

RhinoCFD Tutorial - Convert Revit files into PHOENICS/RhinoCFD compatible formats By Shakil Ahmed, Concentration Heat And Momentum Limited (CHAM), August 2022.

Convert a Revit Model to a RhinoCFD / PHOENICS compatible file	2
Exporting from Revit	2
Step 1	2
Step 2	2
Step 3	3
Step 4	3
Step 5	3
Step 6	4
Step 6.1 – PHOENICS	4
Step 7	4
Step 8	5
Step 9	6
Important optimisations	6
In Revit	6
In Rhino	6

Concentration, Heat and Momentum Limited (CHAM) Bakery House, 40 High Street, Wimbledon Village, London, SW19 5AU, England Tel: +44 (0)20 8947 7651 Email: phoenics@cham.co.uk Web: www.cham.co.uk

Convert a Revit model to RhinoCFD / PHOENICS compatible file

Revit models can be successfully imported into PHOENICS and RhinoCFD if the appropriate procedure is followed when exporting the model from its native format.

Key parameters are to ensure that the solids from Revit are exported as **ACIS solids** and that some tolerance settings are adjusted in Rhino3D. Additional optimisations during export can reduce the complexity of the preprocessing of the case significantly. These optimisations can be done via Rhino3D – used here for demo purposes.

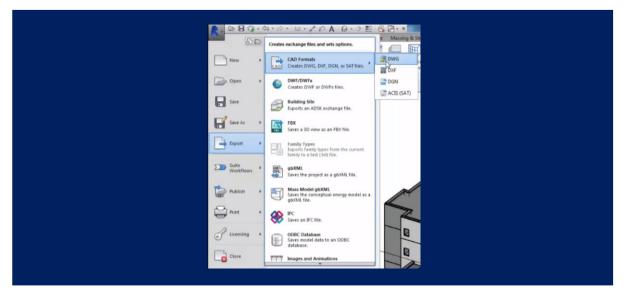
This tutorial describes the steps needed.

Exporting from Revit:

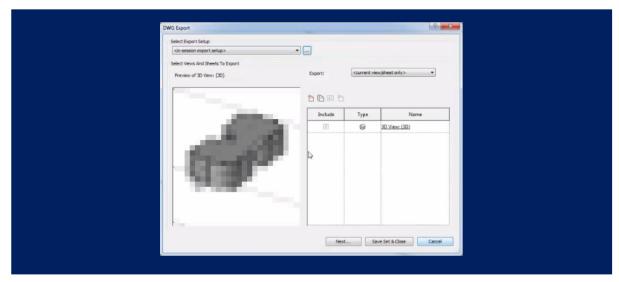
Step 1

Open your Revit file and go to:

• File > Export > CAD Formats > DWG



Step 2



With the "DWG Export" window open, click on Export Setup configuration button.

Step 3		
	5.1 <u></u>	
Modify DW0/DW7 Expension Select Expension Reference 2000 Reference	International Sectors (International Sectors) (Interna	
		OX Carel

With the "Modify DWG/DXF Export Setup" window open navigate to the Solids tab and select ACIS solids.

Step	4

Seet topor Sele Content of your labour Polymenh Acti solds Content of your labour Polymenh Acti solds Content of your labour Polymenh Acti solds Content of your labour Polymenh Content of your labour Content of your labour Polymenh Content of your labour Content of your labour	Molify DWG/DVF Esport Setup		2 2	
		Export solids as: (for 30 views only) O Polymeth @ ACIS solids		
			OK Cancel	

Press "OK" on "Modify DWG/DXF Export Setup" window

DWG Export			L.B	
Select Export Setup				
Select Views And Sheets To Exp				
Preview of 3D View: (3D)	Export:	scurrent	iew/sheet only> +	
	200	CT. 0		
			1	_
	Inclu		Name	_
	2	6	3D Views (3D)	
913				

