revit useful geometry exchange

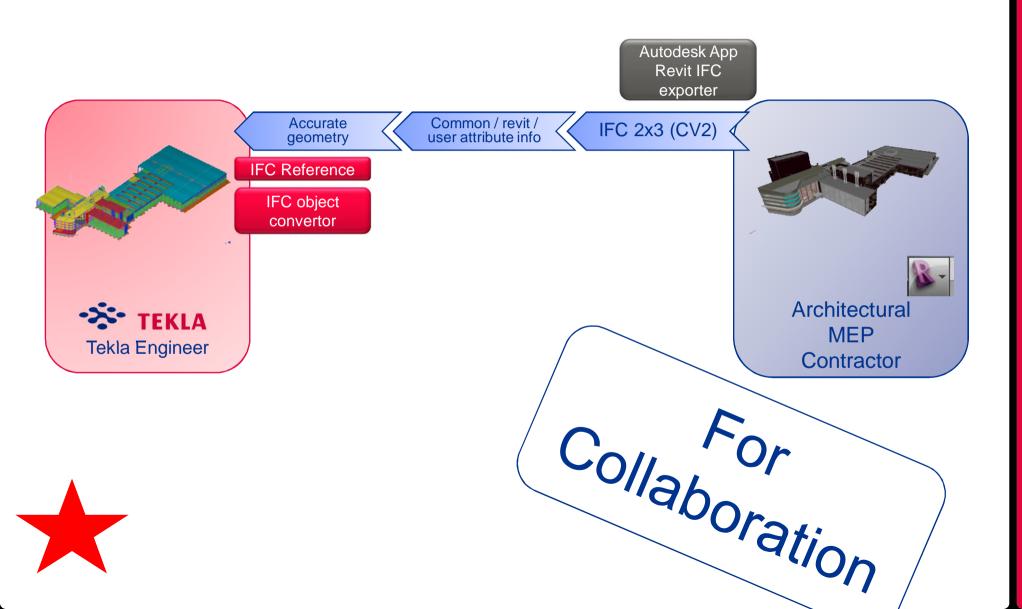
General guidance: Updated: 2nd June, 2014

(New material is starred)

David Lash Engineering Segment

FROM Autodesk Revit Architectural to Tekla Structures





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 <u>a sensible point</u> 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.

potential	
EKLA ®	

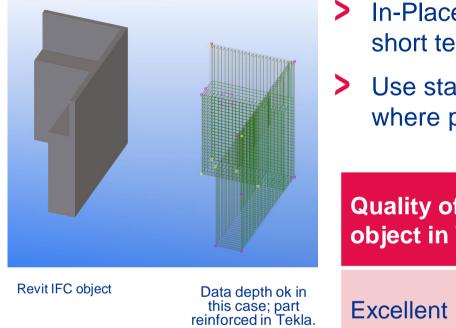
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Properties	
Concrete-Rectang BM 450x800	ular Beam
Structural Framing (Other) (1)	👻 🖯 Edit Type
Constraints	
Reference Level	Level B0
Start Level Offset	-3403.0
End Level Offset	-3280.0
Cross-Section Rotation	0.000"
Geometric Position	
yz Justification	Uniform
y Justification	Origin
y Offset Value	0.0
z Justification	Тор
z Offset Value	0.0
Text	
Beam Type	BB0213
Pour Zone	
Materials and Finishes	
Structural Material	Concrete 1
Structural	
Cut Length	4614.0
Structural Usage	Other

?

