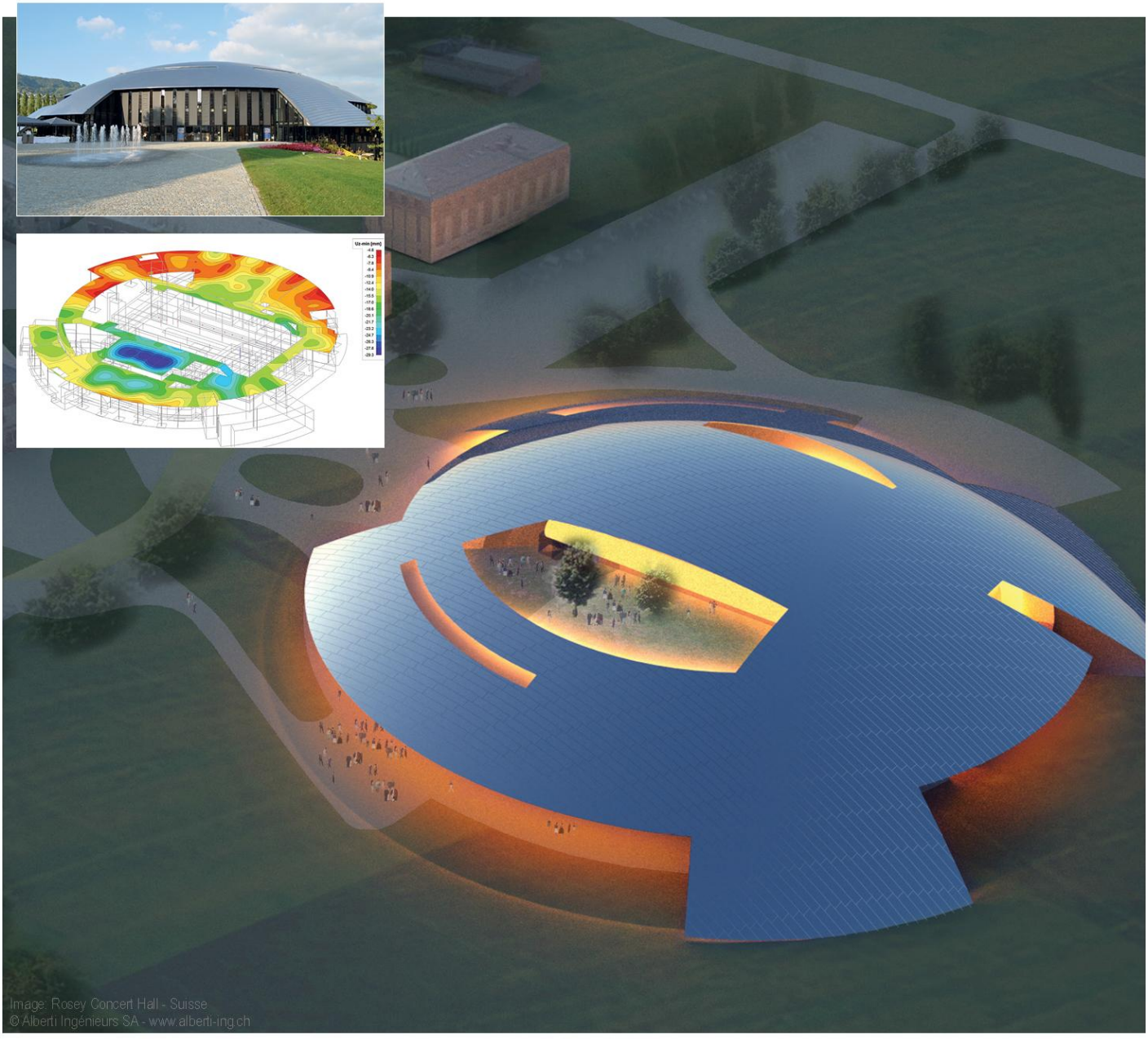
Scia Engineer



Advanced training

Revit Structure Interface

All information in this document is subject to modification without prior notice. No part or this manual may be reproduced, stored in a database or retrieval system or published, in any form or in any way, electronically, mechanically, by print, photo print, microfilm or any other means without prior written permission from the publisher. SCIA is not responsible for any direct or indirect damage because of imperfections in the documentation and/or the software.

© Copyright 2015 SCIA. All rights reserved.

Table of contents

Introduction and requirements 1

Requirements for Scia Engineer side 1

Requirements for the Revit Structure side 2

Analytical versus structural model 4

Example 1: First use Revit link 5

Creating the model in Revit Structure 5

Using the Revit link 8

Importing in Scia Engineer 14

Exporting from Scia Engineer 16

Importing in Revit Structure 16

Example 2: Modification of cross-section in Scia Engineer 20

Example 3: Adding elements in Scia Engineer 21

Customer example 4: Generic (analytical) families 22

The Revit model 22

Export in Revit 23

Importing in Scia Engineer 26

Appendix 1: Mapping materials and cross-sections 27

Preferred tables 27

Mapping rules 28

Source and target rules 28

Revit family mapping 30

Revit family path 30

Mapping tables 31

APPENDIX 2: Options (CADS Revit - Scia Engineer Link) 34

APPENDIX 3: FAQ's 37

Where are the mapping databases stored? 37

Problems due to user rights or files 37

Access "C:\Program Data\CADS\Revit to Scia\Revit 2013\Databases" is denied 37

Unable to replace REVIT.TDX file 37

Microsoft .NET Framework error 38

Problems during export in Revit Structure 38

Export Revit: "Exception from HRESULT: 0x80010105" 38

Export Revit: "Material is null, hence not set." 38

Export Revit: How do I find an element mentioned in the log file? 39

Export Revit: "Ignored by user" 40

Export Revit: the object is not supported by the Revit link 40

Export Revit: the object is not supported by Scia Engineer 41

Could not find file 'C:\ProgramData\CADS\Revit to Scia Engineer\Revit 2015\Templates\Unnamed.EC – EN.esa' 42

Problems during import in Revit Structure 42

Problems with importing in Scia Engineer 42

Appendix 4: Installation of Revit Structure 44

Introduction and requirements

The Revit Structure Interface is a tool that is used to transfer projects between Autodesk Revit Structure and Scia Engineer. The projects are transferred with the help of a free plug-in for Revit Structure that can be freely downloaded on the Nemetschek Scia website.

➔ *http://nemetschek-scia.com/en/support/downloads/plugin-revit-structure-scia-engineer*

The **Revit Structure Interface** is also called the **Revit link** and will be referred to as such. The file format which is used between Revit and Scia Engineer is R2S (Revit to Scia).

This guide will describe the basics to use the Revit link. For more information, we refer to the 'Getting started' & 'Best Practices' from CADS (which you find in the help of the plug-in in Revit)

Requirements for Scia Engineer side

To be able to import and export .r2s –files in Scia Engineer, you need a licensed version of Scia Engineer or at least the module described below.

Here follows an overview of the required Scia Engineer modules / editions:

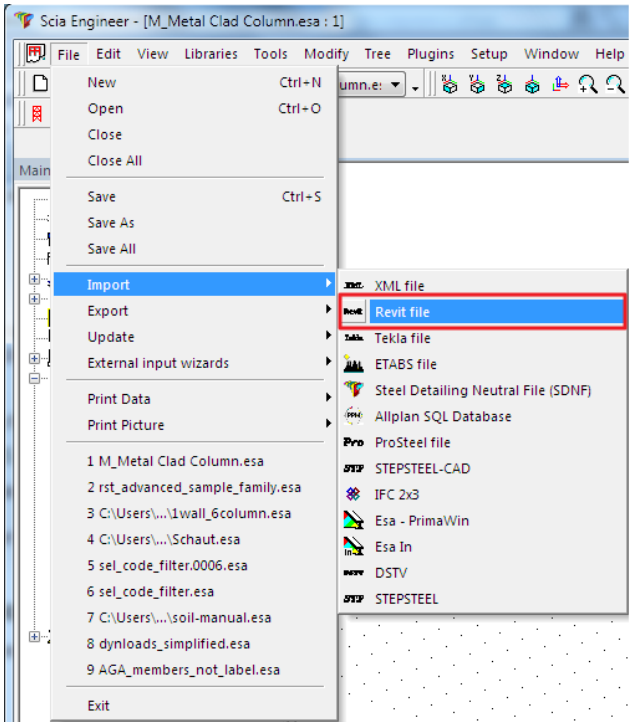
- **Revit Structure interface**

esa.21 Not part of any edition

The link does *not* work with the following editions:

- **Student license**
- **Try-out license (except for the special 'try-out Revit link')**

There is no additional software required in Scia Engineer. If the module is activated, you will see the following option in Scia Engineer:



Requirements for the Revit Structure side

- First install **Revit Structure** to the computer where you are going to import and export data. The next step is to install **Scia Engineer**. Choose the type of installation as '**custom'** and in the next dialog window, switch on the box **'Revit Structure plug-in'** and click on the button 'next'. If Revit Structure is not installed on the computer, then the plug-in won't be linked to it.

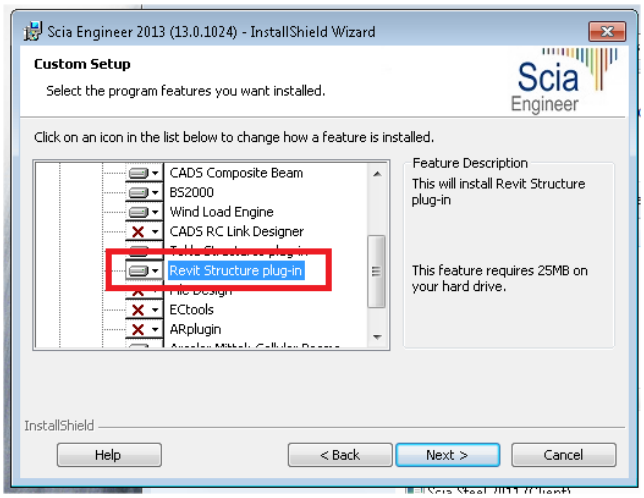


Figure 1: Normal installation of Revit plug-in

> ***Note:*** *Since Scia Engineer 15 and later, the Revit link is activated by default as component in the installation of Scia Engineer.*

Once the link is implemented into Revit structure, you will be able to find the tab Add-ins in Revit Structure. There you find buttons and dialogues which are used in the link between Revit Structure and Scia Engineer.

Figure 2: Add-in tab in Revit Structure after installing the plug-in

To use the plug-in in Revit Structure, there are no additional licenses required for Revit Structure. The special license in Scia Engineer is only required on the pc where you want to import the model in Scia Engineer. The installation of Scia Engineer serves only as source for material and cross-section mapping (and licenses are not necessary if this installation is only to support the Revit link).

If the setup of the Revit Structure plug-in goes wrong, you could also use the following step:

- The **Revit link plug-in** can also be installed **independently**. But it will still be necessary to also install a version of Scia Engineer on the same pc as Revit Structure. This setup file can be found on the DVD or on our website (www.nemetschek-scia.com →Support → Downloads).

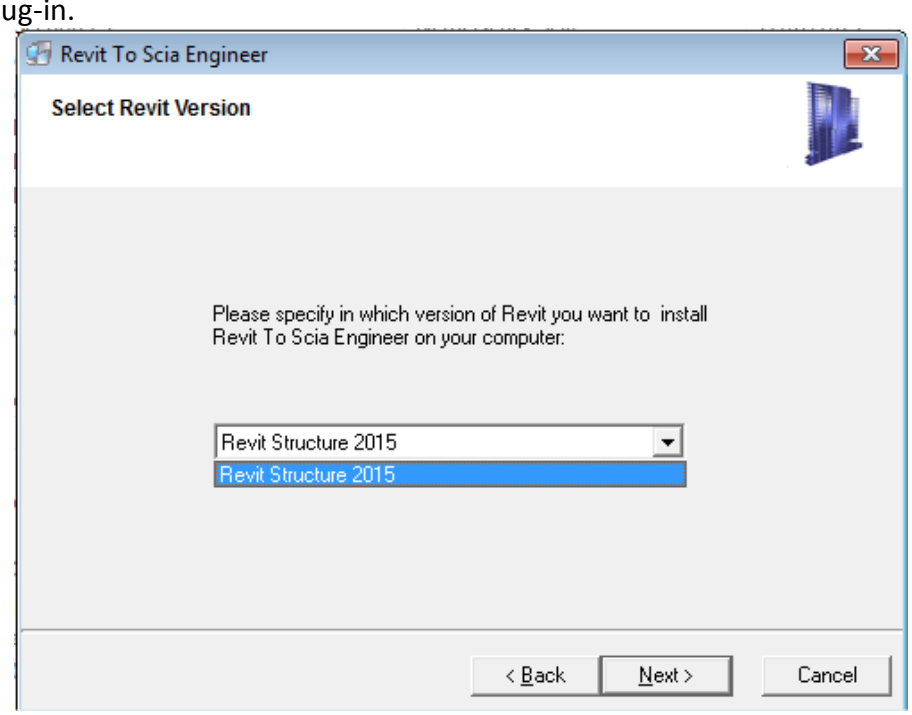
Revit Structure	Scia Engineer	Information	Download
r.2015 r.2014 r.2013	v.14 v.2013 v.2012	Release note v3.1 Getting started v3.1 Check list v3.1 Best Practices v3.1	SE Revit link v3.1 (build 269)
r.2015 r.2014 r.2013	v.14 v.2013 v.2012	Release note v3.0 Getting started v3.0 Check list v3.0 Best Practices v3.0	SE Revit link v3.0 (build 254)
r.2014 r.2013 r.2012	v.2013 v.2012 v.2011	Release note v2.2 Getting started v2.2 Check list v2.2 Best Practices v2.2	SE Revit link v2.2 (build 244)
r.2013 r.2012	Independant		SE Revit link v2.1 (build 222)

Figure 3: Revit Structure plug-in found on Nemetschek Scia site

Also make sure that the folder containing the Revit families (including the standard families) is fully accessible for the Revit link. This folder can also NOT be set to “Read-only”.

Note

- If there are more Revit structure versions on the computer user have to choose the one for the plug-in.



Analytical versus structural model

The Revit link comes down to exchanging the analytical model between Scia Engineer and Revit Structure.

In Revit Structure as well as in Scia Engineer, there are 2 different representations of the model in each project. These are the analytic model and the structural model.

The analytical model is used for calculations. It is a model in which a beam or column is represented by a single line. The cross-section that belongs to that beam or column is assigned to that line, and thus the properties of that beam or column are assigned to that line as well. A plate or wall in the analytical model is represented with a plane with no thickness, but the material and the thickness of the plate or wall are also assigned to that plane. For analysis of the structure (forces and stability), this analytical model is used.

The structural model is used for drawings and shows the volumes. For example in Scia Engineer, you must activate the structural model to see a volumetric representation of the entire model. In Revit Structure the emphasis lies on this volumetric representation, but this does not ensure a good underlying analytical model at all! In the end, a modeller will use this structural model to see how the realisation of the project will look like and to create drawings etc.

Now the problem occurs: when you are using the Revit link between Revit Structure and Scia Engineer, you are actually exchanging the analytical model. The structural (volumetrical) model gets neglected and therefore it is important that the analytical model in Revit Structure is correctly constructed. So the modeller has to understand the importance of a correct analytical model of the project.

As one can see in Figure 4, a good looking structural model can contain a very bad underlying analytical model. The beam is clearly not connected to the columns in the analytical model.

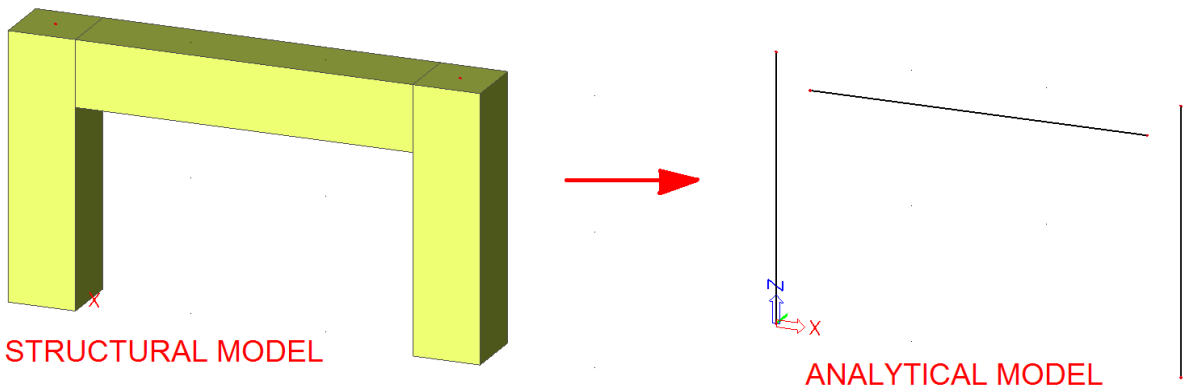


Figure 4: From structural model to analytical model

Note: *The reason that the link between Revit and Scia Engineer only works with Revit Structure is because Revit Structure contains an analytical model while Revit Architecture does not contain an analytical model.*

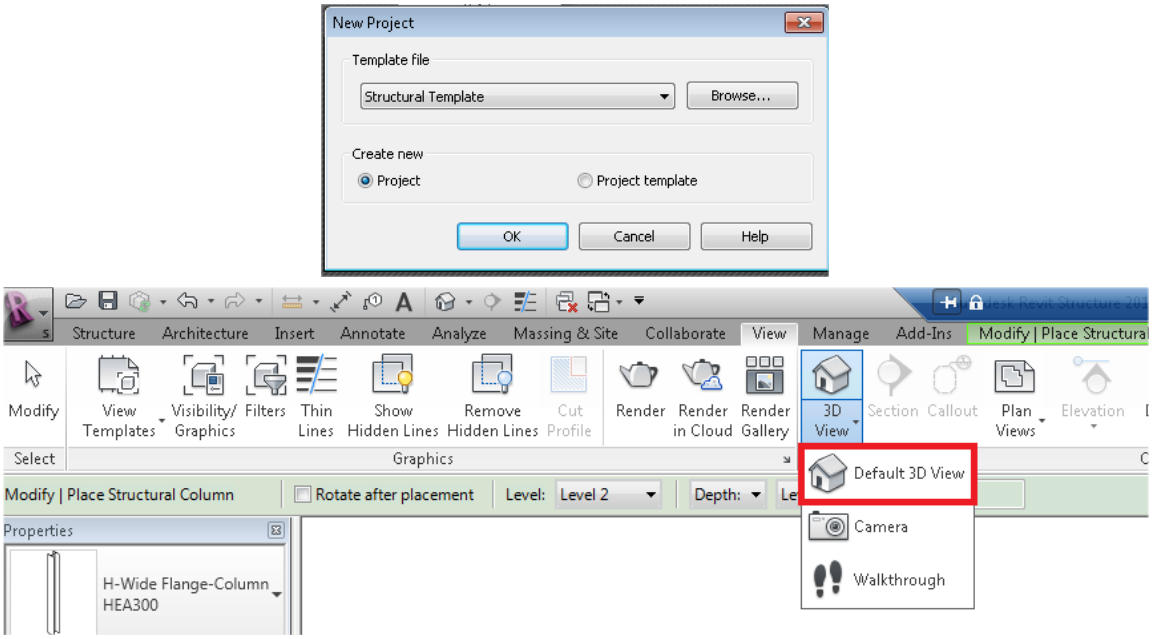
Example 1: First use Revit link

To prevent errors that can occur, make sure that all users have full read & write rights on the following folders (go to properties -> security), and make sure they are not 'read-only':

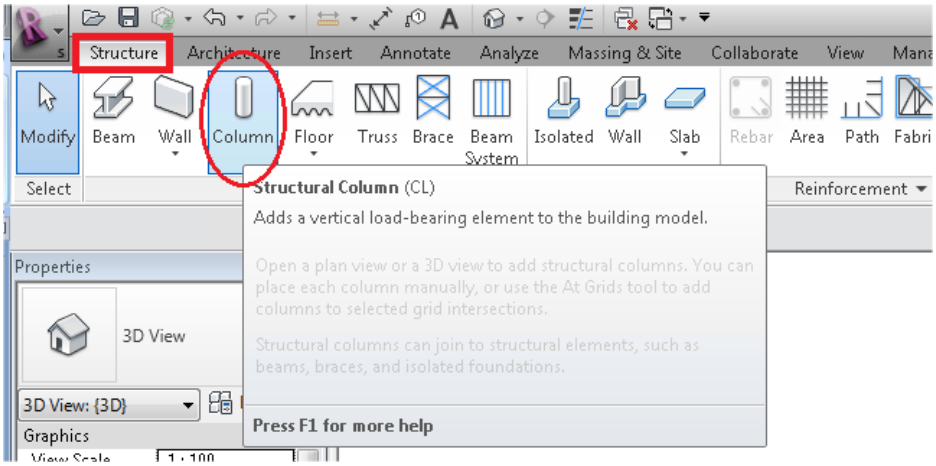
- C:\Program Data\CADS\Revit to Scia*
- C:\Program Files (x86)\Scia*

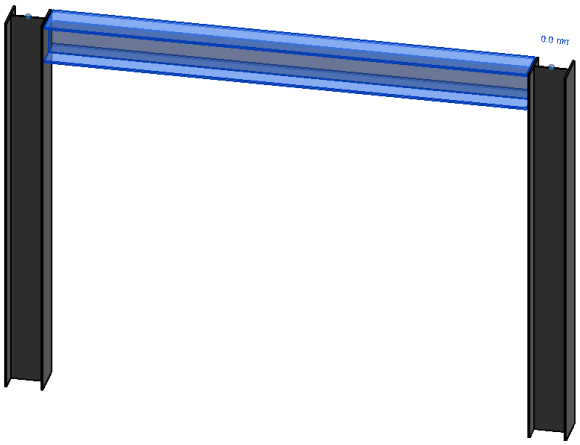
Creating the model in Revit Structure

Start a new project in Revit Structure.

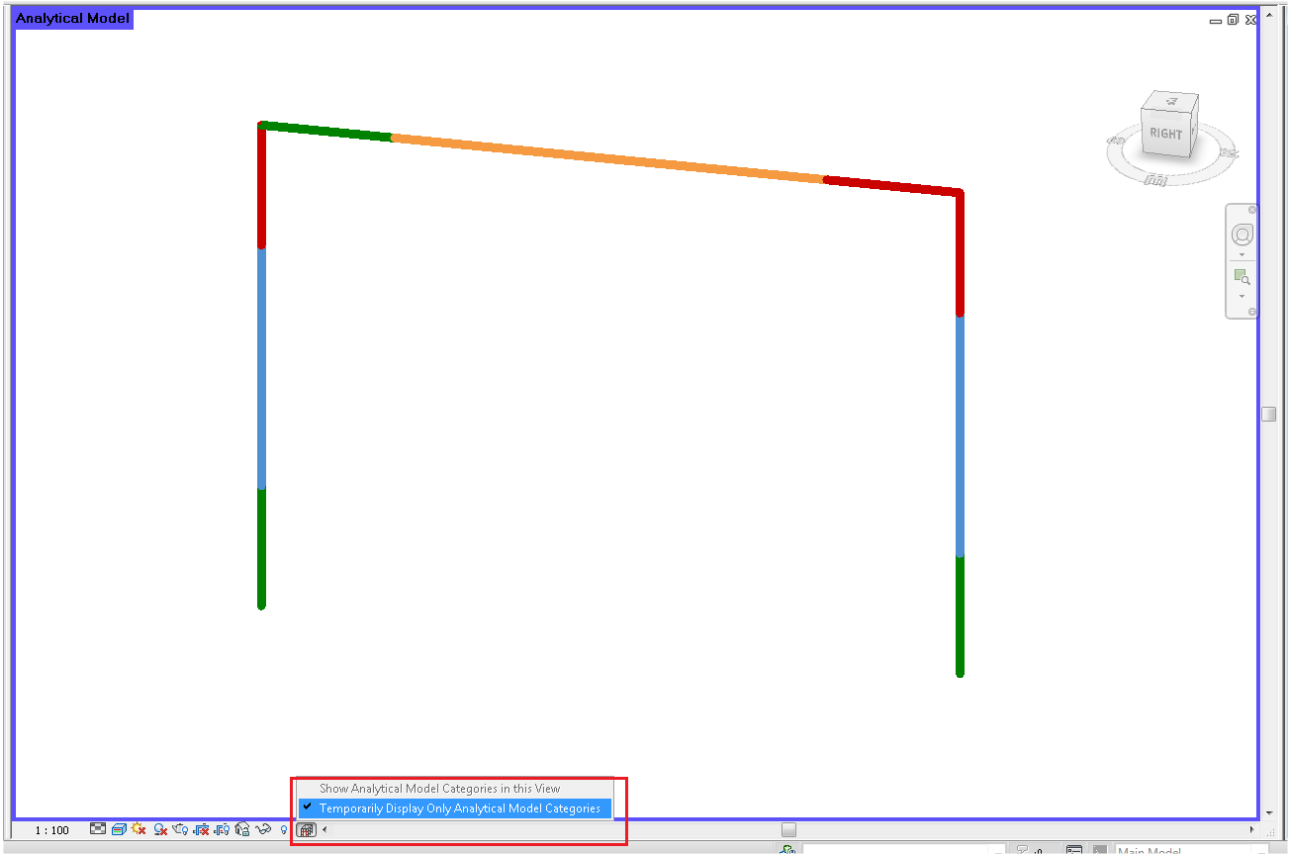


Start with inputting 2 column (standard Revit families; cross section **H-Wide Flange Column: HEA300** and material **Steel, 45-345**) of 3 meters height at a distance of 4 meters. Then add a beam (same cross-section and material) between the upper ends of the columns.



