SCIA ENGINEER

TOPIC TRAINING

ENGINEERING REPORT

Contents

Introduction

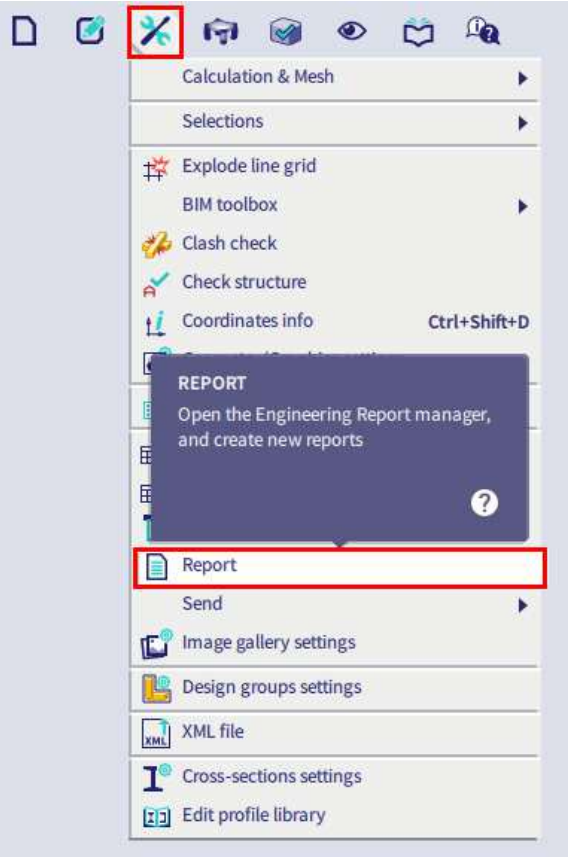
Engineering Report is a tool for easy and efficient creating of reports. All data, results tables and drawings can be used. Not only SCIA Engineer data are available, but external pictures and text files can be added as well.

Also integrated are the clipboard function and the commonly used shortcut CTRL+V to insert any external output into the report. So, there is no need to have separate documents: all outputs related to the project can be bundled into one global report.

Chapter 1: Engineering Report Manager

Engineering Report manager is a tool for creating new Reports and for opening existing ones.

The manager is a part of SCIA Engineer and can be started from **Menu bar > Tools > Report** or via searching the **SCIA Spotlight** or in the Reports workstation of the **Process Toolbar**.



The first clicking on the Report button creates a report (in case there is no existing report in the project) and automatically opens it (without first opening the Engineering Report manager).

Since version 14 it is possible to invoke the Engineering report manager also in case there is no report existing yet by pressing key "Shift" when clicking on the Report functionality.

1.1. Management of reports

The Engineering Report manager allows for basic management of reports. It is possible to **Create a new** report, **Delete an existing** report or **Copy an existing** report.

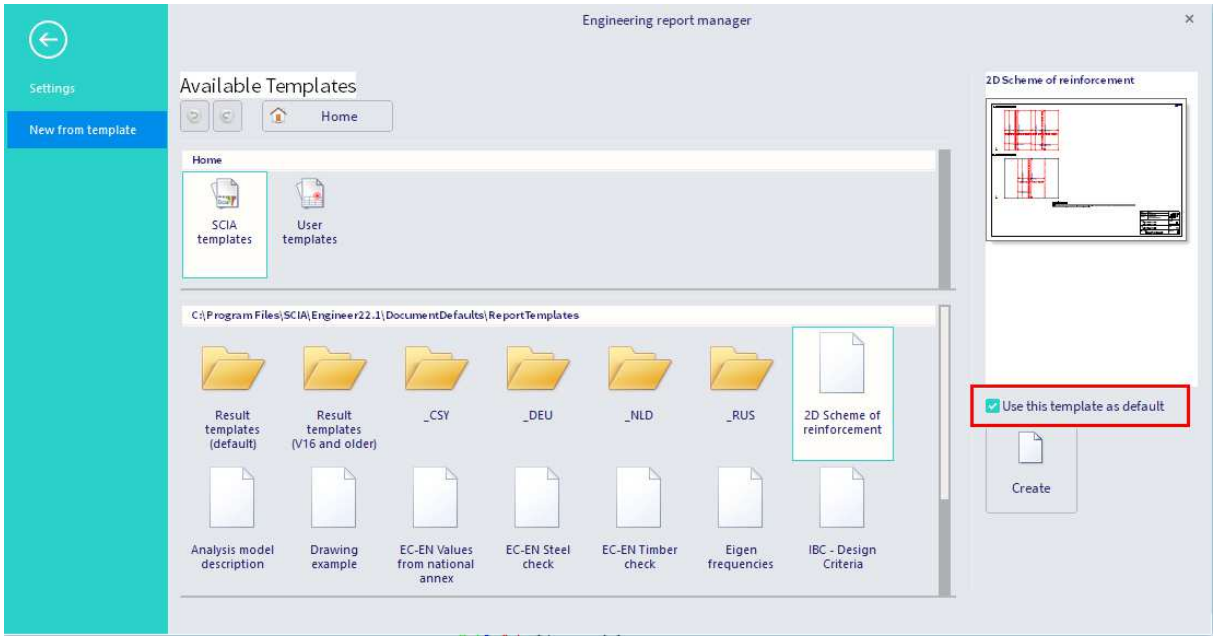
Existing reports are listed in the left part. On the right side there is a preview of the selected report.

1.2. Settings of Engineering Report manager

Via the wheel icon at the top left side of the dialog you can access the Report tools to manage the Settings.

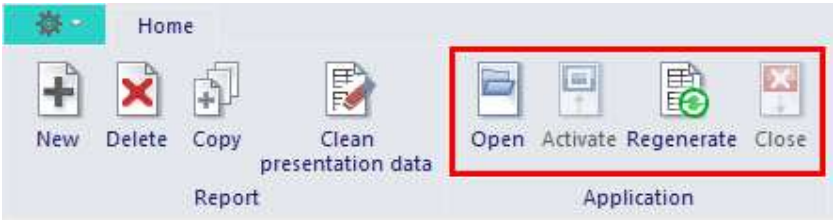
- **Automatically close the manager after opening a report** ensures that the Report manager will be closed automatically when you open some Engineering Report.
- **Show dynamic preview of selected report** switches between dynamic and static preview. Static preview displays only the last seen page from the report while the dynamic preview displays whole content of the report. Displaying of dynamic preview can take longer time and therefore it is by default switched off.
- **Store content of Inbox with the project** enables to keep the content of the Inbox available, also after restart of the project. This setting is new from version 15.
- **Create new report using default template** will simplify the creation of reports by using templates (possible since version 14). Several templates are prepared by SCIA, however you can also prepare your own set of templates.

The different templates are available on tab **New from template**. The default template can also be selected in this window. This template will then be used when creating a new report. You can e.g. create a report with your favourite Style and Header/Footer and use this report as your default.



1.3. Opening, closing, activating of a report

These actions are available from the ribbon in the Report manager dialog.



- **Open:** the selected report will be opened in case it is not opened yet (also possible by double-clicking on the report in the list of reports).
- **Activate:** the already opened report will be active (the window with the report will be on top of the screen).
- **Regenerate:** starts “External regeneration” of the report. It generates the report on the background and exports it to the selected file format (Export after external regeneration).
- **Close:** the application for the selected report will be closed (this action is also possible from the application).

It is possible to have opened more than one report from more projects at the same time. Each report will be opened as a separate instance of the Engineering Report application.

It is also possible to **Clean presentation data**. This action deletes all data which are not necessary for regeneration of the report. It deletes mainly content of all tables and content of some pictures. This reduces the size of the *.esa file and can be useful e.g. in case of sending the project with a report via e-mail.

1.4. Saving of a report

All reports are stored together with the project using the Save button in SCIA Engineer. It is not necessary (and not possible) to manually save a report. It is saved automatically (on the hard drive in the Temp folder) after finishing of each action. It means that in case of any problem in SCIA Engineer or Engineering Report, you do not lose anything from your work.

Renaming the projects can be performed by using the "Save as..." function, in which renaming projects also can be done while other reports are opened. The link between Engineering Report and the project is not damaged by renaming the project.

The Engineering Report application runs separately from the SCIA Engineer application and both need to communicate together to get the information about the project and store the reports into the project. Therefore Engineering Report can't work separately of SCIA Engineer in case of an accidental crash. You are informed about such a case by a displayed message and also by the communication status icon on the status bar of the Engineering Report application. You should close all reports which are currently running and then restart the SCIA Engineer application.

In case of a crash of SCIA Engineer and following restart of it, the Recovery dialog is automatically launched (see the description of Recovery in the Reference Guide of SCIA Engineer). Recovery of a selected project will recover also all reports included in this project. Recovered reports will be in the same status as they were immediately before the crash.

Important: It is necessary to save the project at least once after the creation of a new report before the potential crash of SCIA Engineer occurs. Otherwise the report will be lost.

1.5. Communication between Engineering Report and SCIA Engineer

The communication between Engineering Report and SCIA Engineer is asynchronous and is done via requests and responses. In case the Engineering Report needs some information from SCIA Engineer, it sends request to SCIA Engineer and waits for the response. The status of communication is monitored and displayed on the status bar of the Engineering Report.

Communication is established and currently not used.

Engineering Report is waiting for response from SCIA Engineer.

SCIA engineer is not responding. This can happen when some modal dialog is opened or the program is busy with some calculations or some problem in SCIA Engineer has occurred.

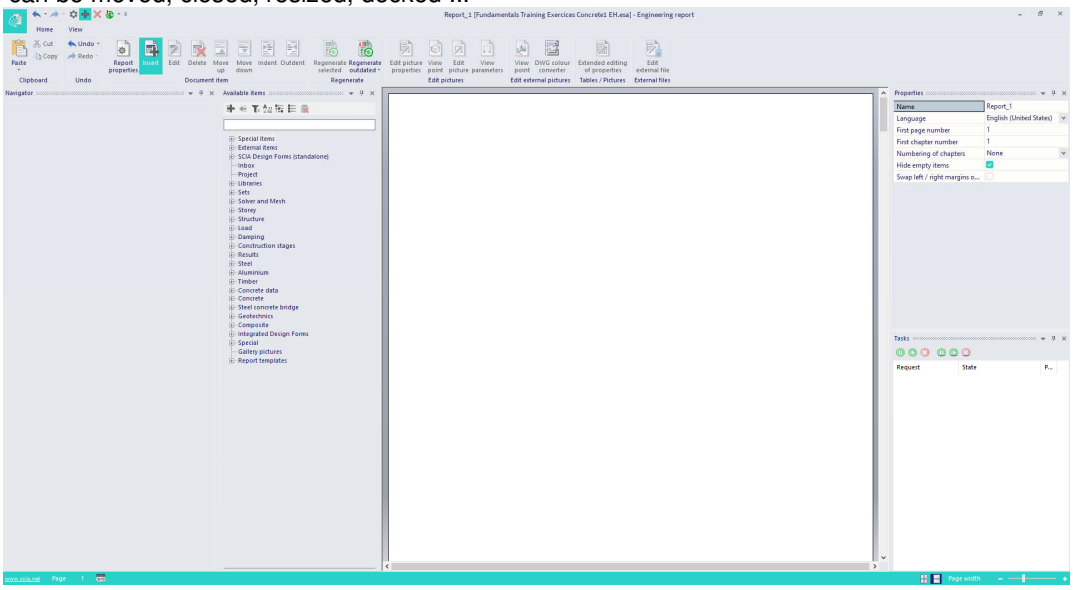
The Engineering Report runs separately from SCIA Engineer but it still needs data from SCIA Engineer during regeneration of report items. Those data are sent as responses on requests.

During regeneration of e.g. a table, the Engineering Report sends request for data to SCIA Engineer. SCIA Engineer generates those data (e.g. by running necessary calculations) and sends them back to the Engineering Report as a response. Afterwards the received data are formatted into the table of the Engineering Report.

Formatting and generation of data is done in separate processes, therefore they can be done simultaneously which is also visible on the progress bars in the Navigator. Both (formatting and generation of data) has its own progress bar.

Chapter 2: Engineering Report GUI

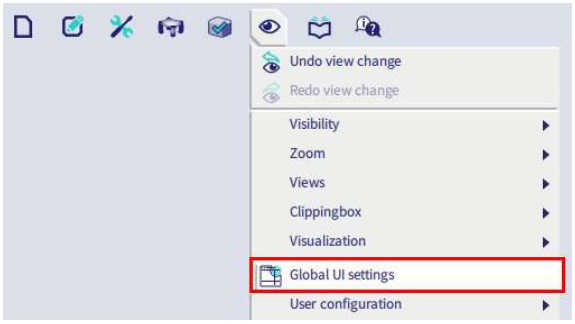
The Engineering Report consists of a set of main components. Some of them are fixed (ribbon, status bar), others can be moved, closed, resized, docked ...



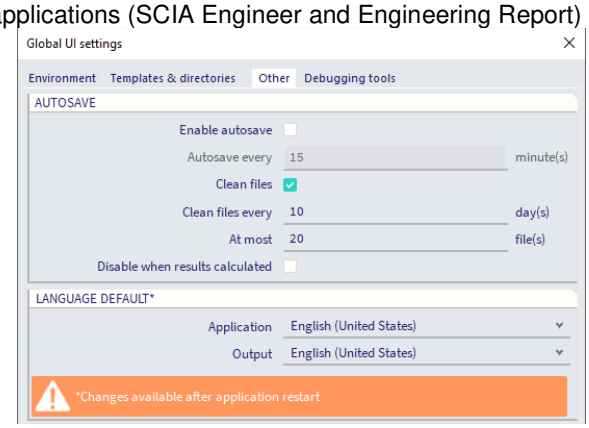
Each panel can be separately docked or undocked by dragging the header of the panel.

2.1. Adjusting view of the workspace

You can customize the graphic style and language in SCIA Engineer via Menu bar > View > Global UI settings:



Via tab Other the language of the Engineering Report workspace is controlled from SCIA Engineer. Language setting for both applications (SCIA Engineer and Engineering Report) is always the same.

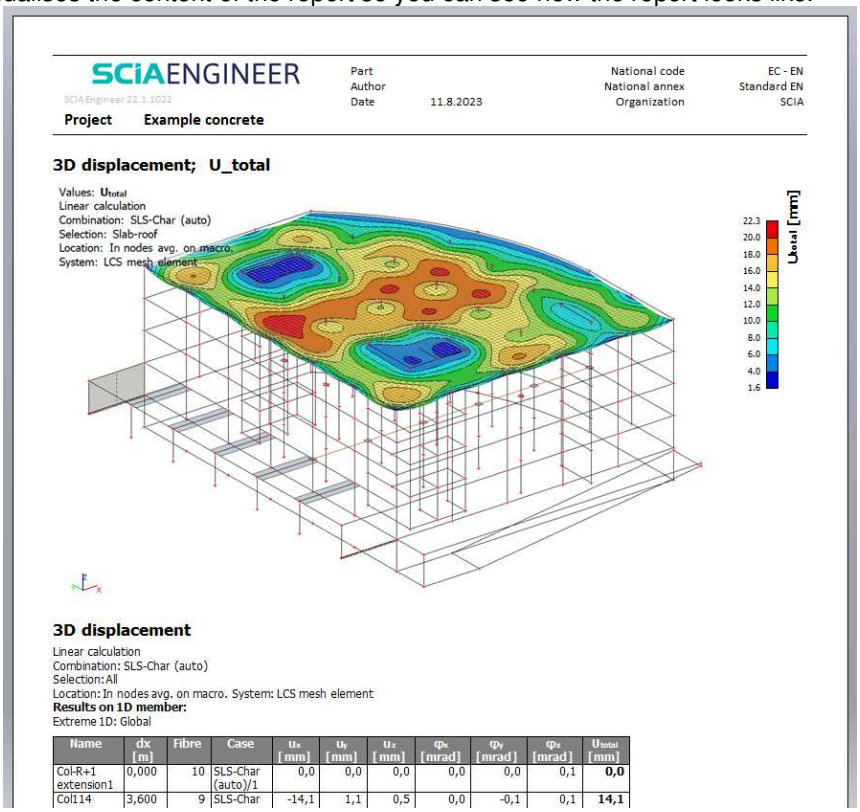


Change of language setting for the workspace is applied after restart of SCIA Engineer application.

2.2. Components of the workspace

2.2.1. Preview

The Preview visualises the content of the report so you can see how the report looks like.



SCIAENGINEER

SCIA Engineer 22.1.1022

Part		National code	EC - EN
Author		National annex	Standard EN
Date	11.8.2023	Organization	SCIA

Project Example concrete

3D displacement; U_total

Values: U_{total}
Linear calculation
Combination: SLS-Char (auto)
Selection: Slab-roof
Location: In nodes avg. on macro.
System: LCS mesh element

U_{total} [mm]: 22.3, 20.0, 18.0, 16.0, 14.0, 12.0, 10.0, 8.0, 6.0, 4.0, 1.6

3D displacement

Linear calculation
Combination: SLS-Char (auto)
Selection: All
Location: In nodes avg. on macro. System: LCS mesh element
Results on 1D member:
Extreme 1D: Global

Name	dx [m]	Fibre	Case	u_x [mm]	u_y [mm]	u_z [mm]	φ_x [mrad]	φ_y [mrad]	φ_z [mrad]	U_{total} [mm]
Col-R+1 extension1	0,000	10	SLS-Char (auto)/1	0,0	0,0	0,0	0,0	0,0	0,1	**0,0**
Col114	3,600	9	SLS-Char	-14,1	1,1	0,5	0,0	-0,1	0,1	**14,1**

2.2.2. Ribbon

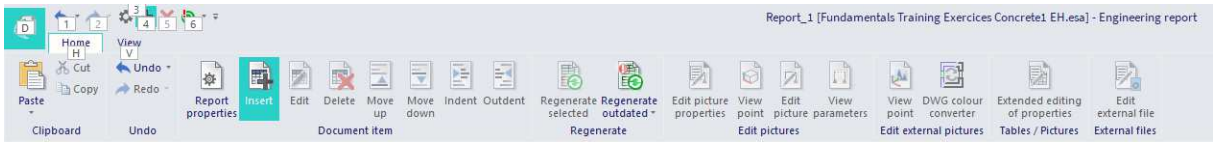
- The ribbon contains actions necessary for working in the Engineering Report. Modification actions are available on the tab "Home".

Panel New items can be activated/hidden using button Insert.

- Report preview related actions are available on the tab "View".

Navigator, Properties panel and Tasks panel can be activated/hidden via the group Show/Hide.

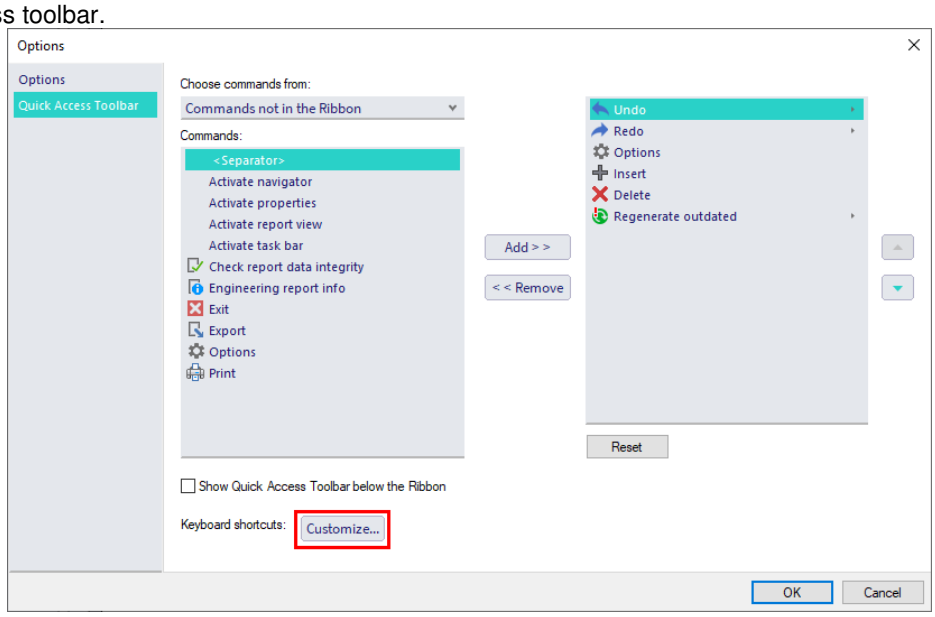
Some ribbon actions can be started using "Alt" key. Press "Alt" key and then continue by pressing letters or numbers as they are shown on the ribbon.



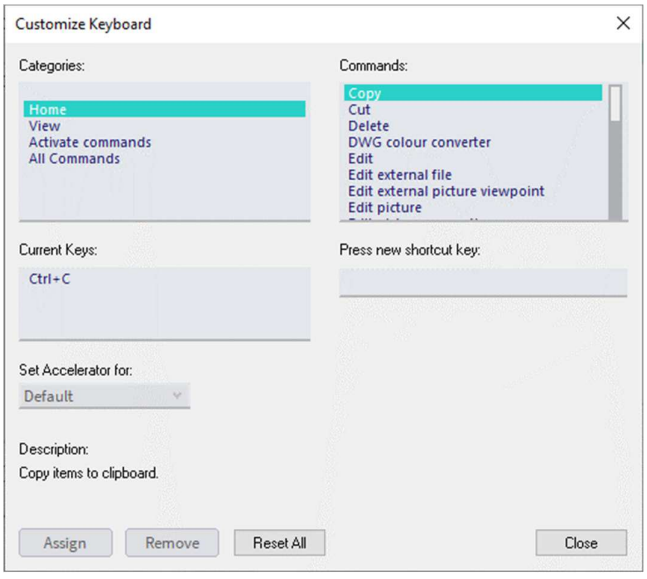
2.2.3. Quick access toolbar

Above the ribbons is the Quick access toolbar which can be customized using the "More commands..." option.

This opens the Options dialog, where it's possible to add, remove or rearrange buttons displayed on the Quick access toolbar.



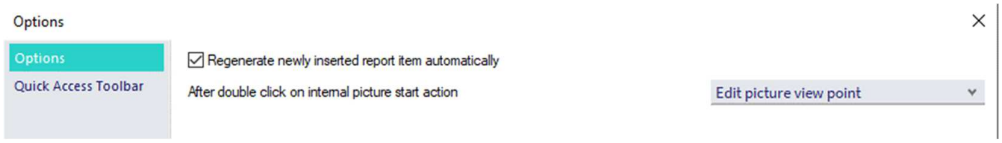
The button "Customize" opens the dialog for customizations of keyboard shortcuts. It is possible to assign any combination of keyboard keys to any of the ribbon actions. This will enable starting of the ribbon action using the defined keyboard combination.



Options

Since version 15 it is possible to modify some basic behaviour of the Engineering Report in the Options dialog.

It is accessible from the Quick access toolbar button Options.

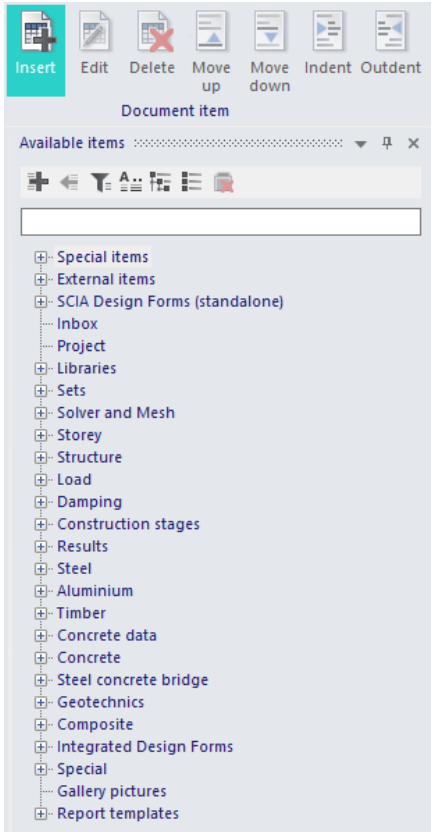


Regenerate newly inserted document item automatically
It is possible to switch ON/OFF the automatic regeneration of inserted report items. Automatic regeneration starts regeneration of an inserted report item immediately after the item (e.g. table) is inserted into the report.

After double-click on internal picture start action
You can define whether the double-click on a report picture starts editing of the view point or editing of the picture.

2.2.4. New items

New items panel enables inserting various report items into a report. There are listed mainly tables which are sorted into groups (Structure, Load, Steel ...).



There is a small toolbar with buttons for starting of necessary actions on the top of this panel.

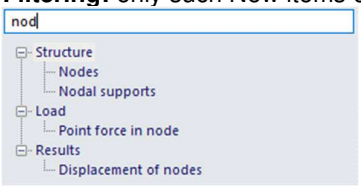
Adds selected item into report after the selected item (on the same level).

Inserts selected item into report under the selected report item (indenting).

Switches ON/OFF filtering of New items (by default switched ON). Filtering is based on in-build algorithm and depends on the data available in the project.

Switches between modes of searching in New items. Available modes are Filtering by typed string or Auto-complete of typed string:

Filtering: only such New items containing the typed string are displayed in the list.



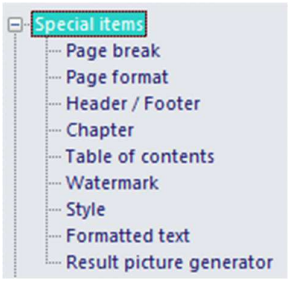
Auto-complete: provides suggestions while you type into the field. The suggestion is accepted by pressing "Enter" key.

Enables to expand all groups in the list.

Enables to collapse all groups in the list.

Deletes a selected inbox item.

Besides tables there are displayed also so called **Special items**. Special items does not display data from the project, but they can be used for formatting and finalization of the report. Those items are explained in the separate chapters.

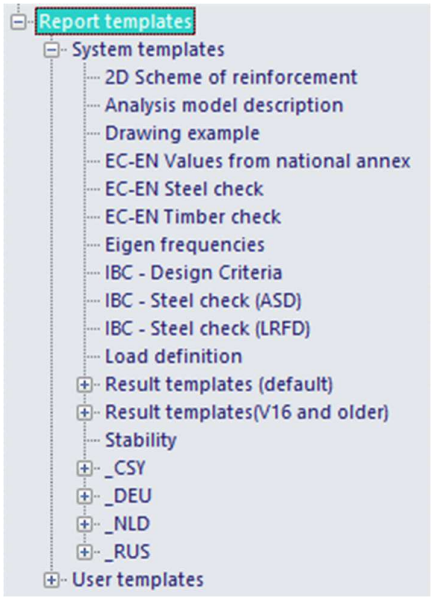


The group called **Inbox** stores tables or pictures which were previously sent from SCIA Engineer. They can be copied more times into the Engineering Report or moved to the Engineering Report.

There is a setting in the Engineering Report manager, where you can decide whether the content of the Engineering Report Inbox will be stored with the project or whether it will be lost after re-opening the project.

Another special group in the list of new items are **Gallery pictures.** There are listed all pictures from the picture gallery in this group.

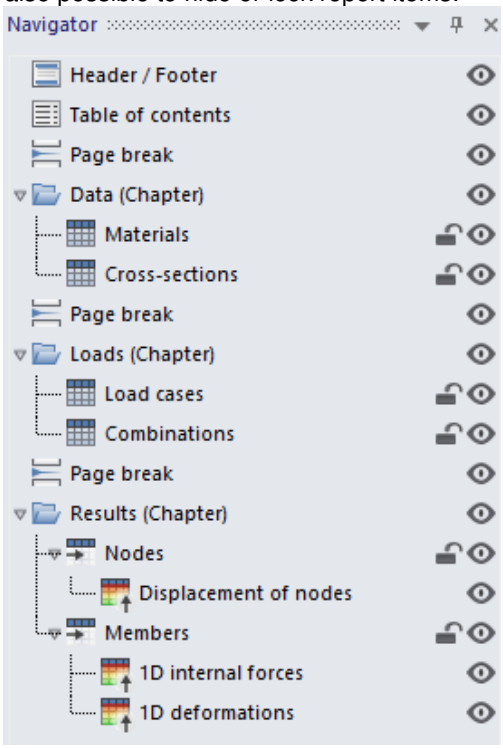
Since SCIA Engineer 14 it is also possible to insert **Report templates** into an existing report from the list of available templates. It is possible to insert more templates into one report. This item is explained in a separate chapter.



Since SCIA Engineer 14 it is possible to insert SCIA **Design Forms** calculations directly into the Engineering Report. The output from those calculation sheets is a part of the report. This item will also be explained in a separate chapter.

2.2.5. Navigator

The Navigator is used for displaying and modification of the report structure. It is possible to select, move, copy or delete report items. It is also possible to hide or lock report items.

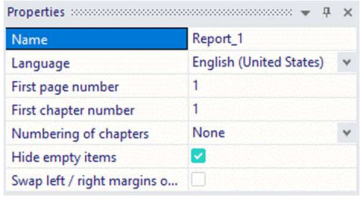


Report items can be moved or copied using Drag-and-drop. It is also possible to copy selected report items to the clipboard and paste items from the clipboard.

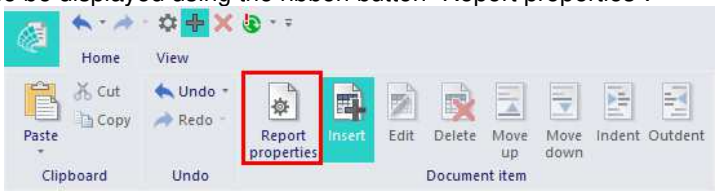
Chapter 3: Report properties and features

3.1. Properties of a report

The properties of an opened report are available if nothing is selected in the navigator.



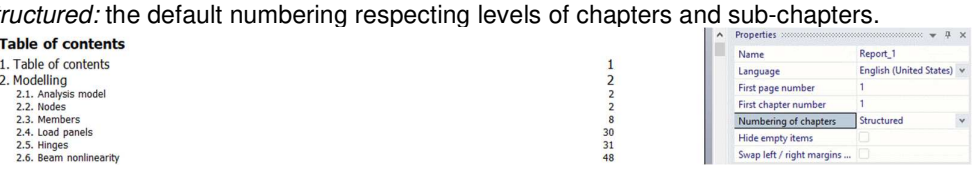
The properties can also be displayed using the ribbon button “Report properties”.



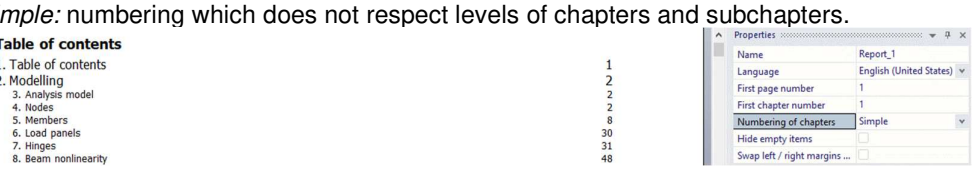
- **Name:** you can specify the name of a report, which is then displayed in the Report manager dialog.
- **Language:** select between available languages to define the language of the output of the report (data displayed in the report preview). After the change of the language, names of available items are translated immediately. Data in tables are translated after the regeneration of tables.

  This setting does not influence the language of the Engineering Report application (GUI). Language of the workspace is defined together with the language of the SCIA Engineer application in the SCIA Engineer menu View > Global UI settings > tab Other.
- **First page number:** defines the number of the first page.
- **First chapter number:** defines the number of the first chapter.

- **Numbering of chapters:** defines the way of numbering of chapters.
  - *Structured:* the default numbering respecting levels of chapters and sub-chapters.

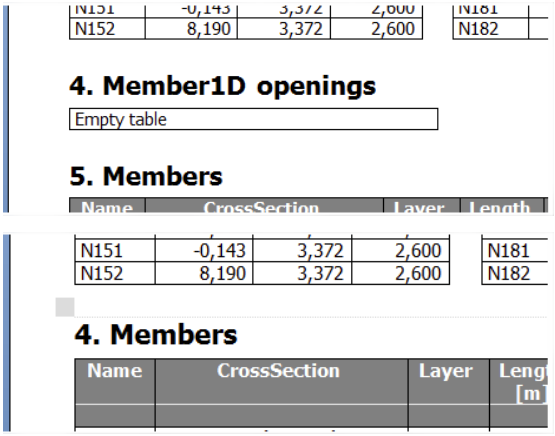


  - *Simple:* numbering which does not respect levels of chapters and subchapters.



  - *None:* numbering of chapters and report items is switched OFF.

- **Hide empty items:** since version 14 it is possible to create reports using predefined templates. It is quite common that a general report template also contains tables which are not relevant for all projects and remains empty. Therefore, since version 15 it is possible to hide all empty tables of the report using the new checkbox in the report properties. When this property is switched ON, all those tables are also hidden and removed from the Table of contents. In the preview they are replaced by a small informative mark. In printings and exported reports, they are removed completely.

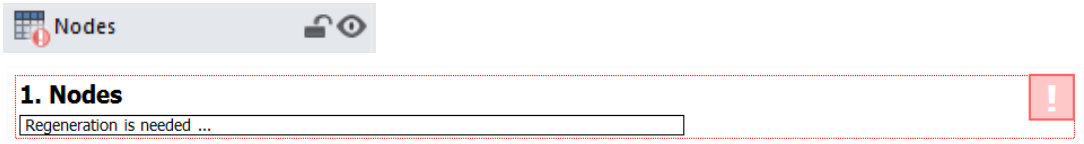


3.2. Validity status

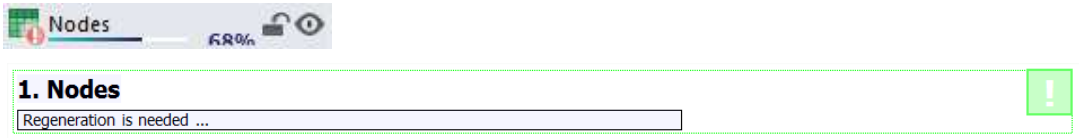
An important feature of the Engineering Report is the indication of validity of the content of report items. It means that you are always clearly informed whether the information in the table or picture is up-to-date or not. The validity status is indicated in the Navigator panel and also in the Report preview.

The Engineering Report distinguishes following validity statuses:

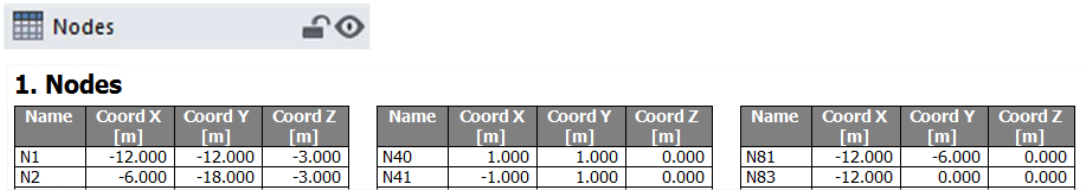
- **Invalid** = not up-to-date report item. It indicates that the information displayed in the Report preview and related to this report item does **not** reflect the current status of the project. This status is indicated by a red exclamation mark.



- **Waiting for regeneration** = it means that this report item is waiting in the queue for regeneration or is just being regenerated. This status is indicated by a green colour of the icon in the Navigator and a green exclamation mark in the Report preview.



- **Valid** = up-to-date report item. It indicates that the information displayed in the Report preview and related to this report item does reflect the current status of the project. This status has no special indication.



The validity status is based on the detection of changes in all entities of one type. It means that a table containing beam B1 only will be marked as invalid after changing beam B2. The validity status also detects changes in all properties of project entities, not only in the displayed ones. It means that a table with beams which does not show e.g. property "Layer" will be marked as invalid after changes in the layers. This

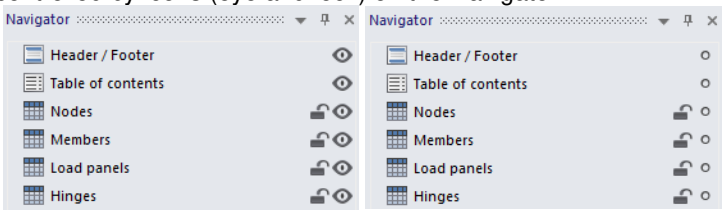
implementation ensures that report items marked as valid are always reflecting the current status of the project. Report items marked as invalid can also be valid, but it is not sure.

The validity status is on the safe side.

It is possible to insert several external items into the Engineering Report (External picture, External text file, External report, ECtools output). Those external items can be inserted as an external reference (not embedded). In this case the validity status informs whether the source file on the hard drive was changed or not. In case the source file is changed, the validity status is set to Invalid. During following regeneration the current content of the source file is displayed in the Engineering Report (and the item is marked as valid).

3.3. Hiding and locking of Report items

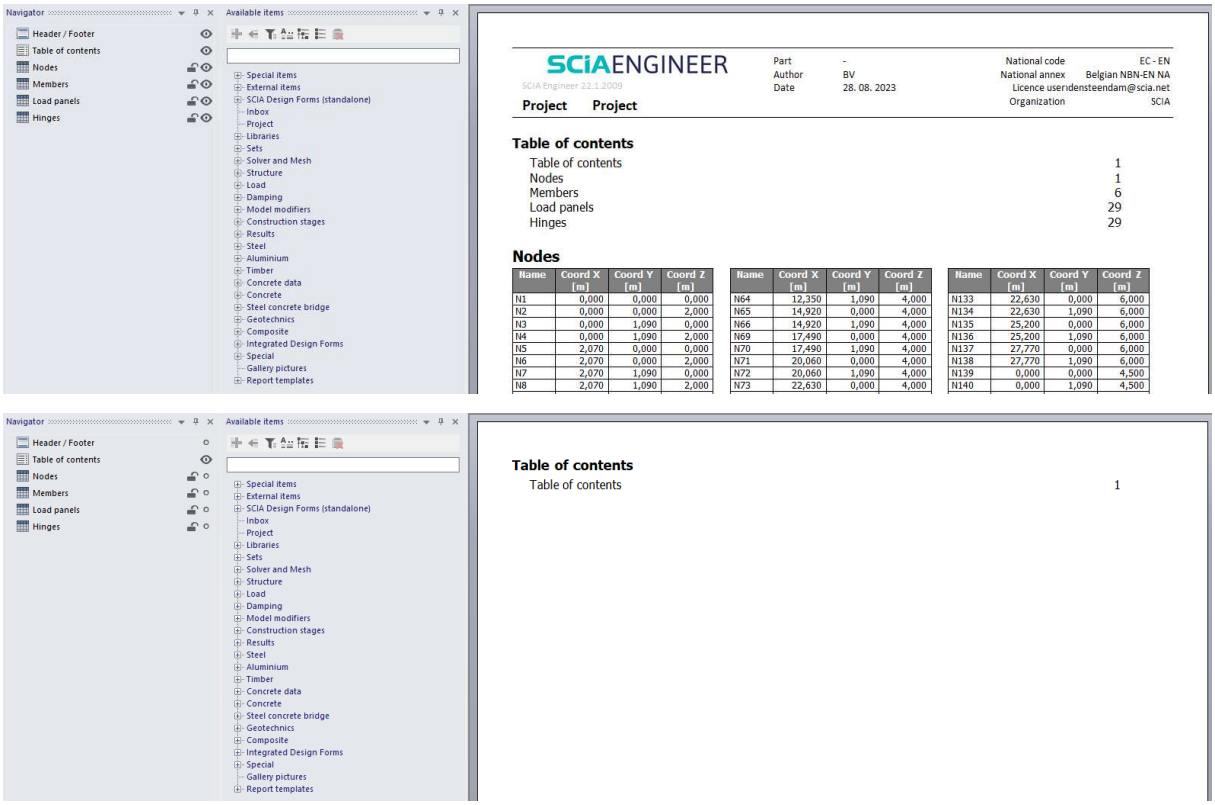
All report items which are inserted in a report can be hidden and some of the report items can be locked. Hiding and locking is controlled by icons (eye and lock) on the Navigator.



