# **SCIAENGINEER**



# **Tutorial** Linking SCIA Engineer & Autodesk Revit

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## **Export via CADS Revit SCIA Engineer Link**

Open Revit-SCIA Transfer.rvt from folder

## Link Location & Setup

1. Open the CADS Revit SCIA Engineer link by selecting the CADS tab from the list of panels.

<b>R</b> -	B	🗄 🌀 • 🤄	<b>→</b> ~ ~		× 10 /	A @ -	> ₺ 🗄		₹				Aut
•	Arcl	nitecture S	Structure	Insert	Annotate	e Analyze	Massing	& Site	Collaborate	View	Manage	Add-Ins	CADS
Optio	<b>\</b>	Consistency Checks	Review & Export	*	ow ported	Review & Import	Select Imported	6	Getting Started Best Practices Help	r∰ Cheo (ĵ) Aboo			
				C	ADS Revit	Scia Enginee	er Link						
2. S	elect	the Opti	ons butt	on 🕽	to c	pen the	options	dialo	gue box.				

- 3. Verify that the following actions are setup:
  - a. National Code = IBC
  - b. Launch SCIA Engineer = No
  - c. SCIA Engineer Version = Browse depending on install version
  - d. Export Selected Items Only = Checked

Options

4. Once the actions are setup, it is possible to make modifications to the Options as well.

ctions	Optio	ns			
National Code IBC -	⊿ E	Export			
		nternal Edges with Beams	No		
Launch Scia Engineer	F	Revit Foundation Slab as	Slab		
Scia Engineer Version 15.0.93 -		Revit Isolated Foundation as	Support		
		Export / Import			
Export Selected Items Only		gnore Load	Yes		
Export to Scia Engineer		gnore Load Combinations	Yes		
		gnore Member Release	Yes		
		gnore Slabs	No		
		gnore Support	Yes		
		gnore Walls	No		
Import from Scia Engineer					
		Analysis results	Yes		
		Jpdate 2D Member Openings	No		
		Jser Mapping			
	I I I	Material as Unknown	No		
Mapping Tables					
Preferred Tables User Table	Anal	vsis results			
		Yes' to import analysis results from Scia	Engineer		
Section Parameter Mapping		ires 'Structural Analysis Toolkit' from A			
			Close Help		

### **Mapping Tables**

The transfer of data between Autodesk Revit and SCIA Engineer is dependent on Mapping Tables. These mapping tables are used to link the Revit Section Name & Family Name to the corresponding SCIA Engineer Section and Catalog name.

1. To access the mapping tables, select the Preferred Tables button in the Option dialogue box of the CADS Revit SCIA Engineer link.

apping Tables	
Preferred Tables	User Table

2. In the Preferred Database, it is possible to arrange the pre-installed databases in order of desired priority. In addition, it is also possible to change the mapping rules and add user Revit family paths to the database. For this exercise, set the databases as shown below.

🕼 Preferred Dat	abases		23	
<b>US</b> -Imperial		*	High Priority	
User Table				
✓ General Sec			Up	
Document-M		=		
General-Mat	erials		Down	
Metric Section	ons - US			
Belgium Colu	imns		View	
😺 Belgium Bea	ms			
V Europe Spec	ific Sections			
✓ General Sec	tion-Metric	-	Low Priority	
Manaina Dulas			1	
Mapping Rules Cross Section		]		
0033 000001	Use If not found	•		
Material	Use If not found			
	Use il not lound	•		
Source Mappi	ng Rules	Revit Family M	apping	
Tarrat Manai	an Pulan	Revit Family Path		
Target Mappi	ig hales		aut	
		Ok	Cancel	

3. The User Table is a listing of items that were either added by the user before running an exchange, or added by the user during the exchange process. The user table will be discussed in more detail later.

## **Model Visibility and Filters**

This model already includes two separate Revit filters. These filters are set up to break apart the model into elements that will be transferred using the link and those that will be transferred using the IFC exchange.

oundation Iteel/Concrete	New
	Edit
	Rename
	Delete

To enable or disable the filters in order to view only a portion of the model, use the <sup>Visibility/</sup><sub>Graphics</sub> button and navigate to the Filters tab. For the link transfer, disable the visibility of the Foundation filter.