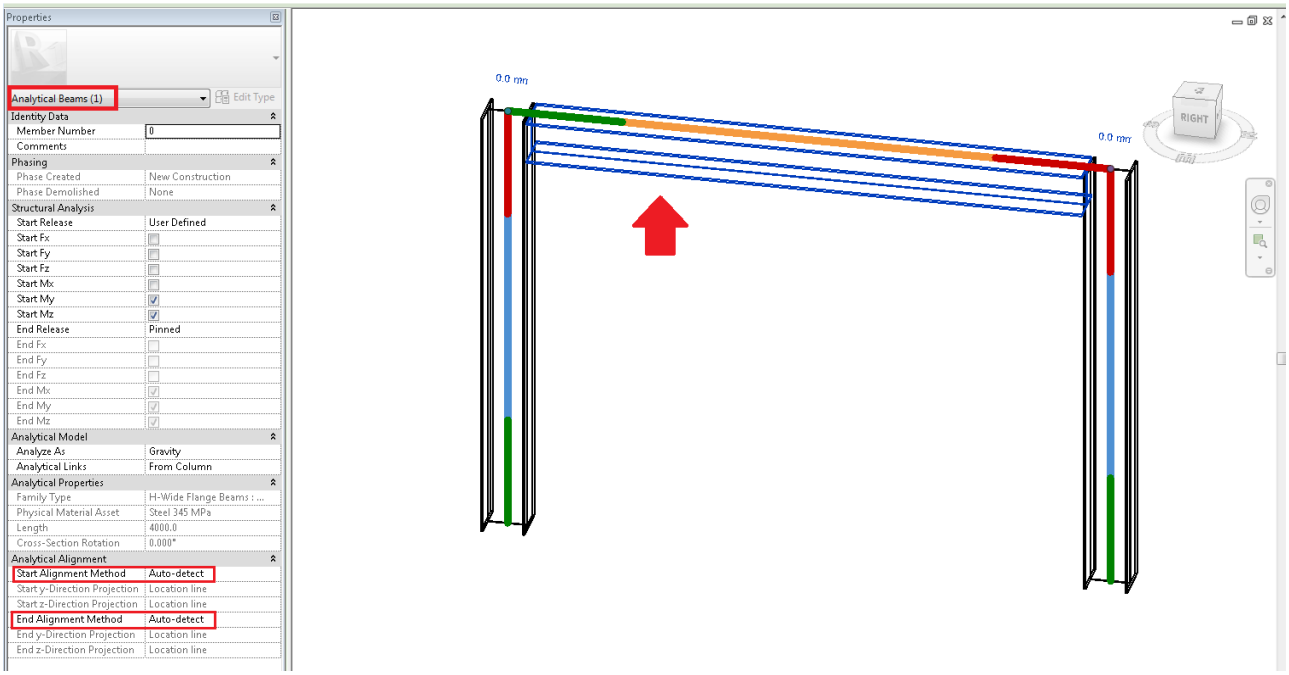


Now change the view towards the analytical model.

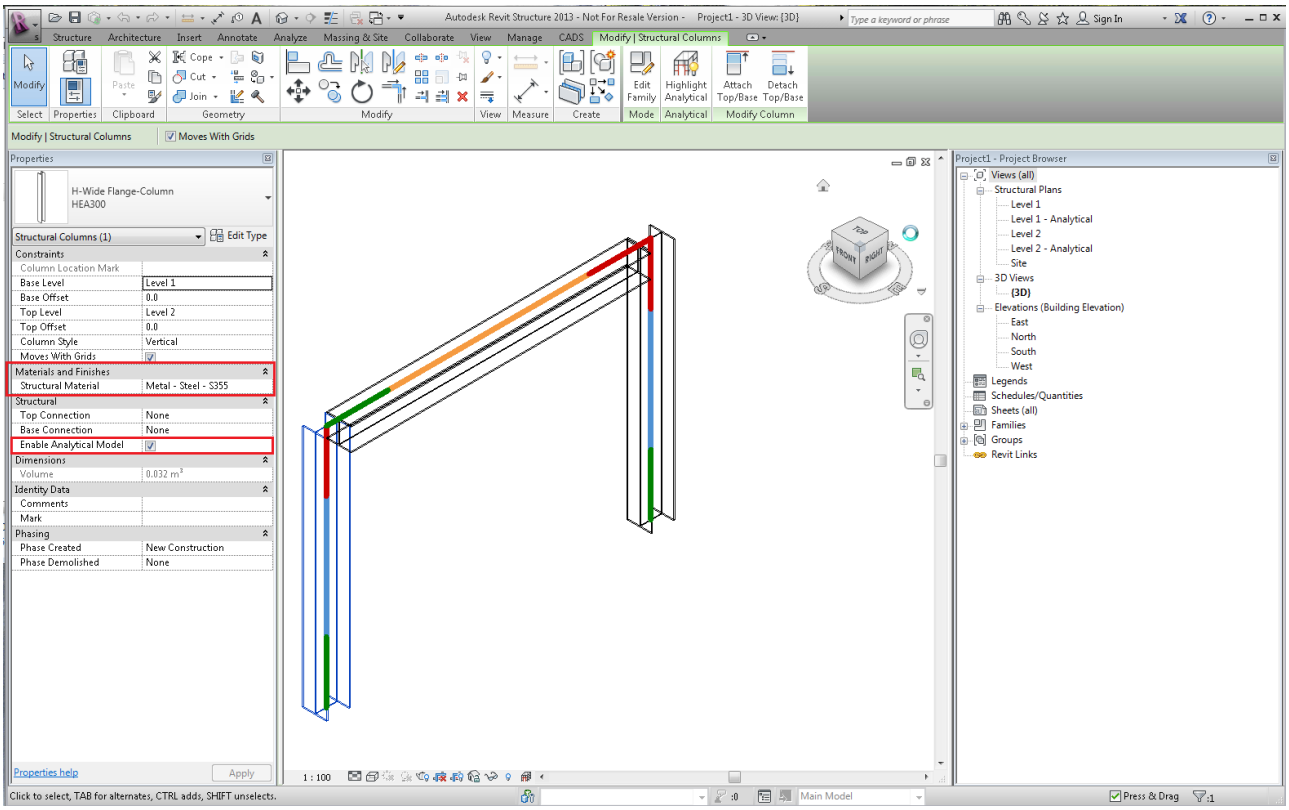


This is the model that will be transferred by the Revit link. If there is nothing here, then you are not using the correct families. Also if the lines of the columns and the beam do not connect, then you must manually change the analytical model to correct this.

However, Revit structure is designed to optimally use both analytical models and volumetric models at once (when creating this example, it was also not necessary to correct the analytical model). This can also be seen in the properties of the beams and columns if we look at their 'analytical' properties.



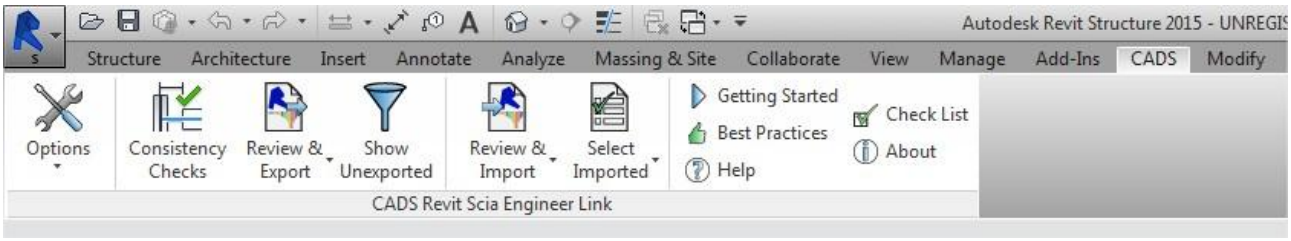
Also make sure that each element which you want to transfer, has 'Enable Analytical Model' activated, and that there is a 'Structural Material' indicated for that element. Revit Structure does not require a material for each element, but the Revit link does require that each element that you want to transfer has a material.



It can be possible that you must still indicate a material. To do this, click on the three dots in the same line as 'Structural Material', and choose the desired material.

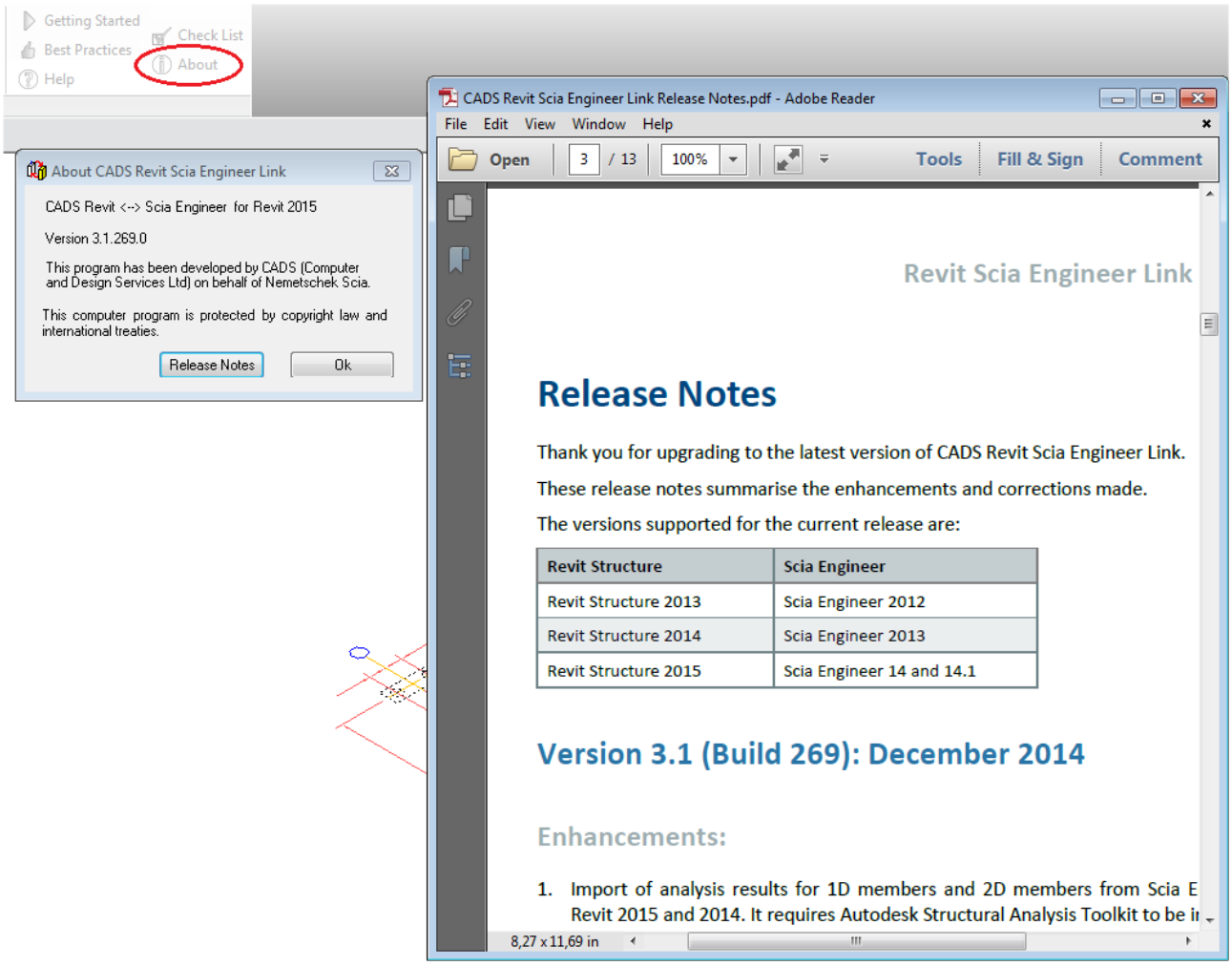
Using the Revit link

In Revit Structure, there should be a tab 'CADS'. This tab is installed by the Revit Structure plug-in (as described in the part 'Introduction & requirements'). If this tab is not available, then please check if the Revit link is installed (Under control panel → 'Revit To Scia Engineer').



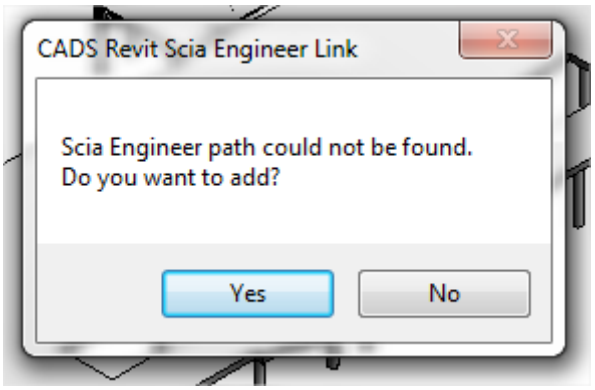
If you are searching for extra documentation/help, then the options 'Getting Started', 'Best Practices', 'Help' and 'Check list' can be of great help to you. Also the option 'About' will give you the version of the Revit link, but also the release notes (improvements in the last patch of the Revit link in comparison with the previous one).

Open '**About'** to see if the installed version of the Revit link will be sufficient to link it to the version of Scia Engineer installed on this pc.



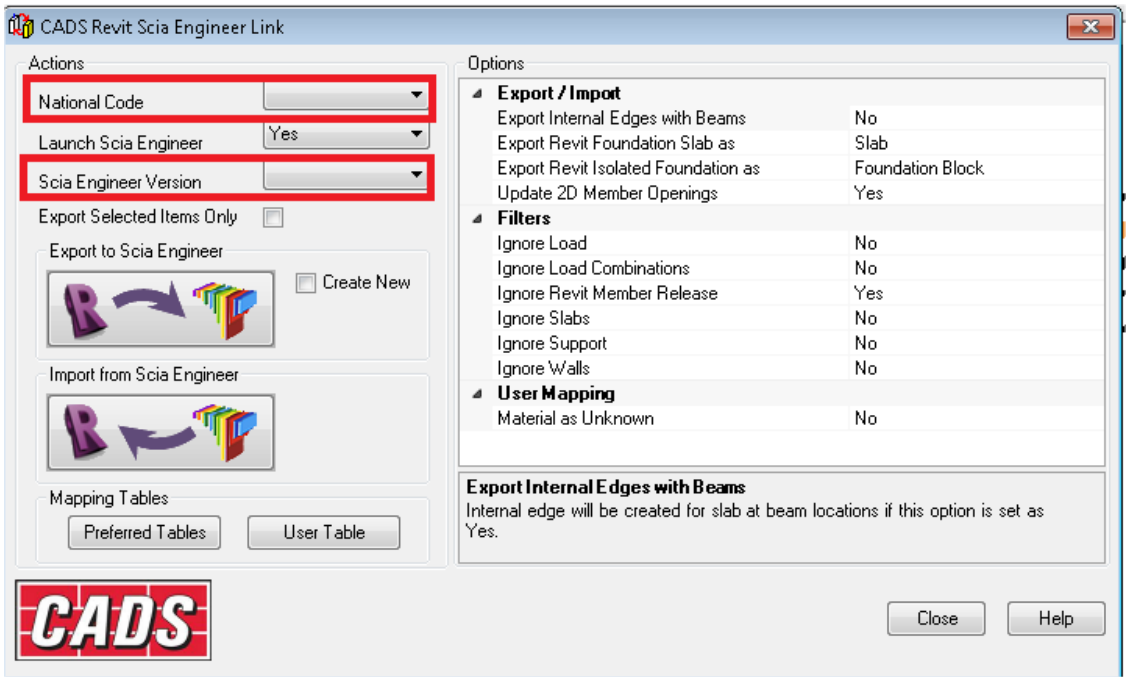
Once you have confirmed the version, go to '**Options'**. There are several functions which affect the exported and imported models that run through the Revit link. These functions can be found in the Options dialogue.

Upon opening the 'Options' for the first time, it might say this (this links the Revit link to the installed Scia Engineer files):



Click yes and browse to the folder which contains **esa.exe**. This is for example:
C:/Program Files (x86)/Scia/Engineer15.

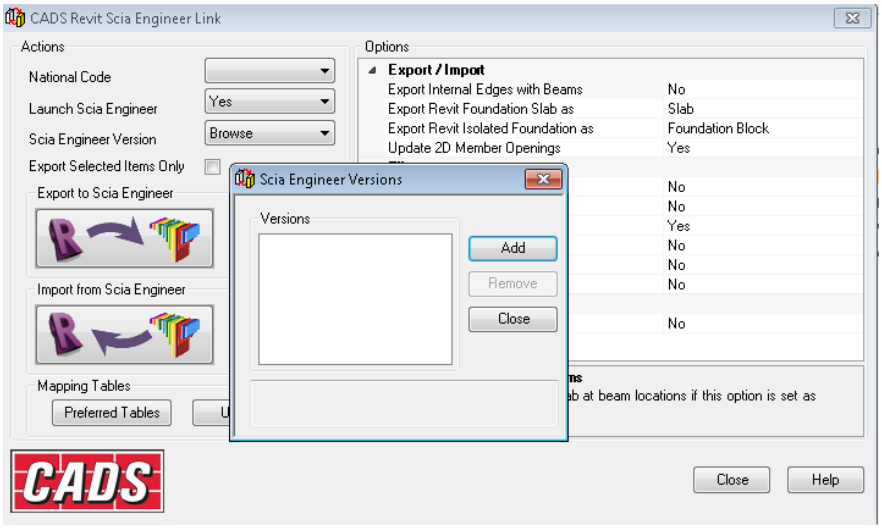
These options give the Revit link the information it needs to execute the transfer. If the previous window did not occur, and if this is the first time the Revit link is used, the **'National Code'** as well as '**Scia Engineer Version'** will be blank.



Click on the box after Scia Engineer version and choose browse. Now the Revit Link wants you to add the different version of Scia Engineer which you have installed on the pc. This is why a version of Scia Engineer also has to be installed on the same pc as Revit Structure. The Revit link uses the installed files to make the link between Revit Structure and Scia Engineer.

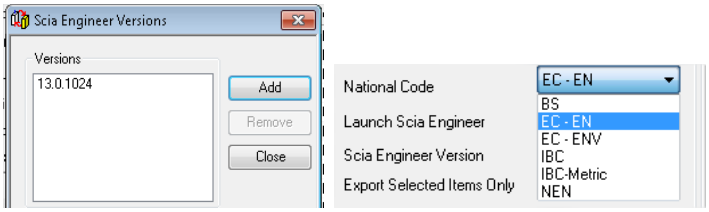
Just browse to the folder which contains **esa.exe**. This is for example:
C:/Program Files (x86)/Scia/Engineer15.

> ***Note:*** *If you are using Revit link 3.1.269 to exchange with Scia Engineer 15, then you will have to copy the files from "C:/ProgramData/CADS/Revit to Scia Engineer/Revit 2015/Templates/Sen/2014" to the folder "C:/ProgramData/CADS/Revit to Scia Engineer/Revit 2015/Templates/". (fixed in next version of the link)*



Choose 'Add' and browse to the folder where Scia Engineer is installed (the Revit link will search for esa.exe in this folder). For 64-bit pc's, the default location is C:\Program Files (x86)\Scia\Engineer 2013.0\.

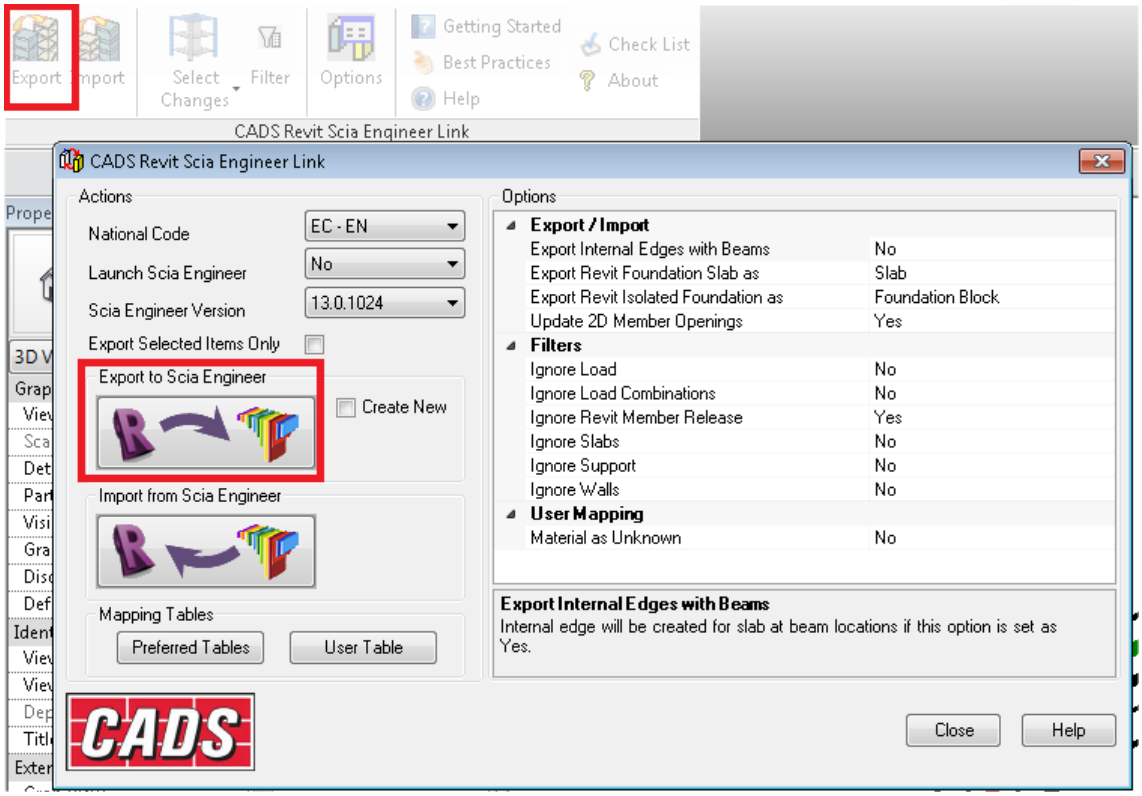
After indicating the path, you will see the version of Scia Engineer in the window. After closing this window, you will also see that 'National Code' now has multiple choices available.



