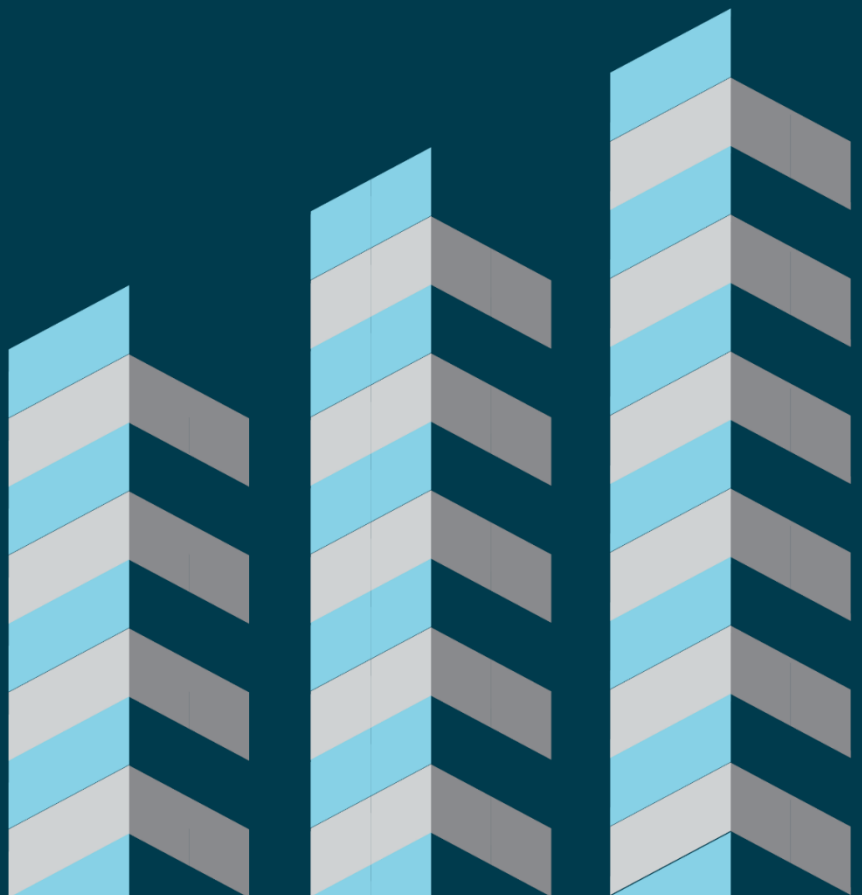


# DESITE BIM

## User Manual

Manage your 3D Building Model interactively.



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Release: February 13<sup>th</sup> 2023

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## Document Versions

Date	Software Version	Editor	Comments
2023-02-13	3.2	JB	Smaller corrections System requirements updated Chapter 'Cutting Tool' added
2023-01-09	3.2	JB	Initial PDF version of DESITE user manual

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# 1. Introduction

DESITE md is an analysis and information software that facilitates the use of digital building models and improves collaboration between project participants. DESITE md helps you with your day-to-day work with building models and enables you to access the information in your BIM model.

DESITE md enables you to check your building models interactively and perform rule-based model checking using your own rulesets. You can also calculate quantities from model geometry and link schedules to the building model to further analyze and visualize your schedule. After all, md stands for 'manage data'.

With DESITE md, you can visualize, check, expand and analyze a 3D building model interactively.

From the very beginning.



## 2. Installation

### 2.1 System requirements

The following system requirements apply to all applications of the DESITE line of products. Note that, while the given 'minimum requirements' suffice to run the software, the performance will heavily depend on your projects' size. Hence, even the 'recommended requirements' should be regarded as open-ended.

We suggest using two monitors when working with DESITE md or DESITE md pro because the increased screen space facilitates the software use and navigation. General screen requirements are not applicable to the tablet-oriented DESITE touch application.

It is highly recommended to install the specific graphics drivers provided by the manufacturer and keep them updated.

Please note that while it's possible to use DESITE BIM in virtualized environments, they are not officially supported.

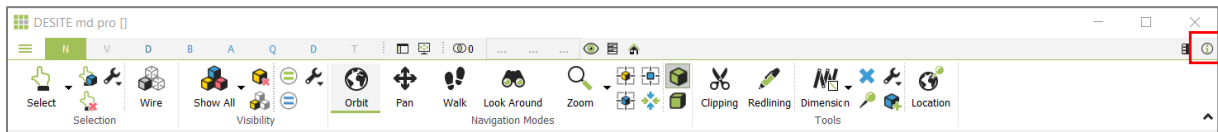
	Minimum Requirements	Recommended Requirements
<b>Operating System</b>	Windows 10 64 Bit or newer	Windows 10 64 Bit or newer
<b>CPU</b>	64 Bit E.g. Intel Core i5 2500 / AMD Athlon 200GE	64 Bit E.g. Intel Core i9 9900 / AMD Ryzen 2700X
<b>GPU</b>	Integrated Graphics Card, OpenGL 3.0 compatible  E.g. Intel HD Graphics 2000, Nvidia 920 MX, AMD internal GPU with Vega 3 CU or newer	Dedicated Graphics Card, OpenGL 3.0 compatible  E.g. Nvidia GTX 1660 / AMD Radeon 570X
<b>Memory</b>	4 GB RAM	32 GB RAM
<b>Storage Space</b>	300 GB	300 GB
<b>Screen Resolution</b>	1920 x 1080 Full HD	2560 x 1440
<b>Other</b>	Internet connection required *	Internet connection required *

### 2.2 License

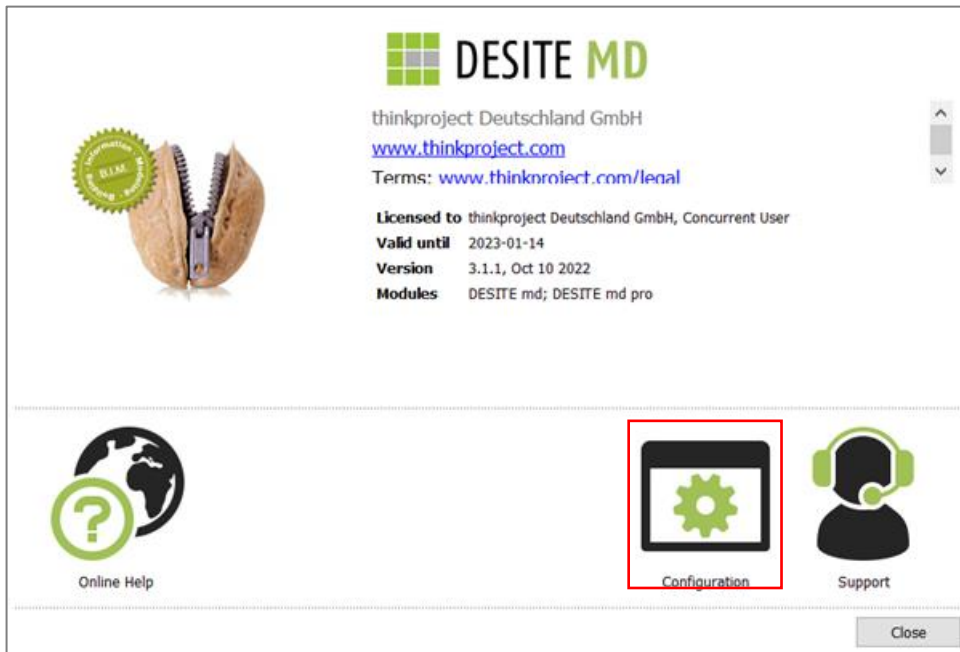
After the first installation of DESITE, the license window appears automatically at start-up.

If you are already working with DESITE and want to enter a new license key:

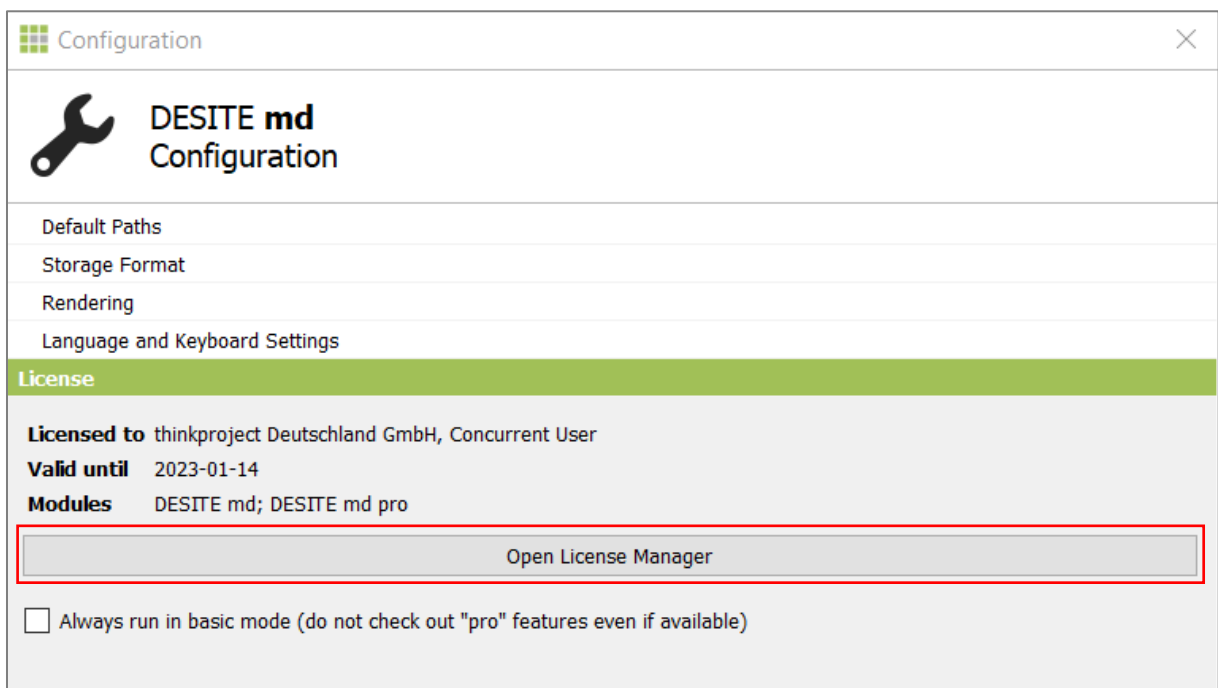
1. Click on the Info-icon in the upper right corner.



2. Then click on the Configuration button

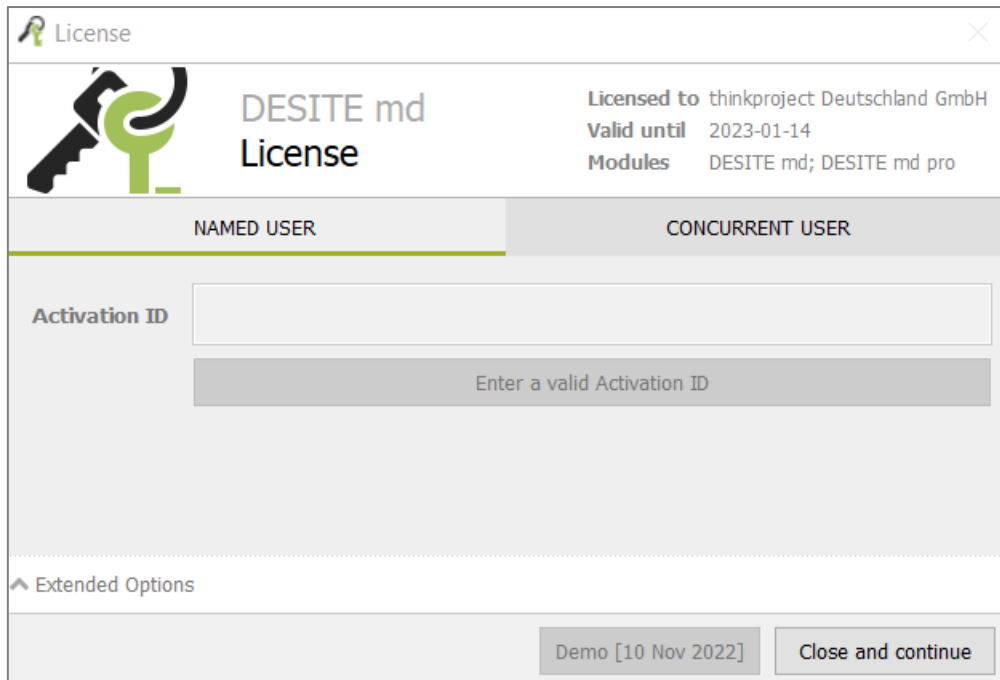


3. Select Open License Manager under License.



Depending on the type of license you have purchased, select the NAMED USER (user license) or CONCURRENT USER (network license) tab as appropriate and enter your license key.





If you would like to test DESITE first, click on the Demo button. This will generate a test version with a runtime of 14 days.

### 2.2.1 Named User

NAMED USER licenses are assigned to a specific user and may be registered on a maximum of two devices for this user.

The license is activated via an Activation ID. This consists of 32 characters and includes both letters and numbers. Every fourth character is separated by a hyphen.

To activate the license, an active Internet connection is required. Afterwards, no Internet connection is required to use the software.

The validity of the license depends on the duration of the contract. If the contract is extended, a new Activation ID is required.

### 2.2.2 Concurrent User

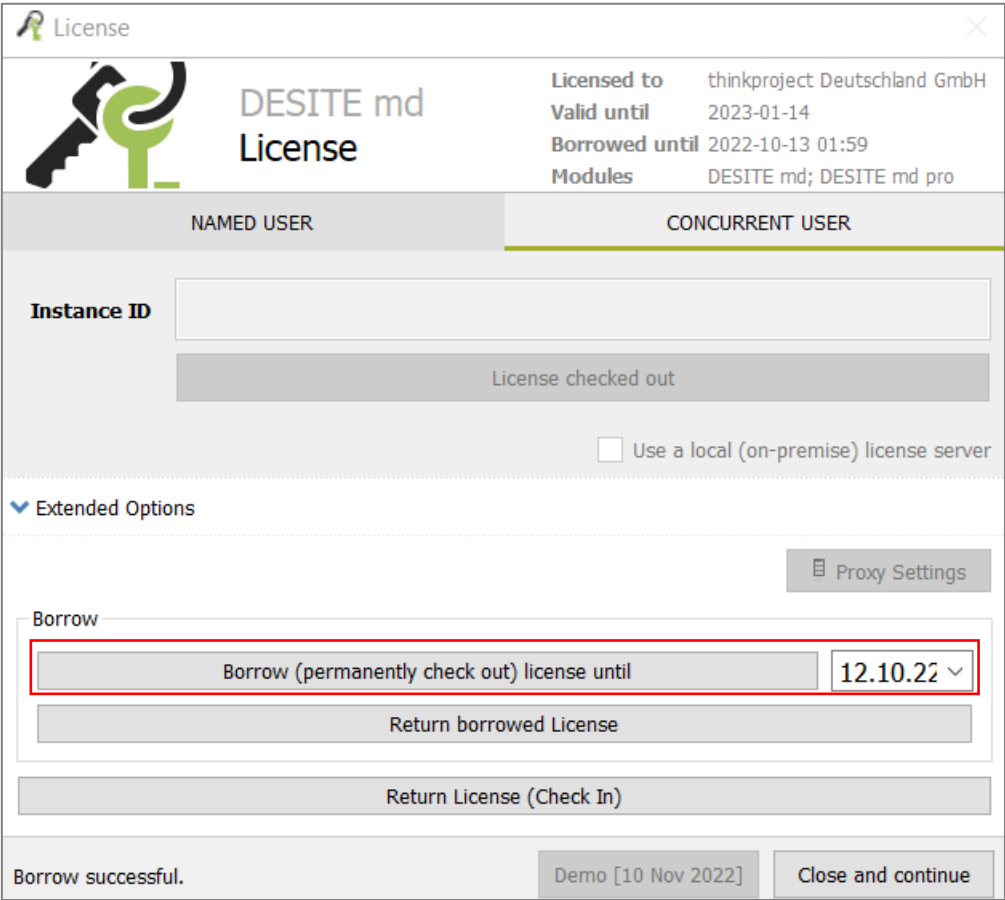
CONCURRENT USER licenses are network licenses. They are not assigned to a specific user. The number of concurrent users depends on the number of licenses purchased (at least two). For example, if ten CONCURRENT USER licenses are available in your company, ten employees can work with DESITE simultaneously.

The activation of the license is done by an Instance ID. This consists of 10 characters and contains both letters and numbers (without hyphen).

To activate the license or to start DESITE, an active internet connection is required.

The validity of the license depends on the duration of the contract. If the contract is renewed, a new instance ID is not required.

If you want to work with DESITE without an internet connection, you have the possibility to borrow a license ID. To do this, click on *Extended Options* on the CONCURRENT USER tab and then on Borrow. Specify the duration of the borrowing here.

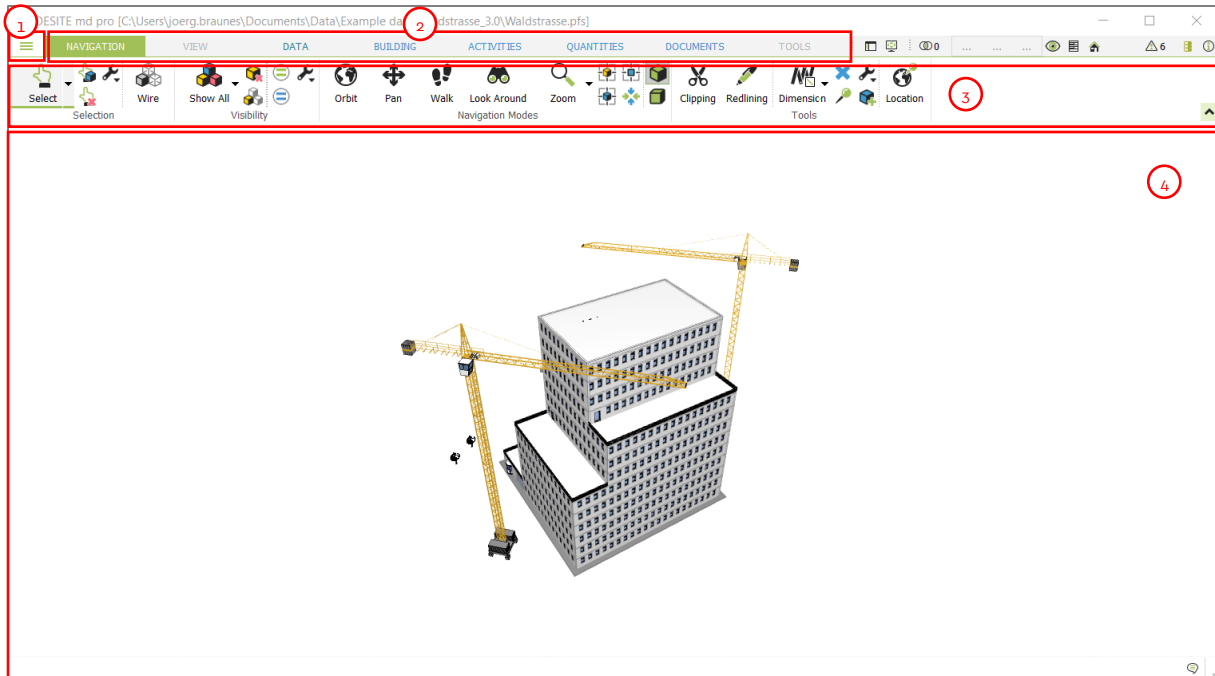


**Notes:**

A CONCURRENT USER license can be borrowed for a maximum of 14 days. Borrowing can only be done with an active internet connection.

## 3. Getting Started

### 3.1 User Interface



1. Application Menu
2. Ribbon Tabs
3. Ribbon Bar
4. Main Window shows a 3D view of the active project

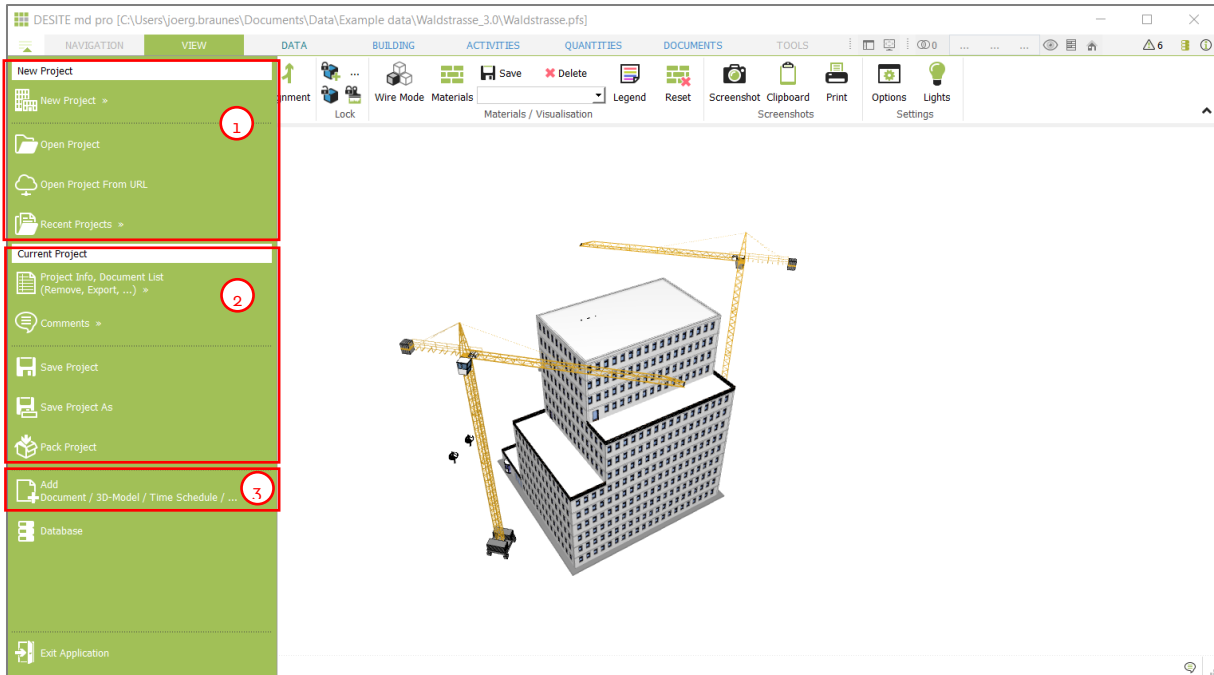
Ribbon Tabs:

- **NAVIGATION:** Navigation and Object Selection options; Redlining and Measurement tools
- **VIEW:** Issues and 3D Viewpoints, Materials and Color schemes, Visualization options
- **DATA:** Display and Entry of Attribute information corresponding to 3D model objects
- **BUILDING:** Project Structure, Building Structure and Model Export
- **ACTIVITIES:** 4D Simulation, Time Schedules and Process Components
- **QUANTITIES:** Bill of Quantities
- **DOCUMENTS:** Managing Documents and Linking to 3D model objects
- **TOOLS:** Model Checking, Clash Detection and Model Version Comparison

### 3.2 Application Menu

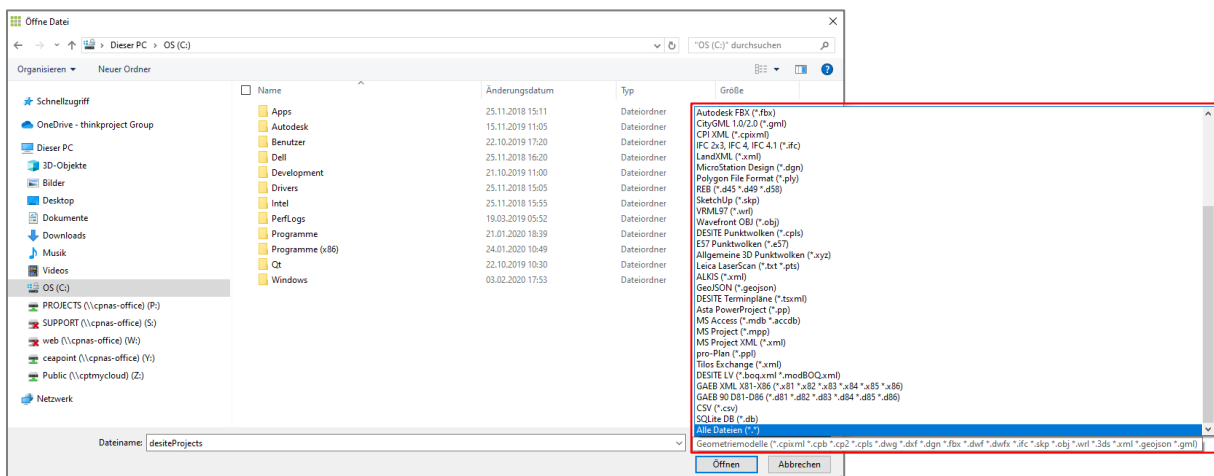
The Application Menu contains all the important functions for managing projects.

1. You can create an empty New Project or open existing projects in native formats .cpa, .cpzip or .pfs. In this case, click on Open Project.
2. You can display Project Info for the current project, export individual models or save the entire project.
3. Whether a 3D geometry model, time schedule, bill of quantities or database, you can import any project data into the project using the function Add Document / 3D-Model / Time Schedule / ...

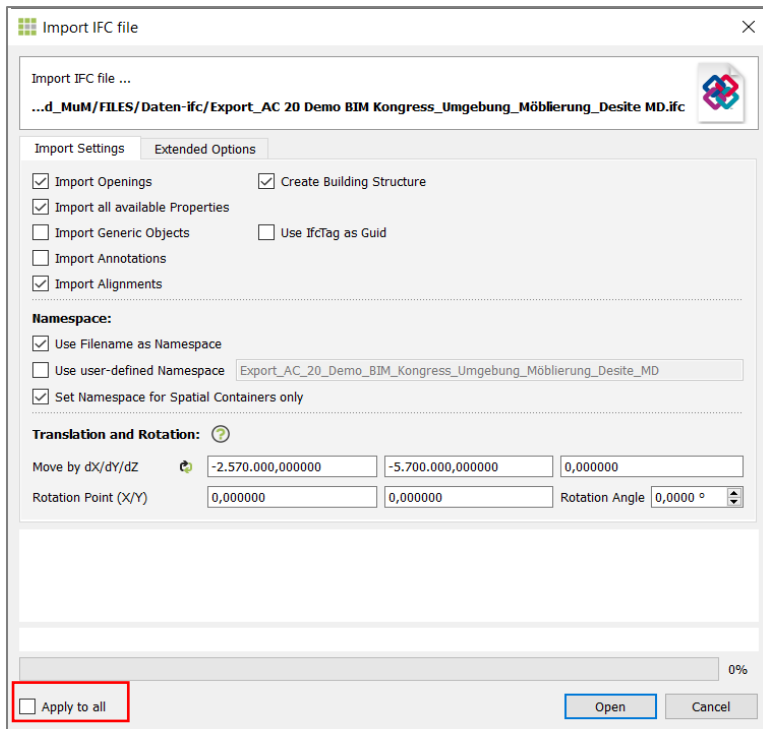


### 3.2.1 Import Data

In order to import a 3D Geometry model, Time Schedule, Bill of Quantities or Database, select Add Document / 3D-Model / Time Schedule /... under Application Menu. You can choose the file format to be imported in the file dialog box that is opened.



Depending on the selected file format, you can set different import options. When you click on the Open button, data will be imported into DESITE md.



Multiple files of different types can be imported and put together in your project.

3D geometry models can be transformed and rotated during the import. This allows models with different local coordinate systems to be merged using a unified coordination model.

Multiple files can be imported at the same time. Import settings can also be applied to each individual file or to all files, depending on whether checkbox Apply to all is checked.

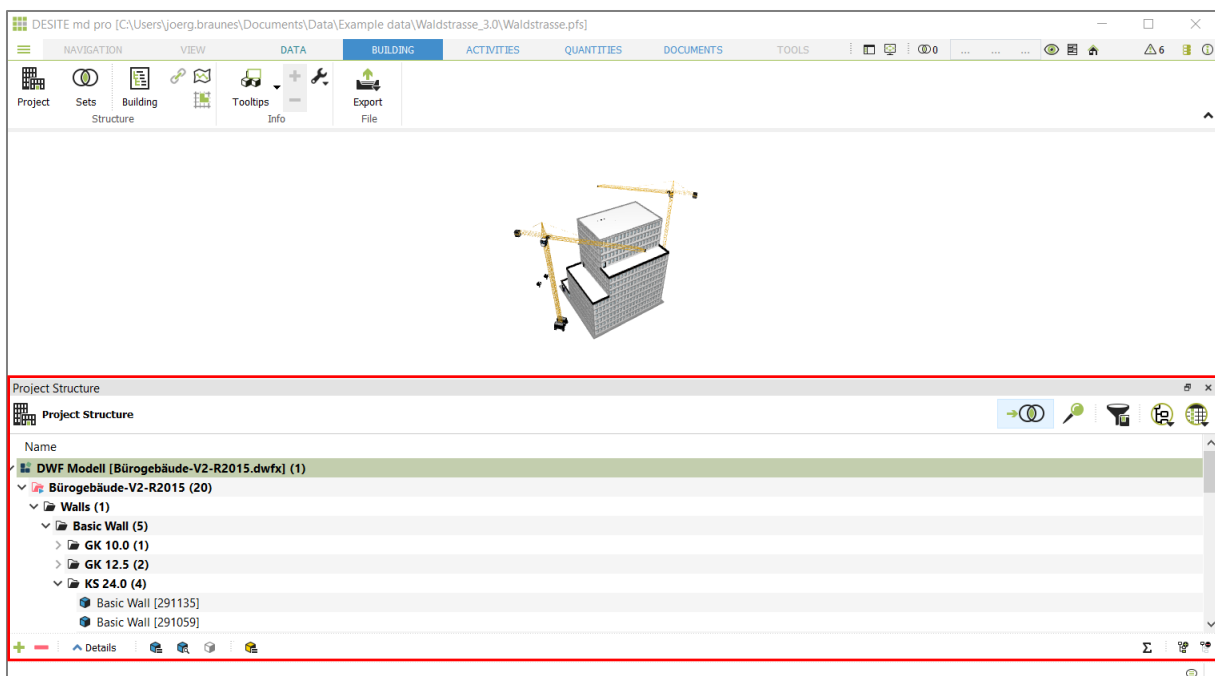
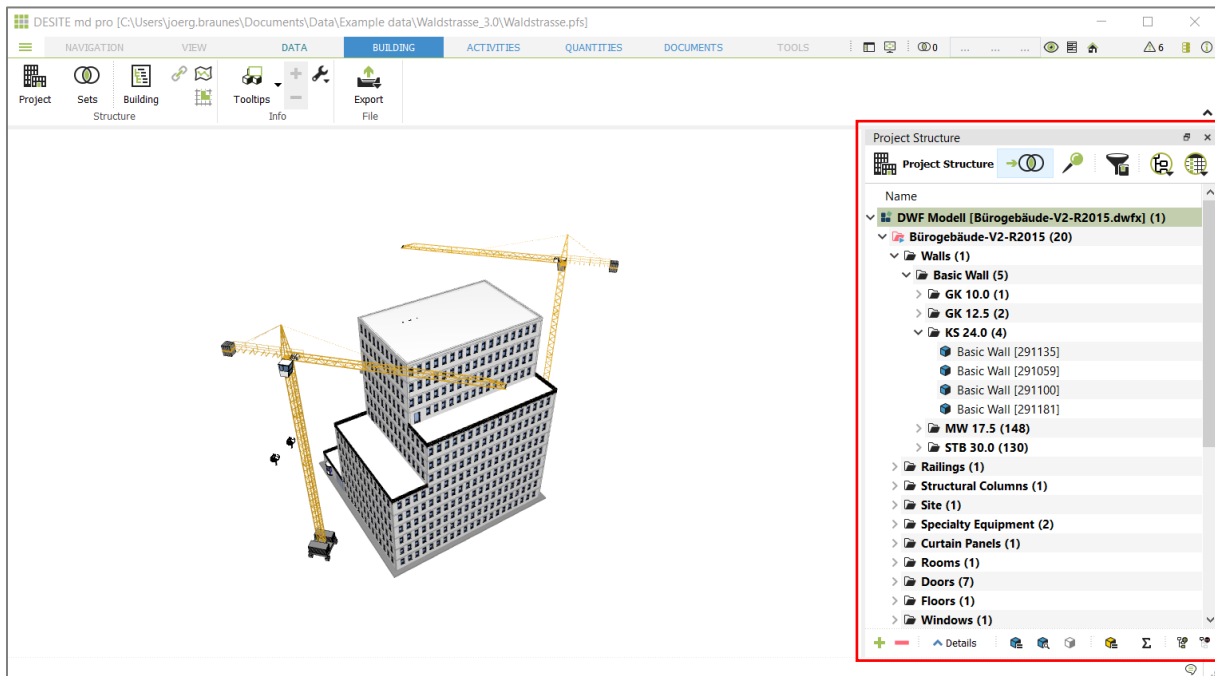
### 3.2.2 Supported File Formats

DESITE Project (*.pfs *.cpa, *.cpzip)
DESITE Binary Format 1 (*.cpb) / DESITE Binary Format 2 (*.cp2)
3D Studio (*.3ds)
AutoCAD Drawing (*.dwg)
AutoCAD Exchange File (*.dxf)
Autodesk DWF (*.dwf *.dwfx )
Autodesk FBX (*.fbx)
Autodesk Revit (*.rvt)
CityGML 1.0/2.0 (*.gml, *.xml)
Collada DAE 1.5 (*.dae)
CPI XML (*.cpixml)

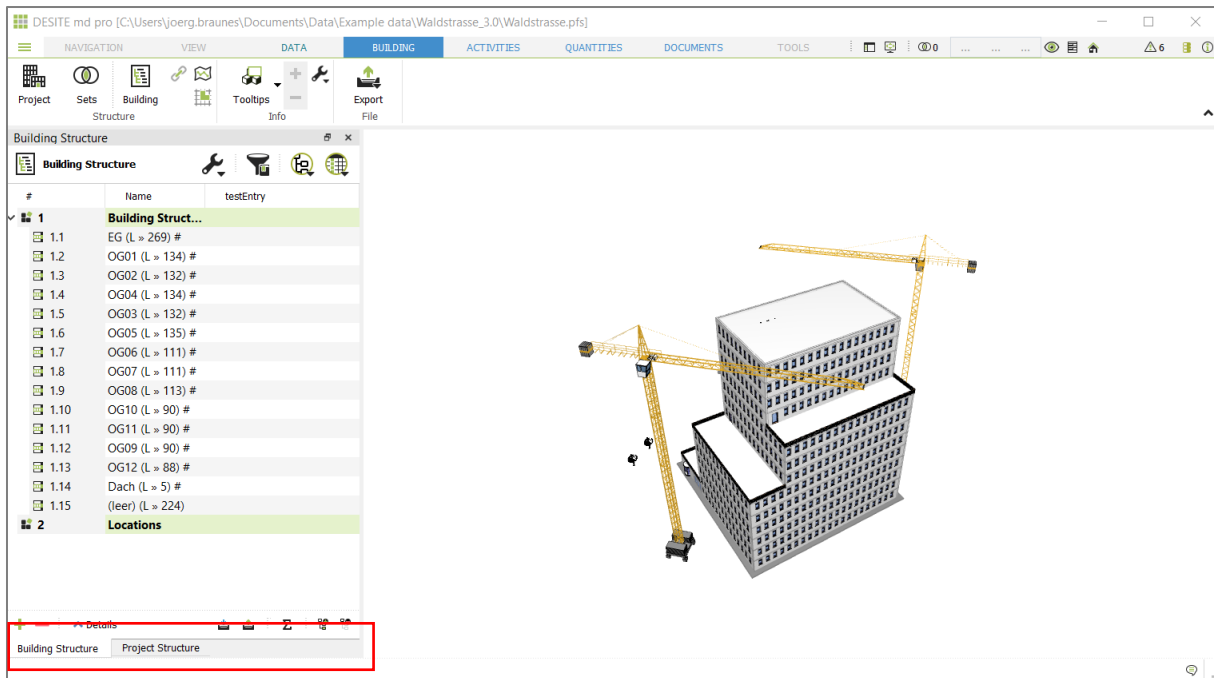
IFC 2x3, IFC 4, IFC 4.1, IFC 4.2, IFC 4.3 RC2 (*.ifc)
LandXML (*.xml)
MicroStation Design (*.dgn)
Polygon File Format (*.ply)
REB (*.d45 *.d49 *.d58)
SketchUp (*.skp)
VRML97 (*.wrl)
Wavefront OBJ (*.obj)
DESITE Point Clouds (*.cpls)
E57 Point Clouds (*.e57)
General 3D Point Clouds (*.xyz)
Leica LeiserScan (*.txt *.pts)
ALKIS (*.xml)
GeoJSON (*.geojson)
DESITE Activities (*.tsxml)
Asta Powerproject (*.pp)
Microsoft Access (*.mdb *.accdb)
MS Project (*.mpp) / MS Project XML (*.xml)
pro-Plan (*.ppl)
Tilos Exchange (*.xml)
Primavera P6 (*.xer, *.xml)
DESITE Bill of Quantities (*.boq.xml *.modBOQ.xml)
GAEB XML X81-X86 (*.x81 *.x82 *.x83 *.x84 *.x85 *.x86)
GAEB 90 D81-D86 (*.d81 *.d82 *.d83 *.d84 *.d85 *.d86)
CPI CSV (*.csv)
SQLite DB (*.db)

### 3.3 Customize User Interface

When a module (e.g. project structure) is selected, a new sidebar ('widget') will open. These sidebars can be moved and docked with drag-and-drop or used on a separate window (e.g. on a second screen) as desired:

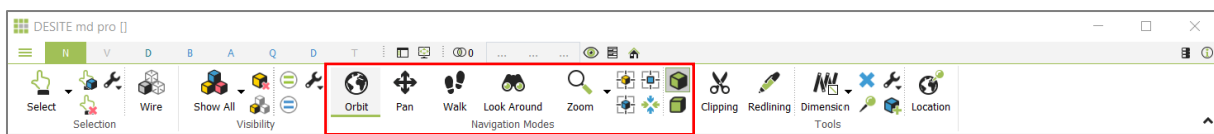


It's possible to place multiples widgets to the same sidebar. This creates tabs for widget:



### 3.4 Navigation

There are various Navigation Modes available to explore the model in 3D View:



In Orbit mode, you can rotate the camera around your model and view it from different angles. Press and hold the left mouse button and move the mouse to the left and right to rotate or up and down to tilt the camera.

