



# BIM DESIGN COLLABORATION

Tips to improve file  
coordination between  
ARCHICAD and Revit users

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# BIM Design Collaboration

Collaboration in the architectural design and build industries is not new; whether the collaboration be between co-workers, external partners, or suppliers.

The take-up of BIM software platforms such as ARCHICAD and Revit has resulted in the need for standardized workflows and outputs to ensure all parties have access to the data they require – most commonly DWG or PDF files for 2D coordination, and IFC (or 3D DWGs) for 3D coordination.

## Exchange between different authoring tools

Collaborating parties will most commonly share their BIM data files using translation software, however the resulting data is almost always different from what would have been produced natively in the secondary application.

In other words, a file produced in ARCHICAD and then translated into Revit format will be different than the same document originally authored in Revit. The same can be said about authoring in Revit for continued editing in ARCHICAD.

With these known limitations on dataset exchange/translation processes, the workflow needs to be tailored around the types of collaboration and exchange that work well.

Non-editable 3D geometry can be exchanged relatively accurately using IFC, but accurate 2D information requires 2D DWG exchanges. This leads to a workflow that requires a clear separation of responsibilities and deliverables for each discipline or team.

See the Appendix at the end of this document for a short explanation of Collaboration using the same authoring tool for all contributors.

# The ARCHICAD + Revit Collaboration workflow

BIM design collaboration involves virtual-building information exchanges. A Project Execution Plan that defines the divided and overlapping responsibilities, will also need to establish building special relationships such as model origin and the levels/stories for exchange.

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## General Instructions: Export to a neutral, nonproprietary format

The workflows for exchanging information between ARCHICAD and Revit rely on IFC for 3D coordination and on DWG or PDF for 2D coordination.

Non-editable 3D geometry can be exchanged relatively accurately through IFC, but accurate 2D information requires 2D file exchanges. This leads to a workflow that requires a clear separation of responsibilities and deliverables for each discipline or team.

With clearly defined roles, each team can develop their own production model optimized for creating their own deliverables. Part of that will include special model views that efficiently convey design information tailored to the needs of the other teams. Some of those views will be saved into IFC format and others into DWG format. ARCHICAD users can use the Publisher feature to automate consistent updates of these exports, as the model develops.

Revit users use different methods, depending on the file type and the circumstances, so consistency from one round of exports to the next, will require more attention to procedure. On the Revit team, it is especially helpful if the same person processes the exports each time, and is the point of contact with the ARCHICAD team.

Model Views for IFC export should convey parts of the model rather than attempting to create one IFC file with everything included. These views can be considered "IFC Subsets" of the whole-building dataset. On a large project, the IFC might be exported from ARCHICAD or Revit, in six or more subsets, each a single IFC file.

## Model Linking

Production Models are carefully crafted machines for producing deliverables. Models built by other stakeholders should be linked in with caution. IFC models should be translated as separate staging models, which will be linked into the production model, after reviewing it and correcting anything that will pollute the production model.

# ARCHICAD to Revit

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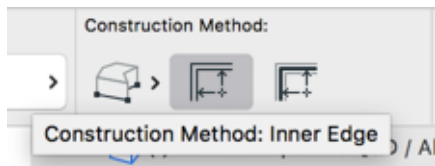
## Navigator View Map Setup

Create a folder of Views in the ARCHICAD View Map for export and collaboration. These will be 3D views that consist of separate parts of the model and 2D views. The 3D Views will be used for IFC exports and the 2D Views will be used for DWG exports. Depending on the size and detail of the model, the you will probably need more than one IFC View.

### ARCHICAD Zone Best Practices:

Start with a good model with properly defined Zones.

- The zones export best when they are using "Inner Edge" geometry method:

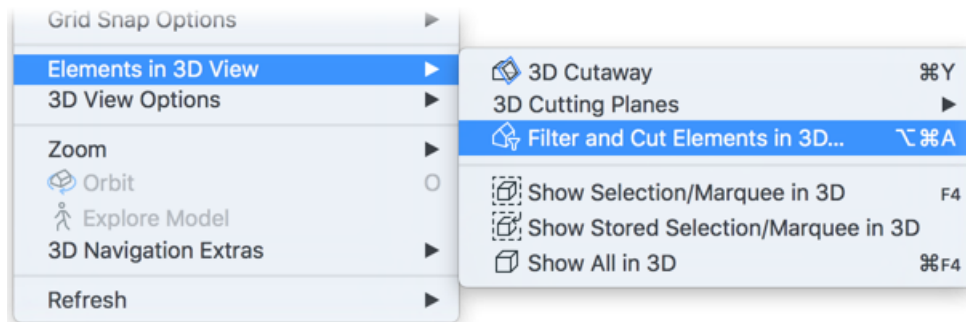


Of course, this means that when you don't have an enclosing wall, you will need to add a line or polyline with the "Zone Boundary" option, checked in order to complete an enclosing space for the zone.

- Place the extra 2D zone boundary lines on the same layer as the zones. These will become "room boundary lines" in Revit.
- Set your view to show the Zone Category Color in plan, so you can easily see the extent of the zones.
- Hide unrelated annotation and lines in the plan view.
- Finally, for ARCHICAD Zone "best practices", (ARCHICAD 21 and earlier) never have overlapping zones on the same story, even on hidden layers.

### 3D View Settings for the IFC Export Views:

- Set your 3D Window Settings to make Zones visible in 3D. View/Elements in 3D View/Filter and Cut Elements in 3D...



- Use Layer Settings to limit the content of the 3D View to parts of the model
- The Views can also be simplified by Using the "Partial Structure Display" option for hiding elements that are not defined as "Core" or "Load Bearing, etc.