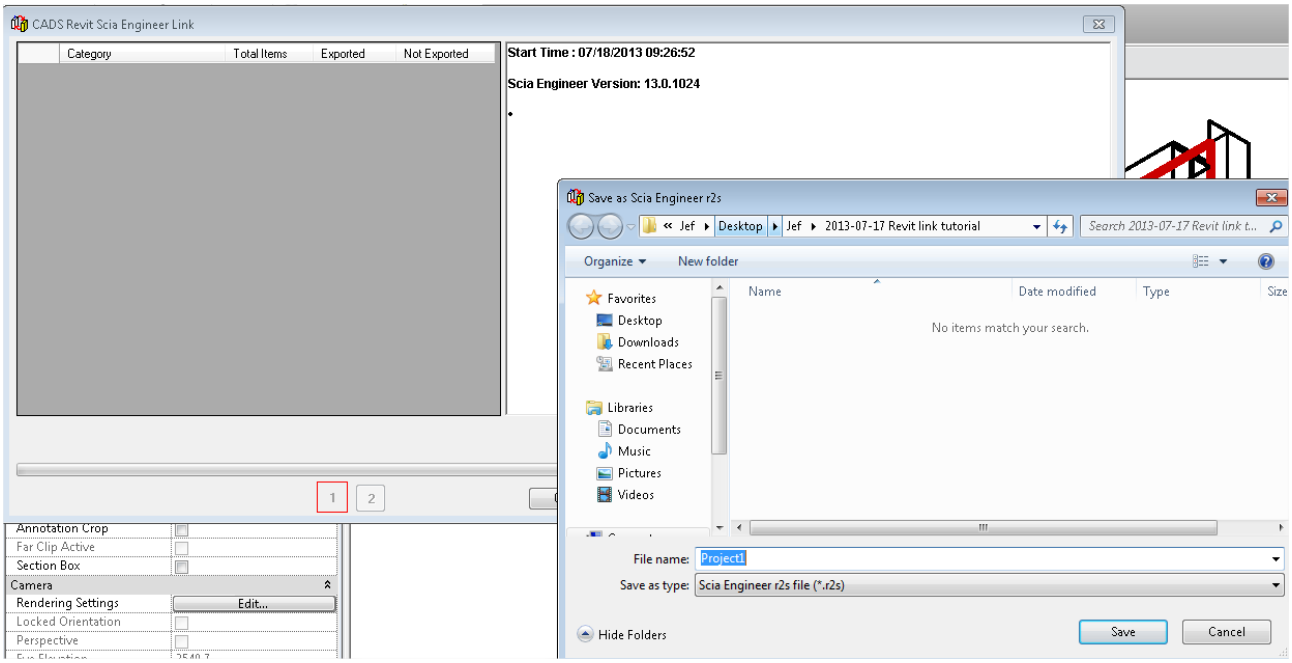
In between the two options, there is '**Launch Scia Engineer**'. If you chose 'yes', then the Revit link assumes that you wish to import and export from Scia Engineer on this pc. If you chose 'no', it will create an .r2s (Revit to Scia) file, which can be imported on the other pc later on in Scia Engineer (regardless of this option, the transfer will always happen by means of a .R2S file).

Let us chose '**no**' for this option (this makes it easier to find the (user) error during tests). Explanation for the other options can be found in the 'Help' of the Revit Link (which has been mentioned on the previous page). To completion of this tutorial, I have copied the explanation of the different options to appendix 1.

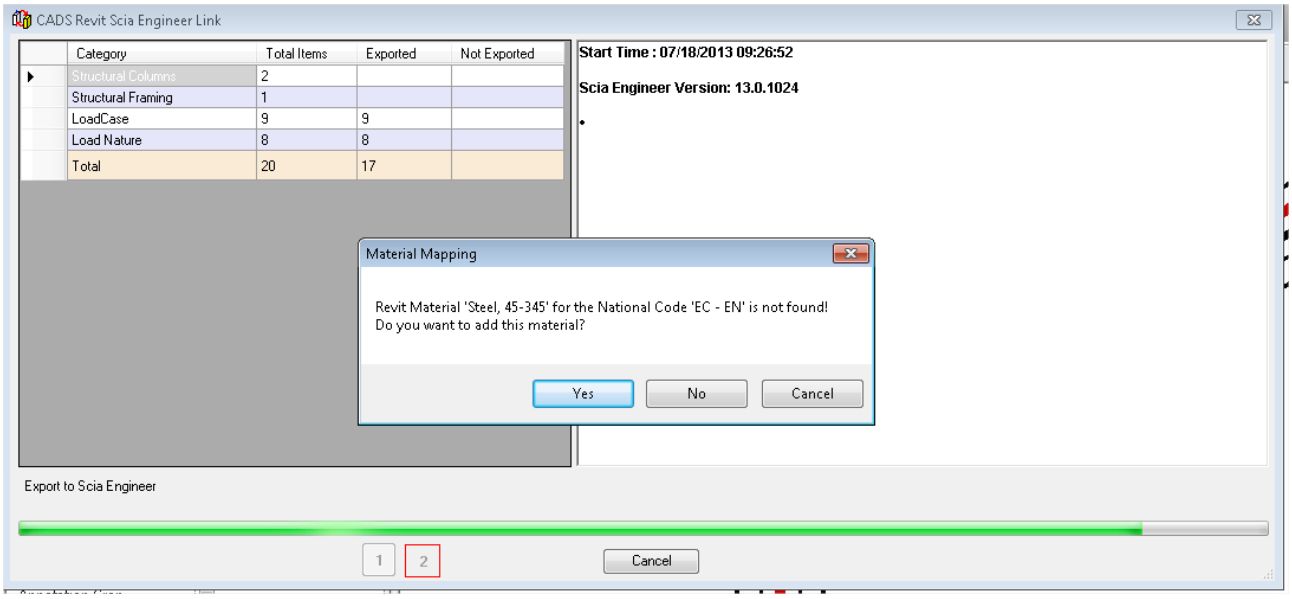
Before you are going to export the Revit Structure project to Scia Engineer, you must save the project first. Then choose the 'export' option. Note that the 'Export' button under the tab 'CADS', or the 'Export to Scia Engineer' button in the options of the tab 'CADS' do the exact same thing: create an .R2S file that can be imported in Scia Engineer.



You will see the '**CADS Revit Scia Engineer link**' progress window appear. Here you can see which items (beams, columns, plates, load cases ...) are recognised by the link. It will also ask where to save the .R2S file (which is the file you must import in Scia Engineer). Save the '**Scia Engineer r2s file**' as 'Project1' and choose 'Save'.

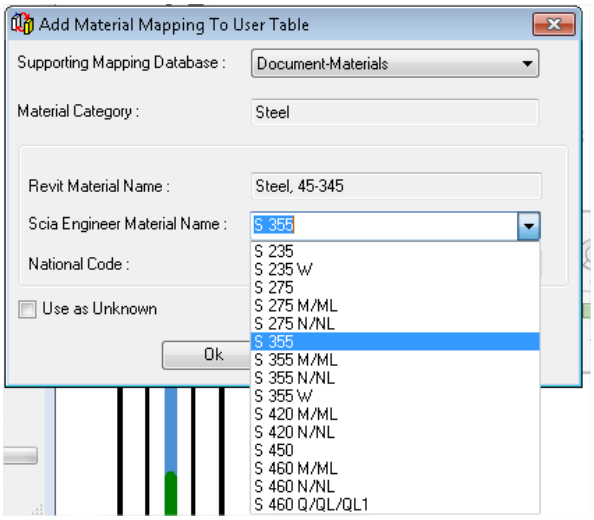


Once the transfer has started, the link will give a message when it does not recognise a certain item. The link is based on names. In this example, the **Revit material** 'Steel, 45-345' cannot automatically be linked to Scia Engineer. This link is called '***mapping***', and must be added manually if the link cannot do the mapping automatically.



Click 'Yes' and choose the correct '**Scia Engineer Material** Name' (for example S355).

Note: There is also an option 'Use as Unknown'. We strongly advise to NOT use this option. This will generate problems when you are importing the file in Scia Engineer later on.

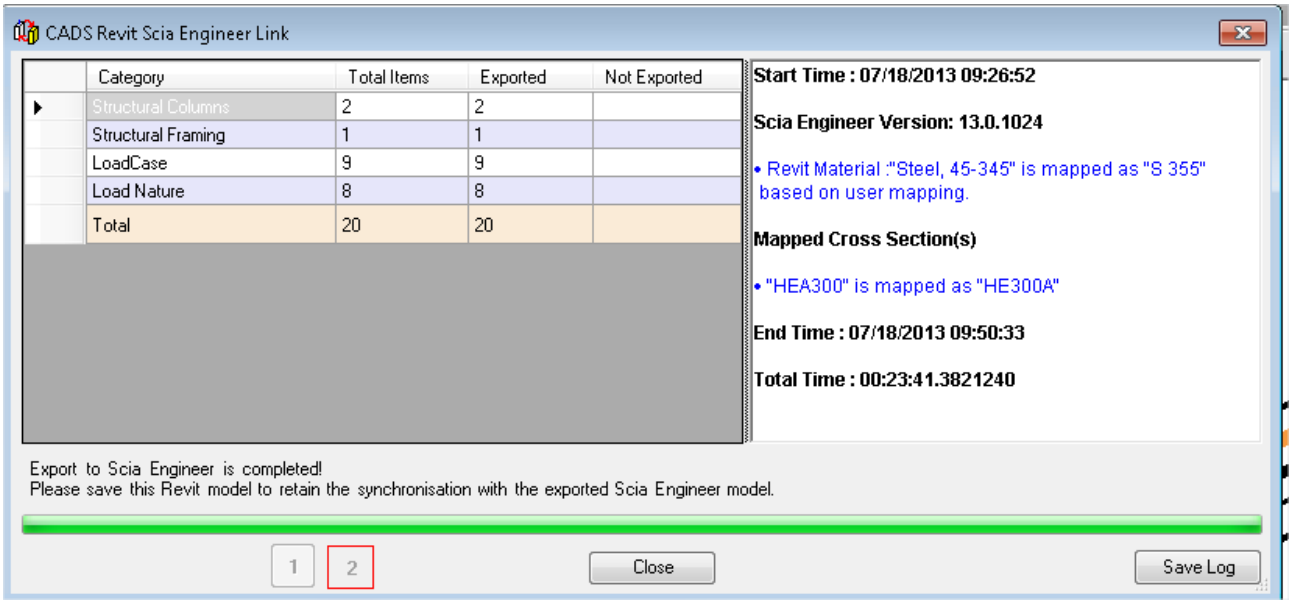


Once the export is completed, you will be able to see the total number of items recognised for each category, and the amount which has been successfully exported. Not that the separate elements (structural columns and structural framings) must have analytical lines to be recognised.

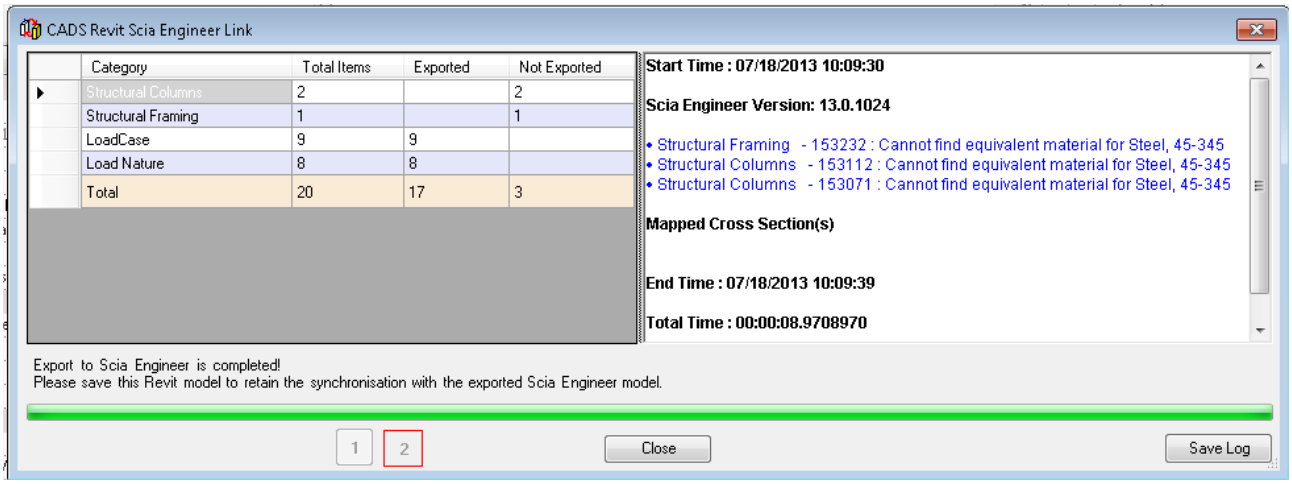
On the right side of the window, you will be able to see the log file. This explains how the mapping has been done for the different materials and cross sections.

- Revit Material "Steel, 45-345" is mapped as "S 355" based on user mapping
- "HEA300" is mapped as "HE300A"

This log file can also be saved by using the option 'Save Log' (in the bottom right corner of the window).

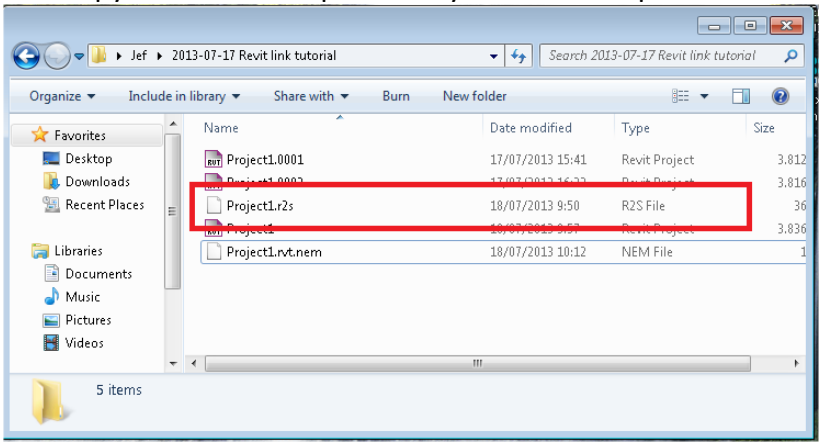


If we would not have mapped this material (by clicking 'no' for the question to add this material), then all elements that used this material, would not have been exported (see image below).



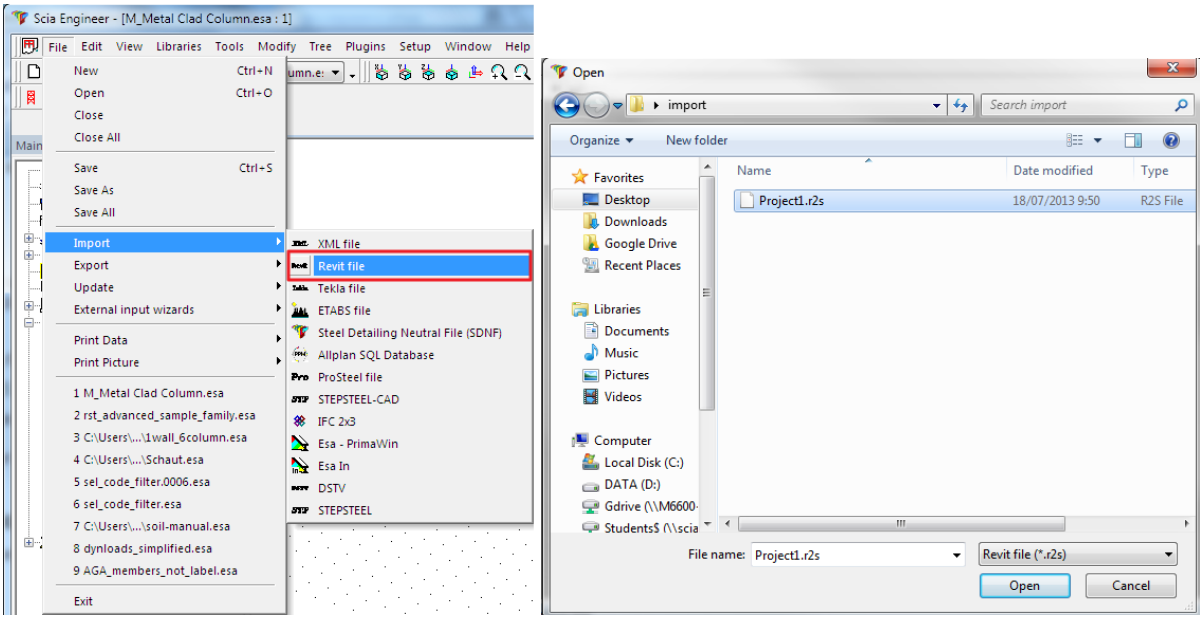
The log can be saved to the text-file when the export is finished. Scia Engineer is opened automatically if it is set in the option dialogue and the newly exported structure will be displayed in the model window. If you are doing tests with the Revit link, we advise to keep this option off, and to open Scia Engineer manually later. The reason for this is to easily identify if the problem is on the the Revit side or on the Scia Engineer side if there would be a problem configuring the link.

Now open your Windows explorer, and go to the .R2S file which has been generated by the Revit link. Copy this file to the pc where you wish to import the file in to Scia Engineer.

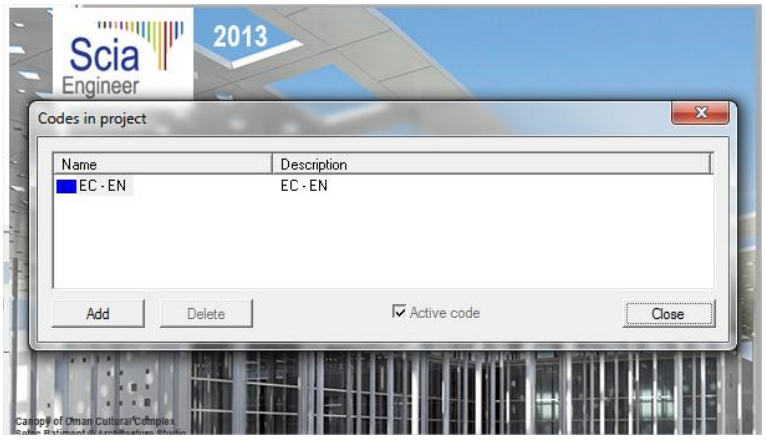


Importing in Scia Engineer

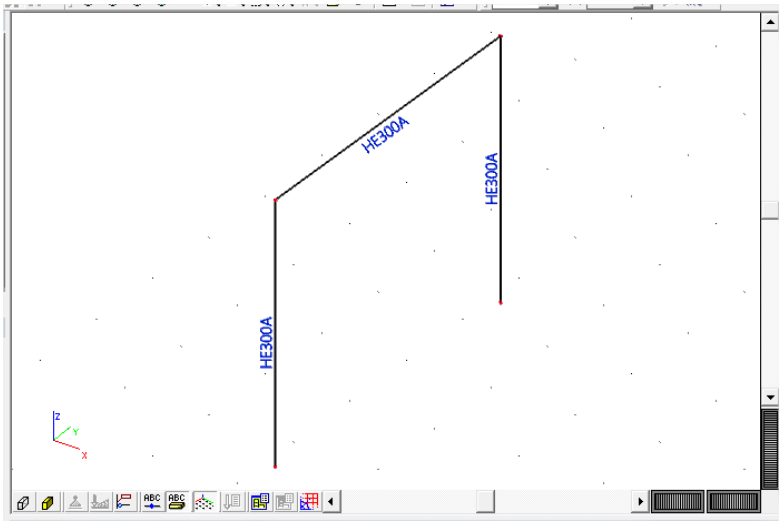
Open Scia Engineer, and import the .R2S file:



Scia Engineer will ask for a code. The .R2S file is mapped to the Scia Engineer materials for the code that was configured in the Revit Link options (in this case the EC-EN). We will use the EC-EN in Scia Engineer as well (if necessary, 'Add' the correct code). Click 'close' if you have the correct code.

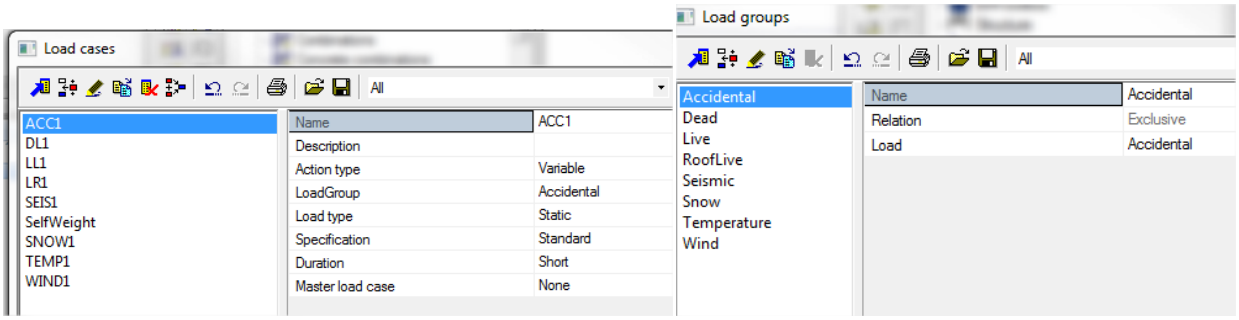


Now you will see the imported items in Scia Engineer.

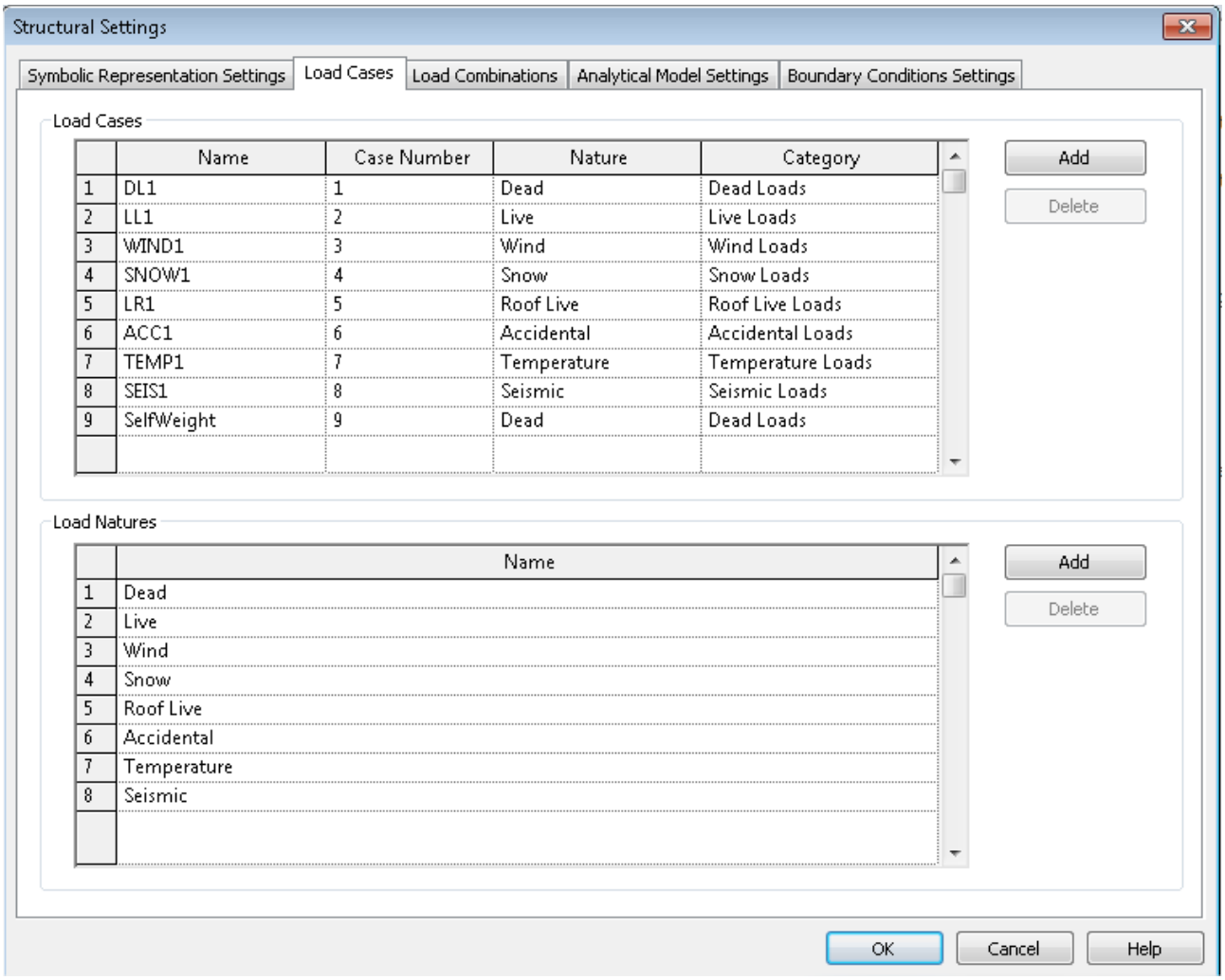


Under ‘load cases’, you will also find the load cases which have been transferred from Revit Structure to Scia Engineer. These are the same 9 load cases that you could see being exported by the Revit link (2 pages back). The ‘Load Natures’ from Revit Structure are imported as ‘Load Groups’ in Scia Engineer.