**Tip:** You can left-click on an object to set the pivot point while rotating the model.



Pan moves the camera on screen level, i.e. left, right, up or down.

**Tip:** The arrow keys can be used to pan in any navigation mode. A similar effect can be achieved by pressing and holding the mouse wheel and dragging the mouse.



In Walk mode, you can explore the model in detail. Use the mouse to move back and forth and to turn to the left or right. The further you slide the mouse with the mouse button pressed, the faster you will move in the scene.



When using Look Around, your position remains fixed, and you can freely pan the virtual camera using the mouse.

**Tip:** You can also look around in any navigation mode by using 'Ctrl' key and the left mouse button together.

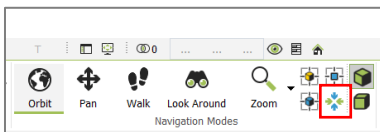




You can use Zoom mode by clicking on the icon on the left side of the main window and moving the mouse back and forth. Alternatively, you can also use the mouse to draw a frame around the area to be zoomed in: left-click and hold on the centre of the target area and drag the mouse in any direction until the frame is of the desired size.

**Tip:** In Orbit mode, other navigation modes can also be used temporarily pressing the mouse wheel and right mouse button or using left mouse button in combination with 'Ctrl' key.

Standard views are available for a practical and quick overview of the model.



Clicking on an arrow will set the view to the selected position.



In addition, following predefined views are also available:



View will be adapted to visible objects



View will be adapted to selected objects



Selected or visible objects will be displayed from above



Perspective projection (recommended)



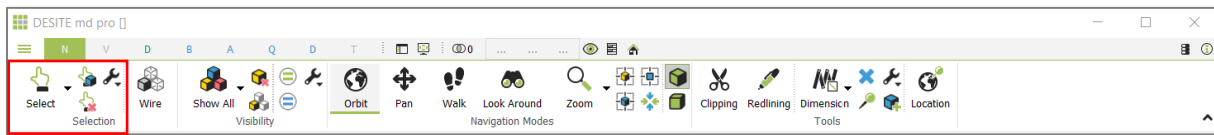
Orthographic projection

**Tip:** To switch between navigation modes more quickly, use the 'Ctrl' key in combination with the following keys:

- **Q:** 'Select' mode
- **W:** 'Pan' mode
- **A:** 'Orbit' mode
- **S:** 'Look around' mode
- **X:** 'Zoom' mode
- **Y:** 'Walk' mode

### 3.5 Selection

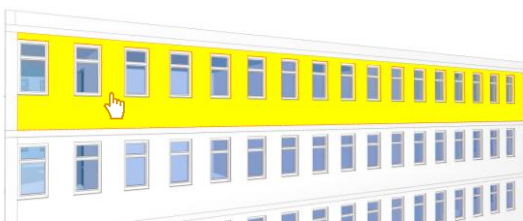
Selection allows the user to select 3D objects in the model in order to work on them.



 Select objects in 3D view

There are three selection modes in the 3D View:

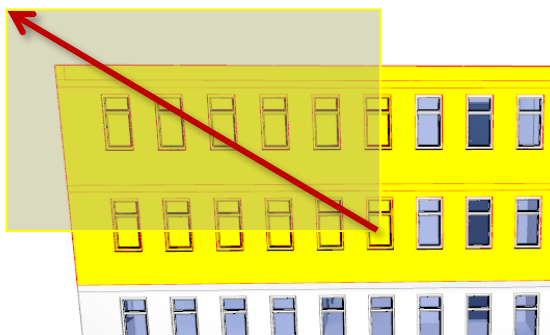
1. Individual selection by clicking on an object.



2. Box selection: **Left-click and hold, and drag the mouse down and to the right.** The selection box will be green. All objects which lie entirely within the box are selected, even if they are concealed by other objects and not visible.



3. Box selection: **Left-click and hold, and drag the mouse either to the left, upwards or both.** The selection box will be yellow. All objects which lie partly within the box are selected. Concealed objects are not selected.



**Tip:**

You can select multiple objects one after another if you press and hold 'Ctrl' while clicking on objects.



Select all visible geometric elements



Clear selection

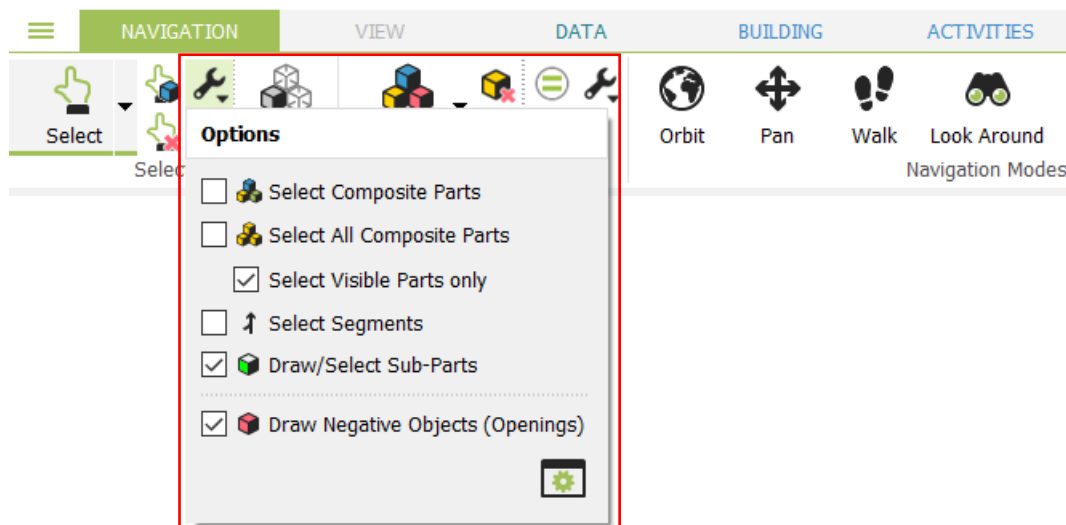
**3.5.1 Selection Settings**

Composite objects (assemblies) are distinguished in many geometry models.

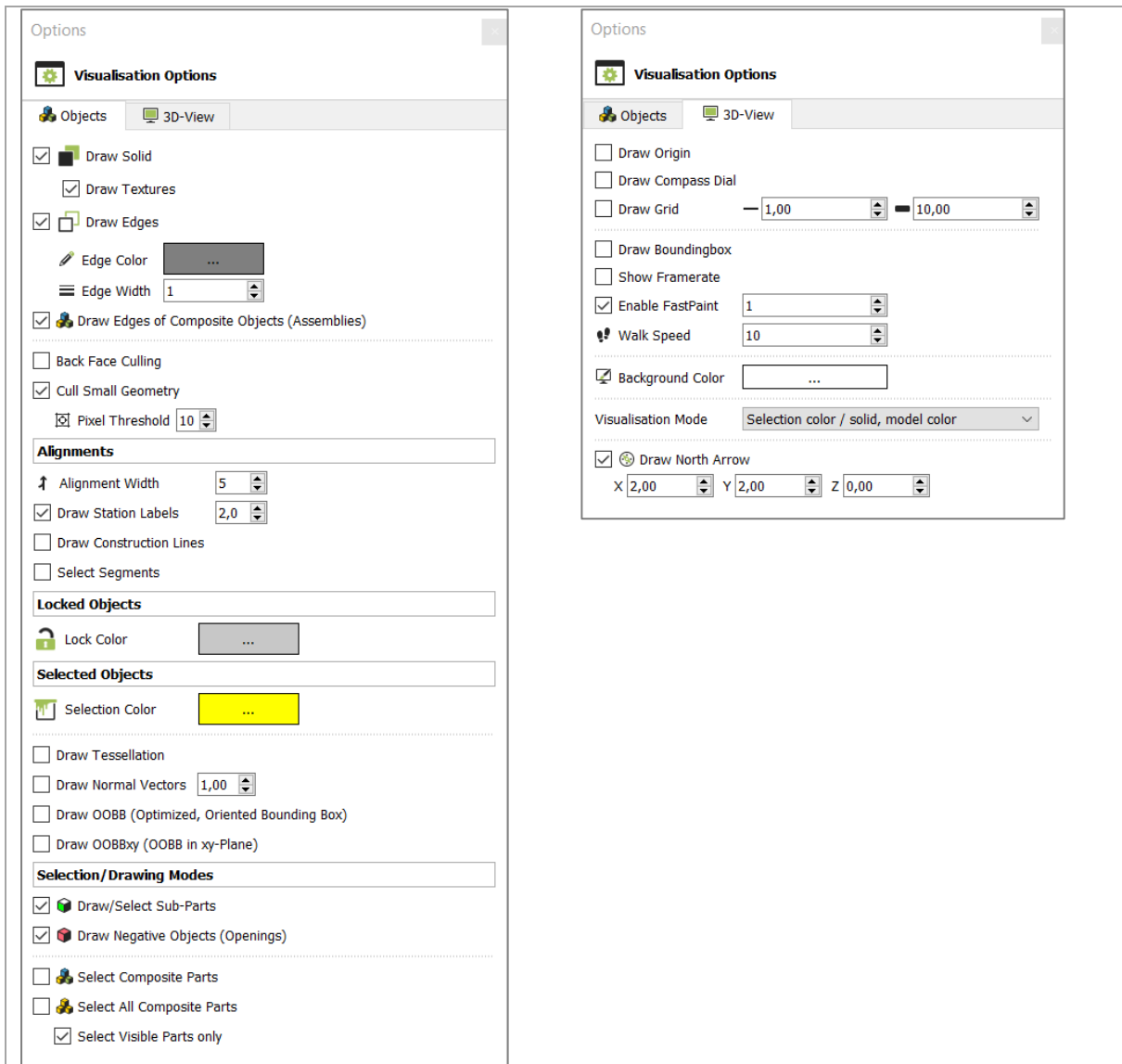


Selection type of such Composite objects can be specified in the navigation menu or in display options (under View / Options). Here you can also activate display of sub-components and negative objects such as window or door openings (if they are present in the project).

**Note:** Sub-components are components that have been divided by **Cutting** tool in DESITE md.

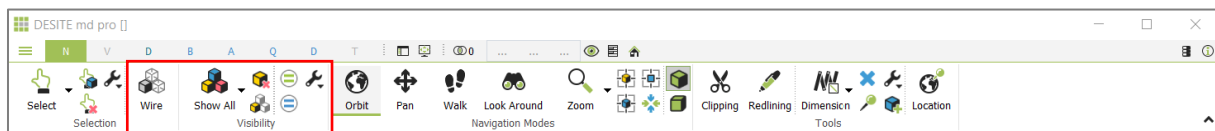


Via 'Open Options' button, you can select further display options in the tabs Objects and 3D-View.



### 3.5.2 Selection and Visibility

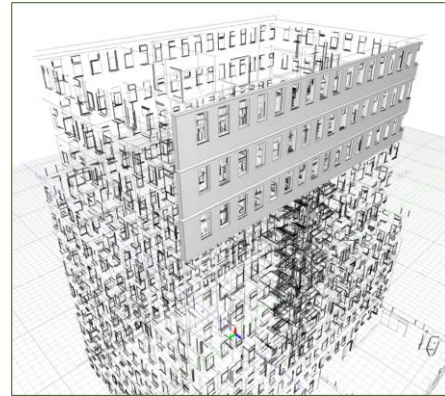
Display and visibility of objects can be changed depending on their selection status.



With *Wire mode*, only edges of objects are displayed in 3D view. Click on the button again to deactivate this display mode.



If objects are selected, they are still displayed with their faces. This allows a quick visual inspection of individual selected objects.



All 3D model objects in the project will be displayed. You can also press 'A' key as an alternative.



Selected objects will be hidden. You can also press '-' key as an alternative.

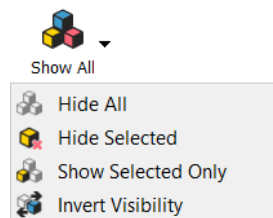
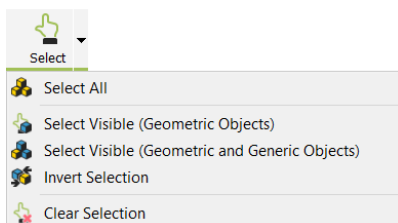


Only selected objects will be displayed. You can also press '#' key as an alternative.



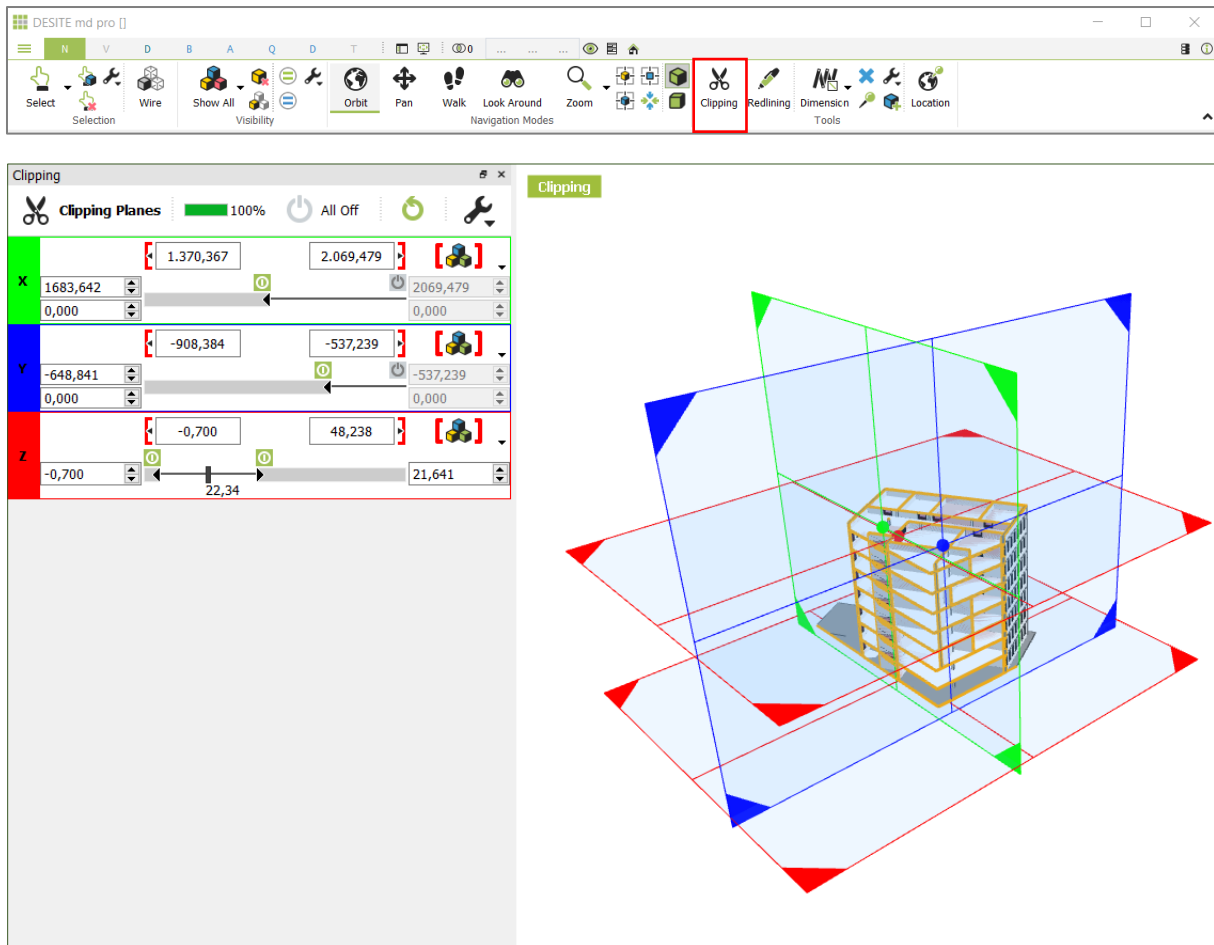
**Tip:**

'Selection' and 'Visibility' of model objects can also be inverted. Selected objects can be hidden, displayed or isolated and vice versa. You find these additional options in the drop down of the *Select* and *Show all* buttons:



### 3.6 Clipping Planes

With Clipping function, parts of the models can be cut away up to six planes simultaneously.



Activate the desired clipping plane using On/Off symbol and move the section using the slider bar below it.



Alternatively, you can also move the clipping planes using the mouse cursor (scissors) by clicking on corners of each section or centre point.



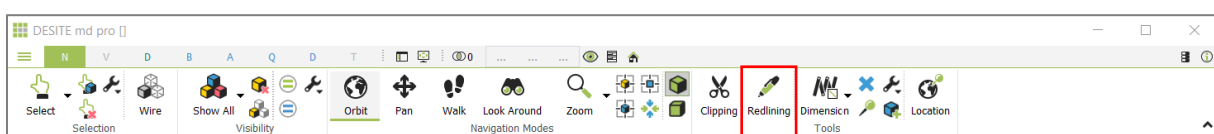
You can adjust display settings for the edges, colors and fills of cutting sections by clicking on the spanner icon.



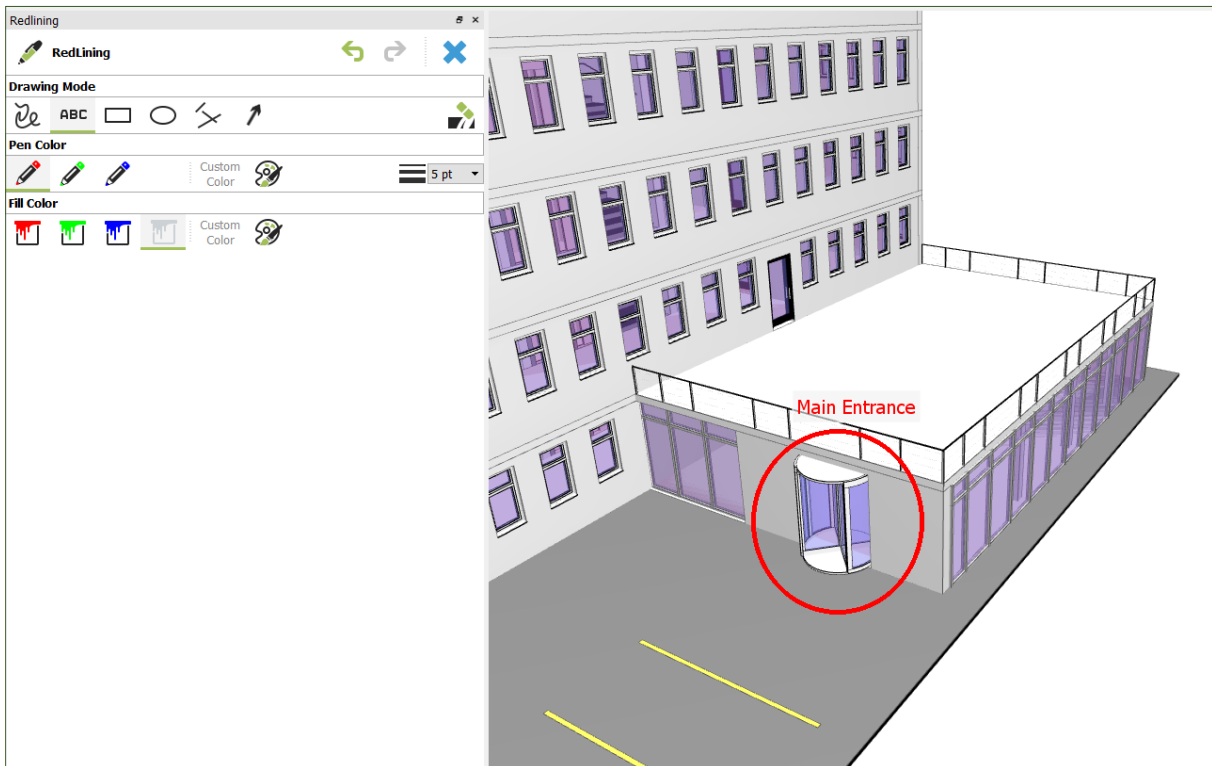
**Tip:** Bounding box of visible or selected objects can also be used to restrict the limits within which a clipping plane can be moved.

### 3.7 Redlining

Redlining tool provides functions for placing comments and annotations within the 3D model.



Click on the Redlining button in the Navigation toolbar in order to open the palette for markup tools. You can adjust settings for Drawing Modes, Pen color and Fill color and choose different colors, shapes or pen thickness values.



You can erase markups by using the eraser while redlining.



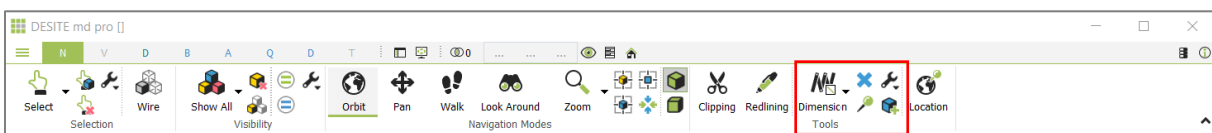
You can remove last markup item or restore the last removed item using arrow buttons.



You can remove all markup items by clicking on X button

**Tip:** Markups will be saved automatically in a 3D Viewpoint. You can also manually save visible and selected objects or clipping planes while creating 3D viewpoints as well.

### 3.8 Measuring



The Dimension tool allows the user to measure points, paths, polylines, 3D polygons, areas and distances.

User can switch between measuring modes using drop down arrow button.



In Points mode, you can display the coordinates of any number of points in the model as required.



In Lines mode, you can measure the distance between two points. Coordinates of selected start and end points will also be displayed.



In Polylines mode, you measure the paths of several consecutive lines. Angles between the lines as well as the total length of all paths are also displayed.



In 3D Polygons mode, you can set as many consecutive points as desired. Dimensions and angles are displayed corresponding to each line or area created.

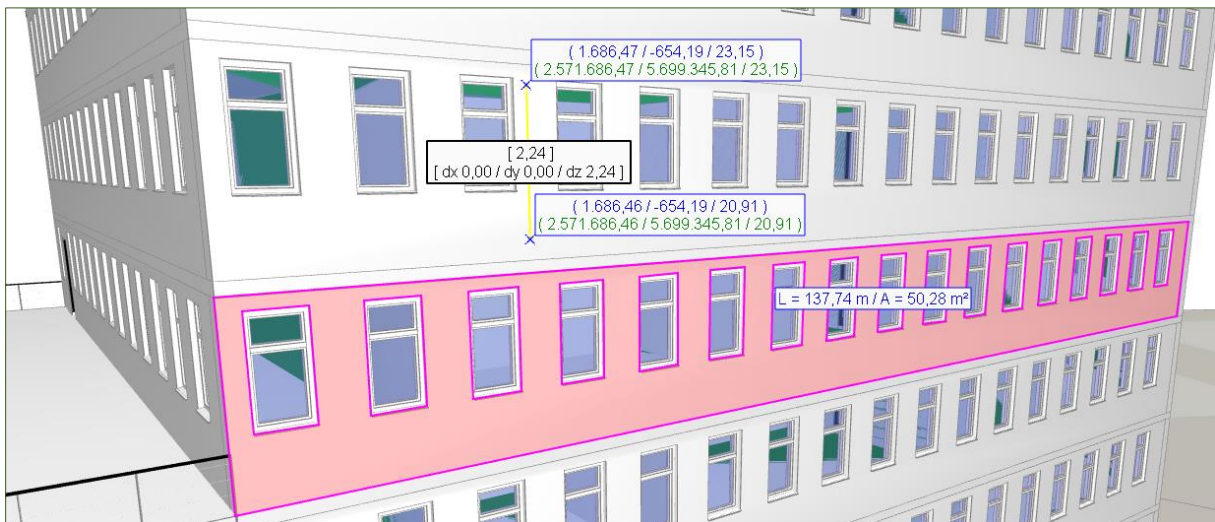


In Faces mode, you measure the areas of objects with just one click. Length of the border lines as well as measured area will be displayed.



In Distance mode, you can measure the perpendicular distance between two parallel paths or parallel areas.

Dimensions will be displayed as temporary objects in the 3D view:



Clears the 3D view from all dimensions

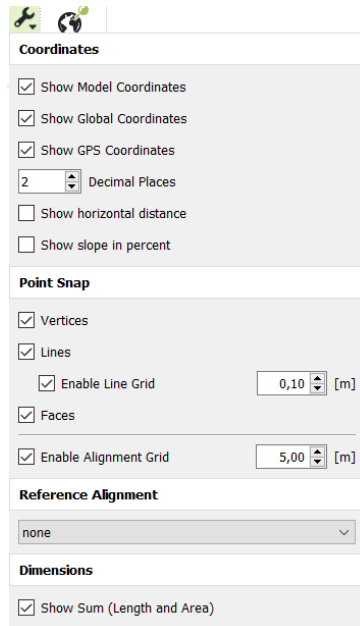


If you select the stick measurement item to 3D view option, you can navigate in DESITE md as usual and the dimension will always remain in the 3D view.

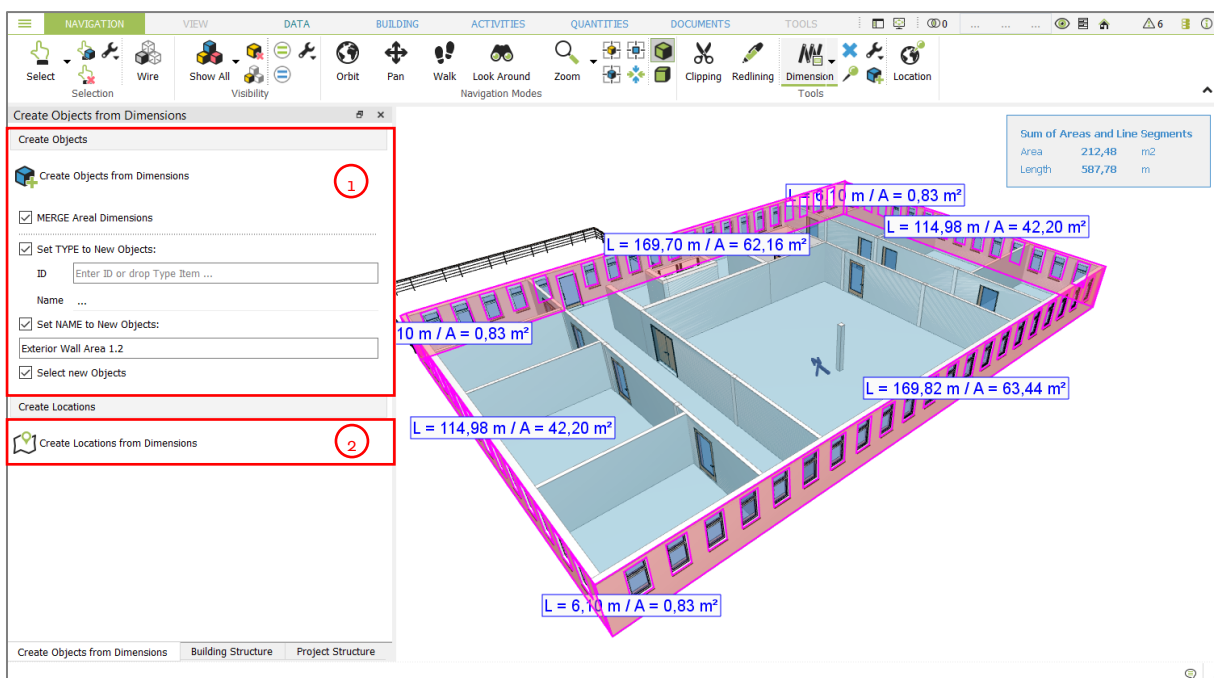


Adjust options for dimension objects (coordinate values, snapping, reference alignment)





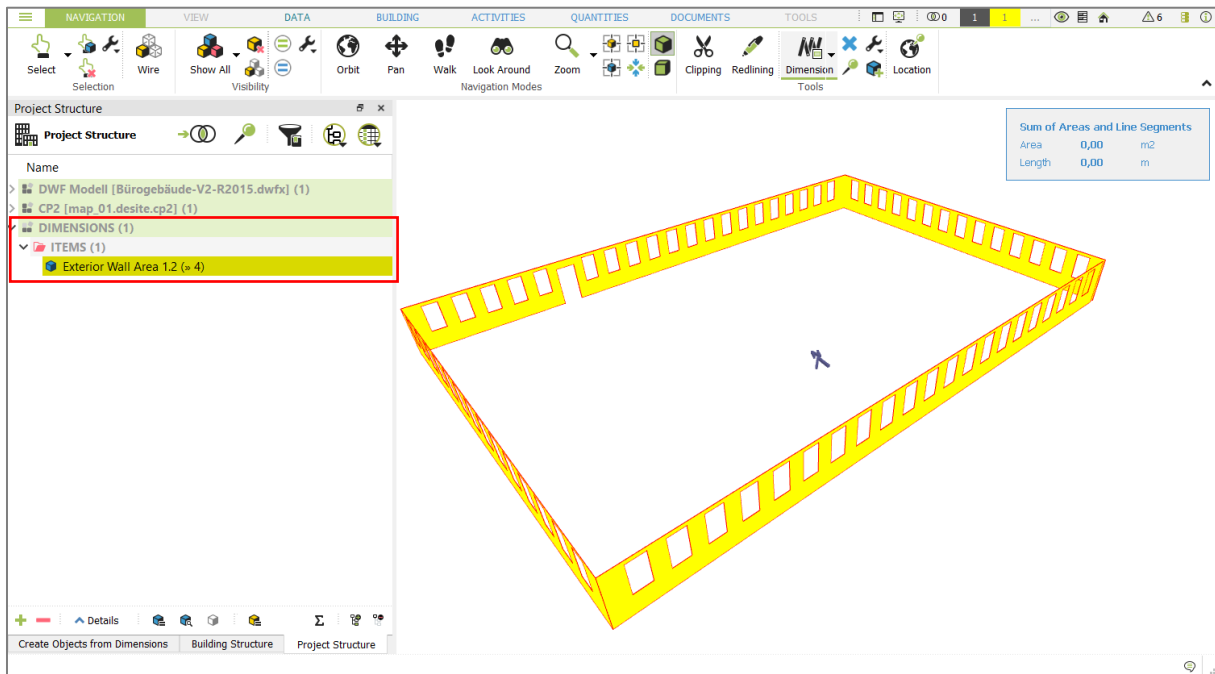
This option creates new geometry objects from all visible dimensions and stores them in the project structure.



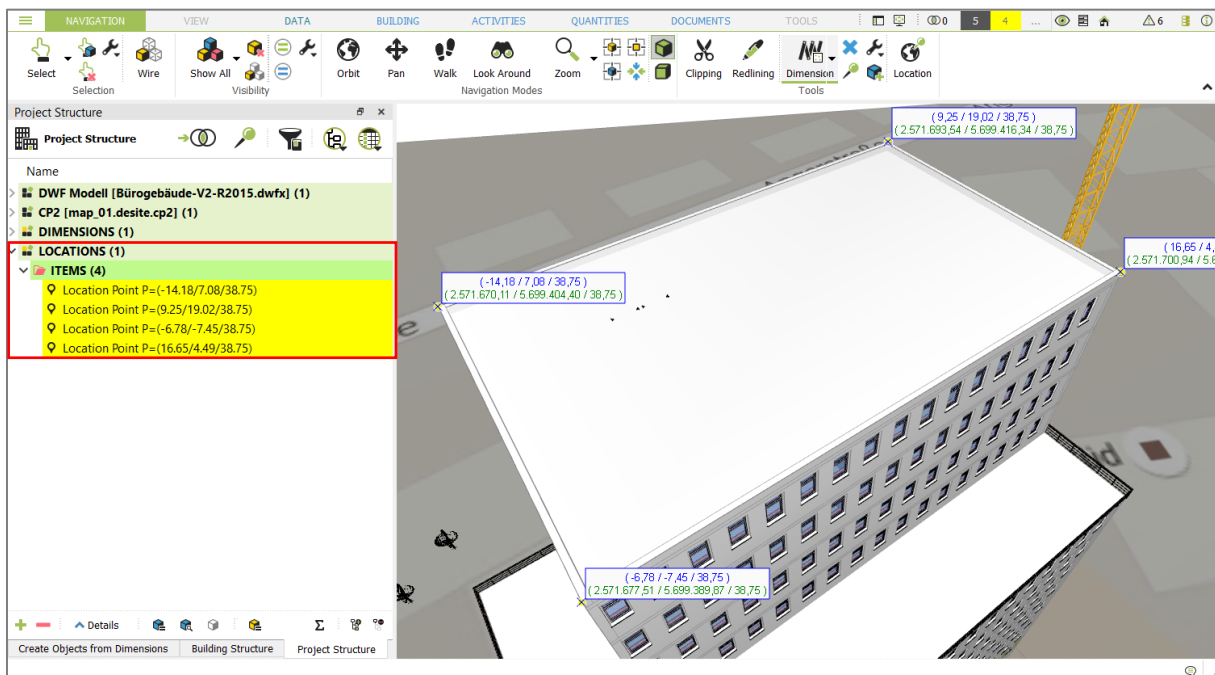
- Creates geometry objects from all visible dimensions with the selected options. The newly created objects will be stored in the project structure in folder 'DIMENSIONS' and can now be handled as any other 3D geometry object.
  - Merge Areal Dimension:** merges all areal dimensions into one single object
  - Set TYPE to New Objects:** If you enter the ID or drag-and-drop a Type from the DESITE 'Type' domain, the newly created objects will be assigned to this Type.
  - Set Name to New Objects:** Enter a name that should be assign to the newly created object

- **Select new Objects:** The newly created objects will be selected

**Note:** The original objects that were selected to create the dimensions (e.g. the walls for Face Measurement), will be linked to the newly created objects in the project structure



2. Creates Location objects from all visible dimensions. The newly created locations will be stored in the Project Structure in the folder 'LOCATIONS' and can now be handled as any other location object.

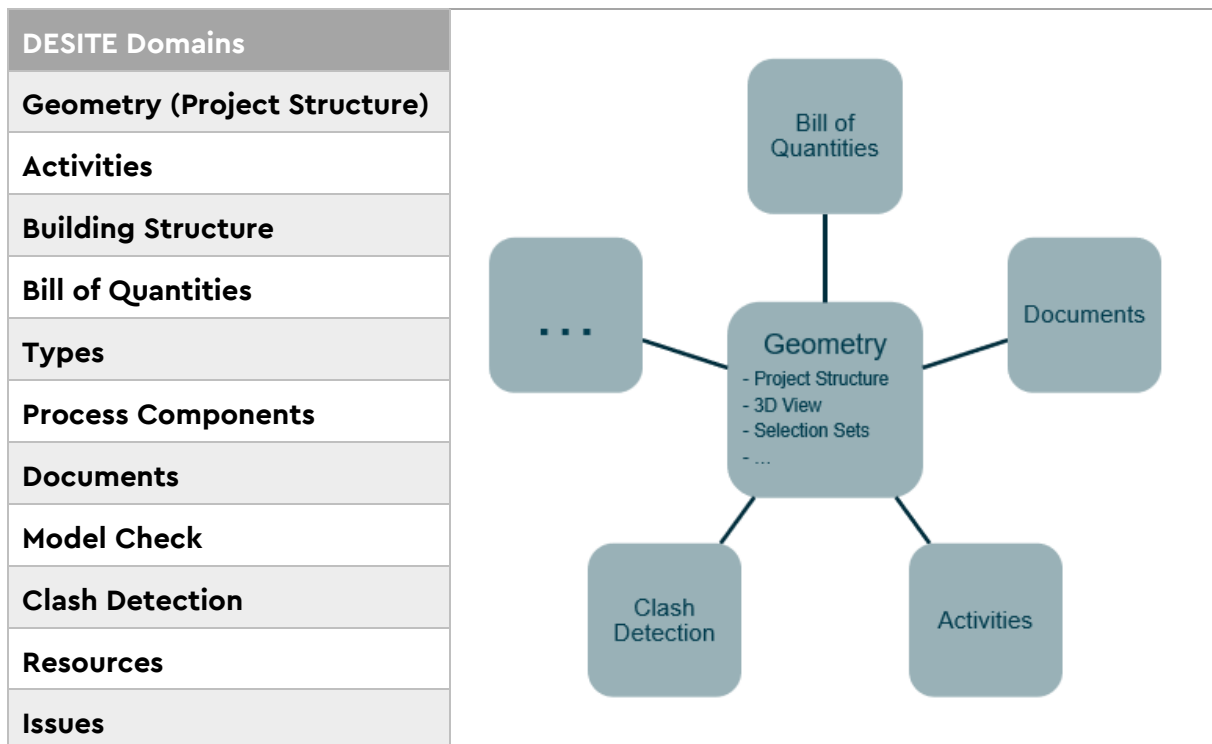


## 4. Information Management

### 4.1 Domains and Models

All information in a project is managed in different domains.