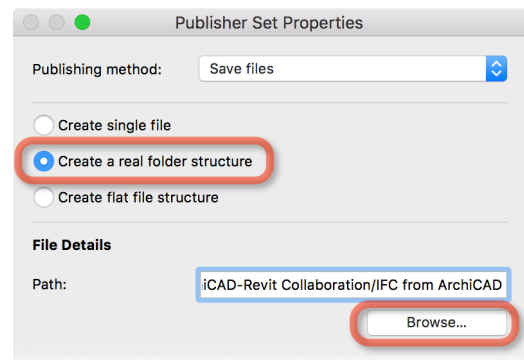
#### Suggested Views for IFC Export:

- IFC Levels, Grids & Exterior
- IFC Structure and Stairs
- IFC Partitions and Zones
- IFC Ceilings
- IFC Plumbing Fixtures, Casework and Furniture
- IFC Site

It is helpful that the first IFC model contain content on every story of the building that will be part of the exchanges because empty stories will not generate Levels in Revit.

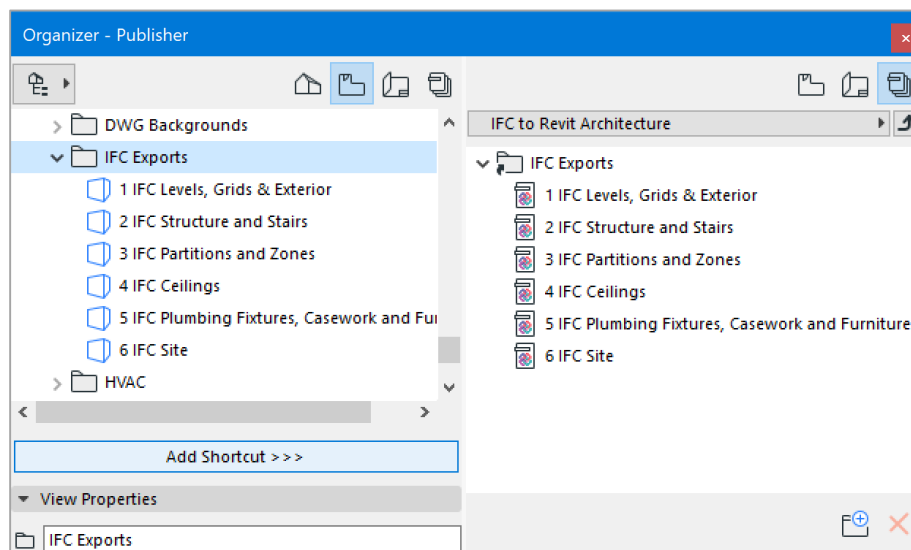
Setup a Publisher Set in the Navigator to automate the saving of these views.

- Choose to "Create a real folder structure"
- Browse to set the path for a dedicated folder on your server.



## Use the Organizer to Link the IFC View Map Folder to the Publisher Set

That way, you can use Publisher to save updated versions of all, or selected views, with a single mouse click.





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## Set the file format and translator for the View exports

### **For the 3D Views:**

- Use IFC format
- Select the "Exact Geometry Export" translator

### **For the 2D Views:**

- Use DWG Format
- Select the "00 DWG for Dummies" or "05 Layer By Color" DWG translator
- Use dedicated views for generating these underlays so that they can be optimized for the other team's needs without affecting your own deliverables.

Publisher can now export some or all of these views.

**Check your IFC files in Solibri Model Viewer to make sure that you are happy with the translations.**

**Check exported DWGs with AutoCAD or DraftSight (free).**

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## Opening IFC files in Revit

### **Import IFC models into separate staging files.**

Use this file to verify the imported translation and to cleanup any extraneous data before linking this staging file into the production model.

- Use ARCHICAD IFC Add-In for Revit in Revit.
- Adjust Project Unit Display
- Check 3D Views
- Check Elevations
- Adjust Grid heights if necessary and Propagate Extents
- Save as RVT
- Link Subset RVT files to a new project based on your Revit template
- Start with Levels and Grids
- Use Copy Monitor for levels and grids, if desired.

# Revit to ARCHICAD

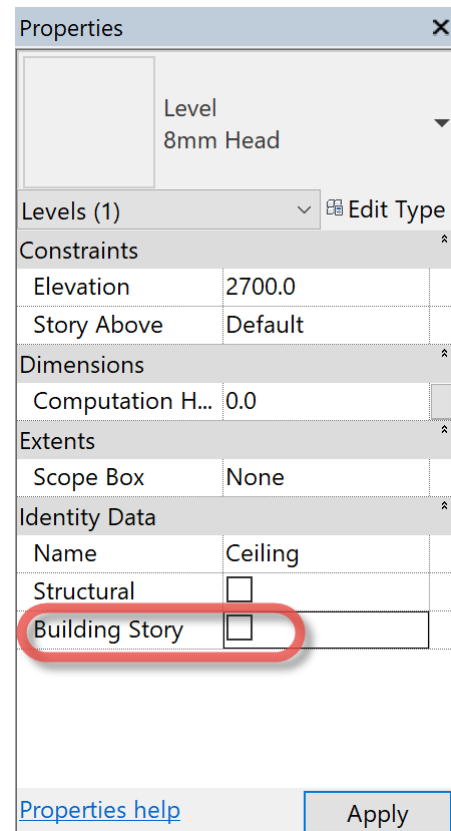
## Revit Export

Setup Views for exporting specific model content. You may not need to split the model into separate parts, as described above for the ARCHICAD users because ARCHICAD is faster and can import larger IFC models without the performance limitations of model constraints.