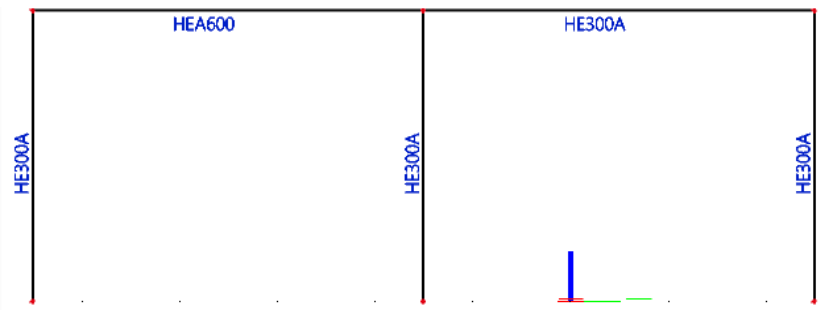
Scia Engineer:



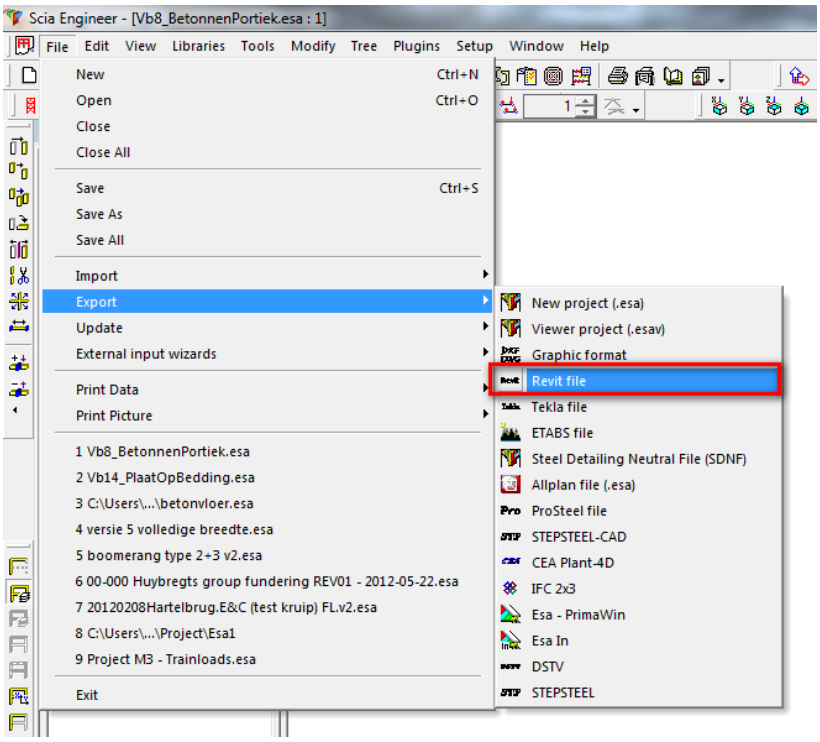
Revit structure:



Now we will change the project in Scia Engineer, and then export it back to Scia Engineer. Copy 1 beam and 1 column, and change 1 cross-section to HEA600.



Exporting from Scia Engineer

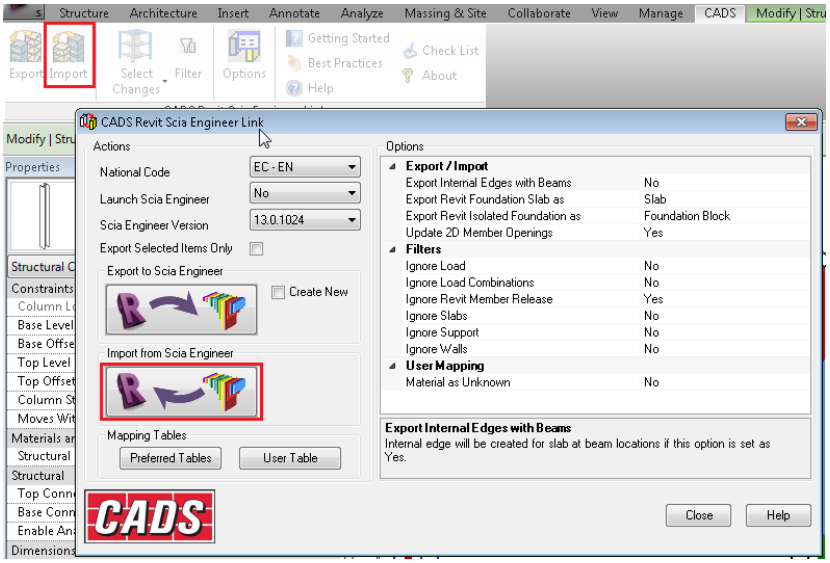


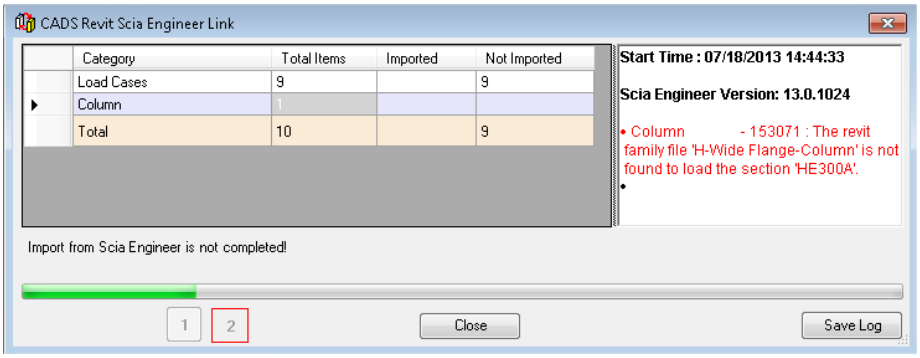
The file will be saved as an .r2s file again. This time we'll name it 'Project1s.r2s'. Be sure to unselect everything in Scia Engineer first, otherwise only the selection will be exported.

Importing in Revit Structure

Copy the 'Project1s.r2s' file that has just been created to the computer with Revit Structure.

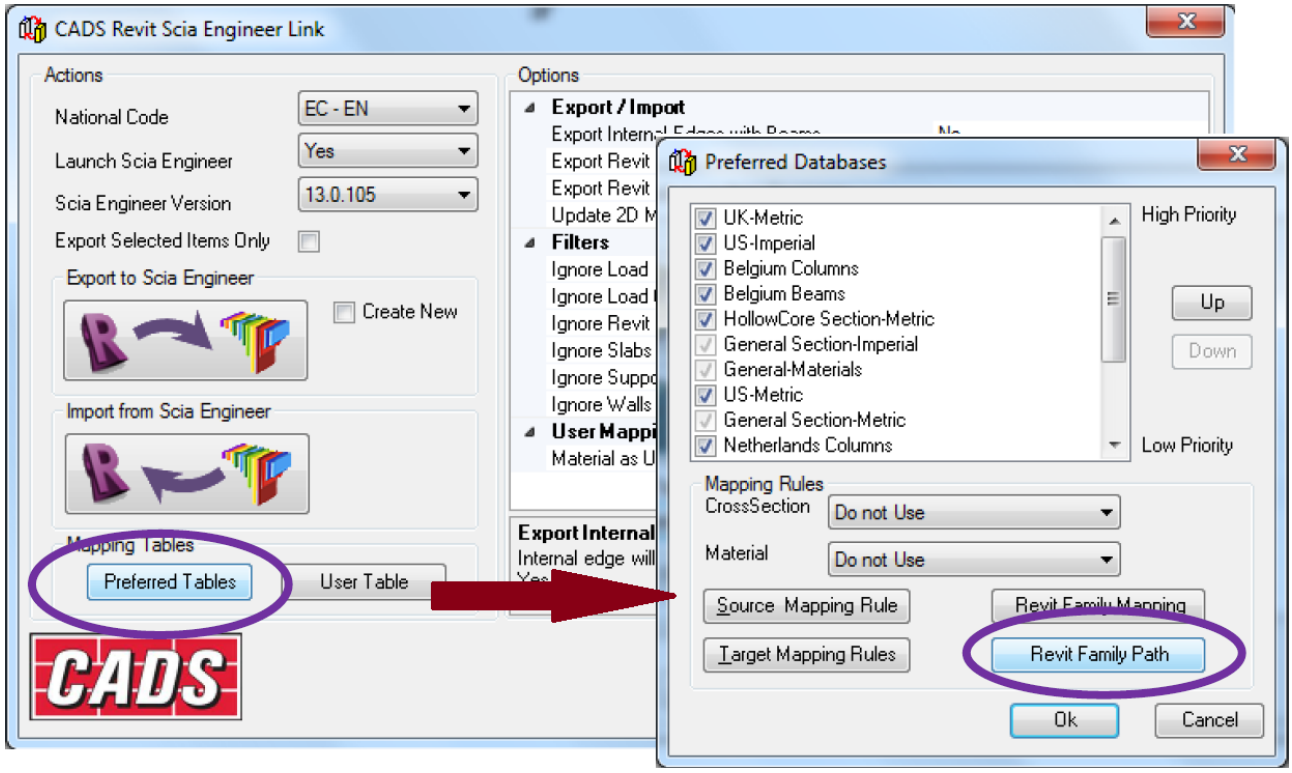
Open Revit Structure (with an empty project) and go to the 'CADS' tab. Choose 'Import' (which you can find both in the CADS-tab as in the options dialogue) and select the 'Project1s.r2s' file.





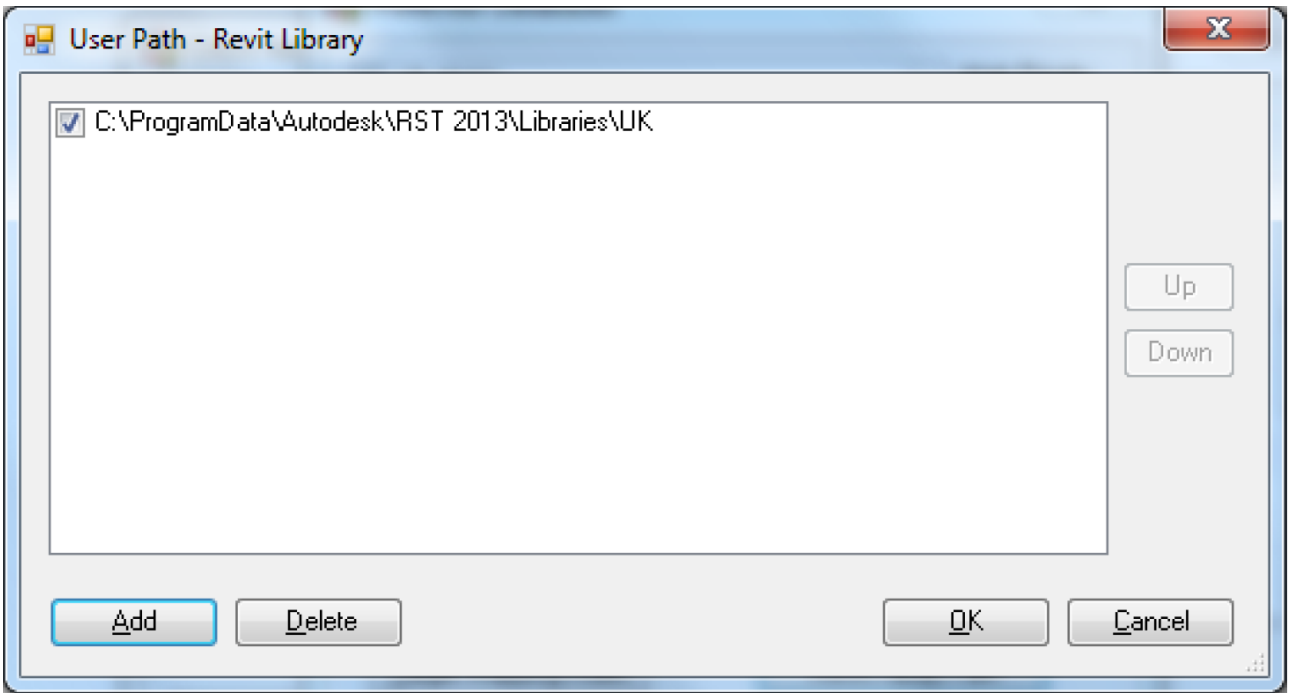
You will see that the 'HE300A' from Scia Engineer is not imported into Revit Structure. It is mapped correctly, because it recognises that the HE300A profile is linked to the 'H-Wide Flange-Column' family, but the problem is that the Revit link itself cannot find this family.

So the problem can be solved by telling the Revit link where it can find the necessary families. To do this, follow the next steps:

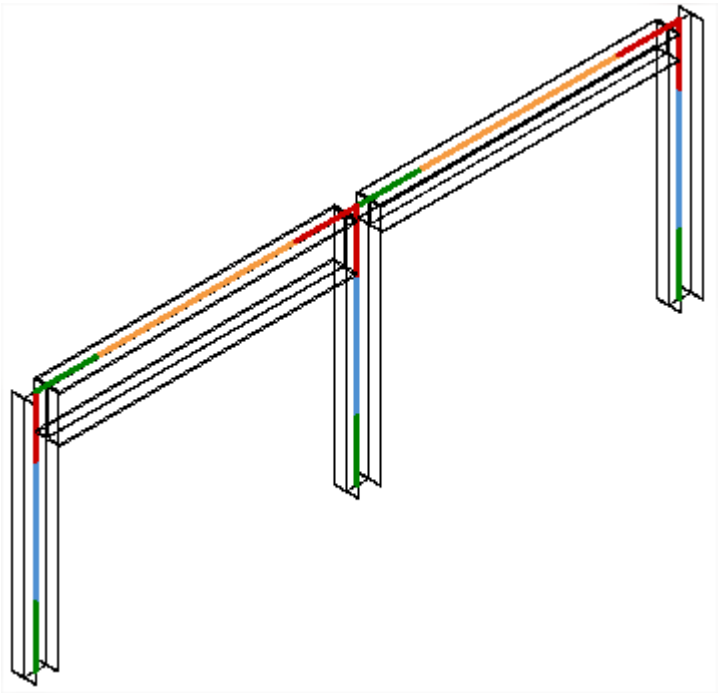


In the next window you will be able to add paths where Revit family files are located. The default families are located in the following folder: C:\ProgramData\Autodesk\RST 2014\Libraries\.

If it is preferred to use a different folder, you must make sure that the Revit link has full access to the folder containing the family files. It is also possible to use server based folders (but the location must be addressed by giving the network location a drive name, for example 'F:').

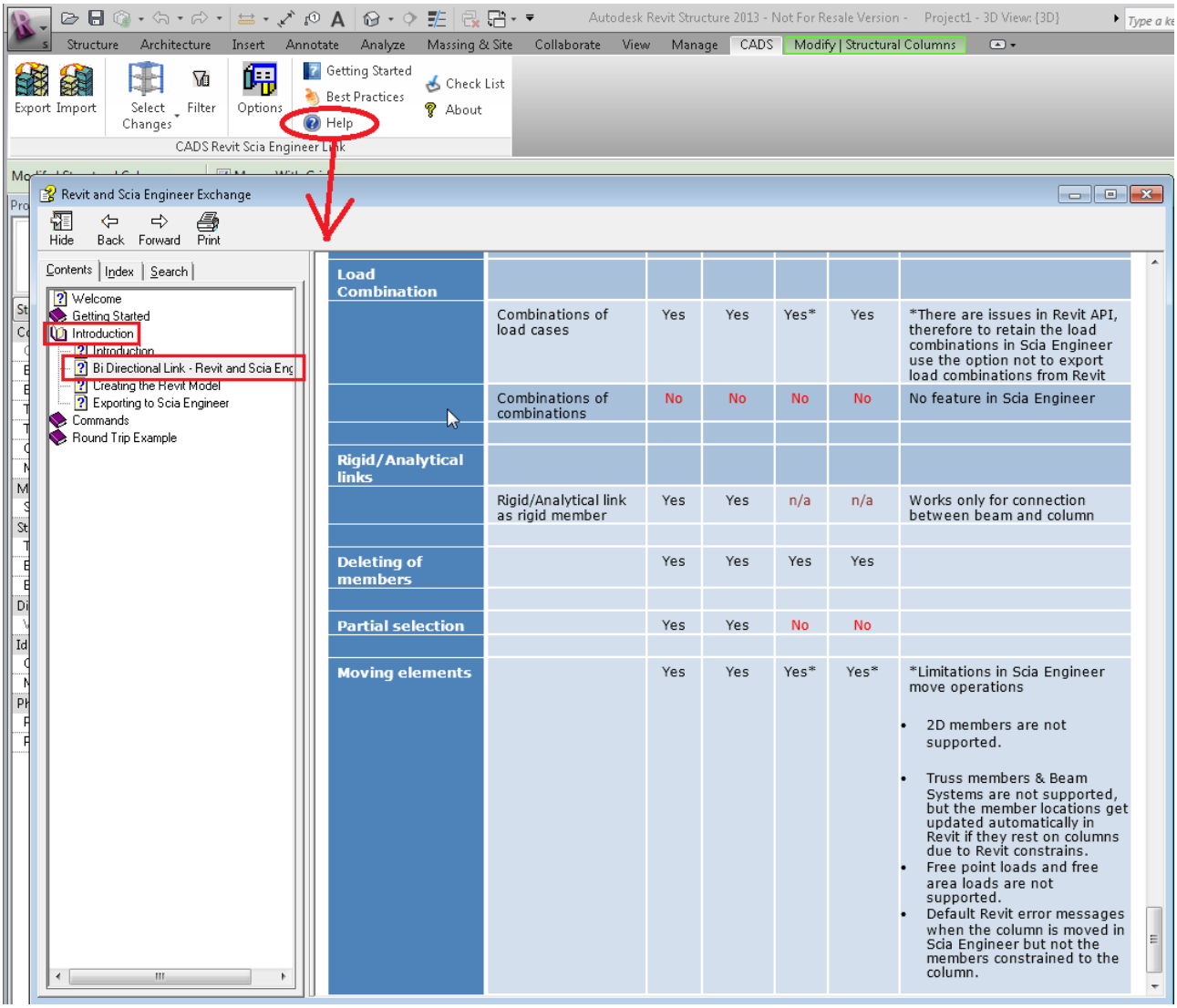


If the import went successfully, you will see the same structure as you had in Scia Engineer:



The functionality has its limitations. If you wish to check the possibilities (and impossibilities of the link, we refer to the help of the Revit Plugin. We refer to the plug-in instead of placing the information here, because a newer version of the plug-in will allow more, and these options will also be updated in its help file.

In the next image you can see that the help file has been used to check the possibilities concerning load combinations.



Load Combination						
	Combinations of load cases	Yes	Yes	Yes*	Yes	*There are issues in Revit API, therefore to retain the load combinations in Scia Engineer use the option not to export load combinations from Revit
	Combinations of combinations	No	No	No	No	No feature in Scia Engineer
Rigid/Analytical links						
	Rigid/Analytical link as rigid member	Yes	Yes	n/a	n/a	Works only for connection between beam and column
Deleting of members		Yes	Yes	Yes	Yes	
Partial selection		Yes	Yes	No	No	
Moving elements		Yes	Yes	Yes*	Yes*	*Limitations in Scia Engineer move operations • 2D members are not supported. • Truss members & Beam Systems are not supported, but the member locations get updated automatically in Revit if they rest on columns due to Revit constrains. • Free point loads and free area loads are not supported. • Default Revit error messages when the column is moved in Scia Engineer but not the members constrained to the column.

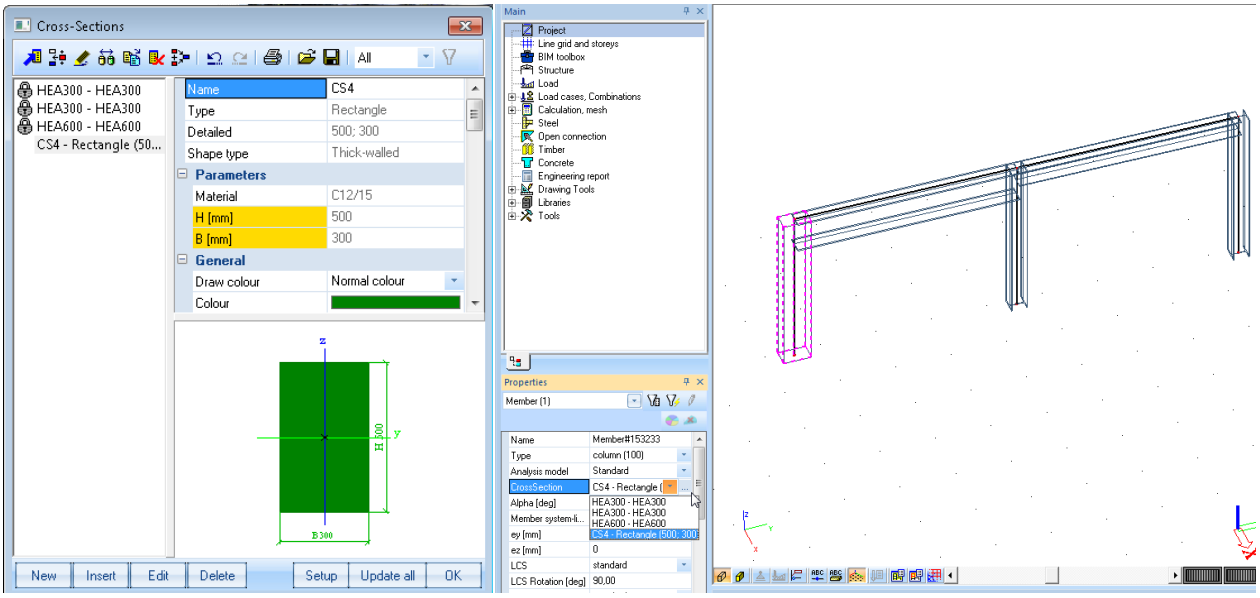
Note

- The Revit link was originally implemented to send files/models from Revit Structure to Scia Engineer. It is also possible to send files back from Scia Engineer to Revit Structure, but it can also still be possible to transfer these changes verbally to the architect using Revit Structure so that he is fully aware of the changes. But as you will see in examples 2 and 3, changed, added and deleted items can be perfectly exchanged from Scia Engineer to Revit Structure

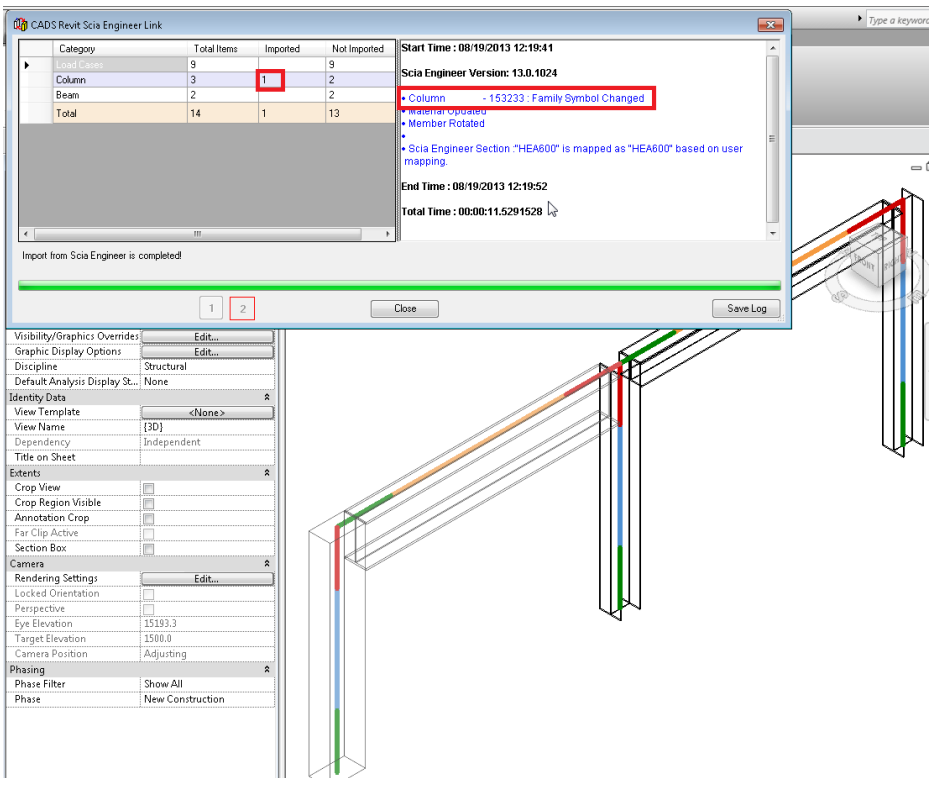
Example 2: Modification of cross-section in Scia Engineer

Take the project which we ended with in example 1. We are now going to adapt the column cross-section in Scia Engineer and import it back in the same existing Revit Structure project.