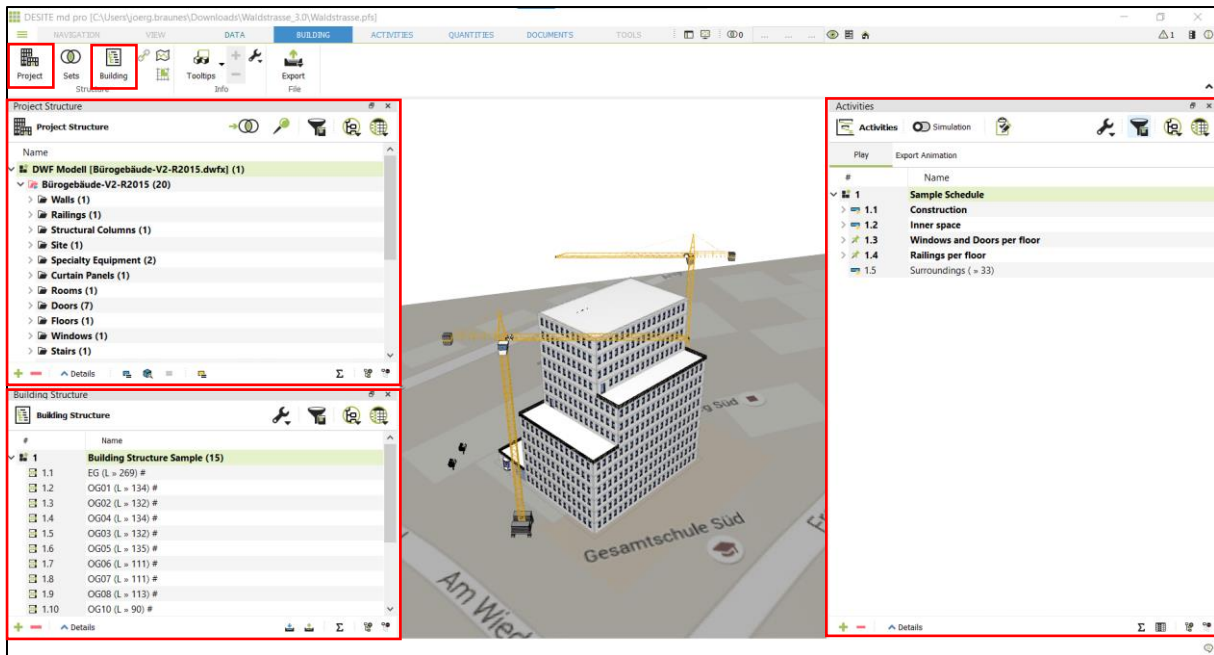
Each domain contains arbitrary number of models and domain-specific objects. The geometry model forms the central reference point. Objects from all domains can be linked to geometric objects, including geometric objects to each other.



Objects of domain models are represented as tree structures in most domains.

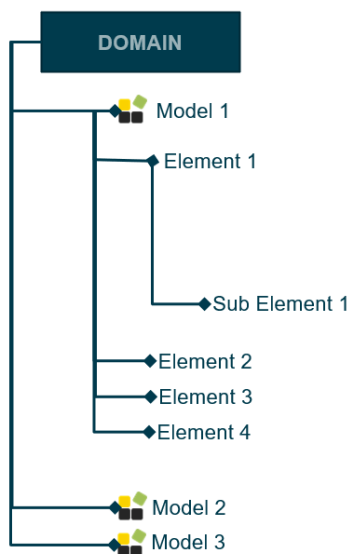
In the following screenshots, the Geometry, Building and Activities Domain tree structures are shown.

**Hint:** The Geometry Domain is also called 'Project Structure', as it represents the main structure of a project with all its geometric objects.



Key functionalities of the tree structure, like the creation of objects, handling of selections and element visibility, are very similar for each domain.

#### 4.1.1 Domain Hierarchy (tree structure)



The first element in any domain hierarchy is always a model, under which other elements are organized. A model can contain multiple instance elements and container elements. Container elements can contain both further container elements and instance elements.



Model



Root Container



Container



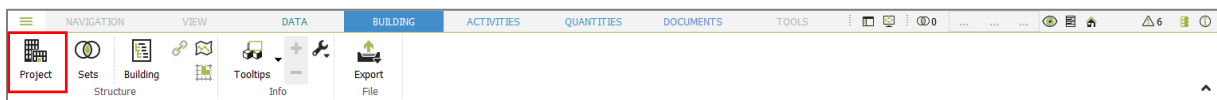
Element (in this case a geometry object). The element icons look different depending on their domain and the type of element.

**Hint:**

An instance element is an element unit that does not contain any more child elements (there is no further nesting).

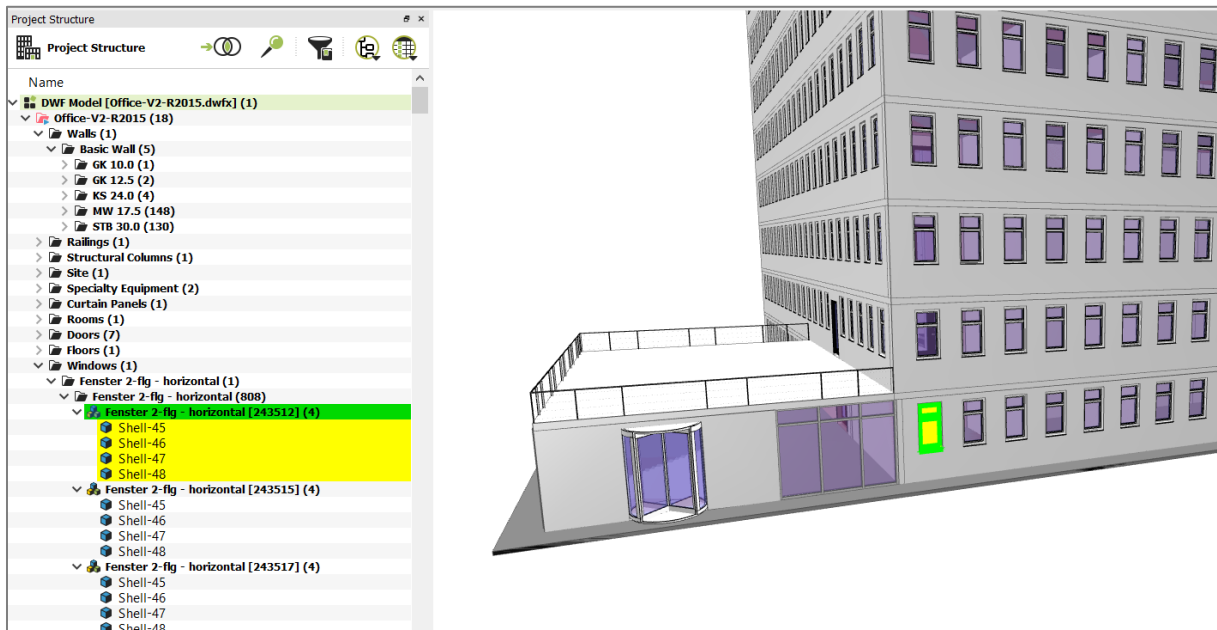
You can create new Models, Container or Elements with the '+' button. The available options differ depending on the domain. Element properties can be displayed in multiple columns next to the element names. For more information, refer to the chapter **Working with Properties**.

## 4.2 Geometry Domain / Project Structure














Contents of imported geometry models are displayed in a tree view under Project Structure. You can open project structure by clicking on the Project button in the Building toolbar.

Each model corresponds to an imported file. The structure of the tree is given by imported native file.



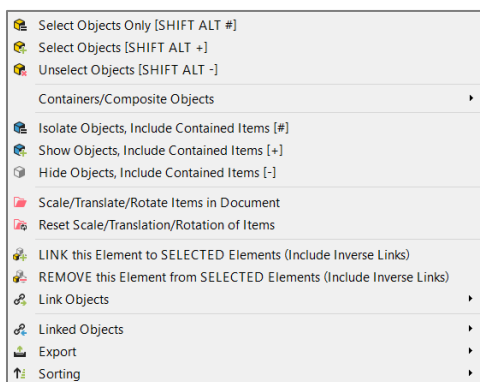
Tree structure is broken down into the following elements:

-  Model. In the Project Structure this represents an imported file. It's also possible to create new models and adding objects to it (e.g. by creating 3d objects from [Dimensions](#))
-  Root Container
-  Root Container with a translation applied
-  Container
-  Composite object (group of logically related objects, building component group)
-  Object
-  Opening or negative objects
-  Part of an object (this can be created with the cutting tool)
-  Lines
-  Points
-  Generic object

**Note:**

Objects are highlighted in yellow by default when selected, while Composite objects in green.

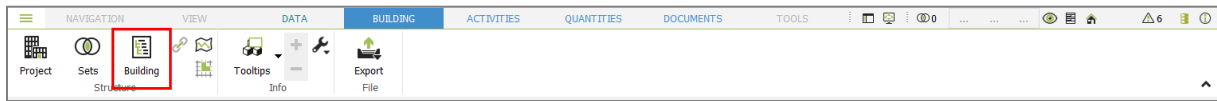
Visibility and selection of objects can also be handled in the Project Structure window. The context menu (opened by right-clicking on a tree element) offers many options:



Alternatively, you can also use the following keyboard shortcut keys:

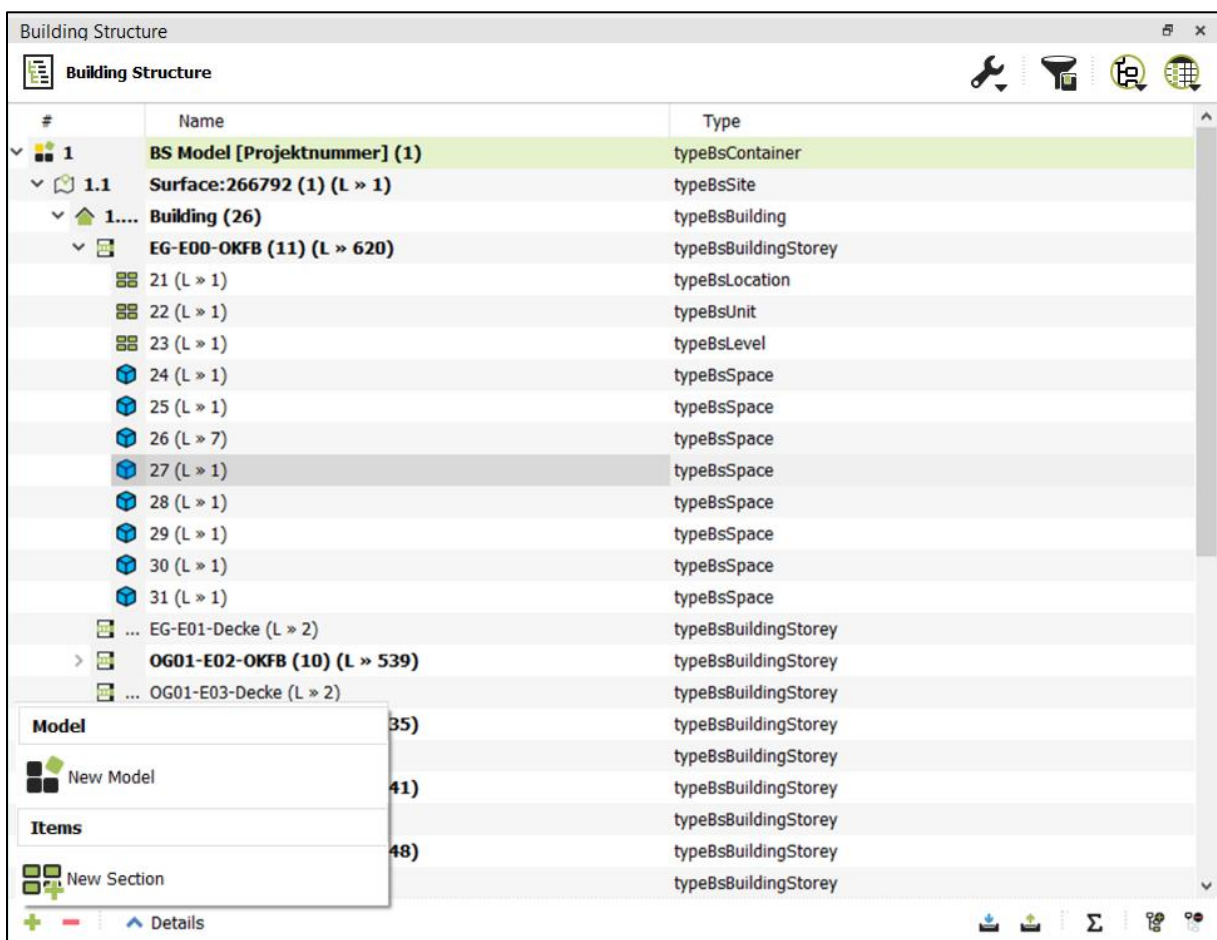
- **Esc:** Cancel selection (use in the 3D view)
- **3:** Show selected only
- **- :** Hide selected
- **+ :** Show selected
- **T:** Activate/deactivate tooltips
- **I:** Show Quick Info
- **A:** Show all
- **Z:** Zoom to visible

## 4.3 Building Structure

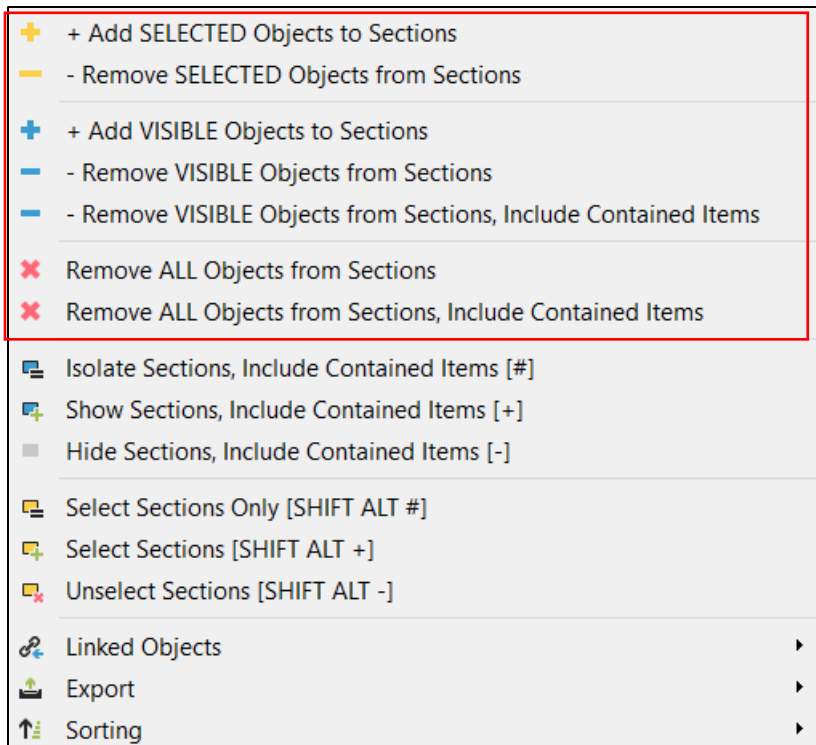


In the Building Domain, you can organize your project in a hierarchy according to the spatial structure (e.g. based on building storeys). It is also the mandatory base for exports into the IFC format. For this purpose, the objects of the project are linked to the elements of the building structure.

Compared to other domains, the Building Structure contains no entity other than models and structural elements. The identity of a structural element is defined by its 'Type' property:

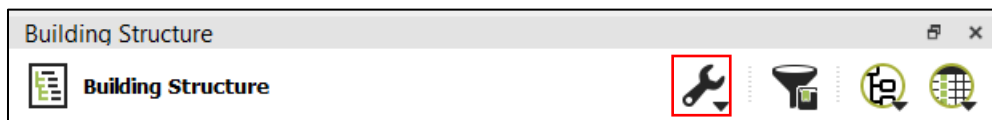


To manually assign geometric objects to the Building Structure, right click on the appropriate structural element and choose one of the options for manual linking.



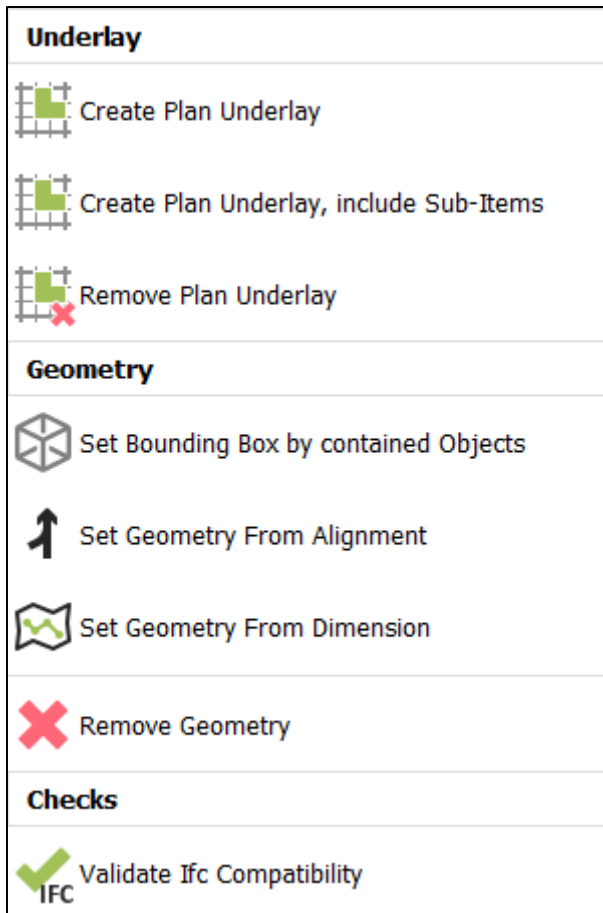
You can also use **Rule based linking** to assign geometry objects to the Building Structure.

### 4.3.1 Building structure element tools



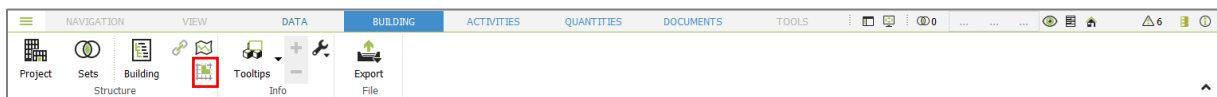
Access additional options and tools for working with the Building Structure:





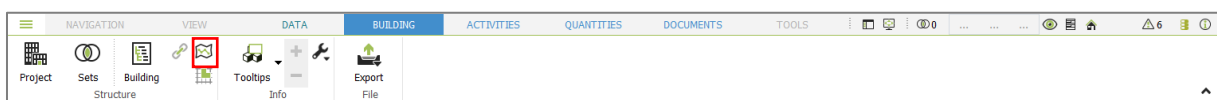
## Underlay

Tools to create 2D plan underlays from the linked geometry object. The underlay itself can be shown/hidden with the appropriate button in the Ribbon bar of the Building domain.



## Geometry

Tools to create a geometric representation that is directly assigned to a structural element. The resulting geometric representation can be shown/hidden with the appropriate button in the Ribbon bar of the Building domain.



## Checks

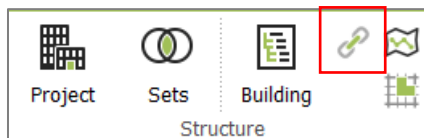
Validate IFC compatibility checks the selected Building Structure model, if it can be used as basis for an IFC export. IFC export is only possible with at least one valid Building Structure model.

## 4.4 Rule based linking

In DESITE, links between 3D model elements and objects from other domains can be created based on user defined rules.

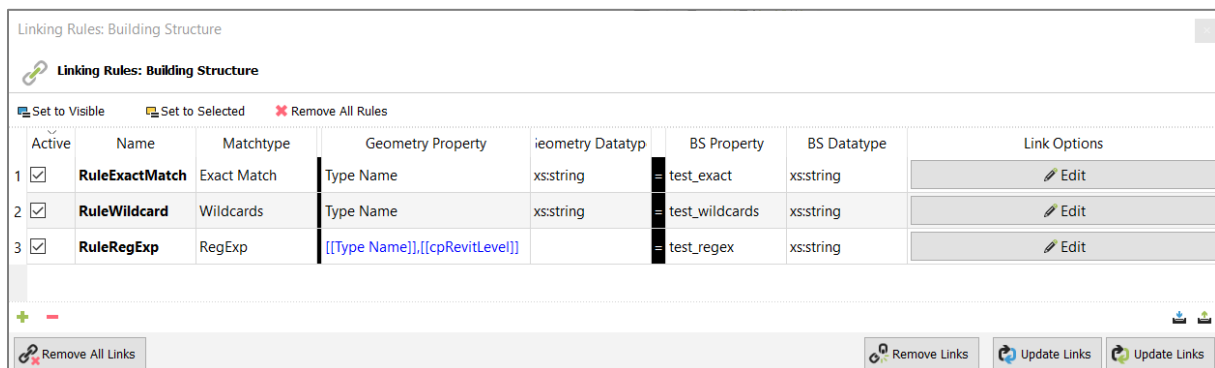
For example, Activities in a time schedule, Bill of Quantity items or object types in domain Types can be linked automatically to geometry objects. Rule-based linking is performed based on attributes of geometry objects and attributes of the objects of the respective domain.

Rule-based linking editor can be accessed via chain icon next to domain widget button in the respective domain i.e. Building Structure:



New rules can be created via '+' button at the bottom left corner in the editor window. Assign an appropriate name to each rule and define which Geometry Properties i.e. which 3D object attributes are to be compared with corresponding Building Structure Properties. If property values of both domains match together, objects are linked to activities automatically.

The following screenshot shows an example of three different rules to automatically link geometry objects to a Building Structure:



(Button text in the lower right is modified in the daily)

Options to create rules and links:

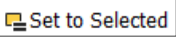
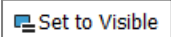
- **'+' Button:** Create a new Linking Rule
- **'-' Button:** Delete the selected Linking Rule
- **Remove All Links:** Removed all links between geometry objects and domain objects. This considers links created by linking rules as well as manually created links
- **Remove Links:** Removes all links created by linking rules
- **Update Visible Links:** Creates or updates links based on the active Linking Rules for visible geometry objects only

- **Update All Links:** Creates or updates links based on the active Linking Rules for all geometry objects

Defining rules:

- **Active:** activate or de-activate this rule
- **Name:** name of the rule
- **Matchtype:** select between 'Exact Match', 'Wildcard' or 'RegExp' ( Regular Expression)
- **Geometry Property:** The name or names of the Geometry properties that are used for the linking. You can specify one property or multiple properties by placing multiple property names between double square brackets '[[...]]'. You can place a separator (e.g. ',') between the property names to make the concatenated properties more readable. Any other separator or no separator can also be used as desired.
- **Geometry Datatype:** Data type of the geometry property (if only one is used). If more properties are defined, this field is empty.
- **Equal sign '=':** visual separation between the definition of the properties in the geometry domain (on the left site) and the definition of the properties in the domain where the objects should be linked to (on the right site; in this example the Building Structure domain).
- **[domain] Property:** The name or names of the domain properties that should be linked to.
- **[domain] Datatype:** Data type of the domain property (if only one is used) Data type must match on left and right side.

To assign a linking rule to objects in the domain, you can either:

1. Select the related objects (e.g the Section in the Building Structure) in the domain and click 
2. Isolate the related objects (e.g the Section in the Building Structure) in the domain and click 
3. Drag and drop the rule to the name of the object in the domain (preferred option)

To see which Linking Rules are applied to a domain element, set the standard DESITE attributes 'cpLinkRule' and 'cpLinkRuleValue' as visible in the columns. These parameters contain the name of the assigned rule as well as the value of the parameter defined in that linking rule.

#	Name	cpLinkRule	cpLinkRuleValue	test_exact	test_wildcards	test_regex
1	Building Structure Sample (15)					
2	Example Structure (3)					
2.1	newSection - exact match	RuleExactMatch	ks24.0	KS 24.0		
2.2	newSection - wildcard	RuleWildcard	gk*		GK*	
2.3	newSection - RegExp	RuleRegExp	^(stb.+og02.+)			^(STB.+OG02.+)

### 4.4.1 Match types

The Match type defines how the property values are evaluated in a Linking Rule.

#### Exact Match

Geometry objects and domain objects will be linked together, if the defined property values in the Linking Rules are identical.

#### Wildcards

Wildcards are placeholders represented by a single character, that can be used in filters and Linking Rules.

Example:

#	Name	cpLinkRule	cpLinkRuleValue	test_exact	test_wildcards	test_regex
1	Building Structure Sample (15)					
2	Example Structure (3)					
2.1	newSection - exact match	RuleExactMatch	ks24.0	KS 24.0		
2.2	newSection - wildcard	RuleWildcard	gk*		GK*	
2.3	newSection - RegExp	RuleRegExp	^(stb.+og02.+)			^(STB.+OG02.+)

The property 'test\_wildcards' has the value 'GK\*'. The related Linking Rule defined this value as a 'Wildcard', so all geometry objects with a property value that begins with 'GK' will be linked to the related domain object.

Active	Name	Matchtype	Geometry Property	Geometry Datatype	BS Property	BS Datatype	Link Options
<input checked="" type="checkbox"/>	RuleExactMatch	Exact Match	Type Name	xs:string	test_exact	xs:string	Edit
<input checked="" type="checkbox"/>	RuleWildcard	Wildcards	Type Name	xs:string	test_wildcards	xs:string	Edit
<input checked="" type="checkbox"/>	RuleRegExp	RegExp	[[Type Name]], [[cpRevitLevel]]		test_regex	xs:string	Edit

In DESITE the following Wildcards can be used for Linking Rules and also for Filters:

Search term	Description
Wa*	Text that begins with 'Wa', such as 'Wall'
*wall*12.*	Text that contains the elements 'Wall' <i>and</i> '12.', such as 'BasicWall_12.5'
Concrete Steel Masonry	Text is either 'Concrete' <i>or</i> 'Steel' <i>or</i> 'Masonry'
'Basic Wall XY'	Text equals 'Basic Wall XY' (without quotation marks, this would mean 'Basic Wall' <i>or</i> 'XY')
!Wa*	Text that does <i>not</i> begin with 'Wa'
Wa* Wind* (space in between)	Text that begins with 'Wa' or 'Wind'
> C	All text that begins with D, E, F etc.
< 0	All negative numbers
!*	Property is not present/defined
# Wa*	Remove all applied filters (i.e. no AND relation) and then show all objects which the property value begins with 'Wa'.
H[ua]nd	Finds Hund and Hand

### Regular expressions

A regular expression is a pattern of characters that can be used in Linking Rules to define a matching patter.

Example:

#	Name	cpLinkRule	cpLinkRuleValue	test_exact	test_wildcards	test_regex
> 1	Building Structure Sample (15)					
▼ 2	Example Structure (3)					
2.1	newSection - exact match	RuleExactMatch	ks24.0	KS 24.0		
2.2	newSection - wildcard	RuleWildcard	gk*		GK*	
2.3	newSection - RegExp	RuleRegExp	^(stb.+og02.+)			^(STB.+OG02.+)

The property 'test\_regex' has the value '^ (STB.+OG02.+)'.

The related Linking Rule defined this value as a 'Regular Expression', so all geometry objects with a property value that matches this RegEx will be linked to the related domain object.

Linking Rules: Building Structure

Linking Rules: Building Structure

Set to Visible Set to Selected Remove All Rules

Active	Name	Matchtype	Geometry Property	Geometry Datatype	BS Property	BS Datatype	Link Options
<input checked="" type="checkbox"/>	RuleExactMatch	Exact Match	Type Name	xs:string	test_exact	xs:string	Edit
<input checked="" type="checkbox"/>	RuleWildcard	Wildcards	Type Name	xs:string	test_wildcards	xs:string	Edit
<input checked="" type="checkbox"/>	RuleRegExp	RegExp	[[Type Name]],[[cpRevitLevel]]		test_regex	xs:string	Edit

Remove All Links Remove Links Update Links Update Links

In this example two Geometry Properties are used, 'Type Name' and 'cpRevitLevel'. The RegEx matches with all values (as a combination of 'Type Name' and 'cpRevitLevel') that:

- starts with 'STB' (Quantifier '^')
- followed by any character with one or more repetitions (Metacharacter '.' and Quantifier '+')
- followed by 'OGO2' (Letters and Digits)
- followed by any character with one or more repetitions (Metacharacter '.' and Quantifier '+')

### Quick reference

The following summary of Regular Expressions is just an excerpt and not a complete reference. To learn more about Regular Expressions (RegEx), countless web resources and tutorials are available. Some examples:

- <https://www.regular-expressions.info/tutorial.html>
- <https://regexone.com/>
- [https://www.w3schools.com/jsref/jsref\\_obj\\_regexp.asp](https://www.w3schools.com/jsref/jsref_obj_regexp.asp)

**Brackets:** Brackets are used to find a range of characters

Expression	Description
[abc]	Find any character between the brackets
[^abc]	Find any character NOT between the brackets
[0-9]	Find any character between the brackets (any digit)
[^0-9]	Find any character NOT between the brackets (any non-digit)
(x y)	Find any of the alternatives specified

### Quantifiers

Quantifier	Description
------------	-------------

n+	Matches any string that contains at least one n
n*	Matches any string that contains zero or more occurrences of n
n?	Matches any string that contains zero or one occurrences of n
n{X}	Matches any string that contains a sequence of X n's
n{X,Y}	Matches any string that contains a sequence of X to Y n's
n{X,}	Matches any string that contains a sequence of at least X n's
n\$	Matches any string with n at the end of it
^n	Matches any string with n at the beginning of it
?=n	Matches any string that is followed by a specific string n
?!n	Matches any string that is not followed by a specific string n

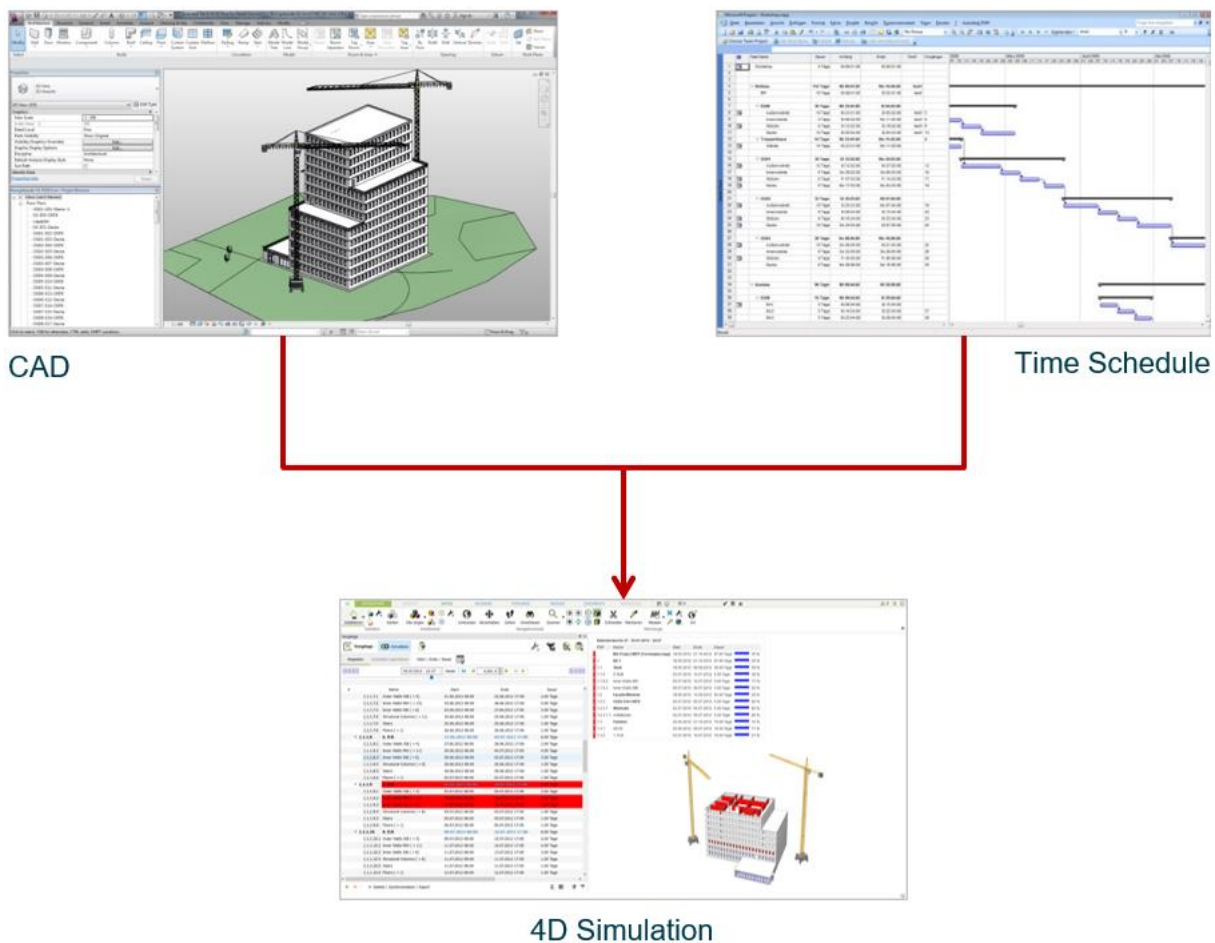
**Metacharacters:** Metacharacters are characters with a special meaning:

Metacharacter	Description
.	Find a single character, except newline or line terminator
\w	Find a word character
\W	Find a non-word character
\d	Find a digit
\D	Find a non-digit character
\s	Find a whitespace character
\S	Find a non-whitespace character
\b	Find a match at the beginning/end of a word, beginning like this: \bHI, end like this: HI\b
\B	Find a match, but not at the beginning/end of a word
\0	Find a NULL character
\n	Find a new line character
\f	Find a form feed character
\r	Find a carriage return character
\t	Find a tab character
\v	Find a vertical tab character

\xxx	Find the character specified by an octal number xxx
\xdd	Find the character specified by a hexadecimal number dd
\udddd	Find the Unicode character specified by a hexadecimal number dddd

## 4.5 Activities domain

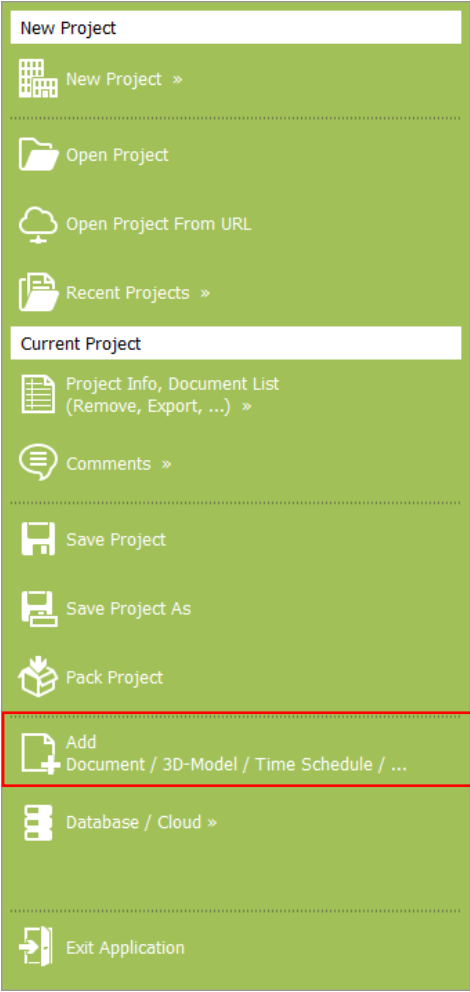
You can also import time schedules into DESITE md/md pro or create them manually. If you link the activities of the time schedule to the elements in the geometry, you create a 4D BIM coordination model.



This 4D BIM model can later be used for various use cases i.e. for visual time schedule controlling, for feasibility analysis as well as time-related quantity analysis.

If you would like to import an existing time schedule into your DESITE project, click on Add Document / 3D-Model / Time Schedule / ... under Application Menu and select time schedule format to be imported. Microsoft Project (\*.mpp), Asta Powerproject (\*.pp), Tilos (\*.xml), pro-Plan (\*.ppl) and native DESITE time schedule format (\*.tsxml) are currently supported.



