

Version February 2010

Interface

RX-Revit

Link between RFEM/RSTAB and Autodesk Revit Structure

Program Description

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Contents

	Contents	Page		Contents	Page
1.	Introduction	4	3.1.3	Load Data	17
1.1	General Information about BIM	4	3.2	Import	21
1.2	RX-Revit	4	3.2.1	Structural Data	23
1.3	RX-Revit Team	5	3.2.2	Support Data	23
2.	Installation	6	3.2.3	Load Data	24
2.1	Versions	6	4.	Materials and Cross-sections	25
2.2	Installation Procedure	6	4.1	Materials	26
3.	Functionality	7	4.2	Cross-sections	28
3.1	Export	7	Α	Index	30
3.1.1	Structural Data	9			
3.1.2	Support Data	14			



1. Introduction

1.1 General Information about BIM

Building Information Modeling (BIM) is already widely-used in the automobile industry as well as in mechanical engineering and plant construction. Now, civil engineering benefits from this new planning method.

The term describes a new concept of digital planning in which all processes related to a building's life circle are connected with each other. It is an integrating overall process used to redesign planning, construction and management of buildings and structural works.

BIM is offering an innovative approach for designing, constructing and managing buildings. It is characterized by the direct and continuous availability of consistent and reliable highquality information concerning a project's design, timing and cost development.

Building Information Modeling does not represent an independent technology but a method for which appropriate basic technologies are required to use it efficiently. In this context, examples may be the following (efficiency in ascending order):

- CAD
- Object-oriented CAD
- Parameterized structural modeling

1.2 RX-Revit

As RFEM is based on an object-oriented data model and Revit Structure on the parametric structural modeling, the objects' intelligence won't get lost when exchanging data. This means that you will get an equivalent object for every column, wall or beam in Revit Structure/RFEM, not only a collection of lines or surfaces.



1.3 RX-Revit Team

The following people were involved in the development of RX-Revit:

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2. Installation

RFEM provides an integrated interface to Revit Structure by default. In Revit Structure, however, after it has been installed, the interface must be activated manually.

2.1 Versions

The following versions of Autodesk Revit Structure are supported:

- Autodesk Revit Structure 2009 32-bit (development stopped)
- Autodesk Revit Structure 2010 32-bit
- Autodesk Revit Structure 2010 64-bit

2.2 Installation Procedure

If you have installed RFEM/RSTAB first and then Revit Structure, start the file "Revit-Installer.exe" to install the interface. The file can be found in the following directories:

Win XP 32-bit: C:\Program Files\Common Files\Dlubal\ImportExport\RX-Revit

Win Vista 32-bit: C:\Program Files\Common Files\Dlubal\ImportExport\RX-Revit

Win Vista 64-bit: C:\Program Files (x86)\Common Files\Dlubal\ImportExport\RX-Revit

Start Revit Structure and open a model. In the menu tab "Add-Ins", you find the entry "External Tools" and the menu items "Export to RFEM...", "Import from RFEM...", "Export to RSTAB..." and "Import from RSTAB..." that enable the interface.





3. Functionality

This manual section describes to which extent the interface to Revit Structure can be used.

3.1 Export

When exporting a structure from Revit Structure to RFEM/RSTAB, different options that are described below can be selected.

"General Settings" tab

 Revit Structure - Dlubal Link General Settings Structural Settings Z-Direction Upwards Downwards RFEM Create new Structure Overwrite existing Structure Update existing Structure Update existing Structure Termove absent Objects Do not overwrite Member Releases 	Options Apply Member Eccentricities Apply Surface Eccentricities Only Selected Objects Export Release of type Fixed Updated Objects to Partial View	
		Start Close

Figure 3.1: Interface in action (RFEM)

Orientation of Z-axis

The orientation of the Z-axis can be set "Upwards" or "Downwards".

In Revit Structure, upwards is set by default. In RFEM, downwards is the default setting. Therefore, it is recommended for further calculations in RFEM to set the orientation of the Z-axis downwards when importing data from Revit Structure.

RFEM / RSTAB

Use the option "Create new Structure" to export the current Revit Structure model to a new RFEM or RSTAB structure.

Select "Overwrite existing Structure" to overwrite the RFEM/RSTAB structure. If more than one structure is open, you can select the structure you want to replace.

When you select "Update existing Structure", you can update the RFEM/RSTAB structure to adjust it to the Revit Structure model. During the update process, objects that have been deleted in Revit Structure can also be removed in the RSTAB/RFEM structure by ticking the check box "Remove absent Objects". Select "Do not overwrite Member Releases" to avoid overwriting those member release definitions that have already been modified in RFEM/RSTAB.



Options

With the settings in this dialog section, you can consider member and surface eccentricities as well as selected objects only, for example to calculate a plate individually.

When you select "Export Release of type Fixed", RFEM/RSTAB interprets all releases that are defined as fixed in Revit Structure in a way that they are member releases but without degrees of freedom.

Use the option "Updated Objects to Partial View" to define a partial view in RFEM/RSTAB where only the updated objects can be found.