### Revit Levels vs ARCHICAD Stories:

Revit users may use levels differently than ARCHICAD users use Stories.

If the Revit user needs a level that the ARCHICAD users do not want, it is important to uncheck the level Property "Building Story", in Revit.



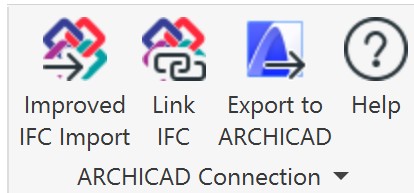
The screenshot shows the 'Properties' window for a 'Level' in Revit. The level is named 'Level 8mm Head'. The 'Levels (1)' dropdown is set to 'Levels (1)'. The 'Constraints' section shows 'Elevation' at 2700.0 and 'Story Above' as 'Default'. The 'Dimensions' section shows 'Computation H...' as 0.0. The 'Extents' section shows 'Scope Box' as 'None'. The 'Identity Data' section shows 'Name' as 'Ceiling', 'Structural' as unchecked, and 'Building Story' as unchecked. The 'Building Story' checkbox is circled in red. At the bottom, there is a 'Properties help' link and an 'Apply' button.

Properties	
Level 8mm Head	
Levels (1) Edit Type	
Constraints	
Elevation	2700.0
Story Above	Default
Dimensions	
Computation H...	0.0
Extents	
Scope Box	None
Identity Data	
Name	Ceiling
Structural	<input type="checkbox"/>
Building Story	<input type="checkbox"/>
Properties help	
Apply	

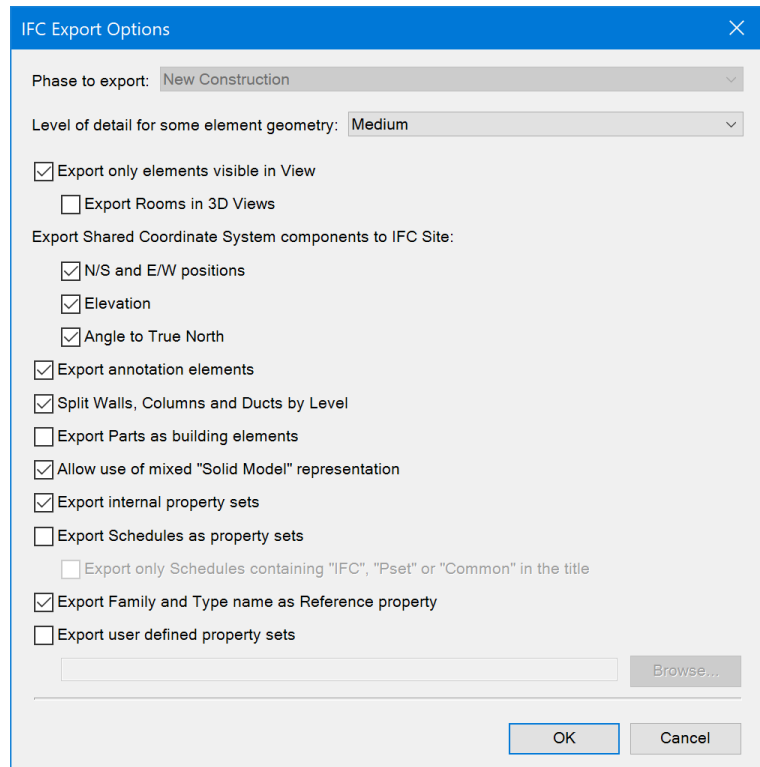
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## Use the ARCHICAD Connection Add-In for Revit:

Though Revit can export, import or link IFC files natively, there is an Add-In that can improve the import and export results in Revit. This Add-In, called the ARCHICAD Connection, is a free Add-In that can be installed in the ribbon in Revit. It is available on the Graphisoft website.



Export to ARCHICAD and set these options:



# Opening IFC in ARCHICAD

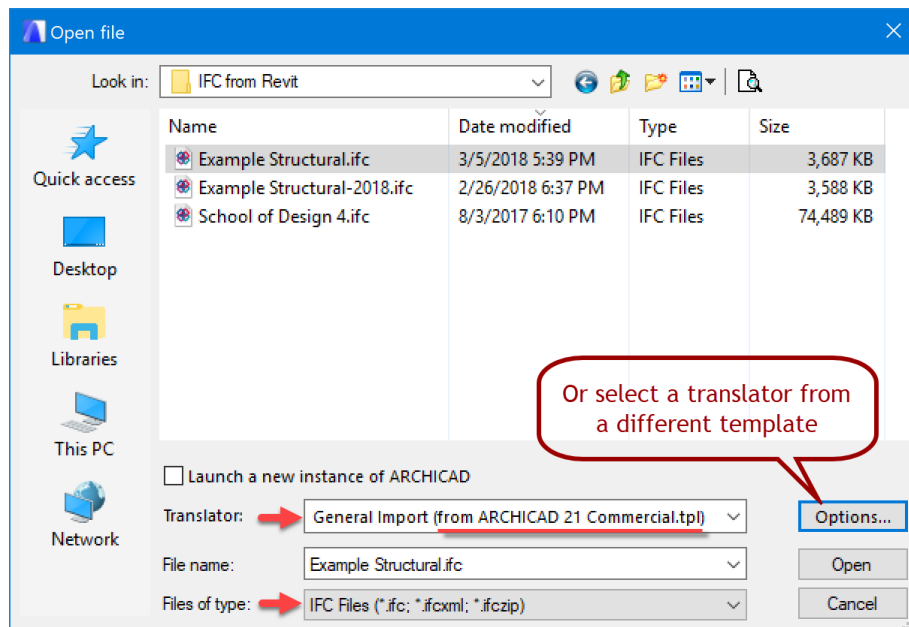
IFC can be directly linked into ARCHICAD, but as proposed earlier, it is best to open the IFC in a separate session of ARCHICAD, save it as a PLN, and link that into your production model.