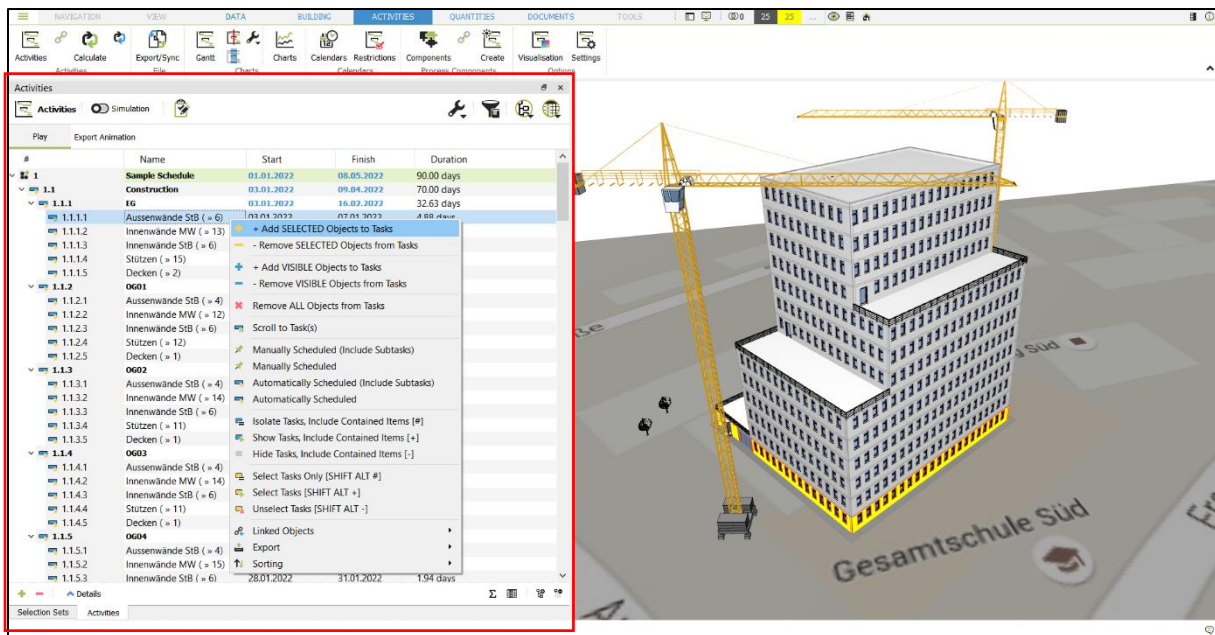


**4.5.1 Linking Activities to 3d Objects**

You can create and run 4D simulations under Activities menu tab. Click on Activities button in the toolbar to open the widget and access all available time schedules that have been imported or manually generated in the project.



In order to link your time schedule and 3D model together, most simply you can manually select model objects in 3D view and then assign those to related activities in your time schedule. It is suggested to use selection sets in order to filter and select model objects in an easier way.



It is generally more effective to link 3D objects to activities automatically by using **Rule based linking** functionality.

#### Advantages:

- Rules can be saved and reused in other projects.
- Linking rules can be reapplied if a geometry model version or time schedule has been imported and thus links between model objects and activities can easily be updated.

#### Disadvantage:

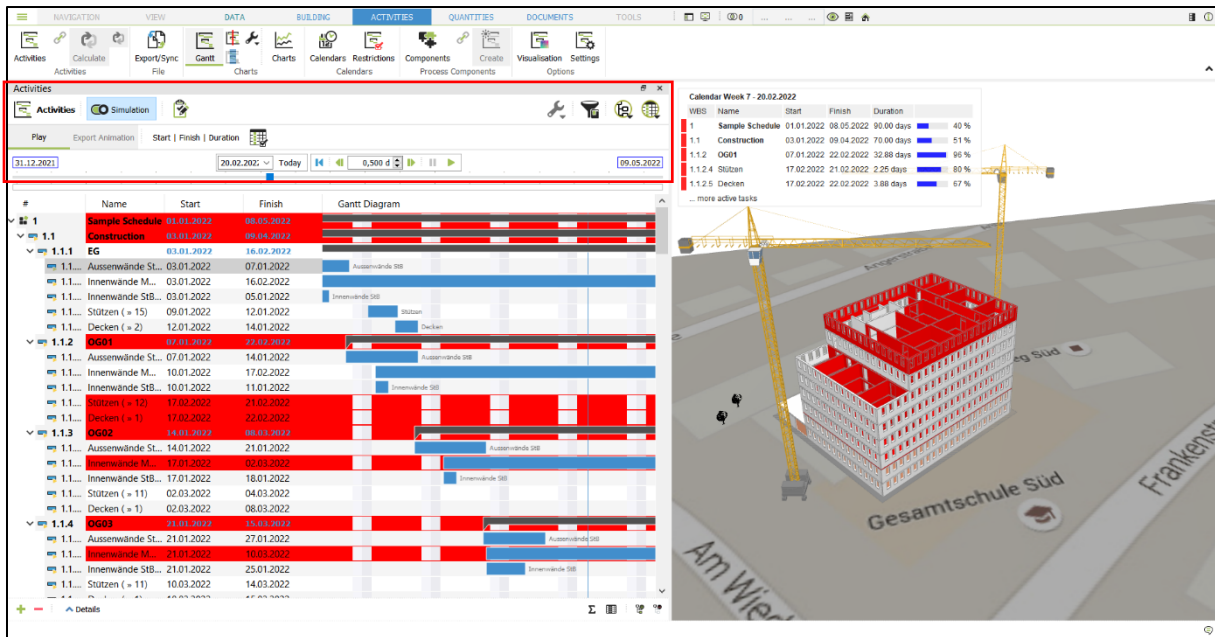
- Activities and 3D (geometry) objects must define the same property types as in the DESITE projects, these rules have been saved from.
- Also property values matching the rules must have been set for the rules to actually function.

It is also possible to create time schedule automatically based on the **Building Structure** together with **Process Components**.

### 4.5.2 4D Simulation

Click on Simulation slider button in order to switch on 4D simulation mode. A new section with a timeline will be displayed.

You can specify a Start Date and Step Size for simulation in the toolbar. Use the corresponding buttons to play or pause the simulation. Single steps are also possible.



**Tip:** Activate the domains properties Start, Finish and Gantt Diagram in the Activities domain table (see also Properties in the domain tree structure).



Simulation Settings: Define options for the 4D Simulation and the legend that is displayed in the 3D view during the simulation.

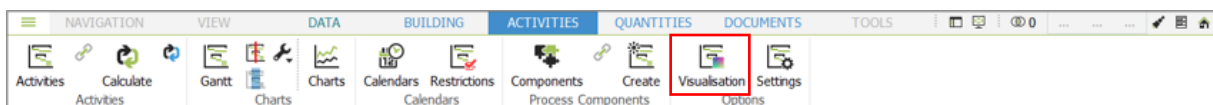


Activity tools: Multiple operations to work with tasks and corresponding Process Components.

**Note:** Simulation options and settings can only be accessed and adjusted when 4D simulation mode is switched off.

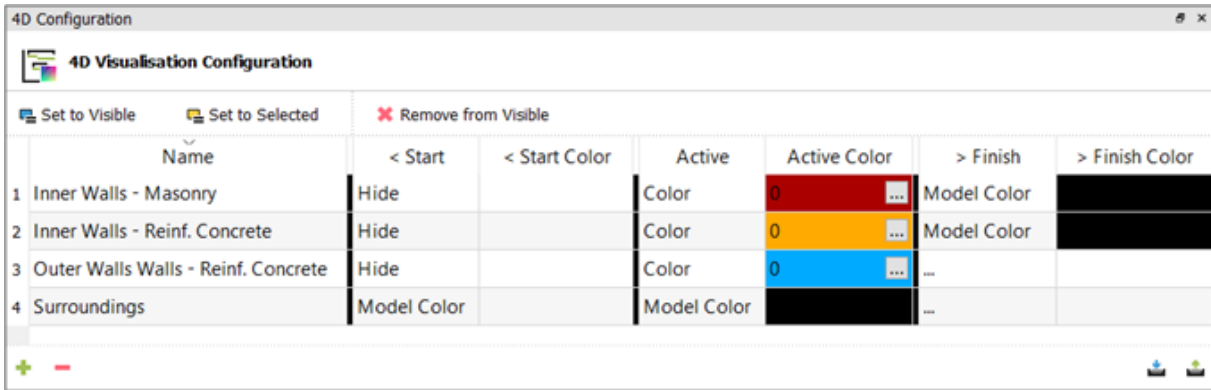
### 4.5.3 Customize 4D Visualisation

You can customize how model objects linked to corresponding activities are displayed before, during and after their execution while running a 4D simulation. For that, click on Visualisation tool under the Activities menu tab.



Click on '+' button in order to create a new visualization rule, and assign a name to it (Simulation mode needs to be switched off). Start and Start color define corresponding activities and how model objects linked to them are displayed before they are executed.

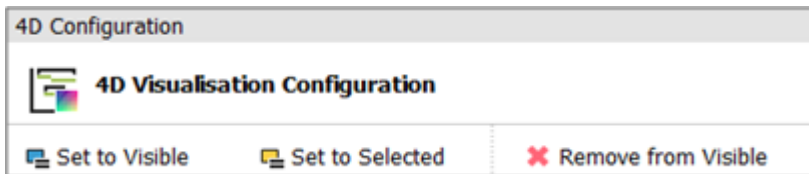
Active and Active color define corresponding activities and how model objects linked to them are displayed during their execution. Finish and Finish color define corresponding activities and how model objects linked to them are displayed after they have been completed.



**Tip:** As a rule of thumb, usually Start is set as hidden so that building components do not appear in 3D view before they are created. Building components are frequently displayed in their model colors after Finish.

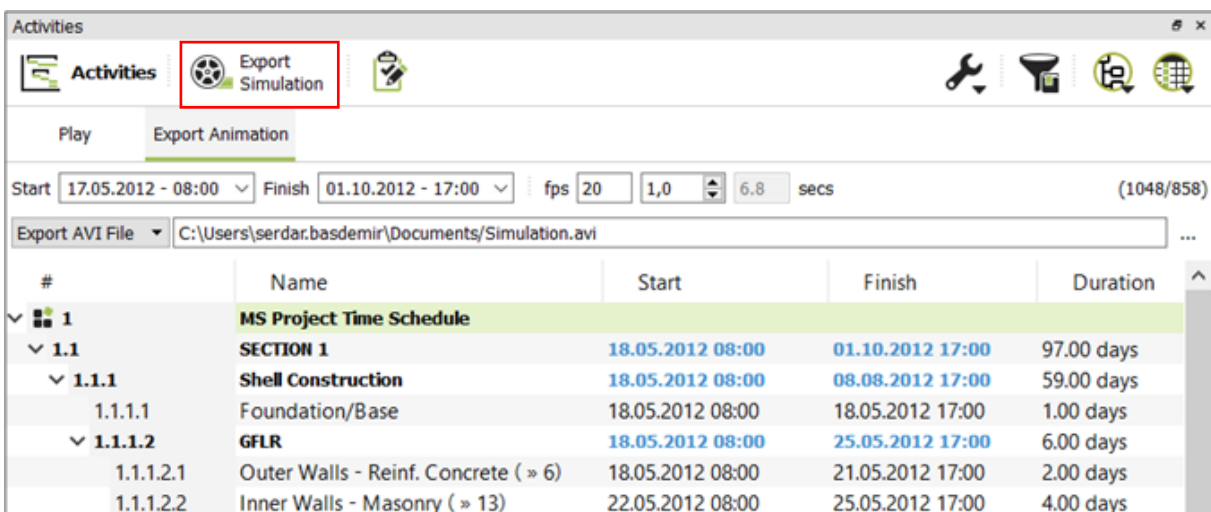
In the next step, created visualization rules must be assigned to the activities or containers that include activities. Assignment is carried out in following ways:

- Drag the rule and drop it on the Activity or a Container that contains Activities
- Make wanted Activities visible and use 'Set to Visible'
- Select wanted Activities and use 'Set to selected'



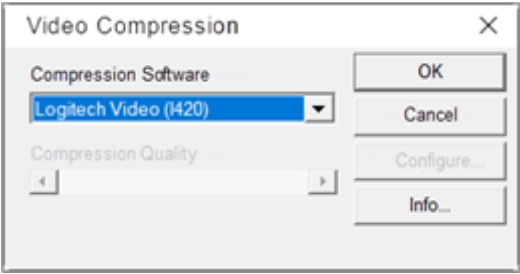
#### 4.5.4 Export 4D Simulation

When 4D simulation mode is switched off, click on Export Animation button first in simulation toolbar in order to export a simulation. A new section with export options will be displayed and Export Simulation option will appear in the Simulation toolbar.



Once you have configured the necessary settings for start, end, step size etc. as desired, choose a directory to save the simulation and then click on Export Simulation button.

Then you will be asked which compression software to be used and export the simulation into the specified folder.



**4.5.5 Creating Charts from Activities**

Click on Charts button in Activities toolbar in order to create property and time-related 4D charts. This allows you to do different time-based analyzes, e.g. a quantity analysis with a time-variation curve.



☰ Show list of properties: Set only the properties whose data is to be analyzed visible in the Property List, i.e. 'cpVolume'

	W	AW	BW	Name	Data Type	Domain
31	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	cpSurfaceContactAreaOOBB_LW_Max	xs:double	Objects
32	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	types:Tapezierung Kosten	xs:double	Objects
33	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	cpSurfaceArea	xs:double	Objects
34	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	cpVolume	xs:double	Objects
35	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Roughness	xs:int	Objects
36	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Stringer Thickness	xs:double	Objects
37	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Länge Waschbecken	xs:double	Objects
38	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	cpTopAreaPartMin	xs:double	Objects
39	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Landing Carriage Height	xs:double	Objects
40	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Einbautiefe (von außen)	xs:double	Objects
41	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Use Landing Height Adjustment	xs:int	Objects
42	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	cpLinesLength	xs:double	Objects
43	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	cpLateralArea	xs:double	Objects
44	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	cpSurfacePartAreaMin	xs:double	Objects
45	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Höhe unterer Flügel	xs:double	Objects
46	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Roughness	xs:long	Objects
47	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Loss	xs:double	Objects
48	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	RB:Wandfläche	xs:double	Objects
49	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Function	xs:int	Objects

There are four options to select for each property:

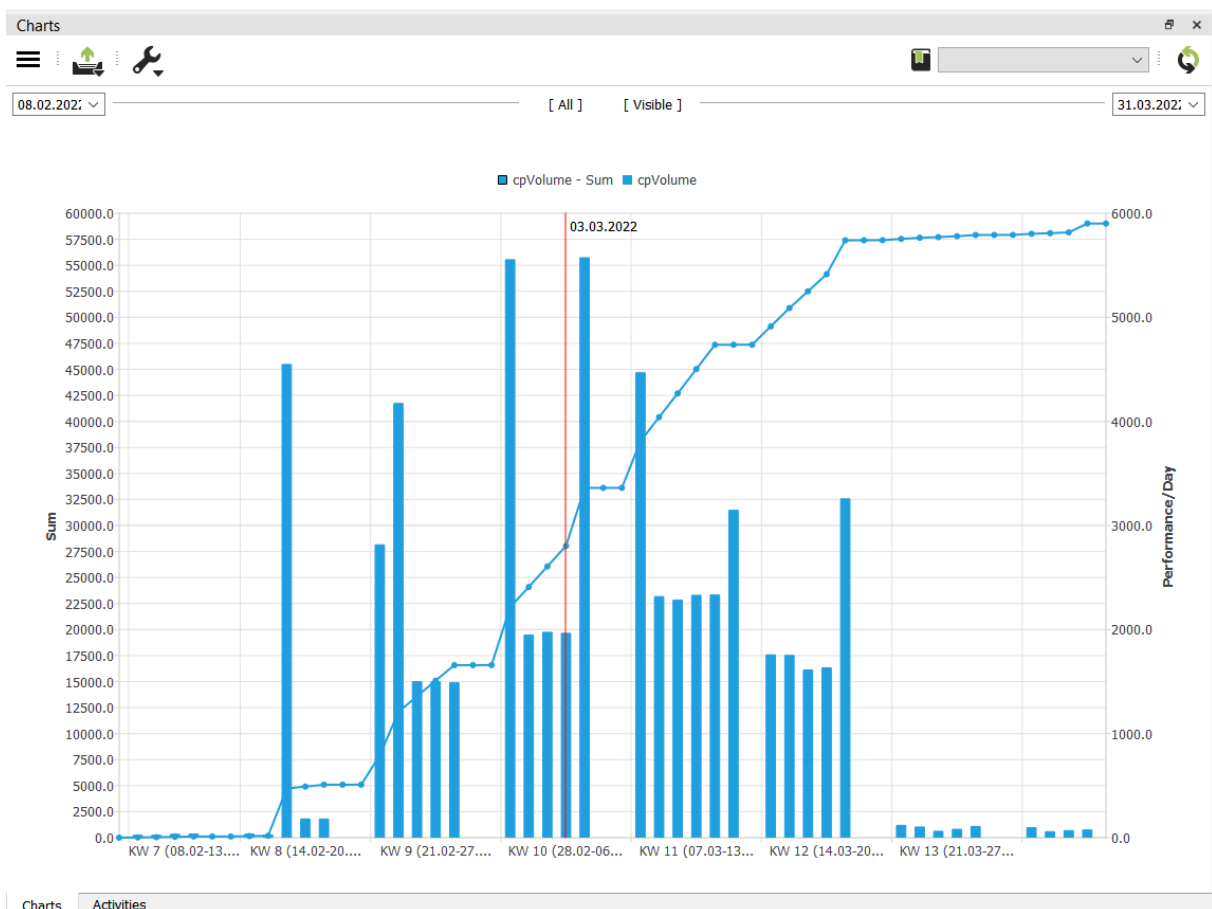
- Visible
- W (Work)
- AW (Actual Work)
- BW (Baseline Work)



In the configuration menu (spanner icon), set the chart display to Visible activities.



Update the chart by clicking on Refresh button at the upper right corner.



Update the chart by clicking on Refresh button at the upper right corner.

## 4.6 Process Components

Time schedules can be automatically created on the basis of a building model. This requires Process Components and the **Building Structure**.

The Process Components specify which activities are to be executed to create a building component, thus they define the work content and the required duration of work based on the linked geometry.

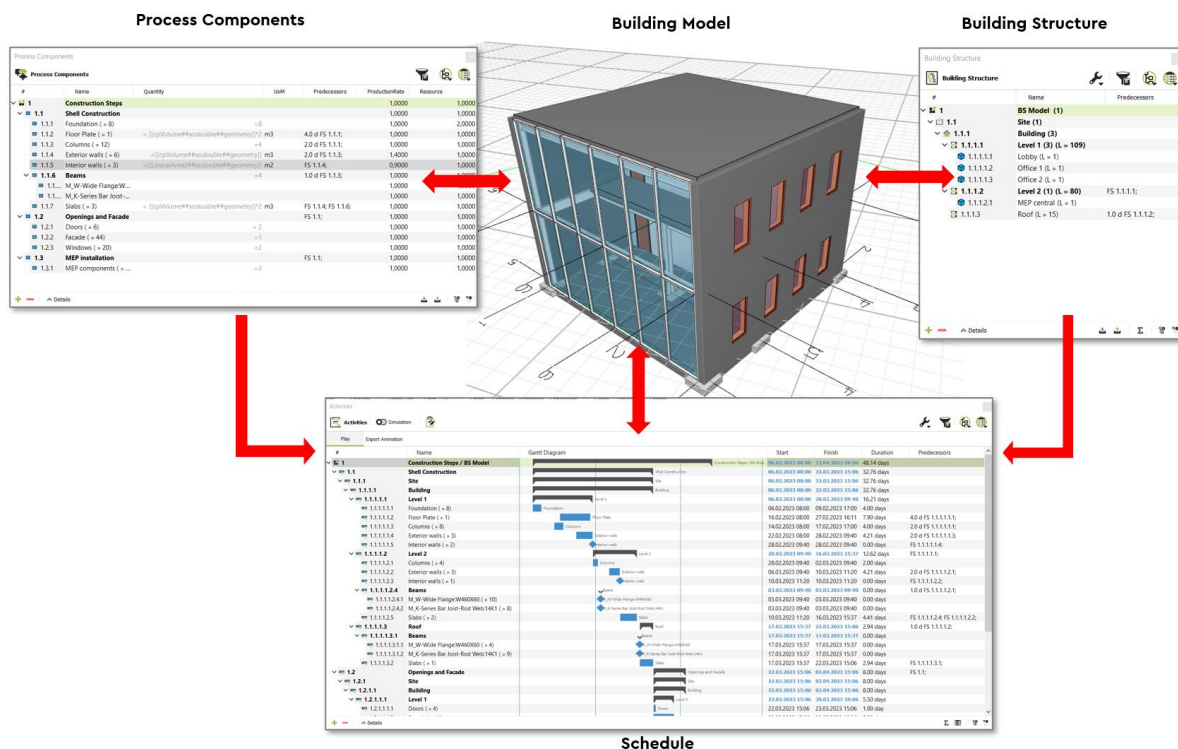
A Process Component contains:

- Name
- An effort value in hours per unit of measure and resource
- A formula for quantity calculation and a unit of measure
- Relationships to other Process Components
- Settings for the visualization in the 4D simulation
- If necessary, a Process Component can contains other Process Structures

The Building Structure defines the location where an activity is to be carried out. The elements of the building structure are arranged hierarchically, they define the topological structure of the building.

The calculation of a schedule is performed in the following steps:

1. The objects of the building model are linked to their Process Components.
2. The objects of the building model are linked to the elements of the Building Structure.
3. The entry nodes for the Process Components and the Building Structure are selected.
4. The schedule is calculated with
  - Start, finish, duration of tasks
  - Task dependencies
  - Quantities per task
  - Visualization parameters



#### 4.6.1 Calculation of schedules

To calculate the schedule, open the 'Create time schedule' tool from the Activities Ribbon bar.



For the calculation of the schedule, the entry nodes in the Process Components (1) and the Building Structure (2) must be defined.

 A screenshot of the 'Create Time Schedule' dialog box. The dialog has a title bar and a close button. Below the title, there is a 'Create Time Schedule' label and a green play button. The main area contains three sections:
 

- Process Components Root (1):** A red box highlights this section. It includes an ID field with the value '1e0b4cd1-b53e-4577-bc56-a0afd64ea755' and a Name field with the value 'Example Order Keys'.
- Building Structure Root (2):** A red box highlights this section. It includes an ID field with the value 'bs::2N\_MsFeQT7wA6JSEh3b9nO-oh' and a Name field with the value 'BS Model'.
- Project:** This section includes a 'Start Date' dropdown menu set to '01.02.2023 08:00' and a 'Calendar' dropdown menu set to '... (Default Calendar)'. There is also a green play button next to the start date.

The entry nodes define which substructures of the Process Components and Building Structure are to be taken into account. You can just drag-and-drop the appropriate entries of these two domains into the specific fields of the creation dialog.

Now define the start date for the schedule and one of the **Calendars** that should be used.

Start the calculation with the 'Create Time Schedule' button. As a result, a new model (that schedule) is created in the **Activities domain**.

The next chapters explain in detail, how to define Process Components and the automated structuring of the schedule.

#### 4.6.2 Define Process Components

The define Process Components, click on the appropriate button in the Activities Ribbon bar.





Process Components

Process Components

#	Name	Quantity	UoM	Predecessors	ProductionRate	Resource
1	<b>Construction Steps</b>				1,0000	1,0000
1.1	<b>Shell Construction</b>				1,0000	1,0000
1.1.1	Foundation ( » 8)	=8			1,0000	2,0000
1.1.2	Floor Plate ( » 1)	= [[cpVolume##xs:double##geometry]]*2		4.0 d FS 1.1.1;	1,0000	1,0000
1.1.3	Columns ( » 12)	=4		2.0 d FS 1.1.1;	1,0000	1,0000
1.1.4	Exterior walls ( » 6)	= [[cpVolume##xs:double##geometry]] m3	m3	2.0 d FS 1.1.3;	1,0000	1,0000
1.1.5	Interior walls ( » 3)	= [[cpLateralArea2##xs:double##geometry]] m2	m2	FS 1.1.4;	0,5000	1,0000
1.1.6	<b>Beams</b>	=4		1.0 d FS 1.1.3;	1,0000	1,0000
1.1.7	Slabs ( » 3)	= [[cpVolume##xs:double##geometry]]*2	m3	FS 1.1.4; FS 1.1.6;	1,0000	1,0000
1.2	<b>Openings and Facade</b>			FS 1.1;	1,0000	1,0000
1.2.1	Doors ( » 6)	= 2			1,0000	1,0000
1.2.2	Facade ( » 44)	=1			1,0000	1,0000
1.2.3	Windows ( » 20)	=2			1,0000	1,0000
1.3	<b>MEP installation</b>			FS 1.1;	1,0000	1,0000
1.3.1	MEP components ( » 41)	=3			1,0000	1,0000

Process Components are organized in a hierarchy. This hierarchy (level of detail) is applied to the schedule during the calculation. You can also create folders to group Process Components. These folders are not considered in the calculation of the schedule. Thus, folders help to reduce the hierarchies in activity models.

### Duration of tasks:

The final duration of a task in the schedule is calculation from the parameters 'Quantity', 'ProductionRate' and 'Resource'. The parameter 'UoM' (Unit of Measure) specifies what kind of quantity is meant, e.g. to build a concrete slab, the quantity is measured in m<sup>3</sup>, the installation of multiple windows is measured in pieces.

The quantity is either calculated with a formula or specified with a fixed value. If the expression is preceded by an equal sign, the expression is interpreted as a formula, evaluated for each linked geometry object and summed up at the calculation. If a number is entered, this value is taken as a fixed quantity for the calculation.

### Example:

Process Components

#	Name	Quantity	UoM	ProductionRate	Resource
> 1	<b>Construction Steps</b>			1,0000	1,0000
∨ 2	<b>Example</b>			1,0000	1,0000
2.1	fixed value for quantity ( » 4)	2,0000		1,0000	1,0000
2.2	fixed value per object ( » 4)	= 2		1,0000	1,0000
2.3	formula ( » 1)	= [[cpVolume##xs:double##geometry]]*2 m3		1,0000	1,0000

- **Component 2.1:** The quantity on the resulting operation is '2'. Regardless of the number of linked objects.
- **Component 2.2:** The quantity for each object is 2, in the sum of four linked objects the value is 8.
- **Component 2.3:** The quantity is calculated from the volume of each object, multiplied by 2 and summed over all linked objects

A variable is marked with [[...]]. A variable is defined by the name, the data type (xs:double, xs:int, xs:string, ...) and the domain (geometry, activities, pc, type, ...).

**Tip:** If you start typing a property name (e.g. cpVolume) into the quantity field, a list with all available properties appears.

The production rate describes how much hours one resource would need to fulfill this task (create one quantity unit). The resource indicates how many people are available for this work. You can adjust these number based on the real production rate and the available resources.

In the resulting schedule, the duration of the work is calculated as:

$$Duration = Quantity * Production Rate / Resource$$

This is the resulting schedule from the Process Components example above:

Activities

#	Name	pc:Qty	Duration
> 1	<b>Construction Steps / BS M...</b>		10.13 days
∨ 2	<b>Example / BS Model</b>		2.56 days
∨ 2.1	<b>Site</b>		2.56 days
∨ 2.1.1	<b>Building</b>		2.56 days
∨ 2.1.1.1	<b>Level 1</b>		2.56 days
2.1.1.1.1	fixed value for quantity ( » 4)	2,0000	0.25 days
2.1.1.1.2	ficed value per object ( » 4)	8,0000	1.00 day
2.1.1.1.3	formula ( » 1)	20,5213	2.56 days

The property 'pc:Qty' shows the resulting quantity for this task based on the value or formula in the Process Component. The 'Duration' is the result of the quantity multiplied by the production rate (quantity unit per hour) and divided by the number of resources.

In this example a working day includes 8 hours. This can be defined in the **Calendars** section.

**Predecessor / successor relationships**

The predecessors of a Process Component are defined in the 'Predecessors' property. These dependencies are transferred to tasks that are generated from the Process Components.

#	Name	Predecessors	Quantity	UoM	Productic	Resource
1	Construction Steps				1,0000	1,0000
2	Example Quantity formulas				1,0000	1,0000
3	Example Order Keys				1,0000	1,0000
4	Example Dependencies				1,0000	1,0000
4.1	Example task A ( > 1)		= [[cpVolume#xs:double##geometry]]*2	m3	1,0000	1,0000
4.2	Example task B ( > 6)	3.0 d FS 4.1;	= [[cpVolume#xs:double##geometry]]	m3	1,0000	1,0000

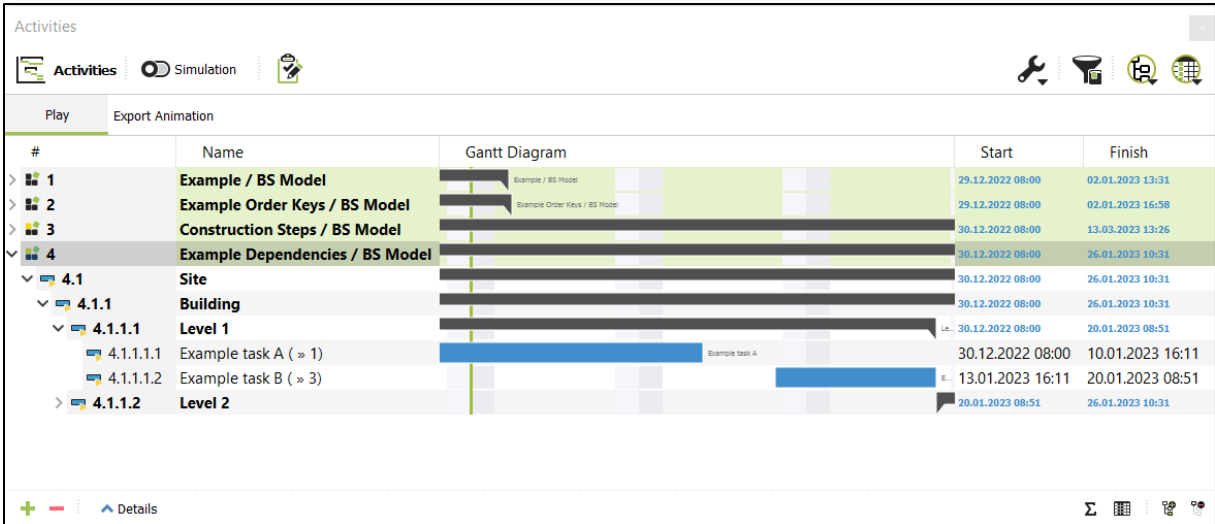
Enter dependencies in the form: *Buffer time // SSFF // Dependent element number*

Following keys are usable:

Key	Description
min, h, d, w	Buffer time in minutes, hours, days or weeks
SS	Start-Start dependency Both activities start together
SF	Start-Finish dependency The start of the first one is the end of the second one
FS	Finish-Start dependency The end of the first one is the beginning of the second one
FF	Finish-Finish dependency Both activities finish together.

**Example:**

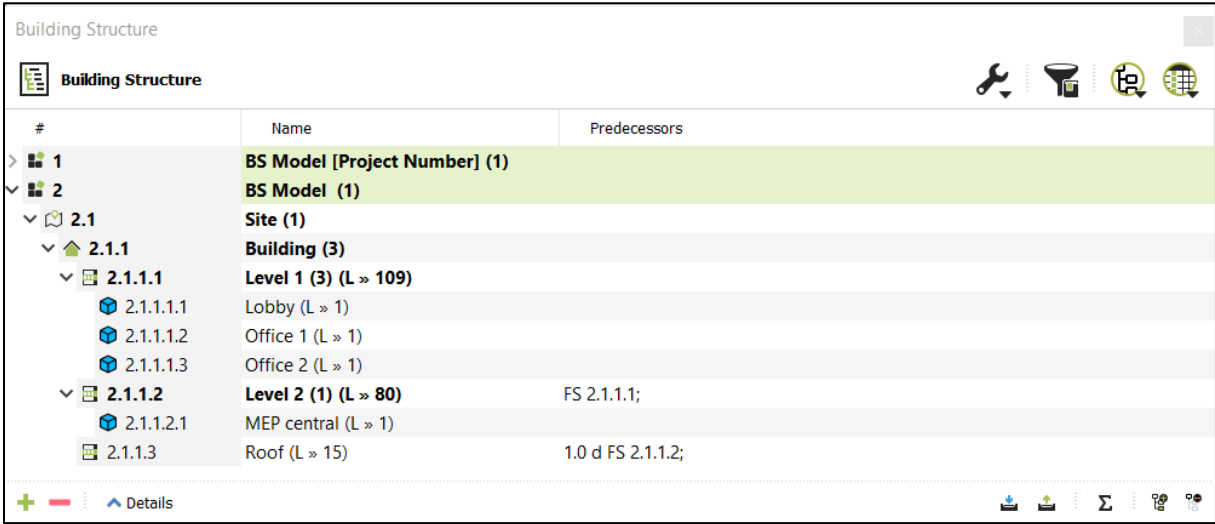
In the screenshot above, the Component 'Example task B' has the dependency '3,0 d FS 4.1' In the resulting schedule the task will start 3 days after the task for Component 'Example task A' has finished:



Dependencies are also defined in the **Building Structure**, which are transferred to tasks that are generated from these elements of the building structure. For this there is also in the building structure the property 'Predecessors'.

**Example:**

For the 'Level 2' a dependency is defined, so that all work will start after the 'Level 2' (with order number 2.1.1.1) is finished. And the work on 'Roof' starts 1 day after the work on 'Level 2' (order number 2.1.1.2) has finished.



**4.6.3 Restrictions**

It is possible to assign Restrictions to Process Components, to control whether a task should start on a certain day, at a certain time or should have a fixed duration (time).

Open the 'Restrictions' window from the Activities Ribbon bar.



Task Restrictions

**Task Restrictions**

Set to Visible   
 Set to Selected   
 Remove from Visible

	Name	Comment	Start on Day	Start at Time	Fixed Time (Days)
1	Monday		Monday	09:00	
2	Fixed Time	...	Wednesday		5,0000 [d]

With the '+' button, you can create new Restrictions. To assign a Restriction to a Process Component, drag and drop the Restriction to the appropriate Process Component. The name of Restriction is now visible in the property 'TaskRestrictions':

Process Components

**Process Components**

#	Name	Predecessors	Quantity	UoM	TaskRestrictions
> 1	<b>Construction Steps</b>				
> 2	<b>Example Quantity f...</b>				
✓ 3	<b>Example Order Keys</b>				
3.1	Create Walls ( » 9)		=[[cpVolume#... m3		Monday
> 4	<b>Example Dependen...</b>				

Details

All tasks that are created from this Process Component will be defined based on this Restriction.

**4.6.4 Structuring of schedules**

When calculating the schedule, a hierarchy is created in the Activities, which results partly from the Process Components and partly from the Building Structure:

- Process Component /
- Tasks
- Building Structure

Part	PC: 'OrderFlag' = true	1	Process Components Sample / Building Structure Sample	298.94 days	
Part 1		1.1	Construction	105.83 days	
Part 2		1.1.1	Building A	56.46 days	
		1.1.1.1	Level 1	41.28 days	
		1.1.1.2	Level 2	32.57 days	
Part 3	PC: 'OrderFlag' = false	1...	Exterior walls concrete ( » 4)	4.72 days	63,0024 m3
		1...	Interior walls brickwork ( » 12)	28.10 days	280,9691 m2
		1...	Interior walls concrete ( » 6)	1.94 days	19,4292 m3
		1...	Columns ( » 12)	2.25 days	12,0000
		1...	Slabs ( » 1)	3.47 days	138,9051 m3
		1.1.1.3	Level 3	37.15 days	
		1.1.1.4	Level 4	39.37 days	
		1.1.1.5	Level 5	37.61 days	
		1.1.1.6	Roof	2.14 days	
		1.1.2	Building B	44.36 days	
		1.2	Inner Space	298.94 days	
		1.2.1	Building A	147.03 days	
		1.2.1.1	Level 1	147.03 days	
		1.2.1.2	Level 2	128.83 days	
		1.2.1.3	Level 3	141.49 days	
		1.2.1.4	Level 4	146.91 days	
		1.2.1.5	Level 5	142.65 days	
		1.2.2	Building B	146.91 days	

} Tasks with linked objects

The first part of the hierarchy results from the Process Components, the second part from the Building Structure. And the third part again from the Process Components.

The change between the first and the second part is defined in the Process Components by the property 'OrderFlag'.

#	Name	OrderFlag	Quantity	UoM
1	Process Components Sample	true		
1.1	Construction	true		
1.1.1	Exterior walls concrete ( » 54)	false	= [[cpVolume##xs:double##geometry]]	m3
1.1.2	Interior walls brickwork ( » 148)	false	= [[Area##xs:double##geometry]]	m2
1.1.3	Interior walls concrete ( » 76)	false	= [[cpVolume##xs:double##geometry]]	m3
1.1.4	Columns ( » 112)	false		= 1 Stk
1.1.5	Stairs ( » 73)	false		= 1 Stk
1.1.6	Slabs ( » 14)	false	= [[cpVolume##xs:double##geometry]]	m3
1.2	Inner Space	true		
1.2.1	Rooms ( » 122)	false		

To further subdivide the structure in the tasks, tasks can be created, based on a certain property value of the linked objects. For this purpose, the 'OrderKeys' property is used for extended grouping of objects.