"Structural Settings" tab

📕 Revit Structure - Dlubal Link	×.
General Settings Structural Settings Loads ✓ Apply Loads ✓ Self-weight in the LC Dead load Export load combinations of type "Envelope" as Load Group C Load Combination	
Conversions Convert Isolated Foundations to Nodal Support YYY NNY Convert Wall Foundations to Line Support YYY NNN	
	Start Close

Figure 3.2: Interface in action (RSTAB)

Loads

It is possible to export loads that are available in Revit Structure to RFEM/RSTAB.

You can even decide if you want to consider the self-weight in a load case. In addition, you can select whether load combinations of the type "Envelope" should be exported as load groups or as load combinations.

Conversions

By selecting the corresponding options, single or wall foundations can be converted respectively into hinged nodal and line supports (only RFEM).



3.1.1 Structural Data

Effects of instance properties in Revit

The contents of the highlighted areas shown in the following figures are not considered when exchanging data from Revit Structure to RFEM/RSTAB. Thus, they do not influence the analysis model in RFEM/RSTAB. Furthermore, if considered necessary, you find recommendations in this chapter about how the analysis model in Revit Structure should be set.

Vertical members (columns)

amily: H-Stütze, weiter Flansch	•	Load
ype: HE300M	•	Edit Type
Control colorited		
Descented	or to-pe-created inst	Value
Parameter		Value
Column Location Mark	E.2	*
Para Loval	E-o	
Base Officet	0.0000	
Ton Level	Fhene 4	
Top Offset	0.0000	
Moves With Grids		
Column Style	Vertical	
Graphics		\$
Top Connection Symbol	None	
Base Plate Symbol		
Materials and Finishes		\$
Stützenmaterial	Baustahl S 235	
Dimensions		\$
Volume	0.089 m ³	~
Identity Data	0.000 111	•
Comments	1	^
Mark		
Dhasiaa	1	•
Phase Created	Neue Konstruktiv	*
Phase Demolished	None	511
Structural Analysis	:	\$
Top Release	Fixed	
Top Fx		
Тор Гу		
Top Fz		
Тор Мх		
Тор Му		
Top Mz		
Bottom Release	Fixed	
Bottom Fx		
Bottom Fy		
Bottom Fz		
Bottom (VIX		
Bottom Mz		
	Gravity	
Applytical Model	Sintity	
		*
Rigid Links		
Rigid Links Auto-detect Horizontal Projection		
Rigid Links Auto-detect Horizontal Projection	Auto-detect	
Rigid Links Auto-detect Horizontal Projection Top Vertical Projection Bottom Vertical Projection	Auto-detect	
Rigid Links Auto-detect Horizontal Projection Top Vertical Projection Bottom Vertical Projection	Auto-detect Auto-detect	

Figure 3.3: Instance properties: column



Horizontal members (girders/beams)

Instance Properties	
Family: IPE-Balken	▼ Load
Type: IPE300	▼ Edit Type
Instance Parameters - Control select	ted or to-be-created instance
Parameter	Value
Constraints	
Reference Level	Ebene 4
Work Plane	Level : Ebene 4
Start Level Offset	-0.0000
End Level Offset	-0.0000
z-Direction Justification	Тор
z-Direction Offset Value	0.0000
Lateral Justification	Center
Orientation	Normal
Cross-Section Rotation	0.000-
Construction	*
Start Extension	0.0000
End Extension	0.0000
Materials and Finishes Beam Material	Baustahl S 235
Structural	*
Stick Symbol Location	Center of Geometry
Moment Connection Start	None
Moment Connection End	None
Cut Length	6.6950
Structural Usage	Girder
Camber Size	
Number of studs	
Dimensions	*
Length	7.0000
Volume	0.035 m ⁻
Identity Data	· · · ·
Comments	
Phasing	
Phase Created	Neue Konstruktion
Phase Demolished	None
Structural Analysis	
Start Release	Pinned
Start Fx	
Start Fy	
Start Fz	
Start Mx	
Start My	
Start Mz	
End Release	Pinned
End Fx	
End Fy	
End My	
End My	
End Mz	
Analyze As	Gravity
Analytical Model	*
Vertical Projection	Auto-detect
Auto-detect Horizontal Projection	on 📃
Other	\$
Start Extension Calculation	3.0127
End Extension Calculation	3.0127
	OK Cancel
	Current

Figure 3.4: Instance properties: beams

3 Functionality



For girders or beams that should be designed as downstand/floor beams, it is recommended to set the analysis model of those objects in Revit Structure as shown below, in case you want to export member eccentricities to RFEM as well:

Instance Proper	ties				Ŀ	X
Family: IPE-Ba	alken			Lo	ad	
Type: IPE30	0		•	Edit	Type	
Instance Parameter	rs - Control selected	or to-be-created	instance	2		
Para	ameter		Value	:		-
Constraints		•			\$	
Reference Level		Ebene 2				
Start Level Offse	t	-0.3000				
End Level Offset		-0.3000				
z-Direction Justi	fication	Тор			-	
z-Direction Offse	et Value	0.0000				
Lateral Justificati	ion	Center				
Cross-Section Re	otation	0.000°				
Construction					×	
Materials and Fi	nishes				×	
Structural					×	
Dimensions					×	
Identity Data					×	
Phasing					×	
Structural Analy	/sis				×	
Analytical Mode	:I				\$	
Vertical Projection	on	Ebene 2				
Auto-detect Hor	izontal Projection					
Other					\$	-
		0	к		Cancel	

Figure 3.5: Instance properties: beam (designed as downstand beam)



Figure 3.6: Result in RFEM

To enable the rib function so that you can use the "Effective Width", you must activate this function in RFEM first by opening the "Edit Member" dialog box and selecting "Rib" in the dialog section "Member Type".





Vertical surfaces (walls)

Instance Properties	
Family: System Family: Basic W	/all Load
Type: Außen - 300mm Beton	
naber boominoean	
instance Parameters - Control select	ed or to-be-created instance
Parameter	Value
Constraints	*
Location Line	Wall Centerline
Base Constraint	Ebene 2
Base Offset	0.0000
Base is Attached	
Base Extension Distance	0.0000
Top Constraint	Up to level: Ebene 3
Unconnected Height	3.0000
Top Offset	0.0000
Top is Attached	
Top Extension Distance	0.0000
Room Bounding	
Related to Mass	
Chausehumel	
Structural	· Development i hande element 40.025
Rebar Cover - Exterior Face	Bewenrungsüberdeckung 1 <0.025>
Rebar Cover - Interior Face	Bewenrungsüberdeckung 1 <0.025
Repar Cover - Other Faces	Bewenrungsuberdeckung 1 <0.025>
Structural Usage	Bearing
Dimensions	*
Length	14.0000
Area	39.390 m ²
Volume	11.817 m³
Identity Data	*
Comments	
Mark	
Phasing	*
Phase Created	Neue Konstruktion
Phase Demolished	None
Analytical Model	*
Enable Analytical Model	
Horizontal Projection	Auto-detect
Top Vertical Projection	Auto-detect
Bottom Vertical Projection	Auto-detect
	OK Cancel

Figure 3.7: Instance properties: wall



Horizontal surfaces (floors/plates)

=amily:	System Family: Floor	▼ Load
Europa (Constincts 200 mm	
Abe:	Generisen 200 mm	• Edit Type
Instance Para	ameters - Control select	red or to-be-created instance
	Parameter	Value
Constraint	s	
Level		Ebene 4
Height Off	set From Level	0.0000
Room Bou	nding	
Related to	Mass	
Structural		
Structural		
Rebar Cove	er - Top Face	Bewehrungsüberdeckung 1 <0.025>
Rebar Cove	er - Bottom Face	Bewehrungsüberdeckung 1 <0.025>
Rebar Cove	er - Other Faces	Bewehrungsüberdeckung 1 <0.025>
Dimension	IS	
Slope		
Perimeter		70.0000
Area		245.000 m ²
Volume		49.000 m ³
Thickness		0.2000
Identity D	ata	
Comments	;	
Mark		
Phasing		
Phase Crea	ted	Neue Konstruktion
Phase Dem	olished	None
Structural	Analysis	
Structural	Jsage	Slab
Structural U		
Structural U Analytical	Model	
Structural U Analytical Vertical Pro	Model ojection	Auto-detect
Structural U Analytical Vertical Pro	Model ojection	Auto-detect

For the export of floors, it is useful to fix the vertical projection of the analytical model to a plane.

	Instance	Properties			×
	Family:	System Family: Floor	•	Load	
	Type:	Generisch 200 mm	•	Edit Type	
	Instance Par	ameters - Control selected o	r to-be-created inst	ance	
		Parameter	1	Value	
	Constrain	ts			*
	Structura	I			*
	Dimensio	ns			*
	Identity D	Jata			*
	Phasing				*
	Structura	l Analysis			*
L	Analytical	Model			\$
L	Vertical Pr	ojection	Ebene 2		-
	1		ОК	Cancel	

Figure 3.9: Instance properties: floor plate (relation to plane)



Figure 3.8: Instance properties: floor plate



3.1.2 **Support Data**

It is possible to define supports in Revit Structure that can be exported to RFEM/RSTAB. Depending on the support condition, you can set different degrees of freedom.