The translation of IFC into ARCHICAD is significantly affected by the IFC Translator settings. IFC Translators are built into the ARCHICAD model file, rather than external files.

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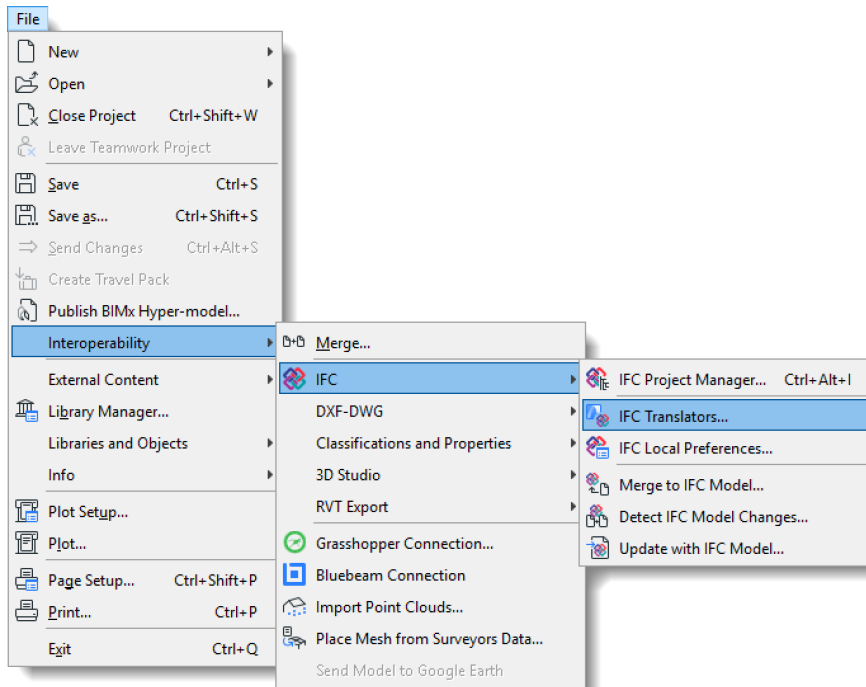
## IFC import using default Translators

- You can start with the default ARCHICAD Commercial template or one optimized for IFC Import. (You can download a recommended template from here: [ARCHICAD 21 IFC Baseline Light.tpl](#))
- If using the default ARCHICAD Commercial template, adjust the following
  - Set All Tool Defaults for best graphics
  - Model View Option: IFC Model Display
  - Renovation Filter: Show All
- In the File Menu/Open...
  - Set "Files of type" to IFC so that you can browse to find an IFC file.
  - Select an IFC Translator (Note the source file of the translator)



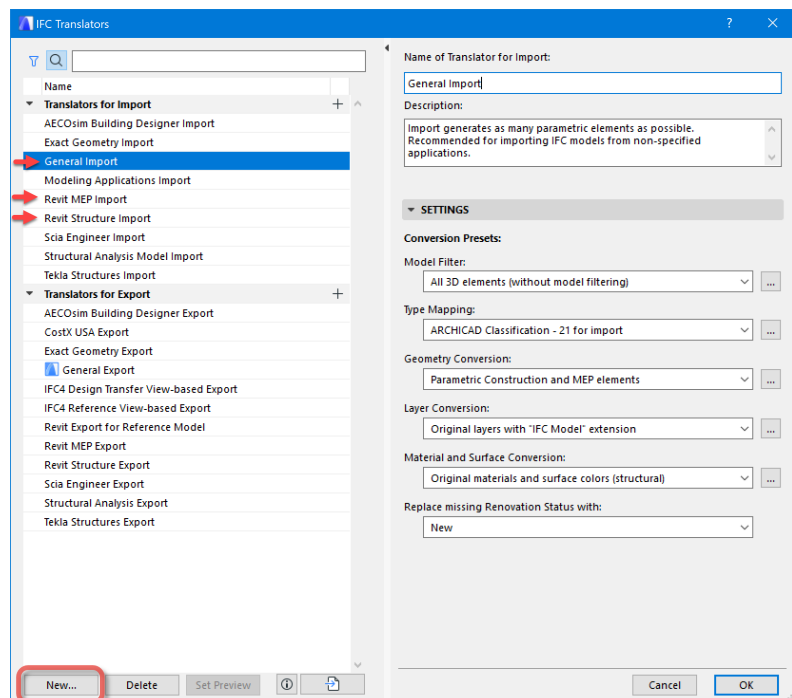
## Using a Custom Translator

Custom IFC Translators need to be setup in advance, in order to be available in the Translator selection dialog.

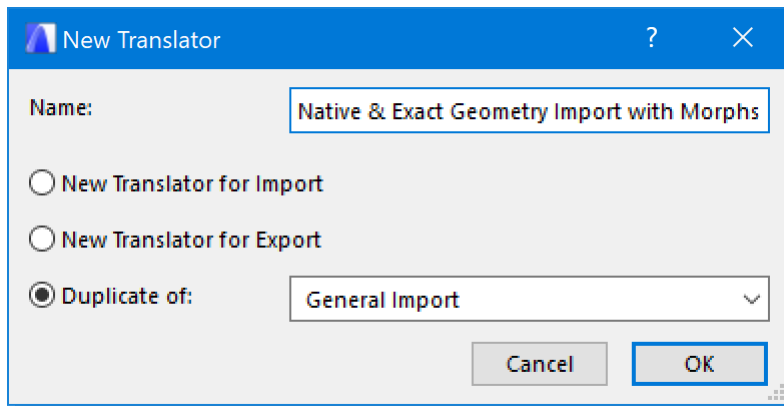


Duplicate an existing translator and modify that, instead of modifying one of the default translators.