Hidden items: **Error! Bookmark not defined.**hidden items are still present in the data of the report, but they are not displayed in the report preview. Those items are also by default skipped during regeneration of the whole report (see the chapter related to regenerations).

Hiding of some report items (page break, page format) has a special meaning. It usually cancels their effect.

Hiding of a Chapter causes hiding of all indented items - hiding of whole report chapter (see the chapter related to report item Chapter).



Locking of items: locked report items are excluded from the regeneration. It means that their content which is displayed in the Report preview is fixed. It can be used e.g. for comparison between result for two variants of one model or as a prevention against accidental deleting of results of time demanding checks.

Locking is not available for some of the Special report items where the locking would not have any sense (Page break, Page format, Table of contents, External picture ...).

Report item Chapter also cannot be locked. It is necessary to lock all separate items in the chapter (e.g. easily by using multi-select).

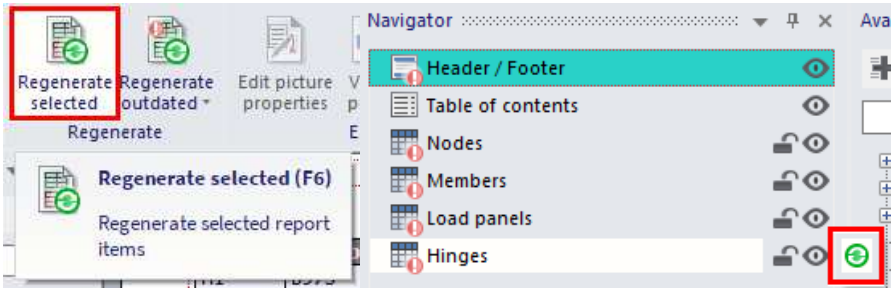
3.4. Regeneration of Report items

There are two types of regeneration of report items in the Engineering Report: Automatic and on-demand.

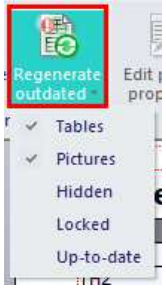
Automatic regeneration is done by the system and it is implemented for items with a very fast update of its content. It is implemented for the table of contents (report item Content) and formatted texts (which are updated immediately after closing of the Formatted text editor).

Content of other report items is regenerated only **on-demand**. It means that you must manually start the regeneration. There are two ways supported of on-demand regenerations in the Engineering Report: regenerate selected items and regenerate all outdated items.

Regenerate selected:**Error! Bookmark not defined.** This type of regeneration ensures that all report items which are selected in the Navigator are regenerated regardless their validity status. This regeneration can be started from the ribbon or from the floating button at the Navigator. Locked report items are not regenerated even if they are included in the selection.

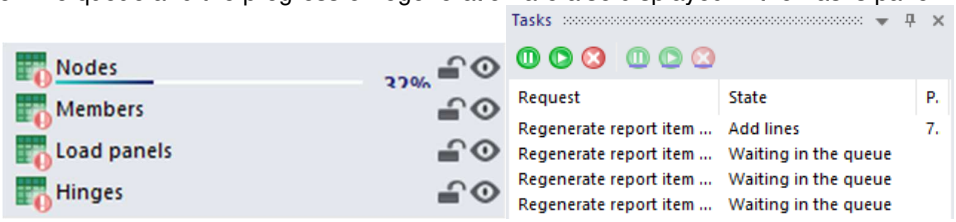


Regenerate outdated: This type of regeneration starts the regeneration of "all necessary" report items to make the report valid. By default "all necessary" means that there are regenerated items which are invalid and which are not hidden or locked. But its behaviour can be modified in drop down menu:



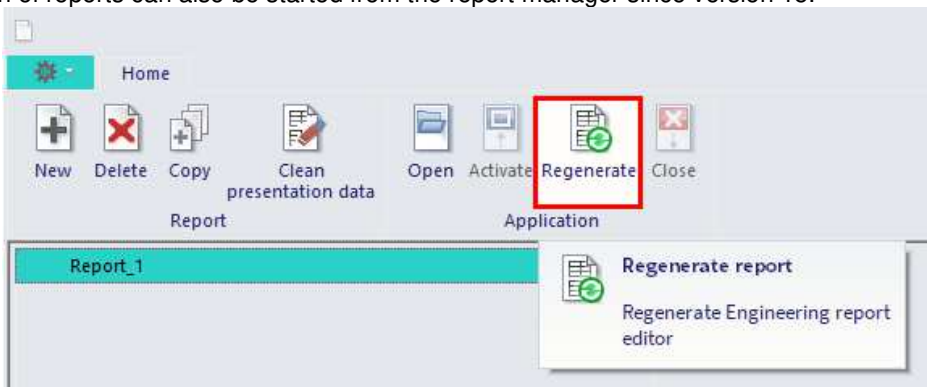
In this menu user can switch ON the regeneration also of hidden, valid and/or locked items. It is also possible to exclude pictures or tables from the regenerate all. This setting does not affect "Regenerate selected" function.

The progress of regeneration is indicated on the progress bar below the report item. On the following picture the table with nodes is just being regenerated. The tables with members, load panels and hinges are waiting in the queue. The queue and the progress of regeneration are also displayed in the Tasks panel.



3.4.1. Regeneration of reports from report manager

Regeneration of reports can also be started from the report manager since version 15.

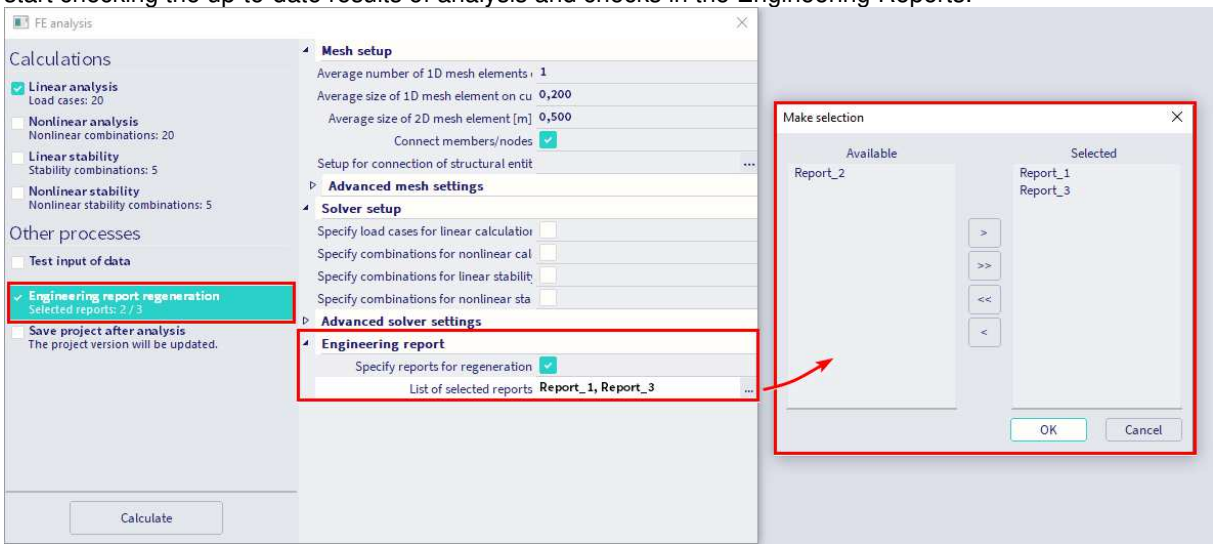


Pressing this button starts the regeneration of all selected reports. The validity status is ignored in this regeneration; all items from reports are regenerated except the locked ones.

During the regeneration each report, opened on the background, is regenerated and finally closed. All regenerated data are stored and available immediately after opening of the report.

3.4.2. Regeneration of Engineering Reports from batch analysis

In the dialog of Batch analysis, it is possible to select some of the existing reports to be regenerated at the end of the analysis. This possibility enables to run the finite element analysis and regeneration of selected reports in one step (e.g. during the night or lunch pause). After finishing those tasks, you can immediately start checking the up-to-date results of analysis and checks in the Engineering Reports.

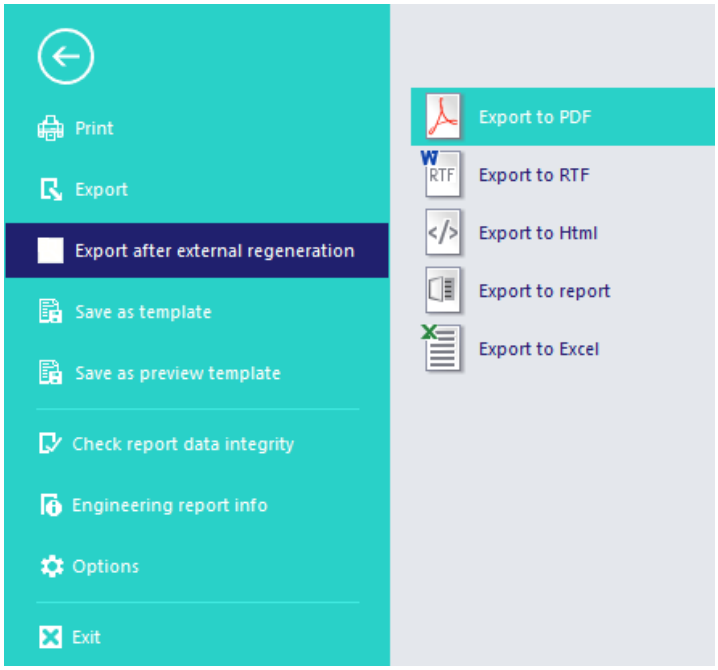


The validity status is ignored in this regeneration, all items are regenerated except locked ones.

During the regeneration, each opened report is automatically regenerated and finally closed. All regenerated data are stored and available immediately after opening of the report.

Automatic export of reports at the end of regeneration
Any report regenerated from the batch analysis or regenerated from the report manager, can be automatically exported into any available format directly after the end of the regeneration.

This automatic export can be set on the setting page of each report.



3.5. Chaptermaker - automatic generation of chapters

Chaptermaker is a named feature known also from the old document. It enables easy automatic generation of chapters according to logical links between tables or pictures. It enables to generate e.g. separate tables with a list of beams for each cross section or generate tables with internal forces for each defined load combination.

Since version 2013.1 it is possible to automatically generate tables and also pictures.

Definition of chaptermaker consists of a master table and slave (indented) tables or pictures. For each record in the master table one chapter containing slave tables or pictures is generated. Slave tables contain only records which have logical reference to a record from the master table. The content of slave pictures is also modified according to its logical reference with the master table. There are several types of logical references supported.

3.5.1. Repeating tables

References for non-result tables
The content of slave tables is defined by limiting of selection of entities. In the selection are only items present with reference to the current record in the master table.

- **Data reference:** This linkage is based on the data structure of the SCIA Engineer model. It can be understand as using data from other entities. Once one entity uses data from another entity then there is data reference. One example is the reference between 1D members and nodes. Simply said Node knows which members are connected to it and member knows which nodes are defining its geometry.

1. Nodes

1.1. Nodes - K1

Name	Coord X [m]	Coord Y [m]	Coord Z [m]
K1	0.000	0.000	0.000

1.1.1. Members

Name	CrossSection	Layer	Length [m]	Shape	Beg. node	Type
					End node	FEM type
S1	CS1 - HEA220	Laag1	5.000	Line	K1	column (100)
					K2	standard

1.2. Nodes - K2

Name	Coord X [m]	Coord Y [m]	Coord Z [m]
K2	0.000	0.000	5.000

1.2.1. Members

Name	CrossSection	Layer	Length [m]	Shape	Beg. node	Type
					End node	FEM type
S1	CS1 - HEA220	Laag1	5.000	Line	K1	column (100)
					K2	standard
S2	CS2 - IPE270O	Laag1	6.083	Line	K2	beam (80)
					K3	standard
S21	CS3 - IPE80A	Laag1	5.000	Line	K2	beam (80)
					K6	standard

- **Library reference:** this type of reference can generate for example all members with given cross-section or all cross-sections with given material.

1. Cross-sections

1.1. Cross-sections - CS1

Name	Type	Item material	Fabrication	A [m²]	Iy [m⁴]
CS1	HEA220	S 235	rolled	6.4300e-03	5.4100e-05

1.1.1. Members

Name	CrossSection	Layer	Length [m]	Shape	Beg. node End node	Type FEM type
S1	CS1 - HEA220	Laag1	5.000	Line	K1 K2	column (100) standard
S5	CS1 - HEA220	Laag1	5.000	Line	K9 K6	column (100) standard
S9	CS1 - HEA220	Laag1	5.000	Line	K14 K11	column (100) standard
S13	CS1 - HEA220	Laag1	5.000	Line	K19 K16	column (100) standard
S17	CS1 - HEA220	Laag1	5.000	Line	K24 K21	column (100) standard

1.2. Cross-sections - CS2

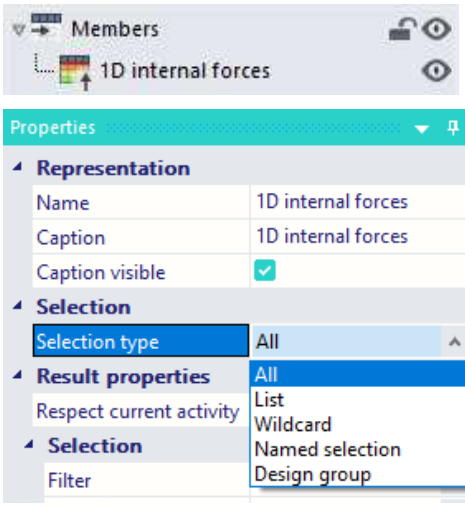
Name	Type	Item material	Fabrication	A [m²]	Iy [m⁴]
CS2	IPE270O	S 235	rolled	5.3800e-03	6.9470e-05

1.2.1. Members

Name	CrossSection	Layer	Length [m]	Shape	Beg. node End node	Type FEM type
S2	CS2 - IPE270O	Laag1	6.083	Line	K2 K3	beam (80) standard
S6	CS2 - IPE270O	Laag1	6.083	Line	K6 K7	beam (80) standard
S10	CS2 - IPE270O	Laag1	6.083	Line	K11 K12	beam (80) standard
S14	CS2 - IPE270O	Laag1	6.083	Line	K16 K17	beam (80) standard
S18	CS2 - IPE270O	Laag1	6.083	Line	K21 K22	beam (80) standard

References for result tables
The content of slave result tables can be controlled by modification of selection or by modification of load definition of the result.

- **Specification of selection**: result table contains only members from the record of master table.



1. Members

1.1. Members - B1

Name	Cross-section	Material	Length [m]	Beg. node	End node	Type
B1	Mid column - IPE750x147	S 235	6,900	N1	N2	column (100)

1.1.1. 1D internal forces

Linear calculation
Load case: LC1
Coordinate system: Principal
Extreme 1D: Global
Selection: B1

Name	dx [m]	Case	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
B1	0,000	LC1	**-39,57**	0,01	16,90	0,00	**0,00**	**0,00**
B1	6,900	LC1	**-29,58**	**0,01**	**16,90**	**0,00**	**116,63**	**0,07**

1.2. Members - B2

Name	Cross-section	Material	Length [m]	Beg. node	End node	Type
B2	Mid column - IPE750x147	S 235	6,900	N3	N4	column (100)

1.2.1. 1D internal forces

Linear calculation
Load case: LC1
Coordinate system: Principal
Extreme 1D: Global
Selection: B2

Name	dx [m]	Case	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
B2	6,900	LC1	**-29,58**	**0,01**	**-16,90**	**0,00**	**-116,63**	**0,07**
B2	0,000	LC1	**-39,57**	0,01	-16,90	0,00	**0,00**	**0,00**

- **Specification of load:** a table with load definition (load case, load combination, nonlinear combination,...) can be used as a master table. This will generate one result table for each item from the master table (e.g. one result table for each load combination).

1. Combinations

1.1. Combinations - EN-ULS

Name	Description	Type	Load cases	Coeff. [-]
EN-ULS		EN-ULS (STR/GEO) Set B	LC1 - Self Weight	1,00
			LC2 - Self Weight Cladding	1,00
			LC3 - Maintenance	1,00
			LC4 - Snow	1,00
			LC5 - Wind X	1,00
			LC6 - Wind Y	1,00
			LC7 - Wind X-	1,00
			LC8 - Wind Y-	1,00

1.1.1. 1D internal forces

Linear calculation
Combination: EN-ULS
Coordinate system: Principal
Extreme 1D: Global
Selection: All

Name	dx [m]	Case	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
B9	0,000	EN-ULS/1	**-162,73**	0,03	86,44	0,00	0,00	0,00
B57	12,060-	EN-ULS/1	**41,23**	-3,09	-18,84	1,25	-23,97	-0,53
B8	0,000	EN-ULS/1	-162,72	0,04	**-86,44**	0,00	0,00	0,00
B6	0,000	EN-ULS/1	-100,73	0,52	**138,66**	-0,17	**-596,45**	-0,06
B5	6,900	EN-ULS/1	-149,24	0,04	86,44	0,00	**596,45**	0,28
B57	15,075	EN-ULS/1	38,94	**-11,23**	4,75	**1,65**	25,27	**-16,53**
B58	15,075	EN-ULS/1	38,94	**11,23**	4,75	**-1,65**	25,27	**16,53**

Name	Combination key
EN-ULS/1	1.35*LC1 + 1.35*LC2 + 1.50*LC4

1.2. Combinations - EN_SLS

Name	Description	Type	Load cases	Coeff. [-]
EN_SLS		EN-SLS Characteristic	LC1 - Self Weight	1,00
			LC2 - Self Weight Cladding	1,00
			LC3 - Maintenance	1,00
			LC4 - Snow	1,00
			LC5 - Wind X	1,00
			LC6 - Wind Y	1,00
			LC7 - Wind X-	1,00
			LC8 - Wind Y-	1,00

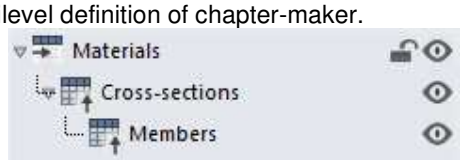
1.2.1. 1D internal forces

Linear calculation
Combination: EN_SLS
Coordinate system: Principal
Extreme 1D: Global
Selection: All

Name	dx [m]	Case	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
B9	0,000	EN_SLS/1	**-115,54**	0,02	61,13	0,00	0,00	0,00
B57	12,060-	EN_SLS/1	**29,17**	-2,18	-13,40	0,89	-17,02	-0,38
B8	0,000	EN_SLS/1	-115,54	0,03	**-61,13**	0,00	0,00	0,00
B6	0,000	EN_SLS/1	-71,23	0,36	**98,02**	-0,12	**-421,77**	-0,05
B5	6,900	EN_SLS/1	-105,55	0,03	61,13	0,00	**421,77**	0,20
B57	15,075	EN_SLS/1	27,54	**-7,94**	3,36	**1,17**	17,87	**-11,69**
B58	15,075	EN_SLS/1	27,54	**7,94**	3,36	**-1,17**	17,87	**11,69**

Name	Combination key
EN_SLS/1	LC1 + LC2 + LC4

It is also possible to prepare multilevel definition of chapter-maker.



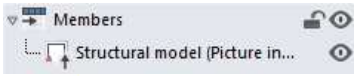
3.5.2. Repeating pictures

There are again several types of picture chaptermakers:

- It is possible to modify the content of the picture by changing set of displayed members.
- **Error! Bookmark not defined.**It is possible to generate pictures with loads for different load-cases (mass groups ...).
- it is possible to generate pictures with results for different loads (load cases, combinations ...).

Only **Live pictures** can be used for chaptermakers. Other types of pictures do not change their content in automatically generated chapters.

Repeating pictures with changed set of displayed members (1D members and 2D members)
The first type of chaptermaker generates pictures where displayed members are different in each picture. See following examples of this type:



1. Members

1.1. Members - B1

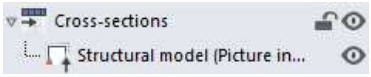
Name	Cross-section	Material	Length [m]	Beg. node	End node	Type
B1	Mid column - IPE750x147	S 235	6,900	N1	N2	column (100)

1.1.1. Structural model

1.2. Members - B2

Name	Cross-section	Material	Length [m]	Beg. node	End node	Type
B2	Beam2 - IPE750x134	S 235	15,075	N2	N6	beam (80)

1.2.1. Structural model



1. Cross-sections

1.1. Cross-sections - Mid column

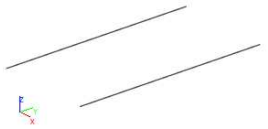
Name	Type	Item material	Fabrication	A [mm²]	A_y [mm²]	I_y [mm⁴]	$W_{el,y}$ [mm³]	$W_{pl,y}$ [mm³]	Colour
	Detailed				A_z [mm²]	I_z [mm⁴]	$W_{el,z}$ [mm³]	$W_{pl,z}$ [mm³]	
Mid column	IPE750x147	S 235	rolled	1,8800e+04	8,6463e+03 9,8340e+03	1,6610e+09 5,2890e+07	4,4110e+06 3,9900e+05	5,1100e+06 6,3100e+05	

1.1.1. Structural model

1.2. Cross-sections - Beam

Name	Type	Item material	Fabrication	A [mm²]	A_y [mm²]	I_y [mm⁴]	$W_{el,y}$ [mm³]	$W_{pl,y}$ [mm³]	Colour
	Detailed				A_z [mm²]	I_z [mm⁴]	$W_{el,z}$ [mm³]	$W_{pl,z}$ [mm³]	
Beam	IPE160	S 235	rolled	2,0100e+03	1,2605e+03 8,1173e+02	8,6900e+06 6,8300e+05	1,0900e+05 1,6700e+04	1,2400e+05 2,6100e+04	

1.2.1. Structural model



Repeating pictures with loads from different load cases

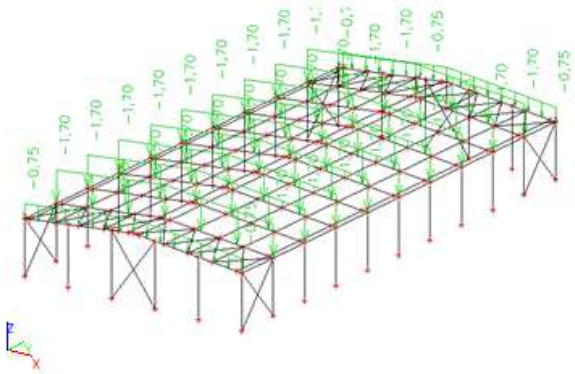
The second type of chaptermaker changes the displayed load which is related to a different load case in each chapter.

1. Load cases

1.1. Load cases - LC3

Name	Description	Action type	Load group	Duration	Master load case
	Spec	Load type			
LC3	Maintenance Standard	Variable Static	Maintena	Short	None

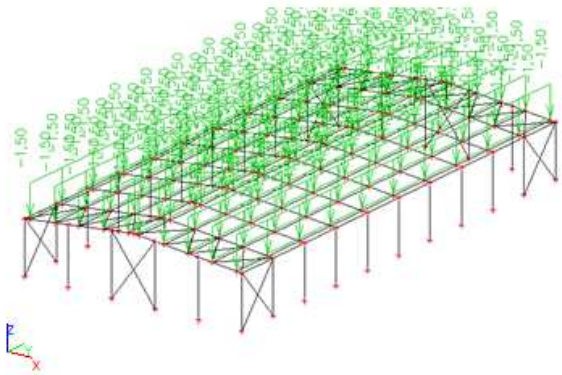
1.1.1. Picture



1.2. Load cases - LC4

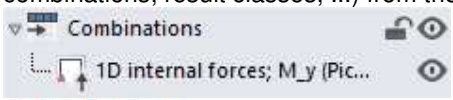
Name	Description	Action type	Load group	Duration	Master load case
	Spec	Load type			
LC4	Snow Standard	Variable Static	Snow	Short	None

1.2.1. Picture



Repeating pictures with results for different loads

The last type of chaptermaker enables to generate pictures with results for all loads (load cases, combinations, result classes, ...) from the master table.



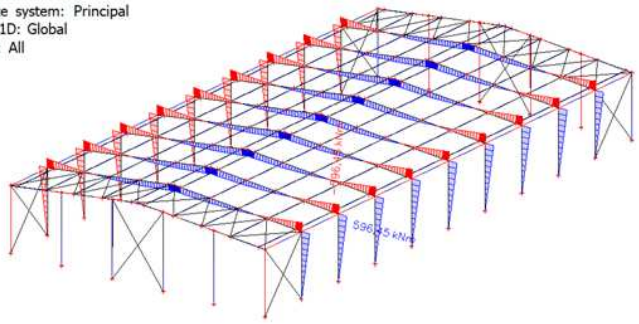
1. Combinations

1.1. Combinations - EN-ULS

Name	Description	Type	Load cases	Coeff. [-]
EN-ULS		EN-ULS (STR/GEO) Set B	LC1 - Self Weight	1,00
			LC2 - Self Weight Cladding	1,00
			LC3 - Maintenance	1,00
			LC4 - Snow	1,00
			LC5 - Wind X	1,00
			LC6 - Wind Y	1,00
			LC7 - Wind X-	1,00
			LC8 - Wind Y-	1,00

1.1.1. 1D internal forces; M_y

Values: M_y
Linear calculation
Combination: EN-ULS
Coordinate system: Principal
Extreme 1D: Global
Selection: All

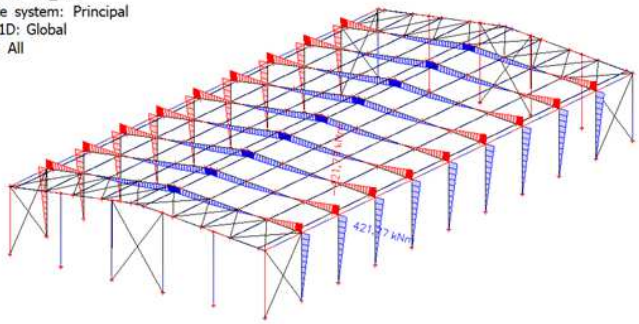


1.2. Combinations - EN_SLS

Name	Description	Type	Load cases	Coeff. [-]
EN_SLS		EN-SLS Characteristic	LC1 - Self Weight	1,00
			LC2 - Self Weight Cladding	1,00
			LC3 - Maintenance	1,00
			LC4 - Snow	1,00
			LC5 - Wind X	1,00
			LC6 - Wind Y	1,00
			LC7 - Wind X-	1,00
			LC8 - Wind Y-	1,00

1.2.1. 1D internal forces; M_y

Values: M_y
Linear calculation
Combination: EN_SLS
Coordinate system: Principal
Extreme 1D: Global
Selection: All



Size of repeating pictures
There are two basic possibilities of specification of size of automatically generated pictures:

- All pictures in the same scale. The Width and Height are calculated automatically so the whole content of the picture is displayed.

Representation	
Name	Picture in scale
Caption	1D internal forces; M_y
Caption visible	☑
Picture size definition	User defined
Automatic scale to fit size	☐
Scale 1:	500
Stretch mode	Dark lines
Rendering	Standard
Antialiasing quality	None
Rotation	None
Result information	Inside picture
Export to PDF as 3D	☐
Horizontal alignment	Centre
Image raster	☐
Scale for model data	4
Scale for results	1

- The Width and Height is fixed. The scale of each generated picture is calculated automatically so the content of the picture fits into the defined size (this is similar to the Zoom all functionality of the old document).

Representation	
Name	Picture in scale
Caption	1D internal forces; M_y
Caption visible	☑
Picture size definition	User defined
Automatic scale to fit size	☑
Width [mm]	149,36
Height [mm]	88,15
Stretch mode	Dark lines
Rendering	Standard
Antialiasing quality	None
Rotation	None
Result information	Inside picture
Export to PDF as 3D	☐
Horizontal alignment	Centre
Image raster	☐
Scale for model data	4
Scale for results	1

Changes of pictures
The content and properties of pictures which are indented under some master table can be modified in the same way as pictures which are not indented. After the changes the whole chaptermaker block must be regenerated to see the proper content.

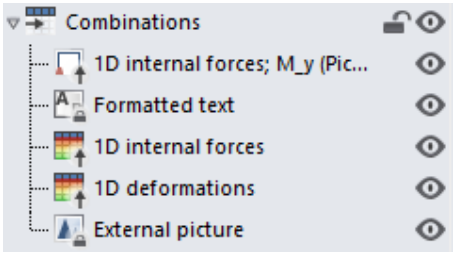
Chaptermaker with more different report items
It is possible to indent more slave items under the master table. It is also possible to mix different types of slave report items. Based on the type of report items it is automatically evaluated, whether the content will be different or the same in each generated chapter.

Items with changing content in each chapter:

- tables with a logical reference to the master table
- live pictures with a logical reference to the master table

Items which do not change its content in each chapter:

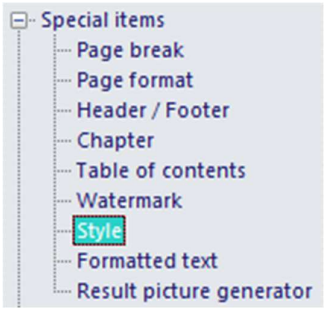
- screenshot picture or gallery picture
- external picture
- formatted text
- other special items (e.g. page break)



Chapter 4: Report items

4.1. Style

Report visual style is one of the special report items which can be inserted into the navigator and which can change the style of the report.



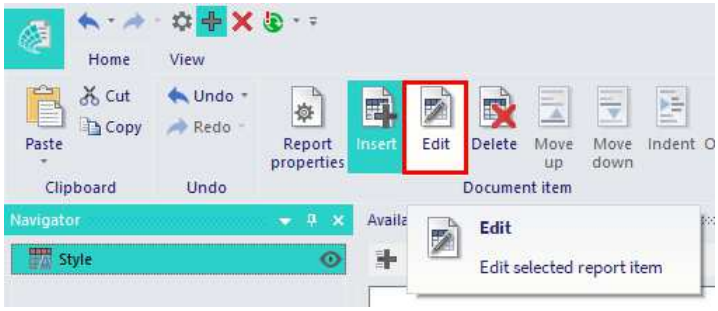
Visual style represents mainly:

- fonts
- colours and thickness of table lines
- setting of 2D result legends

Once the Style item is inserted into the report, its setting is respected from the following page.

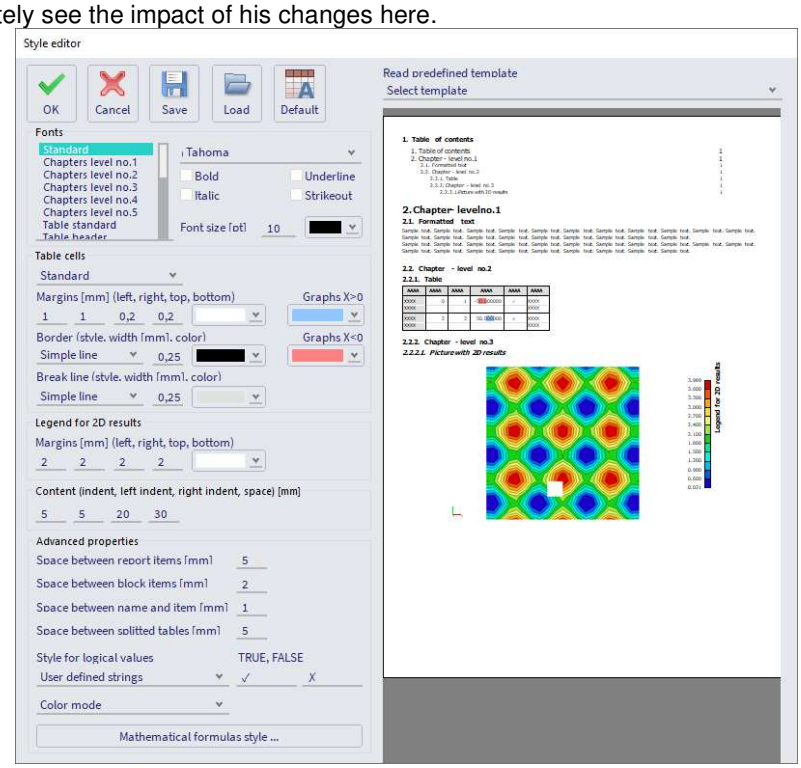
In case there is no Style item inserted into the report, the default style prepared by SCIA is used.

Setting of Style can be changed in the Style editor which is accessible via Edit button on the ribbon.



4.1.1. Style editor

The left part of the dialog is dedicated to editing, the right part of the dialog contains a preview of the page. You can immediately see the impact of his changes here.

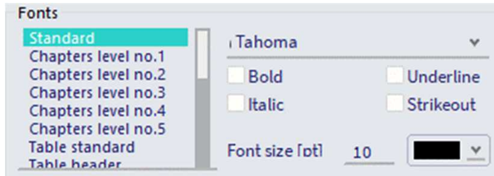


On top of the editor there are buttons for confirmation or cancelling of changes and buttons for storing or opening of files with Page layouts. There is also a combo box with a list of existing predefined page layouts files.

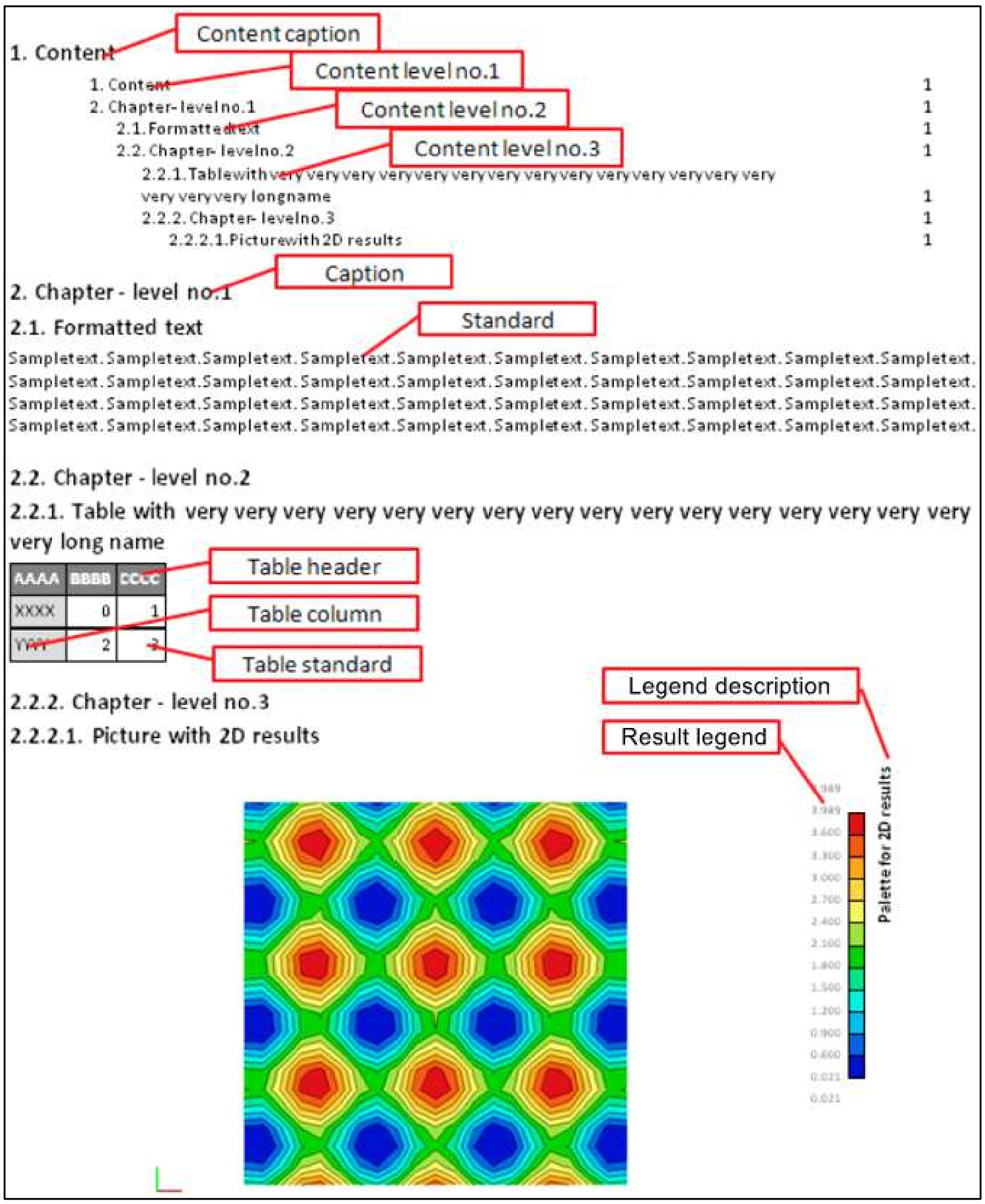
Those files are searched in the DocumentDefaults\PageLayout subdirectories of the SCIA Engineer installation directory and USER directory.

Fonts

In the Fonts panel it is possible to define fonts for different types of texts. Changes are realized by selection of text type and changing the font setting.



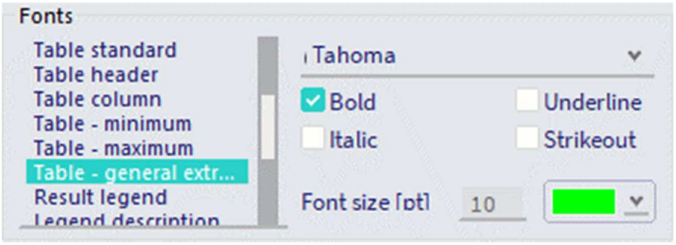
Explanation of text types is displayed on the picture.



Since version 15 there are three new types of fonts:

- Table – minimum
- Table – maximum
- Table – general extreme

These fonts define how the extremes in tables are displayed.



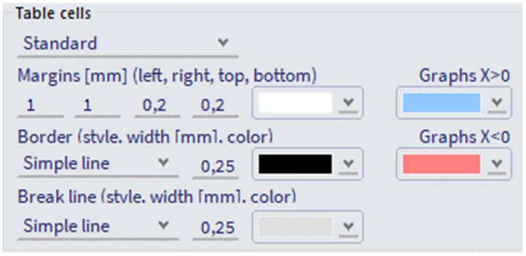
1. 1D internal forces

Linear calculation
Load case: LC1
Coordinate system: Principal
Extreme 1D: Global
Selection: All

Name	dx [m]	Case	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
B9	0,000	LC1	-40,54	0,01	17,55	0,00	0,00	0,00
B57	12,060-	LC1	8,49	-0,63	-5,09	0,25	-5,90	-0,11
B8	0,000	LC1	-40,54	0,01	-17,55	0,00	0,00	0,00
B6	0,000	LC1	-20,41	0,10	27,73	-0,03	-121,07	-0,01
B5	6,900	LC1	-30,55	0,01	17,55	0,00	121,07	0,06
B57	15,075	LC1	7,92	-2,28	1,00	0,34	5,20	-3,35
B58	15,075	LC1	7,92	2,28	1,00	-0,34	5,20	3,35

Table cells

On the table cells panel it is possible to define lines thickness, line colours and background colours for the table header, table left column or standard cells (see explanation picture in Fonts chapter). Margins means offsets from the cell borders.