Point support condition

Instance	Properties		×
=amily:	System Family: Boundary	/ Conditions 👻	Load
Гуре:		•	Edit Type
Instance Par	ameters - Control selecte	d or to-be-created inst	ance
	Parameter		Value
Structura	l Analysis		*
Boundary	Conditions Type	Point	
State		Fixed	-
Translatio	n in		\$
14 TT 1 4	ion	Fixed	
X I ranslat			
X Translat Y Translat	ion	Fixed	
X Translat Y Translat Z Translat	ion ion	Fixed Fixed	
X Translat Y Translat Z Translat Rotation	ion ion about	Fixed Fixed	*
X Translat Y Translat Z Translat Rotation X Rotation	ion ion a bout	Fixed Fixed Fixed	*
X Translat Y Translat Z Translat Rotation X Rotation Y Rotation	ion ion about 1	Fixed Fixed Fixed Fixed Fixed	*

Figure 3.10: Instance properties: point support condition

In the figure above, the state "Fixed" is selected in Revit Structure. The figure below shows the corresponding equivalent in RFEM (RSTAB analog). It is also possible to export translational and rotational springs from Revit Structure to RFEM/RSTAB.

New Nodal Support	×
Support No. On Nodes No.	
Support Rotation	× ×
Sequence: Rotated about XYZ X: 0.00 + b [*] Y: 0.00 + b [*] Z: 0.00 + b [*]	
Elastic Support via	
Column in Z	
Support Conditions	
Support Spring Constant	Support Ineffectivity
₩ ux [MN/m]	None
✓ uy [MN/m]	None
✓ uz: [MN/m]	None 🔻
Restraint Spring Constant	
ØX (MNm/rad)	
ØY (MNm/rad)	
ØZ (MNm/rad)	
Comment	
	•
	OK Cancel

Figure 3.11: Instance properties: nodal support (RFEM)



Fixed Pinned



Line support condition

Type:	Fdit Type
instance Parameters - Control select	ted or to-be-created instance
Parameter	Value
Structural Analysis	
Boundary Conditions Type	Line
State	User
Translation in	
X Translation	Fixed
Y Translation	Fixed
Z Translation	Spring
Z Spring Modulus	1.00 kN/m ²
Rotation about	
X Rotation	Spring
X Spring Modulus	1.0 kN-m/°/m

Figure 3.12: Instance properties: line support condition

Also for lines it is possible to export translational and rotational springs from Revit Structure to RFEM.



Figure 3.13: Instance properties: line support



Area support condition

Family: System Family: Bound	lary Conditions			
Гуре:	► Edit Type			
Instance Parameters - Control sele	cted or to-be-created instance			
Parameter	Value			
Structural Analysis	\$			
Boundary Conditions Type	Area			
State	Pinned 🖉			
Translation in	\$			
X Translation	Fixed			
Y Translation	Fixed			
Z Translation	Fixed			

Pinned User

Figure 3.14: Instance properties: area support condition

When exporting an area support condition from Revit Structure to RFEM, line supports, as a matter of principle, are exclusively created on all boundary lines of the area. In case the area support condition was applied beneath a floor plate that was generated as foundation plate, a surface elastic foundation will be created in RFEM in addition to the line supports.

New Surface Elastic Foundation	— X —
No. On Surfaces No. Spring Constants Calculate Automatically with Additional Module RF-SOILIN (Soil-Structure Interaction Analysis)	Y * X Z
Translation Shear C1,x: 1000.000 m/m [MN/m³] C2,x: 0.000 m/m [MN/m] C1,y: 1000.000 m/m [MN/m³] C2,y: 0.000 m/m [MN/m] C1,z: 50000.000 m/m [MN/m³] Equivalent time	V · · · ×
Comment	C C
	OK Cancel

Figure 3.15: Instance properties: surface elastic foundation

The setting options for support conditions in Revit Structure are adequate, but settings in RFEM/RSTAB are more comprehensive.



3.1.3 Load Data

Revit Structure provides several options shown in Figure 3.16 to create loads.

s	lome Insert	Annotate	Modify	Analyze	Architect	t & Site	Collab	orate View	ı Manage	Add-Ins
ß		Point Loads Point Load 1			ļ	Į1	Ē	Ł		F
Modify	Element Properties	Change Eleme	ent Type	•	Point Load	Line Load	Area Load	Hosted Point Load	Hosted Line Load	Hosted Area Load
Selection		Element						Loads		

Figure 3.16: Load types in Revit Structure

The equivalent load types in RFEM are the following:

Revit Structure	RFEM	RSTAB
point load	free concentrated load	-
line load	free line load	-
area load	free polygon load	-
hosted point load	nodal load	nodal load
hosted line load	line load	member load
hosted area load	surface load	-

To tap the full potential of all load types, it is recommended to generate loads in RFEM/RSTAB, because the number of load types as well as their setting options in RFEM/RSTAB are more comprehensive than in Revit Structure.

ert Annota oL Load Load Cases Combinations Loads

Furthermore, it is possible in Revit Structure to create load cases and load combinations. Load groups, however, cannot be created.

Load cases are exported in the same way as they were defined in Revit Structure, provided that the option to consider the self-weight in load case 1 has been activated in order to carry out the export as shown in the following figures.