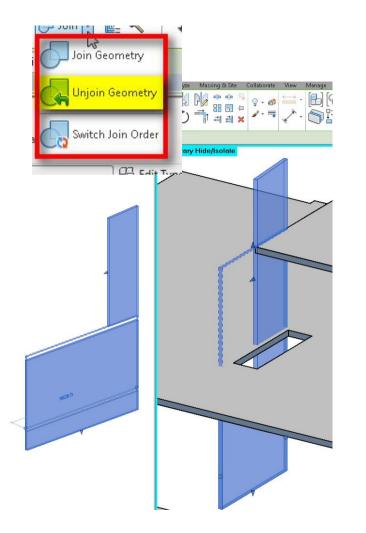
Quality of visible IFC object in Tekla	Depth of data available to create a Tekla Object
Object was created for	Poor. Object was
drawing production.	originally created for
Limited use for wider	purpose of drawings
design team	only

> 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.



- 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

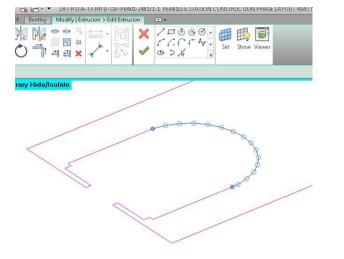


Avoid 'Joining' geometry in Revit where possible. Model each part as it would be constructed. E.g. A precast panel would not be three floors high.

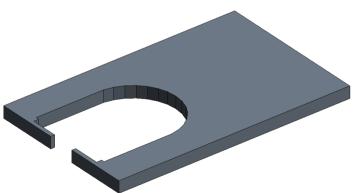
Quality of visible IFC object in Tekla	Depth of data available to create a Tekla Object
Excellent	Possiblity that profile reads incorrectly

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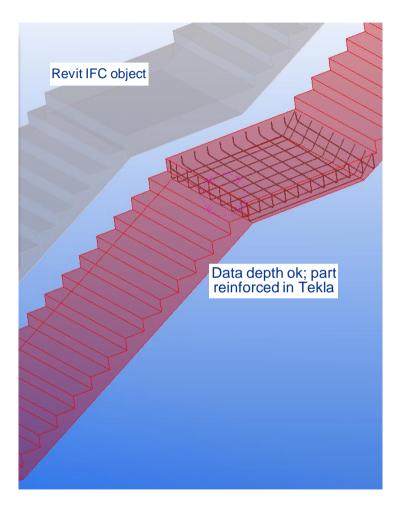




- If possible, use curves only for filleting
- Consider faceting / tessellating for large curved edges in profile object creation



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

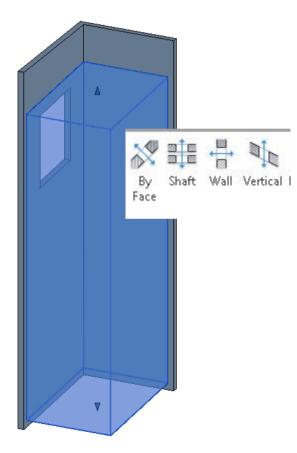


Export only concrete materials in Revit structural stairs (not nosings, kickplates, balustars etc)

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

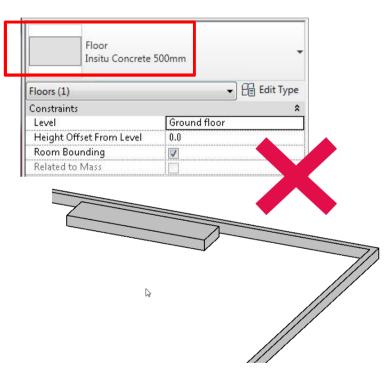
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Consider modifying slabs by profile rather than using the Opening tool or void Family objects. A slab which has holes made in it's profile is much easier to understand in other software.

object in Tekla	Depth of data available to create a Tekla Object
Excellent	Possiblity that Revit profile reads incorrectly

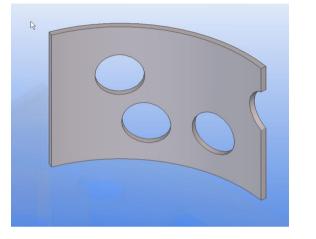


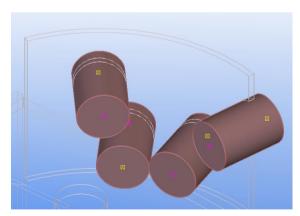
- Use the correct Family category for the building part being modelled
- Using the incorrect family causes confusion

object in Tekla	Depth of data available to create a Tekla Object
Excellent	Possiblity that Revit profile reads incorrectly