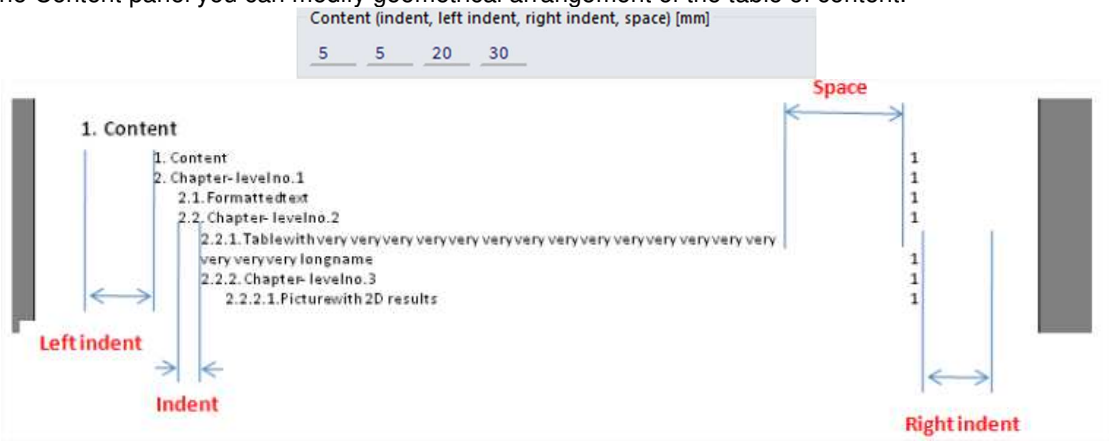


Palette for 2D results

You can define the background colour of the 2D result legend palette and its margins.

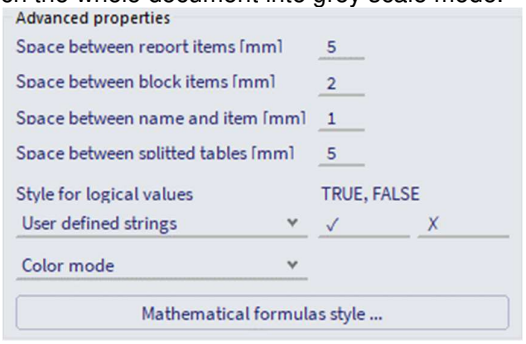
Content

On the Content panel you can modify geometrical arrangement of the table of content.



Advanced setting

On the Advanced panel it is possible to define spaces between document items, style of displaying of logical values and it is possible to switch the whole document into grey scale mode.

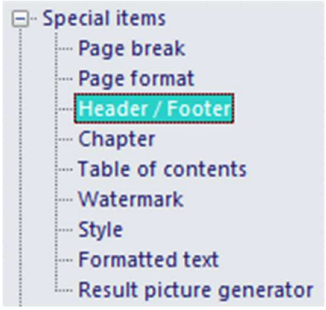


- **Space between document items** means size of gap between end of previous table (picture, text ...) and top of next chapter.
- **Space between block items** means size of gap between sub-tables.
- **Space between name and item** means the gap between the chapter text and the table (picture, text ...) itself.
- **Space between splitted tables** defines space between columns.

- **Style of logical values** enables to define the way of displaying True / False values.
- **Grey scale** makes whole document including all texts and pictures to be displayed in grey scale mode.

4.2. Header / Footer

Header / Footer is a predefined report item which can change layout of pages following this report item.



Layout of pages represents:

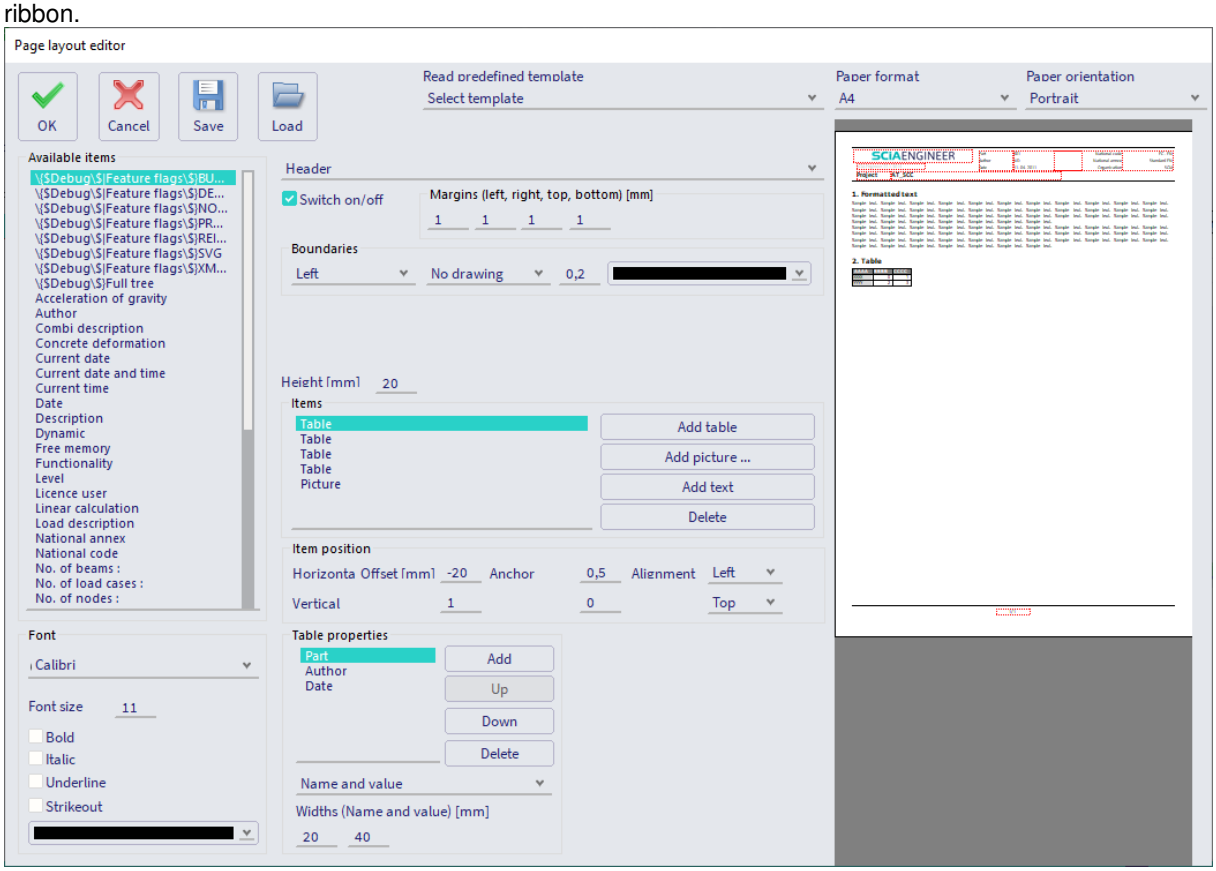
- Header
- Footer
- Page frame

Once the Header / Footer item is inserted into the report its setting is respected from the following page. Header / Footer item uses project data from the project. It can display the same properties which are displayed in the table of Project data object (e.g. project name, author, design code, licence name ...). Content of Page layout item needs to be regenerated manually (as tables and pictures). It has its validity status and it needs to be regenerated to get up to date values from the SCIA Engineer model.

Header / Footer item is also included in "Regenerate All" in case of invalid validity status.

4.2.1. Page layout editor

Setting of Header / Footer can be changed in Page layout editor which is accessible via Edit button on the ribbon.



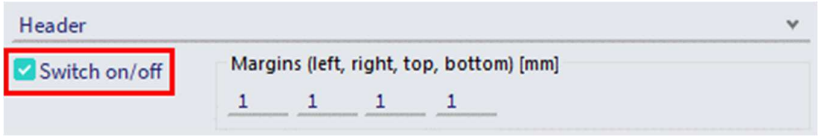
Left part of the dialog is dedicated to editing, right part of the dialog contains a preview of the page. You can immediately see the impact of his changes here. It is also possible to choose from predefined page formats and page orientations just above the preview window to see the preview on different paper formats.

On the top of the editor there are buttons for confirmation or cancelling of changes and buttons for storing or opening of files with Page layouts. There is also a combo box with a list of existing predefined page layouts files.

Those files are searched in the DocumentDefault\PageLayout subdirectories of the SCIA Engineer installation directory and USER directory.

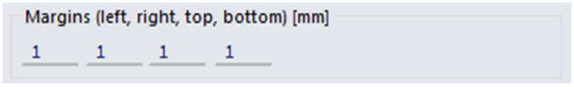
The Page layout editor enables changing of header, footer and page frame. You can switch between editing of Header / Footer / Page frame using the combo box.

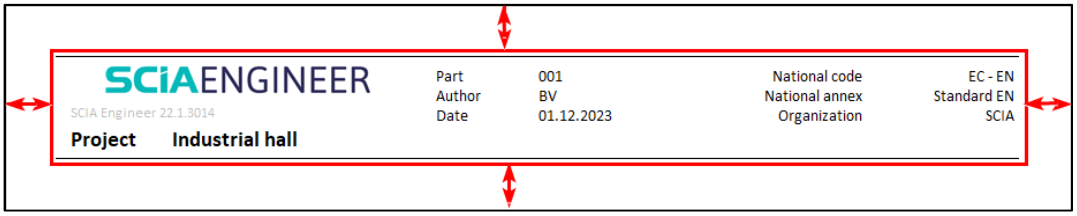
Below the combo box is a checkbox where you can make the selected part of page visible or not visible.



Margins

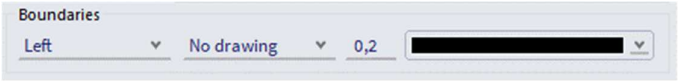
Margins define the inner gap between the border and the content.





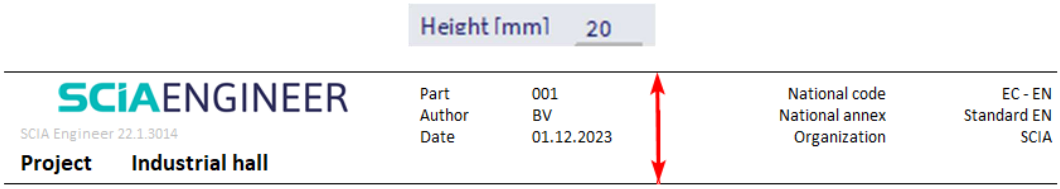
Boundaries

Panel Boundaries enables to specify the way of drawing of boundaries of the selected Page part (header, footer, page frame). You can specify the way of drawing (Simple line or "no drawing"), thickness of the line and the colour of the line. This setting can be done for each line of the border (left, right, top, bottom).



Height

Height defines the height of the edited Page layout part (header or footer). Width of header or footer is taken as the page width (excluding Page frame margins).

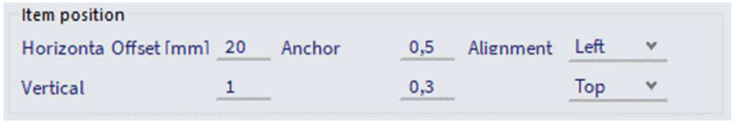


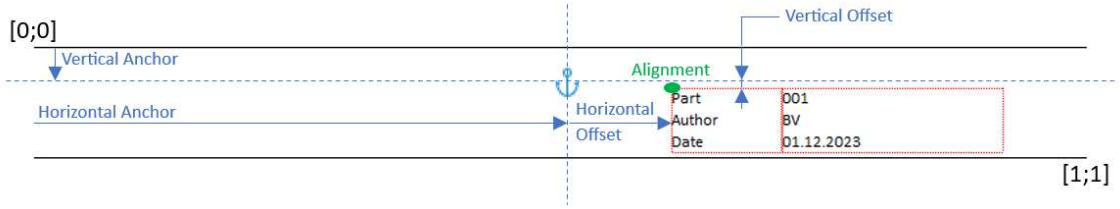
Items

Item position

Panel Items contains basic parts of header or footer. It is possible to insert here pictures or tables.

Insertion point of items and alignment of item to its insertion point is defined on panel Item position.





- **Anchor** represents the relative position within the header or footer area. Value of anchor can be between 0 and 1. Relative positioning enables using one definition of header or footer with more paper formats.
- **Offset** represents the distance from the anchor point. Positive direction of axis is from the left top corner to right bottom corner.

Pictures

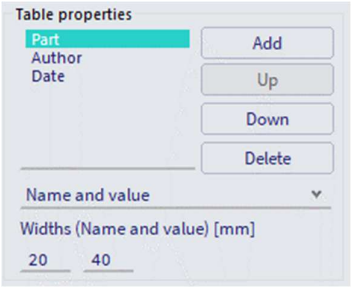
You can specify the size of the inserted picture.

Following formats of pictures are supported: **jpg, bmp, gif, tiff, png, wmf, emf**.

Tables

You can place different kind of information from the project data into the header or footer. That information can be inserted as tables.

Each table can contain a variable list of properties which will be displayed on the header or footer.



Properties can be added from the list "Available items", deleted or moved up/down.

You can decide how to display the content of a table via the dropdown menu (Value, Name or Name and value).

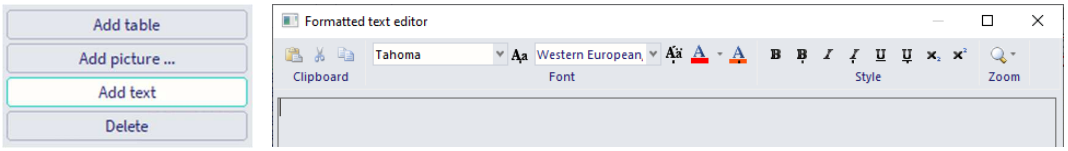
You can also specify the size reserved for name of the property and value of the property.

The list with available items contains also special report related properties: Current date, Current date and time, Current time, Number of pages, Page number, Page number and number of pages. Value of those properties is not lined with the project but with the exact report or exact page.

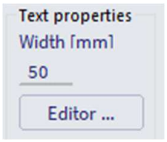
It is necessary to regenerate the Page layout report item in case the list of Available items contains the report related properties only.

Texts

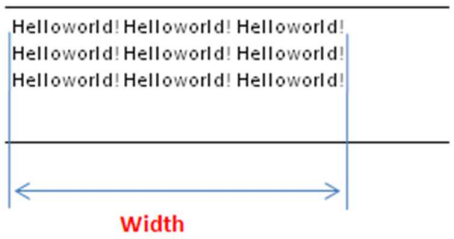
Content of Formatted text item is defined / edited in the Formatted text editor (see also chapter related to Formatted text as a report item).



The editor is opened automatically after inserting the text or it can be entered by pressing button "Editor" on the panel with Text properties.

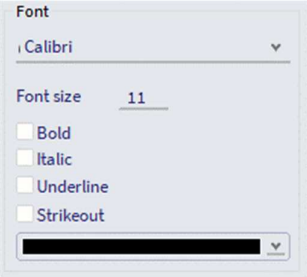


The Width property represents the size of the column which is filled with the text. The vertical size is not limited and depends on the length of the inputted text.



Font for page item

Tables and Texts are printed with the font which is specified on the panel Font.

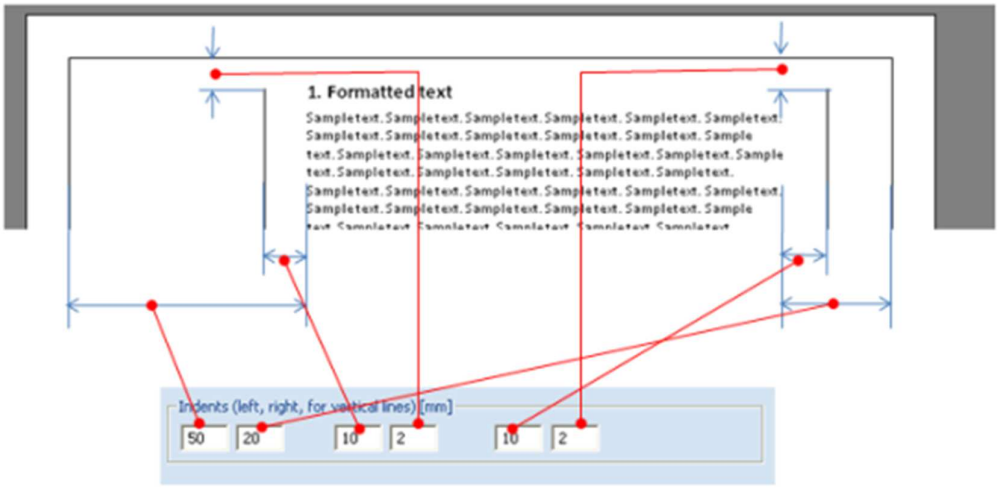


The setting from this panel is used for the whole table. In case of text, the font is used as a default font which is respected until the first change of the font in the text.

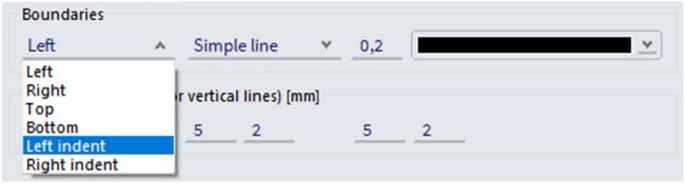
Page frame

Page frame is a special part of the Page layout. It cannot contain any page items and it has a different kind of setting.

The Page frame has two additional boundaries: vertical lines left from text and right from text.



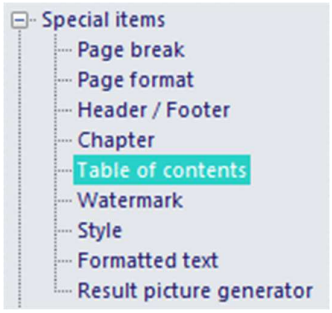
There is also a specific setting available for text indenting from the left and right in case of choosing Page frame.



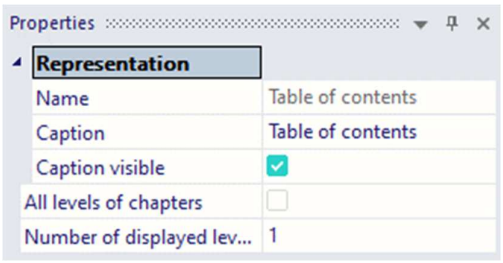
More complicated headers or footers can easily be created by inserting a vector picture and adding automatic texts (tables) from the project.

4.3. Table of contents

Table of contents is a report item which produces the table of contents of the report. It is displayed immediately after inserting into the report without necessity to regenerate this report item. There can be more Table of contents in one report if you need it.



All report items are displayed in the Table of contents except some Special items (Page break, Page format, Header / footer, Watermark, Style). There are also displayed chapters generated automatically by the Chaptermaker function. The hierarchy of chapters is respected in the Table of contents.



You can specify following things in the properties of item Table of contents:

- **Name:** this property is common for all report items and is intended for your orientation. The name identifies the report item in the navigator panel.
- **Caption:** this property is common for all report items and defines the name of the caption of the report item in the report.
- **Caption visible:** this property indicates whether the Table of contents is considered as separate chapter.
- **All levels of chapters:** you can specify how many levels are displayed in the Table of contents.

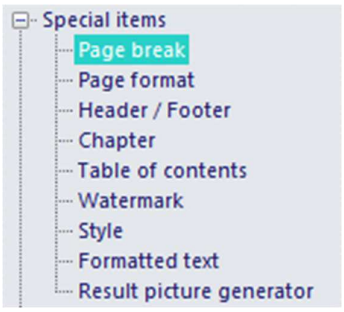
4.3.1. Scrolling to a specific report item using the Table of contents

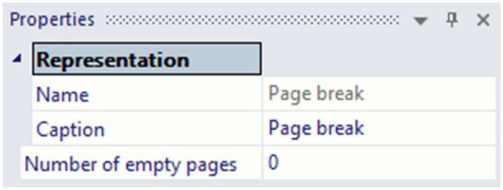
Since version 15 it is possible to scroll to a specific report item by pressing CTRL + clicking on some line in the Table of contents. The report preview will scroll to the position of the chapter.

This way it is possible to scroll to any item in the report which has its caption displayed (also for automatically generated sub-chapters).

4.4. Page break

Page break is a report item which ensures that next report item starts on an empty page.





You can specify following things in the properties of item Page break:

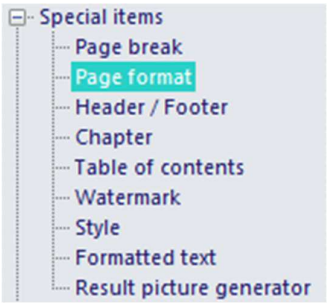
- **Name:** this property is common for all report items and is intended for your orientation. The name identifies the report item in the navigator panel.
- **Caption:** this property is common for all report items and defines the name of the caption of the report item in the report. It is not displayed in the report in case of Page break.
- **Number of empty pages:** this property specifies the number of empty pages which are inserted before the next report item. Setting of 0 means that next report items will start on the next page without any blank paper.

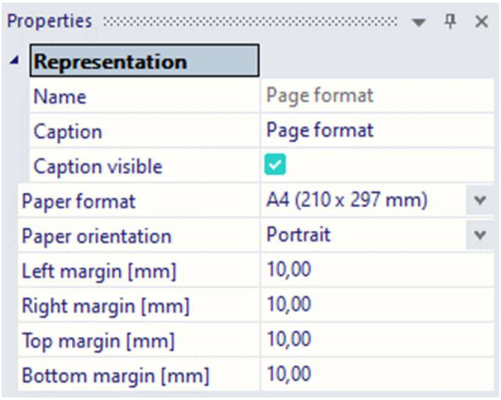
Non-zero value can be used when you need to add later some external report into the printed report from Engineering Report.

Page break item can be hidden by clicking on the "eye" icon in the navigator. Hiding will switch the Page break OFF. Next report item will follow immediately after the previous one.

4.5. Page format

Page format is a report item which enables to change the format of the report paper in the middle of the report. The format specified in the properties of page break is applied on the next page.





You can select from predefined standard sizes (A4, A3, …) and can decide about the paper orientation or you can also specify your own paper size by putting Paper format to User defined size.

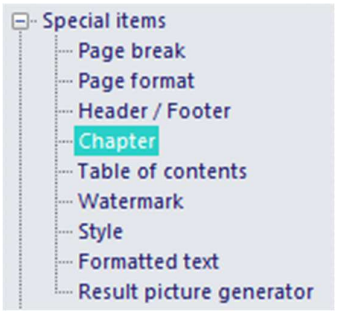
You can specify following things in the properties of item Page break:

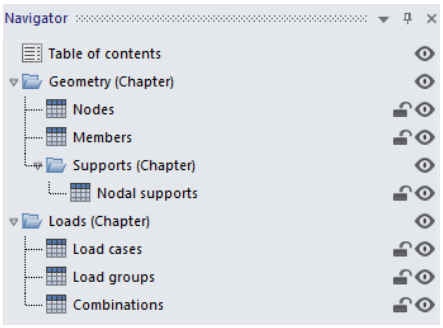
- **Name:** this property is common for all report items and is intended for your orientation. The name identifies the report item in the navigator panel.
- **Caption:** this property is common for all report items and defines the name of the caption of the report item in the report.
- **Paper format:** list of predefined standard paper formats or switching to user defined size.
- **Paper orientation:** you can select between landscape and portrait orientation.
- **User defined width (height):** the size of the paper.
- **Margins:** margins define the border of the paper which cannot be used for printing.

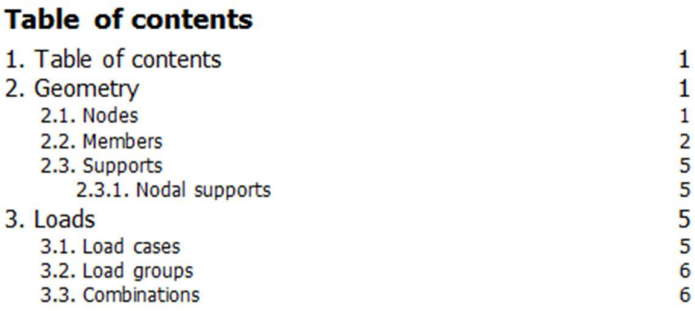
Page format item can be hidden by clicking on the "eye" icon in the navigator. Hiding will switch the Page format OFF and next report item will follow immediately after the previous one on without changing of the paper format.

4.6. Chapter

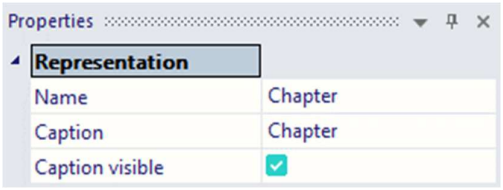
Chapter is a report item which enables to structuralize the report into chapters. There can be more levels of chapters. Report items must be indented under the Chapter item to be included in the chapter.







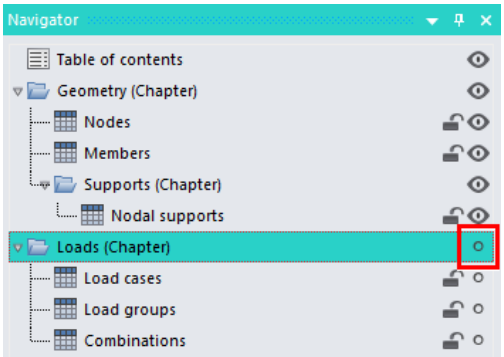
Properties of the Chapter are:



You can specify following things in the properties of item Chapter:

- **Name:** this property is common for all report items and is intended for your orientation. The name identifies the report item in the navigator panel.
- **Caption:** this property is common for all report items and defines the name of the caption in the report.
- **Caption visible:** this property indicates whether this chapter will be displayed in the table of contents. If the property is switched off the chapter is not visible in the report and all report items included in the chapter are also excluded from the Table of contents and excluded from the numbering of chapters.

The Chapter item can be hidden by clicking on the "eye" icon in the navigator. This results in hiding of all items included in the chapter.



Automatic numbering of chapters can be influenced in the properties of document (see separate chapter).

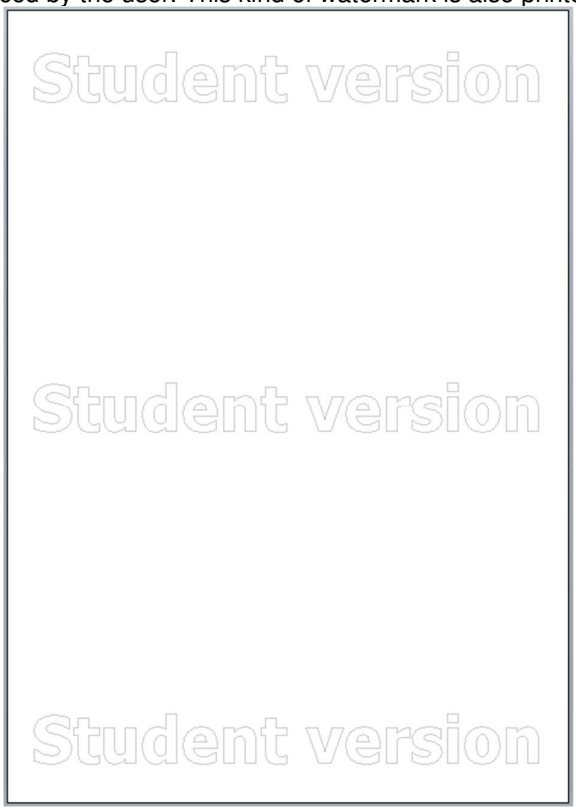
4.7. Watermarks

There are two types of watermarks available in the Engineering Report:

- Hard-coded watermark (Student version, Try-out version, ...)
- User defined watermark

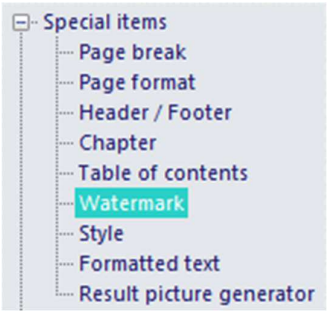
4.7.1. Hard-coded watermarks

These watermarks inform about a limited licence and are linked to the used modules. Displaying of this watermark cannot be influenced by the user. This kind of watermark is also printed and exported to PDF file.

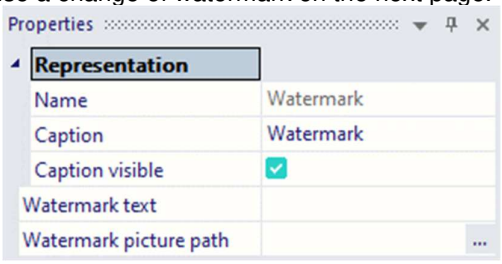


4.7.2. User defined watermark

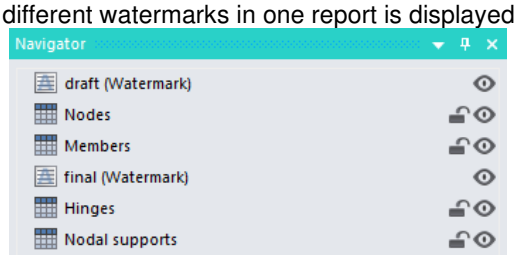
You also can define your watermark.



It is possible to define one watermark for a whole report or to have different watermarks for parts of the report. The watermark is defined by inserting of the report item "Watermark". On the next page following this report item, a watermark according to the properties of this report item will be displayed. Inserting of another report item "Watermark" will cause a change of watermark on the next page.



An example of definition of two different watermarks in one report is displayed on the following picture:



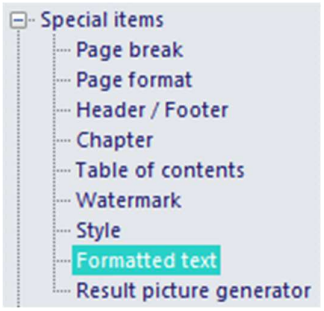
A user defined watermark can be defined as a text or as a picture. A text watermark is defined by the text value in property "Watermark text". The picture must be specified by filling the path and file name in the property "Watermark picture path". The selected picture is then stretched over the whole page size.

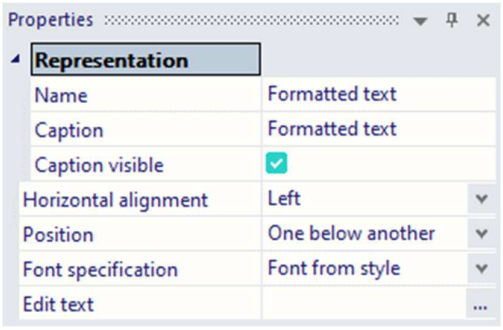
The Engineering Report watermark can use raster images (bmp, png, jpg, gif) and vector images (emf, wmf).

User defined watermarks can be hidden by clicking on the "eye" icon in the navigator.
If you need to have a watermark on only a set of pages, not on the whole report, then the displaying of watermark can be stopped by inserting another watermark item into the report and keeping the properties "Watermark text" and "Watermark picture path" blank.

4.8. Formatted text

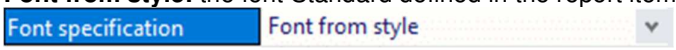
It is possible to use formatted texts in the Engineering Report. The formatted text is inserted into a report as report item "Formatted text".



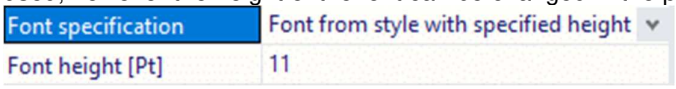


You can specify following things in the properties of item Formatted text:

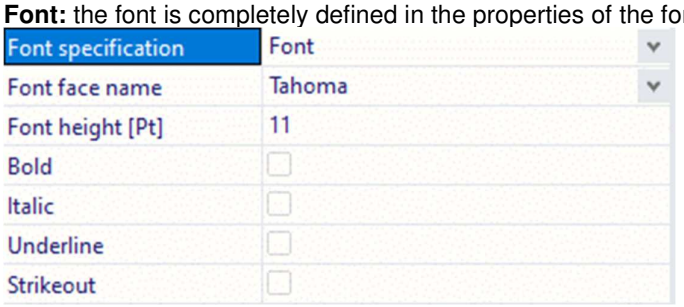
- **Name:** this property is common for all report items and is intended for your orientation. The name identifies the report item in the navigator panel.
- **Caption:** this property is common for all report items and defines the name of the caption of the report item in the report.
- **Caption visible:** this property indicates whether this Formatted text will be displayed in the Table of contents. If the property is switched off the Formatted text follows immediately after the previous report item.
- **Horizontal alignment:** it influences the alignment of the text in the report. The alignment is valid for the whole Formatted text. In case you want to have a set of text paragraphs with different alignment you would need to insert separate Formatted texts items for each different alignment.
- **Position:** this property allows you to choose the position of your formatted text on the paper. When you choose User defined, you can change the horizontal and the vertical position. Also you can define some dimensions and the vertical space between the current and the next item.
- **Font specification:** This property is new since version 15. It defines which font is used as default for displaying the formatted text.
    - **Font from style:** the font Standard defined in the report item Style is used.

    - **Font from style with specified height:** the font Standard defined in the report item Style is used, however the height of the font can be changed in the properties of the formatted text.

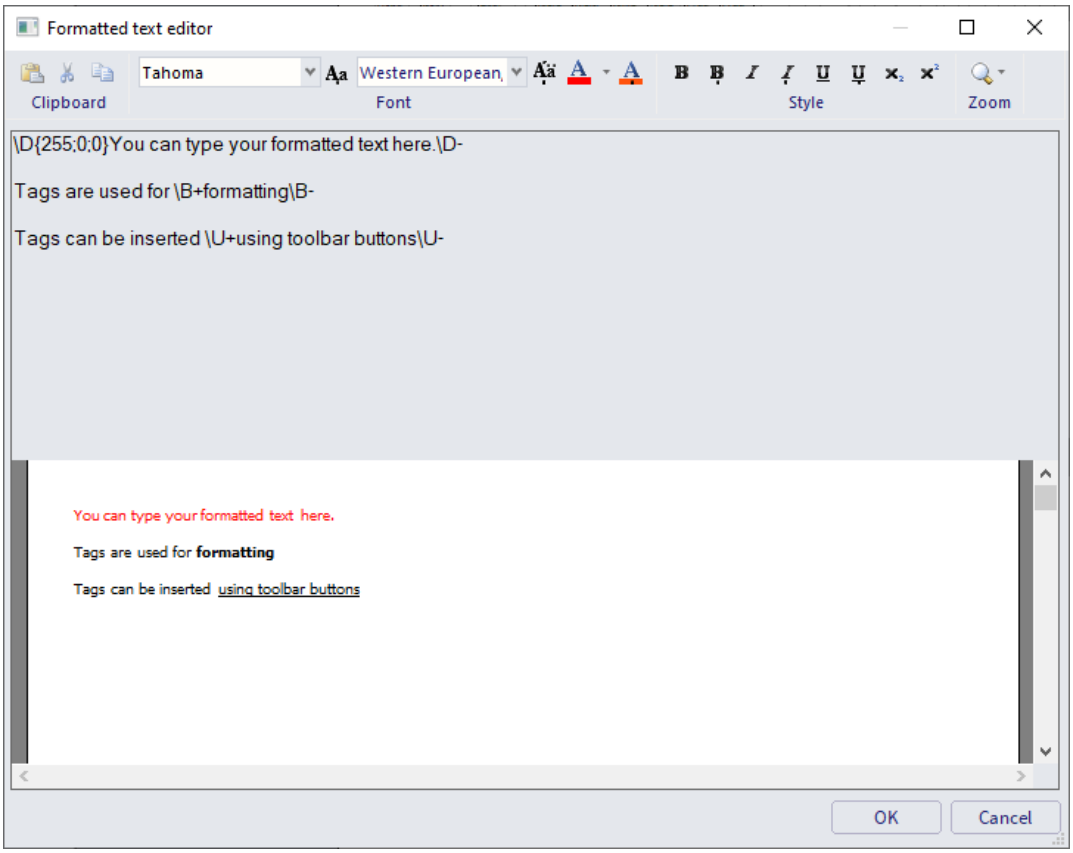
    - **Font:** the font is completely defined in the properties of the formatted text.

- **Edit text [...]:** this property button navigates you to the Formatted text editor where he can enter his text.

4.8.1. Formatted text editor

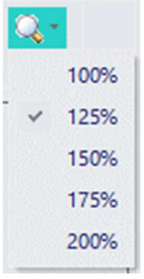
The text can be inserted by typing or using the clipboard function. It is possible to type multiple rows. You can also see a formatted preview of the text (since SCIA Engineer 2013.1).



The formatting of text is done using predefined tags. Those tags can be typed manually or inserted using buttons on the toolbar. Sub and supper scripts are defined using syntax known e.g. from Text. This can be inserted also from the toolbar.

You can insert separate tags from the toolbar by pressing some button while no text is selected. Pressing of formatting button in case some text is selected will insert starting tag before selected text and ending tag after selected text.

Since version 15 it is possible to increase/decrease the size of the text in the editing area.



Writing of subscript / superscript

Subscript	text_{subscript}
Superscript	text^{superscript}
Both scripts	text^{ superscript}_{ subscript}

Tags for changing of font

Switch ON	Switch OFF	According to visual style	Font Property
\B+	\B-	\B.	Bold text
\I+	\I-	\I.	Italic text
\U+	\U-	\U.	Underlined text
\S+	\S-	\S.	Strikeout text

Switch ON	Switch OFF	According to visual style	Font Property
\A{Font name}	\F-	\F.	Change of font name
\D{R;G;B}	\D-	\D.	Change of text color (using Red Green Blue format)
\C+{name of char set}	\C-	\C.	Change of character set

Tags for special characters

You can also use "& notation" to insert special characters. The list of available characters and notations are listed below.