Model Categories	Annotation (	Categories	Analytic	al Model Catego	ries Importe	d Categories	Filters			
				Dr	niection/Surf:	100		0	11	
N	ame	Visib	oility –	Pr Lines	ojection/Surfa Patterns	Transparen	Li	C ines	ut Patterns	Halftone
N: Steel/Concret		Visib				1	Li			Halftone

## **Export to SCIA Engineer (CADS link)**

1. When the visibility is properly set, highlight all the items and select the Review & Export button the CADS Revit SCIA Engineer Link.





<u>Note</u>: The transfer between Autodesk Revit and SCIA Engineer is based on a properly constructed analytical model in Revit Structures. All of the information that will be transferred between the two software's in gathered from the analytical model in Revit. If no analytical model is set up, then no information will be exchanged. For more information on the analytical model in Autodesk Revit, as well as Analytical Model tools, refer to Best Practice PDF found in the link as well as other Autodesk documentation.

2. After selecting export, the export model preview will appear. It is in this interface that specific items can be selected/deselected for export

					Revit		
		Id	Category	Section	Material	Changes	Export S
FROM	•	257738	Structural Columns	HSS10X8X3/8	Metal - Steel - ASTM A500 - Grade B - Rectangular and Square	New	$\checkmark$
		257739	Structural Columns	HSS10X8X3/8	Metal - Steel - ASTM A500 - Grade B - Rectangular and Square	New	$\checkmark$
		257740	Structural Columns	HSS10X8X3/8	Metal - Steel - ASTM A500 - Grade B - Rectangular and Square	New	$\checkmark$
		257741	Structural Columns	HSS10X8X3/8	Metal - Steel - ASTM A500 - Grade B - Rectangular and Square	New	$\checkmark$
		257742	Structural Columns	HSS10X8X3/8	Metal - Steel - ASTM A500 - Grade B - Rectangular and Square	New	$\checkmark$
		257743	Structural Columns	HSS10X8X3/8	Metal - Steel - ASTM A500 - Grade B - Rectangular and Square	New	$\checkmark$
		257744	Structural Columns	HSS10X8X3/8	Metal - Steel - ASTM A500 - Grade B - Rectangular and Square	New	$\checkmark$
parameter a		257745	Structural Columns	HSS10X8X3/8	Metal - Steel - ASTM A500 - Grade B - Rectangular and Square	New	$\checkmark$
		257746	Structural Columns	HSS10X8X3/8	Metal - Steel - ASTM A500 - Grade B - Rectangular and Square	New	$\checkmark$
	1	257747	Structural Columns	HSS10X8X3/8	Metal - Steel - ASTM A500 - Grade B - Rectangular and Square	New	$\checkmark$
		257748	Structural Columns	HSS10X8X3/8	Metal - Steel - ASTM A500 - Grade B - Rectangular and Square	New	$\checkmark$
		257749	Structural Columns	HSS10X8X3/8	Metal - Steel - ASTM A500 - Grade B - Rectangular and Square	New	$\checkmark$
		257770	Structural Framing	HSS8X4X3/8	Steel ASTM A500, Grade B, Rectangular and Square	New	$\checkmark$
		257771	Structural Framing	HSS8X4X3/8	Steel ASTM A500, Grade B, Rectangular and Square	New	$\checkmark$
		257772	Structural Framing	HSS8X4X3/8	Steel ASTM A500, Grade B, Rectangular and Square	New	$\checkmark$
		257773	Structural Framing	HSS8X4X3/8	Steel ASTM A500, Grade B, Rectangular and Square	New	$\checkmark$
		257774	Structural Framing	HSS8X4X3/8	Steel ASTM A500, Grade B, Rectangular and Square	New	$\checkmark$
		257775	Structural Framing	HSS8X4X3/8	Steel ASTM A500, Grade B, Rectangular and Square	New	$\checkmark$
		257776	Structural Framing	HSS8X4X3/8	Steel ASTM A500, Grade B, Rectangular and Square	New	$\checkmark$
		257777	Structural Framing	HSS8X4X3/8	Steel ASTM A500, Grade B, Rectangular and Square	New	$\checkmark$
		257778	Structural Framion	HSSRY4Y3/R	Steel ASTM A500 Grade R. Dectangular and Square	New	

3. After selecting export, the link will prompt the user to save an .r2s (Revit2SCIA) file. Select any location and name and click OK.

4. First, the link will read the entire Revit model and separate the items to be exchanged into categories. Once the read portion is complete, the model will begin to be exported. During the export process, if the link identifies a Material or Cross Section that is not found in the standard mapping tables then the following dialogue box will appear.