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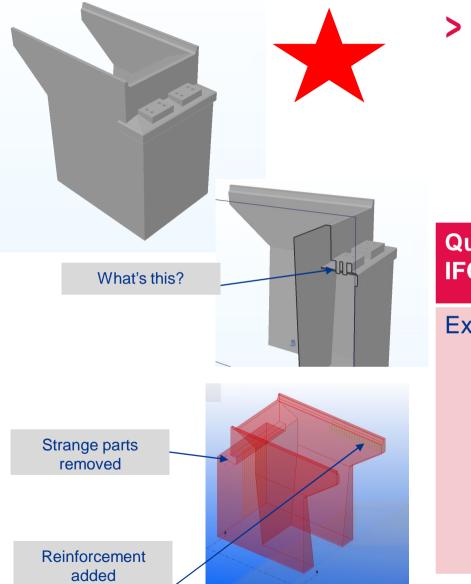




- Curved wall / beam elements with voids would require exporting as an individual IFC object in order to convert to a Tekla Structures object
- Voids convert but massing does not

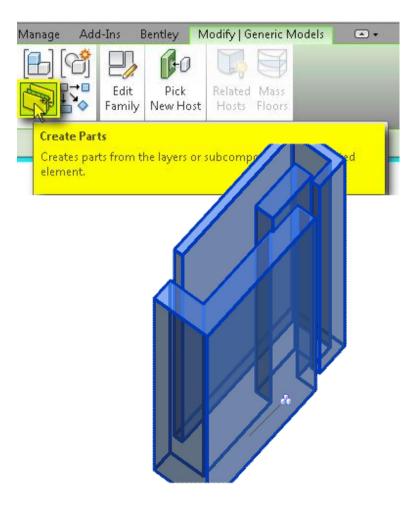
	Depth of data available to create a Tekla Object
Excellent	High possiblity that Revit profile reads incorrectly





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

uality of visible	Depth of data available
C object in Tekla	to create a Tekla Object
xcellent)	High possiblity 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

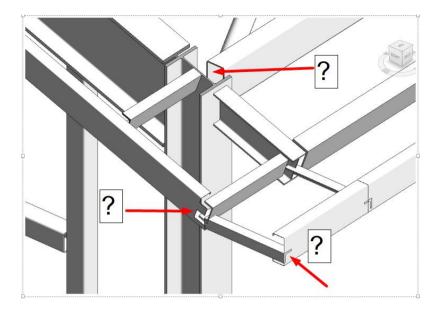


- Complex Family types are often good for drawing production only. They may convert to Tekla Structures objects but still would need refactoring to create a true BIM workflow to communicate with the factory floor.
- Consider dividing these objects into parts before exporting, this may help in creating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

Quality of visible IFC object in Tekla	Depth of data available to create a Tekla Object
Excellent	Possiblity that Revit profile erads incorrectly

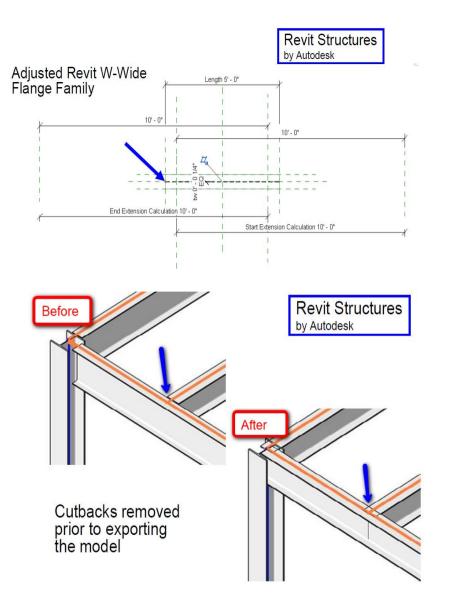
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- Revit cuts-back steel part not for constructability, but for drawing preparation.
- If exporting steel for the purpose of detailing in Tekla Structures – the Revit steel beam Families may want to have their cutbacks removed at Family level
- This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