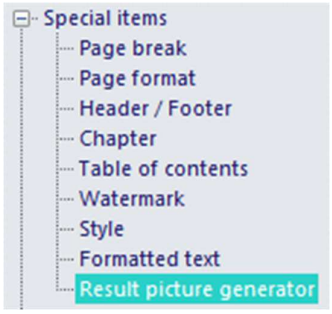
String sequence	Character	Description
ƒ	ƒ	Latin small f with hook = function = florin
Α	Α	Greek capital letter alpha
Β	Β	Greek capital letter beta
Γ	Γ	Greek capital letter gamma
Δ	Δ	Greek capital letter delta
Ε	Ε	Greek capital letter epsilon
Ζ	Ζ	Greek capital letter zeta
Η	Η	Greek capital letter eta
Θ	Θ	Greek capital letter theta
Ι	Ι	Greek capital letter iota
Κ	Κ	Greek capital letter kappa
Λ	Λ	Greek capital letter lambda
Μ	Μ	Greek capital letter mu
Ν	Ν	Greek capital letter nu
Ξ	Ξ	Greek capital letter xi
Ο	Ο	Greek capital letter omicron
Π	Π	Greek capital letter pi
Ρ	Ρ	Greek capital letter rho
Σ	Σ	Greek capital letter sigma
Τ	Τ	Greek capital letter tau
Υ	Υ	Greek capital letter upsilon
Φ	Φ	Greek capital letter phi
Χ	Χ	Greek capital letter chi
Ψ	Ψ	Greek capital letter psi
Ω	Ω	Greek capital letter omega
α	α	Greek small letter alpha
β	β	Greek small letter beta
γ	γ	Greek small letter gamma
δ	δ	Greek small letter delta
ε	ε	Greek small letter epsilon
ζ	ζ	Greek small letter zeta
η	η	Greek small letter eta
θ	θ	Greek small letter theta
ι	ι	Greek small letter iota
κ	κ	Greek small letter kappa
λ	λ	Greek small letter lambda

String sequence	Character	Description
μ	μ	Greek small letter mu
ν	ν	Greek small letter nu
ξ	ξ	Greek small letter xi
ο	ο	Greek small letter omicron
π	Π	Greek small letter pi
ρ	ρ	Greek small letter rho
σ	σ	Greek small letter sigma
τ	τ	Greek small letter tau
υ	υ	Greek small letter upsilon
φ	φ	Greek small letter phi
χ	χ	Greek small letter chi
ψ	ψ	Greek small letter psi
ω	ω	Greek small letter omega
ϑ	ϑ	Greek small letter theta symbol
ϒ	ϒ	Greek upsilon with hook symbol
ϖ	ϖ	Greek pi symbol
ς	ς	Greek small letter final sigma
•	•	bullet = black small circle
…	…	horizontal ellipsis = three dot leader
′	′	prime = minutes = feet
″	″	double prime = seconds = inches
‾	‾	overline = spacing overscore
⁄	⁄	fraction slash
℘	℘	script capital P = power set = Weierstrass p
ℑ	ℑ	blackletter capital I = imaginary part
ℜ	ℜ	blackletter capital R = real part symbol
™	™	trade mark sign
ℵ	ℵ	alef symbol = first transfinite cardinal
←	←	leftwards arrow
↑	↑	upwards arrow
→	→	rightwards arrow
↓	↓	downwards arrow
↔	↔	left right arrow
↵	↵	downwards arrow with corner leftwards = carriage return
⇐	⇐	leftwards double arrow
⇑	⇑	upwards double arrow
⇒	⇒	rightwards double arrow
⇓	⇓	downwards double arrow
⇔	⇔	left right double arrow
∀	∀	for all
∂	∂	partial differential
∃	∃	there exists
∅	∅	empty set = null set = diameter
∇	∇	nabla = backward difference
∈	∈	element of
∉	∉	not an element of
∋	∋	contains as member
∏	∏	n-ary product = product sign
∑	∑	n-ary sumation
−	−	minus sign
∗	∗	asterisk operator

String sequence	Character	Description
√	√	square root = radical sign
∝	∝	proportional to
∞	∞	infinity
∠	∠	angle
∧	∧	logical and = wedge
∨	∨	logical or = vee
∩	∩	intersection = cap
∪	∪	union = cup
∫	∫	integral
∴	∴	therefore
∼	∼	tilde operator = varies with = similar to
≅	≅	approximately equal to
≈	≈	almost equal to = asymptotic to
≠	≠	not equal to
≡	≡	identical to
≤	≤	less-than or equal to
≥	≥	greater-than or equal to
⊂	⊂	subset of
⊃	⊃	superset of
⊄	⊄	not a subset of
⊆	⊆	subset of or equal to
⊇	⊇	superset of or equal to
⊕	⊕	circled plus = direct sum
⊗	⊗	circled times = vector product
⊥	⊥	up tack = orthogonal to = perpendicular
⋅	·	dot operator
⌈	⌈	left ceiling = APL upstile
⌉	⌉	right ceiling
⌊	⌊	left floor = APL downstile
⌋	⌋	right floor
⟨	⟨	left-pointing angle bracket = bra
⟩	⟩	right-pointing angle bracket = ket
◊	◊	lozenge
♠	♠	black spade suit
♣	♣	black club suit = shamrock
♥	♥	black heart suit = valentine
♦	♦	black diamond suit

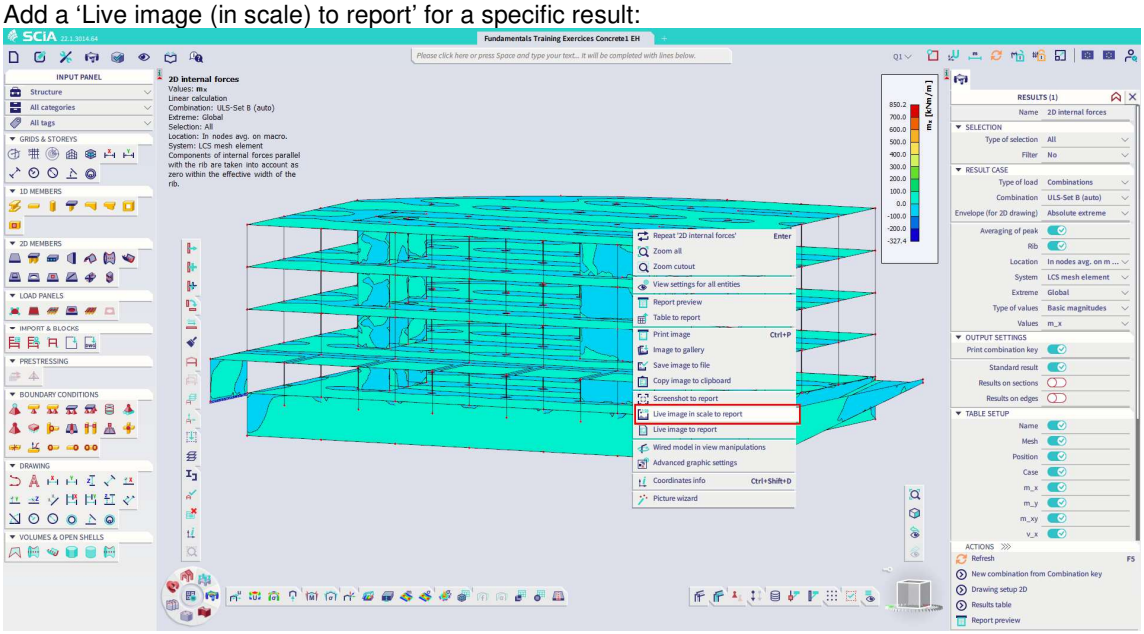
4.9. Results picture generator

The results picture generator provides the ability to create various pictures with different types of results concerning the internal forces of a structure. The advantage of the Results picture generator is the generation of results in pictures which can be adjusted accordingly. The Results picture generator can be found under the following setting:

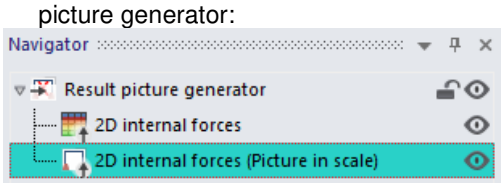


Selecting the Results picture generator, and subsequently using the indent function for the internal forces and a live image under results menu, provides the ability to create results for the bending moments, shear forces, normal forces and various other results. This can be done as follows:

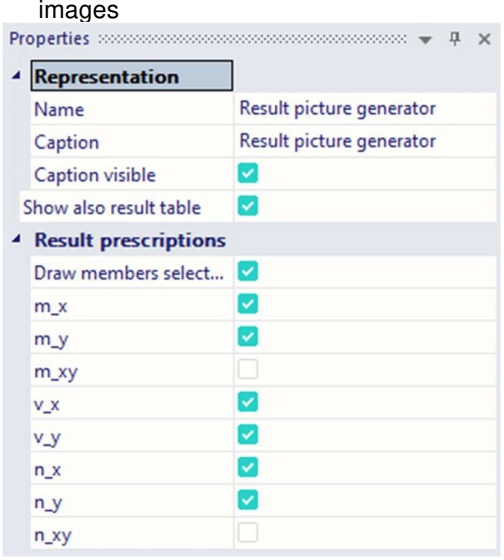
a) Add a 'Live image (in scale) to report' for a specific result:



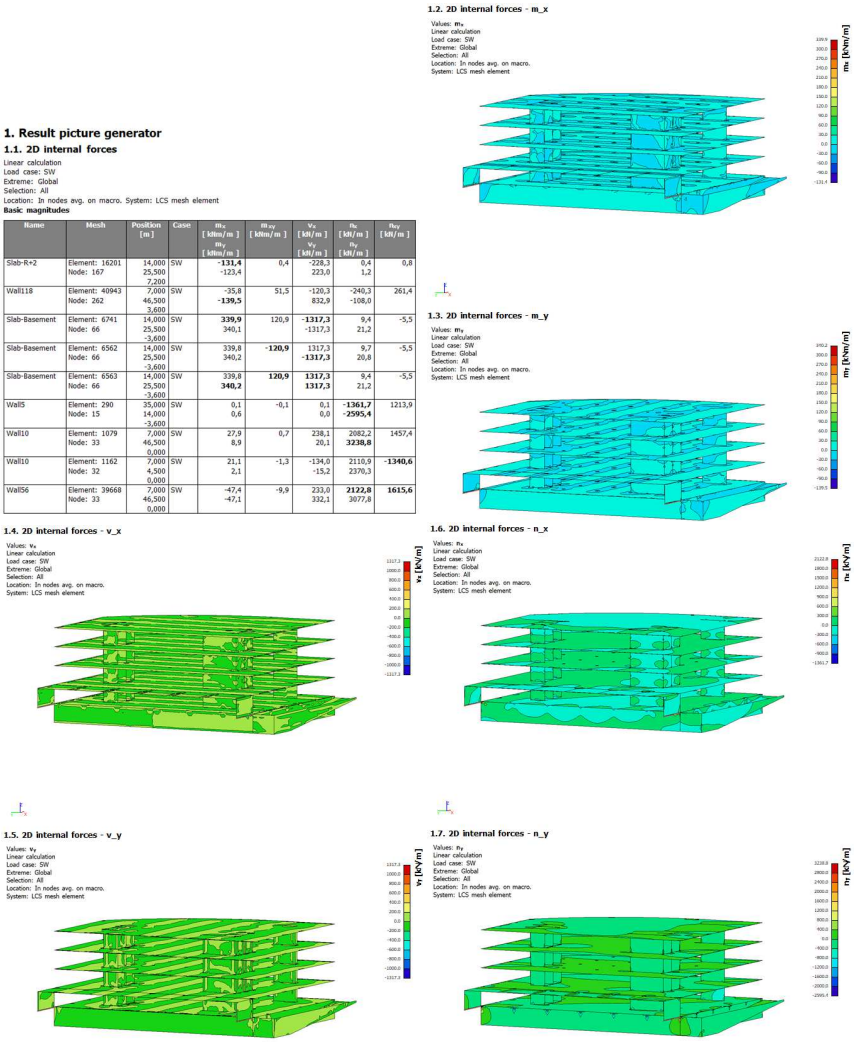
b) Use the Indent function for the item '2D internal forces' and for the inserted live image under the results picture generator:



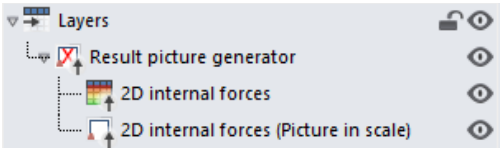
c) Select in the properties of the Result picture generator for which results you want to have additional images



In this case, internal forces m_x, m_y, v_x, v_y, n_x and n_y will be shown by tables and figures which are linked to each other.



An additional indent function can applied, in which the requested results concerning the images will be filtered in the same manner for the structure, organized by layers. This can be done as follows:



1. Layers

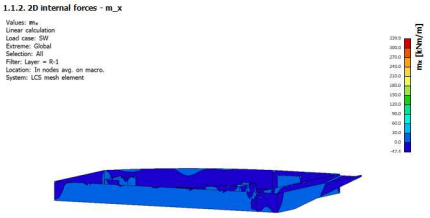
1.1. Layers - R-1

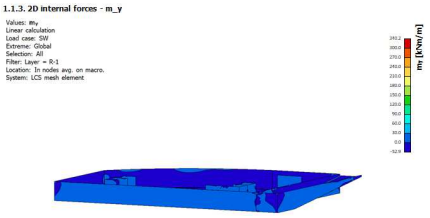
Name	Structural model only	Colour
R-1	X	

1.1.1. 2D internal forces

Linear calculation
Load case: SW
Extreme: Global
Selection: All
Filter: Layer = R-1
Location: In nodes avg. on macro. System: LCS mesh element
Basic magnitudes

Name	Mesh	Position [m]	Case	m_x [kNm/m] m_y [kNm/m]	m_{xy} [kNm/m]	v_x [kN/m] v_y [kN/m]	n_x [kN/m] n_y [kN/m]	n_{xy} [kN/m]
Wall56	Element: 39668 Node: 33	7,000 46,500 0,000	SW	**-47,4** -47,1	-9,9	233,0 332,1	**2122,8** 3077,8	**1615,6**
Wall1	Element: 56 Node: 2	14,000 11,500 -3,600	SW	-10,0 **-52,9**	5,2	18,2 -271,5	-426,2 -774,3	199,3
Slab-Basement	Element: 6741 Node: 66	14,000 25,500 -3,600	SW	**339,9** 340,1	120,9	**-1317,3** -1317,3	9,4 21,2	-5,5
Slab-Basement	Element: 6562 Node: 66	14,000 25,500 -3,600	SW	339,8 340,2	**-120,9**	1317,3 **-1317,3**	9,7 20,8	-5,5
Slab-Basement	Element: 6563 Node: 66	14,000 25,500 -3,600	SW	339,8 **340,2**	**120,9**	**1317,3** 1317,3	9,4 21,2	-5,5
Wall5	Element: 290 Node: 15	35,000 14,000 -3,600	SW	0,1 0,6	-0,1	0,1 0,0	**-1361,7** **-2595,4**	1213,9
Wall10	Element: 1079 Node: 33	7,000 46,500 0,000	SW	27,9 8,9	0,7	238,1 20,1	2082,2 **3238,8**	1457,4
Wall10	Element: 1162 Node: 32	7,000 4,500 0,000	SW	21,1 2,1	-1,3	-134,0 -15,2	2110,9 2370,3	**-1340,6**





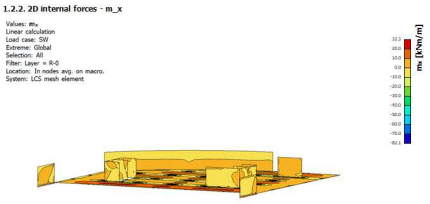
1.2. Layers - R-0

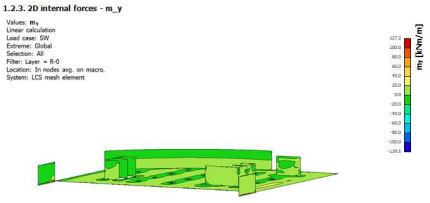
Name	Structural model only	Colour
R-0	X	

1.2.1. 2D internal forces

Linear calculation
Load case: SW
Extreme: Global
Selection: All
Filter: Layer = R-0
Location: In nodes avg. on macro. System: LCS mesh element
Basic magnitudes

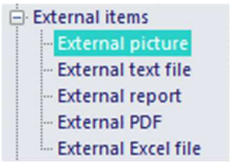
Name	Mesh	Position [m]	Case	m_x [kNm/m] m_y [kNm/m]	m_{xy} [kNm/m]	v_x [kN/m] v_y [kN/m]	n_x [kN/m] n_y [kN/m]	n_{xy} [kN/m]
Slab-R-0	Element: 37991 Node: 328	14,000 25,500 0,000	SW	**-82,1** -87,3	18,0	-232,8 231,6	-12,5 -23,5	14,6
Wall118	Element: 40943 Node: 262	7,000 46,500 3,600	SW	-35,8 **-139,5**	**51,5**	-120,3 **832,9**	-240,3 -108,0	261,4
Slab-R-0	Element: 34728 Node: 24143	21,000 12,000 0,000	SW	-2,9 -5,8	-5,9	**-244,9** 220,3	-2,7 -6,3	89,1
Wall117	Element: 40845 Node: 258	7,000 4,500 3,600	SW	**32,3** **127,3**	**-47,1**	108,5 **-759,5**	-336,3 -126,8	304,5
Wall18	Element: 8965 Node: 75	21,000 11,500 3,600	SW	-0,2 -2,0	1,0	12,9 -0,8	**-960,2** -802,0	541,4
Wall17	Element: 8928 Node: 76	14,000 18,500 3,600	SW	0,0 0,0	0,0	0,4 0,0	-762,7 **-1128,2**	-559,8
Slab-R-0	Element: 34501 Node: 33	7,000 46,500 0,000	SW	-47,5 -98,2	12,6	**422,9** -577,3	**1576,1** 1515,9	**-738,9**
Slab-R-0	Element: 34584 Node: 32	7,000 4,500 0,000	SW	-47,1 -72,2	-40,5	332,3 444,3	1204,3 **1958,5**	**793,5**





4.10. External picture

External pictures are report items enabling to insert pictures from external programs into the Engineering Report.



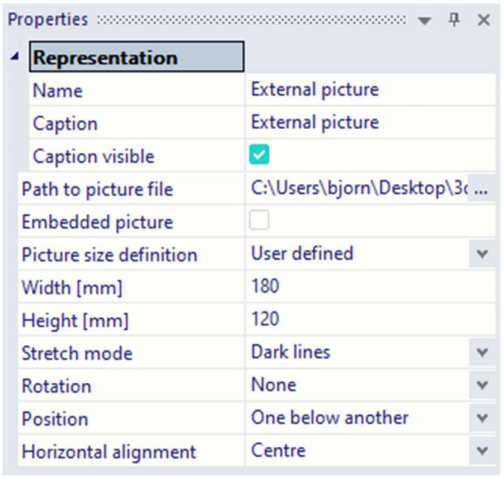
There are supported many standard picture formats:

- **raster pictures:** bmp, jpg, png, ...
- **vector pictures:** emf, wmf
- **3D pictures:** dwg, vrml
- **3D SCIA Engineer pictures:** ep3

Pictures can be inserted as a link to a file on the hard drive or as "Embedded":

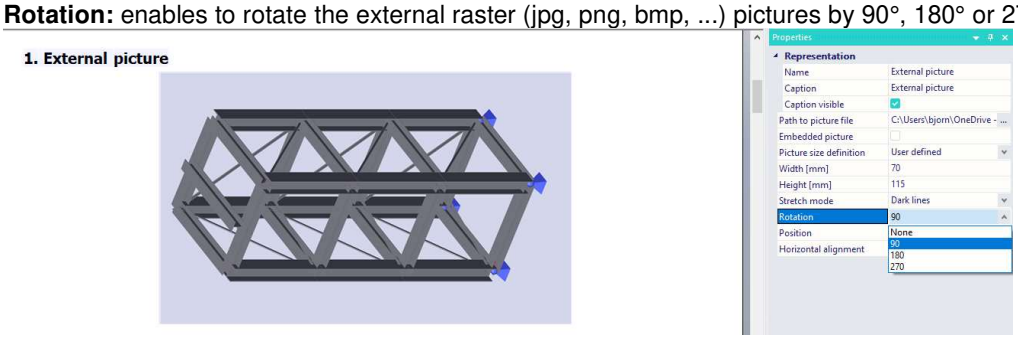
- **Path to picture file:** When the pictures are inserted as a link, they are automatically updated and redrawn after the change of the source file. Such pictures do not increase the size of the project but they are not displayed correctly when the project is opened on a different computer.
- **Embedded picture:** Embedding of the picture means storing of its source file inside the project. Such pictures are independent on the files on hard drives. They are also displayed correctly when the project is opened on another computer. Those pictures increase the size of the project.

External pictures can be inserted from the Available items panel or they can be pasted from the system clipboard. Pasted pictures are automatically set as Embedded.

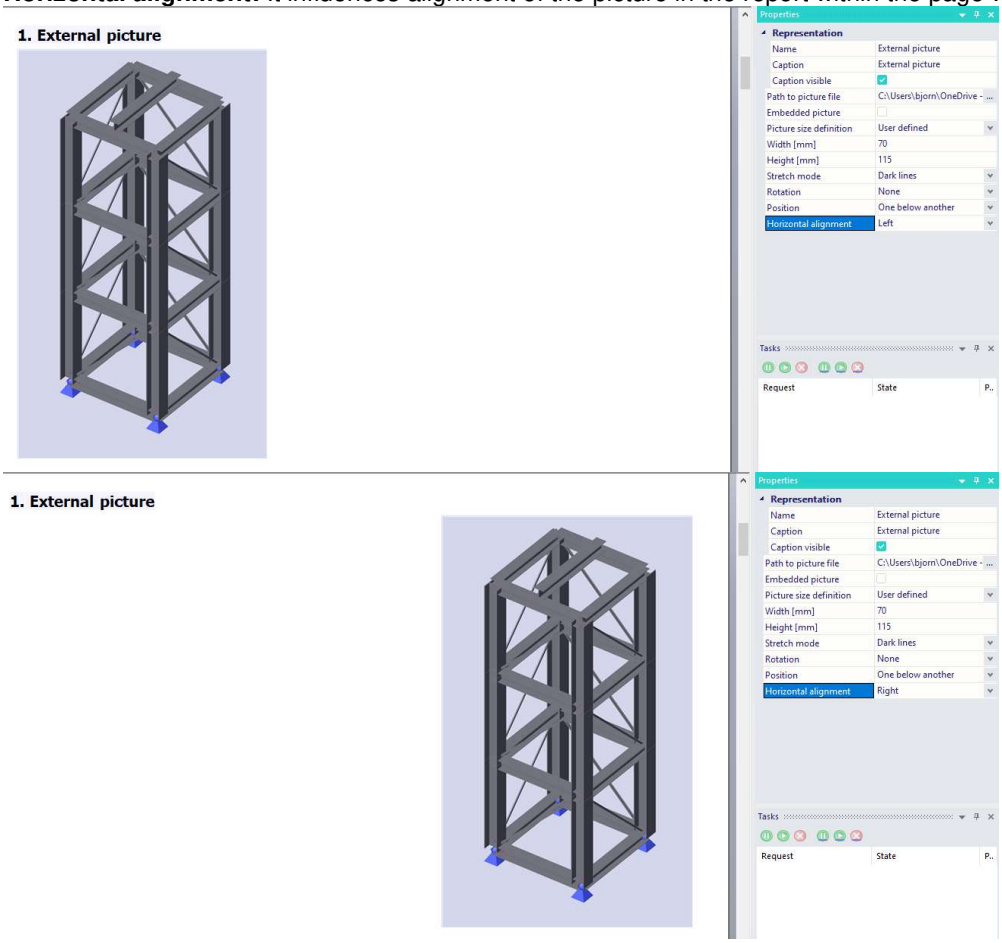


- **Name:** this property is common for all report items and is intended for your orientation. The name identifies the report item in the navigator panel.
- **Caption:** this property defines the name of the caption of the report item in the report.
- **Caption visible:** this property defines whether the report item makes a separate chapter or not. In case the property is switched ON the Caption of the report item is displayed and it is also included in the table of contents.
- **Path to picture file:** here you can select and see the path to the source of the picture.
- **Embedded picture:** this property defines whether the picture is read from the hard drive or whether it is included in the project.
- **Picture size definition:** it is possible to choose the width and height of a picture (user defined). Since SCIA Engineer 15 it is possible to choose relative sizes (one at page, two at page, fit to page width).
- **Width** / **Height:** these two properties define the size of the picture. It is possible to put "0" value as one size. In this case this size will be calculated automatically according to picture's aspect ratio.

- **Rotation:** enables to rotate the external raster (jpg, png, bmp, ...) pictures by 90°, 180° or 270°.

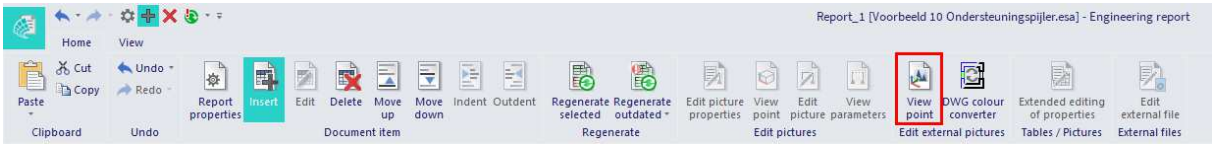


- **Position:** Property Position defines the placement of the picture with respect to the previous report item.
- **Horizontal alignment:** It influences alignment of the picture in the report within the page width.

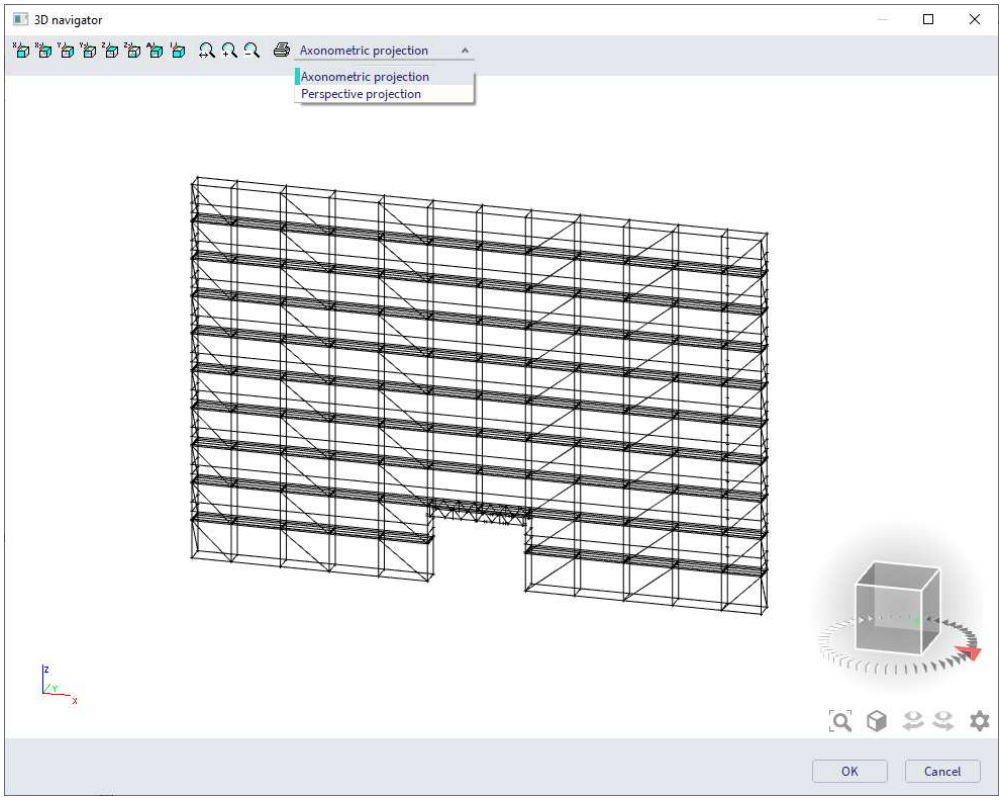


4.10.1. Editing of view point for 3D pictures

In case the external picture contains 3D data, it is possible to modify the zoom and the view point using the button on the ribbon Home.



This button opens the following tool:



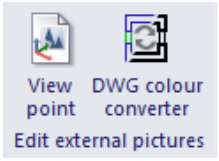
It is also possible to switch between axonometric and perspective projection.

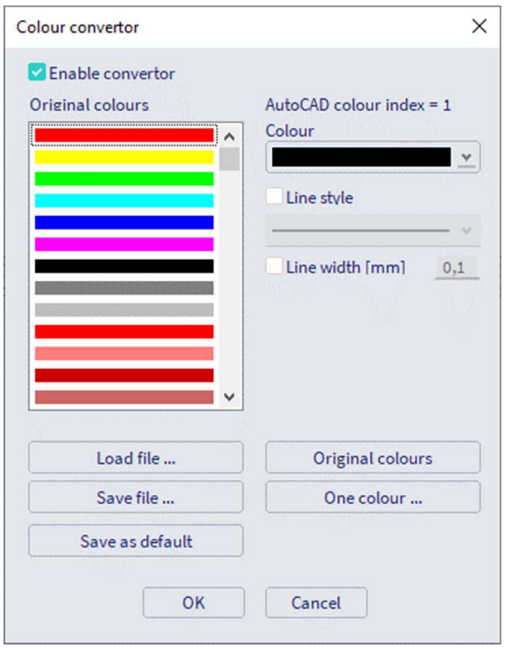
4.10.2. External DWG pictures

It is possible to insert external DWG drawings into the Engineering Report. In this case the content of DWG drawings is imported and converted to drawing objects supported by the Engineering Report. The DWG drawings can be embedded into the report or they can work as external references (as other types of pictures).

Specific DWG characters %%c, %%d, %%p are converted to ø, °, ±.

DWG colour convertor
It is possible to convert colours used in DWG to different colours and/or modify line styles and line thickness based on colours. This conversion can be done using the DWG colour converter.





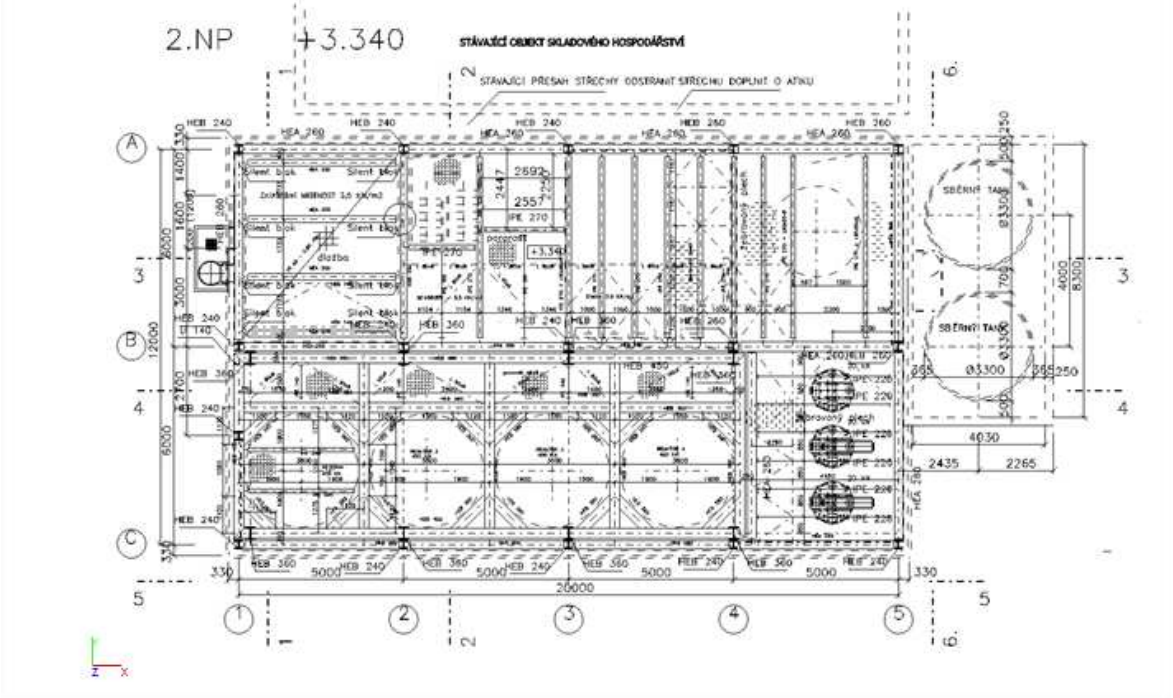
In the DWG colour converter dialog it is possible to switch the conversion ON/OFF. By default the conversion is switched ON.

The colour conversion is available for 254 basic indexed colours. For each of those colours it is possible to define:

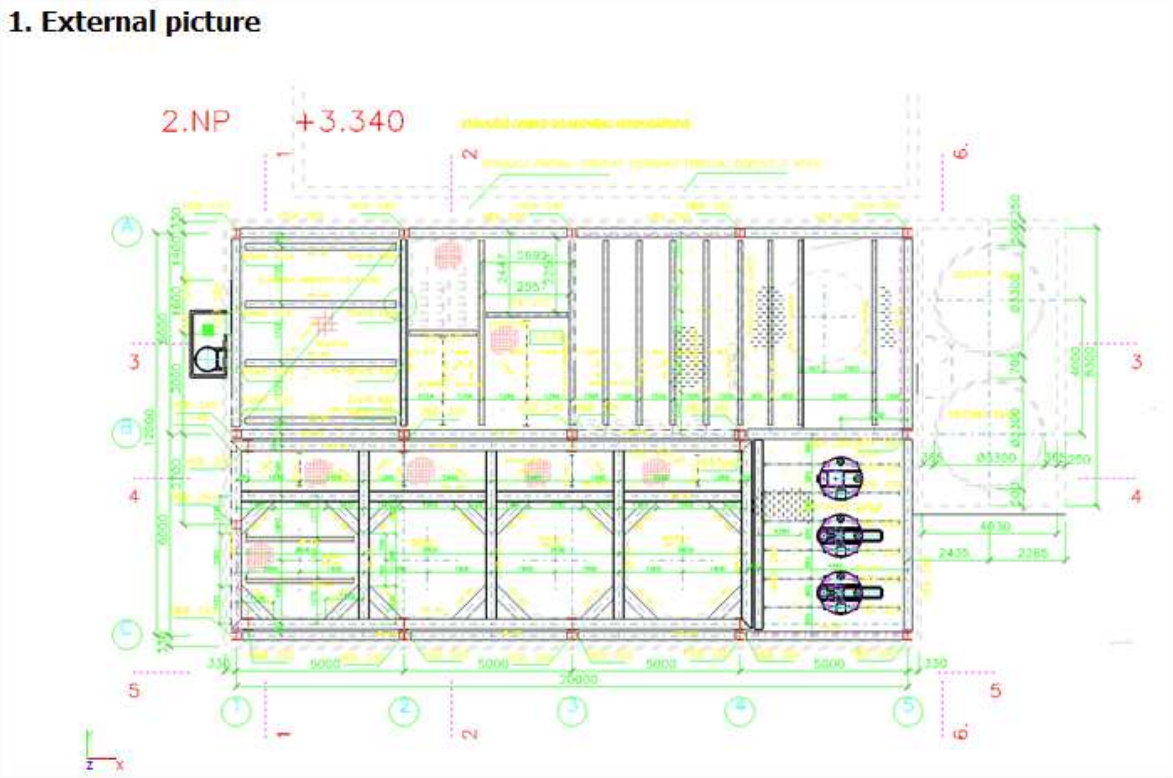
- **Output colour:** the colour displayed in the Engineering Report
- **Output line style:** the line style which will be displayed in the Engineering Report. It is also possible to use styles from DWG by keeping the checkbox unchecked.
- **Output line thickness:** the thickness lines which will be used in the Engineering Report. It is also possible to use styles from DWG by keeping the checkbox unchecked.

See comparison of original and converted picture from DWG.

1. External picture

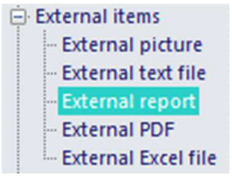


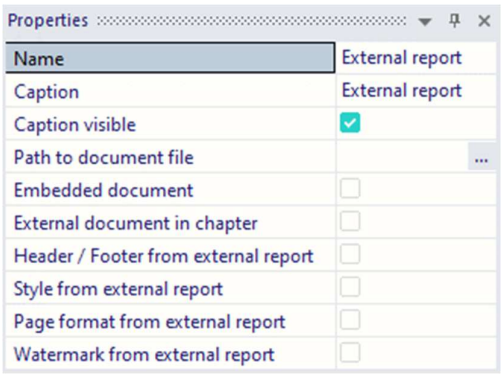
1. External picture



4.11. External report

Content of each report can be exported into a *.dds file. Since version 15 it is possible to insert those files into another report. This way it is possible to compose one report from several smaller ones (even from different projects).





4.11.1. Displaying of content of external report

The file with report content *.dds contains all presentation data. It means content of tables, content of pictures, texts,... Chapters from the original report are respected in the final report and displayed in the Table of contents.

The final report has its own numbering of chapters and pages which goes continuously through all inserted external reports. With the option “External document in chapter”, the name of the External report itself will also be shown as a chapter.

An external report can be inserted as link to file on the hard drive or as “Embedded”:

- **Link to file on the hard drive:** When the reports are inserted as a link, their validity status informs about changes in the source file on the hard drive. They are marked as invalid when the source file changes. During regeneration, their content is updated and redrawn. Those reports are not displayed when the project is opened on a different computer and the report item is regenerated.
- **Embedded file:** Embedding of the External report means storing of its source file inside the project. Such external reports are independent on the files on hard drives. Those external report items increase the size of the project and cannot be updated after changes in the original project.

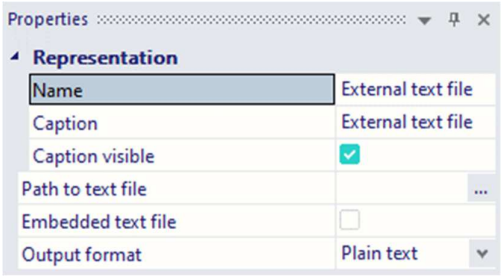
4.11.2. Respecting formatting from External reports

You can decide whether he wants to use formatting from the External report. It is possible to respect separately Headers/Footers, Style, Page Formats or Watermarks used in the External report by checking the relevant checkbox(es).

If those checkboxes are unchecked, then the formatting of the current report is used.

4.12. External text file

Since version 15 it is possible to insert new report items which enable to display the content of a file stored on hard drive.

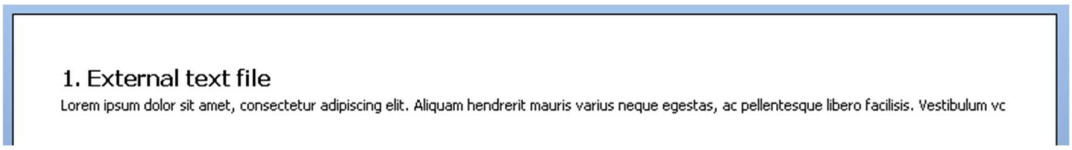


The content can be displayed as plain text, formatted text or as a table. This can be set using the property Output format.

4.12.1. Formatting of text from external file

Plain text: this option enables to display the content of the file as unformatted text. It is intended to be used for displaying of outputs from old programs.

Please note that wrapping of plain text is done according to the source text. It is wrapped only in case there is a “ENTER” character in the source text.



Formatted text: the formatting of text is done using the same formatting tags which are used for the item Formatted text. The text is automatically wrapped to fit the page width.

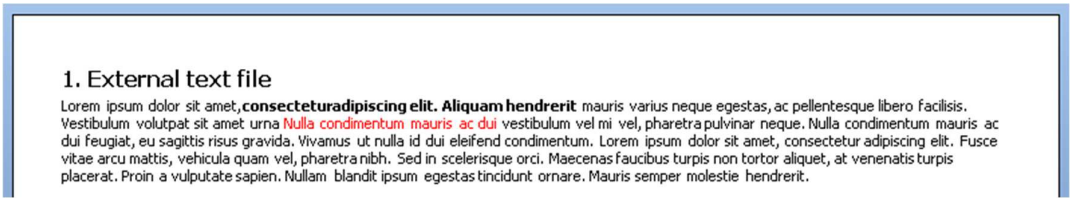


Table: it is also possible to convert text into a simple table. The text is split into columns by “ “ (space) character. Each row in the source text represents a separate row.

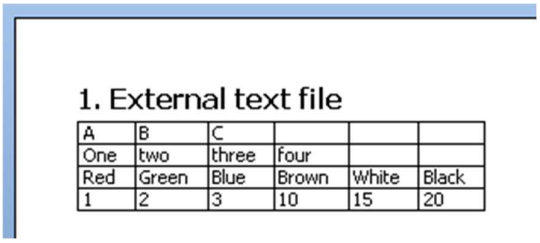
Example:

A B C

One two three four

Red Green Blue Brown White Black

1 2 3 10 15 20



External texts can be inserted as a link to file on the hard drive or as “Embedded”:

- **Link to file on the hard drive:** When the texts are inserted as a link, their validity status informs about changes in the source file on the hard drive. They are marked as invalid when the source file changes. During regeneration, their content is updated and redrawn. Those text files do not increase the size of the project but they are not displayed when the project is opened on a different computer and the report item is regenerated.
- **Embedded text file:** Embedding of the text file means storing of its source file inside the project. Such text files are independent on the files on hard drives. They are displayed correctly when the report item is regenerated on another computer. Those text files increase the size of the project.