For each value of the property that the linked objects have, a task is created and the objects are assigned with the corresponding value. The tasks are sorted by the value of the property.

These tasks are not associated with each other, which results in a parallelization of the activities.

**Example:**

If the Process Component of the creation of walls is defined like this:

Process Components

#	Name	OrderKeys	Quantity	UoM
1	Construction Steps			
2	Example Quantity formulas			
3	Example Order Keys			
3.1	Create Walls ( > 9)		=[[cpVolume#xs:double#geometry]]	m3

The resulting task will look like this (for a Building Structure with two storeys):

Activities

#	Name	Duration
1	Construction Steps / BS Model	10.13 days
2	Example / BS Model	2.56 days
3	Example Order Keys / BS Model	9.74 days
3.1	Site	9.74 days
3.1.1	Building	9.74 days
3.1.1.1	Level 1	5.11 days
3.1.1.1.1	Create Walls ( > 5)	5.11 days
3.1.1.2	Level 2	4.64 days
3.1.1.2.1	Create Walls ( > 4)	4.64 days

If you define a value for 'OrderKeys' based on the name property of the linked objects:

Process Components

#	Name	OrderKeys	Quantity	UoM
1	Construction Steps			
2	Example Quantity formulas			
3	Example Order Keys			
3.1	Create Walls ( > 9)	[[cpName#xs:string#geometry]];	=[[cpVolume#xs:double#geometry]]	m3

The resulting tasks will look like this. A sub-task is created for each linked object, sorted by the names:

Activities

Activities Simulation

Play Export Animation

#	Name	Duration
> 1	Construction Steps / BS Model	10.13 days
> 2	Example / BS Model	2.56 days
∨ 3	Example Order Keys / BS Model	3.00 days
∨ 3.1	Site	3.00 days
∨ 3.1.1	Building	3.00 days
∨ 3.1.1.1	Level 1	1.50 days
∨ 3.1.1.1.1	Create Walls	1.50 days
3.1.1....	Basic Wall:Generic - 300mm:299076 ( » 1)	1.50 days
3.1.1....	Basic Wall:Generic - 300mm:299077 ( » 1)	1.43 days
3.1.1....	Basic Wall:Generic - 300mm:299079 ( » 1)	1.28 days
3.1.1....	Basic Wall:Interior - 135mm Partition (2-hr):302842 ( » 1)	0.59 days
3.1.1....	Basic Wall:Interior - 135mm Partition (2-hr):302958 ( » 1)	0.31 days
∨ 3.1.1.2	Level 2	1.50 days
∨ 3.1.1.2.1	Create Walls	1.50 days
3.1.1....	Basic Wall:Generic - 300mm:299518 ( » 1)	1.50 days
3.1.1....	Basic Wall:Generic - 300mm:299519 ( » 1)	1.43 days
3.1.1....	Basic Wall:Generic - 300mm:299520 ( » 1)	1.28 days
3.1.1....	Basic Wall:Interior - 135mm Partition (2-hr):303266 ( » 1)	0.42 days

+ - Details

It is also possible to extend the structure of the tasks on Building Structure level with the property 'TaktKey'. This makes it possible, to classify objects into tacts and automatically generate tacts in the schedule from them.

This property is defined as variable based on a property in the **Geometry Domain / Project Structure**.

### Example

The property 'TaktName' was created in the Project Structure and a corresponding value was assigned to each window:



Project Structure

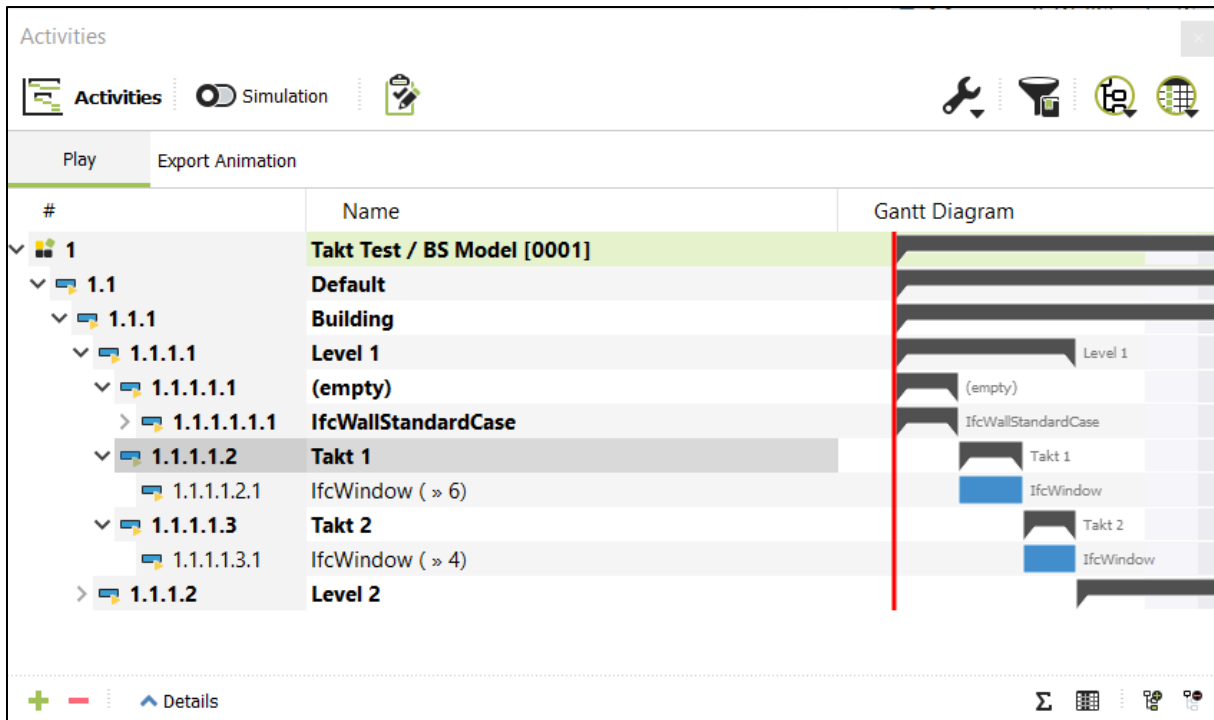
Name	TaktName	ifcType
IFC Model [Cube_Architectural Model.ifc] (1)		
0001 (1)		IfcProject
Default (1)		IfcSite
Building (2)		IfcBuilding
Level 1 (14)		IfcBuildingStorey
Basic Wall:Generic - 300mm:299076		IfcWallStandardCase
Basic Wall:Generic - 300mm:299077 (1)		IfcWallStandardCase
Basic Wall:Generic - 300mm:299079 (4)		IfcWallStandardCase
Curtain Wall:Exterior Glazing:299276 (44)		IfcCurtainWall
M_Fixed:0915 x 1830mm:299891 (2)	Takt 1	IfcWindow
M_Fixed:0915 x 1830mm:300008 (2)	Takt 2	IfcWindow
M_Fixed:0915 x 1830mm:300062 (2)	Takt 1	IfcWindow
M_Fixed:0915 x 1830mm:300110 (2)	Takt 2	IfcWindow
Floor:Generic 300mm:302608		IfcSlab
Basic Wall:Interior - 135mm Partition (2-hr):302842 (2)		IfcWallStandardCase
Basic Wall:Interior - 135mm Partition (2-hr):302958		IfcWallStandardCase
M_Fixed:0915 x 1830mm:303024 (2)	Takt 1	IfcWindow
M_Single-Flush:0915 x 2134mm:303070 (2)		IfcDoor

In the Building Structure, the property 'TaktName' was assigned with the variable '[[TaktName##xs:string##geometry]]' to read the appropriate values from the Project Structure during the creation of the schedule:

Building Structure

#	Name	TaktKey	Predecessors
1	BS Model [0001] (1)		
1.1	Default (1)		
1.1.1	Building (2)		
1.1.1.1	Level 1 (L » 79)	[[TaktName##xs:string##geometry]];	
1.1.1.2	Level 2 (L » 30)	[[TaktName##xs:string##geometry]];	FS 1.1.1.1;

In the resulting schedule, the structure includes now additional nodes for the different tacts (the tact 'empty' contains all objects of the Project Structure in the same hierarchy, but without a value in the property 'TaktName'):



**Hint:**

Tasks created from Process Components with the property 'OrderFlag' = true, are linked with dependencies defined in the property 'Predecessor' in the Process Component.

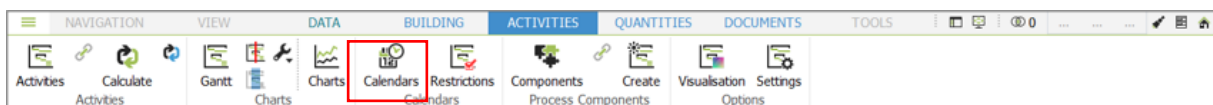
For tasks calculated from Process Components with the property 'OrderFlag' = false apply the following rules:

- Order relations, which are defined at the corresponding Process Component in the property 'Predecessors', are set in relation within the same hierarchy level of the Building Structure.
- Order relations, which are defined at the corresponding Process Component in the property 'PredecessorsLocation', are related to the tasks within the previous hierarchy level of the Building Structure.

For tasks created from the property 'TaktKey', the corresponding sub-tasks are linked with an finish-to-start order relation.

**4.6.5 Calendars**

For the automated schedule calculation, you can define a calendar with the available working days and working hours per day. Open the Calendar dialog from the Activities toolbar.



The screenshot displays the 'Calendars' configuration interface. It is divided into several sections:

- Calendar List (1):** A table with columns 'Name' and 'Comment'. It lists '(Default Calendar)' and 'MyCalendar' (comment: 'custom calendar'). There are '+' and '-' buttons at the bottom.
- Calendar Options (2):** A tabbed interface with 'Working Time' and 'Calendar Options' tabs. The 'Calendar Options' tab shows a monthly calendar for January 2023 with columns for days of the week (Mo, Di, Mi, Do, Fr, Sa, So) and a grid of dates.
- User Defined Days / Holidays (3):** A table with columns 'Date' and 'Comment'. It lists '2022-12-31' for 'New Year's Eve'. There are '+' and '-' buttons at the bottom.
- Week / Day view (4):** A grid showing working hours (05:00 - 19:00) for each day of the week (Monday to Sunday). The grid cells are colored green or blue. There are 'Set' and 'Remove' buttons at the bottom.

1. **Calendar list:** You can define multiple calendars. Create new entries with the '+' button and delete existing entries with the '-' button.
2. **Calendar view:** Select specific days to define the working time. On the tab *Calendar Options* you can define default values for working hours per days, working days per week etc.
3. **User Defined Days / Holidays:** Define specific days, where the working time deviates from the default values. Create new entries with the '+' button and delete existing entries with the '-' button.
4. **Week / Day view:** Define the working hours for a default week and for selected days from the *User Defined Days* list. To do so, click on the columns in the table and than on 'Set' to add this hour to the working time, or on 'Remove' the remove it from the working time.

#### 4.6.6 Process Component Properties

If a task in the schedule is calculated from Process Components, some properties that are defined for the Process Component, will be automatically written into the appropriate property of the task. The following table gives an overview of these properties:

Description	Process Component Property	Task Property	Value
Task is created from Process Component		pc:SourcePc	ID of the Process Component
Tasks is created from Building Structure		pc:SourceBs	ID of the Building Structure element
Visualisation in 4D Simulation	TaskVisualisationID	cpVisualisation	ID of the configuration rule
Restrictions	TaskRestrictionsID	cpRestrictions	ID of the Restriction element
Trade	Trade	pc:Trade	User input
Unit of measure	UoM	pc:QtyUom	User input
Quantity, forecast	Quantity	pc:Qty	Calculated by formula
Quantity, target	Quantity	pc:BaselineQty	Calculated by formula
Expense value, forecast	ProductionRate	pc:ProductionRate	User input
Expense value, target	ProductionRate	pc:BaselineProductionRate	User input
Resource value, forecast	Resource	pc:Resource	User input
Resource value, target	Resource	pc:BaselineResource	User input

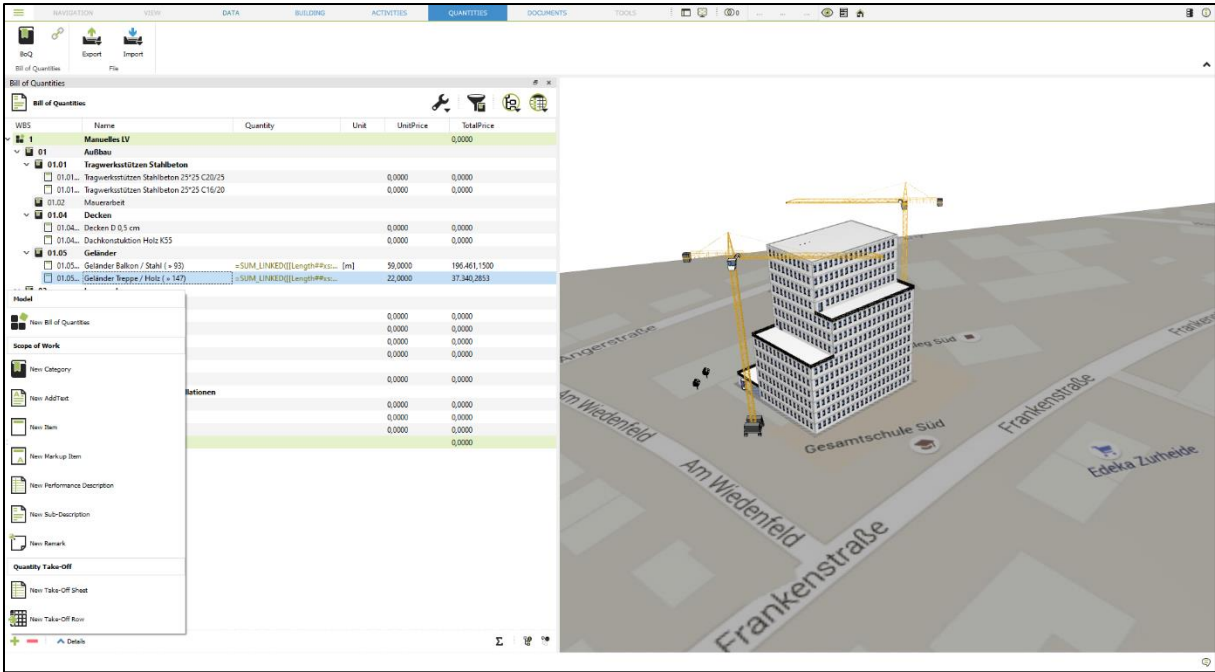
## 4.7 Bill of Quantities

Bill of Quantities (BoQ) domain in DESITE allows you to import and display your BoQ tables easily and interactively, link 3D model objects to corresponding BoQ items and assign quantities calculated from model geometry. You can create your own BoQ table manually in DESITE or import from an external software via GAEB file (GAEB XML). Bill of Quantities domain can be accessed under Quantities menu tab.



In order to create your own BoQ table manually, click on '+' button at the bottom left corner and select the desired item from the menu that opens. Here you can generate a BoQ table or add further entries such as BoQ items, additional texts, take-off sheets etc. in an imported BoQ file.

You can rename the entries with a double click on values on Name field.



Click on Details will open a new dialog box. BoQ properties Order Number, Short Text, Description, Unit, Unit Price and Total Price are displayed in detail view.

Bill of Quantities

Bill of Quantities

WBS	Name	Quantity	Unit	UnitPrice	TotalPrice
1	Mauerwerk LV				0,0000
01	Auflagen				
01.01	Tragwerkstützen Stahlbeton				
01.01...	Tragwerkstützen Stahlbeton 25*25 C30/25	0,0000		0,0000	
01.01...	Tragwerkstützen Stahlbeton 25*25 C16/20	0,0000		0,0000	
01.02	Mauerarbeit				
01.04	Decken				
01.04...	Decken D 0,5 cm	0,0000		0,0000	
01.04...	Deckonstruktion Holz K55	0,0000		0,0000	
01.05	Geländer				
01.05...	Geländer Balkon / Stahl (+ 93)	59,0000		196,461,1500	
01.05...	Geländer Treppe / Holz (+ 127)	22,0000		37,340,2853	

Bill of Quantities

desite MWM Musterprojekt Hochbau

- 01 Hauptgebäudeturm
  - 01.01 Baustelleneinrichtung
    - 01.01... Baustelleneinrichtung einrichten, vorhalten, räumen
    - 01.01... Dokumentation der Bauabrechnung
  - 01.02 Erdarbeiten
    - Erdarbeiten nach DIN 18300
    - 01.02... Boden Baugrube lösen, lagern Tiefe bis 2,8 m Bodenklasse 3
    - 01.02... Boden Graben Kanal Tiefe bis 1,45 m lösen, lagern Bodenklasse 3
    - 01.02... Oberboden abtragen, lagern d= 30 cm Bodengruppe 4
    - 01.02... Betonpflaster L/B 100/100 mm H 80 mm grau
    - 01.02... Betonpflaster L/B 100/100 mm H 80 mm in MWM-blau
    - 01.02... Betrieb Wasserhaltungsanlage
  - 01.03 Maurerarbeiten
  - 01.04 Betonarbeiten
  - 01.05 Nachträge
- 02 Nebengebäude

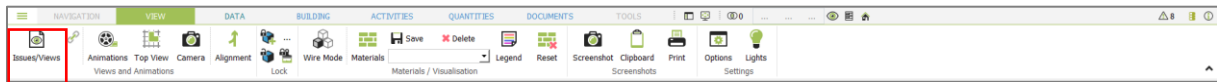
  

Betonpflaster L/B 100/100 mm H 80 mm in MWM-blau

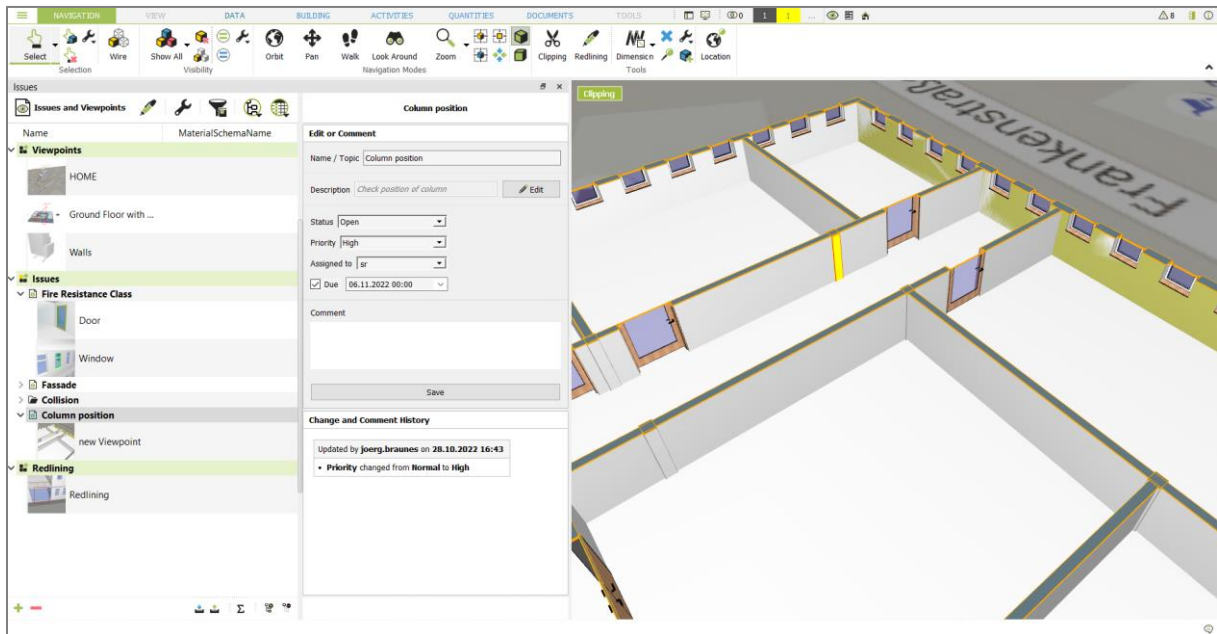
OZ	Menge	ME	EP in EUR	GP in EUR
01.02.0050	Betonpflaster L/B 100/100 mm H 80 mm in MWM-blau	0 m2	22,41	0,00

Pflasterdecke ZTV P-StB, Förderweg bis 4 km, aus Pflastersteinen aus Beton DIN EN 1338 blau, max. Differenzen J, Witterungswiderstand B, Abriebwiderstand H, gefast, Maße L/B 100/100 mm, Höhe 80 mm, in Reihen, in Fußgängerzonen, Bettung aus Kiessand, Körnung 0/4, Dicke 3 bis 5 cm, Pflasterfugen verfüllen mit Sand.

## 4.8 Issues and Viewpoints



Issues and 3D Viewpoints are displayed in a tree view as any other domain objects. You can open tree view by clicking on the Issues/Views button in the View toolbar.



Tree structure is broken down into the following elements:



Issue/Viewpoint Model. The Model can contain multiple Issues and 3D Viewpoints.



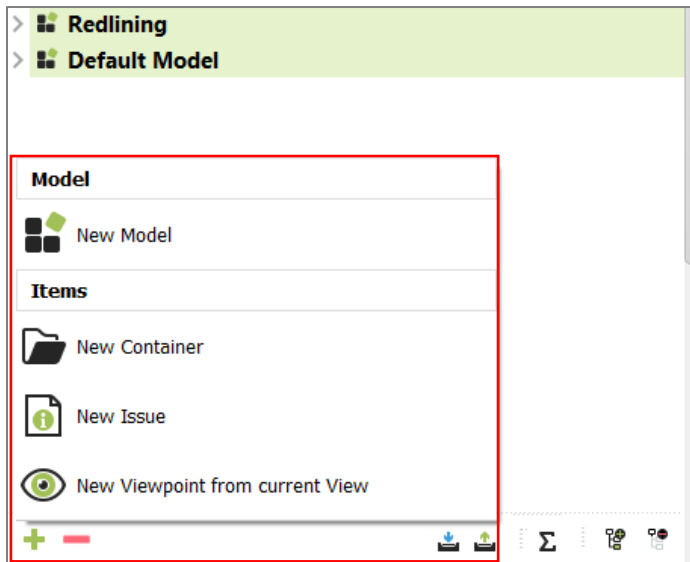
Container. A Container can be used to organize Issues and 3D Viewpoint in different groups



Issue.

*Preview* 3D Viewpoint

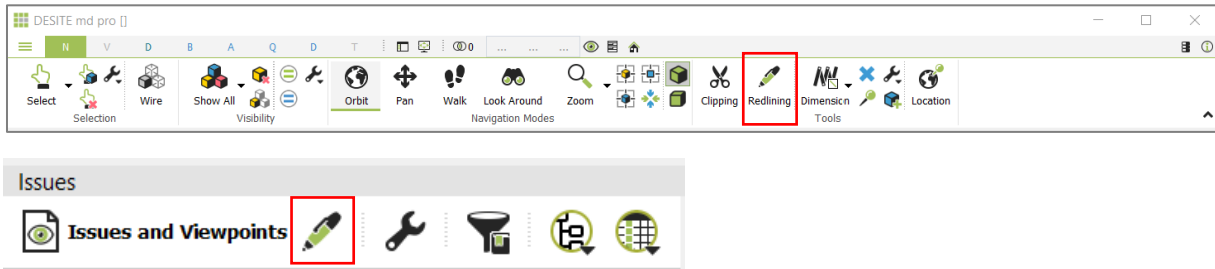
To create a new element for the tree structure, click the '+' Button and choose one of the options:



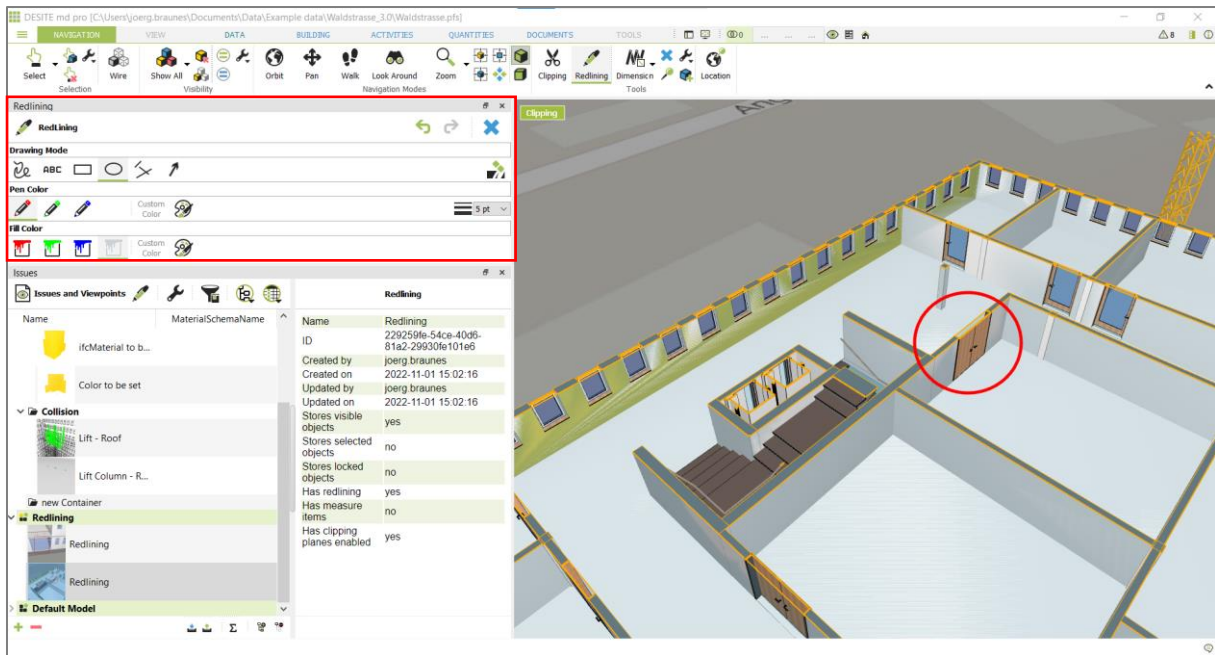
To delete an element of the tree structure, select the desired element and click the '-' button.

#### 4.8.1 Redlining

Redlining tool provides functions for placing comments and annotations within the 3D model. Click on the Redlining button in the Navigation toolbar or in the Issues and Viewpoints Widget in order to open the palette for markup tools.



You can adjust settings for Drawing Modes, Pen color and Fill color and choose different colors, shapes or pen thickness values.



You can erase markups by using the eraser while redlining.



You can remove last markup item or restore the last removed item using arrow buttons.



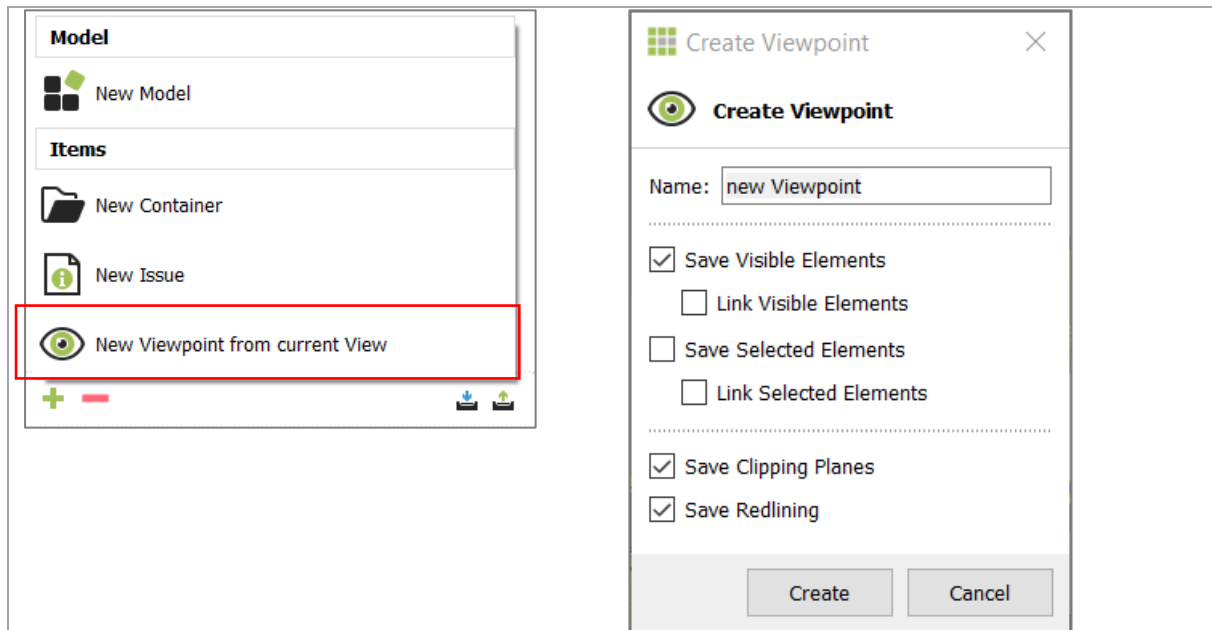
You can remove all markup items by clicking on X button

A 3D viewpoint will automatically be created and saved in the tree view when you create a markup.

#### 4.8.2 3D Viewpoint

If you want to create a viewpoint manually, set the desired view in the model, add comments or annotations with redlining as required, click on the '+' button on chose the viewpoint option. A new dialog appears, where you can define what information should be saved together with the viewpoint:

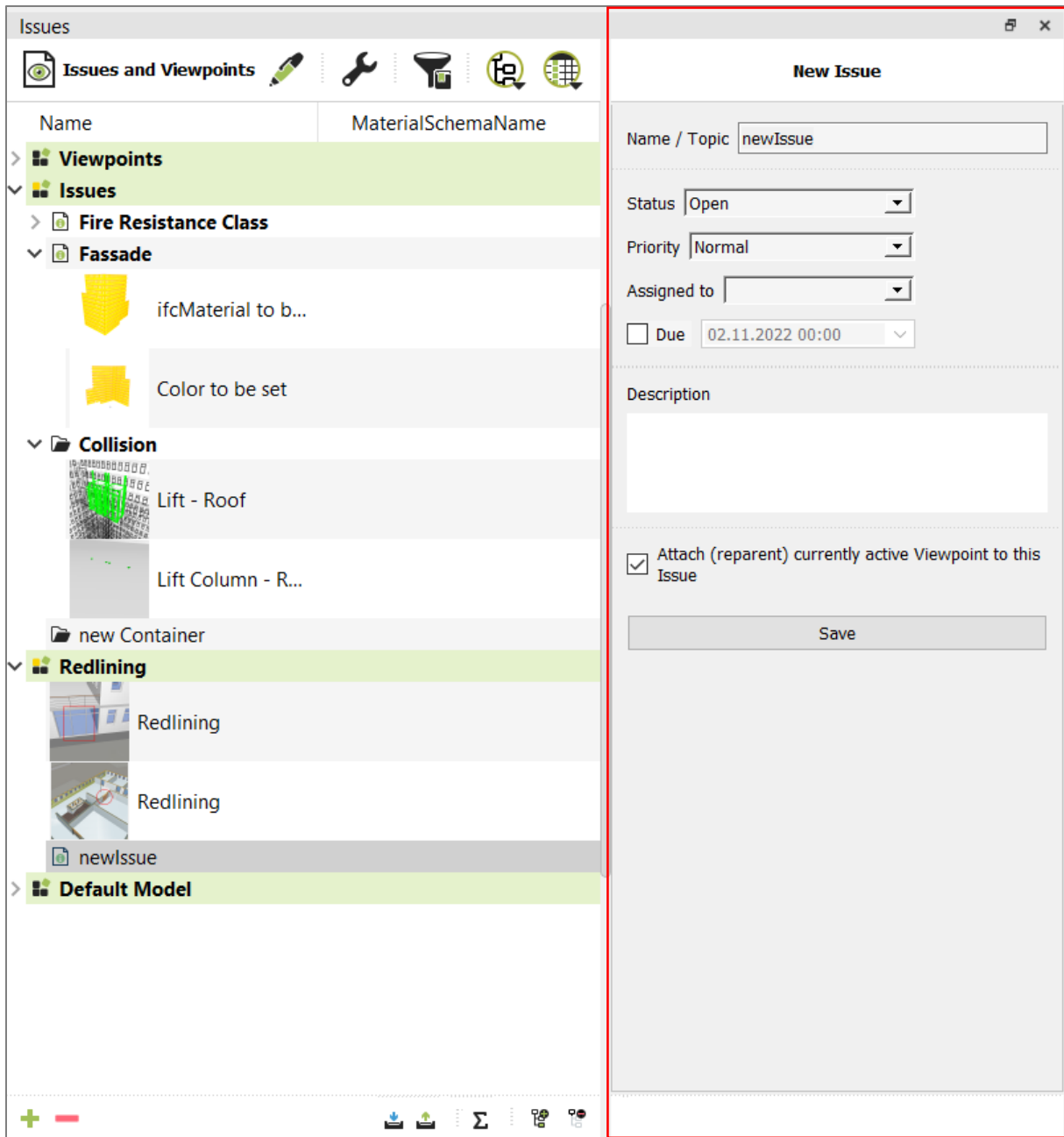




The viewpoint is saved in the tree structure with a small preview image of the current view. Saved viewpoints can be restored with a double click on the element in the tree structure.

### 4.8.3 Issues

Issues can be used to save observations in the model, share them with other project members and track progress on solving these issues. You can create new issue by clicking on the '+' button and choose 'New Issue'. This opens a new widget in the side panel of the view/issues widget:



1. **Name / Topic:** Define a meaningful name for the issue.
2. **Status:** Define the status of the issue. Options in the drop down are customizable in the Domain Configuration.
3. **Priority:** Define the priority of the issue. Options in the drop down are customizable in the Domain Configuration.
4. **Assigned to:** Define a name who should take care of the issue. Available names are customizable in the Domain Configuration.
5. **Due Date:** Define a date until the issue should be solved. This is optional
6. **Description:** Add details about the issue
7. **Attach active Viewpoint:** If this option is selected, the active viewpoint will be attached as child to the issue. If the active viewpoint already exists in the tree structure as an element, this viewpoint element will be moved under the issue.
8. **Save:** Save the issue with the current options and descriptions in the project.

To edit an existing issue, click on the element in the tree structure. Now you can edit all options. As soon as you click on save, the changes will be added as entries into the Change and Comment History:

The screenshot shows the 'Issues' application interface. On the left is a tree view with categories like Viewpoints, Issues, Fire Resistance Class, Fassade, Collision, Redlining, Door, and Default Model. The 'Door' category is selected, showing a 'Redlining' issue. On the right is the 'Edit or Comment' panel for the 'Door' issue. It includes fields for Name / Topic (Door), Description (Please ch...ems wrong), Status (Closed), Priority (Normal), Assigned to (sr), and Due date (02.11.2022 00:00). A 'Save' button is highlighted with a red box. Below the 'Save' button is the 'Change and Comment History' section, which shows two entries: one where the status changed from 'In Progress' to 'Closed' and another where it changed from 'Open' to 'In Progress'.

**Tip:**

Issues can also be created automatically from Clash Detection and also from Model Checks.

**4.8.4 Issue Domain Configuration**

Domain Configuration allows you to customize options for viewpoints and issues.

Issues

Issues and Viewpoints

Domain Configuration

Issues and Viewpoints Configuration

Users Status Priority Preview Defaults

This is a list of allowed Status values on Issues.  
 Status values currently in use by at least one Issue are shown in *italics*. Modifying one of these will also modify the Issue.