Quality of visible	Depth of data available to create
IFC object in Tekla	a Tekla Object
Lengths of steel are determined by drawing rules in Revit, not node to node lengths.	Profiles are correct, lengths of steel are drawing preparation lengths, not construction preparation lengths.



- 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

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2. Revit IFC export to Tekla



The IFC exporter for Autodesk® Revit® 2014 and Autodesk® Revit® LT 2014 contains up-todate improvements on the default IFC export capabilities of Autodesk Revit contributed by Autodesk and our Open Source contributors. While this app is not necessary for IFC support, it is recommended that users that depend on the quality of their IFC export download this app and keep it up-to-date, as new enhancements and defect fixes are added, For more information on IFC, please visit the buildingSMART website (http://buildingsmart.org) or the Revit wiki (http://wikihelp.autodesk.com/enu).

IFC Export Alte	rnate UI <mark>2</mark> 014	****
Autodesk, Inc.	_	
AUTODESK.		
Win32 and 64 💌 English	-	Free

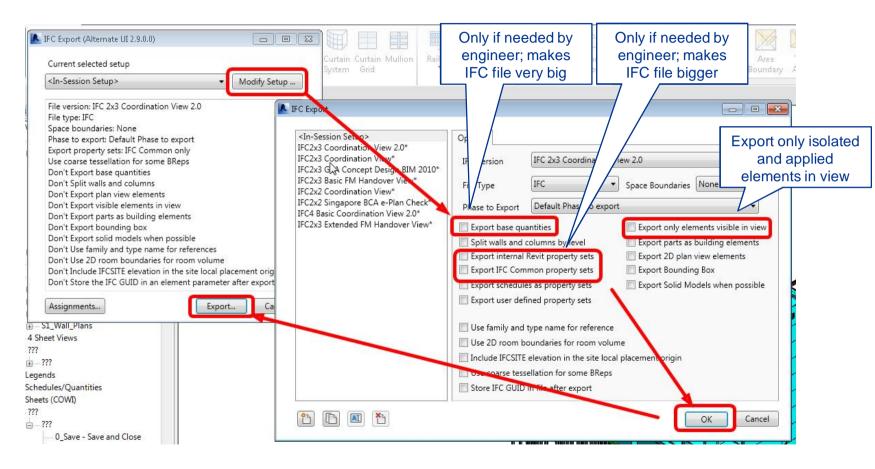
This application provides an alternate user interface for the export of IFC files from Autodesk® Revit® 2014 and Autodesk Revit LT 2014. This new user interface offers additional options not provided in the standard Autodesk Revit user interface, and provides the ability to store setup configurations into the Autodesk Revit model for reuse.

Read Help Document

Use the Autodesk Open Source IFC exporter

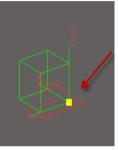
- This is the regularly updated Autodesk approved Open Source exporter which offers up-to-date improvements on the default IFC export capabilities of Autodesk Revit
- Found for free on the Autodesk App Store
- Also found here (same code): <u>http://sourceforge.net/projects/if</u> <u>cexporter/</u>

2b. Revit export options (Open Source exporter)



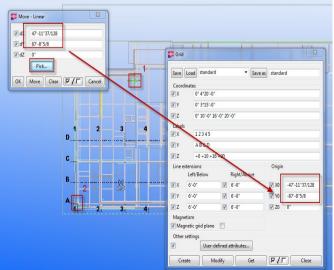
3. Tekla Structures import

- 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

Color and transparency in	all views:	standard
Visibility View depth: 🔽 Up:	5000'-0"	
View depth: 🔽 Up:	30'-0"	
Visibility of object types:	Display.	
Visible object group:	standard	