Name 0 1 2 3	Case Number	Nature Eigengewicht Nicht ständig Schnee	Category Dead Loads Live Loads Live Loads	Dup De	plicate
Name 1 2 3	Case Number	Nature Eigengewicht Nicht ständig Schnee	Category Dead Loads Live Loads Live Loads		plicate elete
1 2 3		Eigengewicht Nicht ständig Schnee	Dead Loads Live Loads Live Loads	De	elete
2 3		Nicht ständig Schnee	Live Loads Live Loads		ciette
3		Schnee	Live Loads		
				-	
				-	
		Name			Add
icht					elete
ıdig					
idige Dachlasten					
/ohnlich					
ur					
	icht ndig ndige Dachlasten vöhnlich tur	ndige Dachlasten vöhnlich tur	ndige Dachlasten vöhnlich tur	Name Name icht ndig Dachlasten vöhnlich tur	Name

Figure 3.17: Load cases in Revit Structure

Load Case	s		x	Edit Load Case - General Data	
LC				LC No. Load Case Description	LC Factor
Load Ca	ses				
No.	Description	Results	<u>^</u>	General Calculation Parameters	
LC1	DL1	No		Type of Load Case	Self-weight
LC2 LC3	LL1 Snow	No No	H H	Permanent Variable Exceptional Imperfection Prestress Favourable Permanent Favourable Variable Comment	✓ Consider with Factor in Direction: X. 0.000 ⊕ Y. 0.000 ⊕ Z: 1.000 ⊕
					- 🖻
2		Open Close			OK Cancel

Figure 3.18: Load cases in RFEM

Load combinations may be created in Revit Structure, but it is not possible to assign a special criterion to load cases. Load combinations with the definition type "Combination" are exported as load groups to RFEM/RSTAB. For load combinations defined as "Envelope", you can decide if you want to export them to RFEM/RSTAB as load groups or load combinations.



uctural	Settings									
Symbolic	c Represen	ation Settings Load Ci	ases Load Com	binations Analy	tical Mod	el Settings	Bour	ndary C	Conditions Se	ettings
Load	l Combinati	n								
	Nan	e Form	ula	Туре		State			Usage 🔺	Add
		(all)	-	(all)	👻 (all)		-	(all)		
1	ULS	1.35*DL1 + 1.5*LL	1	Combination	Serv	iceability				Delete
2	SLS	1*DL1 + 1*LL1		Envelope	Sen	viceability				
									+	
 •	•		m						•	
-Edit S	Selected Fo	rmula			Loa	d Combinat	ion Us	sage		
Γ	Facto	r Case or	^	Add		Set		Name		Check All
1	1.35000) DL1								
2	1.50000) LL1		Delete						Check None
		1								
										Add
										Delete
										Delete
			-							
									ок	Abbrechen Hilfe

Figure 3.19: Load combinations in Revit Structure

dit Load (Group				
LG No.	Load Group De	escription			LG Factor
1	ULS			-	0.00 🔻
General	Calculation Pa	rameters			
Load Ca	ases in Load Gro	oup [e.g. '1.35*LC1 + 1.5*LC2	2')		Code
1.35*L0	C1+1.5*LC2				DIN 18800 -
				-	
			Set i	n Table	
				in rubic	
Existing	Load Cases			Set in the I	Load Group
No.	LC Type	LC Descri	ption 🔺	No.	Factor
LC1	Permanent	DL1		LC1	1.35
LC2	Variable	LL1		LC2	1.50
			V	1.25	
	Add to LG>			1.35	
Comme	nt				
				-	
2					OK Cancel

3 Functionality



lit Load (Combination								X
CO No.	Load Combinati	on Description							
1	SLS					-			
General	Calculation Par	ameters							
Combina	ation Criterion (e.	g. '1.35*LC1/p +	1.5*LC2 + 1.5*LC	C3 or 1.5*LC	(4')		Code		
1*LC1+	1*LC2					*	DIN 188	300	•
						-		1	
					Set	in Table			
						j		Ľ	
Existing	LC, LG, CO				Set in th	e Load Combin	ation		
No.	LC Type	De	escription		No.	Criterion	Factor	Group	
LC1	Permanent	DL1			LC1	Variable	1.00		
102	Variable	LL1 Snow			LC2	Variable	1.00	-	
LG1	Valiable	ULS							
				-				-	-
Ad	ld with '+'>				1.35	-	1		
	lal under Land Land				Perm	nanent 🕢			
A	ia with or>				Varia	able 🔍			
Commer	nt								
						-			
2							ОК	Cance	el

Figure 3.21: Load combination in RFEM



3.2 Import

When importing a structure from RFEM/RSTAB to Revit Structure, different options that are described below can be selected.

"General Settings" tab

🚚 Revit Structure - Dlubal Link		—X —
Revit Structure - Dlubal Link General Settings Z-Direction Upwards Downwards Revit Create new Structure Overwrite existing Structure Update existing Structure Update existing Structure Remove absent Objects Do not overwrite Member Releases	Options Apply Member Eccentricities Apply Surface Eccentricities Only Selected Objects Export Release of type Fixed Updated Objects to Partial View	
		Start Close

Figure 3.22: Interface in action (RSTAB)

Orientation of Z-axis

The orientation of the Z-axis cannot be changed when exporting data from RFEM/RSTAB to Revit Structure because Revit Structure does not provide such a function.