Status	Default	Mapped alias values
<i>Open</i>	<input checked="" type="checkbox"/>	New
In Progress	<input type="checkbox"/>	Active;Assigned
Closed	<input type="checkbox"/>	Ignored;Resolved
Re-Opened	<input type="checkbox"/>	

When creating, importing or updating an Issue with a Status not in the list:

Extend the list of allowed Status values

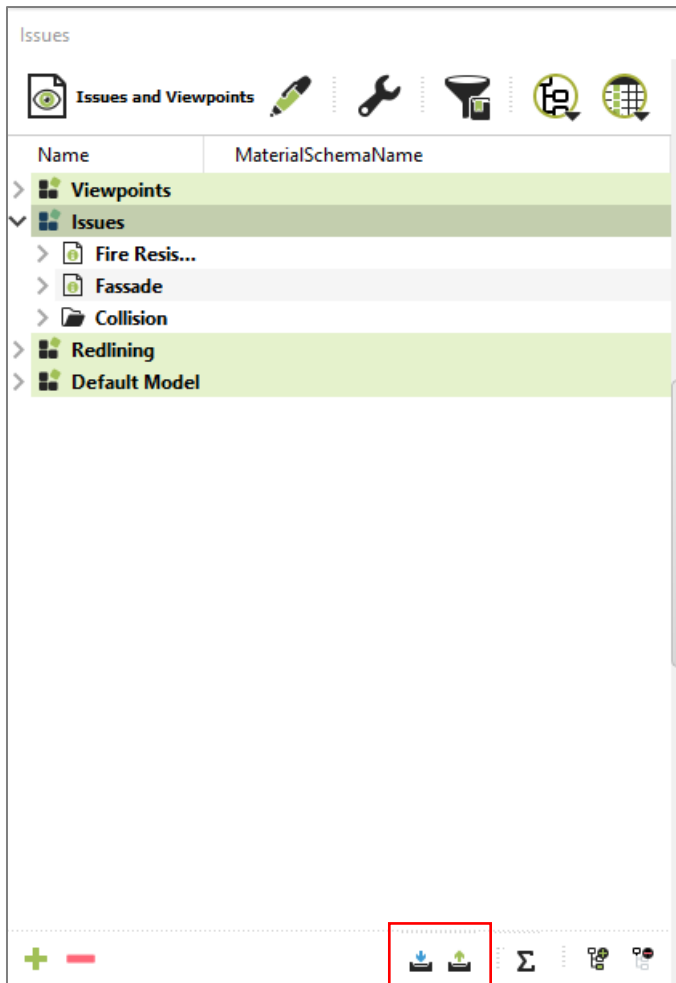
Use the default value (on new Issues) or reject the change (on edit)

OK Cancel

- **Users:** Define a list of user names that will be used as creators and assignees for Issues
- **Status:** A list of statuses that will be used for Issues. You can also define the behaviour if Issues are imported from BCF and contain different status than defined in DESITE.
- **Priority:** A list of priorities that will be used for Issues. You can also define the behaviour if Issues are imported from BCF and contain different priority values than defined in DESITE.
- **Preview:** Define how the preview image and thumbnail for 3d viewpoint will be created.
- **Defaults:** Define the default settings for new 3d viewpoint that will be created together with Issues.

#### 4.8.5 Import and Export of Issues

Issues and Viewpoints can be imported to the project and also exported in order to share with other project stakeholders.



Exports selected items of the tree structure as BCF or creates a PDF report. For BCF export a dialog appears where additional export settings can be defined.



Import Issues and Viewpoint as \*.bcf or \*.bcfzip or the native DESITE format \*.vp.xml and \*.vp.xml. If the ID of an imported Issue already exists for an Issue in the project. The Issue will be updated from the.

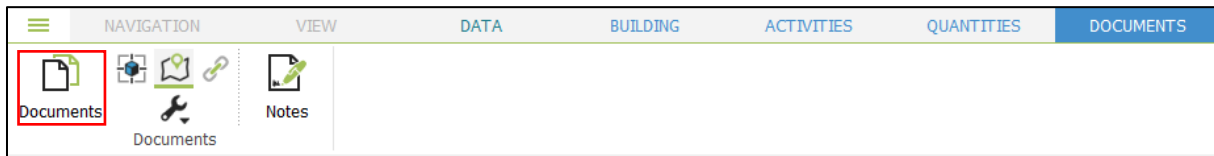
## 4.9 Documents Domain

In the Documents domain, external documents from various sources can be added and managed:

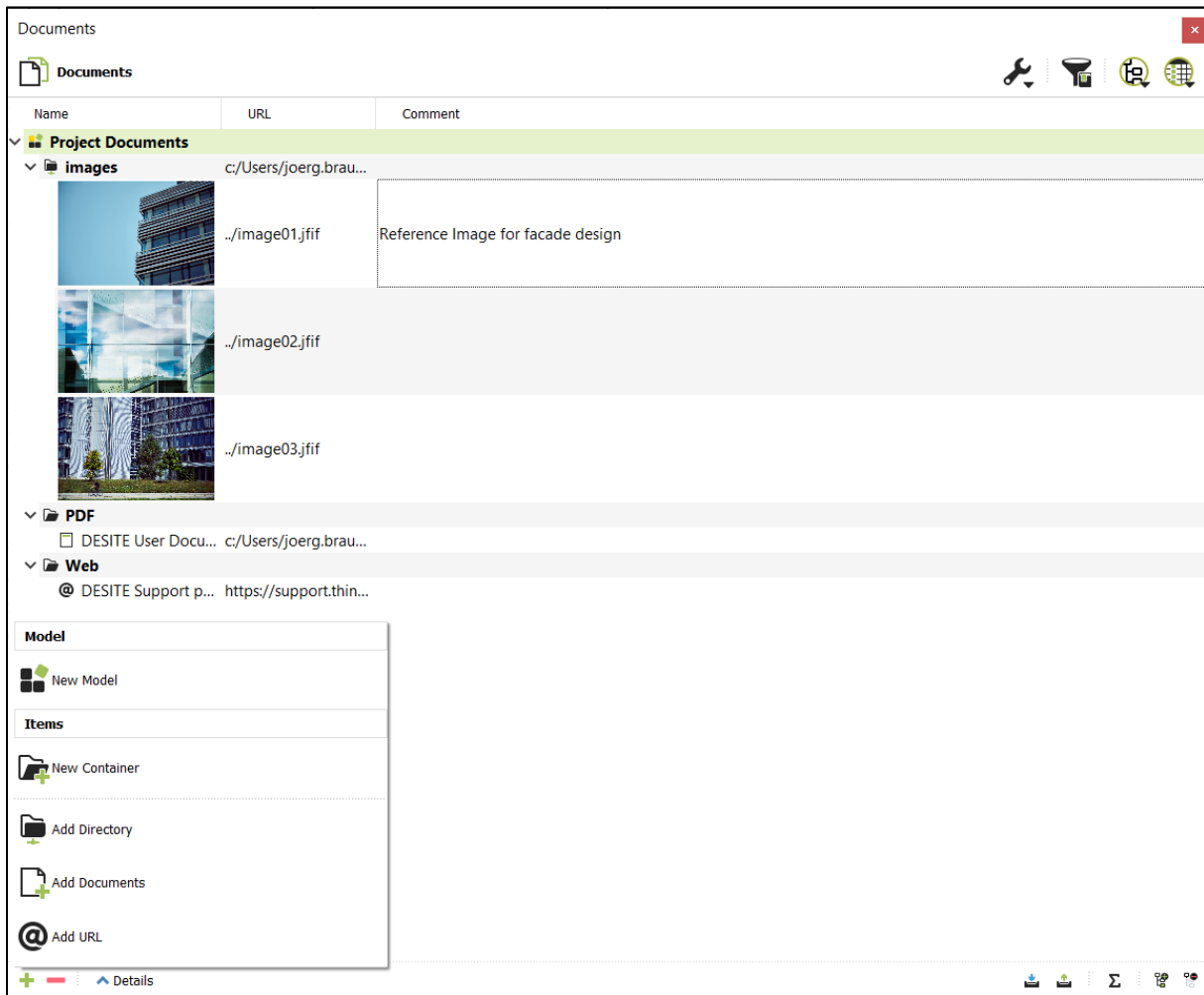
- individual files like images or PDF documents,
- directories from the file system,
- directories from a Webservice
- URLs

Documents can be linked to geometric objects with manual linking or **Rule based linking** and also placed in the 3D space.

Open the Documents dialogue from the Documents Ribbon tab:



Similar to other domains, Documents are organized in a hierarchical structure with models, containers and elements, which represent the external documents.

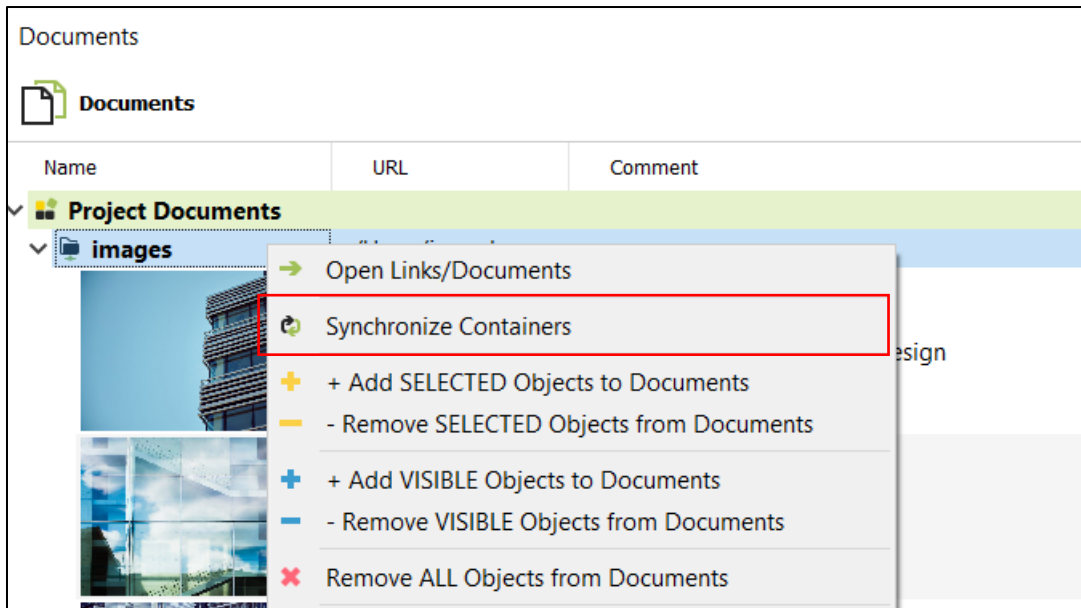


With the '+' button, you can add new elements to the tree structure.

Double click on the element name or the preview image to open the linked Document in related Windows application.

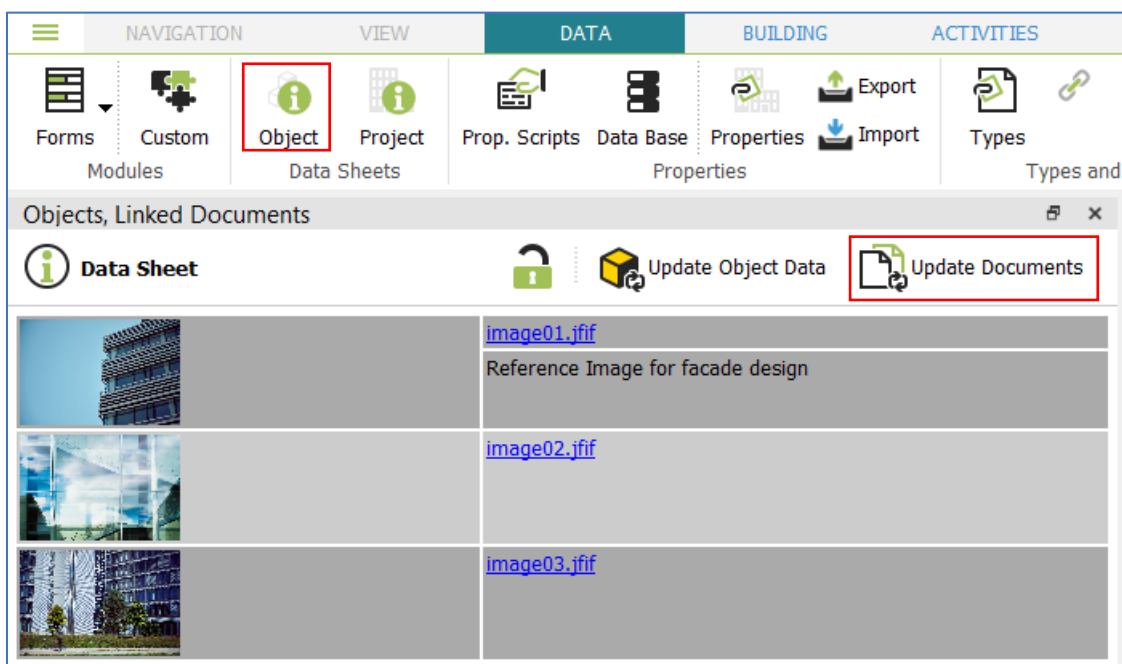
If you add a 'URL' Document, display the property 'URL' and enter the appropriate address as property value.

If a directory is added as a Container (e.g. the Container 'Images' in the screenshot above), all including files are added automatically as child elements. Right click on the Container and choose 'Synchronize Containers' to update the elements based on the current file status in the source folder:



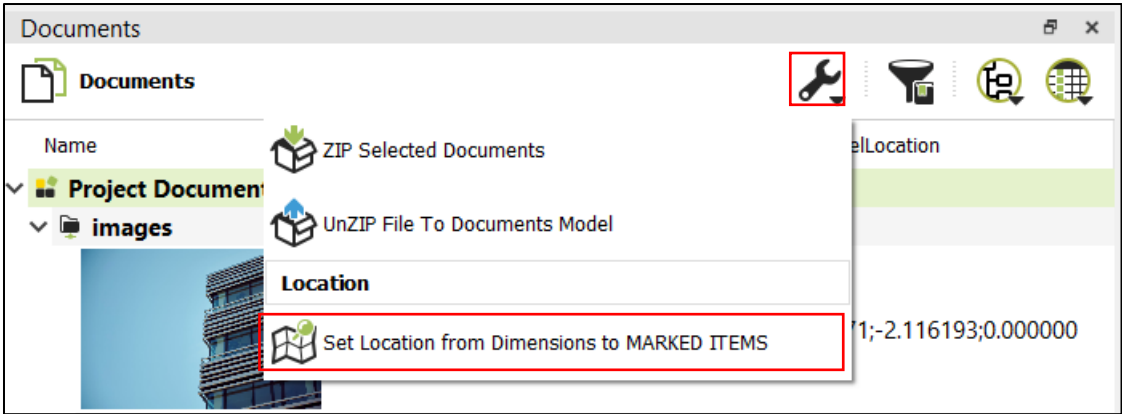
**Tip:**

If a Document is linked to a geometry object, this Document can also be listed in the **Data Sheet:**

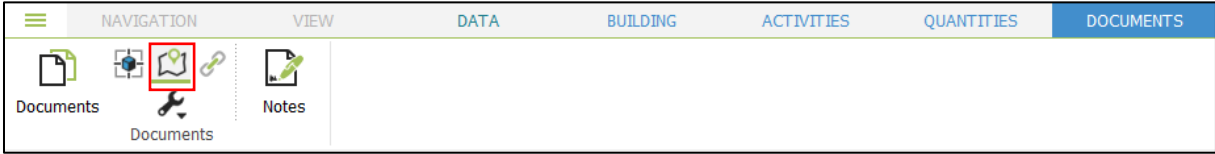


**4.9.1 Place documents in 3D Space**

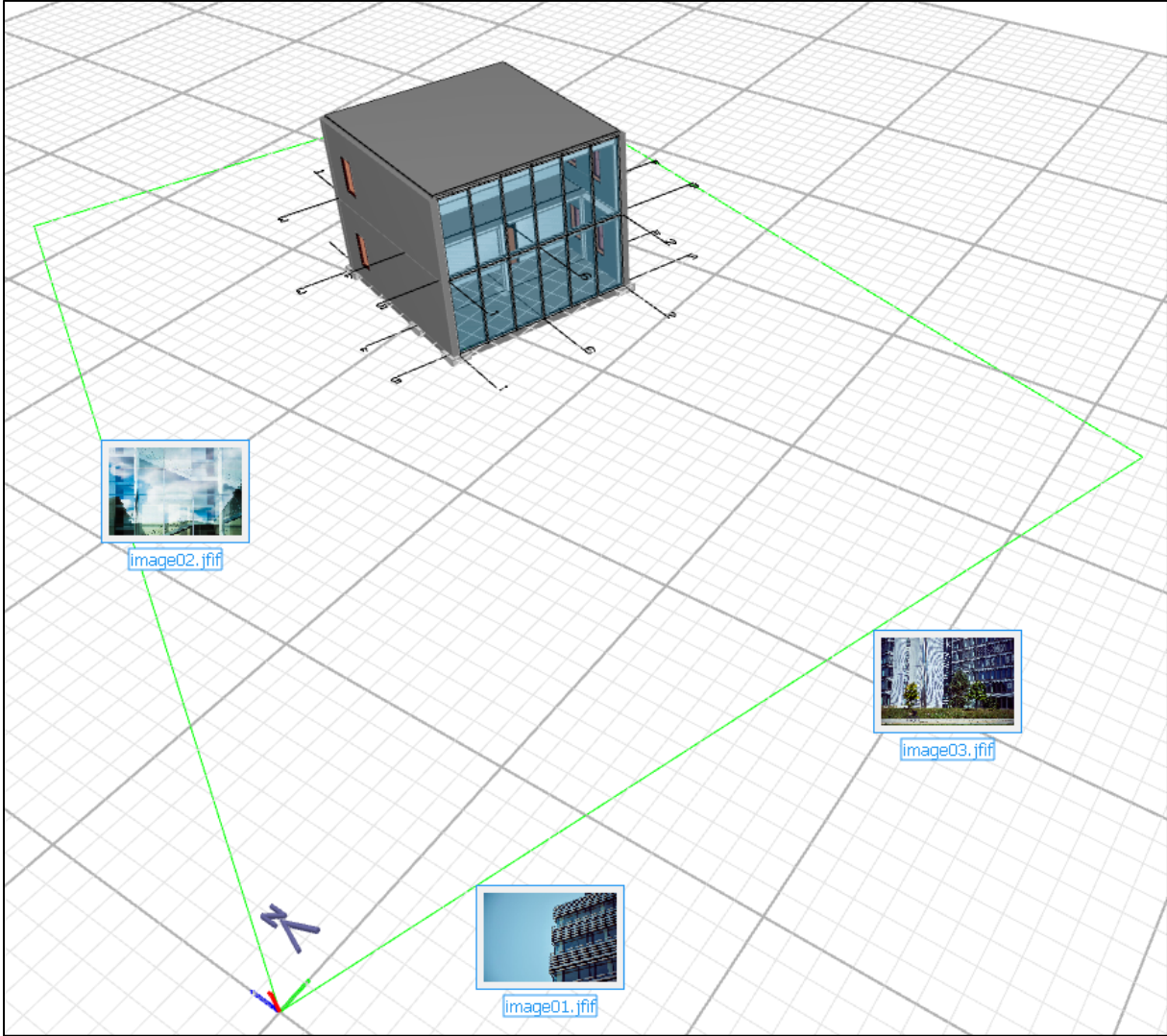
It's possible to assign a coordinate in the 3d space to a Document. You can either enter the coordinate manually into the property 'ModelLocation' in the form '[x];[y];[z]', or you add a measurement point (see **Measuring**) to the model and choose the option 'Set Location from Dimensions to MARKED ITEMS' from the Documents tools:



To display a preview of the located Documents in the 3D View, active the 'Show Location of Documents' option from the Ribbon bar:



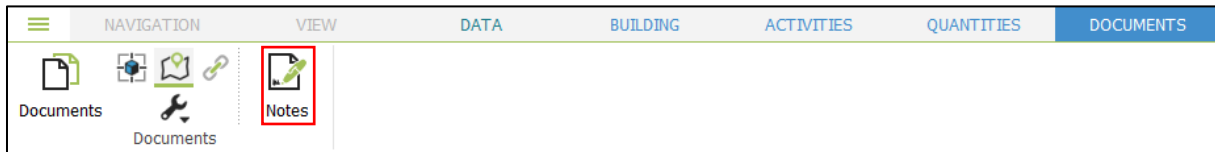
The Documents are now visible on the related geometry point in the 3D View:



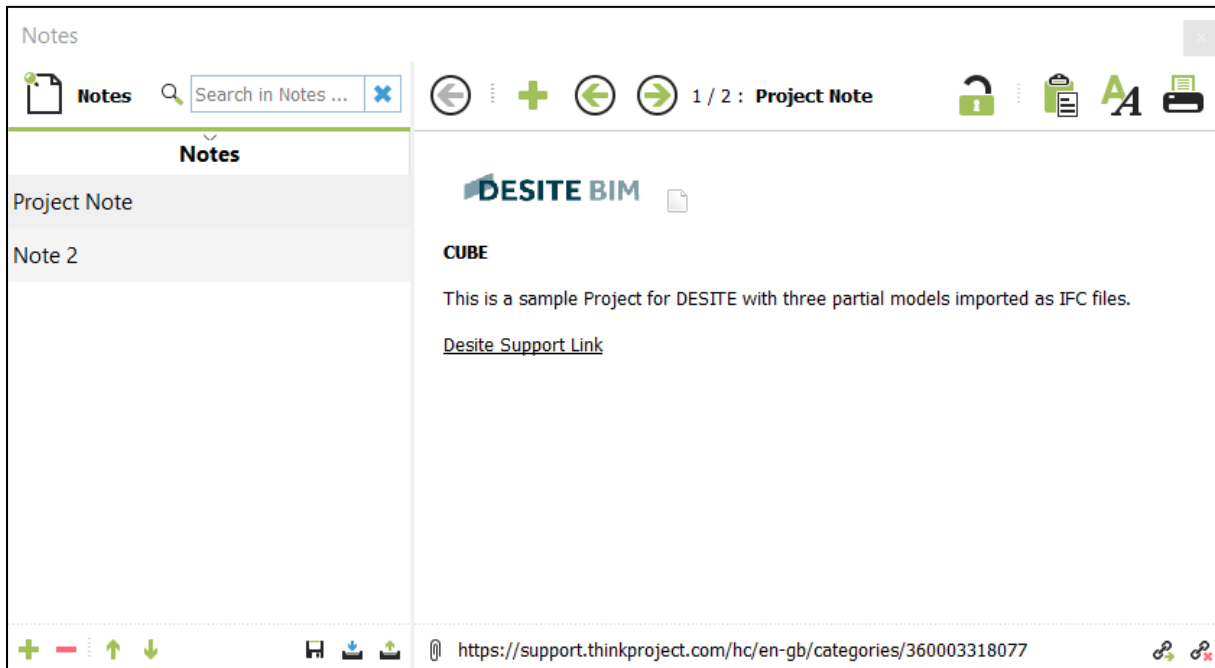












### 4.9.2 Notes

The Notes tool provides functions for creating general notes and descriptions about the project. Open the Notes window from the Documents Ribbon tab:



You can create new notes and edit, save, print, delete, import or export existing notes.



-   Show / hide Notes list
-  Create a new Note
-   Previous / next Note
-  Add link to a local file to marked text
-  Add URL to marked text
-  Remove URL / file link of marked text
-  Set Note editable yes / no
-  Insert options for:
  - Image link
  - Document link
  - Current user and date stamp



Formatting options for paragraph, text, images



Print, PDF export

**Options for Notes list**



Add / remove Note



Move Note in list up / down



Save Note



Import / export Note

**4.9.3 Documents Domain properties**

Following domain specific properties are used in the Documents domain:

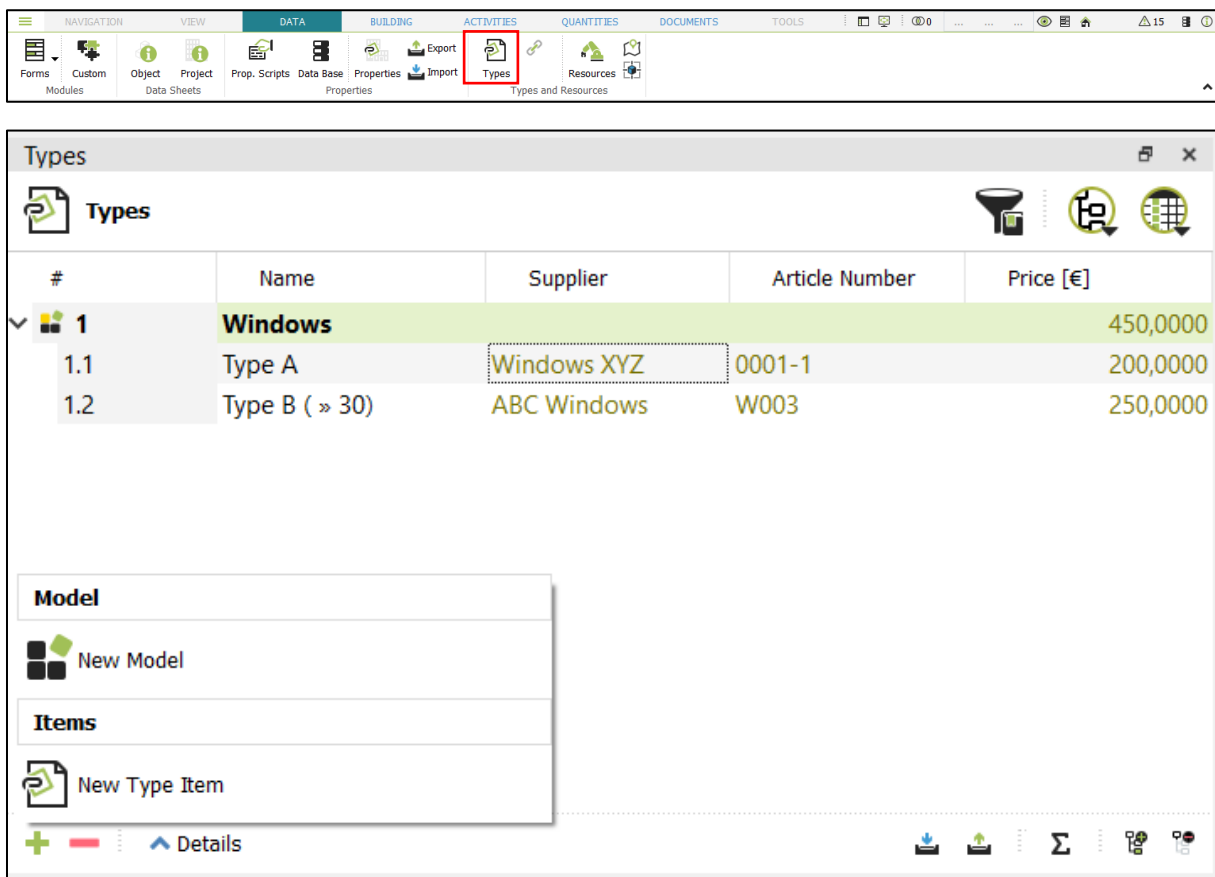
Name	Data type	Description
URL	xs:anyURI	For URL elements: the web address; for documents and directories: relative path in the project directory
GlobalURL	xs:anyURI	For URL elements: the web address; for documents and directories: absolute path in the project directory
RemoteURL	xs:anyURI	The web address of the directory added by a WebService.
ModelLocation	xs:string	Model coordinates of the point assigned to the document
GpsLocation	xs:string	GPS coordinates of the point assigned to the document
GpsLocationJSON	xs:string	GPS coordinates (in JSON format) of the point assigned to the document
GpsDirectionJSON	xs:string	For photo documents: GPS data (in JSON format) for the direction in which the photo was taken.
RefLocationID	xs:IDREF	ID (in the project structure) of the alignment linked to the document or ID of the section of the building structure linked to the document.
RefLocationFrom	xs:double	Start value of the stationing related to an alignment linked to the document.

RefLocationTo	xs:double	End value of the stationing related to an alignment linked to the document.
doc:HEAD	xs:string	Only for documents created from a .cp.json or .cpjson file and containing JSON with the key "HEAD": the HEAD value
doc:DATA	xs:string	Only for documents created from a .cp.json or .cpjson file and containing JSON with the key "DATA": the DATA value

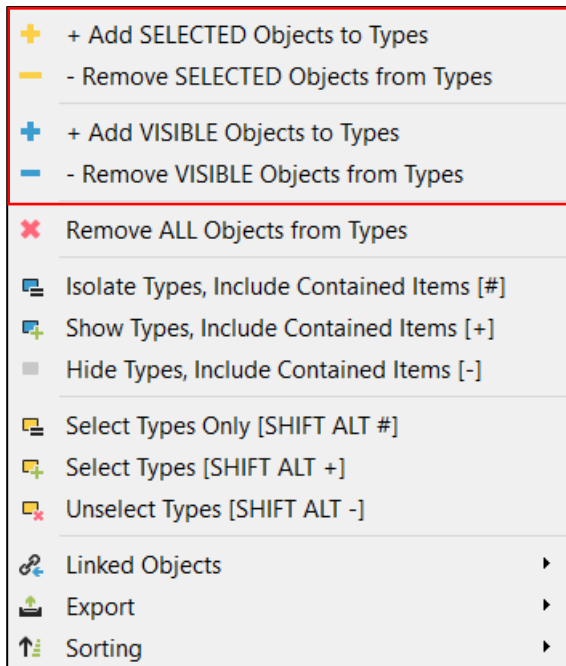
### 4.10 Types Domain

The domain Types allows you to group objects with the same property values into types, in order to manage and edit them more effectively.

Similar to the other domains, Types are organized in a hierarchical structure. Open the Types dialogue from the Data Ribbon tab:



You can add new Types models and Type items with the '+' button. To manually assign geometric objects to the Types, right click on the appropriate Type element and choose one of the options for manual linking:

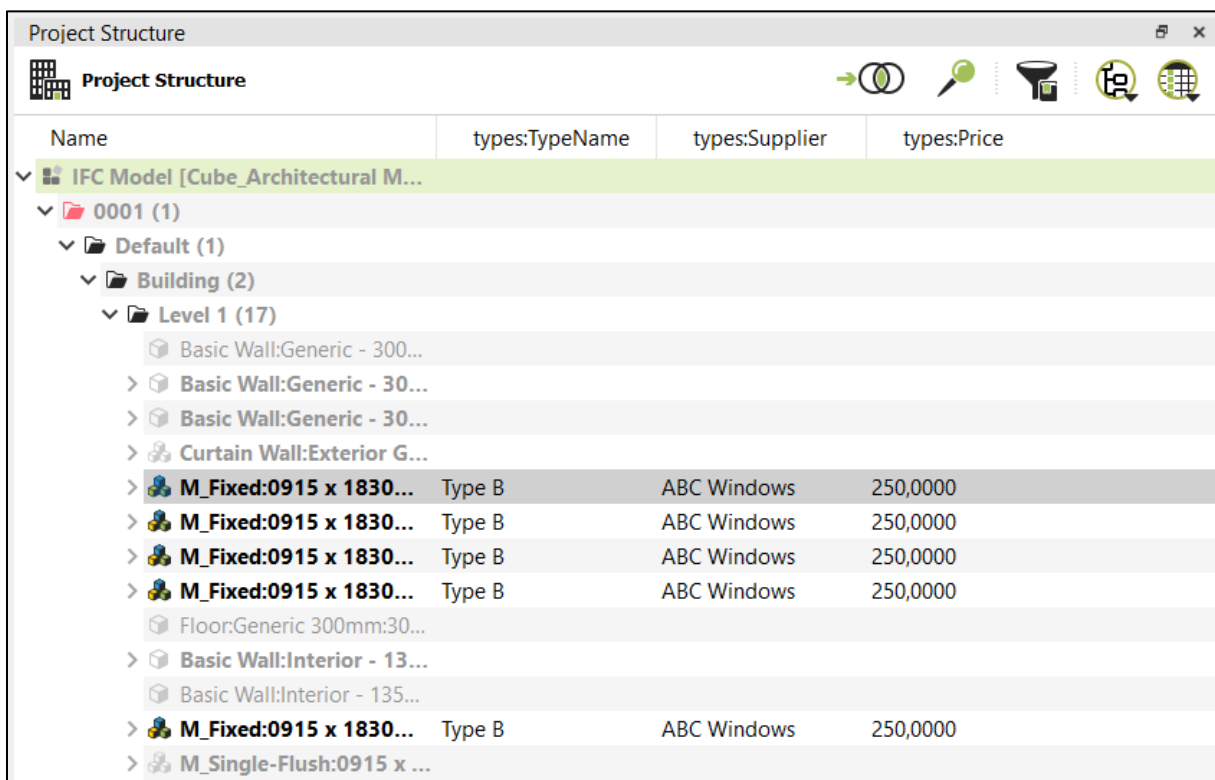


You can also use **Rule based linking** to assign geometry objects to the Types.

**Example:**

In the screenshot above, a new Type model with two Types ('Type A' and 'Type B') were defined. For these Types custom properties for supplier, article number and price were defined (see also: Fehler! Verweisquelle konnte nicht gefunden werden.).

The property values for each Type are now also available for the linked geometry objects in the Project structure. The prefix 'types:' indicates, that these properties are derived from the linked Type:



If a property value in the Types definition is changes (e.g. a new price), this value is immediately visible in the Project structure.

In the following screenshot, a **Selection Sets** was created that contains all windows in the project. With the type property 'types:Price' visible, it is now easily possible to calculate the total price for all windows with the formula '=SUM' (see also: Fehler! Verweisquelle konnte nicht gefunden werden.) in the top container:

The screenshot shows the 'Selection Sets' window with a table containing the following data:

Name	types:Price	types:TypeName
Building Object Types (IFC) (17)		
Window List (30)	7.500,0000	
M_Fixed:0915 x 1830mm:300008:1	250,0000	Type B
M_Fixed:0915 x 1830mm:300285:1	250,0000	Type B
M_Fixed:0915 x 1830mm:299891:1	250,0000	Type B
M_Fixed:0915 x 1830mm:300110	250,0000	Type B
M_Fixed:0915 x 1830mm:302650	250,0000	Type B
M_Fixed:0915 x 1830mm:300286:1	250,0000	Type B
M_Fixed:0915 x 1830mm:300286	250,0000	Type B
M_Fixed:0915 x 1830mm:299891:2	250,0000	Type B
M_Fixed:0915 x 1830mm:300285:2	250,0000	Type B
M_Fixed:0915 x 1830mm:303268:2	250,0000	Type B
M_Fixed:0915 x 1830mm:303024:2	250,0000	Type B
M_Fixed:0915 x 1830mm:300062:2	250,0000	Type B

**Hint:**

A geometry object should only be linked with one Type element. If you link a geometry object with multiple Types, the derived values show a warning with 'undef' in the data tables:

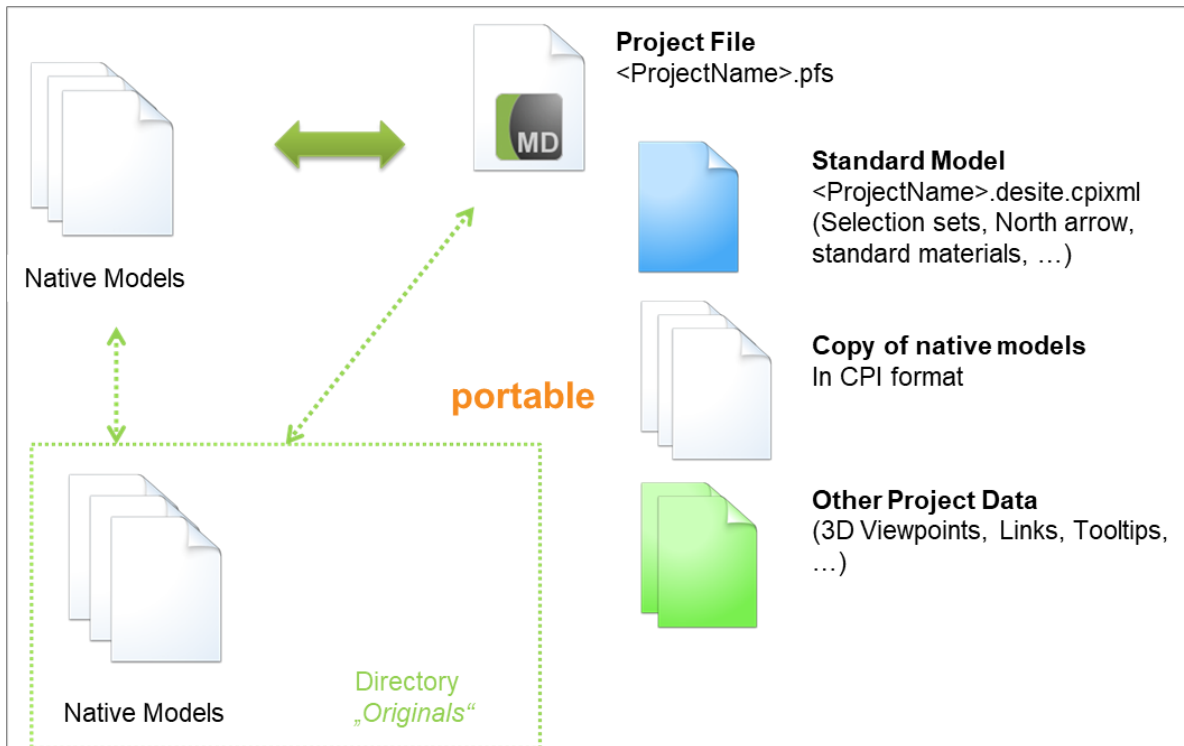
The screenshot shows the 'Project Structure' window with a table containing the following data:

Name	types:TypeName	types:Supplier	types:Price
IFC Model [Cube_Architectural M...			
0001 (1)			
Default (1)			
Building (2)			
Level 1 (17)			
Basic Wall:Generic - 300...			
Basic Wall:Generic - 30...			
Basic Wall:Generic - 30...			
Curtain Wall:Exterior G...			
M_Fixed:0915 x 1830...	undef	undef	undef
M_Fixed:0915 x 1830...	Type B	ABC Windows	250,0000
M_Fixed:0915 x 1830...	Type B	ABC Windows	250,0000
M_Fixed:0915 x 1830...	Type B	ABC Windows	250,0000



## 5. Project File Structure

Current project can be saved in native pfs format in the application menu. A new folder should be created for this purpose since individual files are created directly in the specified directory.



Project can also be opened by executing the project file.