Revit Material 'Metal - St the National Code 'IBC' Do you want to add this	- Rectangular and	d Square' for

5. Selecting Yes will open the following dialogue box and will allow the user to add the mapping information for the specified Revit material. Set the mapping as shown below and click OK.

Supporting Mapping Database :	Document-Materials	•
Material Category :	Steel	
Bevit Material Name	Metal - Steel - ASTM A500 - Gra	de P - Dec
nevic material marile.	Metal - Steel - AS IN ASUU - Gla	ide b - nec
Scia Engineer Material Name :	A500 grade B	ve b - nec

6. Complete a similar process for the mapping of the cross section, 3" STD PIPE in the Revit Family, HSS – Round Structural Tubing setting the mapping as shown below. Both the material and the cross section mapping will be saved in the User Mapping Table. Once a material/cross section is mapped by the user, the link will utilize the new mapping for subsequent transfers.

🕼 Add Cross Sec	tion To User Table
Supporting Mapping	Database : US-Imperial
Revit	
Family Name :	HSS-Hollow Structural Section-1
Section Name :	HSS6X6X5/16
Family Role :	Frame
Scia Engineer	
Catalog Name :	Rolled
Section Name :	HSS(Imp)6X6X5/16 👻
Catalog Id :	2
Use as Numer	rical Cross Section 📃 Use as General Cross Section
	Ok Cancel

7. When the link has finished the exchange, a list of the mapped cross sections and materials is shown. Also, shown is the total number of items exported. It is also possible to save a log of the exchange to a Word file.

Category	Total Items	Exported	Not Exported	<ul> <li>"W12X79" is mapped as "W(Imp)12X79"</li> </ul>	
Structural Columns	262	262		"W10X45" is mapped as "W(Imp)10X45"	
Structural Framing	706	706		"W30X90" is mapped as "W(Imp)30X90"     "C5X9" is mapped as "C(Imp)5X9"	
Walls	53	53		• "W16X31" is mapped as "W(Imp)16X31"	
Floors	13	13		<ul> <li>"W18X35" is mapped as "W(Imp)18X35"</li> </ul>	
Total	1034	1034		<ul> <li>"W12X19" is mapped as "W(Imp)12X19"</li> <li>"HSS8X4X3/8" is mapped as "HSS(Imp)8X4X3/8"</li> </ul>	
				Summary: 282 out of 282 Structural Columns exported 706 out of 706 Structural Framing exported 53 out of 13 Walls exported 13 out of 13 Floros exported	
				Total items exported 1034 out of 1034 End Time : 01/07/2016 09:28:07 Total Time : 00:01:36.4266417	

## **Export via IFC (Industry Foundation Class)**

1. The remaining items in the model (Foundations) will be transferred using the IFC file format. In order to properly exchange the foundation information, change the Filter in View > Visibility/Graphics so the Foundation filter is checked on.

						1755				
Iodel Categories Annotation		Categories	Analytical Model Categories		Imported Categories		Filters			
			1000							
N	ame	Visibi	lity	Projecti	ion/Surfa	ce		С	ut	Halftone
Na	ame	Visibi	ility Lines		ion/Surfa atterns	ce Transparen		C Lines	ut Patterns	Halftone
Na Steel/Concret	27 NK	Visibi	lity Lines			1				Halftone

2. Once only the foundation elements are shown, select all the elements and navigate to Revit button > Export > IFC file.



3. Select a location, file name and make sure that you are exporting only the "Current View" so that only the elements that are selected are exported.



4. When the export is complete, Autodesk Revit can be closed.

## Import into SCIA Engineer

Now that the .r2s file and the IFC file have been exported from Revit Structures, the user can import both and combine them into one file in SCIA Engineer.

#### Import .r2s file

- 1. To import the .r2s file, navigate to File > Import > Revit file while in SCIA Engineer.
- 2. Navigate to the location for the saved .r2s file and open it.
- Once the file is opened, the user has the option to select the code used for the SCIA Engineer file. Make sure that the code used in Revit Structures matched the code used in SCIA Engineer. If a new code needs to be added, select the Add button to change the code.

Name	Description	
IBC .	IBC	
Add Delet	te 🕢 Active code	Close

4. Select Close and the file will be imported. Use the Zoom All button  $\xrightarrow{EX}$  to show the entire model.

#### Import IFC file

- 1. To import the IFC file into the same SCIA Engineer file, navigate to File > Update > IFC2x3 and select the saved IFC export from Revit Structures.
- 2. When the IFC Import Options dialogue appears, modify the setting for the import of the geometry as follows and click OK.