Revit

Even if the option "Create new Structure" is gray and therefore inactive, you can import a structure from RFEM/RSTAB to Revit Structure without having designed a model in Revit Structure previously. All you need is an opened/new project.

Select "Update existing Structure" to update the structure of the Revit Structure model. Tick the check box "Remove absent Objects" to remove objects in the update process, that have been deleted in RFEM/RSTAB, in the Revit Structure model.

Options

With the settings in this dialog section, you can consider member and surface eccentricities as well as selected objects only, for example to reduce the effort when aligning complex structures.

If you want to update "Only Selected Objects", take care to select all objects in RFEM that belong together (see Figure 3.23).



	02 -	Poicpial	0*1						
4 <u>F</u> ile	<u>E</u> dit	<u>V</u> iew	<u>I</u> nsert	<u>C</u> alculate	<u>R</u> esult	s <u>T</u>	ools	Ta <u>b</u> le	<u>O</u> ptions
i 🗋 📄 🖁	5	Undo		C	trl+Z	9			CO1 - SL
· • •/ •	\bigcirc	<u>R</u> edo		0	trl+A		Ês -	 	🕞 🌯 💈
Project Nav	Þ	Сору		c	trl+C	_			
🗐 😵 Be	1	Insert		C	trl+V				
i 🚞		Select				2	<u>A</u> II		Shift+A
	6	<u>E</u> dit Sele	ction	Alt+	Enter	₿	<u>R</u> hor	nboid	
.	ø	<u>F</u> ind via	Number.			*#+•	Secti	on <u>L</u> ine	
+	×	Delete S	election		Del	3 [±]	Selec	t/Desele	ect
	20	Delete <u>A</u>	II			đ	<u>S</u> pec	ial	
	ey.	Move/Co	py			đ	<u>I</u> n Pla	ane	
±	å	Rotate				\mathbf{z}	<u>F</u> ree	Nodes	
	<i>۵</i> ۵	Mirror				1	R <u>e</u> lat	ed Obje	ects
		Project							
		S <u>t</u> retch							

Figure 3.23: RFEM/RSTAB - selecting related objects

"Structural Settings" tab

Revit Structure - Dlubal Link General Settings Structural Settings	
Loads ✓ Apply Loads ✓ Self-weight in the LC DL1 Export load combinations of type "Envelope" as Load Group ⊚ Load Combination	
Conversions	
	Start Close

Figure 3.24: Interface in action (RFEM)

Loads

It is possible to import loads that are available in RFEM/RSTAB to Revit Structure. However, it is not possible to consider self-weight because Revit Structure does not provide such a function.

Load groups will be imported as load combinations with the definition type "Combination". When importing load combinations, the program checks first whether they include a load case, a load group and/or a load combination with the criterion "permanent". In such a case, the load combination is imported as load combination with the type "Combination". Otherwise the load combination is imported as load combination with the type "Envelope".



3.2.1 Structural Data

Basically, the extent of the import is similar to the extent of the export. However, some limitations exist on the part of Revit Structure, which are described in the following. Please note that all cross-section families to be used must be loaded before you start the import from RFEM/RSTAB to Revit Structure.

Vertical members (columns) and horizontal members (girders/beams)

see Export (chapter 3.1.1, page 9)

Vertical surfaces (walls)

In Revit Structure, it is not possible yet to model non-vertical walls by using the "wall" command. Therefore, non-vertical walls imported from RFEM are modeled as non-horizontal floor plates in Revit Structure.

Horizontal surfaces (floors/plates)

The import of rotated surfaces, B-spline surfaces and pipes from RFEM to Revit Structure is not possible, because Revit Structure does not provide equivalent objects.

3.2.2 Support Data

The setting options for supports in RFEM/RSTAB are more comprehensive than in Revit Structure. This means that there are some settings that cannot be imported to Revit Structure. These settings are shown in the highlighted areas of the figures below.

Nodal support



Figure 3.25: Nodal support RSTAB



Line support



Figure 3.26: Line support

Surface elastic foundation

Surface elastic foundations are not considered when importing data from RFEM to Revit Structure. Area support conditions won't be created. If a surface elastic foundation is defined on a horizontal surface in RFEM, this surface becomes a foundation plate in Revit Structure. If the surface does not have any surface elastic foundations, the surface becomes a floor plate.

3.2.3 Load Data

The following load types are not imported from RFEM/RSTAB to Revit Structure as Revit Structure does not provide any equivalents for them.

- free rectangular loads
- free circular loads
- imposed nodal deformations
- imposed line displacements
- imperfections



4. Materials and Crosssections

As a matter of principle, when exchanging data between Revit Structure and RSTAB/RFEM, the databases for materials and cross-sections from RSTAB/RFEM are used.

The respective Revit Structure name is compared with the corresponding database and, in case they are consistent, the relevant entry will be imported from the database.

If they are not consistent, the Revit Structure name will be imported and the material and cross-section properties will be generated according to the figures below.