Contents of a DESITE Project

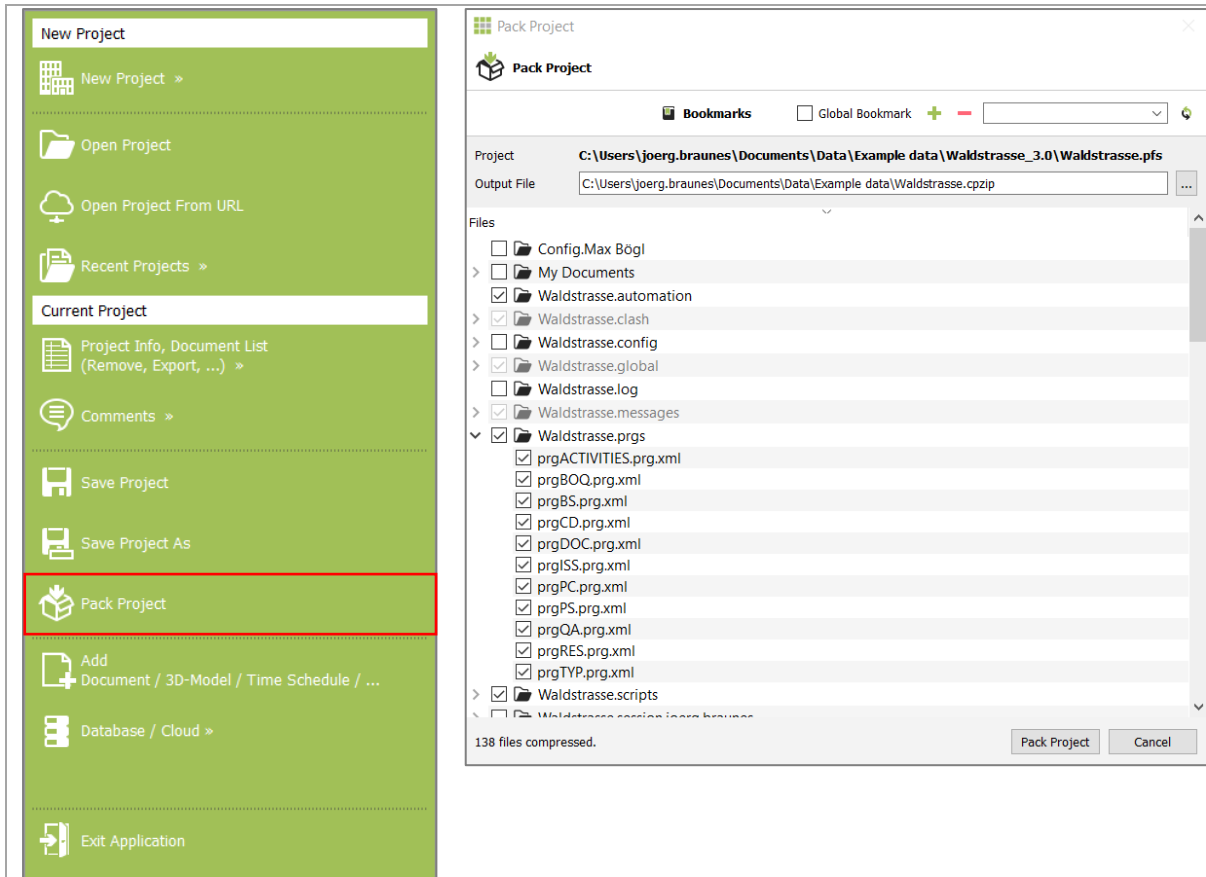
Folder	
desite.modules	Standard DESITE folder for additional Web Forms
<ProjectName>.automation	Automated scripts (Menu: Tools/Automation)
<ProjectName>.clash	Results of the clash runs
<ProjectName>.cloud	
<ProjectName>.global	Global bookmarks (available to everyone project-wide)
<ProjectName>.messages	Session events
<ProjectName>.prgs	Property scripts (Menu: Data/Scripts)
<ProjectName>.scripts	Global scripts (Menu: Tools/Scripts)
<ProjectName>.session.dh	Personal bookmarks

<ProjectName>.templates	Templates, e.g. QuickInfo.html
<ProjectName>.textures	
<ProjectName>.viewpoints	Thumbnails of 3D viewpoints
<b>Files</b>	
<ProjectName>.pfs	Project file, contains a directory of all project files
<ProjectName>.db	Standard project database (SQLite)
<ProjectName>.lock	Lock file, shows that a user has opened the project
<ProjectName>.prjACT.xml	Domain projects for the data domains (in this order): Activities, Bill of Quantities, Building Structure, Clash Detection, Documents, Geometry, Process Components, Properties, Quality Assurance, Resources, Types
<ProjectName>.prjBOQ.xml	
<ProjectName>.prjBS.xml	
<ProjectName>.prjCD.xml	
<ProjectName>.prjDOC.xml	
<ProjectName>.prjGEO.xml	
<ProjectName>.prjPC.xml	
<ProjectName>.prjProp.xml	
<ProjectName>.prjQA.xml	
<ProjectName>.prjRES.xml	
<ProjectName>.prjTYP.xml	Contains a Repository, Links (Relations) and also Linking Rules
10816.modBOQ.xml	Various domain models For performance reasons, geometric models are compressed and saved in native .cp2 format by default
18822.modTYP.xml	
25178.modBOQ.xml	
27827.modDOC.xml	
28728.modTYP.xml	
49614.modPC.xml	
53384.modGEO.cp2	
63650.modBS.xml	
<ImportedGeometryFile1>.desite.cp2	Cache of an imported geometry file
<ImportedGeometryFile2>.desite.cp2	Cache of a second imported geometry file
<ImportedSchedule1>.tmap	Cache of an imported time schedule (mapping/link activity to geometric object and time schedule itself)
<ImportedSchedule1>.tsxml	
<ProjectName>.cs.xml	Color scheme s
<ProjectName>.cut.xml	Cutting positions for split objects into parts
<ProjectName>.desite.cpixmap	North arrow, standard colors
<ProjectName>.lck.xml	Locked objects
<ProjectName>.location.xml	Geocoordinates of the project
<ProjectName>.objMap.xml	Links between objects
DbInputForm.html	Front page for Forms
<ProjectName>.ptype.xml	Property types
<ProjectName>.qa.xml	Model checking rules (is no longer used)
<ProjectName>.setGEO.xml	Selection sets
<ProjectName>.tip.xml	List of objects for permanent tooltips
<ProjectName>.tv.xml	Top views
<ProjectName>.vis.xml	Visualisation styles for 4D simulation



<ProjectName>.vp.xml	Saved 3D Viewpoints
<ProjectName>.wms.xml	Wire mode scheme

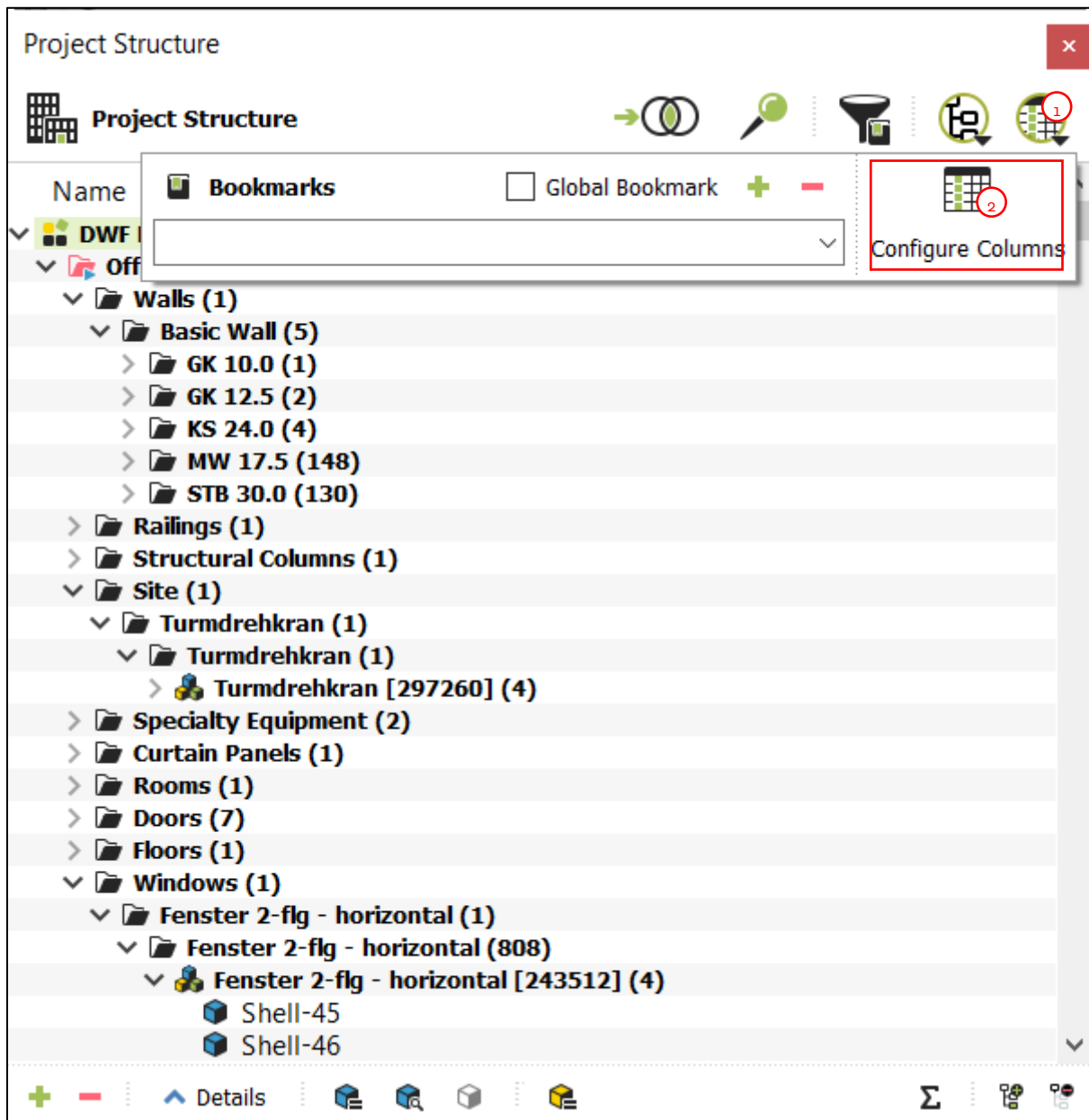
If you would like to forward a project to another stakeholder, you can pack it in the native .cpzip format. When you open a .cpzip file, all the files contained within the project are unpacked and placed in the same directory.



## 6. Working with Properties

### 6.1 Properties in the domain tree structure

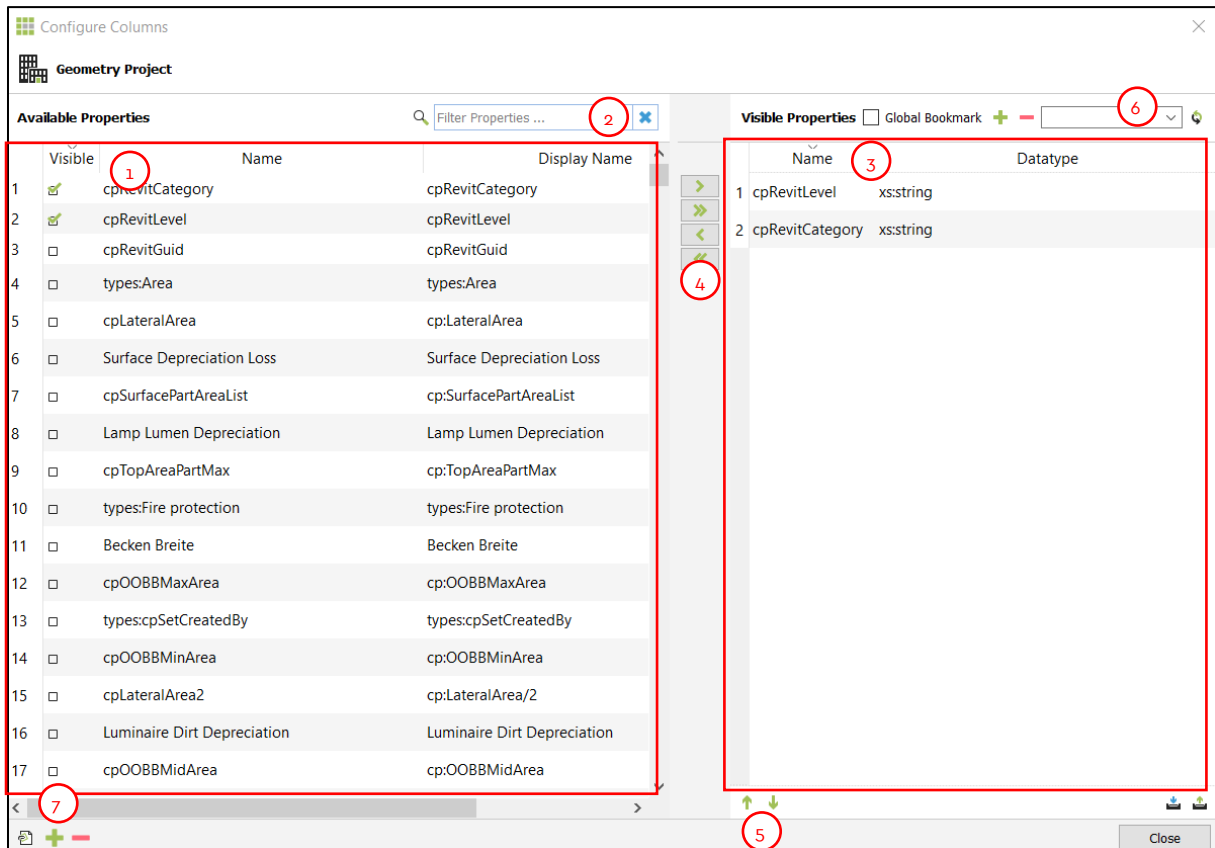
Properties of objects and domain elements can be displayed in the domain tree structure in table format. You can set the object properties to be displayed in the structure table.



1. Click on Column configuration / Bookmarks button and then on
2. Configure columns.

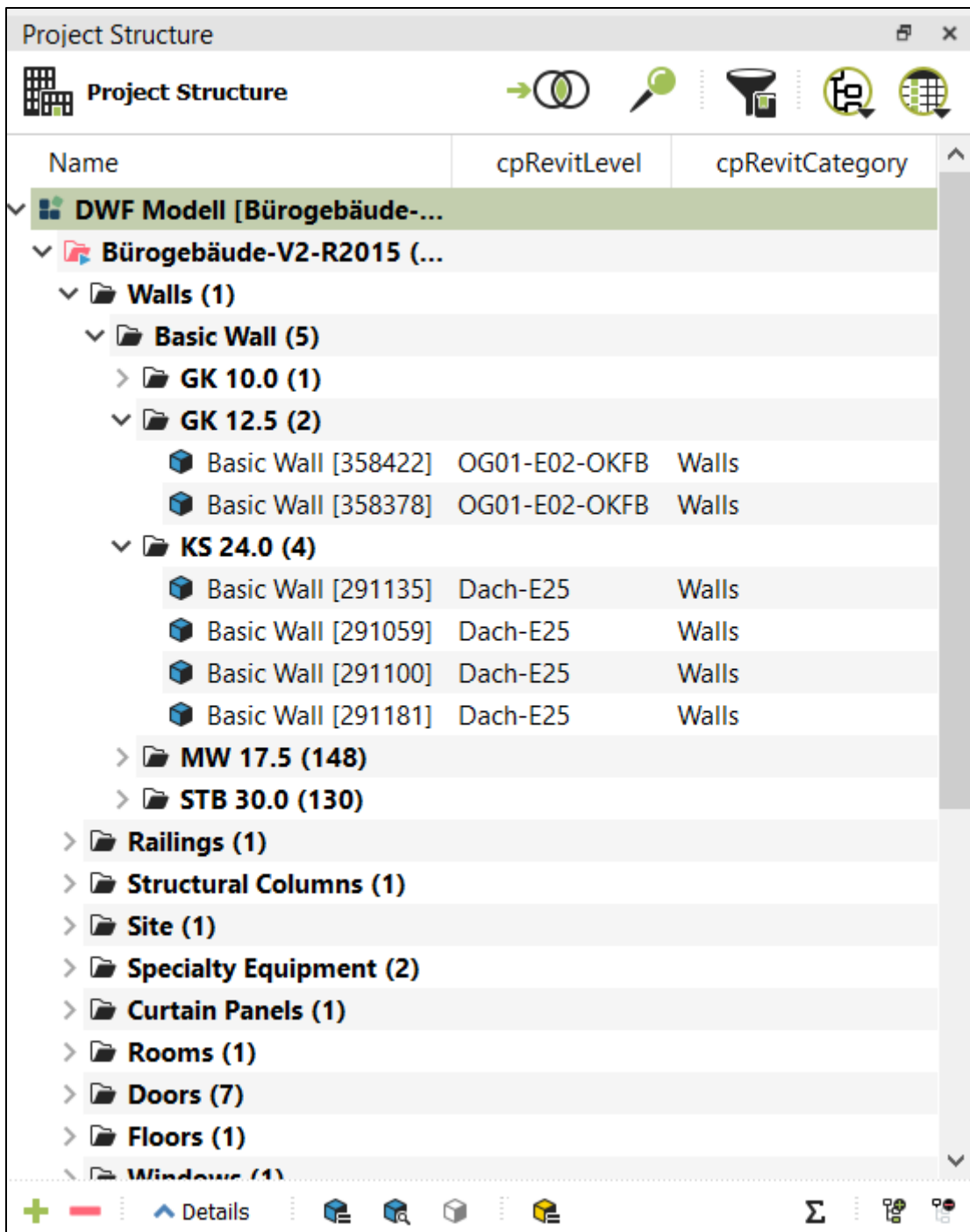
Configure columns window will open. From a list of all available object properties, you can select those to be displayed as columns in the project structure table.

**Tip:** A customized column configuration is useful for filtering the model elements and creating selection sets in the geometry domain.



1. List of all available properties for the active Domain
2. Filter the list of available properties by typing in any name. Use the check box under Visible or click on the desired property and use > button to add it to the visible properties.
3. List of visible properties to be displayed as columns in the project structure table
4. Use the arrow button to add / remove one or multiple properties from the list of visible properties
5. Use the arrow button to move a selected property up or down
6. You can save your configuration of properties if you insert a name in the bookmark list and press '+' button at the upper right corner to create a bookmark.
7. Use the '+' button to create new properties and the - button to delete a property permanently from the project

**Result:** two new columns are displayed now in the project structure table:



### 6.1.1 Custom Properties Types

You can create own Properties Types with the '+' button on the 'Configure Columns' dialog, in order to extend your project with additional data:

### Create Property Type

---

Name

Data type

Unit

Inheritable

---

Create in  Memory / Domain Project  
 Database

---

The name and data types defines the uniqueness of a Property Type per domain. The option 'Inheritable' defines, if a property value will automatically assigned to all child elements of an object. Inherited values are marked in red:

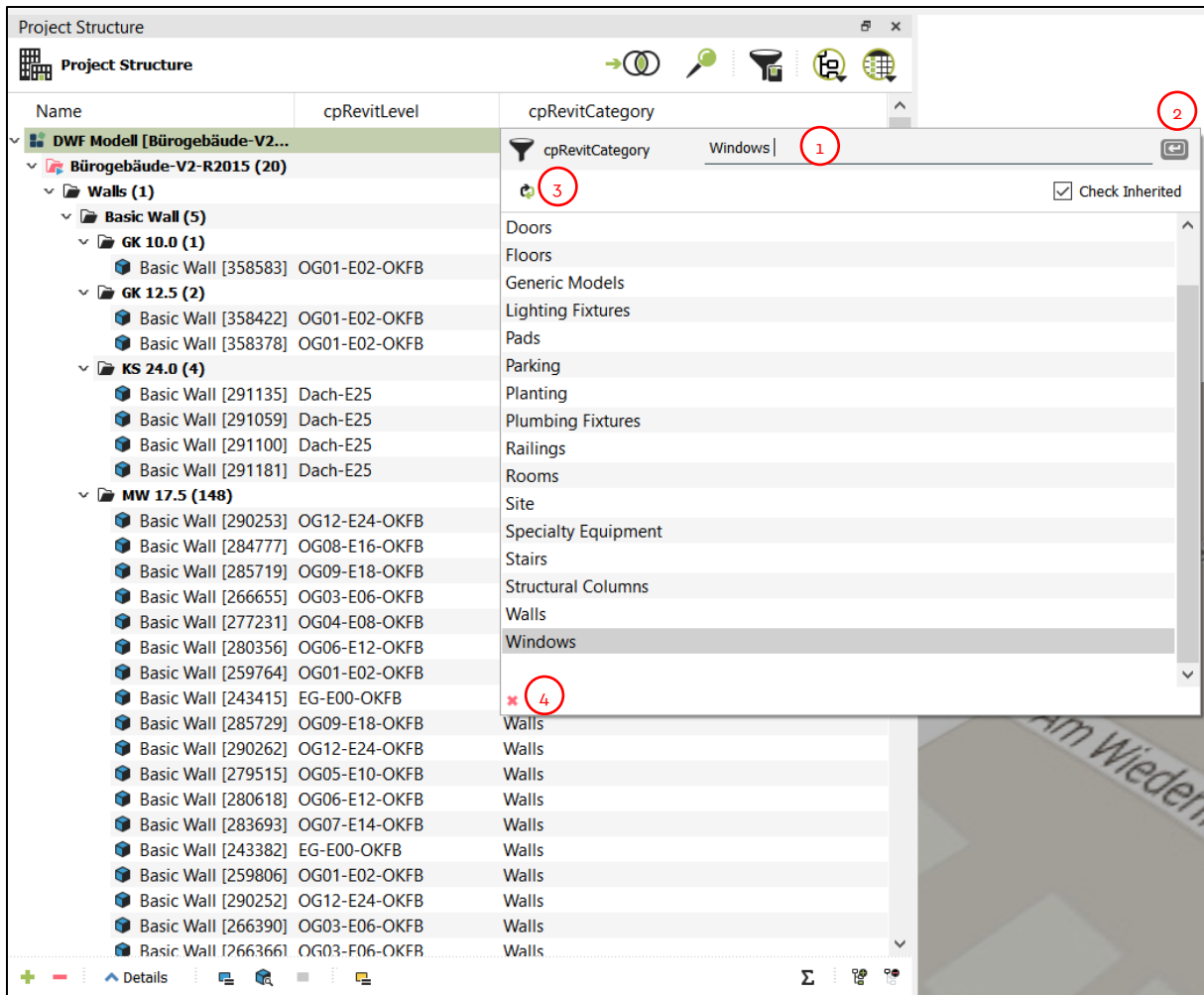
Name	CustomProperty [m3]
IFC Model [Cube_Architectural Model.ifc] (1)	
0001 (1)	
Default (1)	
Building (2)	
Level 1 (14)	3,0000
Basic Wall:Generic - 300mm:299076	3,0000
Basic Wall:Generic - 300mm:299077 (1)	3,0000

The Property Values can either be stored within the project (domain xml files) or in a database, if any is assigned to the project (see [Connecting to a Database](#)).

### 6.1.2 Filters

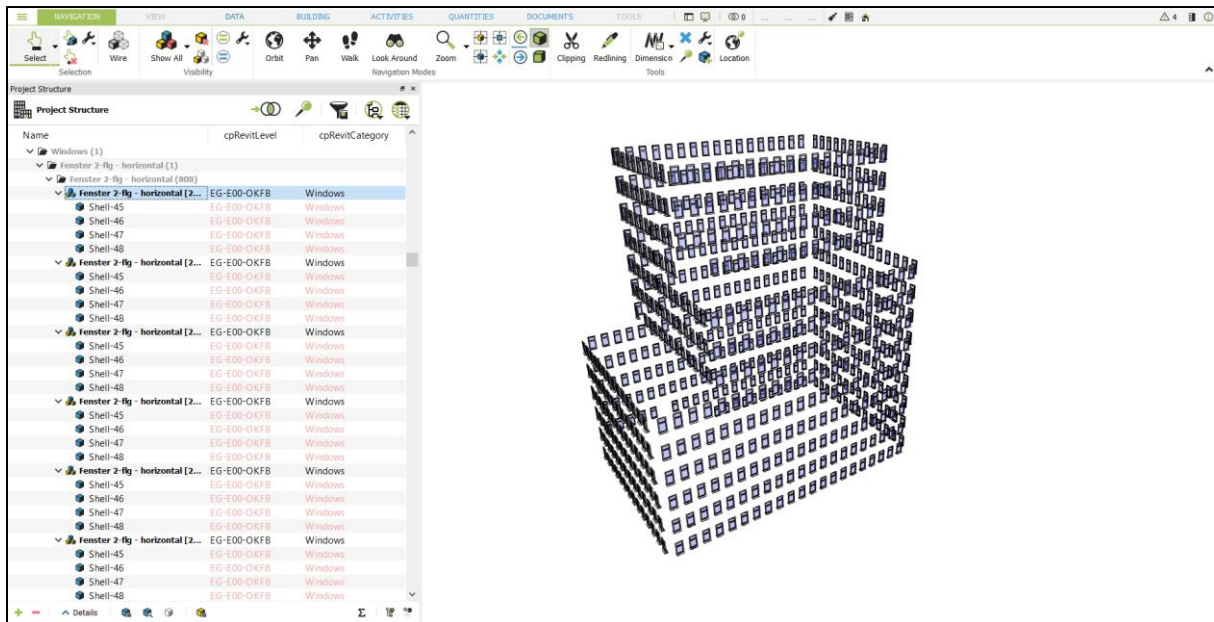
Model objects in the tree structure can be filtered according to any desired criteria. Filtered object will be drawn in grey color in the tree structure. If you filter 3d geometry models, this will also hide the model in the 3d view.

Click on the column header (e.g. 'cpRevitCategory' in this example) in order to open the filter menu:



1. Enter field for filter expression
2. Apply filter (you can also press 'Enter')
3. Update preview (note: not all available values are visible in the preview list. This depends on the amount of different values)
4. Remove current filter

If you want to filter model objects by value 'Windows' for the attribute 'cpRevitCategory', for example, choose 'Windows' from the list. Once you press Enter key, only those objects which contain property value 'Windows' will be displayed in 3D view.



Wildcards and operators can also be used to apply filters. For example '!' symbol negates the filter and all objects will be found which do not contain the value in a property.

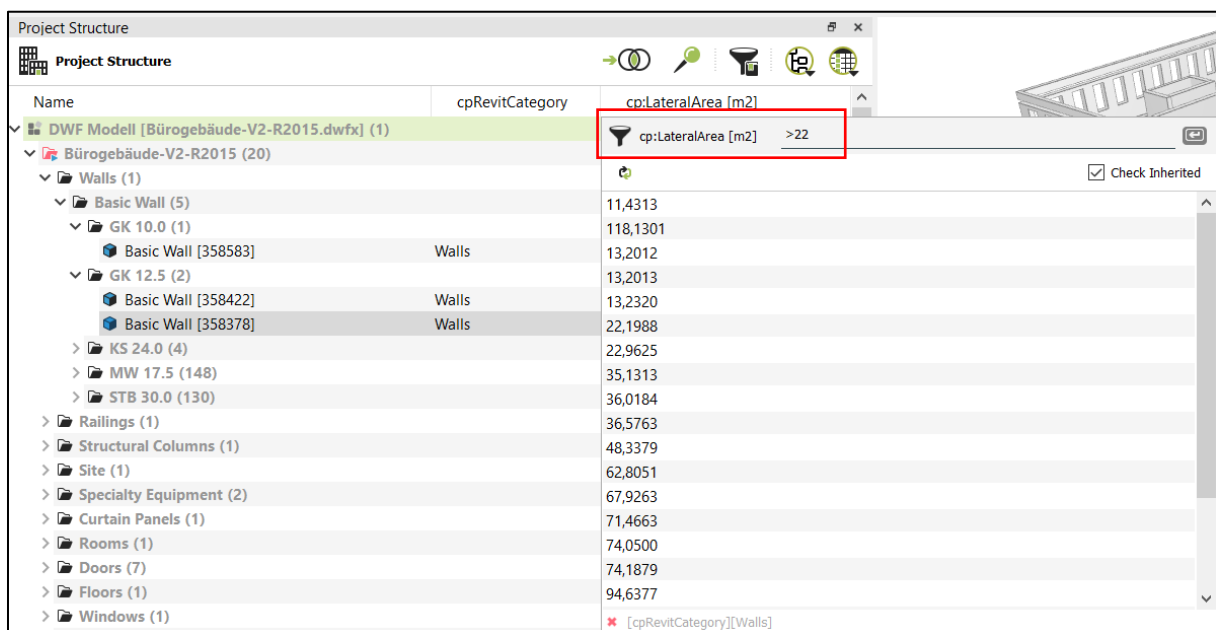
The following wildcards and operators are supported:

Search term	Description
<b>Wa*</b>	Text that begins with 'Wa', such as 'Wall'
<b>*wall*12.*</b>	Text that contains the elements 'Wall' and '12.', such as 'BasicWall_12.5'
<b>Concrete Steel Masonry</b>	Text is either 'Concrete' or 'Steel' or 'Masonry'
<b>'Basic Wall XY'</b>	Text equals 'Basic Wall XY' (without quotation marks, this would mean 'Basic Wall' or 'XY')
<b>!Wa*</b>	Text that does not begin with 'Wa'
<b>Wa* Wind*</b> (space in between)	Text that begins with 'Wa' or 'Wind'
<b>&gt; C</b>	All text that begins with D, E, F etc.
<b>&lt; o</b>	All negative numbers
<b>!*</b>	Property is not present/defined
<b># Wa*</b>	Remove all applied filters (i.e. no AND relation) and then show all objects which the property value begins with 'Wa'.

**Notes:**

- Filter is always applied to the currently visible partial models.
- Placing a '#' at the beginning of search term means that filter will not only be applied to the visible elements, but also to all available elements in the project structure.
- Space in the expression means an OR relation.
- Multiple filters include an AND relation.
- Search term is not case sensitive.
- '\*' is a placeholder for any desired term.

It is also possible to combine multiple filters. In the following example, the objects are already filter by the value 'Walls' in the property 'cpRevitCategory'. Now an additional filter is entered to show only walls with a lateral area bigger than 22:



It is possible to filter with values and also with operators:

**Values:**

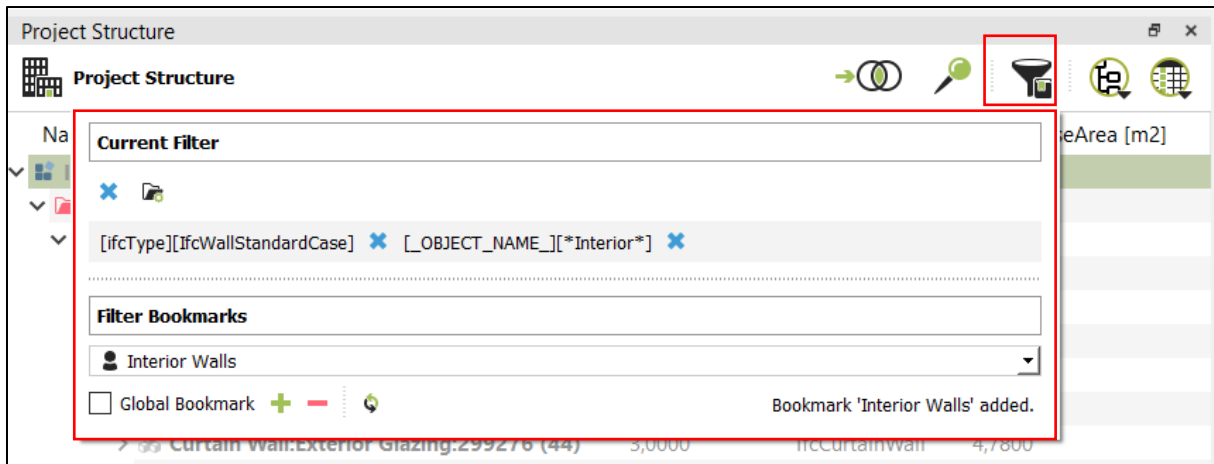
- Single values or wildcards
- Enumerations: a1 a2 a3

**Operators:**

- Equal: [without special character]
- Unequal/ not equal: !
- Greater/ greater than equal: >, >=
- Smaller/ less equal: <, <=

With the 'Filter Bookmarks' tool, you can edit all currently assigned filters, save them as bookmarks and apply already available filter bookmarks:

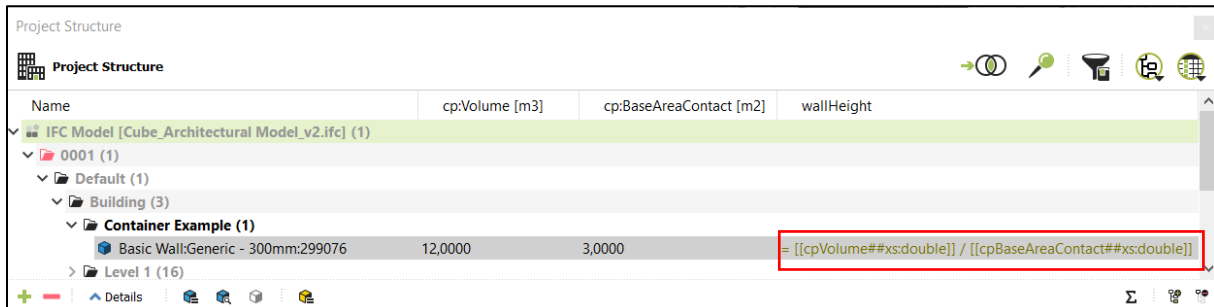




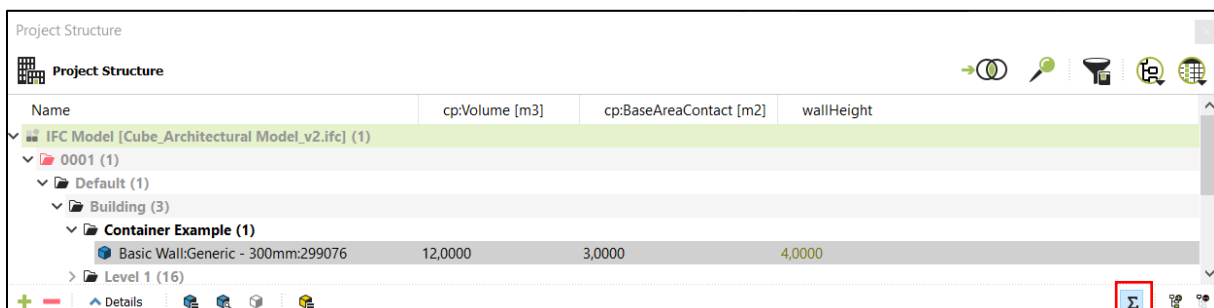
### 6.1.3 Formulas and Inheritance

You can use formulas in property value fields to create simple calculations based on other property values of the element.

The following example shows a simple calculation of a wall height from the geometric properties 'cpVolume' and 'cpBaseAreaContact' (for more information about derived geometric properties, see **Properties for Geometry domain**) in the property 'wall height':

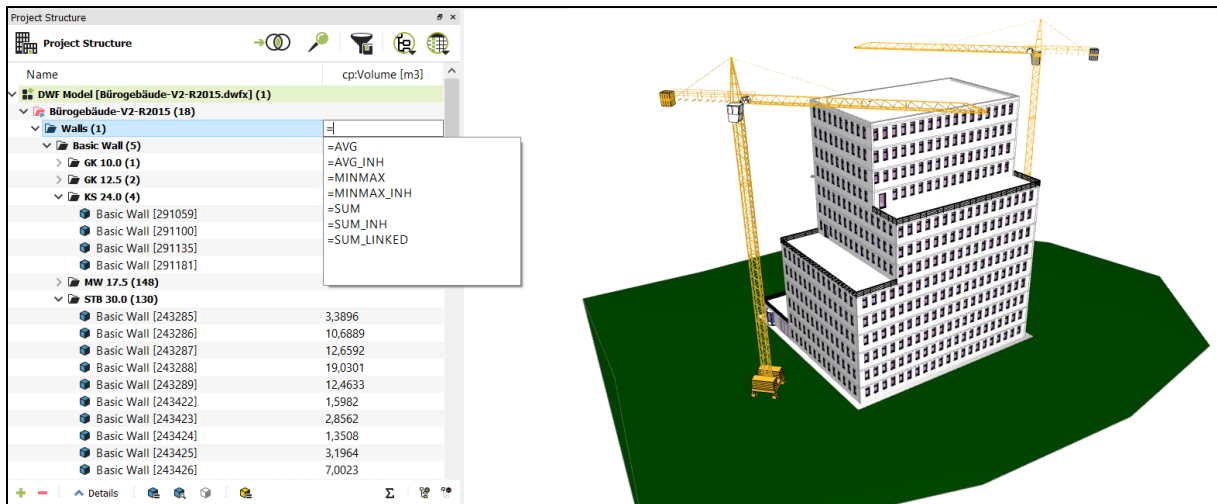


To see the result, turn on the calculation with the 'Sum' icon:



### Aggregate functions

Aggregate functions can be used at any point in domain structure, i.e. to calculate total volume of all walls.