In Scia Engineer, we are going to add the default rectangular concrete cross-section and change the property of one column to this cross-section.



As you can see, the new rectangular cross-section is applied to one of the columns. The next step is to export the Scia Engineer project to an .r2s file, and to import this file into Revit Structure. Be sure to deselect everything in Scia Engineer first, otherwise only the selection will be exported.

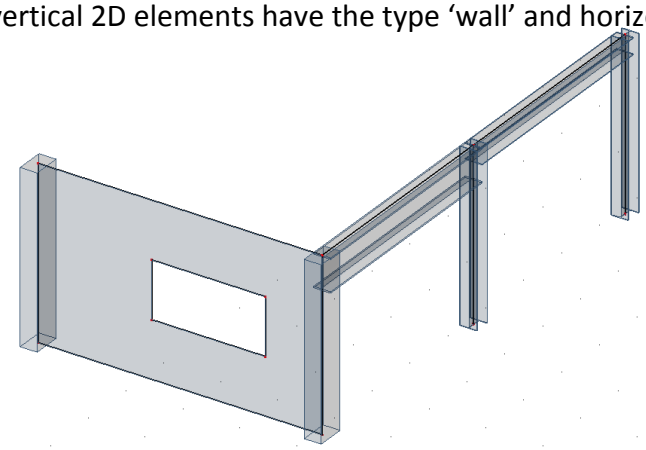


As you can see, only the changed element will be imported. The log mentions that the family symbol has changed. Only the imported elements cause changes in the model, so the imported column is the on we changed, and the message refers to exactly that column.

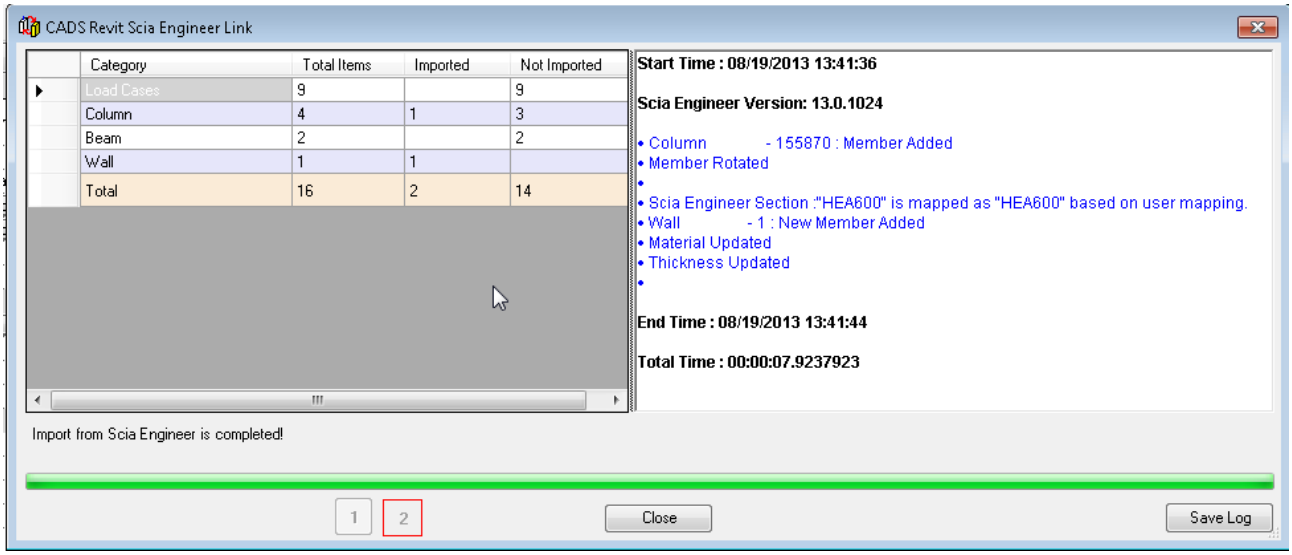
Example 3: Adding elements in Scia Engineer

For this example, we will continue with the modified Scia Engineer project from the end of example 2. We are going to add a column and a wall and import the entire project in Revit Structure.

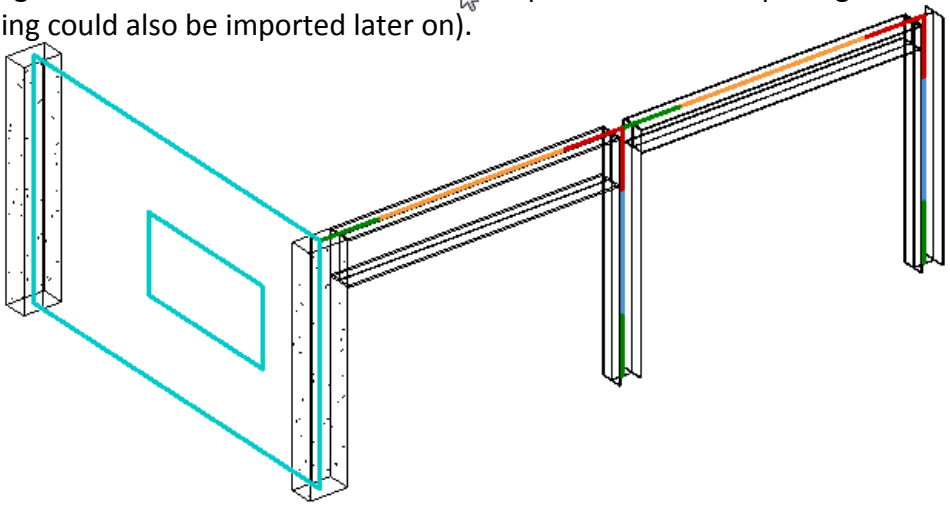
In the image below, the concrete column has been copied, and a (steel) wall has been placed between the two concrete columns. An opening has also been added to the wall (it is important that vertical 2D elements have the type ‘wall’ and horizontal the type ‘plate’).



Next step is importing the project in to the Revit project which we acquired at the end of example 2. The import log will look like this:



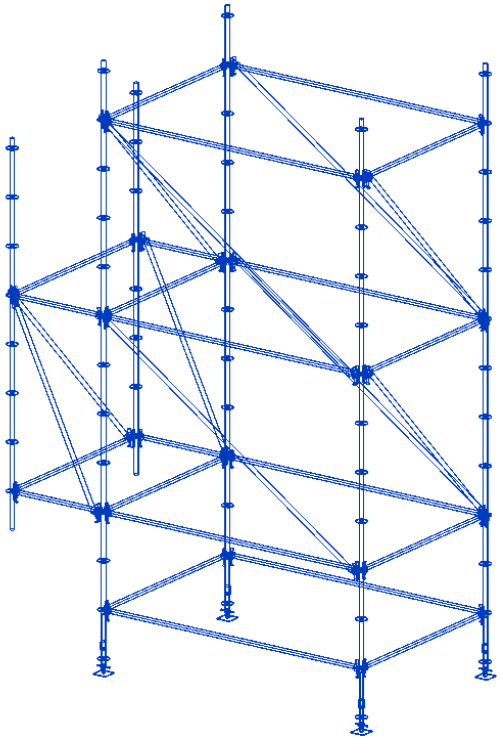
The new elements are the one imported, the already existent (and not changed) have not been imported again. One column and one wall were imported. Also the opening has been imported (this opening could also be imported later on).



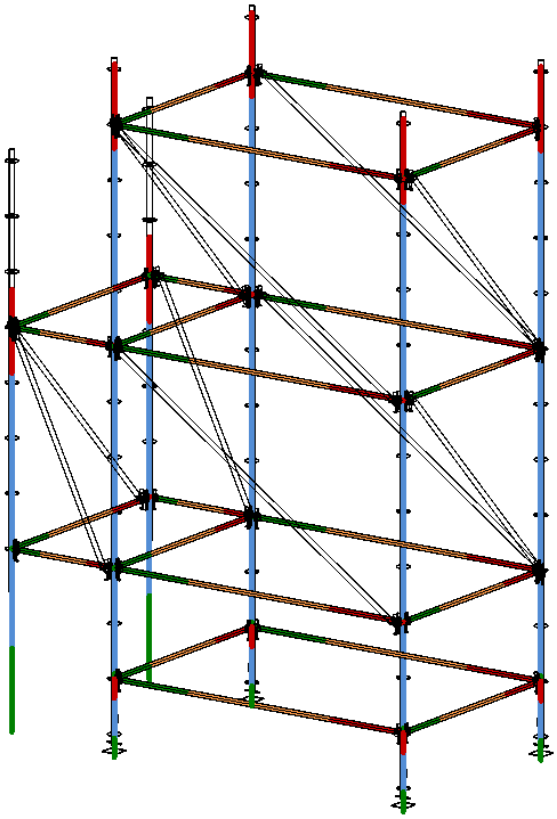
Customer example 4: Generic (analytical) families

The Revit model

This is the Revit Structure model which we want to transfer to Scia Engineer.



The first step is to look at the analytical model:

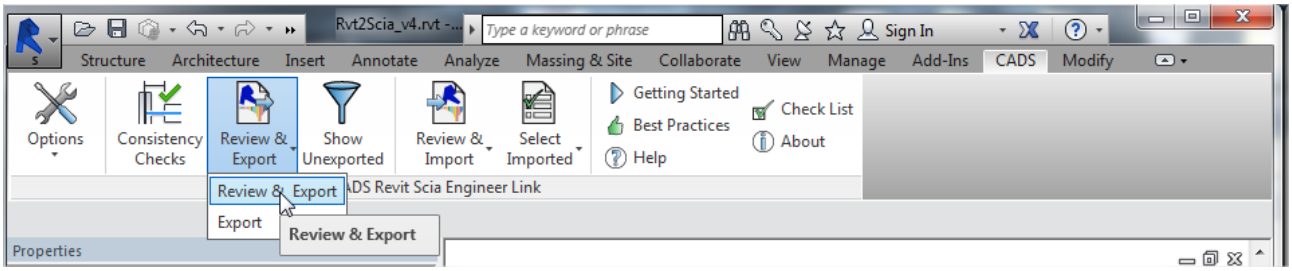


The diagonals are not elements with analytical properties, since they do not have an analytical representation. So it can already be foreseen that they will not be transferred by the Revit link. A solution would be to replace these elements with new elements that come from a family with analytical properties. In the explanation of this example, the diagonals are ignored for the rest of the solution.

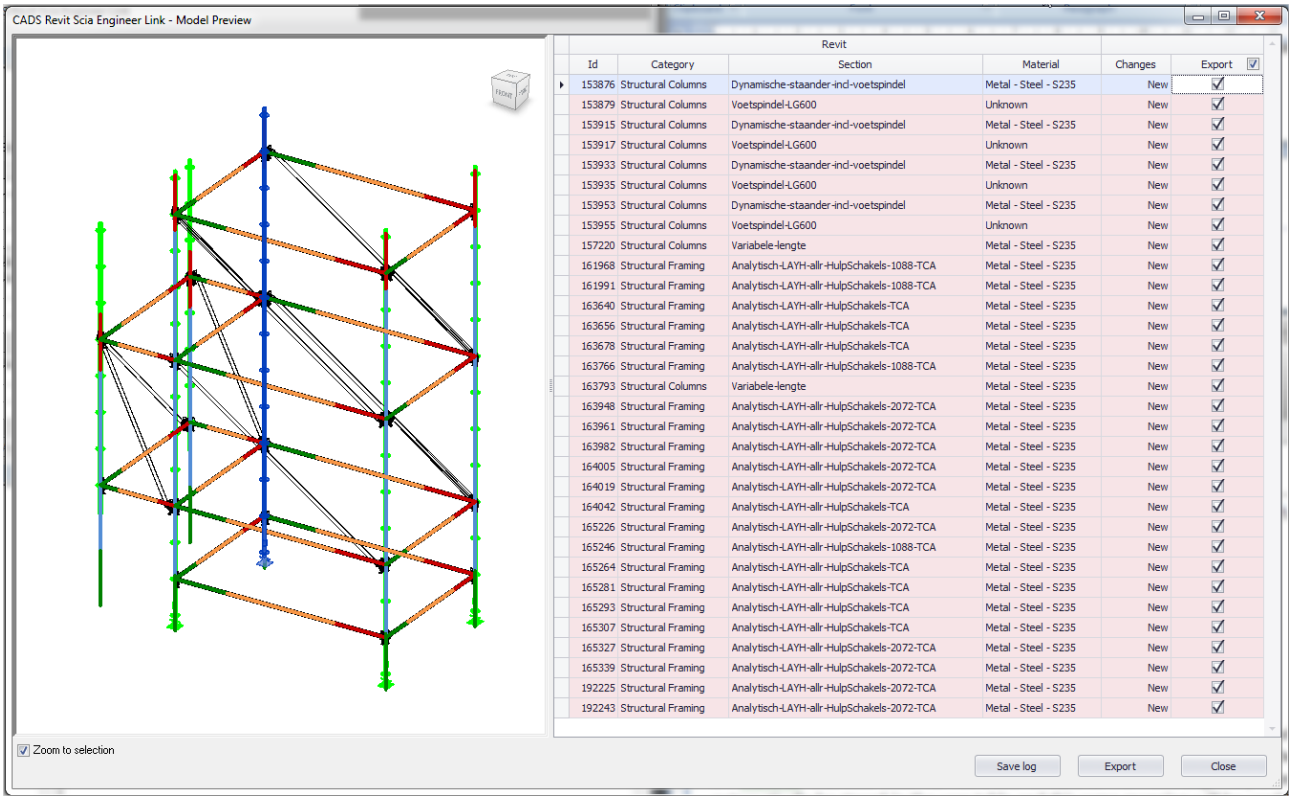
> **Note:** *Since the diagonals are not in the analytical model, they will be completely ignored by the Revit link.*

Export in Revit

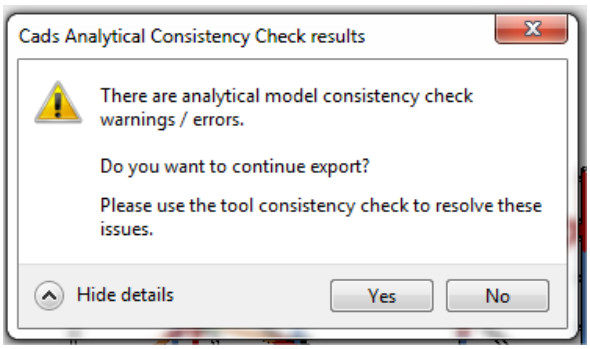
In the next step, we will try to export immediately:



In the preview you can see the elements that will be exported:



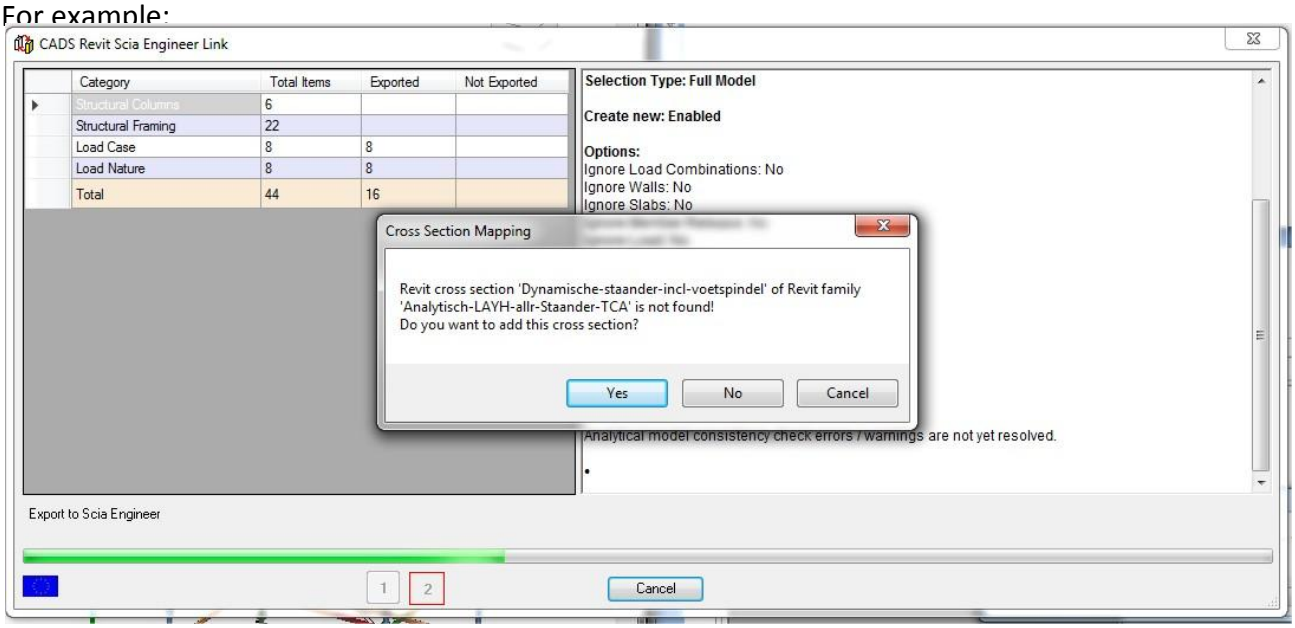
The link also tells us that there are some issues in the analytical model consistency check. But we click on 'Yes' to continue.



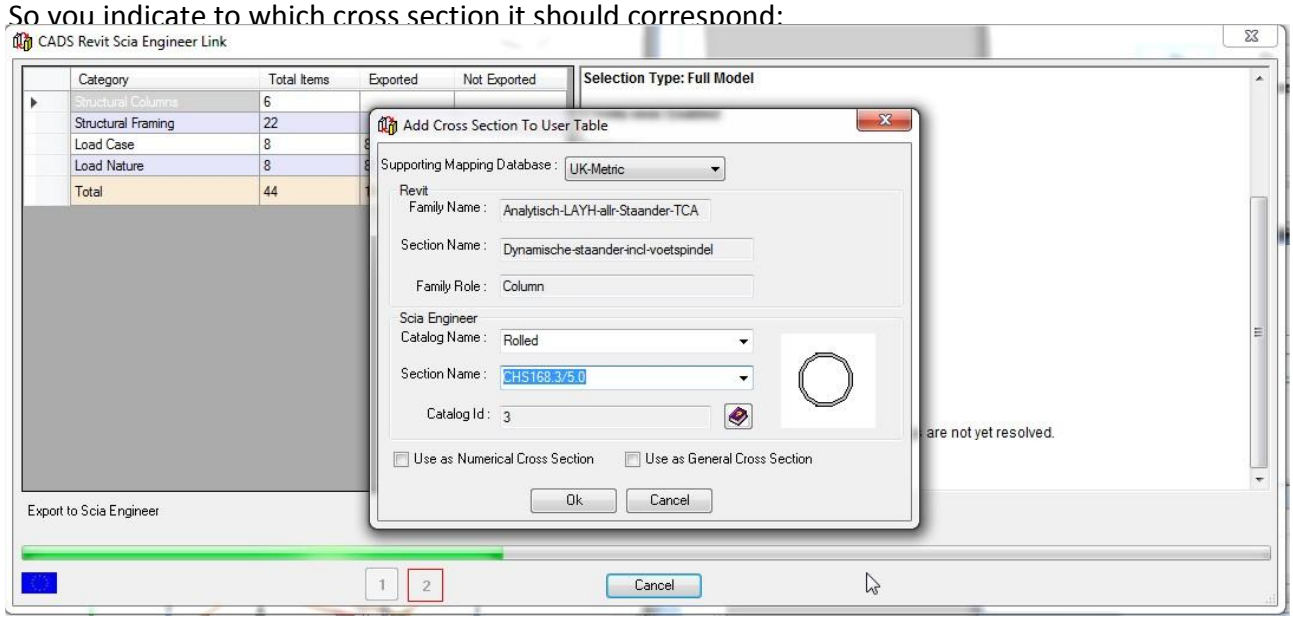
The link will start with converting the data to the exchange file which can be read by Scia Engineer.

If it encounters parts which it cannot convert to a Scia Engineer section or material, it will ask you to indicate to which section or material it must be converted.

For example:



So you indicate to which cross section it should correspond:



And in a similar way, the next cross sections will also be linked.

You can see the corresponding log file here:

Start Time : 03/24/2015 10:03:09
Revit: Autodesk Revit Structure 2015
CADS Revit Scia Engineer Link Version: 3.1.269.0
Scia Engineer Version: 15.0.45
National Code: EC - EN
Selection Type: Full Model
Create new: Enabled

Options:
Ignore Load Combinations: No
Ignore Walls: No
Ignore Slabs: No
Ignore Member Release: No
Ignore Load: No
Ignore Support: No
Revit Isolated Foundation as: Foundation Block
Revit Foundation Slab as: Slab
Material as Unknown: No
Internal Edges with Beams: No

Exporting...
Creating new Scia Engineer model...
Analytical model consistency check errors / warnings are not yet resolved.

- Revit Section :"Dynamische-staander-incl-voetspindel" is mapped as "CHS168.3/5.0#153792" based on user mapping.
- Revit Section :"Analytisch-LAYH-allr-HulpSchakels-2072-TCA" is mapped as "CHS193.7/10.0#163447" based on user mapping.
- Revit Section :"Analytisch-LAYH-allr-HulpSchakels-TCA" is mapped as "CHS168.3/10.0#162725" based on user mapping.
- Revit Section :"Analytisch-LAYH-allr-HulpSchakels-1088-TCA" is mapped as "CHS168.3/12.5#161787" based on user mapping.
- Revit Section :"Variabele-lengte" is mapped as "CHS193.7/8.0" based on user mapping.