1.3 Mate	rials										3	×
	i 🖂 i 🖳 🛃 🤭 🧲 😒 i 💿 🔅	3 🐹 🗚 🗣	🕩 I 🛄 📖	📝 😤 😡	🛛 🖬 🛛 🚛	$f_x \not \to_x$						
	A	B	C	D	E	F	G	H			-	
Material	Material	Modulus of Elast.	Shear Modulus	Poisson's Ratio	Specific Weight	Coeff. of Th. Exp.	Partial Factor	Material				1
No.	Description	E [kN/cm ²]	G [kN/cm ²]	μ[-]	γ [kN/m ³]	α [1/°C]	γм [·]	Model	Comment			
1	Concrete C30/37 DIN 1045-1: 2008-08	2830.00	1180.00	0.200	25.00	1.0000E-05	1.000	sotropi	Beton C30/37			
2	Concrete C40/50 DIN 1045-1: 2008-08	3140.00	1310.00	0.200	25.00	1.0000E-05	1.000	sotropi	Beton C40/50			
3	Finish	0.00	0.00	0.000	0.00	0.00	0.000	<u>I</u> sotropi	Finish_			
4	Steel S 235 DIN 18800: 1990-11	21000.00	8100.00	0.300	78.50	1.2000E-05	1.100	<u>I</u> sotropi	Baustahl S 235			
5	Metall - Stahl - 345 MPa	20000.00	7751.90	0.290	77.00	1.1700E-05	1.660	Isotropi	Metall - Stahl - 345 MPa		-	٠
Nodes	Lines Materials Surfaces Solids Opening	s Nodal Supports	Line Supports	Surface Elastic	Foundations Li	ne Releases Cros	ss-sections M	ember Rel	eases / Member Eccentricit	ies Id d	• •	ы
Comme	nt ([] to retain comment from a list of d	efault comments).									

Figure 4.1: Table 1.3 Materials

1.13 Cros	is-sections											×
23	2 🛛 🖼 🖪 🖂 🖓 🧲 🤇) 🔮 💈	3 🗙	≱ ⊶ ∋•	🛗 📰	📝 । 😭 🐼	🛛 🖬 🔒	$f_x \not f_x$	III I I I	B HE-M ORO RR		
	A	В	С	D	E	F	G	Н		J	К	A
Section	Cross-section	Material	Mom	ents of Inertia	[cm ⁴]	Cross-s	ectional Areas	s [cm ²]	Principal Axes	Rotation		
No.	Description	No.	Torsion I _T	Bending Iy	Bending Iz	Axial A	Shear Ay	Shear Az	α[°]	α' [°]	Comment	
4	Rectangle 300/600	3 🗖	370777.49	540000.01	135000.00	1800.00	1500.00	1500.00	0.00	0.00	300 x 600 mm	
5	HE-B 300	4	186.00	25170.00	8560.00	149.00	95.05	28.63	0.00	0.00	HE300B	
6	HE-M 300	4	1410.00	59200.00	19400.00	303.00	202.24	58.75	0.00	0.00	HE300M	=
7	IPE 300	4 🔳	20.20	8360.00	604.00	53.80	26.83	19.79	0.00	0.00	IPE300	
8	WRF 1000X210	5 🗖	100000000.	100000000.	10000000.	10000.00	10000.00	10000.00	0.00	0.00	WRF1000x210_	
Nodes	Lines Materials Surfaces S	olids Oper	nings Nodal S	Supports Line	Supports S	urface Elastic	Foundations	Line Releases	Cross-section	s Member Re	leases Member Eccentricities	14 4 F FI
Comme	nt ([] to retain comment fr	rom a list o	of default cor	mments).								

Figure 4.2: Table 1.13 Cross-sections



4.1 Materials

In addition to the transfer of materials from Revit Structure to RSTAB/RFEM, it is possible to consider standards by creating your own material conversion.

In the following, you find a description on how to convert material.

First, find out where the material conversion file is stored. Select "Import" on the RSTAB/RFEM "File" menu to open the "Import" dialog box. Then click the "Details" button to open another dialog box. In the "All Formats" tab, the appropriate file directory is shown.

Import			X
Import Type		Direct Imports	
OSTV Format - I Detail S Steel Constructio	ettings for Import		
ProSteel 3D (*.st	mats DSTV Interface (*.stp)	2010	
Tekla Structures Custo C.NP	omers Conversion File for Materials: ProgramData\Dlubal\StammDat\ConvertFile_Material		
Intergraph Frame Custo	omers Conversion File for Cross-sections:	DXF Layer	
Advance Steel (C:\P	ProgramData\Dlubal\StammDat\ConvertFile_CrossSe	ection.txt isting	
CIS/2 Structural	o Plausibility Check after Import	Z Axis: Default 👻	
O DXF Format - Sti	io Plausibility Check before Export ixport only Selected Objects	Switching of Coordinates Mirror	
Glaser Format Structure Data fr and r	: ng Z axis direction, changing coordinates mapping mirroring affects local system of topology and load	X->X •	
Program PLATE (*.000, *.001, *.0	s and may lead to unwanted results.	Z->Z	
Strakon (*.cfe)		OK Cancel	
		OK Ca	ncel

Figure 4.3: RFEM directory for material conversion file

Open the file "ConvertFile_Material.txt", for example by using the editor.