Press "Next" on "DWG Export" window

Step 6

Name Date modified Type Size Intry MMAin 60/0004 4000 MM Na finishing StaMMar/Design 60/0004 4000 MM Na finishing StaMMar/Design 50/0004 4000 MM Na finishing StaLlable-MECH_Debashing, landing TO20004 400 MM Na finishing StaLlable-MECH_Debashing, landing TO200014 400 MM Na finishing StaLlable-MECH_De	
 Markadowige Schladbowige Schlad	
ALL LTM, JIM, ARCH (CINTRAL, DHeadley, Ju., 174/3014-4/174M, Reinfelder Str. 2014, 3014, ARCH (CINTRAL, DHeadley, Ju., 174/3014-4/474M, Reinfelder Str. 2014, 3014, ARCH (CINTRAL, DHeadley, Lincology Str. 2014, 3014, ARCH (DHeadley, Lincology	
Sell 3334, JBM, ARCH, CDYTRAL, durdiniteselle, Sell 3344, JBM, ARCH, CDYTRAL, durdiniteselle, Sell 3344, JBM, ARCH, CDYTRAL, durdiniteselle, Sell 3344, CDYTRALARCH, Direktor, Sell 3344, CDYTRALARCH, Direktor, Sell 3344, Arch, durdiniteseller, Jacobay Sell 3344, Arch, durd	
 MILLIGH-MICH, DHeading, Jackup MILLIGH-MICH AND CHARDER, Jackup MILLIGH-MICH AND CHARDER, Jackup MILLIGH-MICH, DHEADING, Jackup MILLIGH-MICH AND CHARDER, Jackup MILLIGH-MICH, DHEADING, Jackup MILLIGH-MILLIGH, Jackup MILLIGH-MILLIGH-MILLIGH MILLIGH-MILLIGH-MILLIGH MILLIGH-MILLIGH-MILLIGH MILLIGH-MILLIGH MILLIGH-MILLIGH MILLIGH-MILLIGH MILLIGH-MILLIGH MILLIGH-MILLIGH MILLIGH-MILLIGH MILLIGH-MILLIGH MILLIGH-MILLIGH MILLIGH-MILLIGH<td></td>	
 MILLIGH-MICH, DHeading, Jackup MILLIGH-MICH AND CHARDER, Jackup MILLIGH-MICH AND CHARDER, Jackup MILLIGH-MICH, DHEADING, Jackup MILLIGH-MICH AND CHARDER, Jackup MILLIGH-MICH, DHEADING, Jackup MILLIGH-MILLIGH, Jackup MILLIGH-MILLIGH-MILLIGH MILLIGH-MILLIGH-MILLIGH MILLIGH-MILLIGH-MILLIGH MILLIGH-MILLIGH MILLIGH-MILLIGH MILLIGH-MILLIGH MILLIGH-MILLIGH MILLIGH-MILLIGH MILLIGH-MILLIGH MILLIGH-MILLIGH MILLIGH-MILLIGH MILLIGH-MILLIGH<td></td>	
 Bill 2012 344-ARCH, Dirkendery, Jacobusy DTU3024 2022 ARCH. Reinfolder 2012 344 ARCH, disstrikenderg, Jacobusy 2014 344 ARCH option 1, Dirkonderg, Jacobusy 2014 4014 ARCH option 1, Dirkonderg, Jacobusy 2014 4014 ARCH option 1, Dirkonderg, Jacobusy 2014 4014 ARCH option 1, Dirkonderg, Jacobusy 	
SEI1244.Arch, dostindeendey, bardung Tr20/0004.901.Adv Note holder SEI1244.Arch, dostindeendey, bardung Tr20/0004.901.Adv Note holder SEI1244.Adv Autoriteteendey, bardung Tr20/0004.901.Adv Note holder SEI1244.Adv Autoriteteendey, bardung SEI2242.20174.901.Adv Note holder SEI2242.20174.901.Adv SEI2242.20174.901.Adv Note holder	
2013/4.MIDI, futfohaafky, Jackup 7/20/2014/40.44 File fulder 2013/41, Hirols 2, dualerbearthy, Jackup 7/20/2014/46.04 File fulder 2014/014.440(*) option 1, DHoudley, Jackup 6/20/2014/2014/46.04 File fulder	
2012 JH Jilesh J, doubinheading Jackap TOR/3014 MH AM Rehabler 2014 014 ARCH option 1,0Handley, beckup 6:056-0014 225 PM Rehabler	
2014-014-ARCH option-1_DHeadley_backup 5/26/2014-225-PM Rechtler	
2014.014 IRRCH option 4 (PHeodley Jacobap 6/25/2014 3/29 PM His fulder	
2014/014 ARCH sprice 3 - move symmetrics 6/25/2814 3:37 PM Rischolder	
 3014.014 ARCH option 1 - more symmetrics 5/25/2014 4/31 PM Reinider onter 	
Second State and a state of the second stat	
2014/014.ARCHQatory_DHeadley_beckup TV9/2014.3/27 PM Reinlider	
File name/prefix:	
Files of type: AutoCAD 2013 DWG Files (*.dwg)	
Naming: Automatic - Long (Specify prefix) -	

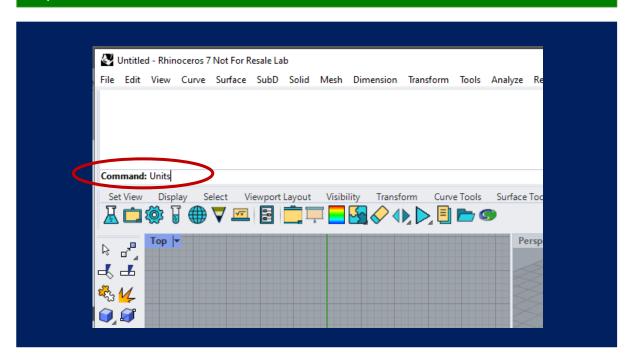
With the "Export CAD" widow open press "OK".