4.13. Report templates

Since version SCIA Engineer 14 it is possible to simplify the creation of reports using Templates.

There are several templates prepared by SCIA however you can also prepare your own set of templates.

Such a report can also be created in older versions as a new blank report and all data from another report can be copied into this new report using the clipboard (Copy – Paste).

Report templates can be used for creating new reports (In the Engineering Report manager) or it is possible to insert them into an existing report from the list of available templates in the New items panel. It is possible to insert more templates into one report.

Report templates contains a list of report items. Once the template is inserted into a report, those report items are inserted as independent items and can be independently modified, copied, deleted, moved, ... as any other report items.

In the report, templates are stored with the following information:

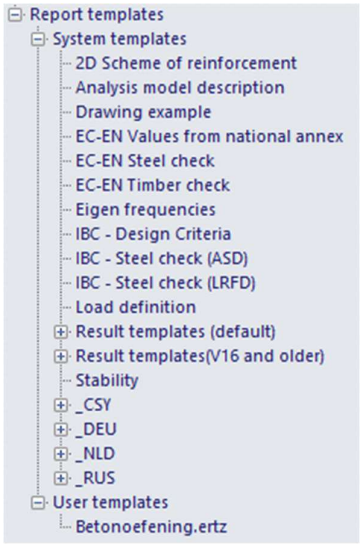
- values of properties
- table layout (TLX)
- content of formatted text
- content of external pictures
- definition of header/footer
- definition of style
- SCIA Design Forms calculations
- settings of pictures (view parameters, view point, activity, properties of result inside picture, ...)

Gallery pictures cannot be stored in the report template.

4.13.1. Inserting of templates into the report

Report templates can be inserted into an existing report. It is possible to compose a report from more report templates. It is also possible to insert template multiple times.

Report templates can be inserted from the list New items:



In the list there are displayed both (user defined and SCIA defined) types of templates.

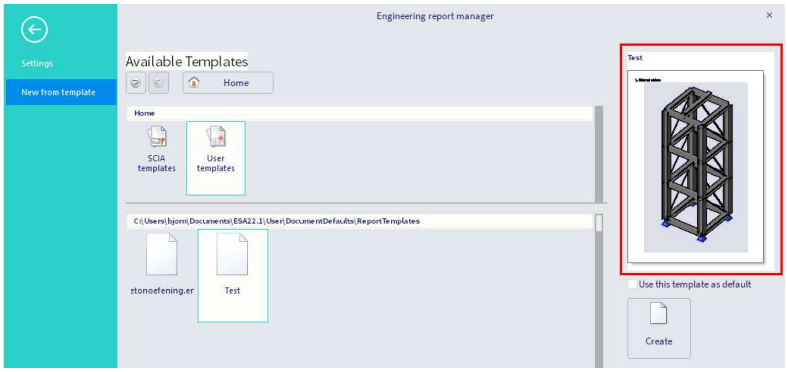
4.13.2. Creation of user defined templates

You can store the whole report or a selected part of it as a template. It can be done via "Save as template" in the Engineering report settings (button left top).

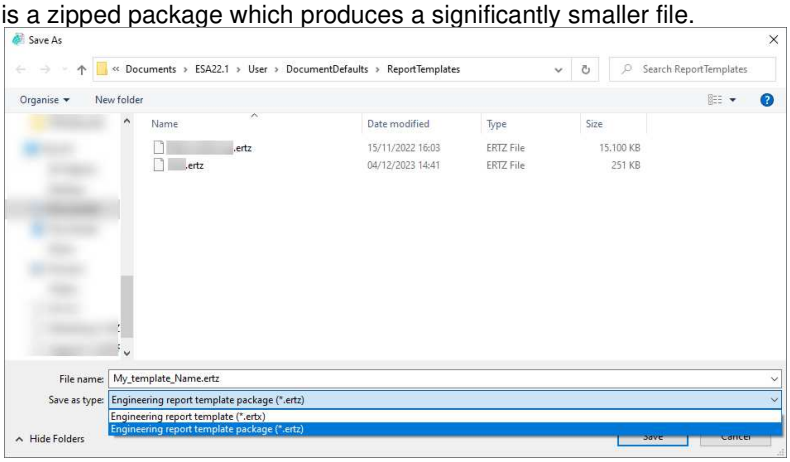
By default the report template contains only the necessary definition of report items. But it is possible to store also presentation data with the template. In such case the content of tables will be immediately visible after inserting it into a new report.

Presentation data describes the status of the source project. Once you use a template with stored presentation data in another project, it will immediately show the content of tables, but this content will be related to the original project.

The included current page preview is displayed as a preview of selected report template in the Engineering Report manager.



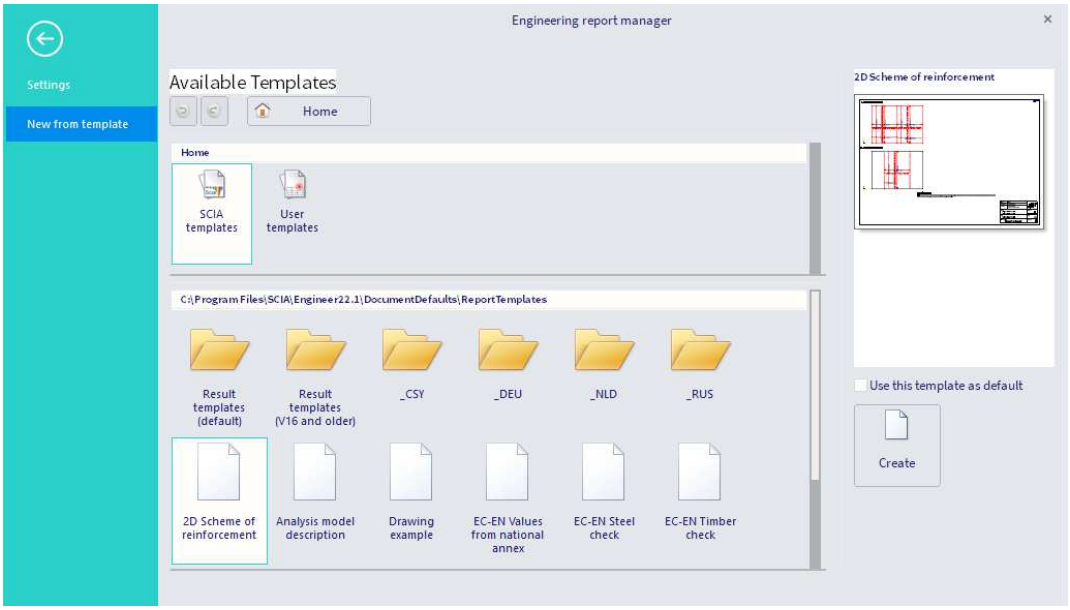
When selecting a report file name, it is possible to select one of two available formats of report template file. The default format is a zipped package which produces a significantly smaller file.



Report templates created by the user are stored in the following directory:
Documents\ESAXX.X\User\DocumentDefaults\ReportTemplates\

4.13.3. Creating of new reports using predefined template

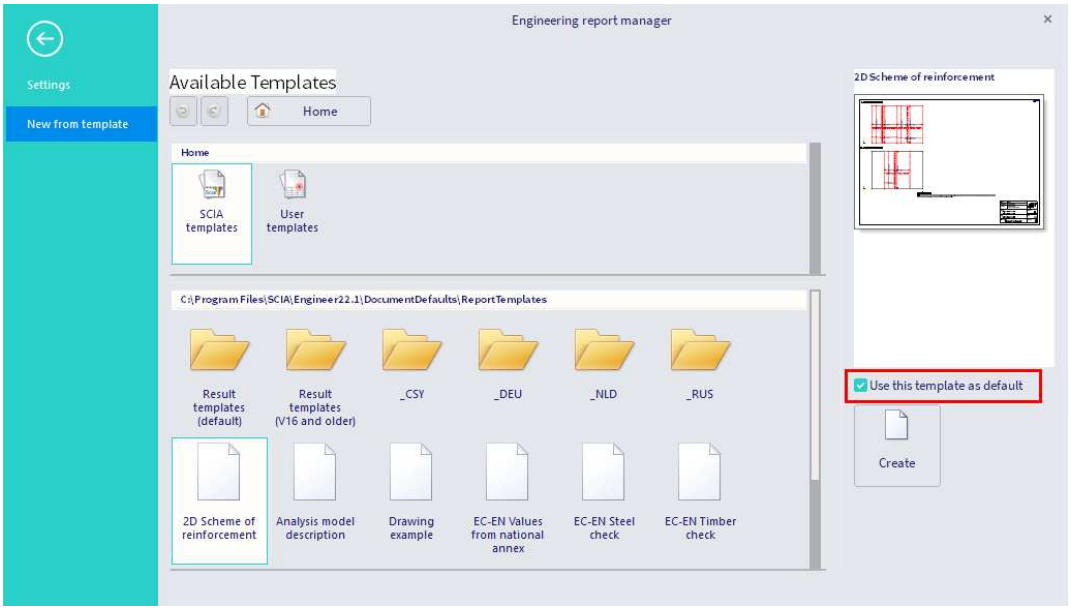
In the Engineering Report it is possible to create a new report from one of the predefined templates.



4.13.4. Selecting of default report template

It is possible to select one report template as the default one. This template will then be used when creating a new report. You can e.g. create a report with your favourite Style and Header/Footer and use this report as your default.

The default template can be selected in the Engineering Report manager on the tab “New from template”. Select the template which should be used as default and tick the checkbox.



4.14. SCIA Design Forms

Since version SCIA Engineer 14 it is possible to insert SCIA Design Forms sheets directly in the Engineering Report. Output from those calculation sheets is then part of the report. Editing of SCIA Design Forms can be done directly in the Engineering Report using SCIA Design Forms User application.

SCIA Design Forms data are included in data of the Engineering Report and therefore they are also in the project stored in the *.esa file.

4.14.1. Inserting of SCIA Design Forms calculations

SCIA Design Forms can be inserted into the report as any other report item from the Available items panel. It is placed in the group "SCIA Design Forms".

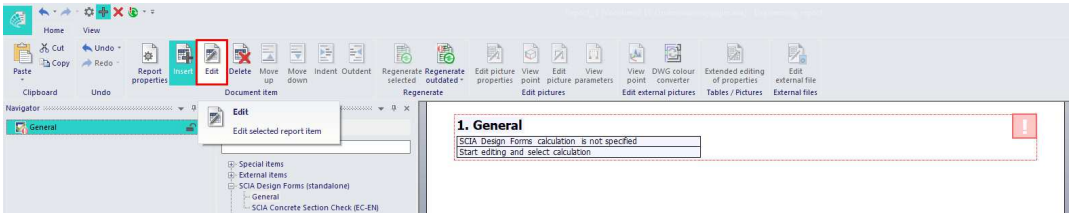
It is possible to copy a SCIA Design Forms report item together with included calculations from one report to another report using the clipboard (Copy / Paste). They can also be stored in the report templates.

In case the SCIA Design Forms calculation sheet is protected by any licence then this licence is required to be able to edit the calculation sheet.

After it is inserted in the report, it is blank and does not contain any SCIA Design Forms sheet. The sheet is selected during editing in the SCIA Design Forms User application.

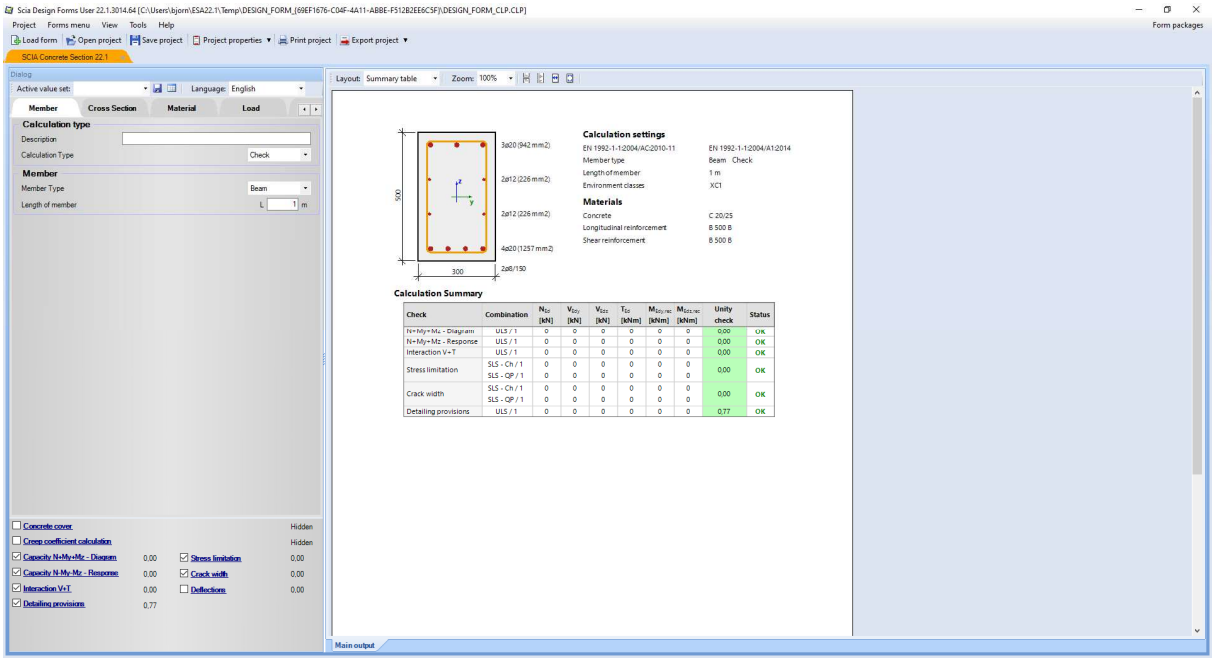
4.14.2. Editing of SCIA Design Forms sheets

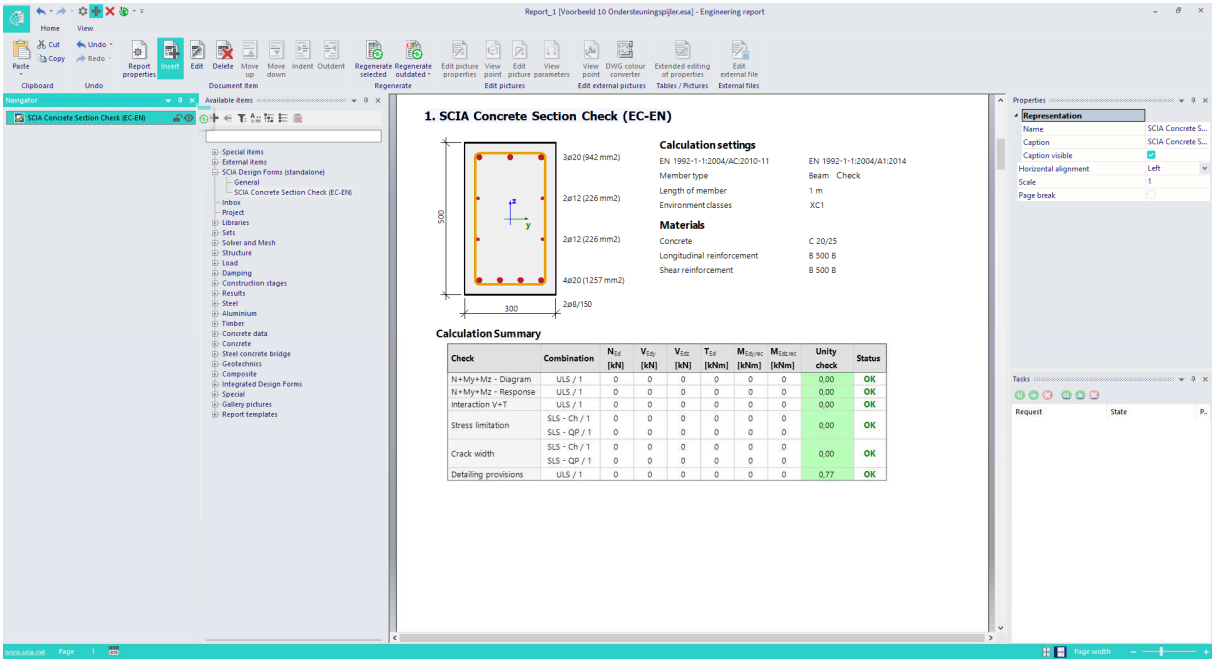
To edit any SCIA Design Forms calculation included in the Engineering Report, you need to select it in the Navigator or in the Preview panel and then press the button Edit on the ribbon Home. It is also possible to use double-click on the SCIA Design Forms calculation sheet output.



Next, the SCIA Design Forms User application is launched. Here you can add new calculation sheets using the Forms menu, Load form,... or delete some calculation or edit input values (see the manual related to SCIA Design Forms).

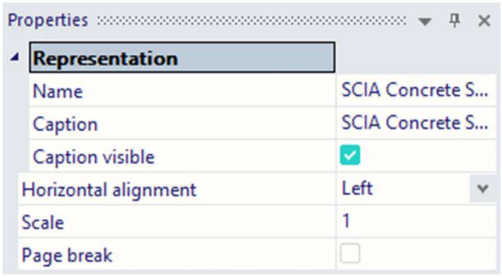
Editing of SCIA Design Forms sheet is finished by closing of the User application. Then the output from SCIA Design Forms is displayed in the Engineering report.


Calculation settings
Materials
Calculation Summary

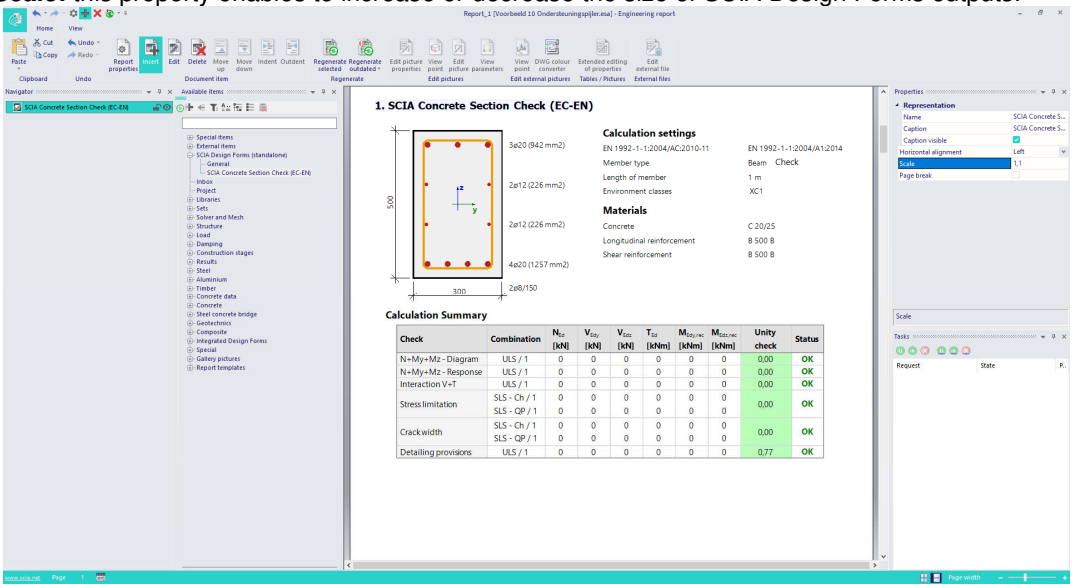

1. SCIA Concrete Section Check (EC-EN)
Calculation settings
Materials
Calculation Summary

4.14.3. Properties of SCIA Design Forms report item

The SCIA Design Forms report item has also its specific properties.



- **Name:** this property is common for all report items and is intended for users' orientation. The name identifies the report item in the navigator panel.
- **Caption:** this property defines the name of the caption of the report item in the report.
- **Caption visible:** this property defines whether the report item makes a separate chapter or not. In case the property is switched ON the Caption of the report item is displayed and it is also included in table of contents.
- **Horizontal alignment:** this property defines the position of the SCIA Design Forms calculation output within the page width.
- **Scale:** this property enables to increase or decrease the size of SCIA Design Forms outputs.

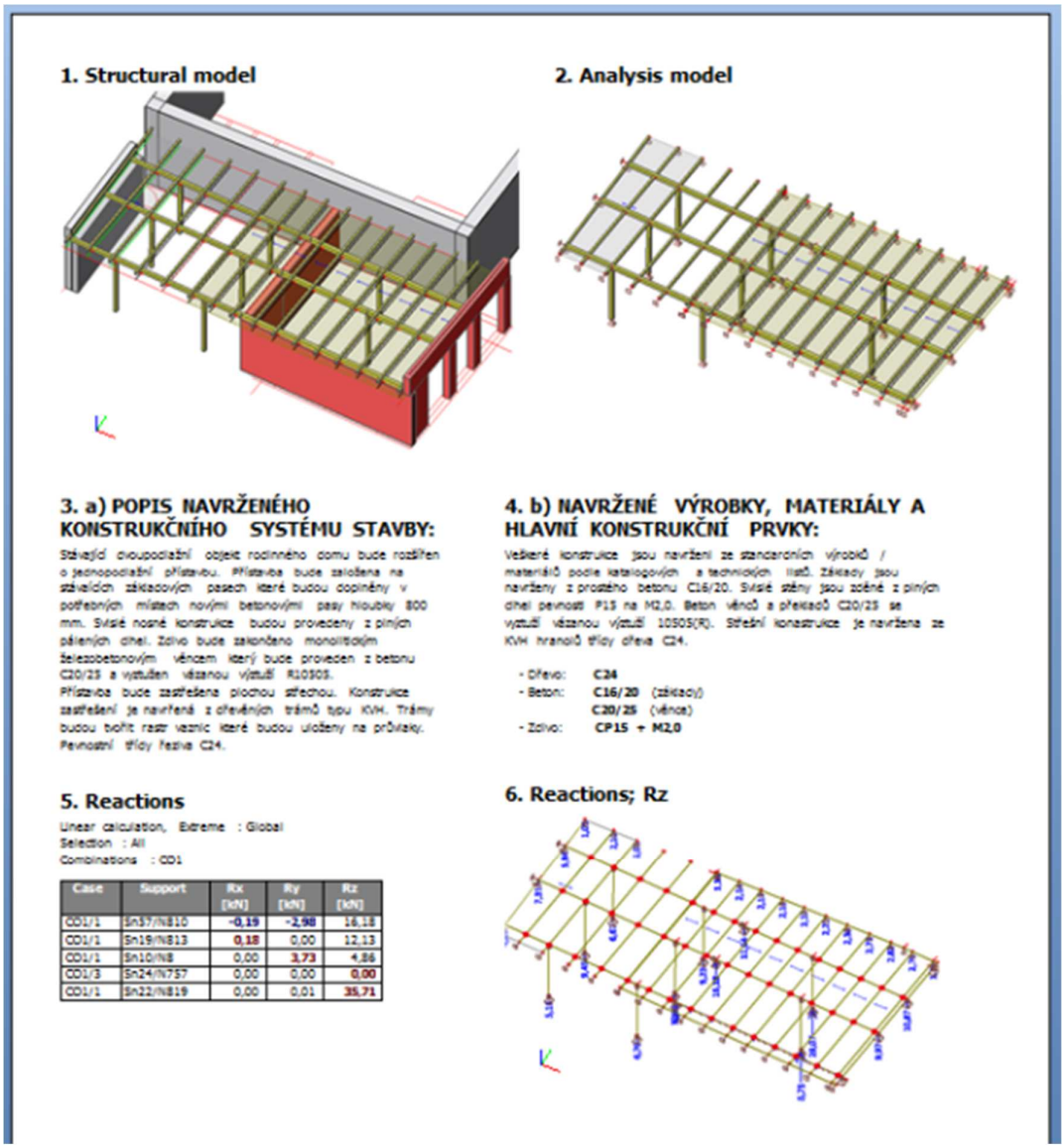


- **Page break:** in case one report item contains more SCIA Design Forms calculations it is possible to insert between each of them a page break. In this case following calculations start on a new page.

4.15. User defined positioning of Report items

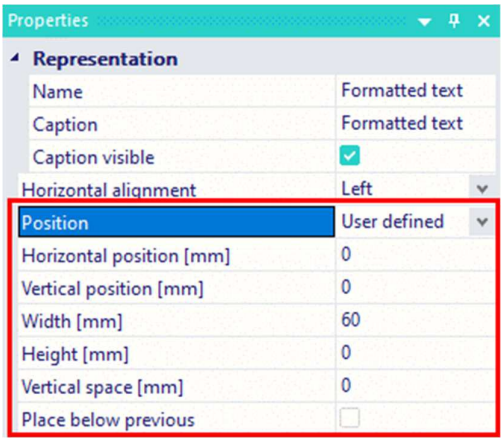
The Engineering Report enables from version 2013.1 advanced positioning of report items. You can define the exact position of a report item within the page width. For texts it is possible to define also the width of the text block.

Advanced positioning is available for **formatted texts** and **all types of pictures**.

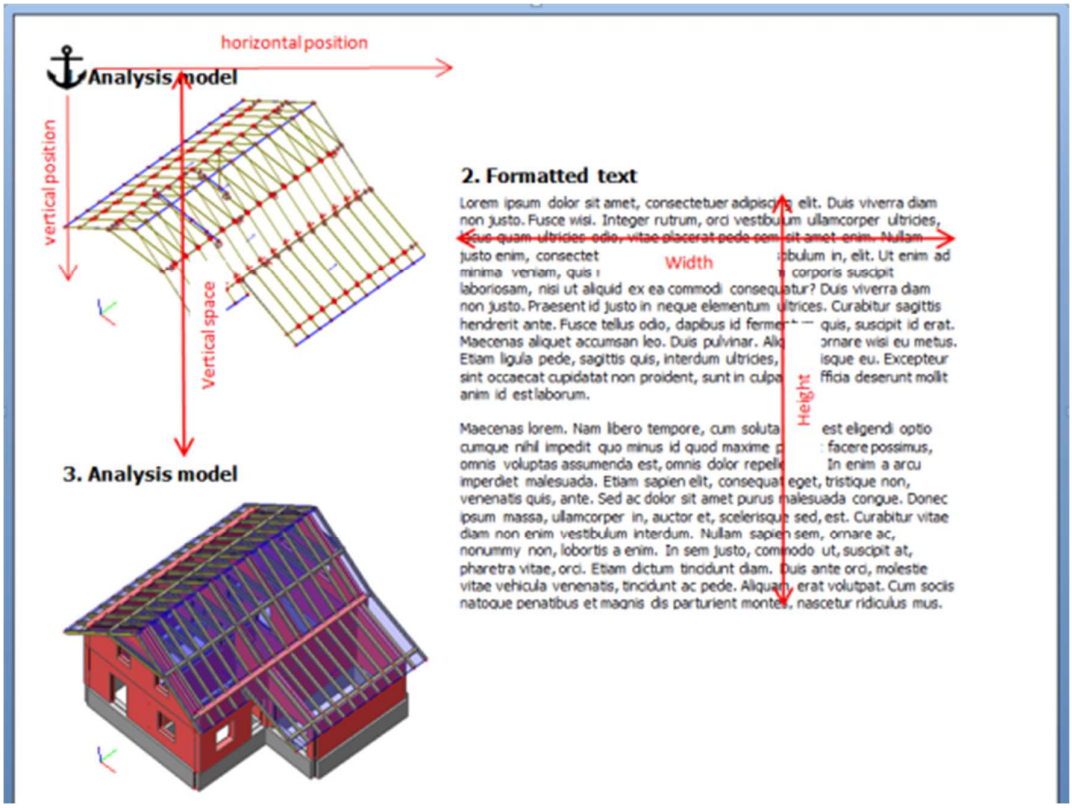


You can choose the type of positioning using the property **Position** of the report item. The options are "One below another" and "User defined":

- **One below another** means standard sequential placing of report items.
- **User defined** positioning enables more variants of placing report items.



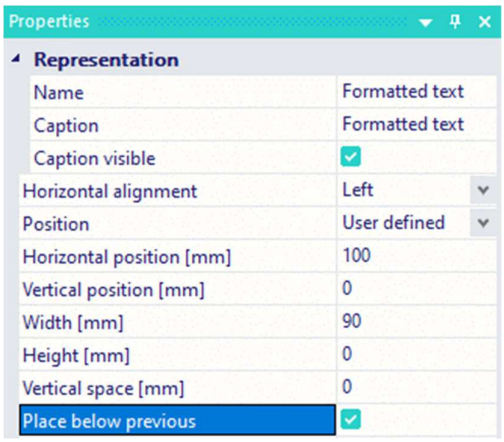
Once the **User defined** positioning is selected, you can define the position itself in the additional properties of the report item. The position is related to the "anchor" which is by default placed at the top of previous report items.

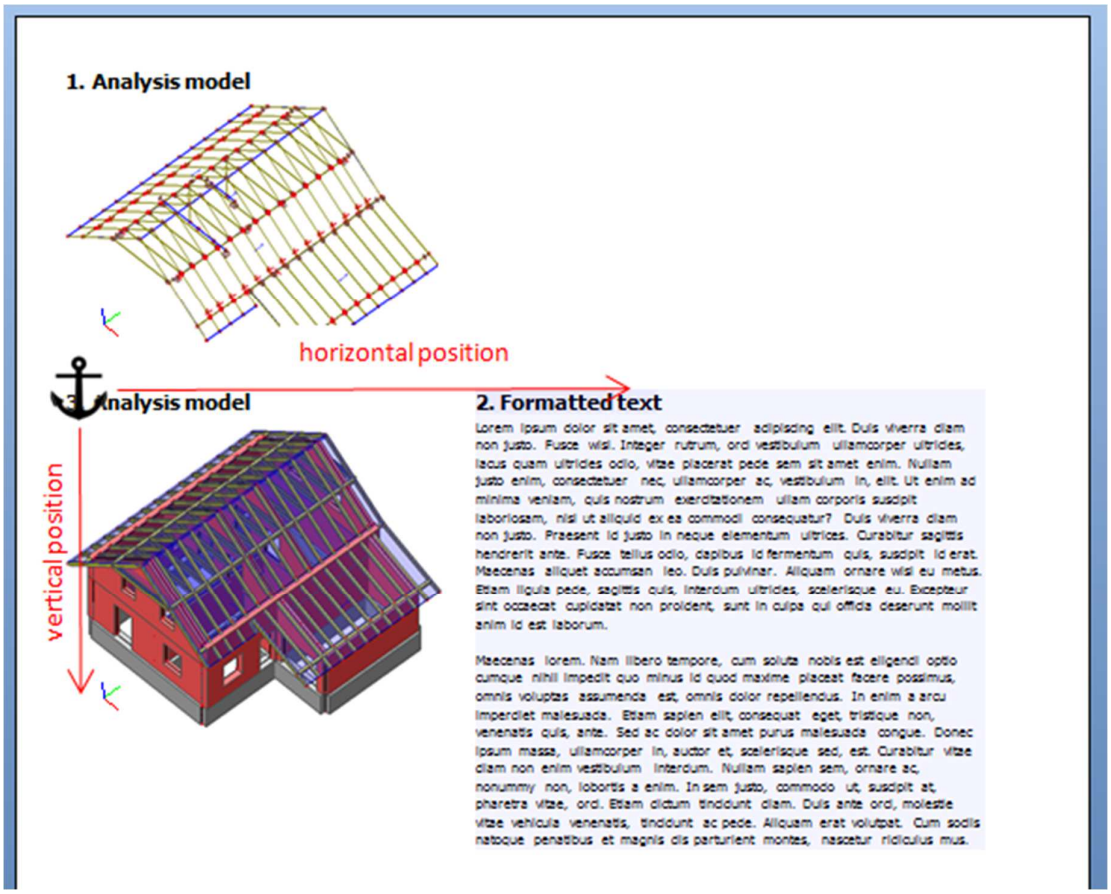


Width and **Height** properties are available for Formatted texts only. Width defines the maximal width of the text column. Height can define the exact height. The height is calculated automatically when the 0 value is chosen in the property window.

Property **Vertical space** influences the position of the next report item with Standard positioning. If the vertical space is bigger than the vertical size of the previous report item, then the space between the previous and the following report items is extended.

Property **Place below previous** enables to put the anchor at the end of the previous report item.





Chapter 5: Document tables

Tables are the basic parts of the document. Tables can contain information about the project, different settings, and results of FEM analysis designs or checks. Nearly all information from the project can be displayed in the document as a table.

By default each table creates a chapter and the Caption of the table represents the name of the chapter.

There are following ways how to insert tables into a report:

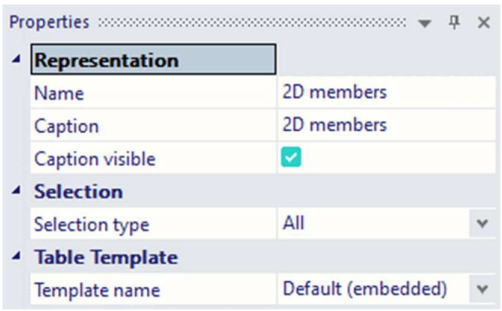
- from the SCIA Engineer pop-up menu
- from the panel "Available items"

5.1. Types of tables

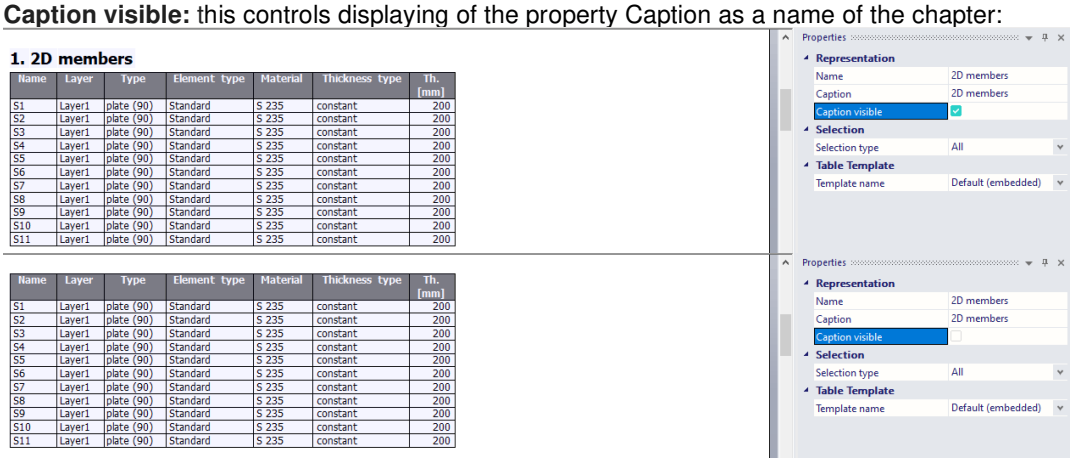
There are two basic types of tables available: result tables and non-result tables. Non-result tables display information about the project (list of members, nodes, load cases, combinations, cross-sections, supports, setups ...). Result tables are tables which show results of some calculations, those can be results of FEM analysis or results of some designs or checks.

5.1.1. Non-result tables

Those tables have following properties.



- **Name:** this is the identification of the table. It is filled automatically after inserting the table and usually contains the type of entities which are displayed in the table. The content of property Name is generated according to language of the UI.
- **Caption**: this is the name of the chapter which contains the table. Content of the property Caption is generated automatically and if it is left unchanged it is also translated automatically after switching the language of the document.
- **Caption visible:** this controls displaying of the property Caption as a name of the chapter:

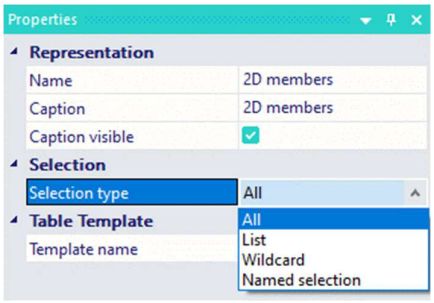


1. 2D members

Name	Layer	Type	Element type	Material	Thickness type	Th. [mm]
S1	Layer1	plate (90)	Standard	S 235	constant	200
S2	Layer1	plate (90)	Standard	S 235	constant	200
S3	Layer1	plate (90)	Standard	S 235	constant	200
S4	Layer1	plate (90)	Standard	S 235	constant	200
S5	Layer1	plate (90)	Standard	S 235	constant	200
S6	Layer1	plate (90)	Standard	S 235	constant	200
S7	Layer1	plate (90)	Standard	S 235	constant	200
S8	Layer1	plate (90)	Standard	S 235	constant	200
S9	Layer1	plate (90)	Standard	S 235	constant	200
S10	Layer1	plate (90)	Standard	S 235	constant	200
S11	Layer1	plate (90)	Standard	S 235	constant	200

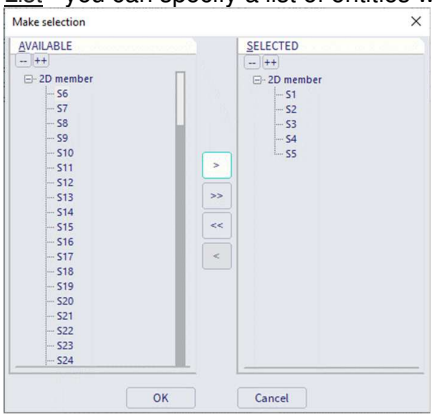
Name	Layer	Type	Element type	Material	Thickness type	Th. [mm]
S1	Layer1	plate (90)	Standard	S 235	constant	200
S2	Layer1	plate (90)	Standard	S 235	constant	200
S3	Layer1	plate (90)	Standard	S 235	constant	200
S4	Layer1	plate (90)	Standard	S 235	constant	200
S5	Layer1	plate (90)	Standard	S 235	constant	200
S6	Layer1	plate (90)	Standard	S 235	constant	200
S7	Layer1	plate (90)	Standard	S 235	constant	200
S8	Layer1	plate (90)	Standard	S 235	constant	200
S9	Layer1	plate (90)	Standard	S 235	constant	200
S10	Layer1	plate (90)	Standard	S 235	constant	200
S11	Layer1	plate (90)	Standard	S 235	constant	200

- You can reduce the content of the table by using the property **Type of selection**.

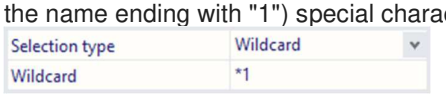


Here it is possible to switch between following values:

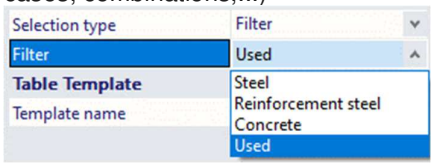
  - All - all entities are displayed in the table
  - List - you can specify a list of entities which are to be displayed using the selection dialog



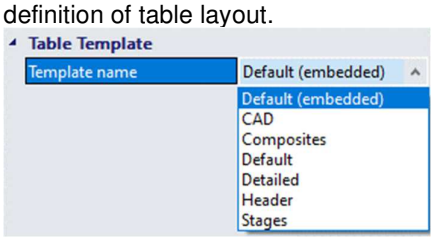
  - Wildcard - you can filter displayed entities using a wildcard filter (e.g. "*1" will show all entities with the name ending with "1") special characters * and ? are recognized as wildcards



  - Named selection - named selections defined in the project can be used as a limitation of the list of table entities
  - Filter - this type of selection is available for library entities only (materials, cross-sections, load cases, combinations,...)



- The property **Template name** enables to switch between predefined table templates = files with definition of table layout.



Property **Visible** is linked with the "eye" icon in the navigator. Hidden tables are present in the document data but not visible. Hidden tables are by default not regenerated even if they are invalid.