Three of the translators are pretty good starting points for developing an optimized translator for importing IFC from Revit.



## Custom Import Translator Example

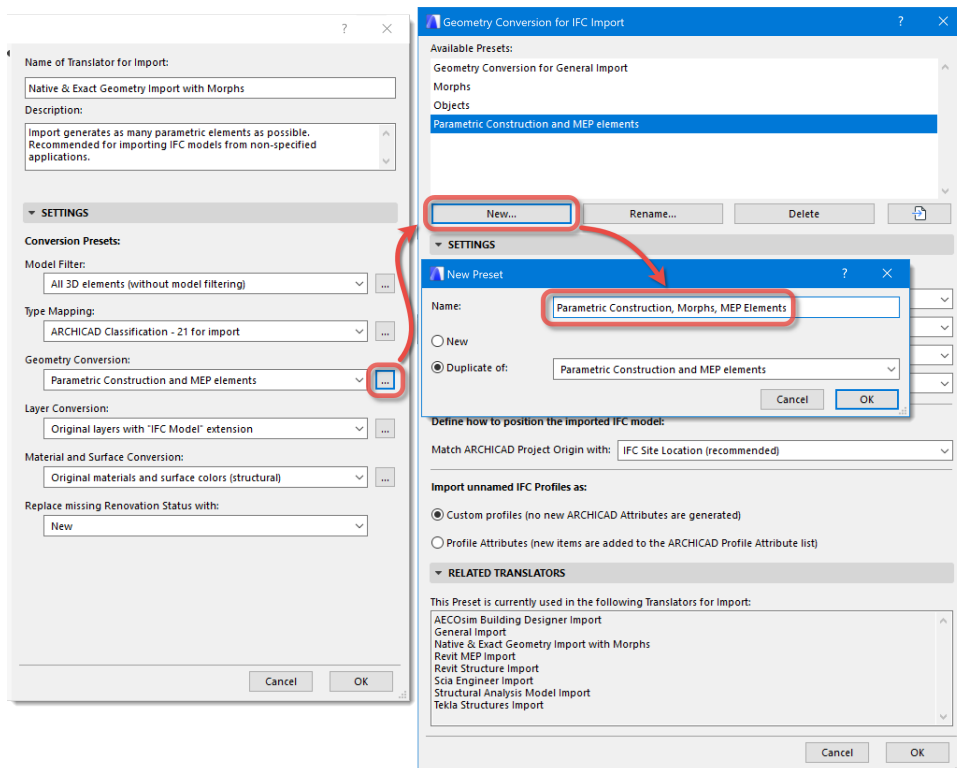


### Duplicate General Import and Name it "Native & Exact Geometry Import with Morphs"

Add a description similar to the following:

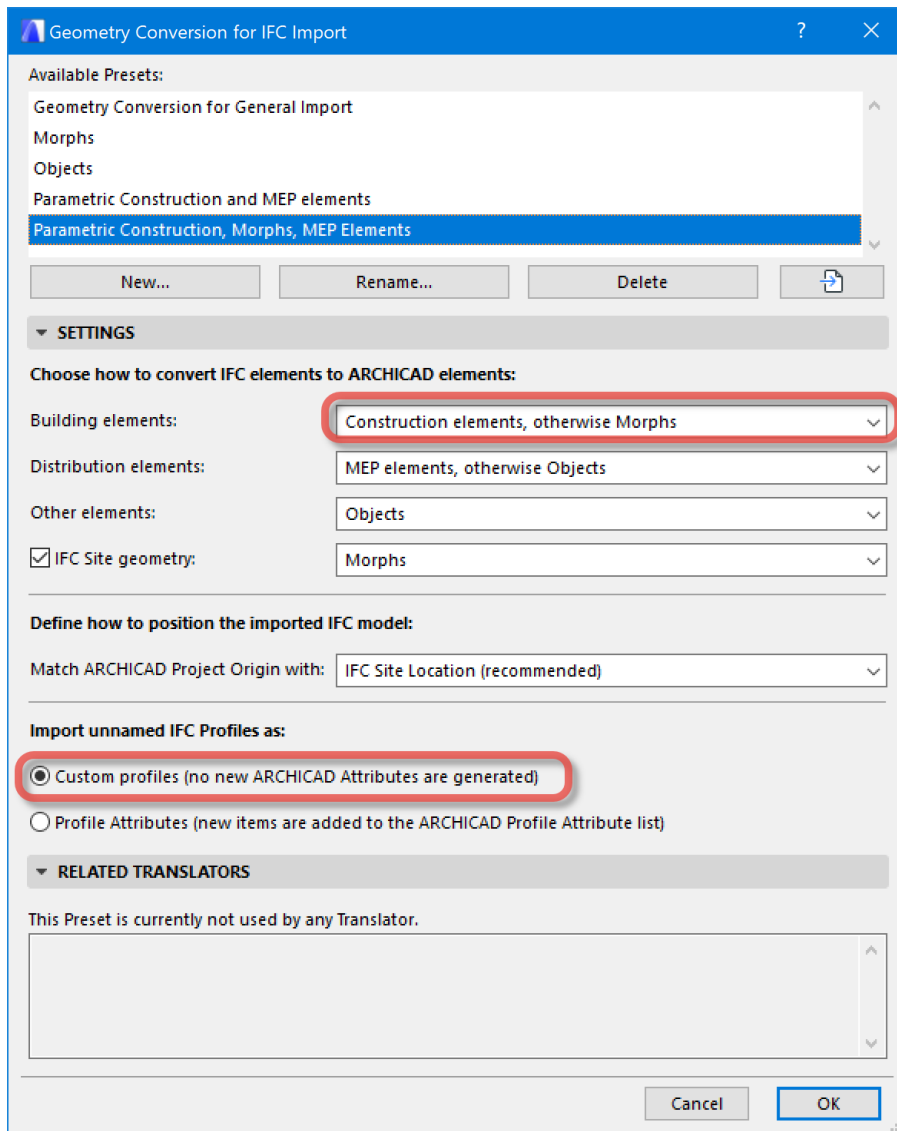
*Optimized for importing models from Autodesk Revit, Imports as many parametric elements as possible, and IFC Spaces will be converted to Zones. Non-Native Construction elements will be imported as Morphs.*