Mapped Cross Section(s):

Summary:
6 out of 6 Structural Columns exported
22 out of 22 Structural Framing exported
8 out of 8 Load Case exported
8 out of 8 Load Nature exported
Total items exported 44 out of 44

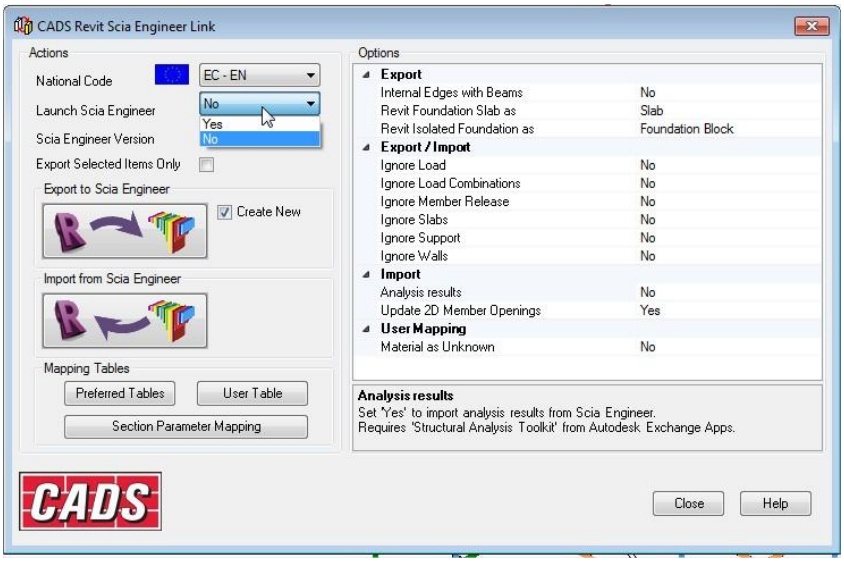
End Time : 03/24/2015 10:11:38
Total Time : 00:08:29.6671513

Depending on the configuration of your options in the Revit link (in Revit Structure), the link will either open Scia Engineer and import the model directly, or it will create an intermediary .r2s (Revit To Scia) file which can be imported in Scia Engineer.

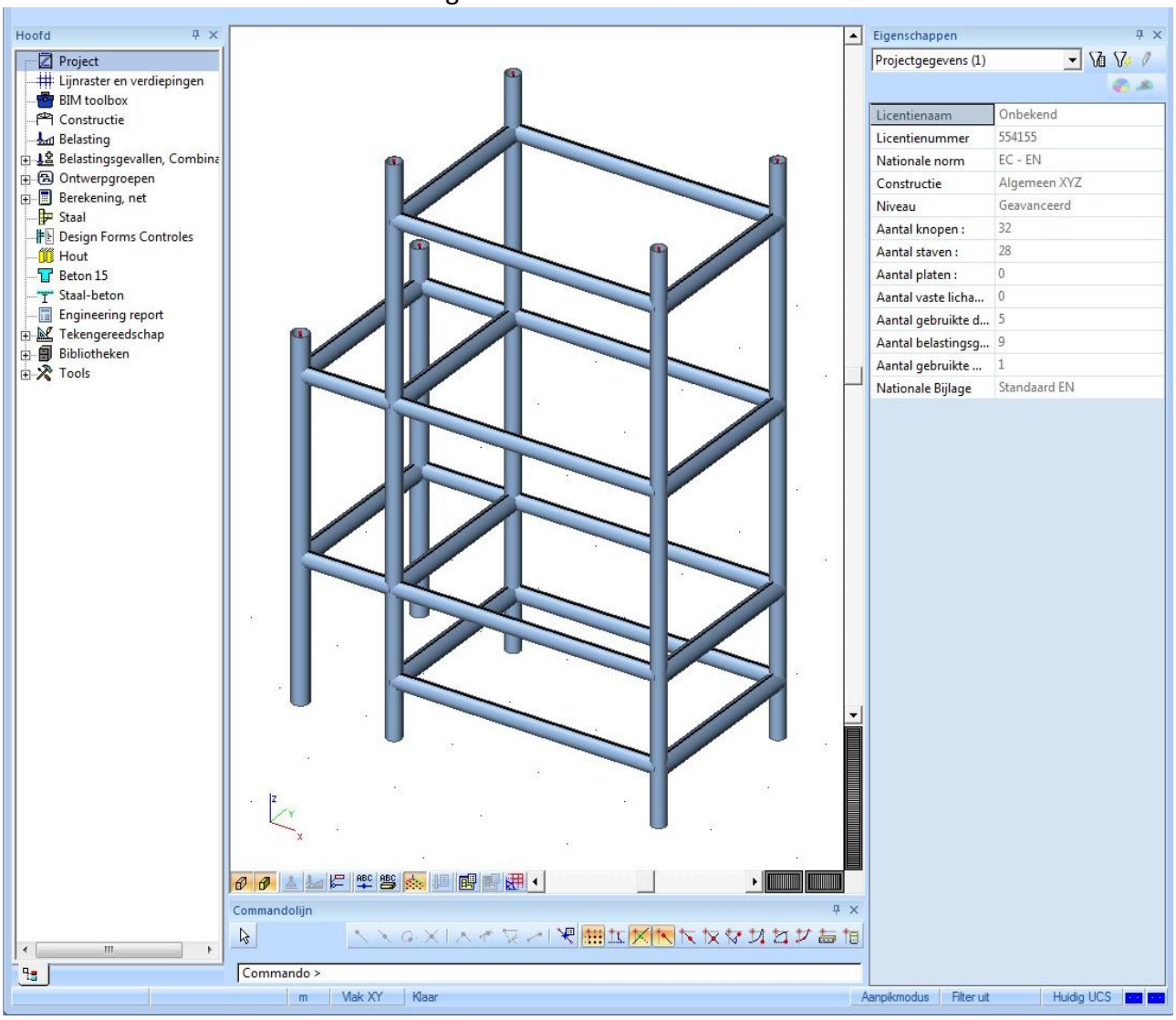
> ***Note:*** *The mapped cross-section and materials are remembered by the Revit link and they are stored in the mapping database. You can access the mapping databases by going to the options of the Revit link in Revit Structure.*

Importing in Scia Engineer

The model will be opened immediately in Scia Engineer, or the model can be imported by importing the .r2s file through 'File -> Import -> Revit' in Scia Engineer (requires 'Revit' license in Scia Engineer). Wether the model is imported automatically or you have to do it manually, is determined by the 'Options' setting in the Revit link (in Revit Structure).



The model will look like this in Scia Engineer:



Appendix 1: Mapping materials and cross-sections

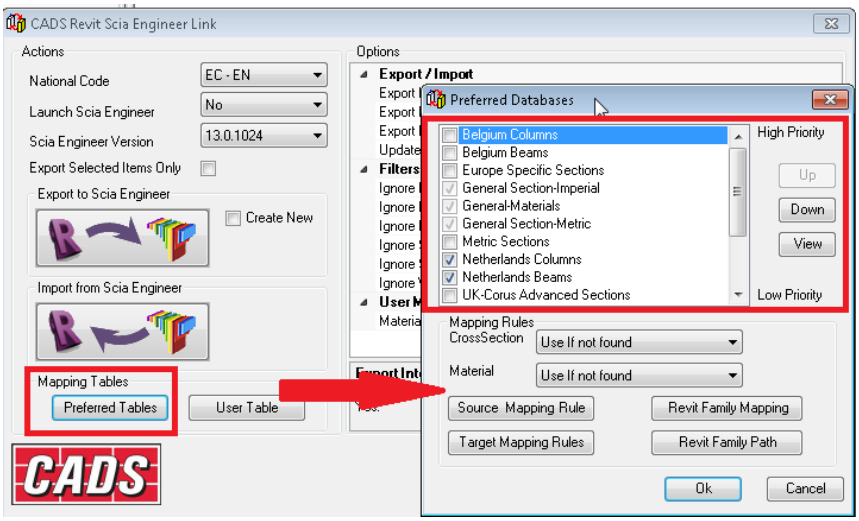
The mapping between the Revit and the Scia Engineer is based on tables. There are three types of mapping tables – user-defined table, tables based on national codes and mapping rules.

For most standard materials and cross-sections from Revit families, the tables between Scia Engineer and Revit Structure are implemented. If you are using different families then the standard Revit Structure families, then manual mapping becomes much more necessary. Also families provided by separate Revit Structure dealers are considered as personal families (and not standard families). The upside is that mapping must be done just once for each material and cross-section that must be mapped (since the link stores the mapping in a file).

This example is about configuring the mapping and can be used on a simple example with a non-standard analytical family. This mapping is always based on the names of materials and cross-sections.

Preferred tables

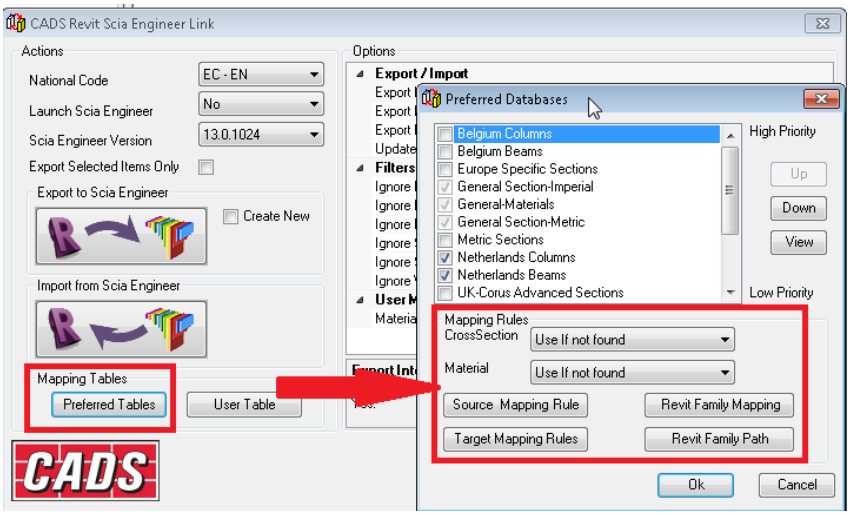
This dialogue defines which predefined tables should be used. There are mapping tables based on national codes and also user defined table in the list.



The top tables in the list have the higher priority. The mapping is done preferably by them. The checkbox can deactivate tables for mapping. The buttons Up and Down is used for moving the selected table in the list (and thus changing their priority).

Mapping rules

The mapping rules can be used when mapping by tables is not sufficient anymore. These mapping rules were the original (old) way to configure the mapping.



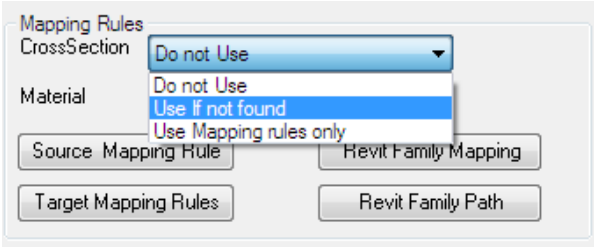
Source and target rules

The mapping rules become necessary when:

1) There are too many items for mapping
2) There is no sufficient table and the mapping has to be done manually – some specific project or a national code.

The box with choices can set the mapping rule when the mapping tables become insufficient. There are three options:

1. "Do not Use": if the mapping tables are insufficient, the mapping rules will NOT be used.
2. "Use If not found": if the mapping tables are insufficient, the mapping rules will be used.
3. "Use mapping rules only": the mapping tables are ignored, and ONLY the mapping rules will be used.

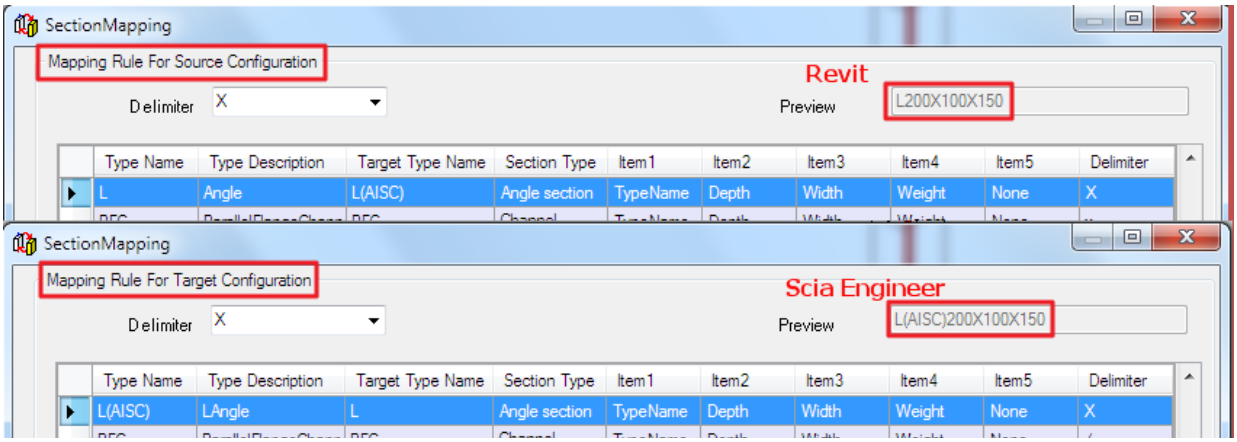


What do the mapping rules do exactly?

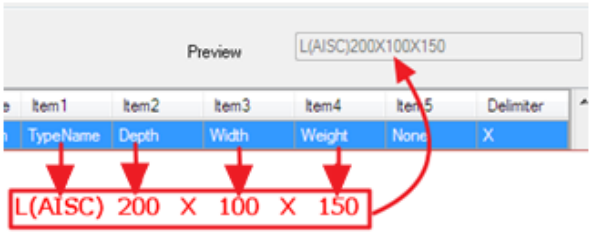
- The mapping rules define mapping between parts from Revit Structure and parts of Scia Engineer. Each rule defines the name in the Revit (Source table) and the name for the Scia Engineer (Target table). This is not based on libraries from the Revit or the Scia Engineer but on exact naming.

- For example, if I open the “Source Mapping Rule” (or “Mapping Rule For Source Configuration”), I can select a line in the table, see the Revit Structure name of the section in the preview, and the parts of the name will be explained in the selected line. E.g.: L200X100X150 has ‘Type Name’ L, it is an L(AISC)-section in Scia Engineer, and its name can be decomposed (with Delimiter ‘X’):
    - TypeName : L200
    - Depth = 100
    - Width = 150

- For a section from Scia Engineer, the same thing can be done. You will see that the mapping will look wether the Target Type Name and Type Name from the Scia Engineer and the Revit Structure cross sections match.

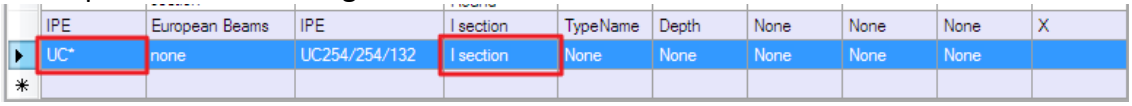


The explanation of the name composition:



Note

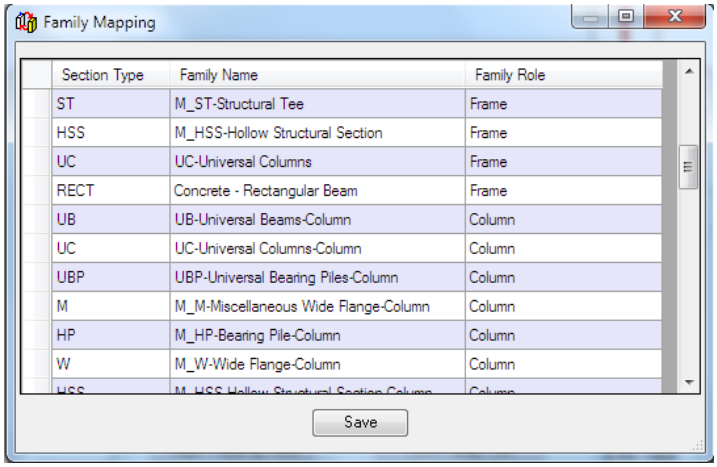
- The star symbol can be used to map the section as a particular family in the Scia Engineer. This can define the section which is not in the Revit actual model but should be adapted later in Scia engineer.



Revit family mapping

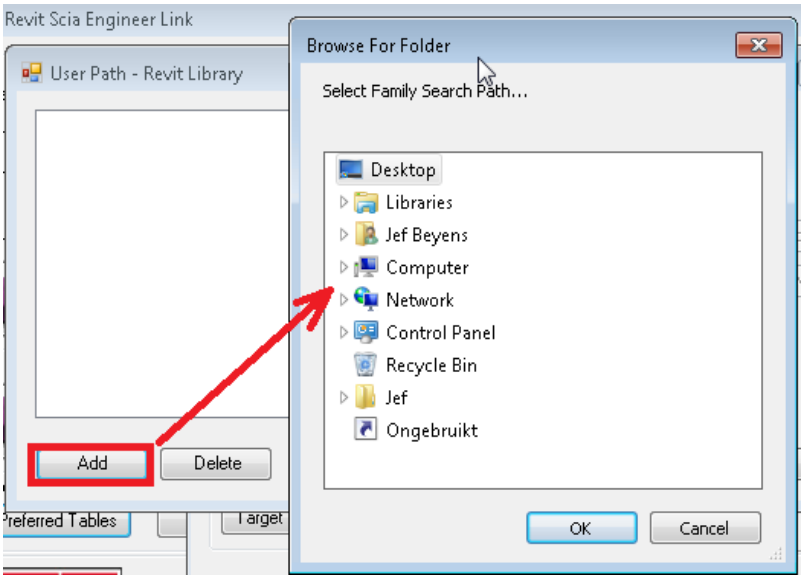
The Revit family mapping dialog specifies the mapping of the section types to the Revit family names. This will result in the following procedure:

- An imported (or exported) cross-section will be recognised as a certain section type by the 'Mapping Rules for Source or Target Configuration'.
- The 'Revit family mapping' will link this section type to a family.



Revit family path

The Revit family path dialogue allows the user to define the path of another Revit family which is saved on the computer. The family mapping configuration (mentioned above) will be able to also look in the folders defined in this setting.

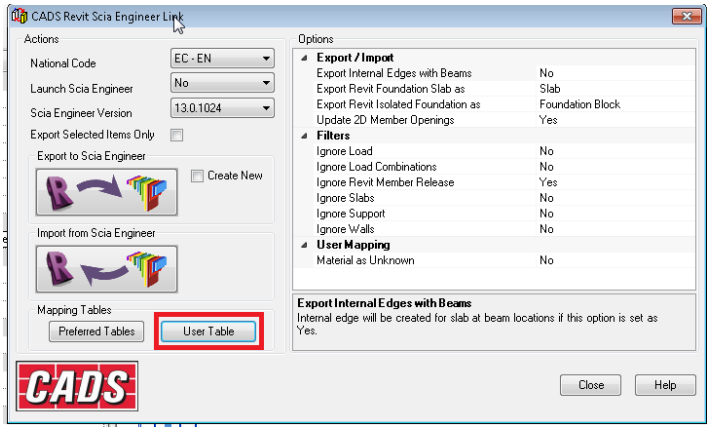


IMPORTANT: The Revit link needs full read & write rights on this folder, and thus it can also not be set to 'read-only'.

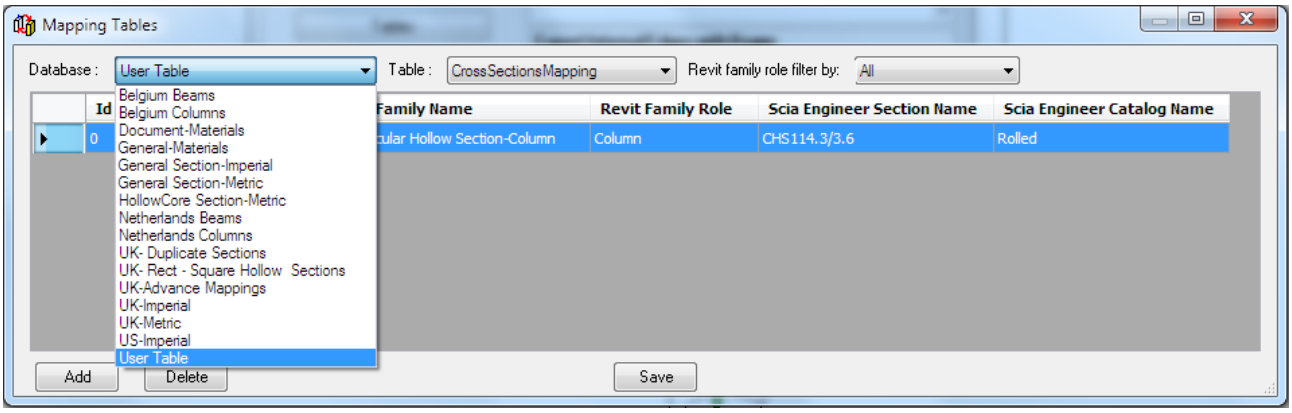
Mapping tables

It is possible to look at the tables (mentioned in the preferred tables) in detail. This is done in a dialog which shows the whole database of mapping. These tables are based on the libraries taken from the Revit and Scia Engineer.

To access them, you can use “User Table” in the options window.



This will result in the following table, where the different tables can be chosen. For each table you will be able to see how different cross-sections (or materials) are mapped.

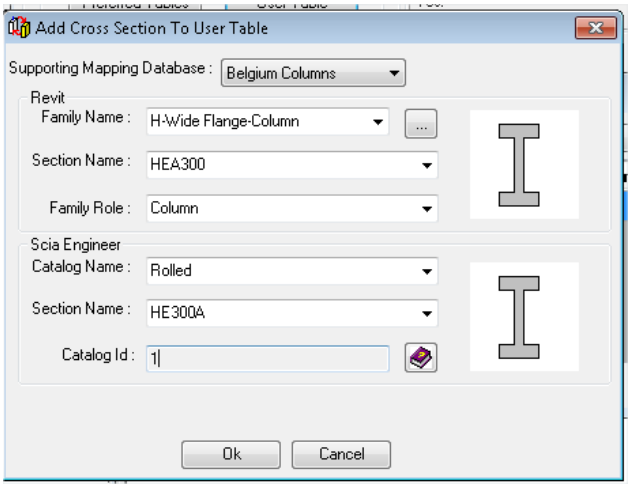


The user table is clearly user defined. New mapping rules can be added in the user table by using the dialogue button “Add”. Then the user can select the section name in Revit Structure and the corresponding name in Scia Engineer.