Import entities	Geometry		
✓ 1D members	C as members		
✓ 2D members	as reference model		
Reinforcement			
Tendons	Analysis shape only		
✓ Others	Run member recognizer		
Tendons	-Material table		
as internal	Choose File Edit		
C as free			
Storeys	National code		
Import storeys	Change		
inport store ys	Chungern		

3. The IFC file will be imported and the Update dialogue window will open. From the update window, the new entities are identified in Green, while the existing entities are identified in Red. It is now possible to select the entities that should remain in the update. Uncheck the box for Deleted Entities and click Accept. Once the changes have been accepted, the dialogue can be closed.



4. The model is now updated and aligned with the foundation elements inserted as General Solid geometry. This geometry can now be dealt with in a variety of different ways. It is first possible to convert the foundation elements into plate elements using the BIM toolbox and the Convert General Solid into Plate/Wall command.

IM tool	xoc
1 miles	Convert <b>Seneral solid into beam/column</b>
	General solid into plate/wall Part of a general solid to a member Heam/slab into general solid Align Evaluate - Clash check
New	Close
9.3	

- 5. If conversion isn't desired, the entities can remain as general solid or reference geometry and support conditions (nodal, line, surface, etc.) can be added.
- 6. The final model in SCIA Engineer after the transfer from Autodesk Revit is shown below.



## Import changes & results to Autodesk Revit

Now that the project has been loaded, analyzed and designed the modified geometry and results can be sent back to Autodesk Revit for documentation and coordination.

## Import .r2s file into Autodesk Revit

- 1. Open SCIA Engineer file, SCIA-Revit Transfer\_Results. This file already has loading and results.
- 2. Navigate to File > Export > Revit file to create new .r2s file.
- 3. In order to import analysis results, users must install the Structural Analysis Toolkit 2015 that is available for Autodesk Revit. The toolkit can be downloaded for free from the following link:

https://apps.exchange.autodesk.com/RVT/en/Detail/Index?id=appstore.exchange.autodesk.com%3Astr ucturalanalysistoolkit2015 windows64%3Aen

- 4. Open Autodesk Revit and start a new project.
- 5. With a new project open, access the CADS tab and select Review and Import Import in order to import the file that was exported from SCIA Engineer. Make sure that the link options are set up to accept new analysis results.

⊿	Import	
	Analysis results	Yes
	Update 2D Member Openings	No

6. Once the file has been imported, select the 3D Analytical Model View.

#### Access Structural Analysis results in Revit

- 1. Next, the Structural Analysis functionality can be accessed from the Analyze tab.
- Select the button for Results Explorer import the analysis results from SCIA Engineer to Revit.



- With the results imported, open up the 3D View > Analytical Model, select a load case and result type and then click Apply.
- 4. The structural analysis toolkit will now show the forces, moments or deformations on the 3D model.



- 5. It is also possible to export internal forces on beams as reaction "tags" to be used to document the beam end reactions.
- 6. Navigate to the View tab and add Structural Plan View for Level 7.



- 7. Navigate to the Annotate tab and select the button for Beam Annotations
- 8. In the Beam Annotations dialog add the Structural Framing Tags for the Start & End Reaction Tags

m Annotations				8 23
se this tool to place beam ann	iotations, tags and spot el	evations, on the beams in your current plan view.		
eam annotations can be place	d at the ends and mid-poir	nts of level and sloped beams. They can also be placed o	n either side of the beam.	
elect the annotation type and	l location. A schematic pre	view is given below.		
Placement				
All beams in current plan v	view			
All selected beams in current	ent plan view			
Include beams from links				
Remove existing beam tag	ns and spot elevations			
			_	
Beams that have exit	sting host file annotations	will not be reannotated.		Settings
Level beams in plan Slop		Structural Framing Tag : Sta	End Reaction Tag	
<pre></pre>		Beam Elevation (Project)	<pre><pre><pre><pre><pre><pre><pre><pre></pre></pre></pre></pre></pre></pre></pre></pre>	

- 9. Clicking OK will add the Beam End Reactions to the beams in the plan view.
- 10. The maximum beam reactions that are shown on the plane view of the structure coincide with the maximum shear value (Vz) at either end from all of the available combinations. For additional information on analysis results and beam reactions, refer to the CADS Revit Link Help guide installed in Revit.

Þ	Getting Started	_	Check List
6	Best Practices		About
?	Help	U	About