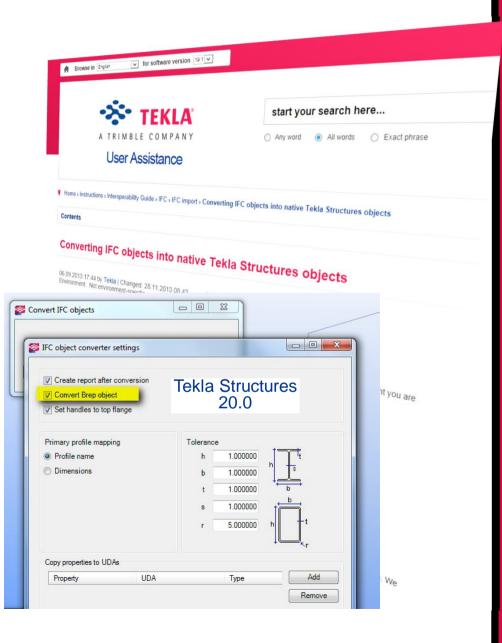


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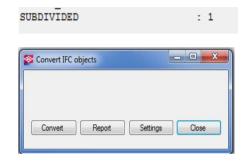
4. Convert IFC objects

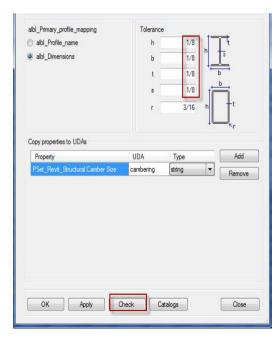
- > IFC Object Converter
- Converts <u>only useful</u> IFC reference objects into native Tekla Structures Objects. Less successful with models created for the sole purpose of making drawings.
- Dependant on quality of revieved IFC file. Models that were created for the purpose of GA drawings are unlikely 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. Therefor, 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





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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

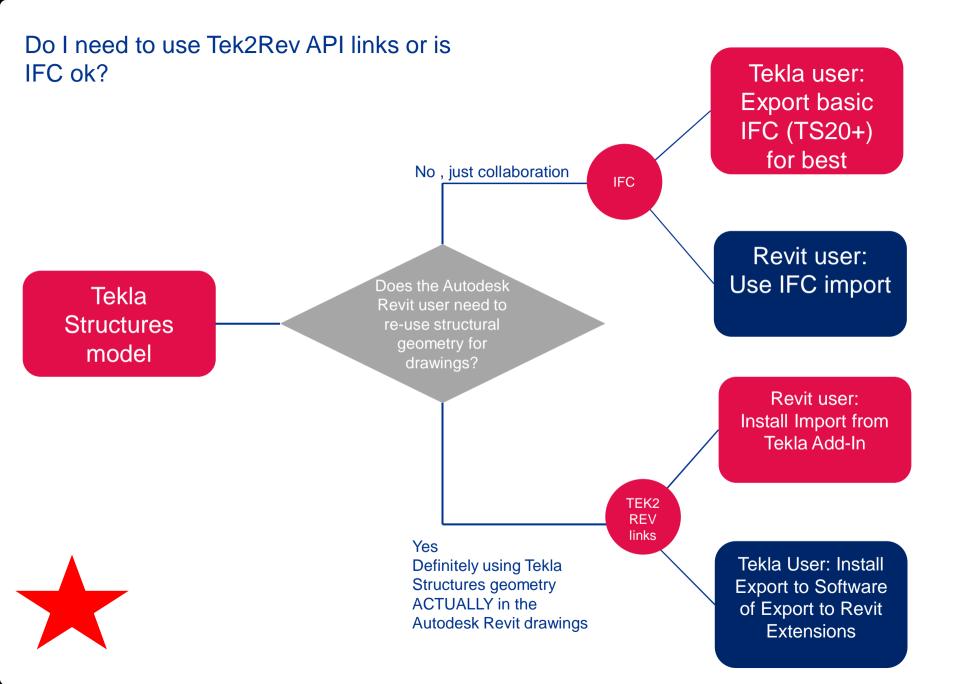
	ID	Name	Profile In:	itial profile	Class
Id:	44483	BEAM	800WB192	800WB192	990
Id:	44461	BEAM	800WB192	800WB192	990
Id:	43899	PANEL	6600*175	INTERIOR-175PRE	990
Id:	43846	PANEL	6600*175	INTERIOR-175PRE	990
Id:	43827	PANEL	6600*175	INTERIOR-175PRE	990
Id:	43858	PANEL	14328.4*175	INTERIOR-175PRE	990
Id:	43911	PAD_FOOTING	D750	750DIA	990
Id:	43892	PAD_FOOTING	D750	750DIA	990
Id:	44119	BEAM	HI298-5.5-8*14	9 310UB32	990
Id:	44112	BEAM	HI298-5.5-8*14	9 310UB32	990
Id:	44105	BEAM	HI298-5.5-8*14	9 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