Step 6.1 - PHOENICS

At this point the .DWG file is capable of being imported into either RhinoCFD or PHOENICS. Using Rhino, we can further optimize the geometry for easier pre-processing and potentially creating a better mesh for the CFD case.

The optimisations are discussed in the last section of the tutorial.

Step 7



In Rhino type in "Units" in the command prompt

Lower the Absolute tolerance by a few decimals.

Document Properties				×
Document User Text Grid Hatch Linetypes Location Mesh Notes	Units and tolerances Model unite Absolute tolerance: Angle tolerance:	0.0001 units		-
V Units Layout Web Browser Rhino Options	Custom units Name: Units per meter:	Millimeters		-
Advanced Alases > Appearance Cycles > Files General Idle Processor Keyboard Libraries	Distance display © Decimal O Fractional O Feet & Inches Display precision:	1.000	v	
Licenses > Modeling Aids > Mouse Plug-ins RhinoScript Selection Menu > Toolbars Updates and Statistics				
> View	▼	ОК	Cancel Help	

Step 8

We can now drag+n+drop our *.dwg file into Rhino

File Options	×
 Open file Insert file Import file Attach file 	?
ОК	Cancel

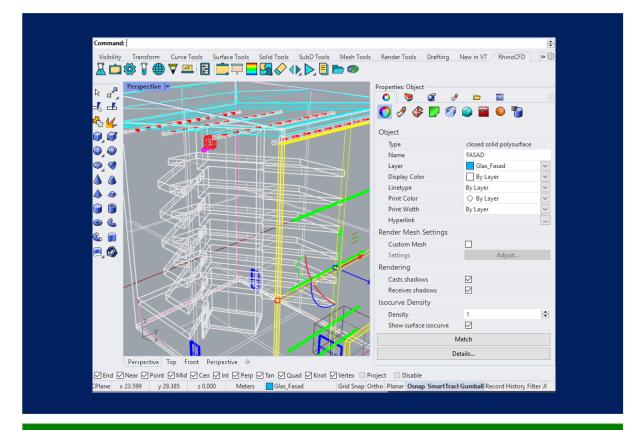


Import unreferenced layers Import unreferenced blocks Import unreferenced linetypes Convert wide polylines to surfaces Ignore thickness Convert regions to curves Mesh precision Automatic Double precision Single precision Model units
Ignore thickness Convert regions to curves Mesh precision Automatic Double precision Single precision
Automatic Double precision Single precision
Model units Feet
suput units Milimeters

Select the Model and Layout units according to your CAD files and press OK.

Step 9

If we now click on an object/part from the Revit model we will see it is detected as a closed solid polysurface. These objects can be successfully read by RhinoCFD.



Important Optimisations

In Revit

Revit files usually have many layers of information, not all of which will be necessary for the CFD analysis. It is therefore good practice to trim the Revit model before exporting.

In Rhino

When passing objects to the RhinoCFD plugin it can be helpful to separate the geometry into blocks of interest. This will reduce the complexity of the CFD mesh.

For example:

- Walls (and windows and others misc included within the walls) can be blocked into a single object if they are simply acting a containment for the room.
- In cityscape models, the buildings that are not of interest can all be blocked as a single Rhino object

To block objects in Rhino:

- select the objects
- type "Block" in the command prompt

Co Pa 1 c	ommand: Units ommand: _DocumentPrope ge to display <render> (R :losed polysurface added to :losed polysurface removed</render>	ender PostEffects Mesh selection.	Units PageUnits G	rid Notes Annot	tationStyles [Defau
	urve, 58 polysurfaces, 1996 mmand: Block	sh added to selection.				
	l 🗖 🏟 l 🌐 7	urve Tools Surface To			Mesh Tools	Rer
4	Perspective v					Prope O

• Set base point to 0, give it a name and press OK

1 curve, 58 polysurfaces, 1 mesh added to selection. Command: Block Block base point Command: Block Block base point: U				
Block Definition Properties	×s	Mesh Tools	Render To	
Name: Block 01 Description Hyperlink Description: URL:			Properties: C Object Type Name Layer Display Linetyp Print Cc Print W Hyperfin Render M	