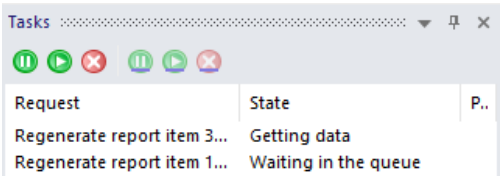
Property **Locked** is linked with the "lock" icon in the navigator. Locked tables are by default not regenerated even if they are invalid.

The properties Visible and Locked are not displayed in the property grid. They are controlled via icons in the Navigator:

5.1.2. Result tables

Result tables have the same properties as non-result tables plus properties of the result that the table is displaying. Those result properties are the same as are available when displaying the result in SCIA Engineer.

The result properties must be taken from SCIA Engineer after each change, therefore there can be some delay in displaying those properties in case SCIA Engineer is busy. Waiting tasks for properties can be seen on the Tasks panel. In case the tasks are stuck in the queue it is advisable to check whether the SCIA Engineer is not blocked by any message box. The communication can also be blocked by some modal dialog displayed in SCIA Engineer.



It is also possible to select from predefined result table templates using the Template name property.

Changing of result properties or changes in selection property causes invalidation of the table. Changes in Name, Caption, Visibility, Locking and Template name are processed immediately and do not affect the validity status of tables.

5.2. Graphical presentation of values

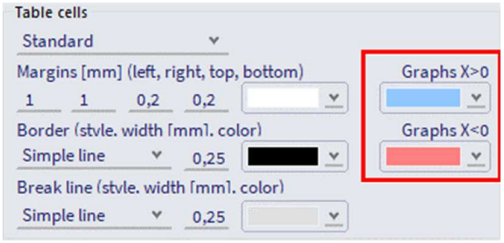
All numerical values in tables can also be represented by a background graph. The background graph can display a relative value of the current table field with respect to the maximal value of this field within the table.

Name	dx [m]	Case	N [kN]	V_y [kN]	V_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]
B9	0,000	LC1	**-40,54**	0,01	17,55	0,00	0,00	0,00
B57	12,060-	LC1	**8,49**	-0,63	-5,09	0,25	-5,90	-0,11
B8	0,000	LC1	-40,54	0,01	**-17,55**	0,00	0,00	0,00
B6	0,000	LC1	-20,41	0,10	**27,73**	-0,03	**-121,07**	-0,01
B5	6,900	LC1	-30,55	0,01	17,55	0,00	**121,07**	0,06
B57	15,075	LC1	7,92	**-2,28**	1,00	**0,34**	5,20	**-3,35**
B58	15,075	LC1	7,92	**2,28**	1,00	**-0,34**	5,20	**3,35**

This graphical representation of values is by default switched ON for result tables (results of FEM analysis).

You can switch the graphical representation ON/OFF on the ribbon View using switch **Draw graphs in tables**.

Graphical representation colour setting in the **Style editor:**



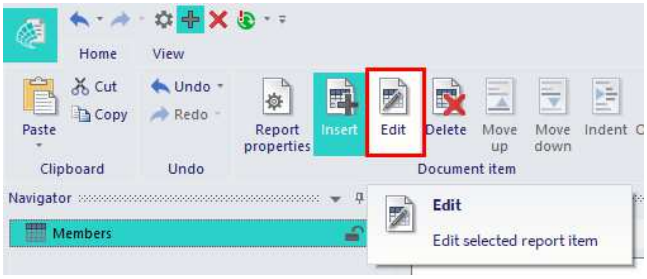
5.3. Table layout editor

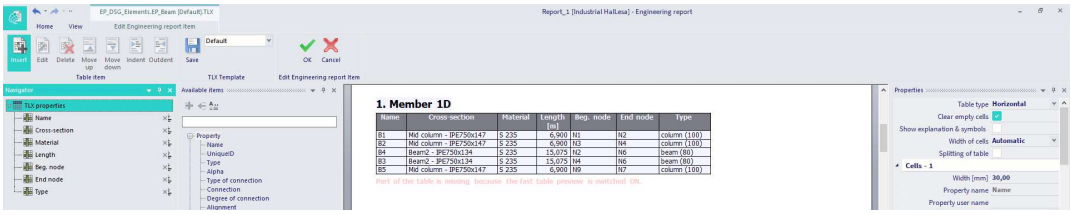
The Table layout editor is a tool for editing of table layouts (templates). The Table layout editor is a special mode of the Engineering Report. It uses the same UI components which are used in the Engineering Report.

Editing of table layouts is a functionality which needs deeper knowledge of SCIA Engineer and structure of its data and it is intended for more advanced users. Especially editing of result tables can be very tricky. It is recommendable not to edit the layout of result tables.

It can be started via the Edit button from the ribbon Home.

Since version 14 it is possible to start editing of table (or their sub-tables) layouts, formatted texts or pictures directly by double-clicking on them in the report preview window.

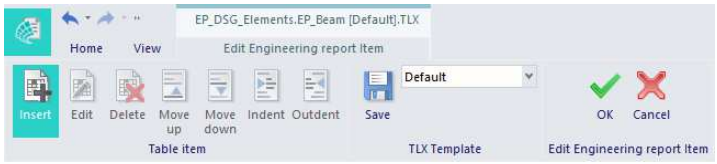




- **Navigator:** it contains a list of table items which were inserted into the table layout.
- **New items panel:** it contains a list of table items which can be inserted into the table. Those available table items are sorted in groups according to their types.
- **Property panel:** it displays properties of the selected table item or properties of the whole table layout (when the root item "TLX properties" is selected)
- **Preview panel**: it displays the preview of the edited table (number of displayed table records is reduced to 5 to increase speed of preview drawing)
- **Ribbon**: the ribbon contains buttons for starting of various actions related to editing of tables

In the table layout editor you can modify layout of tables or prepare new layouts of an edited table.

On the ribbon all necessary actions are available:



- **Insert** shows or hides the Available item panel.
- **Edit** starts editing of sub-tables.
- **Delete** deletes selected table items.
- **Move up/down moves** selected table items.
- **Indent** groups selected table items into one table cell.
- **Save** stores current status of table layout to USER directory. Afterwards the changed table layout is available also in other tables of the same type.
- **Combo box with the name of the table layout** can be used for switching between predefined table layouts. It is also possible to rewrite the name and create a new table layout file.

5.3.1. Working with templates

Each table in the SCIA Report is composed from raw data according to the table layout. Table layout contains information about the table geometry and a list of values which should be displayed in the table. The definition of a table layout is called a template. Predefined table templates are stored in *.TLX files.

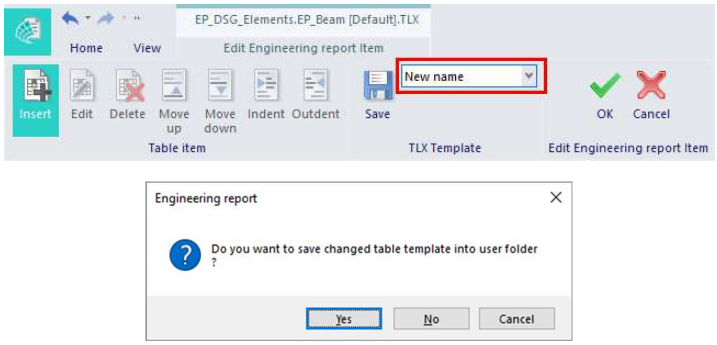
You can change the table layout in two ways:
- by the selection of a different predefined table template
- by editing of the template

It is not necessary to regenerate tables after editing of their layout. Changes are displayed immediately.

Changes done in table layouts are related to the edited tables only unless you explicitly save your changes in the Table layout editor.

Creating new table layout (TLX file)
The very first table layout for each entity is prepared by SCIA or by in-built automatic generator. You can modify this layout or create a new one.

A new table layout can be created by typing a different text into the combo box with the name of the user table layout.



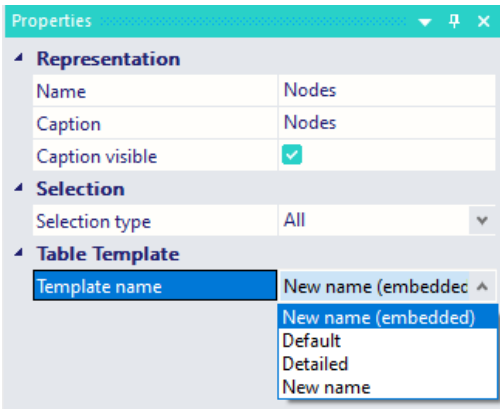
After the confirmation a new table layout file is created in the USER\DocumentDefaults folder.

TLX files on hard drive
Each table layout is represented by one *.TLX file. The name of the file is composed from the identification of the entity table and the name of the layout.

Example for Nodes:

EP_DSG_Elements.EP_StructNode [New name].TLX = *"EP_DSG_Elements.EP_StructNode"* (name of entity type) + *"[New name]"* (name of table layout) + *".TLX"* (extension)

In the SCIA document UI there are displayed only the names of the templates.



A set of predefined templates is stored in the installation directory of SCIA Engineer in the subdirectory \DocumentDefaults. Any further changes done in table templates are stored in USER\DocumentDefaults folder (for localization of USER directory see Main menu > View > Global UI settings > tab Templates & directories: Show directories for Engineering report templates).

In case there are templates with the same name in SCIA Engineer and the USER directory the one from the USER directory is used.

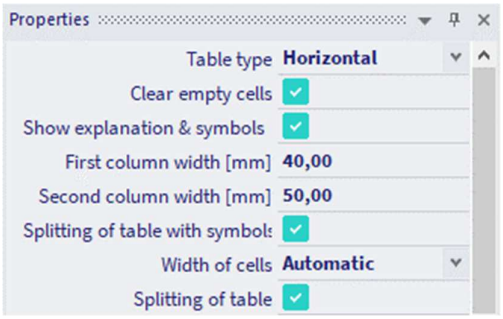
You should never change files with predefined templates in the SCIA Engineer directory!

If you need to delete your template or return back to the original state of templates, it is possible to delete the particular TLX file from the USER\DocumentDefaults directory.

Sub-tables have their own TLX files with a completely different name of file than the name of TLX file of the parent table.

5.3.2. TLX properties

The root item displayed in the navigator cannot be deleted and contains properties relevant for the whole table.



- **Table type:** table type defines the orientation of the table header. There are following types of tables available:
  - Horizontal (header of table is in horizontal direction)

Name	Coord X [m]	Coord Y [m]	Coord Z [m]
N1	-12.000	-12.000	-3.000
N2	-6.000	-18.000	-3.000
N3	12.000	-18.000	-3.000
N4	18.000	-12.000	-3.000
N5	18.000	-6.000	-3.000

  Vertical (header of table is in vertical direction). In case of **Vertical tables** it is possible to select from different variants:
    - Standard variant:

Name	N1	Coord X [m]	-12.000	Coord Y [m]	-12.000	Coord Z [m]	-3.000
Name	N2	Coord X [m]	-6.000	Coord Y [m]	-18.000	Coord Z [m]	-3.000
Name	N3	Coord X [m]	12.000	Coord Y [m]	-18.000	Coord Z [m]	-3.000
Name	N4	Coord X [m]	18.000	Coord Y [m]	-12.000	Coord Z [m]	-3.000
Name	N5	Coord X [m]	18.000	Coord Y [m]	-6.000	Coord Z [m]	-3.000
Name	N6	Coord X [m]	0.000	Coord Y [m]	12.000	Coord Z [m]	-3.000

    - **Common first column** (displays names of all properties in the left column):

Name	N1
Coord X [m]	-12.000
Coord Y [m]	-12.000
Coord Z [m]	-3.000
Name	N2
Coord X [m]	-6.000
Coord Y [m]	-18.000
Coord Z [m]	-3.000

    - Both options can be displayed on a different way when the option **First cell as header** is checked:

N1					
Coord X [m]	-12.000	Coord Y [m]	-12.000	Coord Z [m]	-3.000
N2					
Coord X [m]	-6.000	Coord Y [m]	-18.000	Coord Z [m]	-3.000
N3					
Coord X [m]	12.000	Coord Y [m]	-18.000	Coord Z [m]	-3.000

N1	
Coord X [m]	-12.000
Coord Y [m]	-12.000
Coord Z [m]	-3.000
N2	
Coord X [m]	-6.000
Coord Y [m]	-18.000
Coord Z [m]	-3.000

  - Simple form (table without header)

N1
-12.000
-12.000
-3.000
N2
-6.000
-18.000
-3.000
N3
12.000
-18.000
-3.000

    Simple form type of tables is intended mainly for result tables with set of sub-tables.

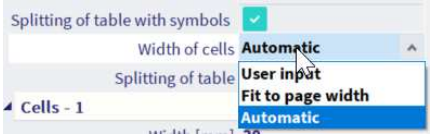
- **Clear empty cells:** columns of tables which do not contain any valid value will be completely removed from the table if this property is checked.

- **Show explanation & symbols:** this property controls displaying of a sub-table with explanation of symbols used in the table. The sub-table is placed after the main table. See example with explanation of symbols used in the table of cross sections.

Explanations of symbols	
A	Area
Ay	Shear Area in principal y-direction
Az	Shear Area in principal z-direction
Iy	Second moment of area about the principal y-axis
Iz	Second moment of area about the principal z-axis
Iw	Warping constant - Not calculated or simplified
It	Torsional constant - Not calculated or simplified
Welz	Elastic section modulus about the principal z-axis
Wely	Elastic section modulus about the principal y-axis
Wplz	Plastic section modulus about the principal z-axis
Wply	Plastic section modulus about the principal y-axis
dy	Shear center coordinate in principal y-direction measured from the centroid - Not calculated or simplified
dz	Shear center coordinate in principal z-direction measured from the centroid - Not calculated or simplified
cYUCS	Centroid coordinate in Y-direction of Input axis system
cZUCS	Centroid coordinate in Z-direction of Input axis system
α	Rotation angle of the principal axis system
IYZLCS	Product moment of area in the LCS system
Mply+	Plastic moment about the principal y-axis for a positive My moment
Mply-	Plastic moment about the principal y-axis for a negative My moment
Mplz+	Plastic moment about the principal z-axis for a positive Mz moment
Mplz-	Plastic moment about the principal z-axis for a negative Mz moment
AL	Circumference per unit length

In case there is not any explanation info for a particular table available, the sub-table is not displayed.

- **Width of cells:** this option defines the way of calculation of table column widths.



  - **User input** means that the user defined width will be used.
  - **Fit to page width** means that the width of columns will be calculated as the page width divided by the number of columns.
  - **Automatic** means that the width of columns will be calculated as the length of longest string in the table column. Columns will be as narrow as all strings will fit in them.

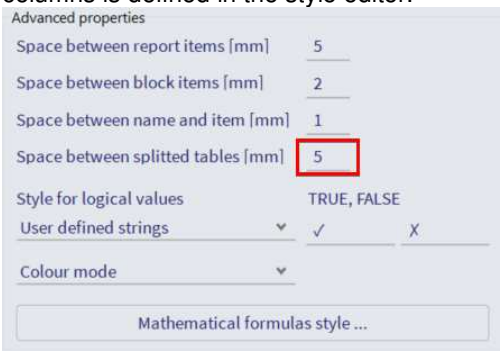
- **Splitting of table:** this property enables to split narrow tables into more columns.

Name	Coord X [m]	Coord Y [m]	Coord Z [m]
N1	-12.000	-12.000	-3.000
N2	-6.000	-18.000	-3.000
N3	12.000	-18.000	-3.000
N4	18.000	-12.000	-3.000
N5	18.000	-6.000	-3.000
N6	0.000	12.000	-3.000
N7	6.000	0.000	-3.000

Name	Coord X [m]	Coord Y [m]	Coord Z [m]
N40	1.000	1.000	0.000
N41	-1.000	1.000	0.000
N42	-7.000	5.000	0.000
N43	-5.000	5.000	0.000
N44	-5.000	7.000	0.000
N45	-7.000	7.000	0.000
N46	5.000	-7.000	0.000

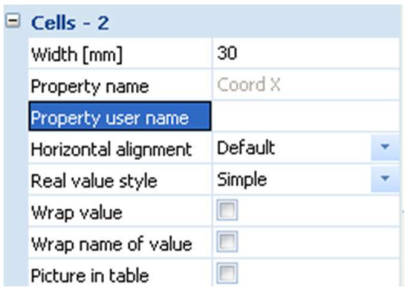
Name	Coord X [m]	Coord Y [m]	Coord Z [m]
N81	-12.000	-6.000	0.000
N83	-12.000	0.000	0.000
N84	-12.000	0.000	3.000
N85	11.513	-3.974	0.000
N86	11.513	-3.974	3.000
K1	0.000	17.000	-3.000
K2	0.000	17.000	0.000

From SCIA Engineer version 2013.1 it is possible to split narrow tables into more columns. The splitting is available for horizontal and vertical tables. It is by default switched ON for some typical examples of narrow tables e.g the table with structural nodes.
The number of columns is calculated automatically to fit on the paper width. The gap between the columns is defined in the style editor.

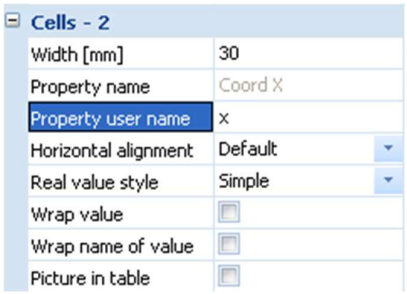


- **User defined name of table column: s**ince version 15 it is possible to overwrite the name of a table cell (column). There is a property called “Property name” with the original name of the cell and a property called “Property user name” in properties of cells.

  An empty value of “Property user name” means that the original name will be used. Otherwise the value from this property will be used as a name of the cells.

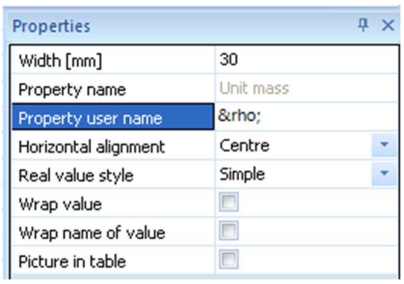


Name	Coord X [m]	Coord Y [m]	Coord Z [m]
N1	-0,290	6,600	2,600
N2	8,340	6,600	2,600



Name	x [m]	Coord Y [m]	Coord Z [m]
N1	-0,290	6,600	2,600
N2	8,340	6,600	2,600

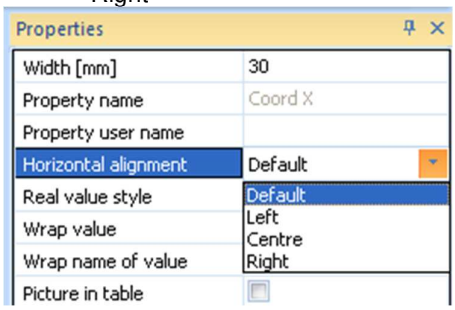
User defined texts can contain the same formatting tags as can be used in the Formatted text (together with ampersand notation).



Steel EC3

Name	ρ [kg/m³]	E_{mod} [MPa]	μ	Lower limit [mm]	Upper limit [mm]	F_y [MPa]	F_u [MPa]
		G_{mod} [MPa]	α [m/mK]				
S 235	7850,0	2,1000e+05	0.3	0	40	235,0	360,0
		8,0769e+04	0,00	40	80	215,0	360,0

- **Horizontal alignment:** since version 15 it is possible to change the horizontal alignment of values in tables. The property “Horizontal alignment” enables to switch between following modes:
  - Default – text to the right and numbers to the left
  - Left
  - Centre
  - Right



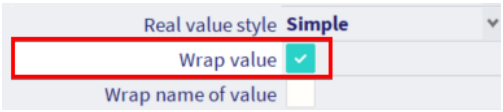
- **Wrapping of texts:** in some cases there are very long texts in tables. Those texts can appear in the header of the table (names of values) or as the values itself. Those long texts can cause exceeding of the tables (with automatic calculation of columns width) behind the page width. To prevent this exceeding it is possible (since version 2013.1) to switch ON wrapping of text in the value fields and also in the names of fields.

  The first picture shows the table without text wrapping:

1. Load cases

Name	Description Spec	Action type Load type	LoadGroup	Direction	Duration	Master load case
BG1	Eigengewicht	Permanent Self weight	LG1	-Z		
BG2	Permanent	Permanent Standard	LG1			
BG3	Gebruik Standard	Variable Static	LG2		Short	None
BG4	Some very very very very long description of the loadcase Standard	Variable Static	LG2		Short	None

The second picture shows wrapping of the long value of Description:



1. Load cases

Name	Description Spec	Action type Load type	LoadGroup	Direction	Duration	Master load case
BG1	Eigengewicht	Permanent Self weight	LG1	-Z		
BG2	Permanent	Permanent Standard	LG1			
BG3	Gebruik Standard	Variable Static	LG2		Short	None
BG4	Some very very very very long description of the loadcase Standard	Variable Static	LG2		Short	None

And the third picture shows wrapping of the long name of Master load case:

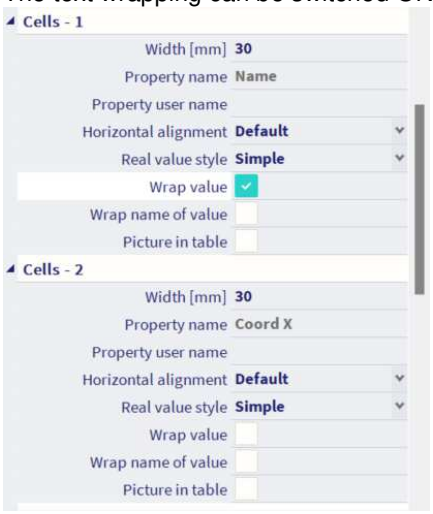
1. Load cases

Name	Description Spec	Action type Load type	LoadGroup	Direction	Duration	Master load case
BG1	Eigengewicht	Permanent Self weight	LG1	-Z		
BG2	Permanent	Permanent Standard	LG1			
BG3	Gebruik Standard	Variable Static	LG2		Short	None
BG4	Some very very very very long description of the loadcase Standard	Variable Static	LG2		Short	None

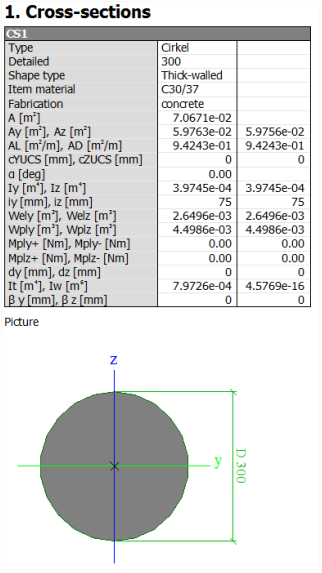
The text wrapping works for all possible modes of Width of cells evaluation (Fit to page width / User input /Automatic).

Because the text wrapping reduces speed of displaying of tables it is by default switched ON only in cases where the long texts are very common.

The text wrapping can be switched ON/OFF independently for each value in the table.



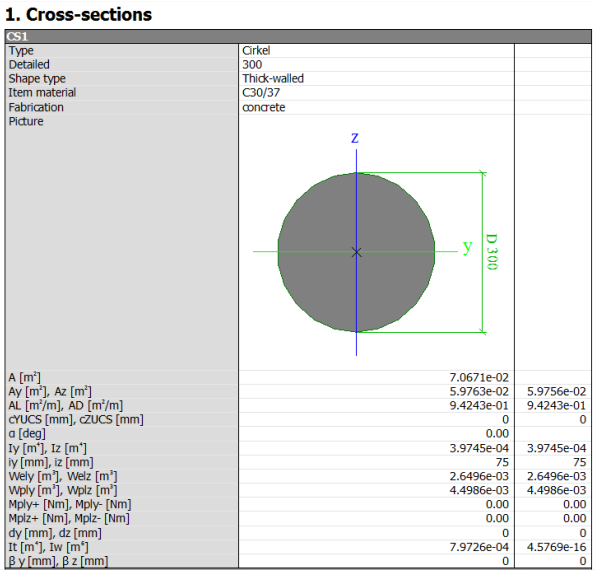
- **Picture in table:** since version 2013.1 it is possible to place pictures into tables. It is possible to decide independently for each picture, whether it should be placed inside the table or outside.



1. Cross-sections

CS1		
Type	Cirkel	
Detailed	300	
Shape type	Thick-walled	
Item material	C30/37	
Fabrication	concrete	
A [m²]	7.0671e-02	
Ay [m²], Az [m²]	5.9763e-02	5.9756e-02
AL [m²/m], AD [m²/m]	9.4243e-01	9.4243e-01
cYUCS [mm], cZUCS [mm]	0	0
α [deg]	0.00	
Iy [m⁴], Iz [m⁴]	3.9745e-04	3.9745e-04
iy [mm], iz [mm]	75	75
Wely [m³], Welz [m³]	2.6496e-03	2.6496e-03
Wply [m³], Wplz [m³]	4.4986e-03	4.4986e-03
Mply+ [Nm], Mply- [Nm]	0.00	0.00
Mplz+ [Nm], Mplz- [Nm]	0.00	0.00
dy [mm], dz [mm]	0	0
It [m⁴], Iw [m⁶]	7.9726e-04	4.5769e-16
β y [mm], β z [mm]	0	0

Picture



1. Cross-sections

CS1		
Type	Cirkel	
Detailed	300	
Shape type	Thick-walled	
Item material	C30/37	
Fabrication	concrete	
Picture		
A [m²]	7.0671e-02	
Ay [m²], Az [m²]	5.9763e-02	5.9756e-02
AL [m²/m], AD [m²/m]	9.4243e-01	9.4243e-01
cYUCS [mm], cZUCS [mm]	0	0
α [deg]	0.00	
Iy [m⁴], Iz [m⁴]	3.9745e-04	3.9745e-04
iy [mm], iz [mm]	75	75
Wely [m³], Welz [m³]	2.6496e-03	2.6496e-03
Wply [m³], Wplz [m³]	4.4986e-03	4.4986e-03
Mply+ [Nm], Mply- [Nm]	0.00	0.00
Mplz+ [Nm], Mplz- [Nm]	0.00	0.00
dy [mm], dz [mm]	0	0
It [m⁴], Iw [m⁶]	7.9726e-04	4.5769e-16
β y [mm], β z [mm]	0	0

- **Sorting of tables:** it is possible to sort tables according to any displayed value.
  Sorting can be controlled in the Table layout editor using the sorting icons on the Navigator. The following picture displays the case when the table is sorted ascending according to value Coord X.

It is also possible to sort a table according to multiple keys.

In this case Coord X is used as a primary key and Coord Z as a secondary key. The priority of sorting keys goes according to the order of tables in the navigator from the top to the bottom.

- **Table cell:** table items can be grouped together into table cells. One cell represents one column in case of horizontal tables. In case of vertical tables the meaning depends on the variant of vertical table. See following examples. There is displayed a table with two properties (table items) in one cell.

  More values in one cell displayed in the navigator:

  - More values in one cell in the horizontal table:

Name	Coord X [m] Coord ux [m]	Coord Y [m]	Coord uy [m]	Coord Z [m]	Coord uz [m]
N1	-12.000 0.000	-12.000	0.000	-3.000	-6.000
N2	-6.000 6.000	-18.000	-6.000	-3.000	-6.000

  - More values in one cell displayed in the standard vertical table

Name	N1	Coord X [m] Coord ux [m]	-12.000 0.000	Coord Y [m]	-12.000	Coord uy [m]	0.000	Coord Z [m]	-3.000	Coord uz [m]	-6.000
Name	N2	Coord X [m] Coord ux [m]	-6.000 6.000	Coord Y [m]	-18.000	Coord uy [m]	-6.000	Coord Z [m]	-3.000	Coord uz [m]	-6.000

  - More values in one cell displayed in the vertical table with headers in common column

Name	N1	
Coord X [m], Coord ux [m]	-12.000	0.000
Coord Y [m]	-12.000	
Coord uy [m]	0.000	
Coord Z [m]	-3.000	
Coord uz [m]	-6.000	
Name	N2	
Coord X [m], Coord ux [m]	-6.000	6.000
Coord Y [m]	-18.000	
Coord uy [m]	-6.000	
Coord Z [m]	-3.000	
Coord uz [m]	-6.000	

  Grouping of table items together is realized by the **selection of items in the navigator** and then pressing the button **Indent**.

Supported types of table items

Following types of table items can be inserted into a table:

- **Property** - this type represents ordinary properties of elements
- **Library reference** - represents properties pointing to another project entity (e.g. reference to material, reference to cross section, reference to Layer, ...)
- **Subtable** - is a special table item which is used mainly in result tables. This table items contain another table. The layout of this table can be edited using "Edit "button
- **Detailed output** - is a special table item which is used mainly in detailed output of various checks. This table item can contain several texts and tables but is fixed and cannot be further edited
- **Detailed output paragraph** - is similar to Detailed output but in this case it contains only part of the check (specific paragraph)
- **Variable type** - is type of table item without specifically defined type. It can contain pictures, texts, tables or combinations of them. This table item cannot be further edited
- **Changing type** - is another variant of Variable type. In this case the type of one table item can change according to changes of result properties

More complicated table items (Subtable, Detailed output, Detailed output paragraph, Variable type and Changing type) are displayed below the main table.

Chapter 6: Report pictures

By report pictures are meant pictures displaying the model or results and which are inserted from the SCIA Engineer model. External pictures are described in a separate chapter.

There are available following types of report pictures:

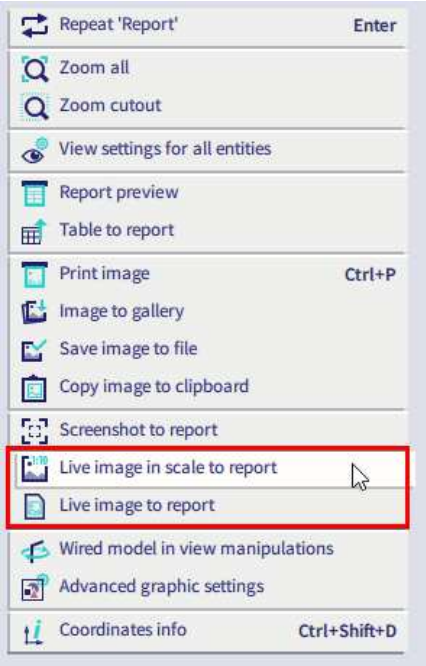
- Live pictures
- Screenshot pictures
- Gallery pictures

Live pictures

Error! Bookmark not defined. Live pictures are generated according to the palette for the document. The size of those pictures is calculated from the user defined scale. In case of perspective pictures the scale is not available. In this case the size is defined by the current zoom. The size of a Live picture can be modified in the properties of the picture or in the Picture view point editor or in the Editor of picture properties. The content of the picture can be edited using the Picture editor. Properties (e.g, size, scale, property of displayed result) of the Live picture can be changed using the Editor of picture properties (see later chapter Editing of pictures).

Live pictures can be regenerated in order to display the current status of the project.

Live pictures can be inserted from the 3D window using the context menu (right-click in the graphical scene).



The validity status of Live pictures indicates whether the content of the picture is displaying the **current status of the project**.

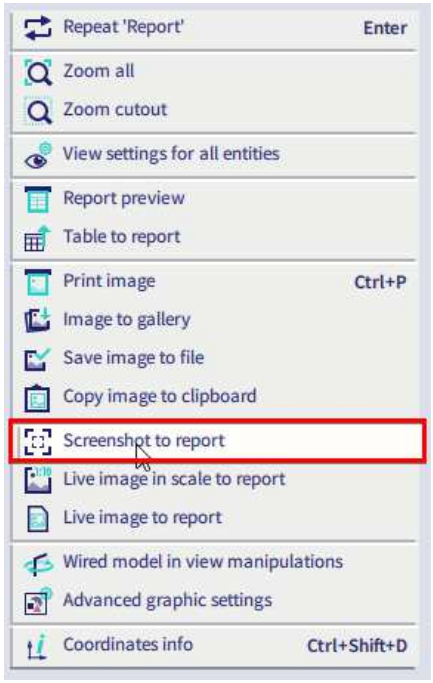
Screenshot pictures

Screenshots are pictures which are generated according to the palette for the screen. It means that those pictures has the same colours and sizes as are used on the screen in SCIA Engineer. The size of screenshots is set according to the size of the 3D window in SCIA Engineer and can be changed later in the Engineering Report using the properties of the picture or using the Picture view point editor (see further). The content of the screenshot picture can be edited in the Engineering Report using the Picture editor (see further).

Screenshot pictures do not have an exact scale. There is used a zoom from the 3D window which can be changed later in the Picture view point editor.

Screenshots work as a screenshot of the 3D window and cannot be regenerated afterwards to display the current status of the project.

Screenshots can be inserted from the 3D window using the context menu (right-click in the graphical scene).

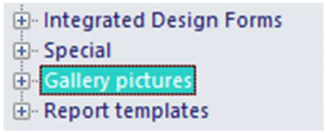


Screenshot pictures cannot be regenerated later even if they are marked as invalid. They are defined as fixed screen shots displaying the status of the project at the moment they were created.

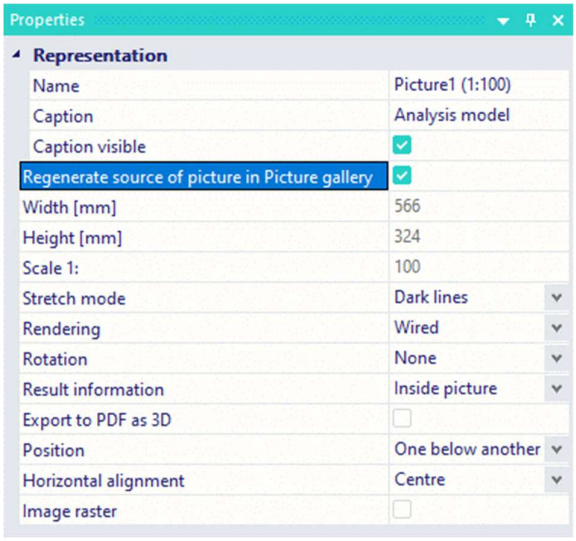
Gallery pictures

Gallery pictures are reflections of pictures from the picture gallery. Those pictures can be edited in the picture gallery only. They cannot be edited from the Engineering Report.

Gallery pictures can be inserted from the New items panel. There can be inserted multiple instances of one gallery picture into different reports within one project. Gallery pictures cannot be copied between various projects.

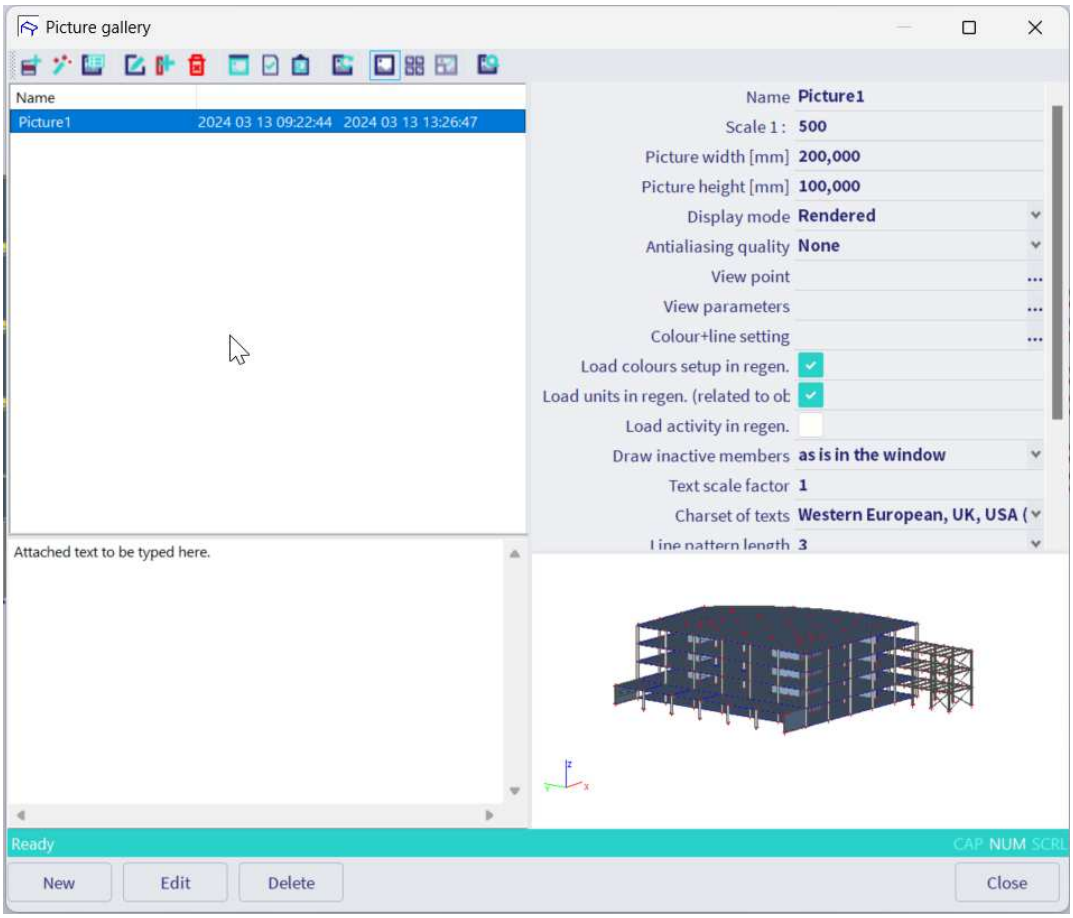


Standard regeneration of a gallery picture in the Engineering Report reads the content of the gallery picture and displays it in the Engineering Report. If you want to regenerate the content of the source gallery picture, you need to switch on the checkbox “Regenerate source of picture in Picture gallery”.

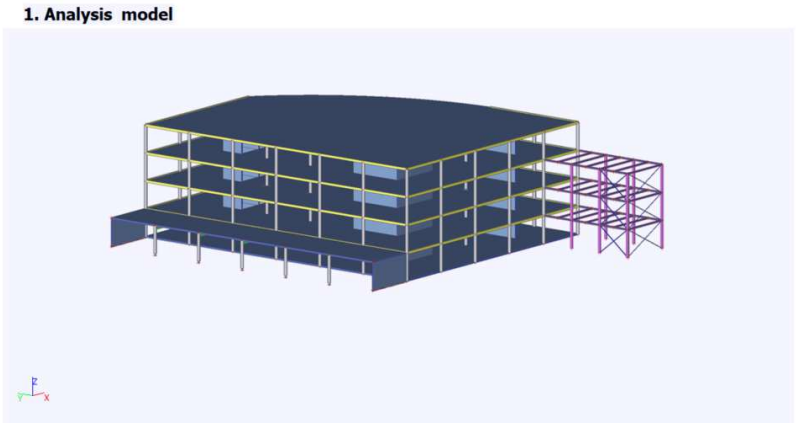


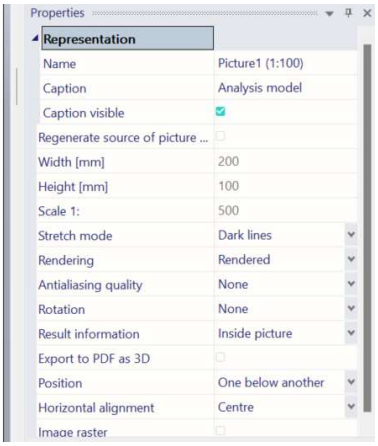
The validity status of a Gallery picture indicates whether the content of the picture displayed in the Engineering Report is the same as the content of the source gallery picture in the SCIA Engineer picture gallery. It does not indicate the validity of the source gallery picture itself.