A window ‘Add Cross Section To User Table’ will appear, and you must follow the next steps (to map for example HE300A from Scia Engineer with HEA300 from Revit Structure)

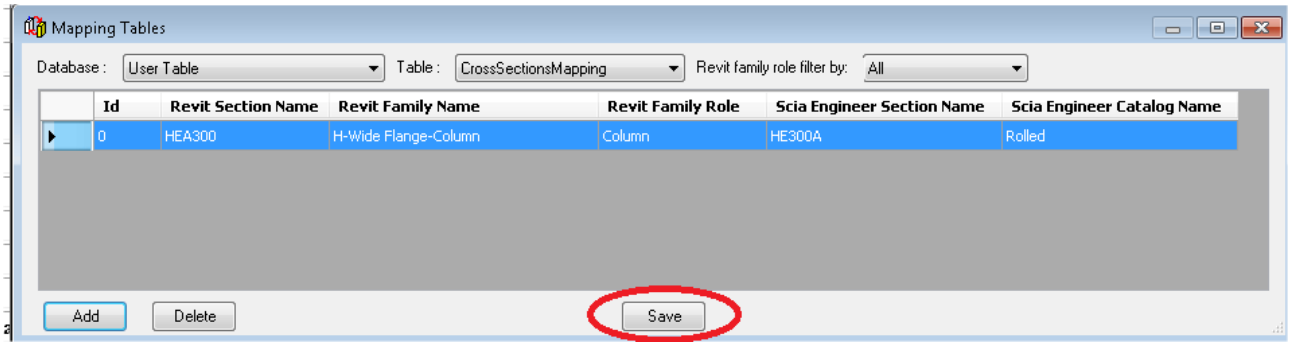
1. Supporting Mapping Database: choose ‘Belgium Columns’ (or ‘Europe Specific Sections’ or ‘Netherland Columns’)
2. Family Role = Column
3. Family Name = H-Wide Flange-Column
4. Section Name = HEA300 (you can start typing, instead of scrolling)

Then for the options under 'Scia Engineer': Catalog Name = Rolled, and search the section HE300A. You should have the following options:

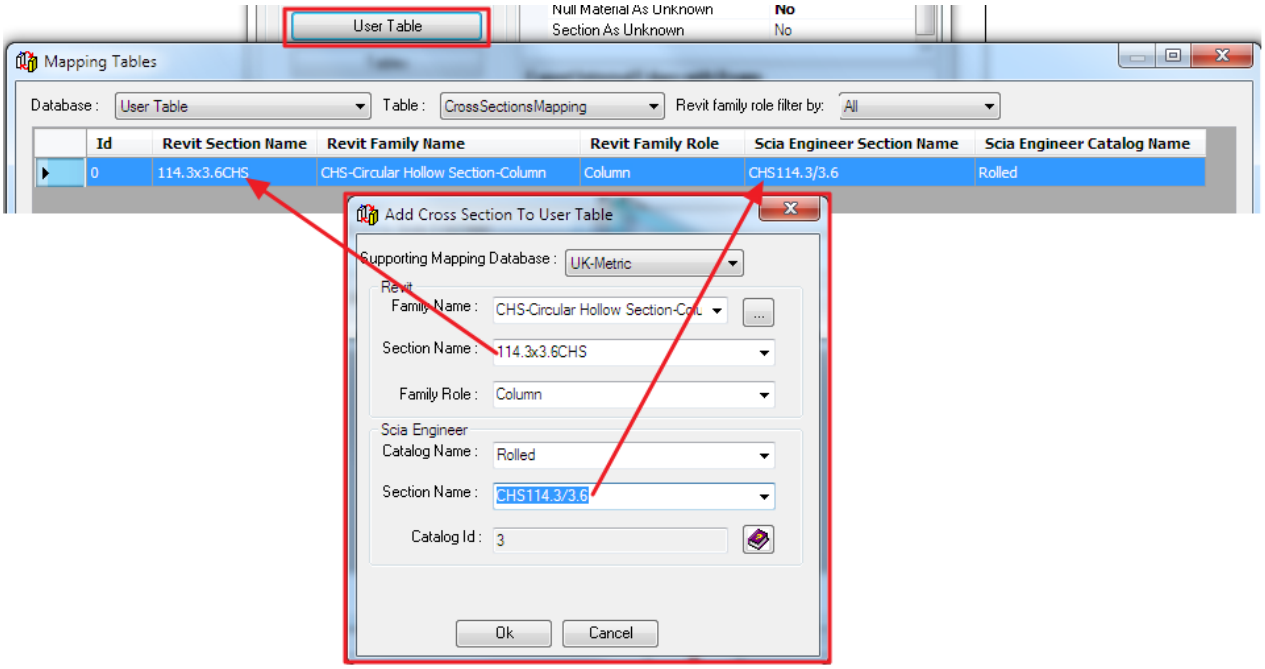


Afterwards, click on 'OK'.

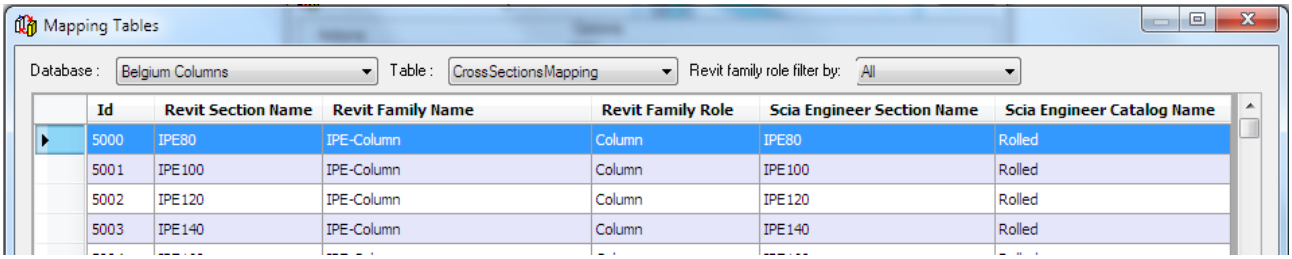
You will see that there is a new line in the mapping table. Now click on 'Save' to keep this new mapping. This will now always be used if you use the Revit Link.



You can see how the 'Add Cross Section To User Table' is translated to a single line in the 'User Table':

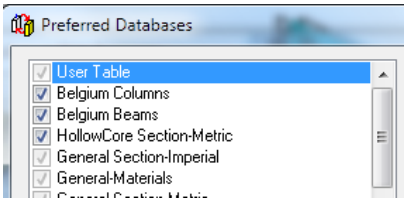


If you look at other tables (by choosing different 'Databases'), then you can see that entire series of mappings are predefined by the system.



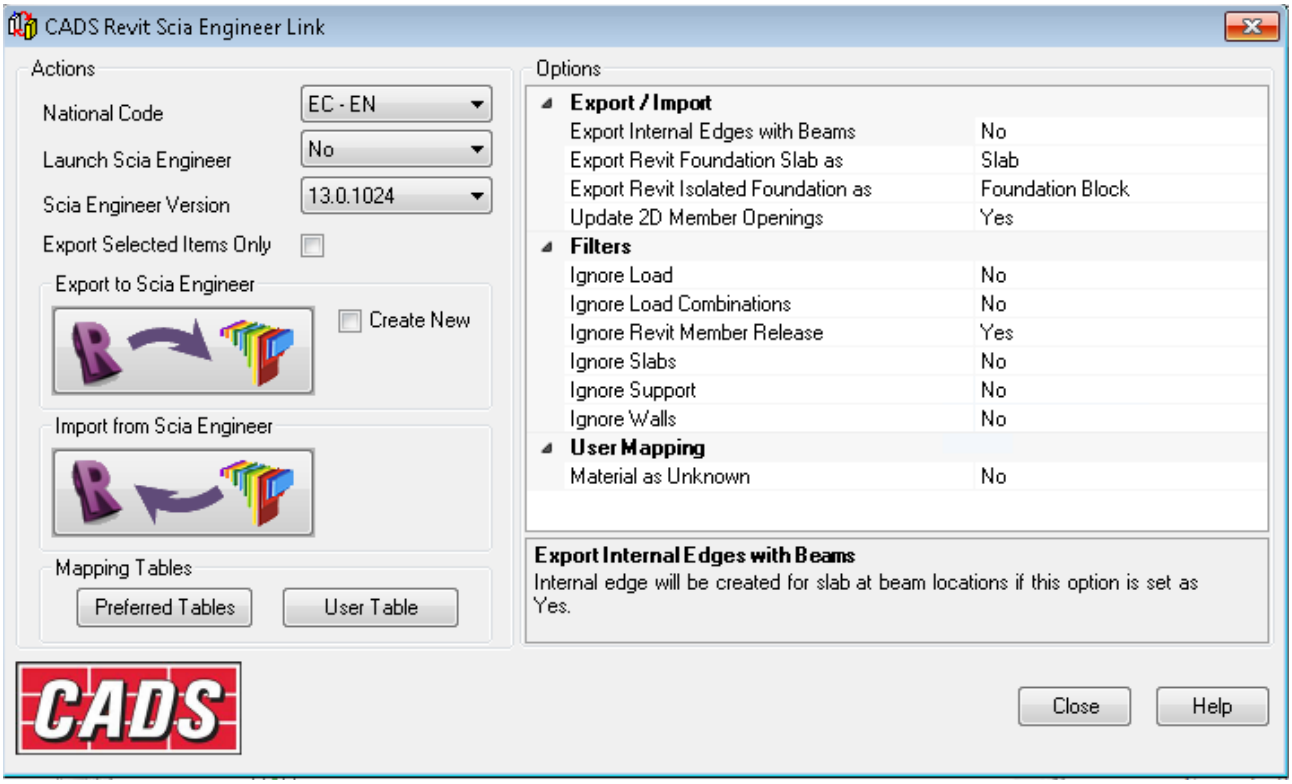
Note

- If the user table contains rules with the higher priority then it must be moved in the list to the top. If different tables contain the same mapping, then the table that is highest in the list will be used in advance to execute the mapping.



APPENDIX 2: Options (CADS Revit - Scia Engineer Link)

The following dialog is displayed when the “Options” command has been selected, either from the menu or from the toolbar.

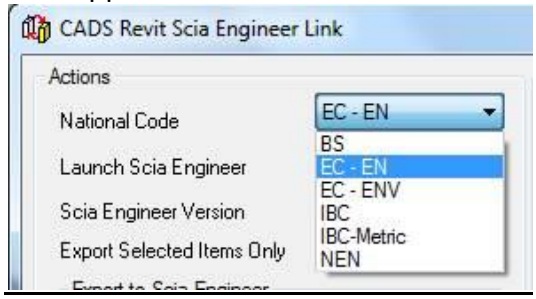


Actions:

Selecting “Export to Scia Engineer” button exports the Revit model into Scia Engineer. Selecting the “Import from Scia Engineer” updates the Revit model from Scia Engineer.

National Code:

The national code option specifies which national code is to be used in Scia Engineer.
The following National codes are supported:

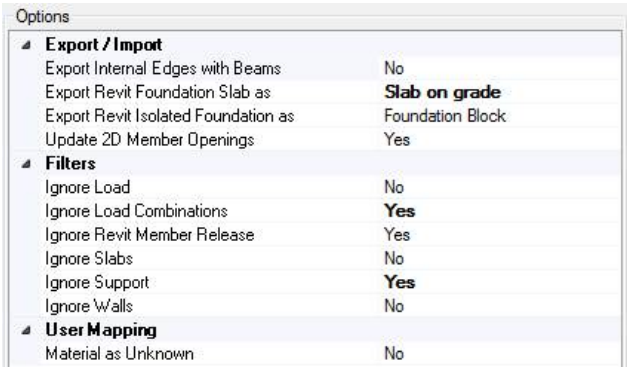


Note:

The link program does not validate when the national code used in the Revit template and the national code in the link software are not the same. For example if the user has modeled using the Canadian template and tries to export using the EC-EN national code, the program may not work as expected.

Selection:

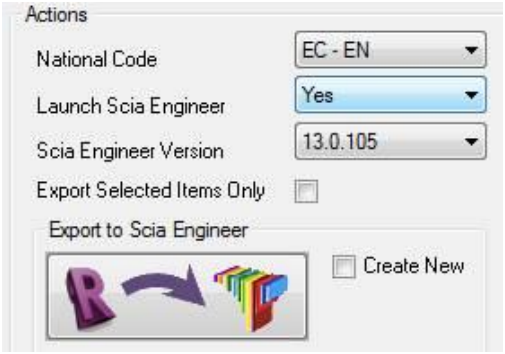
The options as shown here allow the user to export only the selected members from Revit and to control the behavior of the import / export.



If this option is selected, the program will expect a partial selection from the user.

Preferences:

The following preferences can be set in this dialog.



These options work differently depending on the context in which they are used.

If the model is exported from Revit, the option “Launch Scia Engineer = Yes” launches Scia Engineer and exports the model into it.

The option “Launch Scia Engineer = No” writes the FEM data as a Scia Engineer Revit file (e.g. model.R2S) which can be opened into Scia Engineer using the command “Import à Revit File.”

Note:

This option does not require Scia Engineer to be installed in the computer and allows sending this file to other users who have installed Scia Engineer.

If the model is updated from Revit, the option “Launch Scia Engineer” reads the active Scia Engineer job and updates the current Revit model.

Overwrite:

By default the “Export to Scia Engineer” will overwrite if any existing Scia Engineer file with the same name is available in the folder.

If you select “Create New”, then the existing Scia Engineer file with the same name in the folder is deleted and a new Scia Engineer file is created.

Filters:

Filtering options allow the user to ignore certain items so they are not exported from Revit.

Filters	
Ignore Load	No
Ignore Load Combinations	**Yes**
Ignore Revit Member Release	Yes
Ignore Slabs	No
Ignore Support	**Yes**
Ignore Walls	No

- If the “Ignore Load” is set to “Yes”, the loads are not considered for both export and import.
- If the “Ignore Load Combinations” is set to “Yes”, the loads combinations are not considered for both export and import.
- If the “Ignore Revit Member Releases” is set to “Yes”, member end releases set in Revit are not exported to Scia Engineer.
- If the “Ignore Slabs” option is set to “Yes”, structural slabs are not considered for both export and import.
- If the “Ignore Walls” option is set to “Yes”, structural walls are not considered for both export and import.
- The above two options can be used when you want to analyse the frame excluding the slabs and walls.
- If the “Ignore Support” option is set to “Yes”, the Boundary conditions defined in Revit is not exported.

User mapping:

Following user mapping options makes the export option easier when suitable cross section or material is not found for majority of members, but the export is needed without any prompts for mapping with an automatic mapping as unknown sections or materials.

User Mapping	
Material as Unknown	No

If the ‘Material as Unknown’ is set to Yes, the program will not prompt the user for mapping a material whenever a material is not found in the map database.

APPENDIX 3: FAQ's

Where are the mapping databases stored?

Question: The Revit link uses mapping between materials and cross-sections of Revit Structure and Scia Engineer. This mapping can be edited in the user table. Can I create my own mapping table? Or copy these mapping tables to another computer?

Solution: The mapping tables are stored in the following folder: C:\ProgramData\CADS\Revit To Scia Engineer\Revit 2013\Databases.

You can create your own mapping tables by creating your own xml file and placing it in this folder. You will see your own mapping table in the Revit link if there are no errors in it. It is also possible to modify these files by opening them in Excel.

→ Error: if you use the same mapping twice in the same file.

→ Error: if you refer to a material that is not in the Scia Engineer templates (placed in C:\ProgramData\CADS\Revit To Scia Engineer\Revit 2013\Templates\Sen).

Problems due to user rights or files

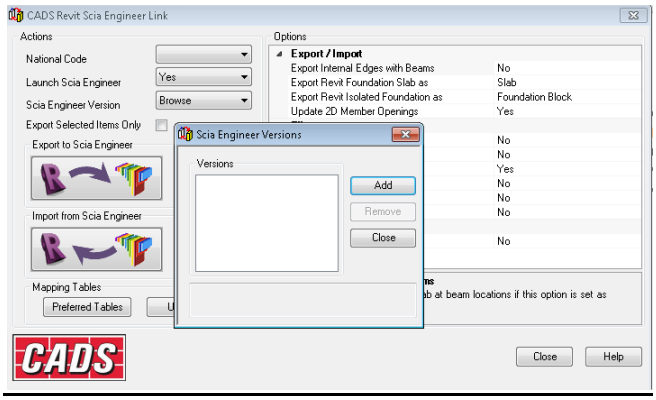
Access "C:\Program Data\CADS\Revit to Scia\Revit 2013\Databases" is denied

Description: When you want to indicating Scia Engineer materials or when you open the options of the CADS plug-in, access is denied.

Solution: Go to C:\Program Data\CADS\Revit to Scia\Revit 2013\Databases and add the current user under the properties -> security. Also make sure that the folder isn't 'read-only'.

Unable to replace REVIT.TDX file

Description: When you want to add a Scia Engineer version, and after browsing to the esa.exe file, you receive the message:
"Unable to replace the "C:\Program Files (x86)\Scia\Engineer2013.0\REVIT.TDX". Please delete the file manually and run the Revit in Administrator mode."

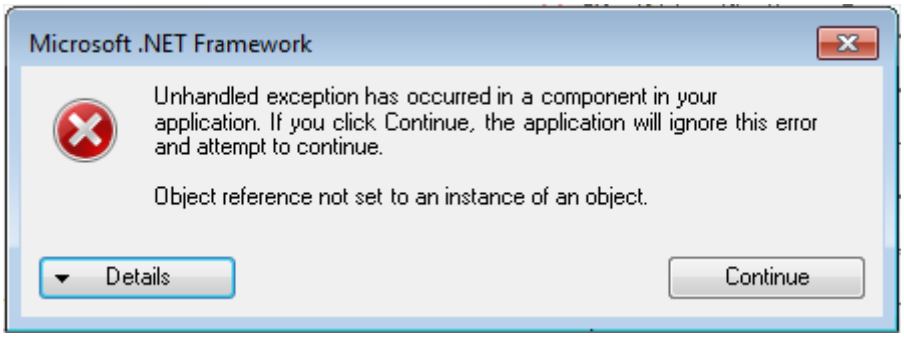


Solution 1: Delete the mentioned Revit.TDX file and run Revit in Administrator mode (by clicking right on it and chose 'run as administator')

Solution 2: Go to the folder "C:\Program Files (x86)\Scia\Engineer 201x", click right mouse button and go to properties. Make sure 'read only' is ticked off, and that all users have all rights under the tab 'security'. You should be able to repeat the action with no problems.

Microsoft .NET Framework error

Description: When you want to open the 'options' in the Revit link (in Revit Structure), a 'Microsoft .NET Framework' message appears. After this, you can continue, but the options window is empty.



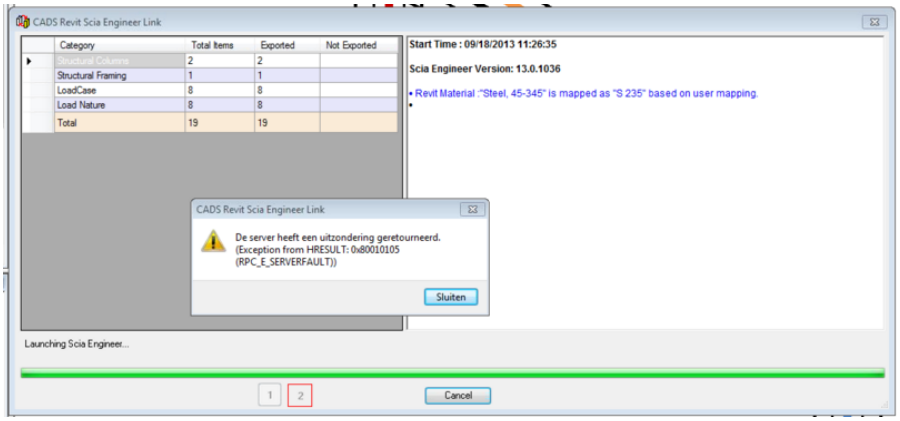
Solution: Go to the folder *"C:\Users\<User name>\AppData\Roaming\CADS\Revit To Scia Engineer"* and make sure:

1. The folder exists
2. It has no content

Problems during export in Revit Structure

Export Revit: "Exception from HRESULT: 0x80010105"

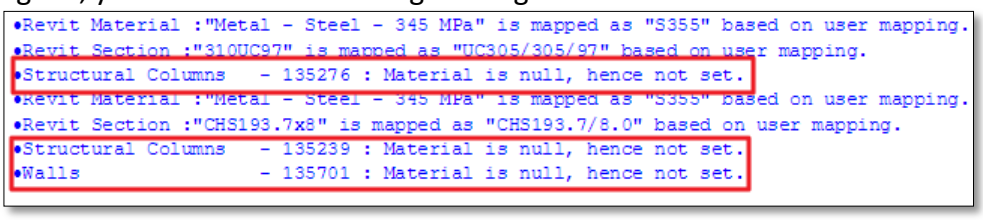
Description: An the end of exporting in Revit Structure, the next error appears:
"De server heeft een uitzondering geretourneerd. / The server has returned an exception. (Exception from HRESULT: 0x80010105 (RPC_E_SERVERFAULT))"



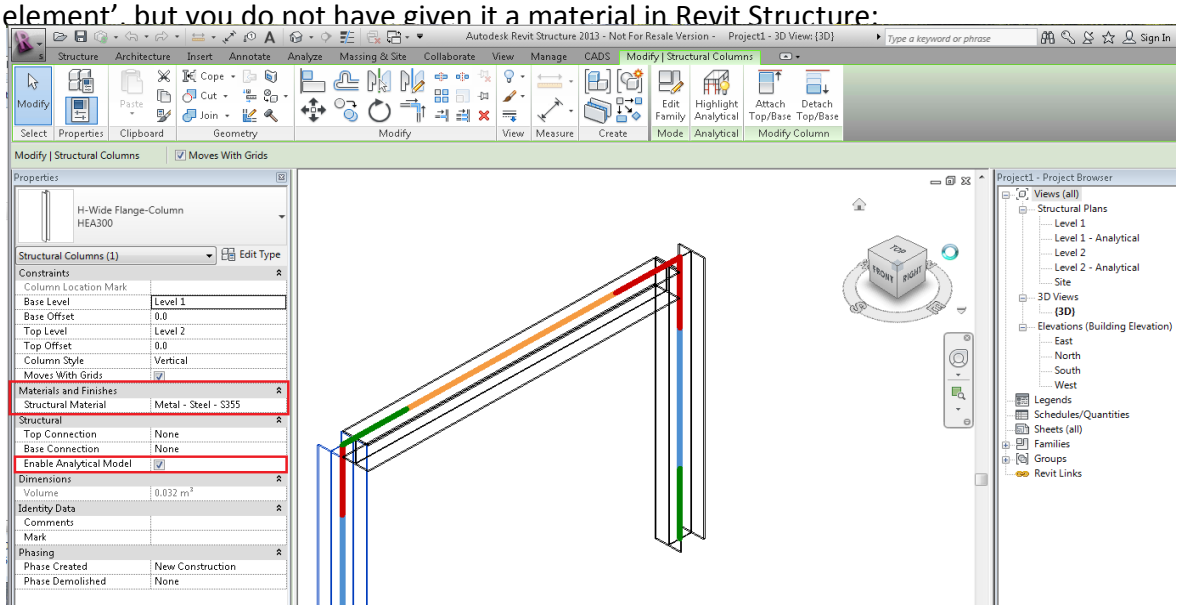
Solution: If you set 'launch Scia Engineer' = no, then you can use the link again without this message appearing.

Export Revit: "Material is null, hence not set."

Description: When exporting in Revit Structure, several elements are not exported, and in the log file, you will see the following message:



Solution: The material is null when you have selected an element to be an 'analytical element', but you do not have given it a material in Revit Structure:



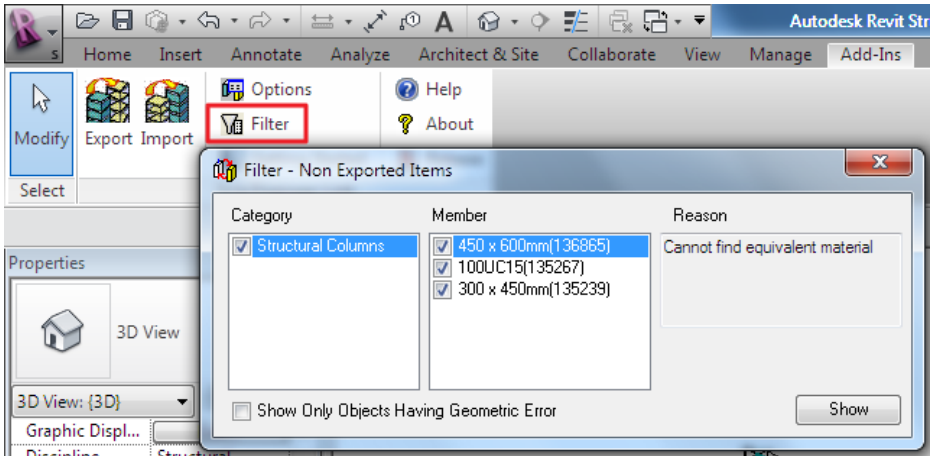
Export Revit: How do I find an element mentioned in the log file?

Questions: During export, there is a problem with a certain element. If I know how to fix it, then how can I find this element?