### Make a custom Geometry Conversion Preset:

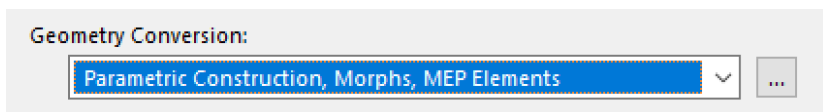


## Set Geometry Conversion for Building Elements

- Building elements: set to Construction elements, otherwise Morphs
- Import unnamed IFC Profiles as Custom profiles



- After closing the dialog above, make sure that you have the new Geometry Conversion Preset selected.



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## Customizing the IFC Translator for a specific IFC file import:

The "Native & Exact Geometry Import with Morphs" translator is a good starting point for making a customized translator for a particular IFC translation.

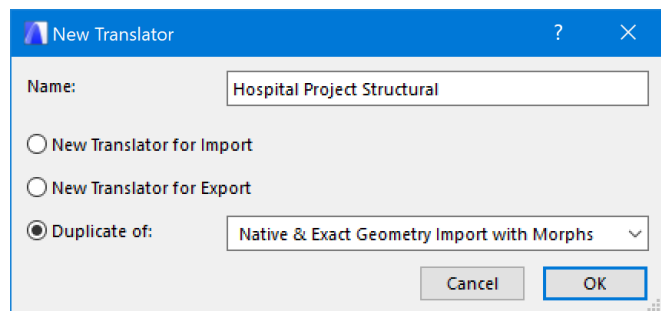
When the translator converts IFC materials into ARCHICAD format, it starts the new Building Material from an existing Building Material, in the template. This is because an ARCHICAD Building Material includes required characteristics not included in (or translated from) the IFC Material. These would include:

- Cut Fill definition
- Intersection Priority

So, these two are acquired from a Building Material already in the template. This leads to an obvious simplification because, if different kinds of IFC materials are converted into ARCHICAD Building Materials that all share the same Cut Fill and Intersection Priority, they will lack the sophistication and functionality of properly defined Building Materials.

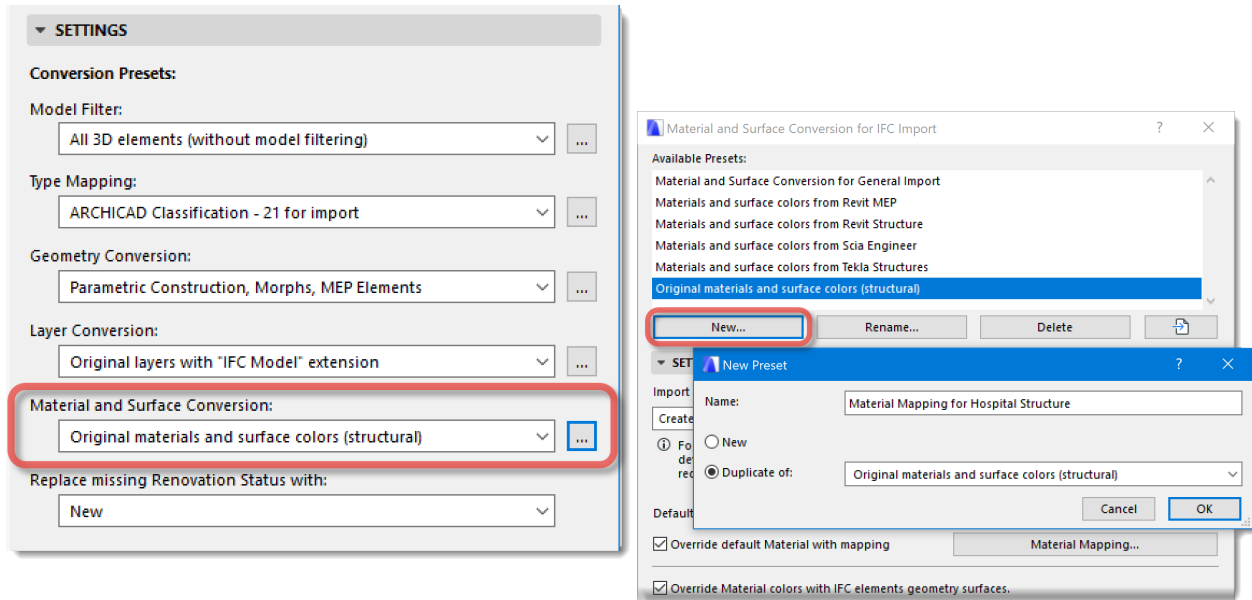
But it is possible to map each material in the imported IFC, to an equivalent ARCHICAD Building Material that is already in the template.