ConvertFile_Material.txt - Editor	x
Datei Bearbeiten Format Ansicht ?	
; Convert file for materials name	*
; Format: ; "Material name"; "Material name in RSTAB/RFEM" ; "Material name"; "Material name in RSTAB/RFEM Code name"	
Example "5235J0": "Baustahl S 235 J0" "C30/37": "Beton C30/37" "C30/37": "Beton C30/37 DIN 1045-1: 2008-08" "C30/37": "Beton C30/37 ÖNORM B 4700: 2001-06"	Ŧ
<	►

Figure 4.4: Material conversion file



Now you can define your own conversion settings by entering the accurate Revit Structure name and the right name including standard from RSTAB/RFEM as shown in the example above.

Please take care to avoid semicolons in front of the line containing the material name, as otherwise the complete line will be evaluated as a "comment" and therefore will lose its influence on the conversion.

Save the conversion file by clicking "Save as" on the "File" menu. In the next dialog box, select "UTF-8" in the coding field and overwrite it with the present file.

ConvertFile_Material.txt - Editor	X
Datei Bearbeiten Format Ansicht ?	
Speichern unter	×)
Suchen	۶
Dateiname: ConvertFile_Material.txt	7
Dateityp: Textdateien (*.txt)	•
Image: Speicher Codierung: UTF-8 ■ Abbrechen	
	-
<	▶

Figure 4.5: Material conversion file



4.2 Cross-sections

The conversion for cross-sections is similar to the conversion of materials. It is possible to create an appropriate cross-section conversion file, for example to recognize directly cross-sections created in SHAPE (add-on module) when transferring data from Revit Structure to RSTAB/RFEM.

In the following, you find a description on how to convert cross-sections.

First, find out where the cross-section conversion file is stored. Select "Import" on the RSTAB/RFEM "File" menu to open the "Import" dialog box. Then click the "Details" button to open another dialog box. In the "All Formats" tab, the appropriate file directory is shown.

Import	23
Import Type Direct Imports	
DSTV Format - Detail Settings for Import Steel Constructir	_
ProSteel 3D (*.st All Formats DSTV Interface (*.stp) 2010	
Tekla Structures Customers Conversion File for Materials: C:\Program Data\Diubal\StammDat\ConvertFile_Material.bd Image: Customers ConvertFile_Material.bd	2
Intergraph Frame Customers Conversion File for Cross-sections:	
Advance Steel (C:\Program Data\Dlubal\Stamm Dat\Convert File_CrossSection txt ing ine	
CIS/2 Structural	
DXF Format - Sti Do Plausibility Check before Export ASCII File of the Export only Selected Objects Switching of Coordinates Mirror	
Glaser Format Structure Data fi Forcing Z axis direction, changing coordinates mapping and mirroring affects local system of topology and load Y → Y →	
Program PLATE (*.000, *.001, *.€ Use only if really needed. Z→Z	
Strakon (*.cfe)	

Figure 4.6: RFEM directory for cross-section conversion file

Open the file "ConvertFile_CrossSection.txt" by using the editor, for example.

ConvertFile_CrossSection.txt - Editor		×
Datei Bearbeiten Format Ansicht ?		
; Convert file for cross-sections name ; :		*
; Format: ; "Cross-section name"; "Cross-section name in RSTAB/RFEM" ;		
;Example: "IPE80"; "IPE 80" ; "T50"; "T 50x50" ; "R042.4x3.2N"; "R0 42.4x3.2 (Mannesmann)"		Ŧ
L *	+	

Figure 4.7: Cross-section conversion file



Now you can define your own conversion settings by entering the accurate Revit Structure name and the right name from RSTAB/RFEM as shown in the example above.

Please take care to avoid semicolons in front of the line containing the cross-section name, as otherwise the complete line will be evaluated as a "comment" and therefore will lose its influence on the conversion.

Save the conversion file by clicking "Save as" on the "File" menu. In the next dialog box, select "UTF-8" in the coding field and overwrite it with the present file.

ConvertFile_CrossSection.txt - Editor	
Datei Bearbeiten Format Ansicht ?	
Speichern unter	x
Suchen	Q
Dateiname: ConvertFile_CrossSection.txt	•
Dateityp: Textdateien (*.txt)	
♥ Ordner durchsuchen Codierung: UTF-8 ■ Speichem ■ Speich	Abbrechen
	_
	-
4	►

Figure 4.8: Cross-section conversion file

С



A Index

Cross-sections
E
Export7
area support16
columns9
floors/plates13
girders/beams10
line support15
nodal support14
walls12
I
Import
columns23
floors/plates
girders/beams23
line support24
nodal support23
surface elastic foundation 24
walls23
Μ
Materials