TEKLA STRUCTURES Converted Parts

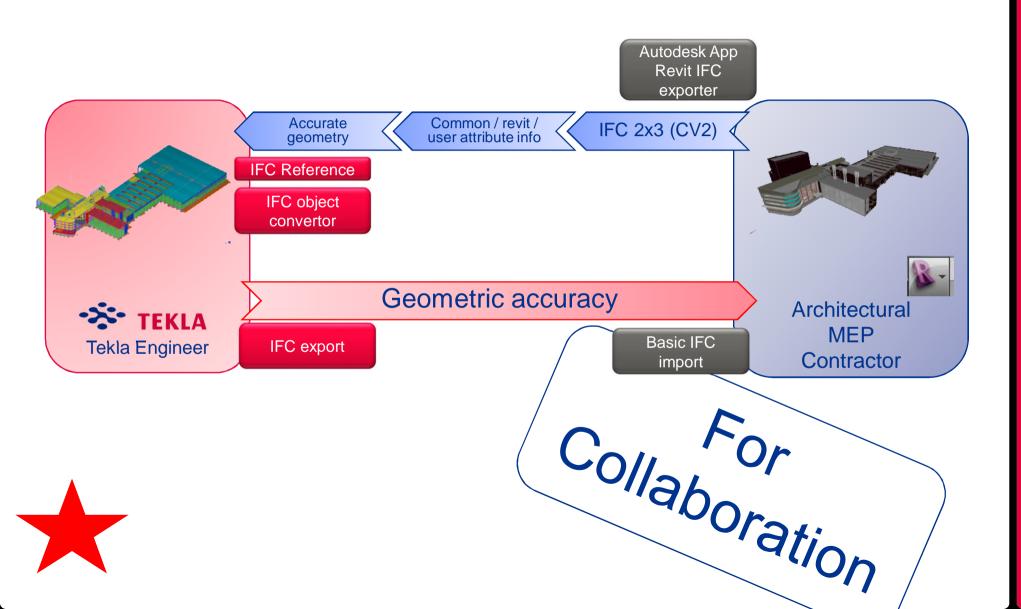
Class value	IFC object data	Converted object description
990	Parametric profile with a name	There is enough information in the IFC model to con- the object successfully.
991	Parametric profile without a name	Tekla Structures determines the name of the object based on the object's profile.
992	Arbitrary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