As usual, Duplicate an existing IFC Translator rather than modify one that you may need to keep.

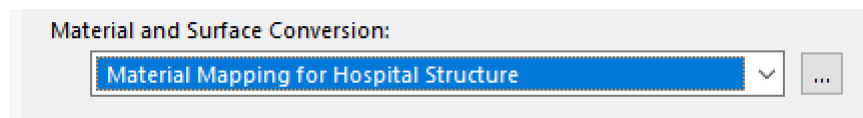




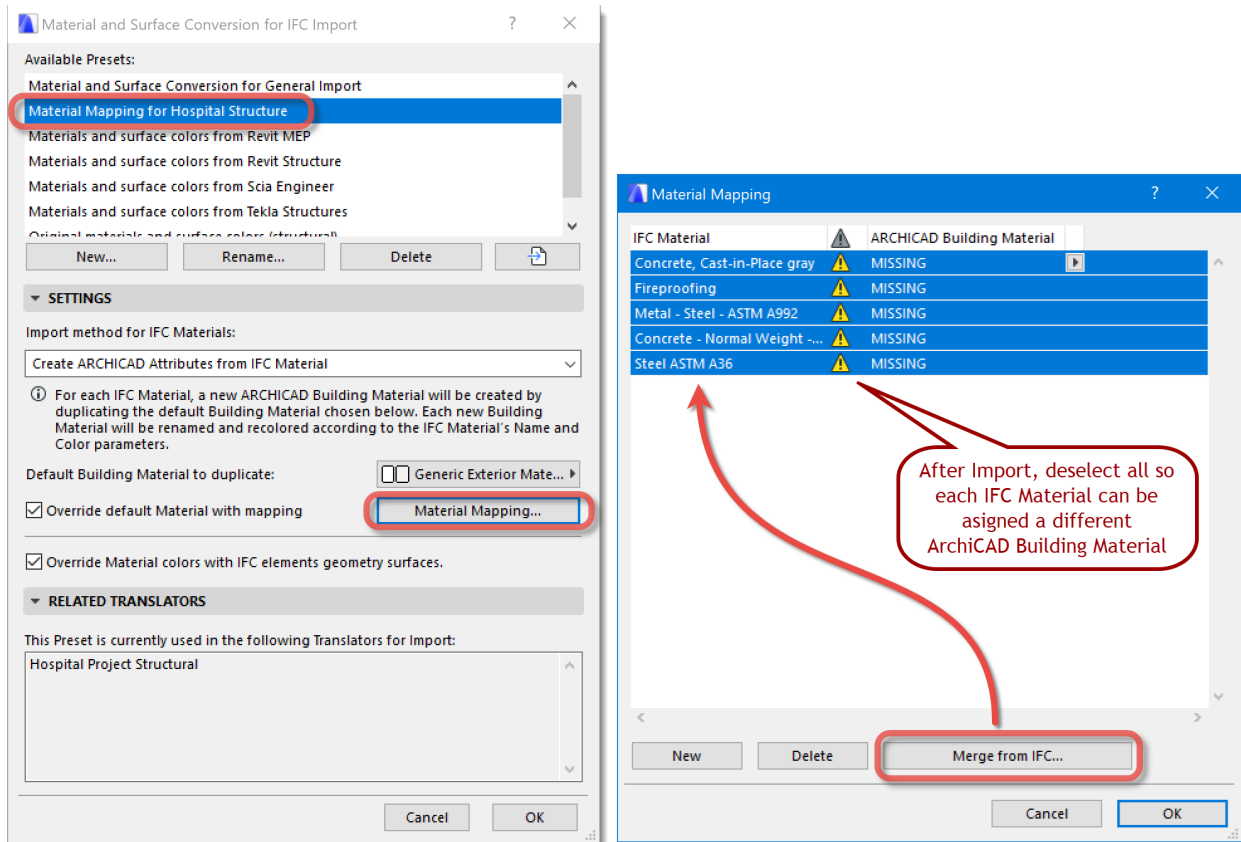
## Make a custom Material & Surface Conversion Preset



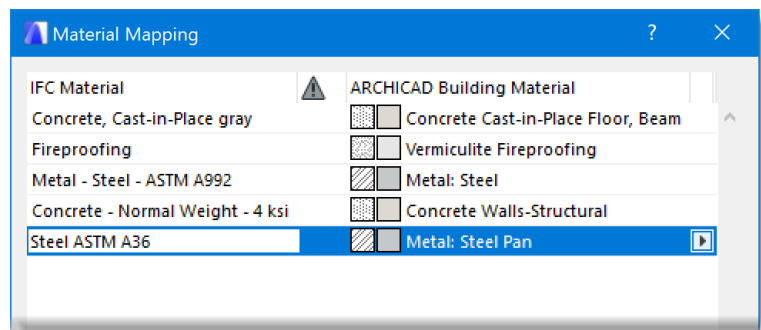
- Again, close the dialog and make sure that your new IFC Translator is using the new Material Conversion Preset.