The source picture in the SCIA Engineer picture gallery
By the "source gallery picture" is meant the picture which is stored in the Picture gallery in SCIA Engineer.



The gallery picture as an Engineering Report item
The gallery picture in the Engineering Report is just the reflection of the source picture from the Picture gallery.





Inserting of pictures

Relative sizes of pictures

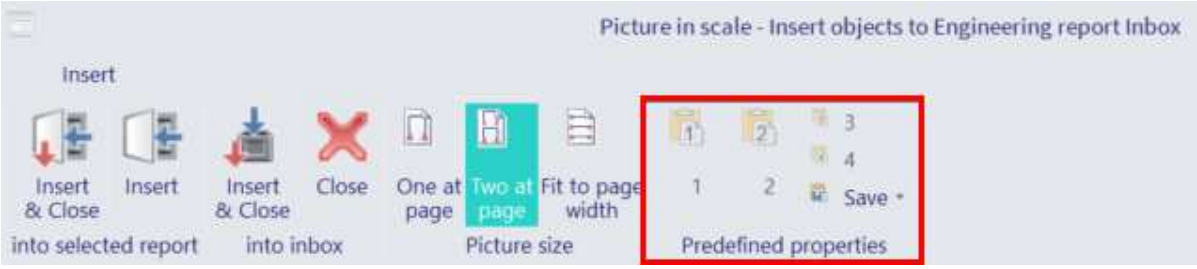
Since version 15 it is possible to use a relative definition of the picture size.

Available relative sizes are:

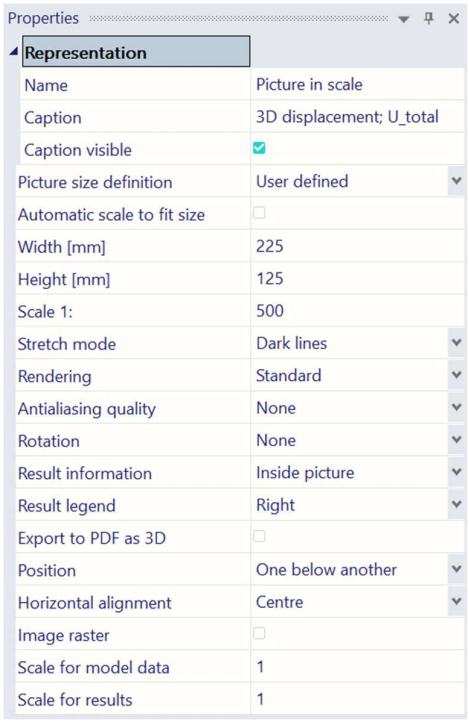
- One at page
- Two at page
- Fit to page width

Simplified inserting of pictures

When inserting a picture from SCIA Engineer into the Engineering Report, it is possible to read values of properties from one of the 4 predefined sets. Content of those 4 sets is defined by the user via the button Save.



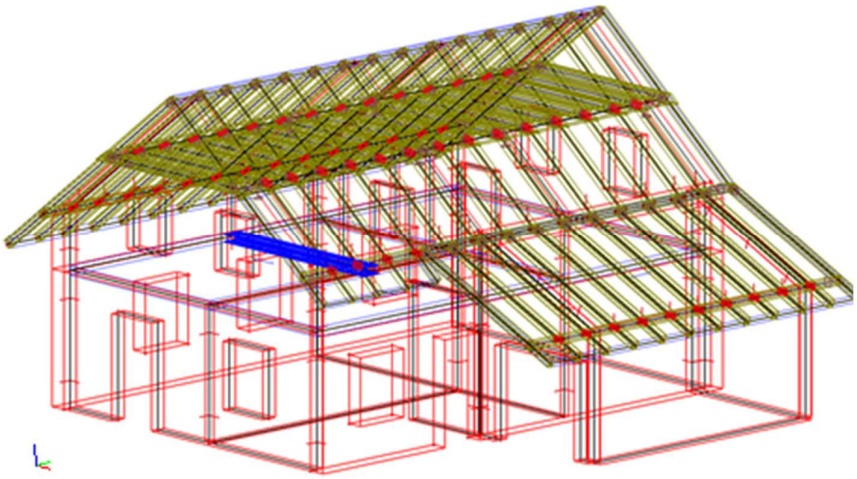
Properties of pictures



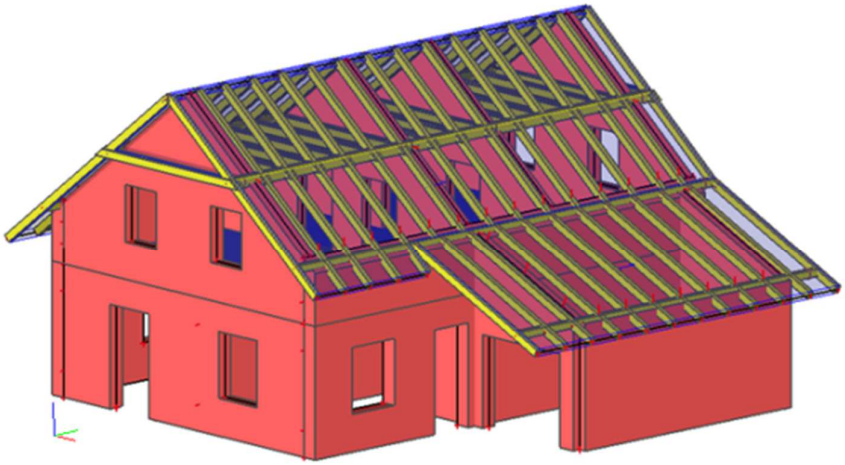
- **Name**: this property is common for all report items and is intended for users orientation. The name identifies the report item in the navigator panel.
- **Caption**: this property defines the name of the caption of the report item in the report.
- **Caption visible**: this property defines whether the report item makes a separate chapter or not. In case the property is switched ON, the caption of the report item is displayed and it is also included in the table of contents.
- **Regenerate source of picture in Picture gallery**: this property is available for gallery pictures only. It influences the regeneration of those pictures. Gallery pictures in the Engineering Report are just references to the source picture in the picture gallery. Standard regeneration (the "Regenerate source picture in gallery" is switched OFF) of gallery pictures reads the content of the source picture from the SCIA Engineer picture gallery.
  On the contrary the regeneration with the property "Regenerate source picture in gallery" switched ON ensures that the source picture in the SCIA Engineer picture gallery is regenerated too. This ensures that such a picture displays the current status of the project after the regeneration.
- **Size of the picture - Width** / **Height** / **Scale**: editing of picture size has changed in the version 2013.1. You can modify the **size** of the picture and its scale. Modification of the size changes the visible area so you can see a bigger or smaller part of the model.
  Modification of the **scale** changes the content of the picture. It means that the whole picture gets smaller or bigger together with the content of the picture.
  Since version 15 it is possible to define the size of the picture relatively with respect to the page format. Following picture size definitions are available:
  - **User defined** – the user defines manually Width and Height.
  - **One at page** – picture is extended to fully cover available area on the page.
  - **Two at page** – picture is extended to cover half of the page available area (it means that two pieces of such picture fit on one page).
  - **Fit to page width** – the width of the picture is extended to fit on a page. It is suitable for narrow horizontal pictures.

  Screenshot pictures does not have the property Scale, their size is defined by the Width and Height. The height can be edited while the width is calculated automatically from the aspect ratio.
  The properties and size of **Gallery pictures** can be edited in the Gallery picture editor in SCIA Engineer (see further).

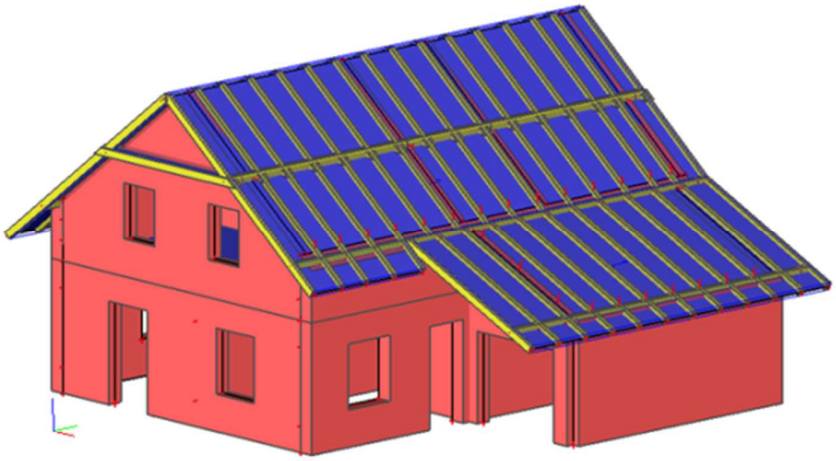
- **Automatic scale to fit size (Zoom all)**: this feature is new since version 2013.1.
  Once this checkbox is switched ON the scale of the picture is calculated automatically during the regeneration of the picture. The scale is calculated so the content of the picture fits into the defined size of the picture.
- **Stretch mode**: a bitmap picture has got a fixed size. If you need to resize it, the program must apply a special algorithm that changes the size and even proportions of the original picture. This algorithm is called "stretch mode". Following modes are available:
  - **Dark lines**: suitable for drawings consisting of dark lines on light background.
  - **Light lines**: suitable for drawings with light lines on dark background.
  - **Photo**: suitable for photographs imported into SCIA Engineer or for fully rendered coloured drawings of details made in SCIA Engineer.
- **Rendering**: this property defines how the picture is displayed.
  - **Wired:** is fast way of displaying pictures but only in a wired mode without surfaces.



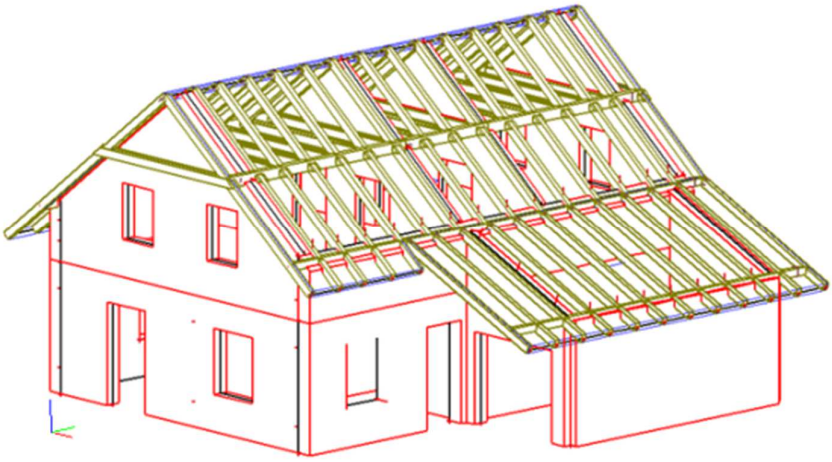
  - **Standard:** respects the rendering of surfaces defined in View parameters (picture looks the same as it was in the SCIA Engineer 3D window)



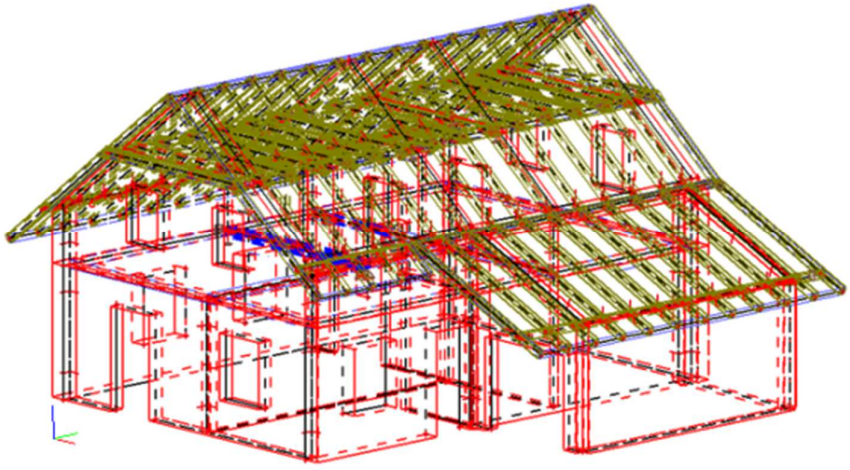
- **Rendered:** this possibility shows all surfaces as rendered regardless on View parameters setting.



- **Hidden lines:** mode draws only lines which are visible. Hidden lines are not drawn.

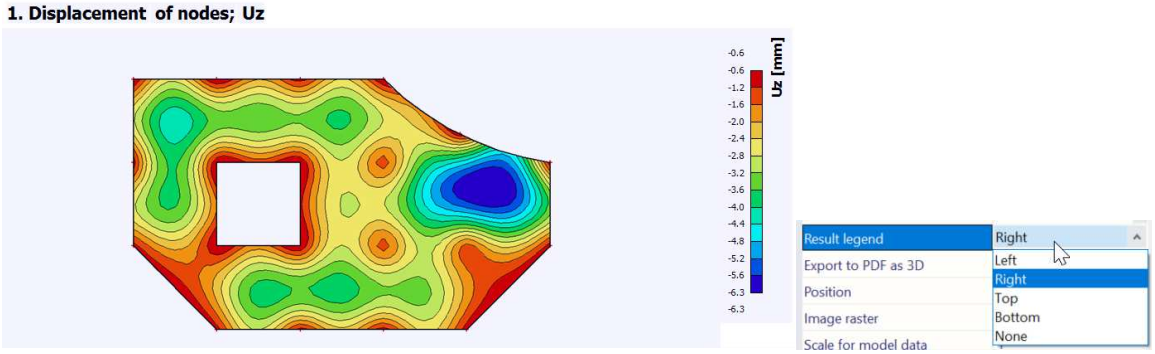


- **Hidden lines dashed:** Visible lines are drawn as solid ones. Hidden are drawn as dashed.



- **Antialiasing quality**: this option enables to select one from four possible levels of antialiasing. The higher level of antialiasing gives smoother pictures but exporting of pictures takes a longer time.
- **Rotation**: you can set a rotation for the picture.
- **Result information**: with this property you can define where to put the result information, inside or above the picture.

- **Result legend**: this property defines the position of a legend for pictures with 2D results. The legend is placed outside the picture. The legend can be also switched OFF using this property.

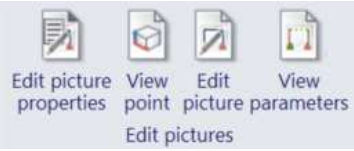


The result legend can also be displayed for external *.ep3 pictures containing a result.
The font and colour of the legend are defined in the visual style.

- **Export to PDF as 3D**: this checkbox enables to export the picture into a PDF as a 3D image.
- **Position**: this property allows to position the picture.
- **Horizontal alignment**: it influences the alignment of the picture in the report within the page width (left / centre / right).
- **Image raster**: with this property you can show a grid over pictures.
- **Scale for model data**: since SCIA Engineer 19.1 it is possible to modify scale of model data similar to possibility in 3D scene of SCIA Engineer.
- **Scale for results data**: since SCIA Engineer 19.1 it is possible to modify the scale of results similar way as in the 3D scene of SCIA Engineer.

Editing of pictures

Editing of report pictures can be started from the ribbon. There are available following editing tools:



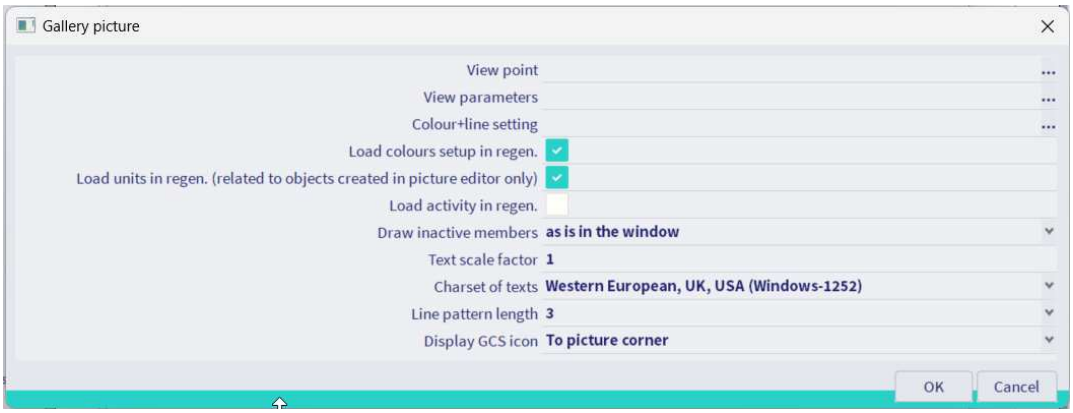
- Edit picture properties
- View point editor
- Picture editor
- View parameters editor

All those editors are part of SCIA Engineer but they are started from the Engineering Report application. This solution enables to use familiar tools from SCIA Engineer into the Engineering Report application. On the other hand it is not possible to work in SCIA Engineer during editing of pictures in the Engineering Report. This blocking is indicated by a message box.

It is not possible to switch perspective ON/OFF after inserting the picture into the Engineering Report.

Edit picture properties

Using this action it is possible to directly edit properties of the selected picture.



In the properties of the picture it is possible to change:

- Scale
- Size
- Properties of displayed result
- View point
- View parameters
- Colour + line setting (setting for current palette)
- and others ...

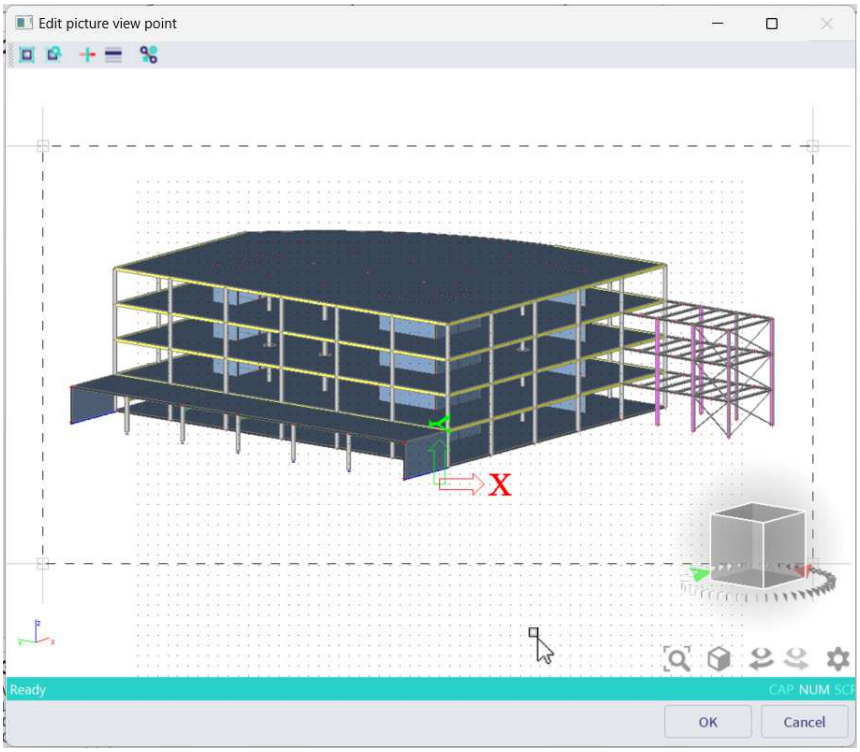
Editing of picture properties is available for Live pictures only.

Properties of Gallery pictures can be edited in the Picture gallery editor.

It is not possible to modify the selection of the displayed result.

View point

The view point can be changed using one of two available dialogs. The first one is for axonometric pictures, the second one is for pictures in perspective. For **axonometric pictures** it is possible to change **the size** of the picture by modification of the boundary rectangle in the View point editor.



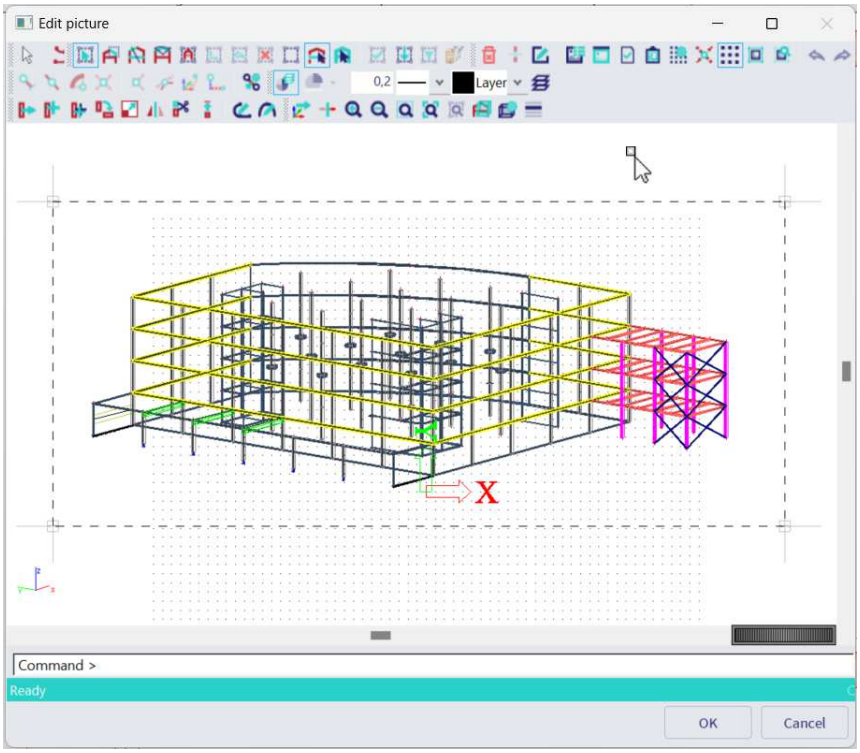
Since version 14 it is possible to modify the view point for multiple pictures in one step. The only needed is to select multiple pictures and press Edit View point.

In the View point editing dialog the first selected picture is displayed. After finishing of the View point editing, the same view point is set to all the selected pictures.

It is not possible to edit in one step View point for axonometric pictures and pictures in perspective. There must be only one type of picture projection in the selection.

Edit picture

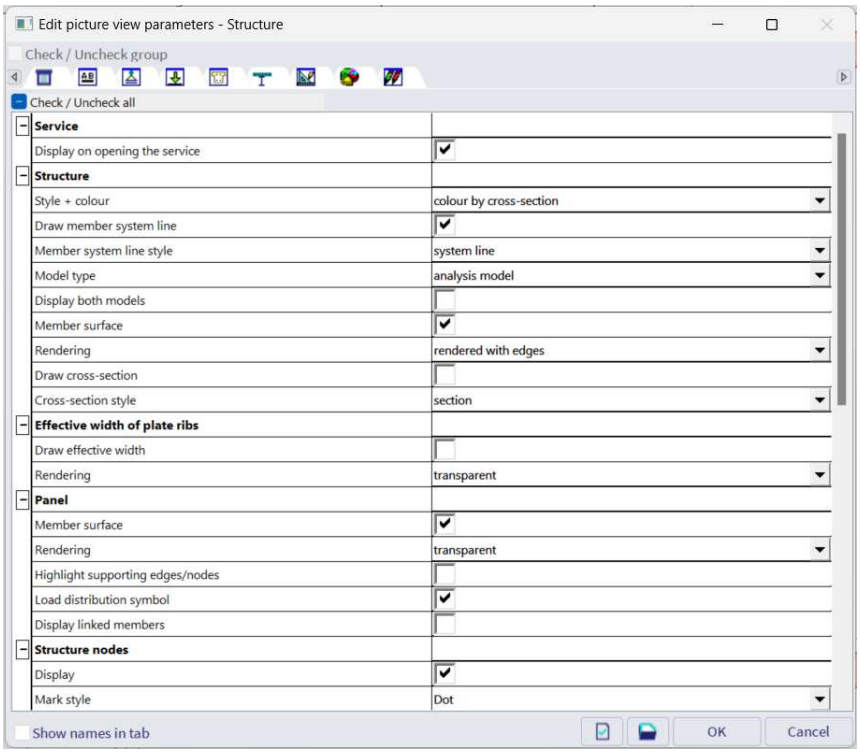
The picture editor enables to modify the content of the picture. It has the same possibilities as the Picture gallery editor in SCIA Engineer (e.g. add lines, dimension lines, texts, change view area ...).



Editing of Gallery pictures needs to be done in the Picture gallery editor.

View parameters

View parameters editor enables to edit the view parameters for the whole picture. It is not possible to modify view parameters for only a selected part of the structure. The dialog is identical to the one available in SCIA Engineer and it has the same possibilities.

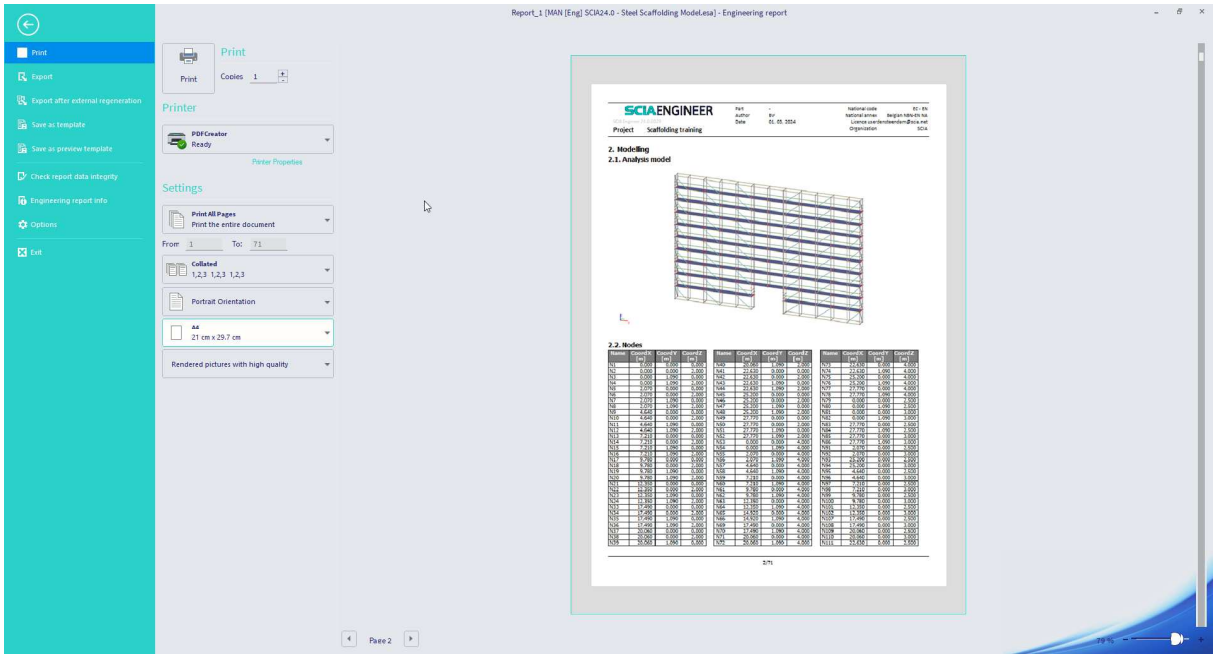


Changing of View parameters is available only for Live pictures.

View parameters of Gallery pictures can be edited in the Picture gallery editor.

Chapter 7: Printing and exports

The Engineering Report can be printed (to a physical printer or a pdf tool,…) or exported to various external formats. Printing and exports can be started from the Back stage view at the top left side.

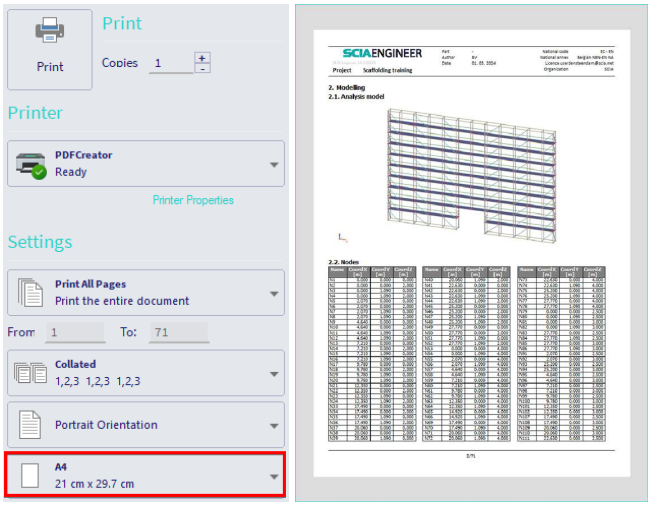


Print

On the Printing page it is possible to select the printer, pages which are to be printed, orientation of the paper and paper size. The right side of the page is dedicated to the print preview.
The last combo box enables to select the **quality of printed rendered pictures**. It can increase the quality of the printed picture. On the other hand it can significantly increase the time needed for printing.

Print preview

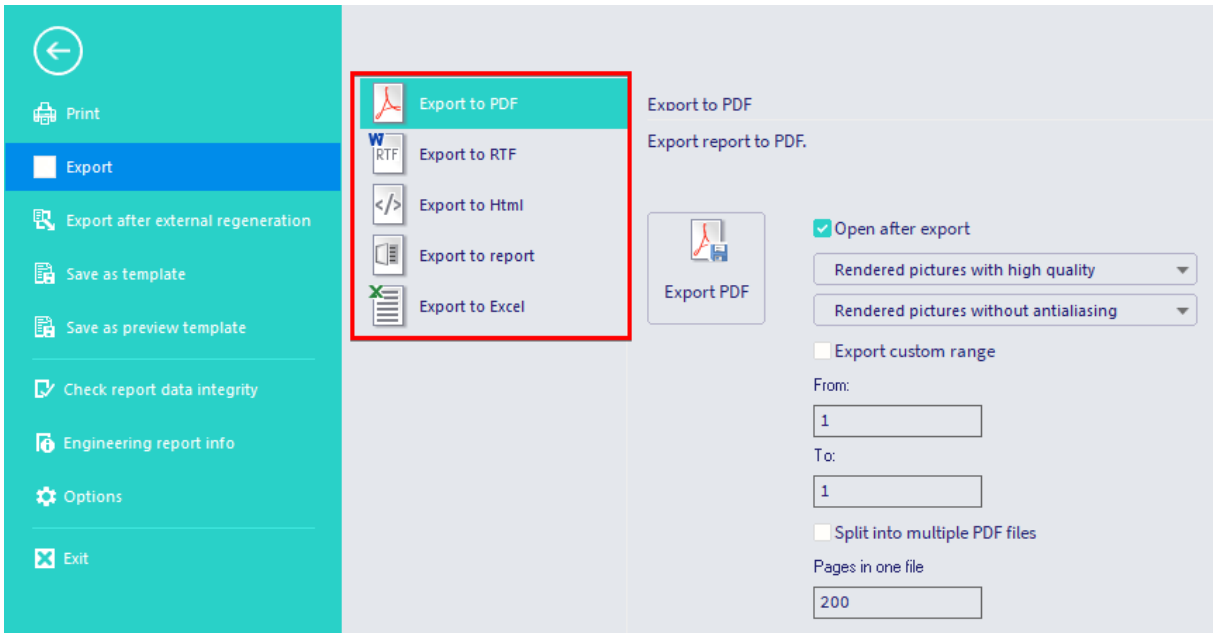
The preview shows how the report will look like when it is printed on paper. In case there is selected a different paper format than is used in the report the preview will take it into account.



Export

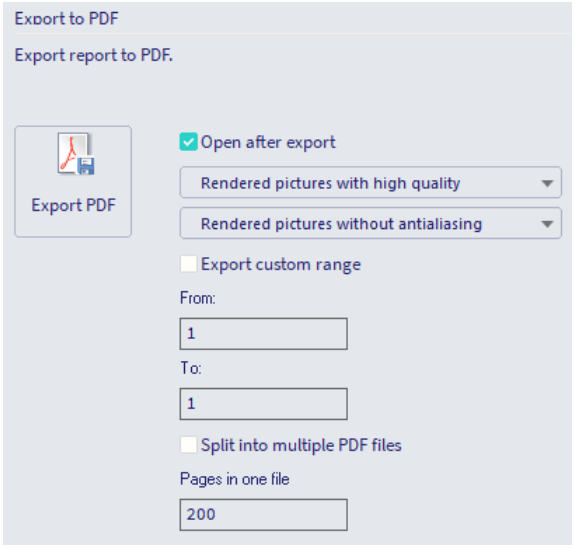
There are exports into following formats available in the Engineering Report:

- PDF
- RTF (since Release 2013.1)
- HTML
- Report (DDS, SCIA internal format)
- Excel



Export to PDF

Export to PDF enables direct export of the report to the PDF file.



Open after export: it ensures immediate opening of the PDF file after finishing the export. The default software defined in the setting of users system is used for opening of the PDF file.

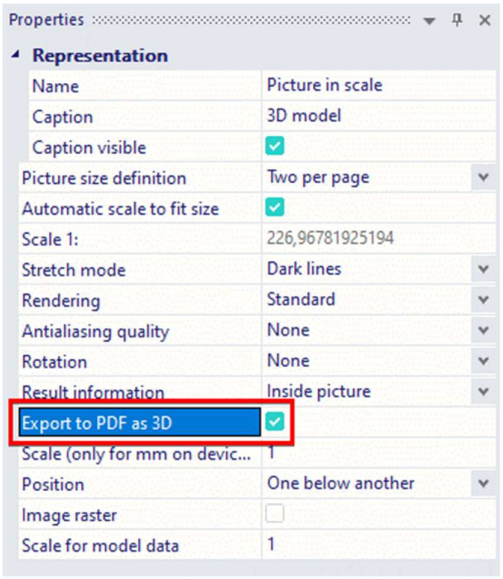
Quality of rendered pictures: this option can influence the quality of rendered pictures. It can significantly increase the smoothness of those pictures. On the other hand it increases the time needed for the export. The size of the PDF file does not increase so significantly when selecting a higher quality.

Antialiasing setting of rendered pictures: this option enables to select one from four possible levels of antialiasing. The higher level of antialiasing gives smoother pictures but exporting of pictures takes a longer time.

Export custom range: since version SCIA Engineer 14 it is possible to define the range of pages which have to be exported.

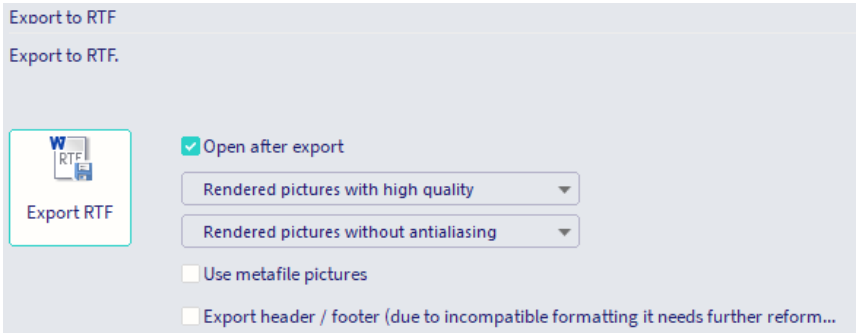
Split into multiple PDF files: since version SCIA Engineer 15 this option enables to generate more PDF files from one report. The report is split into parts, where each part contains a defined number of pages. This possibility is useful in case of longer reports which cause memory problems during export into one file. Names of generated PDF files are numbered (Name.PDF, Name1.PDF, Name2.PDF ...).

Export of 3D pictures is supported in the Engineering Report. It is necessary to check the picture property **Export to PDF as 3D**.



Export to RTF

Since the release 2013.1 it is possible to export reports directly into RTF format. It enables to generate Word documents looking very similar to reports in the Engineering Report.



Open after export: this ensures immediate opening of the PDF file after finishing the export. The default software defined in the setting of users system is used for opening of the PDF file.

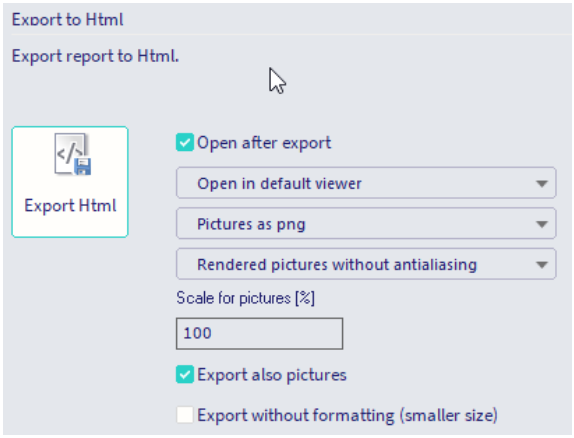
Quality of rendered pictures: this option enables to influence the quality of rendered pictures. It can significantly increase the smoothness of those pictures. On the other hand it increase the time needed for the export.

Antialiasing setting of rendered pictures: this option enables to select one from four possible levels of antialiasing. The higher level of antialiasing gives smoother pictures but exporting of pictures takes a longer time.

Use metafile pictures: it enables to export wired pictures and vector external pictures as vector pictures. This enables to generate smaller RTF file with sharper vector pictures. On the other hand the support of metafile pictures is different on different operation systems and those pictures may not be exported correctly under some version of Windows.

Export to HTML (also opened in Excel and Word)

Export to HTML enables to export report into HTML file which can be later opened in a web browser or Microsoft Word or Microsoft Excel.



Direct opening of the HTML file after export can be controlled using the checkbox **Open after export.** The combo box **Open in...** enables to select tool which is used for opening of the HTML file. User can select between the default internet browser, Microsoft Excel and Microsoft Word.

The second option is the selection of format of pictures. You can select from bmp, jpg, gif and png.

The next option is again to choose the antialiasing of rendered pictures.

In the last available option, you can choose the scale for pictures.

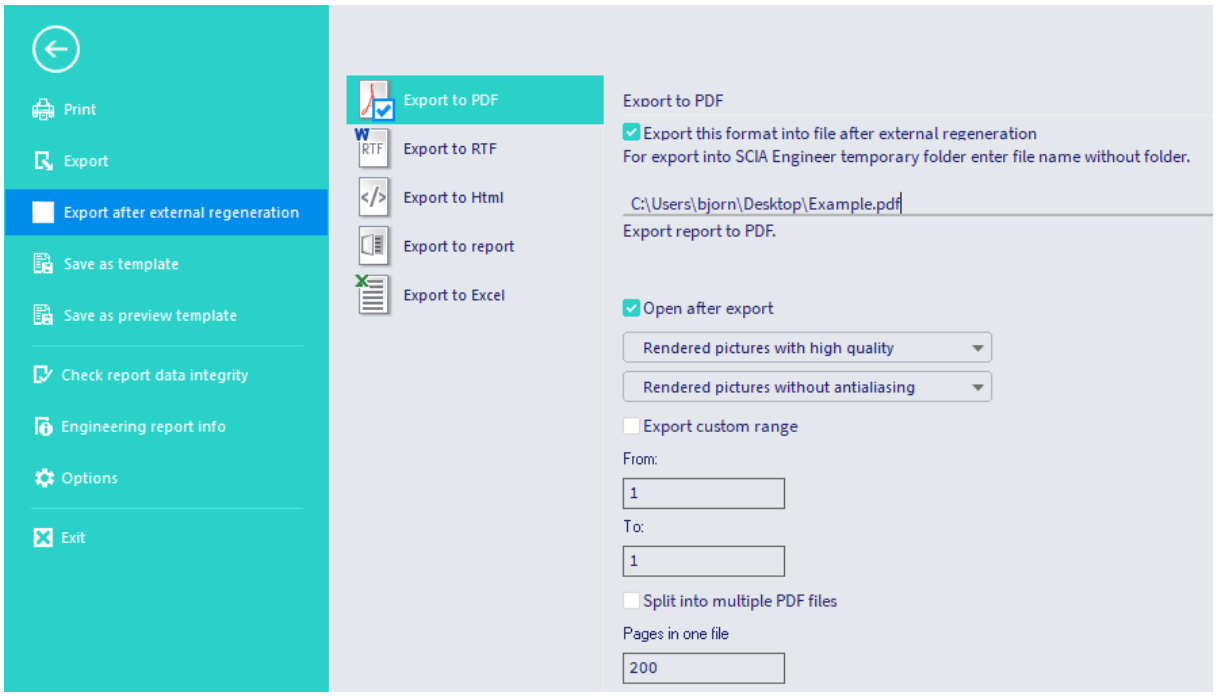
Export to report

Export to report (DDS) enables to store the content of the report in a file and then use it in another report via the item “External report”.