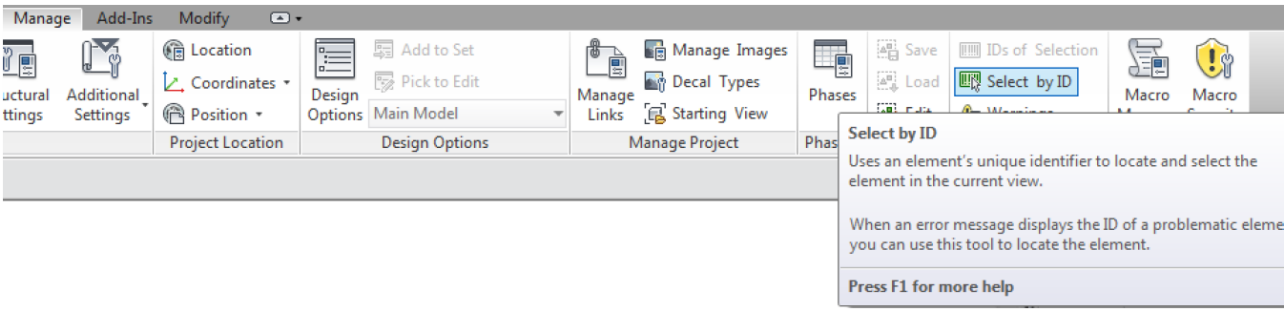
```
•Revit Material :"Metal - Steel - 345 MPa" is mapped as "S355" based on user mapping.
•Revit Section :"310UC97" is mapped as "UC305/305/97" based on user mapping.
•Structural Columns    - 135276 : Material is null, hence not set.
•Revit Material :"Metal - Steel - 345 MPa" is mapped as "S355" based on user mapping.
•Revit Section :"CHS193.7x8" is mapped as "CHS193.7/8.0" based on user mapping.
•Structural Columns    - 135239 : Material is null, hence not set.
•Walls                 - 135701 : Material is null, hence not set.
```

Solution:

1. Not exported items can be selected and showed by the tool Filter, but this will only display object with a bad geometry.

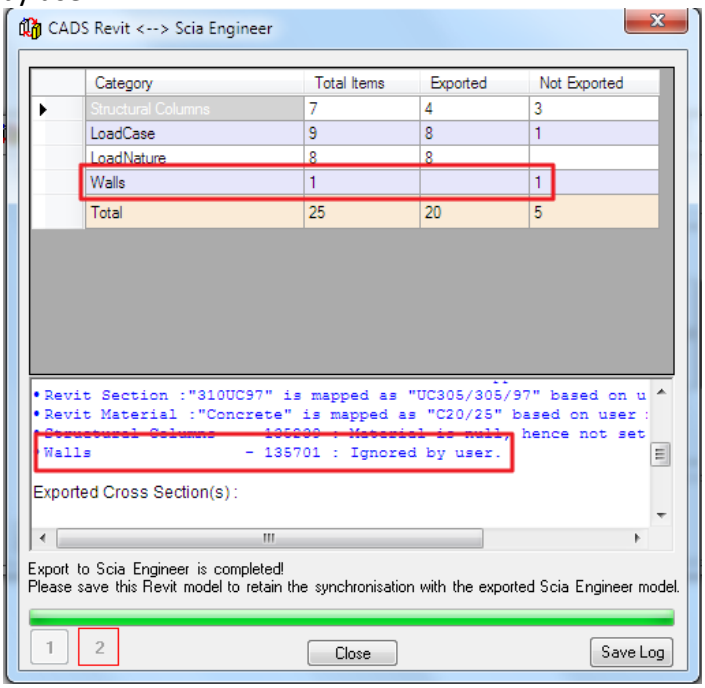


2. The element ID can also be inputted directly. If you go to 'Manage -> Select by ID' in Revit Structure, you will be able to input the ID number (in this example 135276) and the element in question will be highlighted in the model.

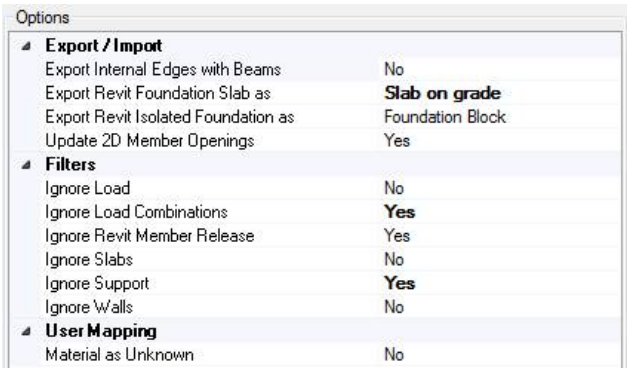


Export Revit: "Ignored by user"

Description: An element is not exported, and the log file indicates that the element was "ignored by user":



Solution: There is a possibility to ignore 2D member during the export. When this functionality is used the 2D member is not exported to the Scia Engineer. So make sure this filter is not activated when it should be deactivated



Export Revit: the object is not supported by the Revit link

Description: The model is not exported at all.

Solution: Only analytical elements can be exported. If the model contains any architectural entities, then they won't be exported to Scia Engineer. This also applies for elements for

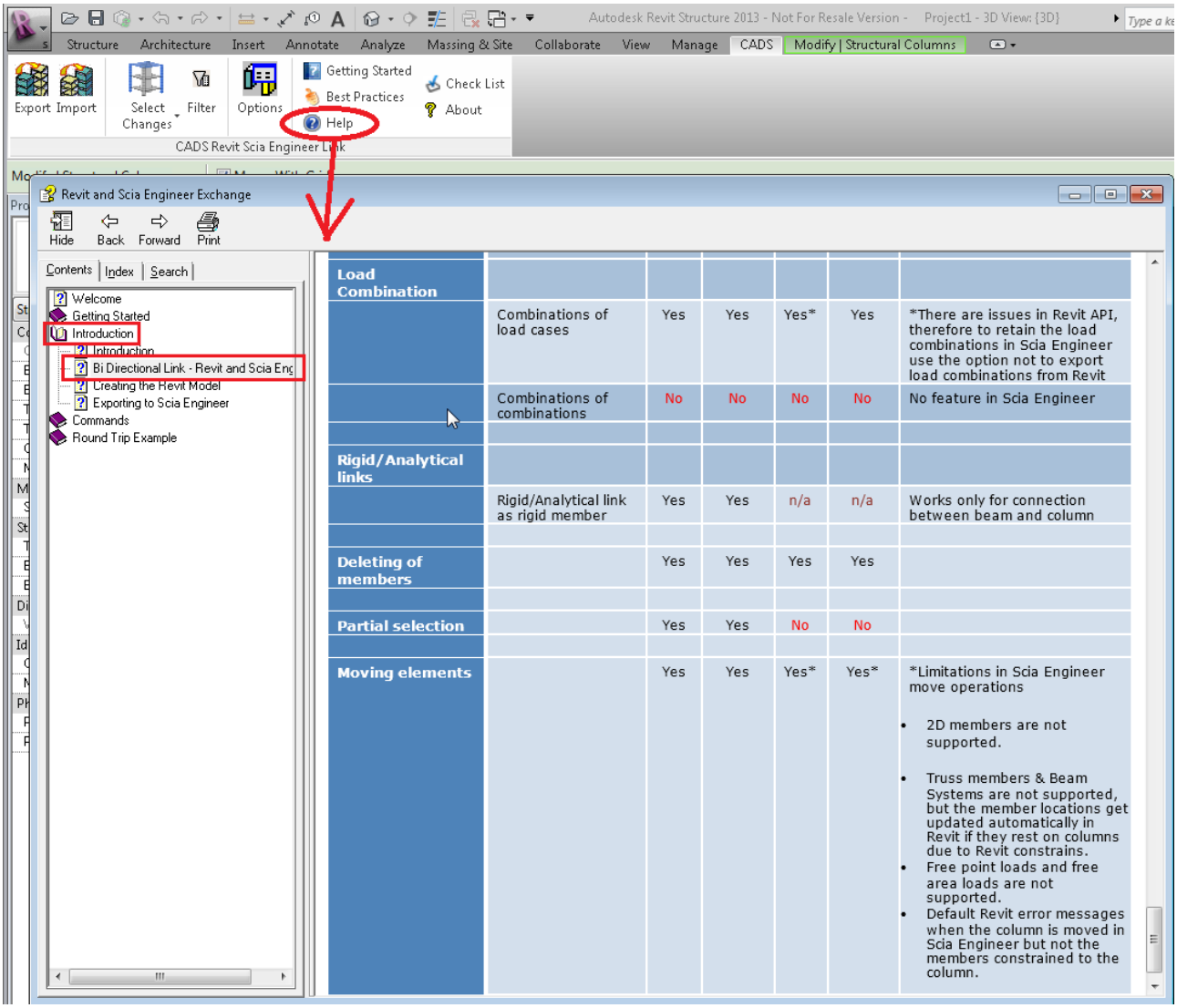
which ‘Enable analytical model’ has not been ticked on (we refer again to the introduction in the first pages of this document).

If the model is created in the Revit architecture then the model must be edited in Revit Structure in such a way that the objects are switched to the analytical objects.

Export Revit: the object is not supported by Scia Engineer

Description: Some elements can get the message that they are not supported in Scia Engineer. Or the Revit link says (in the log file) it does not support them.

Solution: Some objects are specific so they don’t have any corresponding entities in Scia engineer. Some of those are not yet implemented. It is possible to check in the help file of the Revit plug-in (in Revit Structure) what is and what is not supported.



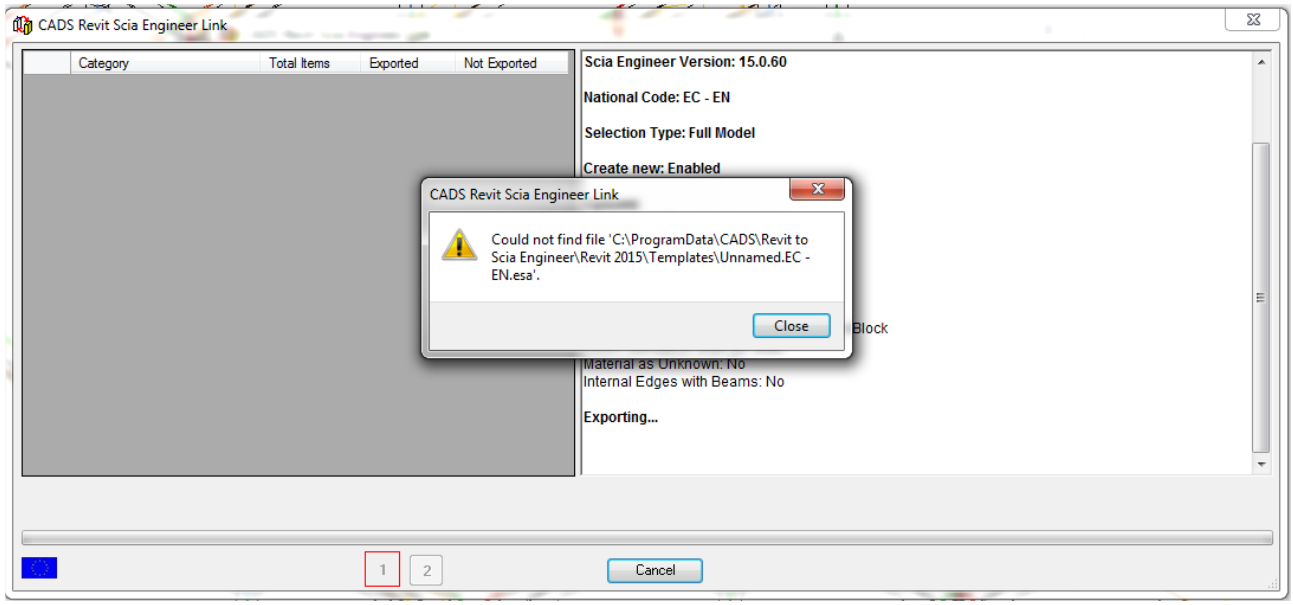
Load Combination						
	Combinations of load cases	Yes	Yes	Yes*	Yes	*There are issues in Revit API, therefore to retain the load combinations in Scia Engineer use the option not to export load combinations from Revit
	Combinations of combinations	No	No	No	No	No feature in Scia Engineer
Rigid/Analytical links						
	Rigid/Analytical link as rigid member	Yes	Yes	n/a	n/a	Works only for connection between beam and column
Deleting of members		Yes	Yes	Yes	Yes	
Partial selection		Yes	Yes	No	No	
Moving elements		Yes	Yes	Yes*	Yes*	*Limitations in Scia Engineer move operations • 2D members are not supported. • Truss members & Beam Systems are not supported, but the member locations get updated automatically in Revit if they rest on columns due to Revit constrains. • Free point loads and free area loads are not supported. • Default Revit error messages when the column is moved in Scia Engineer but not the members constrained to the column.

Could not find file 'C:\ProgramData\CADS\Revit to Scia Engineer\Revit 2015\Templates\Unnamed.EC – EN.esa'

Description: During import or export, the message appears explaining that certain 'templates' cannot be found.

Solution: Copy the files from this folder "C:\ProgramData\CADS\Revit to Scia Engineer\Revit 2015\Templates\Sen\2014 to the folder "C:\ProgramData\CADS\Revit to Scia Engineer\Revit 2015\Templates\".

This issue can appear between Revit link v3.1.269 and Scia Engineer 2015 and will be solved in the next release of the Revit link.



Problems during import in Revit Structure

Question: What are the requirements in Scia Engineer to be able to transfer the project to Revit Structure?

Solution:

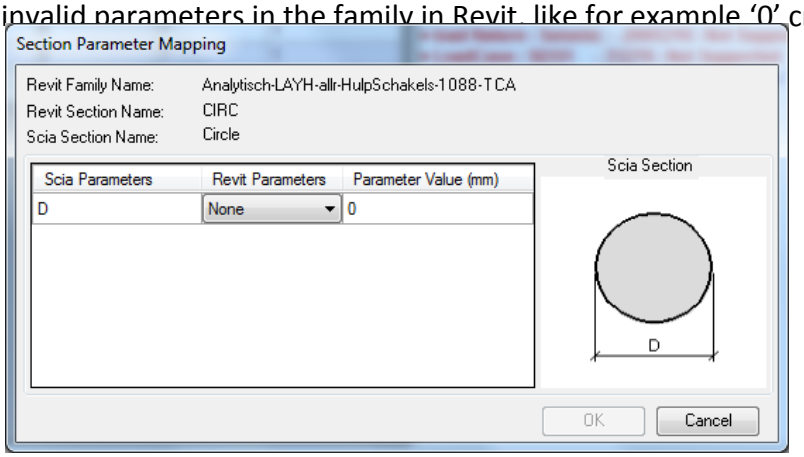
- It is necessary to use 'General XYZ' in Scia Engineer to be able to import the project in Revit Structure later on.
- Rigid links cannot be transferred to Revit Structure.
- Horizontal 2D elements must have the type 'plate' and vertical 2D elements the type 'wall'.

Problems with importing in Scia Engineer

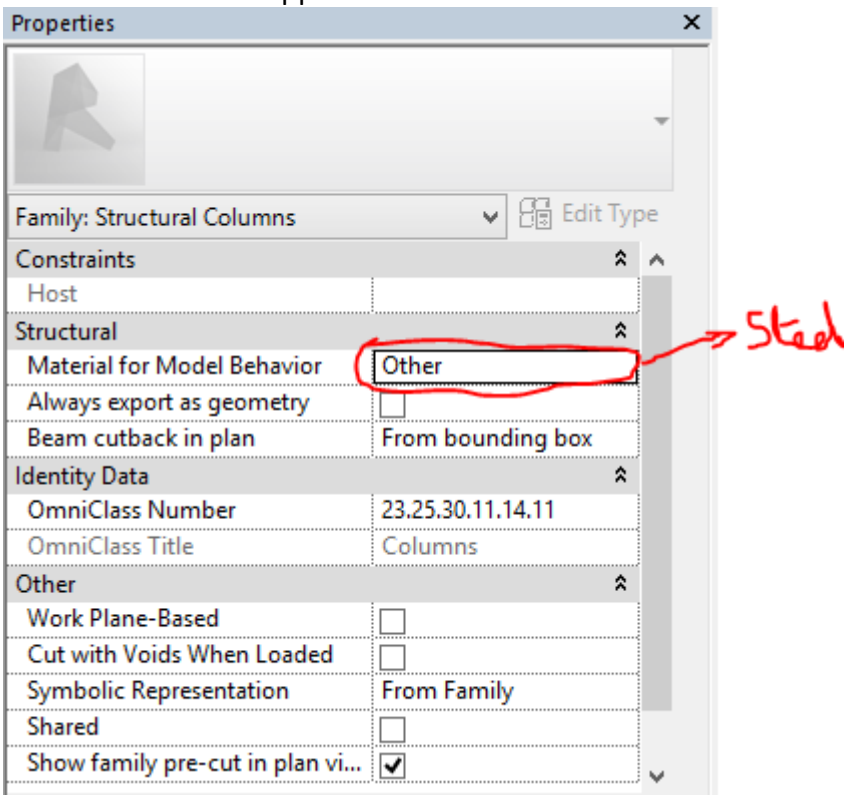
Descripton: You have created an .r2s file by using the export option in Revit Structure, but during the import of this file (in Scia), Scia Engineer crashes.

Solution: The crash is caused by components in the r2s file that cannot be computed by Scia Engineer. So actually the Revit file which was used to create the r2s file has caused the inconsistencies in the r2s file. For example:

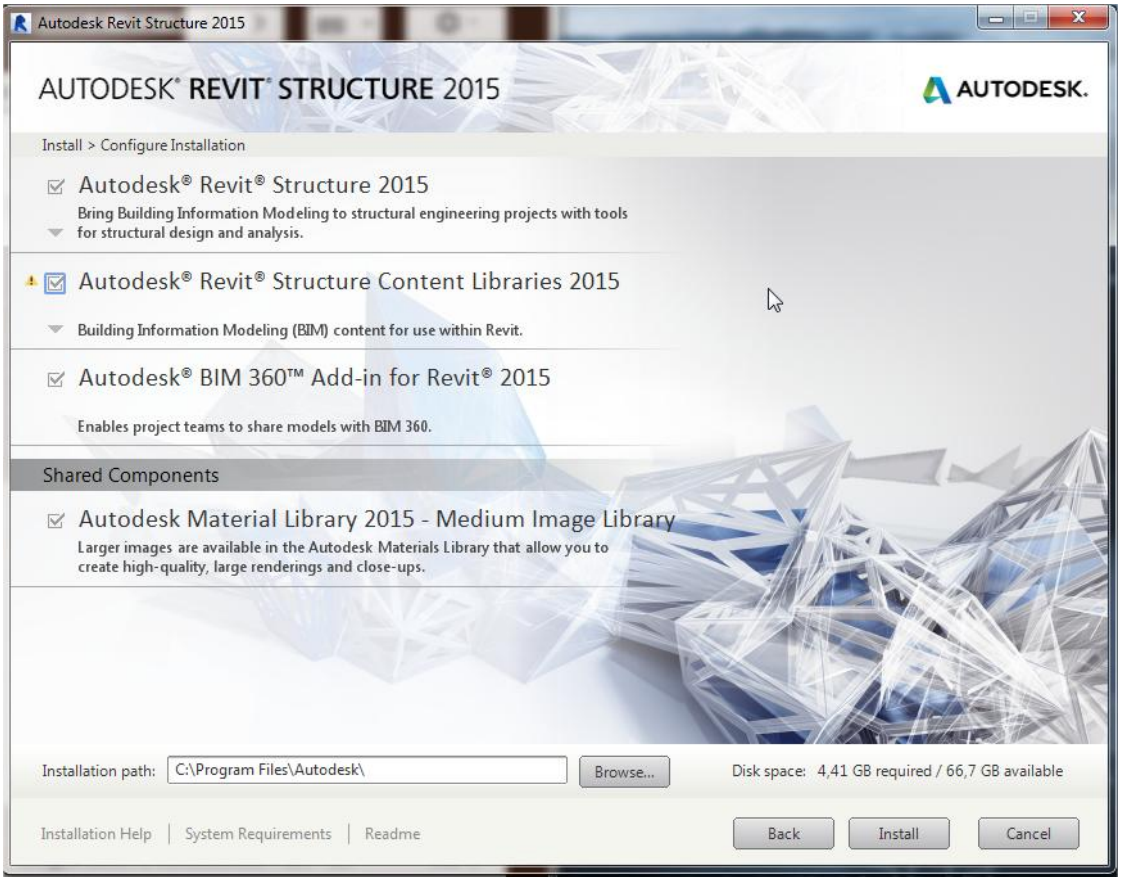
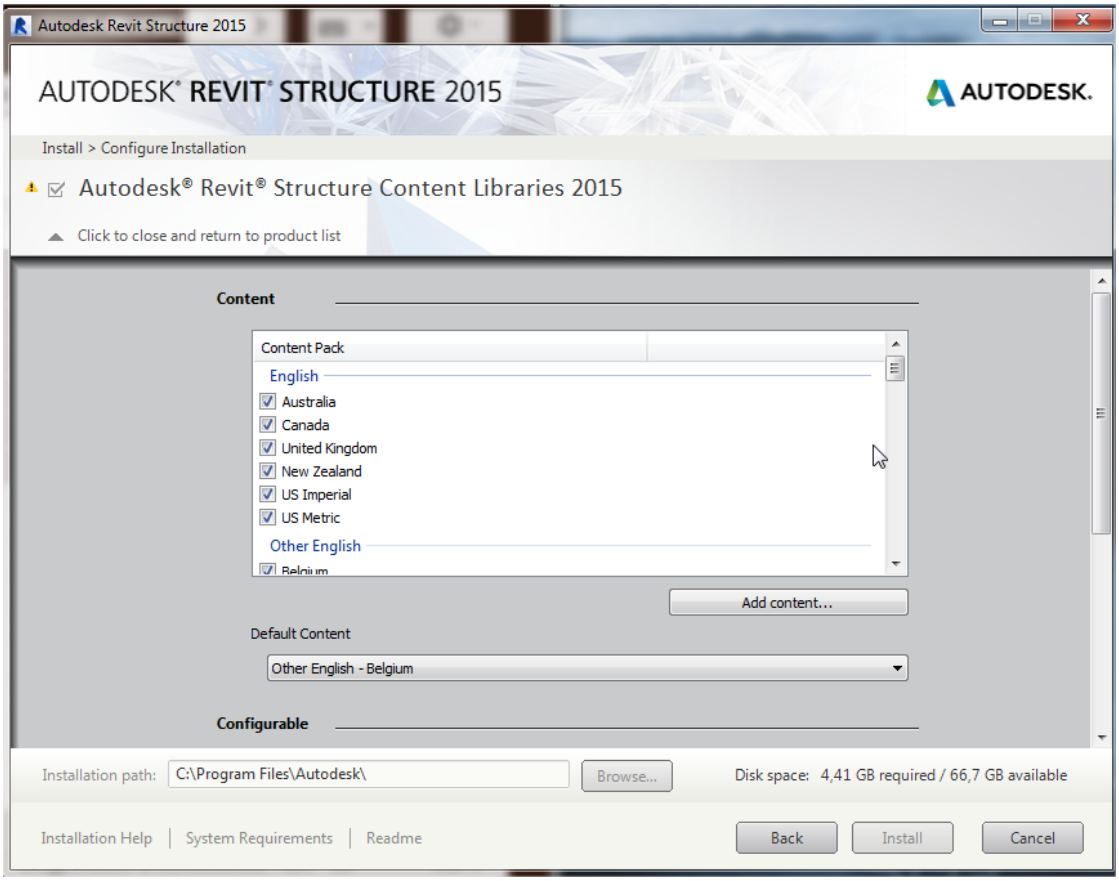
- If you have a parametric cross section from Revit Structure, then there might be invalid parameters in the family in Revit, like for example '0' cross section data.



- If the "Material For Model Behaviour" property is set to "Other" in some families, then you have chosen a property which is not supported. Only steel, concrete and timber families are supported.



- It can be possible that the Revit link cannot get the profile geometry from some of the families (but this will be fixed in the next release after build 244).

Appendix 4: Installation of Revit Structure

Make sure you install sufficient libraries!