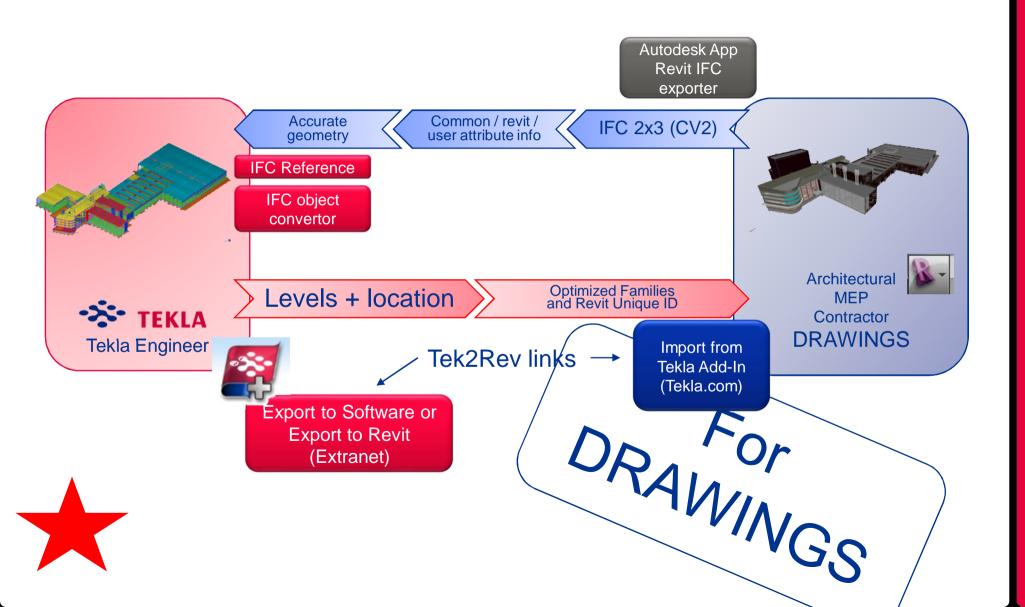
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> STOP AND THINK

- If you are not sending Structural Object information to the Autodesk Revit user for use in Autodesk Revit drawings, then you do no 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"



Tekla Structures user downloads correct Extension

Export to Autodesk Revit [for ARCH/MEP drawings]