Export after external regeneration

This page of back stage view enables to define whether the report will be automatically exported into some file at the end of an external regeneration.

External regeneration means the regeneration which is done at the end of the Batch analysis or regeneration started from the Engineering Report manager.



On those pages it is possible to switch the automatic export ON/OFF, to specify the file name and do necessary settings of export which will be used during the future export.

It is possible to automatically export the report into more types of files.

Chapter 8: Tips and tricks

This chapter describes useful features of the Engineering Report which can help to improve the efficiency of the preparation of reports.

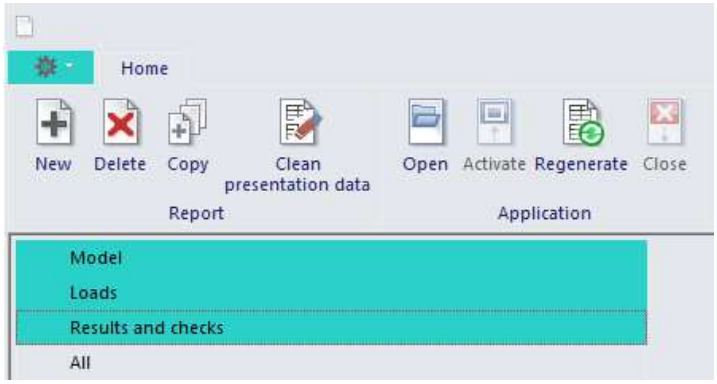
Finer zooming

Finer zooming in the Engineering Report or in the new Preview window is available since version 15 by pressing the CTRL key + scrolling the mouse wheel.

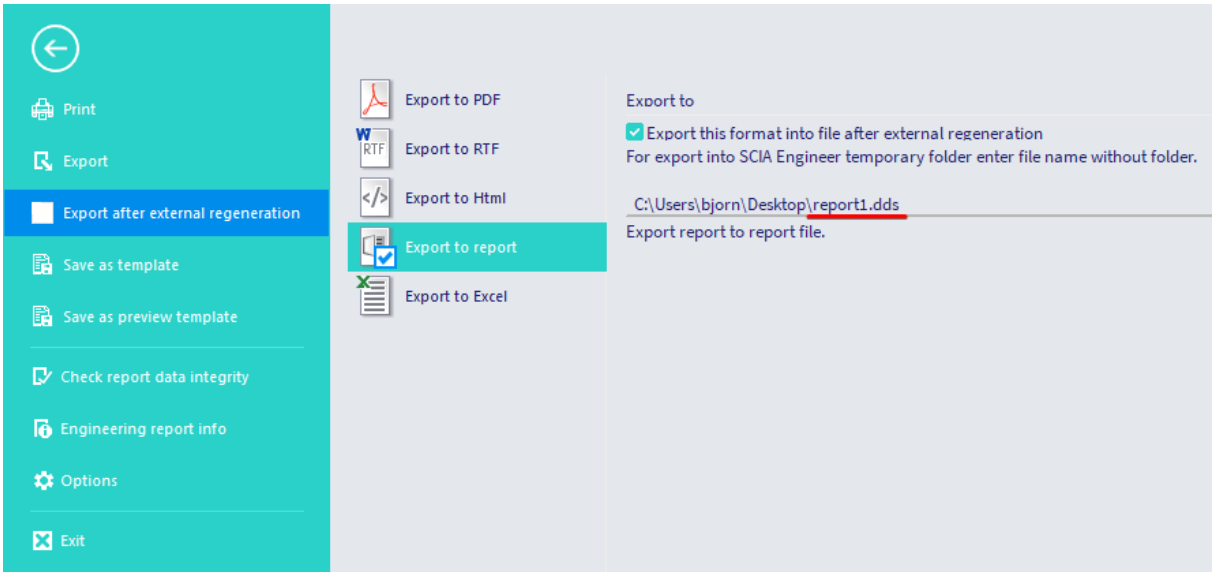
Automatic joining of several reports

Since version 15 it is possible to automatically regenerate and export selected reports at the end of the Batch analysis. Since this version it is also possible to insert references to files with exported content of reports into the Engineering Report. Those two new features together enables automatically the joint of several reports and export them all into one PDF file with one common table of contents and common numbering of pages and chapters.

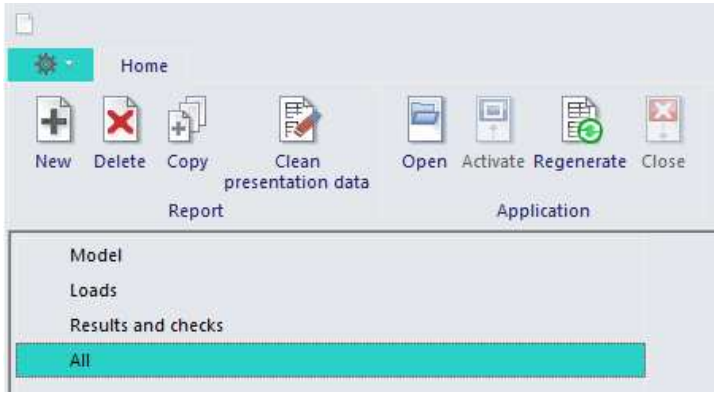
In the example, there are three reports (Analysis data, Load definition and Internal forces).

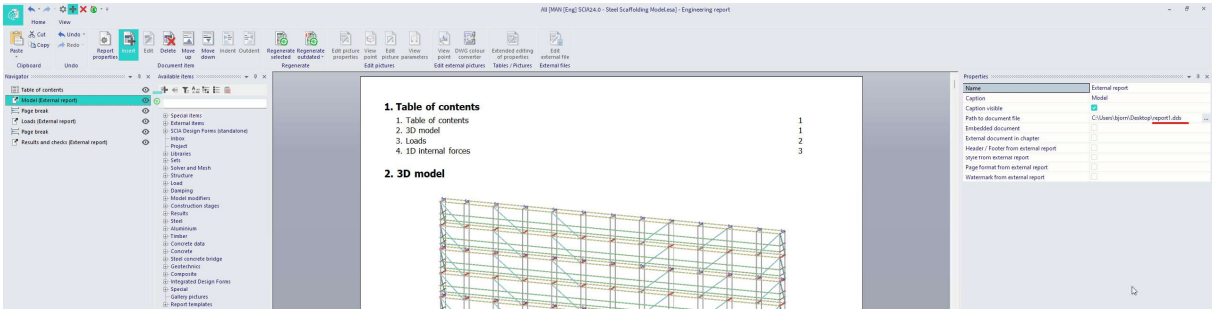


All the three reports are selected to be exported into *.dds files after external regeneration (regeneration started from batch analysis).

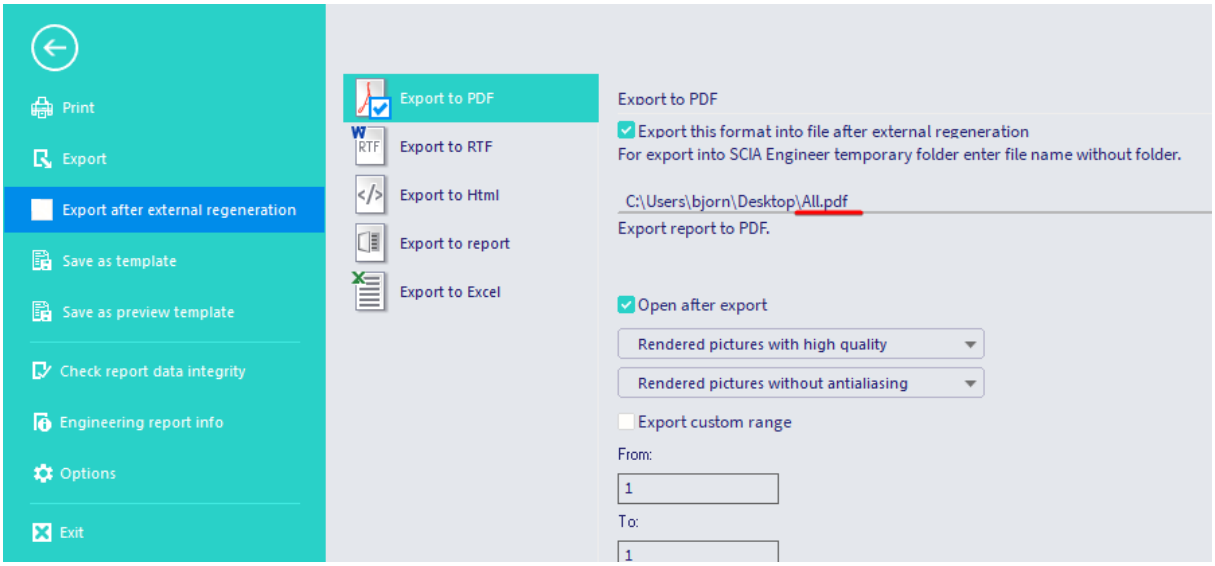


The fourth report called “all” contains items External reports linked to the particular *.dds files specified in the settings for export after regeneration (previous point).

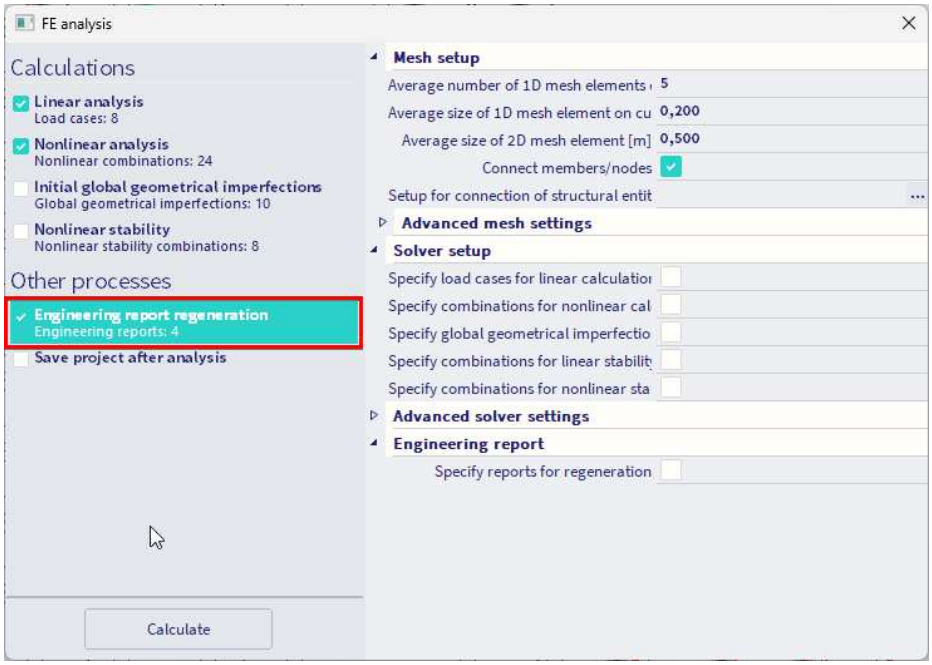




The export after regeneration for this fourth report is set to the PDF file with automatic opening of the PDF.



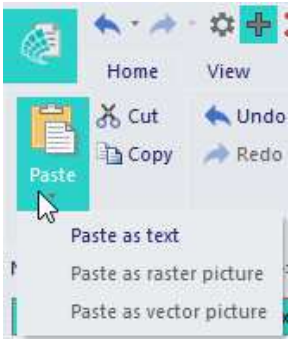
In the setting of batch analysis, the regeneration of all reports is selected.



This setting ensures that at the end of the batch analysis, the first 3 reports are regenerated and exported into *.dds files. Those *.dds files are then loaded into the fourth report. Finally this fourth report is exported into a PDF file.

Inserting calculations from external programs

Supplementary calculation in other programs (e.g. Excel, MathCad, Word ...) is a very common case. The Engineering Report enables a very easy way of inserting of those calculations using the windows clipboard (Copy - Paste). Some programs store its data into a clipboard in more formats. The Engineering Report enables to insert (paste) them as plain text, raster picture and vector picture.



Vector and raster pictures are inserted as a report item External picture. Texts are inserted as report item Formatted texts and can then be formatted using the formatted text editor.

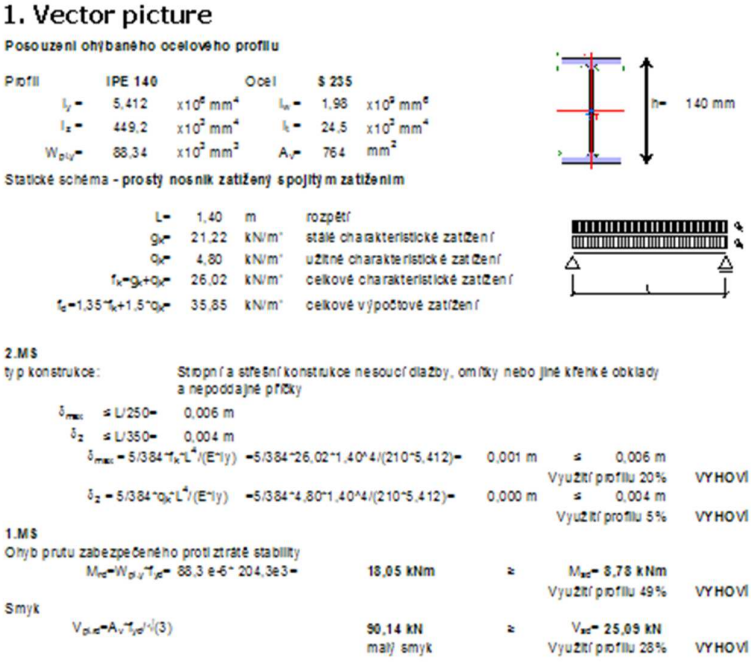
The following chapters are meant as an example of common programs. The windows Clipboard is supported by the majority of programs and can be used for inserting of their data into the Engineering Report.

The size of an external picture (also external pictures inserted by the Paste function) is defined by the Height and Width property. It is possible to **set one size to 0**. In such case the **size is calculated automatically** from the aspect ratio of the picture.

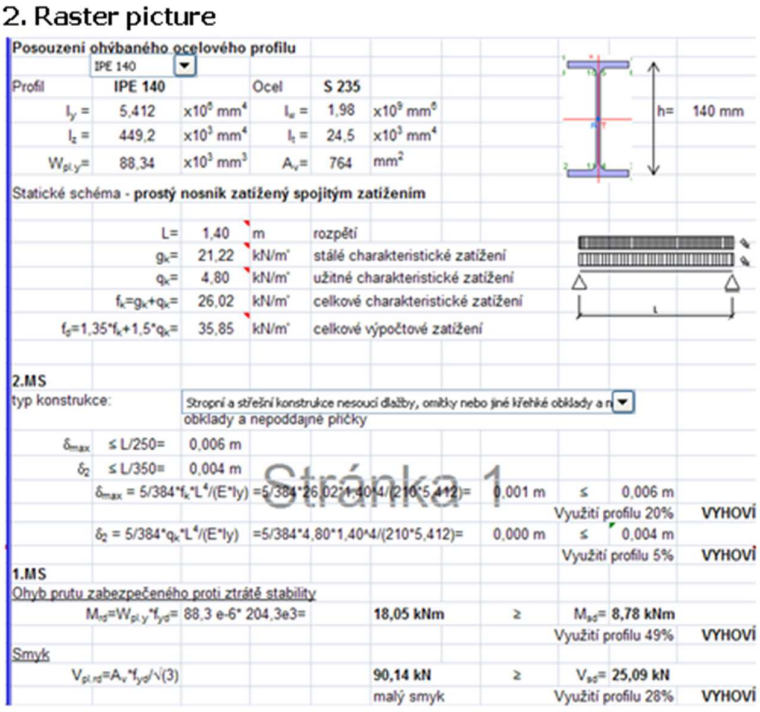
Inserting from Microsoft Excel

Microsoft Excel stores data in the clipboard in all three formats supported by the Engineering Report**Error! Bookmark not defined.** (some versions of Excel does not provide the vector picture). Each format provides a different output.

- **Vector picture** looks like the printed output from Excel:



- **Raster picture** looks like a screen shot of the Excel sheet:



- **Plain text** inserts only the text content of Excel cells:

3. Text

Posouzení ohýbaného ocelového profilu

Profil IPE 140 Ocel S 235
Iy = 5,412 x106 mm4 Iw = 1,98 x109 mm6 h= 140 mm
Iz = 449,2 x103 mm4 It = 24,5 x103 mm4
Wpl.y= 88,34 x103 mm3 Av= 764 mm2
Statické schéma - prostý nosník zatížený spojitým zatížením

L= 1,40 m rozpětí
gk= 21,22 kN/m' stálé charakteristické zatížení
qk= 4,80 kN/m' užitné charakteristické zatížení
fk=gk+qk= 26,02 kN/m' celkové charakteristické zatížení
fd=1,35*fk+1,5*qk=35,85 kN/m' celkové výpočtové zatížení

2.MS
typ konstrukce: Stropní a střešní konstrukce nesoucí dlažby, omítky nebo jiné křehké obklady a nepoddajné příčky
dmax ≤ L/250= 0,006 m
d2 ≤ L/350= 0,004 m
dmax = 5/384*fk*L4/(E*Iy) =5/384*26,02*1,40^4/(210*5,412)= 0,001 m ≤ 0,006 m
Využití profilu 20% VYHOVÍ
d2 = 5/384*qk*L4/(E*Iy) =5/384*4,80*1,40^4/(210*5,412)= 0,000 m ≤ 0,004 m
Využití profilu 5% VYHOVÍ
1.MS
Ohyb prutu zabezpečeného proti ztrátě stability
Mrd=Wpl.y*fyd=88,3 e-6* 204,3e3= 18,05 kNm ≥ Msd= 8,78 kNm
Využití profilu 49% VYHOVÍ
Smyk
Vpl.rd=Av*fyd/√(3) 90,14 kN ≥ Vsd= 25,09 kN kN
malý smyk Využití profilu 28% VYHOVÍ

Inserting from Microsoft Word

From the formats which use Microsoft Word for clipboard the Engineering Report can use a vector picture or a text.

- **Vector picture** looks like the printed output from the Word document. It contains formatted text, pictures, formulas...

4. Vector picture from Word

Stropní trám 160/200
Prvek trámu je uvažován jako prostý nosník uložený na zdivo z plných cihel. Trámy jsou provedeny z rostlého jehličnatého dřeva **C22**. Pro posouzení požární odolnosti je použita metoda účinného průřezu, přičemž horní povrch se uvažuje jako chráněný podle uvedeného schéma.

$$d_{char} = \beta_0 \cdot t = 0,7 \cdot 30 = 21mm$$

$$d_{ef} = d_{char} + k_0 \cdot d_0 = 21 + 0,75 \cdot 7 = 21 + 5,25$$

$$d_{ef} = 26,25mm$$

účinný průřez 107/173

(160 - 2.26,3= 107mm, 200 - 26,3= 173mm)

- Plain **text** contains only text content from the document. It is inserted as Formatted text report item and can be then formatted using the Formatted text editor.

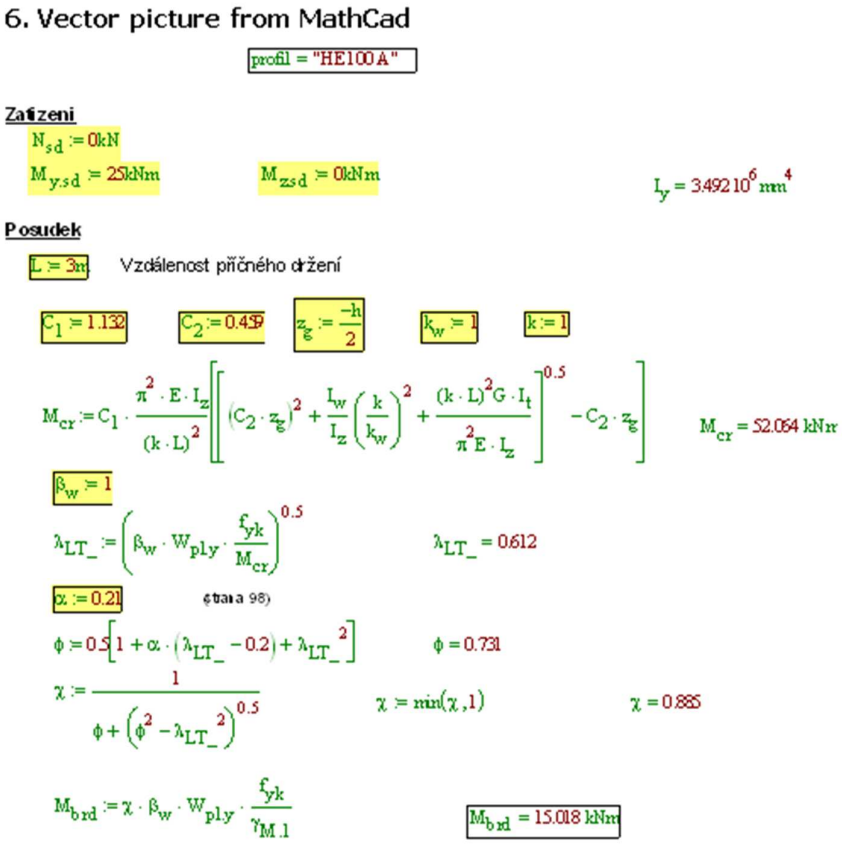
5. Plain text from Word

Stropní trám 160/200
Prvek trámu je uvažován jako prostý nosník uložený na zdivo z plných cihel. Trámy jsou provedeny z rostlého jehličnatého dřeva C22. Pro posouzení požární odolnosti je použita metoda účinného průřezu, přičemž horní povrch se uvažuje jako chráněný podle uvedeného schéma.

účinný průřez 107/173

Inserting from MathCad

MathCad stores its data into the clipboard as a raster picture or vector picture. Both of them looks similar while the vector picture is sharper and uses less memory.



Inserting from PDF files

There can be multiple types of PDF viewers but the most common one is Adobe reader. Adobe reader stores the data into the clipboard as a text or picture. It depends on the type of PDF. The text usually contains a lot of special characters which are not correctly displayed in the Engineering Report**Error! Bookmark not defined.**. It is usually better to do a screen shot of the PDF preview and insert it as a picture.

Inserting drawings from Autocad

Sometimes it is necessary to insert drawings into the structural report. The use of Autocad is quite common and therefore this chapter describes the way of inserting of drawings from Autocad. Inserting of drawings from other CAD software can be similar.
There are several possibilities how to do it:

- The drawing can be printed as a *.jpg or *.png picture. This is enabled by Autocad itself. Then such a picture can be inserted in the Engineering Report as an external picture (see also chapter External picture as an external reference) or via the clipboard.
- The *.dwg file can be inserted directly as External picture
- It is possible to use Copy - Paste from Autocad to Engineering Report

Following chapters will summarize positives and negatives of those variants.

Printing drawings into *.jpg or *.png

Positives:

- pictures can be inserted as "external reference" (their changes can be respected in the Engineering Report using Regenerate function)
- pictures respect line thickness and colour setting used in Autocad for printing
- there can be generated more drawings from one *.dwg (it is possible to print a specific part of *.dwg to picture)

Negatives:

- **Error! Bookmark not defined.**not very easy to define correct picture size and scale
- pictures are stored as raster images, their quality is lower

Inserting *.dwg as an External picture

Positives:

- pictures can be inserted as "external reference" (their changes can be respected in the Engineering Report using Regenerate function)
- it is not necessary to have Autocad installed
- pictures are printed as vector ones. They have a high quality
- **Error! Bookmark not defined.**since version 14 it is possible to change the view point and the zoom (display only wanted part of the drawing)
- since version 15 it is possible to automatically convert colours into various thickness of lines

Engineering Report supports inserting of *.dwg up to version Autocad file format 2013 (file format 2018 isn't supported).

Copy - Paste from Autocad to Engineering Report

The result of Copy - paste depends on the position in Autocad where the Copy function is called. When the copy is done in "Model" the current colours and line thickness are used. When the copy is done inside the "Layout view" (but model editing mode) the colours and line thickness are according to selected printing style.

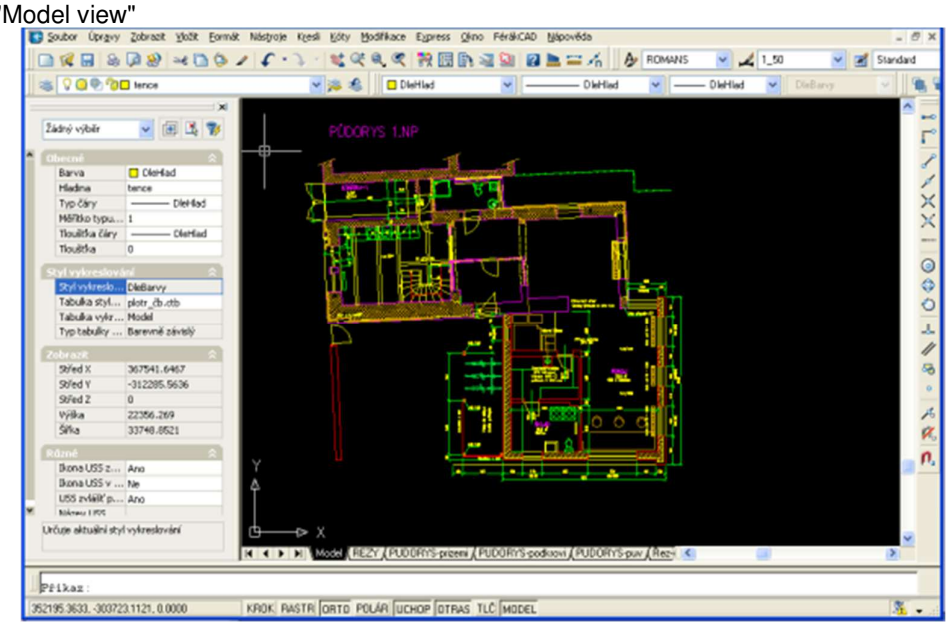
Positives:

- pictures can respect line thickness and colour setting according to selected printing style
- pictures are printed as vector ones. They have high quality
- there can be generated more drawings from one *.dwg (it is possible to Copy just specific part of *.dwg)

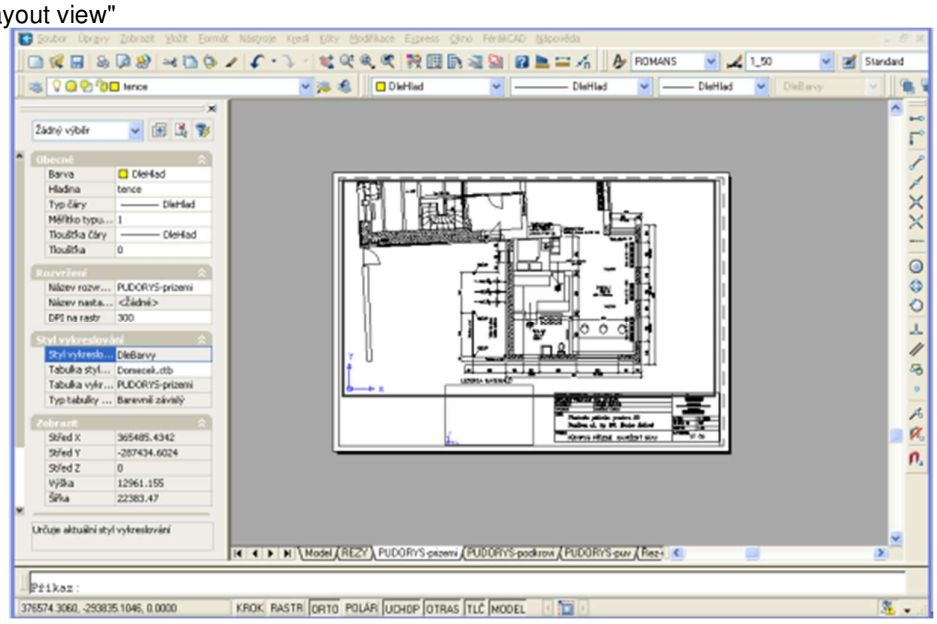
Negatives:

- pictures cannot be inserted as "external reference" - after any change in *.dwg it is necessary to insert the picture again

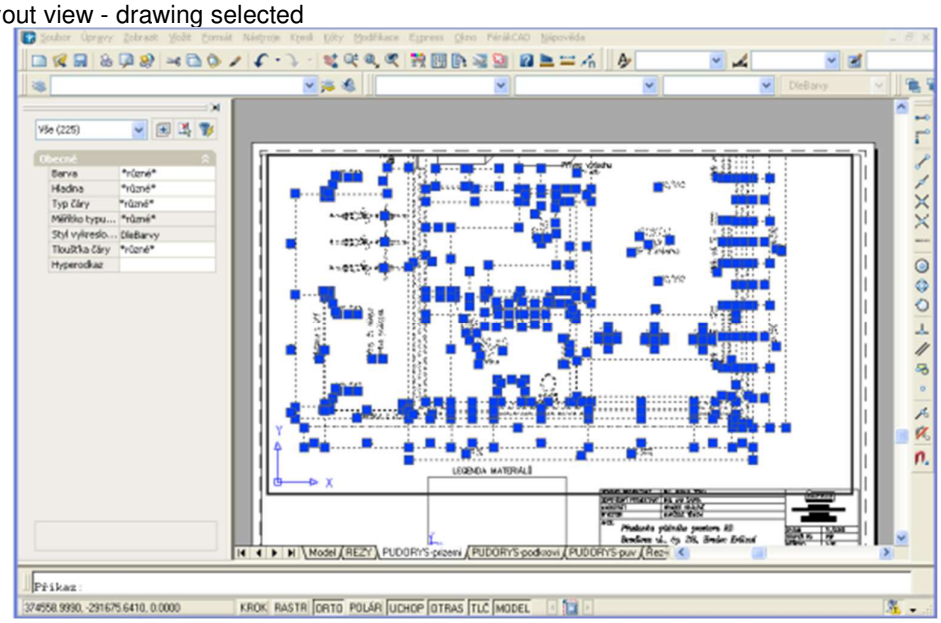
Autocad - "Model view"



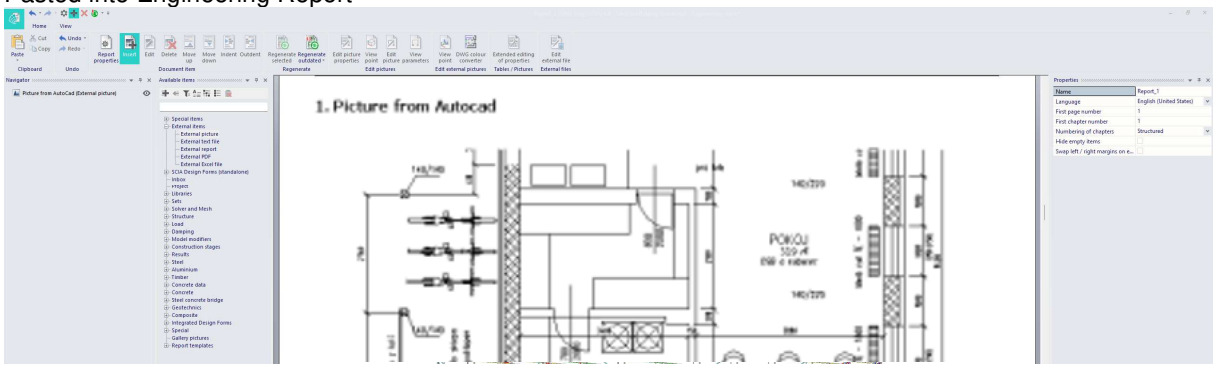
Autocad "Layout view"



Autocad layout view - drawing selected



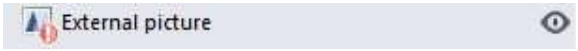
Pasted into Engineering Report

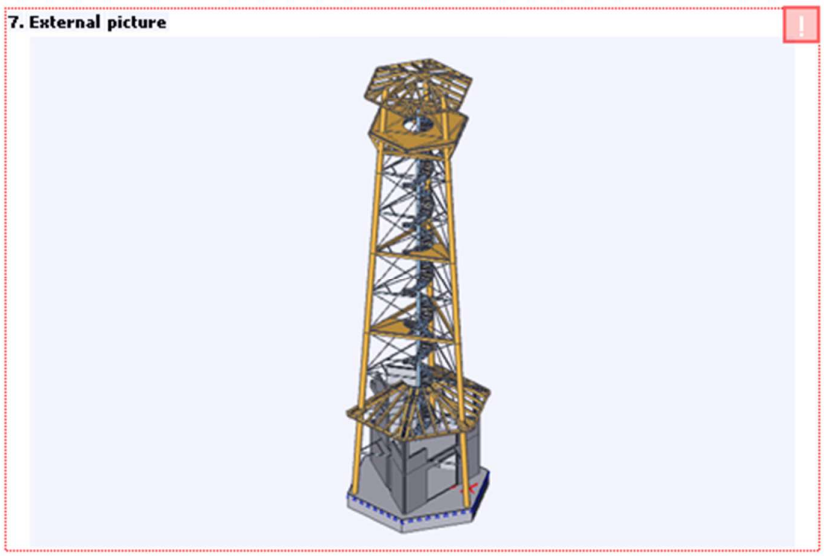


External pictures as external references

The report item External picture supports two ways of storing the picture definition. The first possibility is use **Embedded picture** which means the picture is stored together with the *.esa project. The second possibility is to insert the picture just as an **external reference (Embedded picture is switched OFF)**.

When the picture is inserted as an external reference it is not stored with the *.esa file so its size does not increase. The source picture file on the hard drive is continuously checked and you are notified about its change by validity status (External picture item is marked as invalid).





Regeneration of the picture will reread its content from the hard drive and makes its content again valid. In this way it is possible to work with external pictures in similar way as with e.g. XRefs in AutoCad.

Fast picture preview

The most time demanding operation needed for displaying of a report picture is its OpenGL rendering. On weaker computers the OpenGL rendering can take several seconds in case of bigger pictures.

There are two possibilities how to skip the rendering procedure:

- set the value of picture property Rendering to "Wired" - Wired pictures does not need to be rendered. On the other hand in Wired pictures it is not possible to display surfaces.
- keep the value of property Rendering on "Rendered by OpenGL" and switch on the **Fast picture preview** on ribbon View

The second mentioned possibility (**Fast picture preview**) ensures that all pictures in the report are displayed as wired in the report preview but printed and exported according to the property Rendering. It means that the rendering process is done only during printing or exporting to PDF or Html. This will increase the speed of redrawing of rendered pictures e.g. after opening of a report or after editing of pictures.

The **Fast picture preview** is respected in the document preview in the Report manager. It is also respected in the print preview but it is ignored in printing and export.

It is recommended to have the Fast picture preview switched ON during report preparation and then switch it OFF before printing to check that all desired pictures will be rendered.

Fast table preview

In case of having long tables, manipulations with report items can become slower. To enable faster editing of the report content it is possible to switch ON the **Fast table preview**.

It results in cutting of tables where only two first rows are displayed and information text is added.

1. Nodes

Name	Coord X [m]	Coord Y [m]	Coord Z [m]
N1	-12.000	-12.000	-3.000

Name	Coord X [m]	Coord Y [m]	Coord Z [m]
N2	-6.000	-18.000	-3.000

Part of the table is missing because the fast table preview is switched ON.

This setting is also ignored during export and printing. It means that whole tables are always printed and exported regardless on the Fast table preview status.

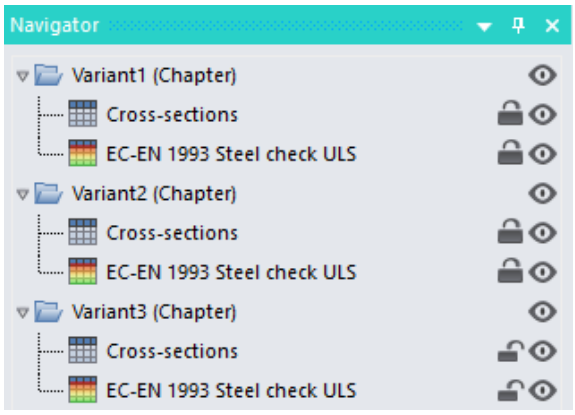
The speed of drawing of tables can be increased by switching OFF the automatic calculation of table column width. This can be done in the Table layout editor (see the related chapter).

Having results from more variants of the model in one report

One of the biggest benefits of the Engineering Report is keeping of presentation data and the possibility to lock a part of the report. Besides common benefits such as immediate visible content of the report after its opening, predictable regenerations and overall stability it enables also creating of more advanced report describing different versions of one model.

Preparation of such a report is very easy. Just calculate the current version of the model, create a part of a report with output from this version of the model. Make sure that all tables in this part are regenerated and lock them. Then modify the model (create a new variant) and Copy - Paste the part describing the first variant to a new chapter and regenerate it. Then you can have information about the first variant in the first chapter and information about the second variant in the second chapter.

Example: navigator with 3 variants



The first two variants will show a red exclamation mark because they are locked and not regenerated.

Copy - Paste between reports

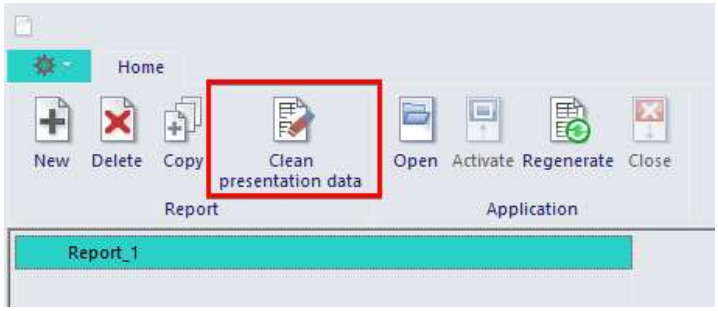
It is possible to move or copy report items between different reports using the windows Clipboard (Copy - Paste). This function enables to copy all report items (except the Gallery pictures) between various reports, even between reports from different projects. During Copy - Paste are also copied all properties of the selected report items and also other definition data (definition of Style or Header / footer).

Using this Copy - Paste function it is easily possible to copy the structure of one report to another report in another project.

Reduce size of SCIA Engineer file by cleaning report presentation data

The basic idea of the Engineering Report is to store as many data as possible to make the report stable and keep not necessary regenerations to the minimum. Therefore all data which are once obtained in regeneration are stored on the hard drive and kept in the *.esa file. Usually it is not a problem but especially if it is necessary to send the project via e.g. email, the size of the project (*.esa file) is more important than the time needed for regeneration of the report.

For such cases it is possible to Clean presentation data of reports in the Engineering Report manager.



This function removes all data which are not necessary for future regeneration of the report. It does not delete e.g. embedded external pictures neither Screen shot pictures from SCIA Engineer.

It is possible to significantly reduce the size of *.esa file using this function.