- Go back into the settings for the Material and Surface Conversion and setup the mapping of materials from a selected IFC file, to ARCHICAD Building Materials:



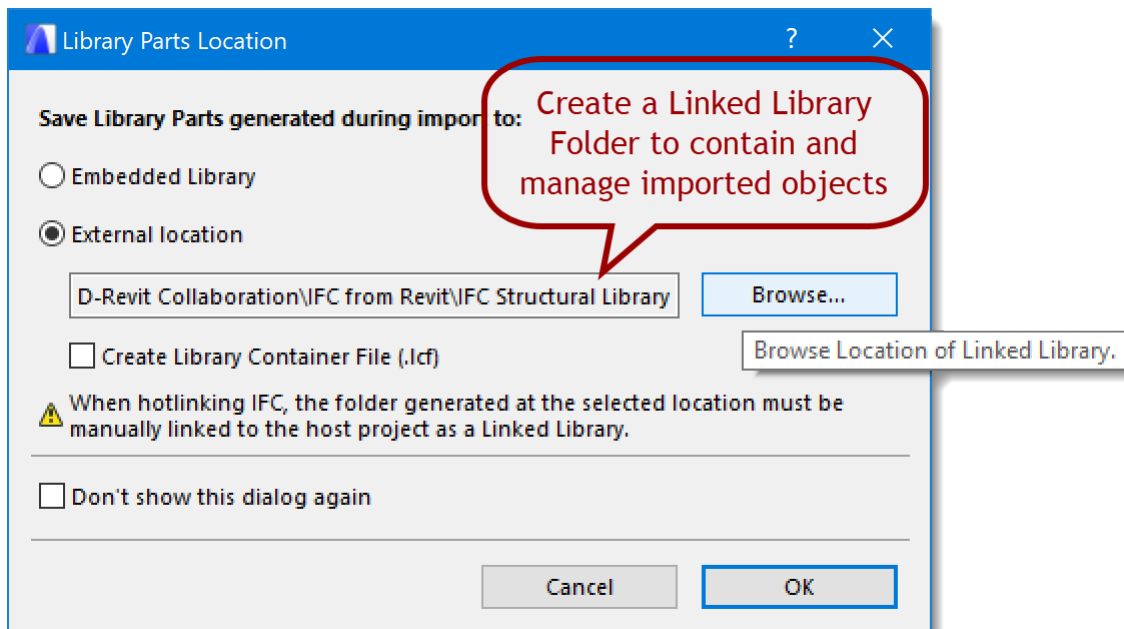
The Material Mapping might look like this:



## Opening an IFC File

Starting with a fresh session of ARCHICAD, started with the Default Template or a Custom IFC Translation Template, Open an IFC file from the File Menu and use your preferred IFC Translator.

It is possible that the IFC import process will create new ARCHICAD objects that will be referenced in the model. It is usually best to place these objects into a Linked Library Folder, so they can be managed with conventional File Management techniques, and loaded into the BIM Server or BIMcloud Project Library.



## **DWG from Revit to ARCHICAD**

Export a DWG Set of Backgrounds from Revit

There are three ways to import DWG into ARCHICAD

- Merge (this brings the DWG into ARCHICAD as if it had been drawn there, rather than linked.)
- XREF
- Drag and Drop a Drawing

Use the Floor Plan Window or Worksheet place the imported DWGs from Revit.

Manage Layer visibility in the imported DWGs, if necessary.

- XREFs can be easier for layer management in ARCHICAD
- Layers can be managed in placed drawings as well, using the Drawing Settings dialog box.

One advantage of using the placed drawing option is that it has easier control of pen table.

Using an XREF can be easier to locate the drawing in the exact place it should be relative to the drawing origin.

# Appendix:

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## Collaboration on the same dataset with the same authoring tool

The goal of all team members using and editing a single unified dataset for the design and production phases of a project, is not a new one. However, given today's technology, it is still only practical on small projects. In practice, separate disciplines develop workflows that divide the scope and responsibilities into separate datasets and then link these to each other to get a more holistic view of their efforts. Even when all the teams are using the same software, this allows each to optimize their template standards to facilitate the unique deliverables that each team is responsible for. It also allows more people to work on the project at the same time, because of the practical limits on concurrent users editing a single model. For Revit, this is about 5 to 7 people.

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## Editing a unified dataset by different stakeholders using Revit

On top of the issues explained above, Revit also imposes a unique challenge to teams that are not working in the same location because its database is not tolerant of network latency typically seen between separate offices. This factor is unique to Revit and no other applications such as AutoCAD, MS Office, or ARCHICAD, and it leads to strategies that fall into three categories:

- 1 Virtual desktop solutions where the users control virtual machines on a central server. Revit sessions are actually running on the central machine and the screen, mouse and keyboard interactions are conveyed through the Internet between the users' locations and the central server.
- 2 Central database mirroring accelerated to each office location to mimic having the real central file located on each office LAN. This can be setup privately in the form of "Revit Server" or Autodesk offers to host the central database engine with a service called C4R. The latter is essentially Revit Server running on Autodesk's resources. But both still suffer from the fact that even when working perfectly, (which they never do) they can only approach the theoretical performance that would be possible if all the teams were working in the same wired Gbit LAN. What still remains is the exponential performance drop that occurs as a result of three factors:
  - Increasing the size of the model or the number of linked models
  - Increasing the number of concurrent users
  - Increasing the number of edits to the model over the course of the project
- 3 Each team builds its own model on their own network server and then saves "dead models" periodically to copy to each other's local server for linking into the other teams' models. These "dead models" are special copies of each central model that do not attempt to connect back to the original central working models at each office.

Note that the third method of linking copies of working models, is often combined with the first two methods since Revit imposes another penalty unique to Revit: Linking a Revit model into another Revit host model makes the host model much less nimble. This is not too surprising due to the exponential performance drop experienced by Revit each time the model doubles in size. However, with Revit the host model affects the linked model as well! This impedes the production efforts of a team if their production model is linked into someone else's production model. So, there is an incentive to only share copies of your production model for linking into other Revit models, even when all the models are being edited on the same LAN.