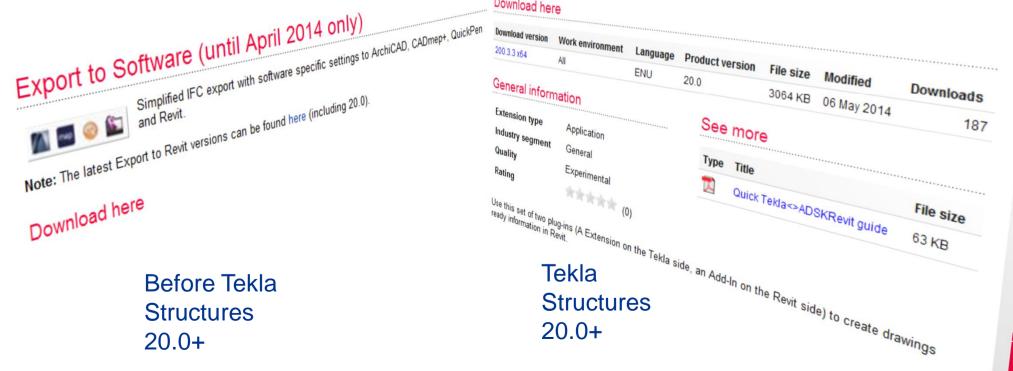
Step 1

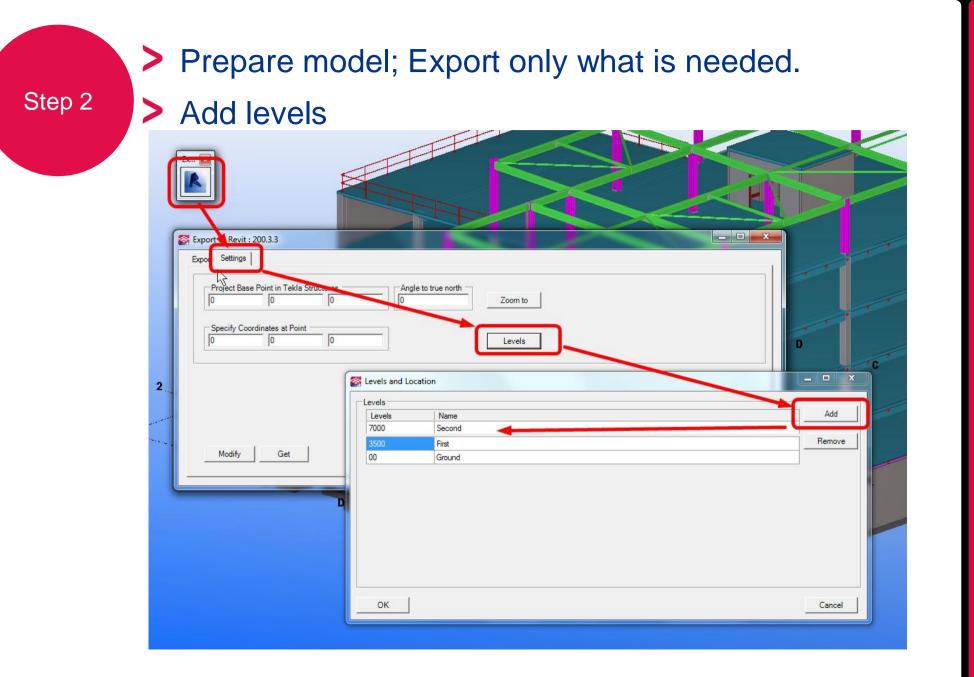
Simplified IFC export to Revit with software specific settings.

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







> Specify Cartesian co-ordinates

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

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Project B	ase Point in Tekla	Structures	Angle to true north	h
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> Then export

Step 5

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

New:	2014	2014_CIPdemo_model	All	<u> </u>	✓ \/ExportedToRevit	Add
Version	Revit	Name	Content	Filter	Folder	
5	2014	2014_CIPdemo_model	All		\ExportedToPro.	. 🗙 🗆
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Step 6



- Install Import from Tekla (for Drawings) from Tekla.com
- http://www.tekla.c om/products/tekla -structures/teklainteroperabilityautodesk-revitproducts



In the AEC process, Tekla seeks to bring owners and architects, engineers and construction contractors the benefits of accurate, coordinated and rich data. With it you can deliver the projects faster and more economically.

We offer you free tools that allow the models to move between ekia Structures and Autodesk Revit. To achieve smooth struction workflows and realization of designs, we wish to project members to collaborate throughout design and nstruction regardless of the software solutions they use. As the software solution is never enough for re esion, we have chosen an open approach to BIM and work with strees to offer the AEC industry integrated, open workflows. Welcome to the Linkedin group Tekla-Revit Interoperability We are happy to receive feedback at kla_Revit_Feedback@tekla.com

For Tekla users

Sing invertices to the trained of th

Tekla Structures in Autodesk Revit

Early stage design – a webinar on architects and structural engineers working together

All Tekla webinars

Tekla - Revit BIM Workflow Example in Tekla User Assistance

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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.

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Tek2Rev links

Work-a-rounds



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

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Seam Properties

V Part

Assembly Attributes

V Name

2 Drofile

OK

Material:

Save Load standard

Attributes Position Deforming
Numbering series
Prefix:

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104-TBR14

FI70-1200*500*35*50

SYSTEM 1B U.N.O.

Modify

F170

\$355-JR

User-defined attributes...

Apply

23

Select...

Select...

meters Workflow End Conditions Analysis IFC export General Design

Brep

STekla Structures x64 Beam (1)

IFC entity IFC export type

IFC building name IFC building storey name

Save as standard

✓ 1✓ 1

Start number

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

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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)