Since property values are inherited from parent elements to their children by default, you often need to insert aggregate function at the highest hierarchical level.

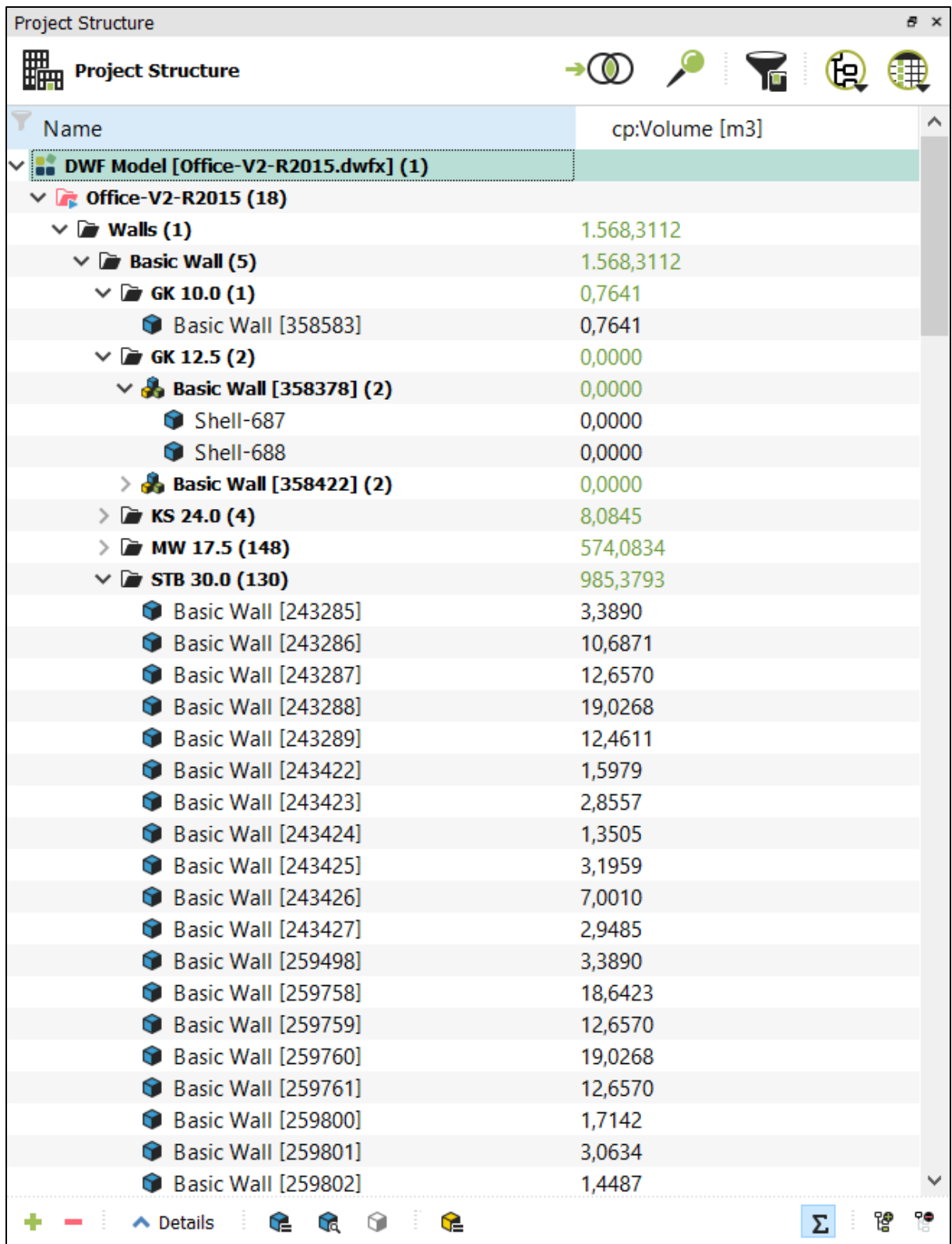
1. Inherited values are displayed in red.

Project Structure

Project Structure

Name	cp:Volume [m3]
▼ DWF Model [Office-V2-R2015.dwfx] (1)	
▼ Office-V2-R2015 (18)	
▼ Walls (1)	=SUM
▼ Basic Wall (5)	=SUM
▼ GK 10.0 (1)	=SUM
Basic Wall [358583]	0,7641
▼ GK 12.5 (2)	=SUM
▼ Basic Wall [358378] (2)	=SUM
Shell-687	0,0000
Shell-688	0,0000
> Basic Wall [358422] (2)	=SUM
> KS 24.0 (4)	=SUM
> MW 17.5 (148)	=SUM
▼ STB 30.0 (130)	=SUM
Basic Wall [243285]	3,3890
Basic Wall [243286]	10,6871
Basic Wall [243287]	12,6570
Basic Wall [243288]	19,0268
Basic Wall [243289]	12,4611
Basic Wall [243422]	1,5979
Basic Wall [243423]	2,8557
Basic Wall [243424]	1,3505
Basic Wall [243425]	3,1959
Basic Wall [243426]	7,0010
Basic Wall [243427]	2,9485
Basic Wall [259498]	3,3890
Basic Wall [259758]	18,6423
Basic Wall [259759]	12,6570
Basic Wall [259760]	19,0268
Basic Wall [259761]	12,6570
Basic Wall [259800]	1,7142
Basic Wall [259801]	3,0634
Basic Wall [259802]	1,4487

2. Calculated values are displayed in green,



3. Results of formulas can be displayed by clicking on  $\Sigma$  sign

Following aggregate functions are available:

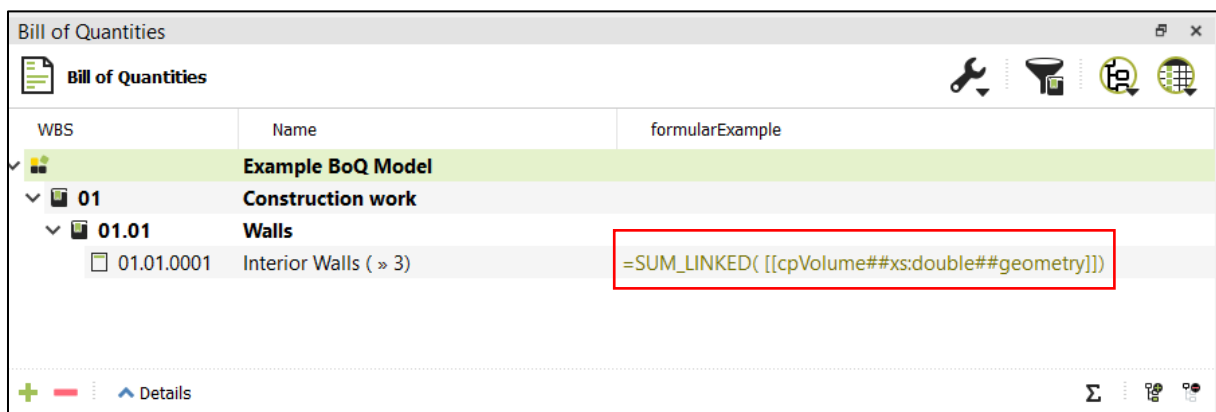
<b>AVG</b>	Average value
<b>AVG_INH</b>	Average value including inherited values

<b>MINMAX</b>	Minimum and maximum values
<b>MINMAX_INH</b>	Minimum and maximum values including inherited values
<b>SUM</b>	Sum
<b>SUM_INH</b>	Sum including inherited values
<b>SUM_LINKED(variable)</b>	Sum of expression in brackets (e.g. a property type) of all linked objects

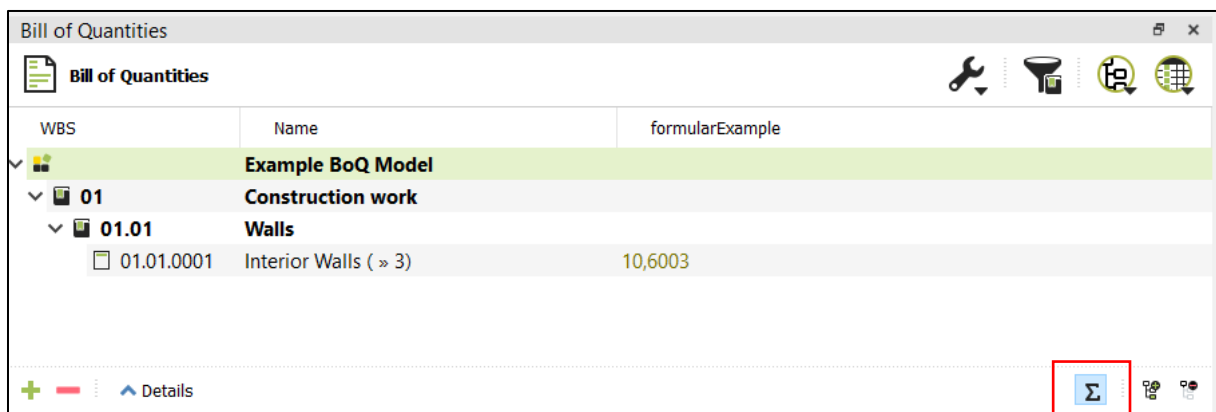
### Aggregation function with linked objects

The function 'SUM\_LINKED' allows you to do a calculation based on property values of the linked geometry objects.

The following example shows a work item in the **Bill of Quantities** domain. A custom property type 'formularExample' (see Custom Properties Types) with the data type 'double' was created. The formula calculates the sum of the property 'cpVolume' off all linked geometry objects:



To see the result, turn on the calculation with the 'Sum' icon:



### 6.1.4 Details View

In the domains, a detail view can be expanded, in which details of the current element (selected row) are displayed with an HTML form.

The detail view can be configured with a template. A standard template is delivered with DESITE and is deposited in the installation of the software in the program directory.

Bill of Quantities

Bill of Quantities

WBS	Name
LV	desite MWM Musterprojekt Hochbau
01	Hauptgebäudeturm
01.01	Baustelleneinrichtung
01.01...	Baustelleneinrichtung einrichten, vorhalten, räumen
01.01...	Dokumentation der Bauabrechnung
01.02	Erdarbeiten
	Erdarbeiten nach DIN 18300
01.02...	Boden Baugrube lösen, lagern Tiefe bis 2,8 m Bodenklasse 3
01.02...	Boden Graben Kanal Tiefe bis 1,45 m lösen, lagern Bodenklasse 3
01.02...	Oberboden abtragen, lagern d= 30 cm Bodengruppe 4
01.02...	Betonpflaster L/B 100/100 mm H 80 mm grau
01.02...	Betonpflaster L/B 100/100 mm H 80 mm in MWM-blau
01.02...	Betrieb Wasserhaltungsanlage
01.03	Maurerarbeiten
01.04	Betonarbeiten
01.05	Nachträge
02	Nebengebäude

OZ	Menge	ME	EP in EUR	GP in EUR
01.02.0050		0 m2	22.41	0.00

Betonpflaster L/B 100/100 mm H 80 mm in MWM-blau

Pflasterdecke ZTV P-StB, Förderweg bis 4 km, aus Pflastersteinen aus Beton DIN EN 1338 blau, max. Differenzen J, Witterungswiderstand B, Abriebwiderstand H, gefast, Maße L/B 100/100 mm, Höhe 80 mm, in Reihen, in Fußgängerzonen, Bettung aus Kiessand, Körnung 0/4, Dicke 3 bis 5 cm, Pflasterfugen verfüllen mit Sand.

**Tip:** If you select a new entry in the domain table, you have to click on the button Update details. When the padlock symbol is closed, details are updated automatically for selected entry.

### Configuration

The templates for the details are reloaded at runtime. The order of the directories where templates are searched is:

1. [PRJNAME].session/gui/ user
2. [PRJNAME].templates/gui/ project
3. [APPDIR]/gui/ Global

The following files are searched in these folders according to the domain.

Example: Bill of Quantity:

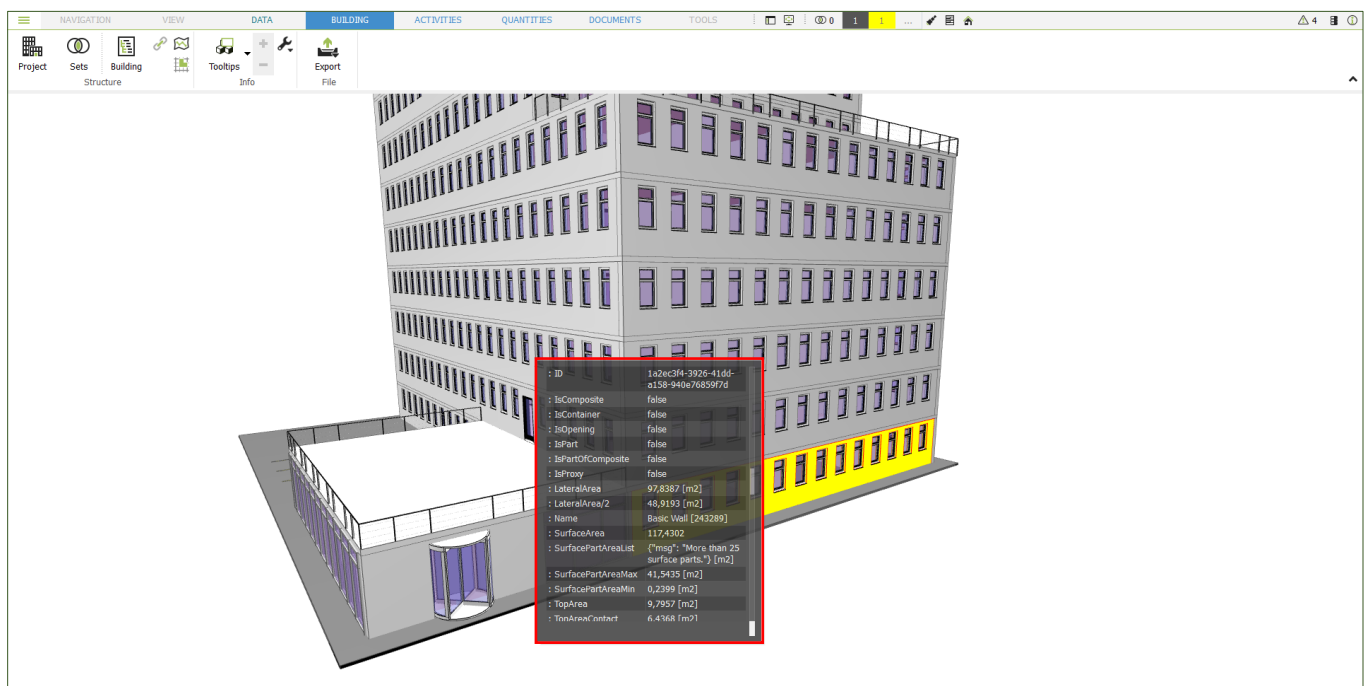
- <...>/gui/domainWorkScope/Item.html
- <...>/gui/domainWorkScope/Model.html

## 6.2 Display Property Information

Properties of Geometry Objects can be displayed in several ways.

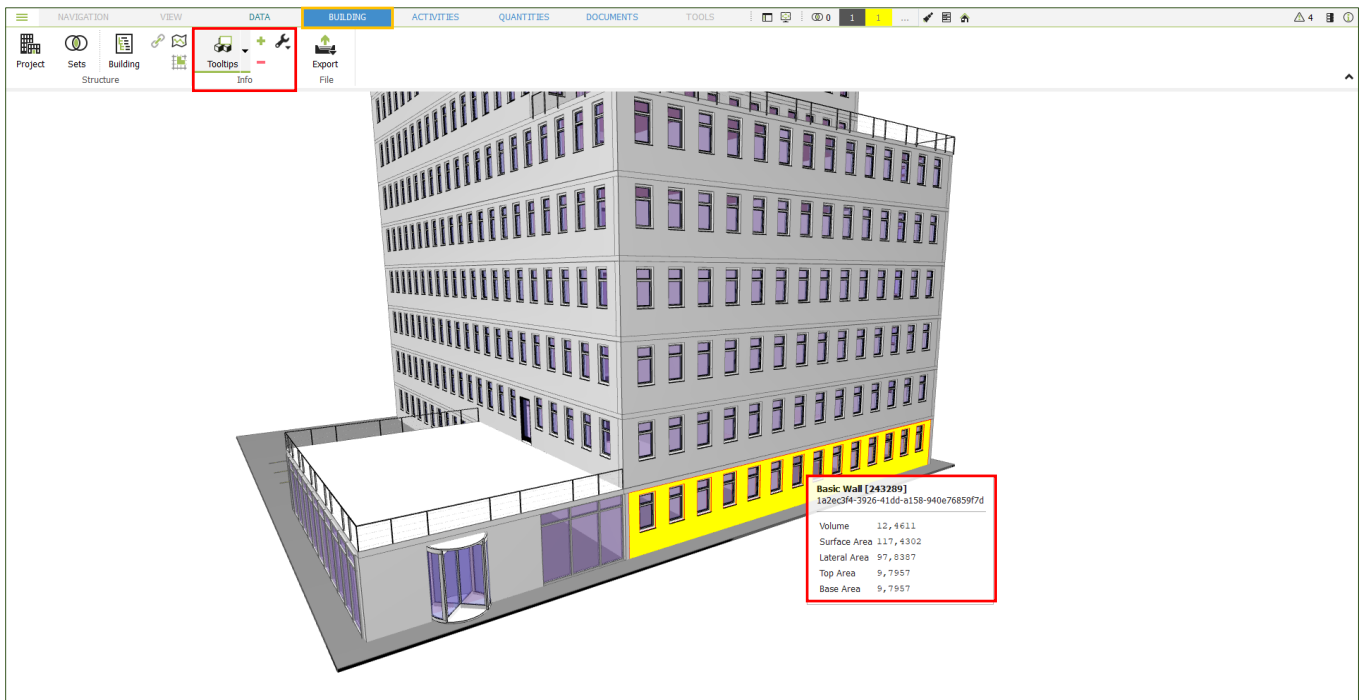
### 6.2.1 Quickinfo & Tooltips

Use I key to access QuickInfo. A list of properties of the selected objects are listed in the QuickInfo window by default.



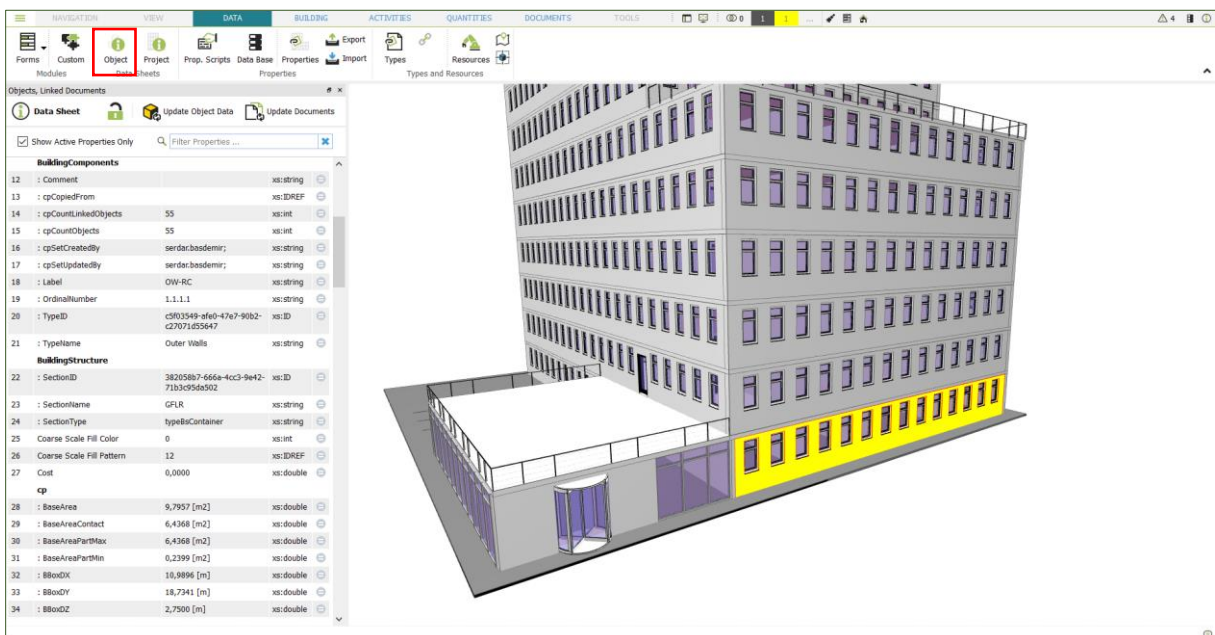
**Tip:** Properties listed in QuickInfo can also be displayed in the Data Sheet under Data menu tab.

Use 'T' key to access Tooltips. Name, ID and geometric properties of the selected object(s) are displayed in the tooltip window. Alternatively, you can open tooltips by clicking on the Tooltips button in the Building toolbar.



## 6.2.2 Data Sheet

You can open Data Sheet by clicking on Object under Data menu tab. All available information and properties of the model objects are displayed in data sheet.



Close the lock to get an immediate update of the object data after selecting another object



If the lock is not closed, you can update the data sheet for the current object selection



Shows a list of all linked Documents (see **Documents Domain**) for the current selected object.

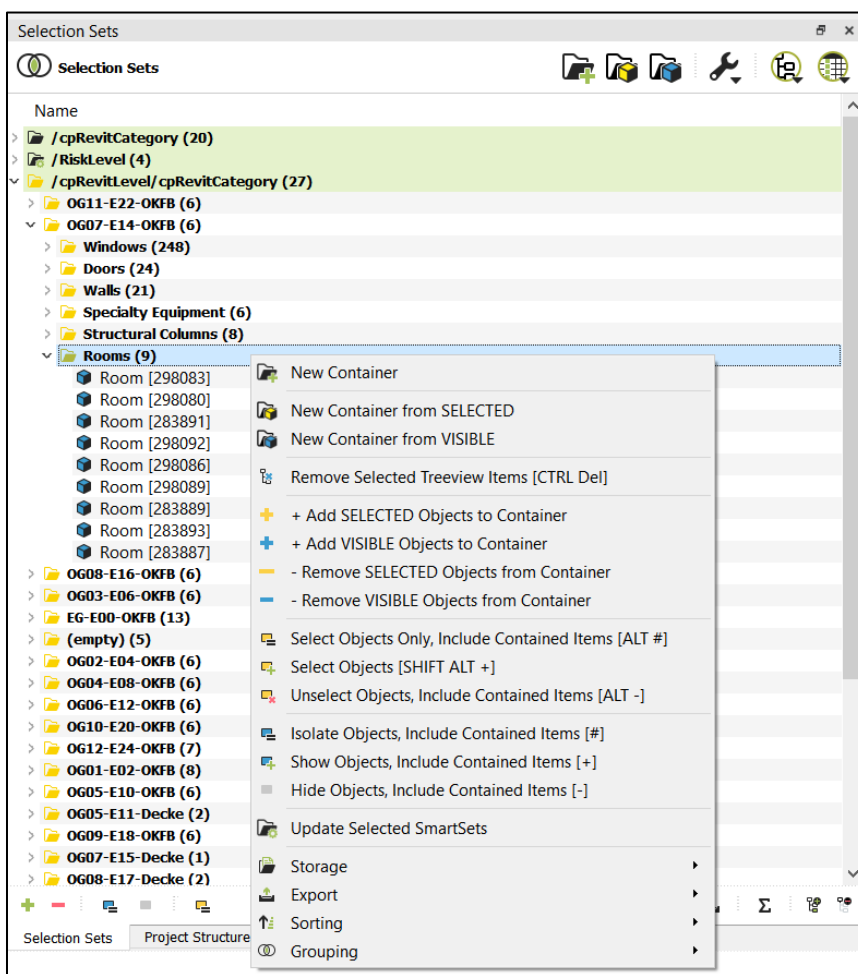


### 6.3 Selection Sets

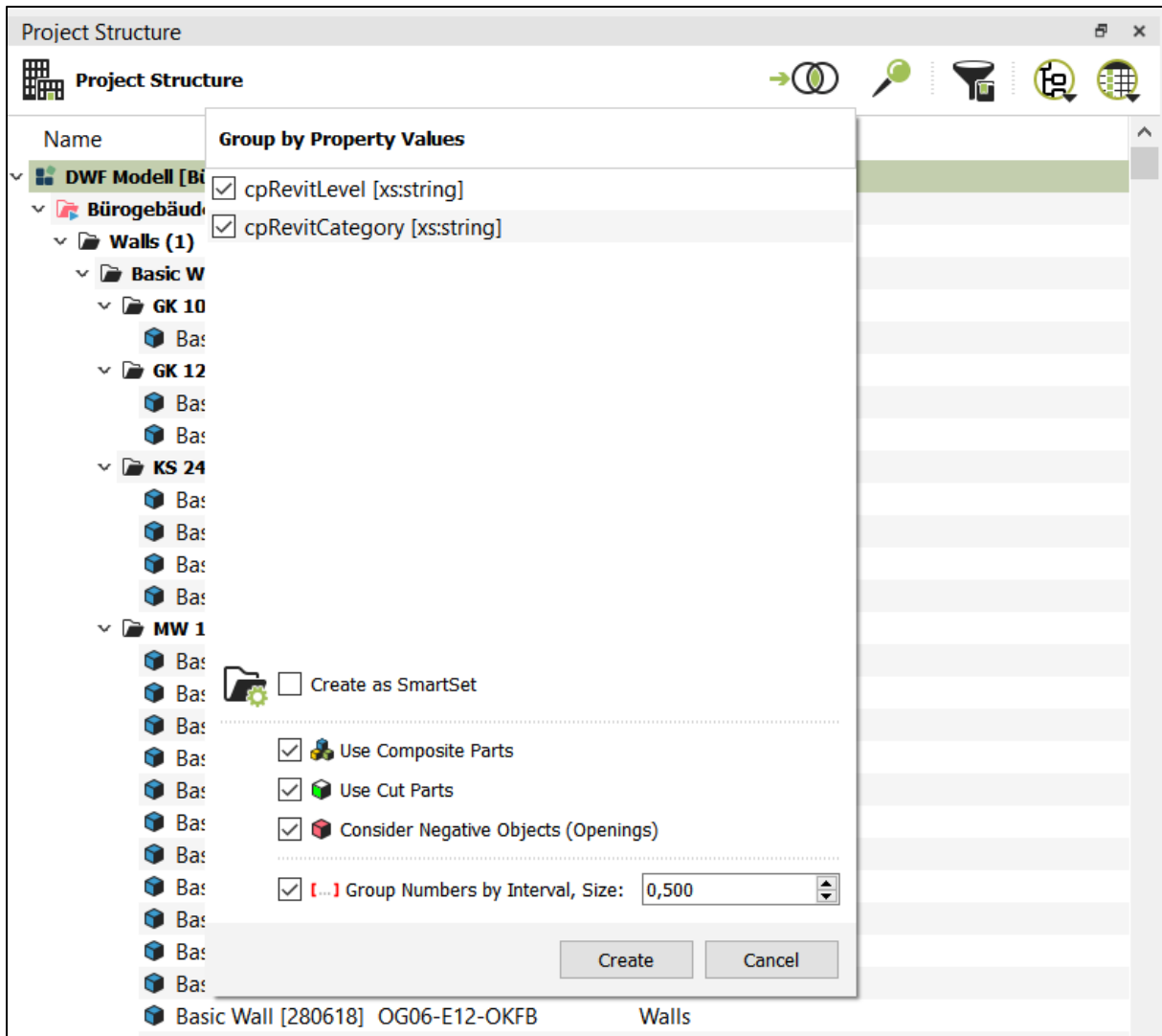
Selection sets are a way of combining certain partial models and defining your own structure of model data. You can open selection sets window by clicking on Sets button in the Building toolbar.



Object properties can also be displayed in this window, as in the project structure. You can also show and hide, select and deselect objects in the selected sets.



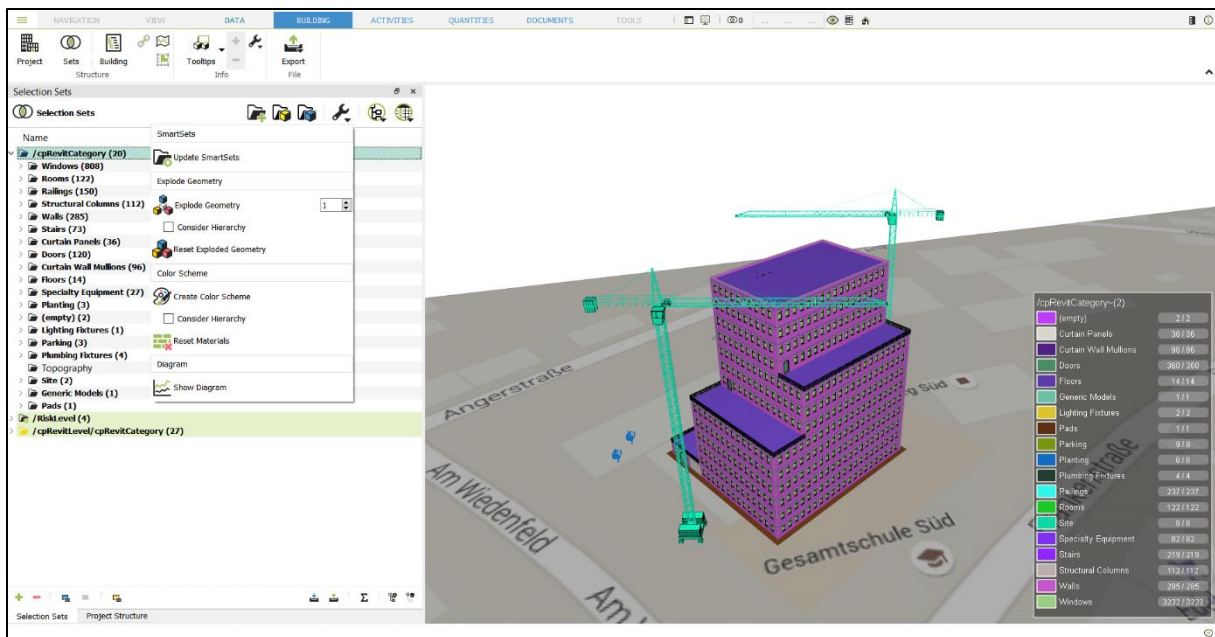
Selection sets can automatically be created in Project Structure. Here visible objects, which are hierarchically structured according to the selected properties in the dialogue, are combined into new data sets.



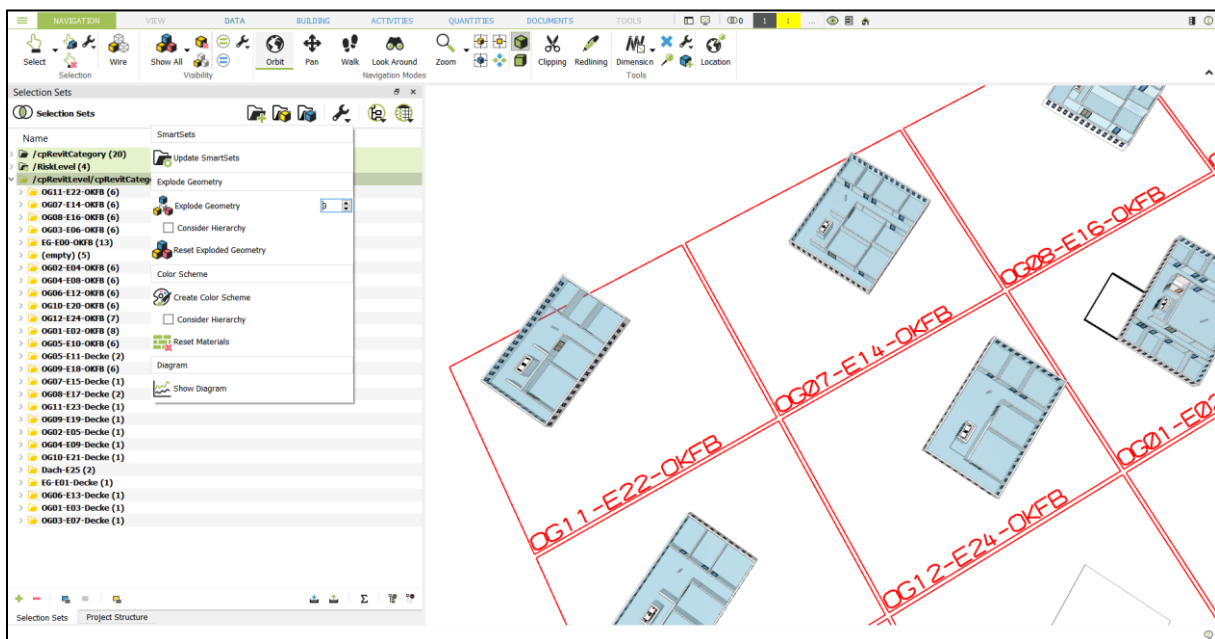
**Tips:**

- When creating selection sets, it is possible to specify whether sub-parts and Composites are included in the set or their sub-components. Opening elements can also be taken into consideration in the same way.
- Smart sets store the rules for creating selection set, in addition to the structure and the objects. Use smart sets if you want to update the selected set with the new objects after updating the model.
- Both in project structure and in selection sets, you can export entire model or only partial models in cpixml format.

With selection sets, it is possible to visualise elements in color. First click on the spanner icon, and then select **Color schemes**. Elements that have the same property values will be assigned the same color.

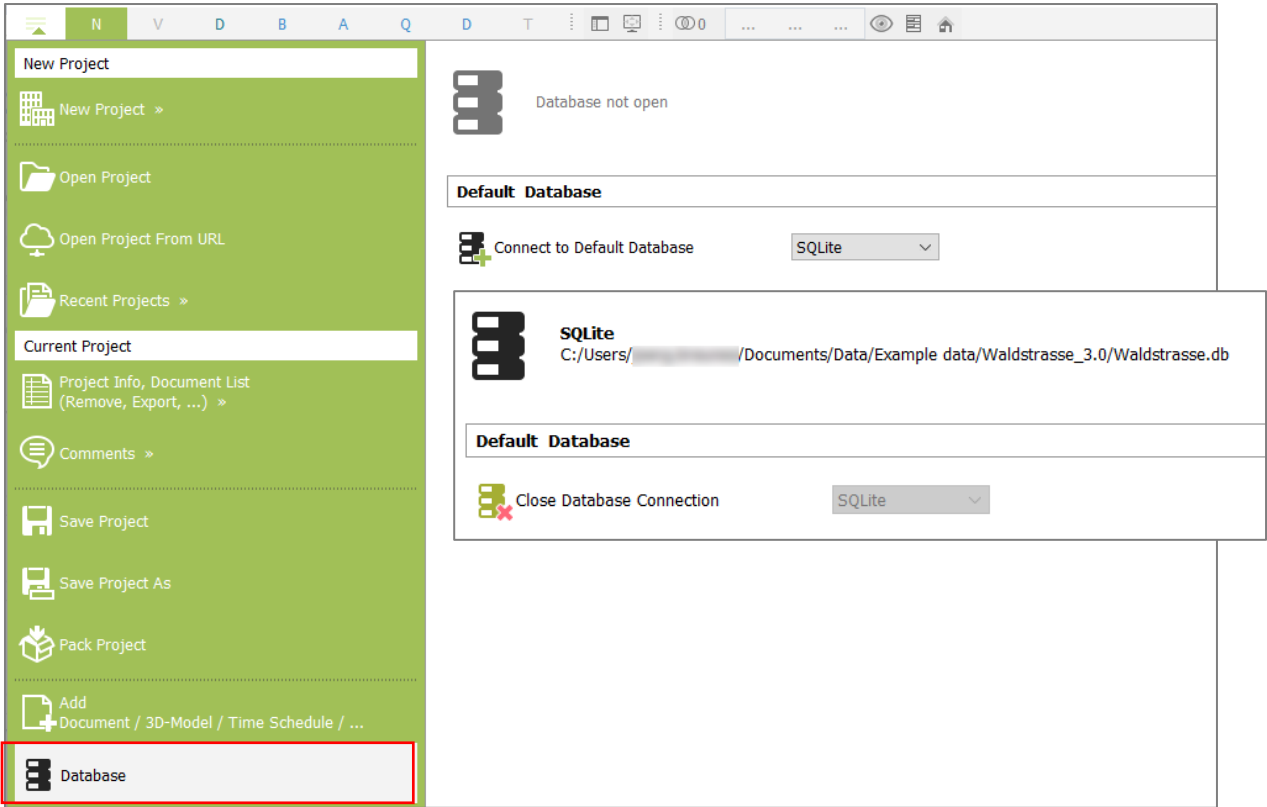


Similarly, selection sets can also be used to generate an exploded view. First click on the spanner icon, and then select Explode Geometry.

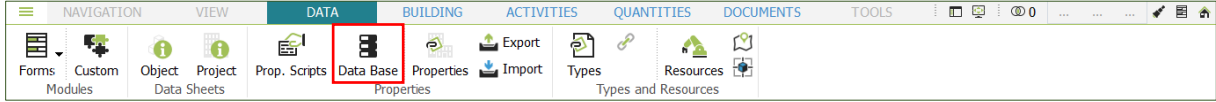


## 6.4 Connecting to a Database

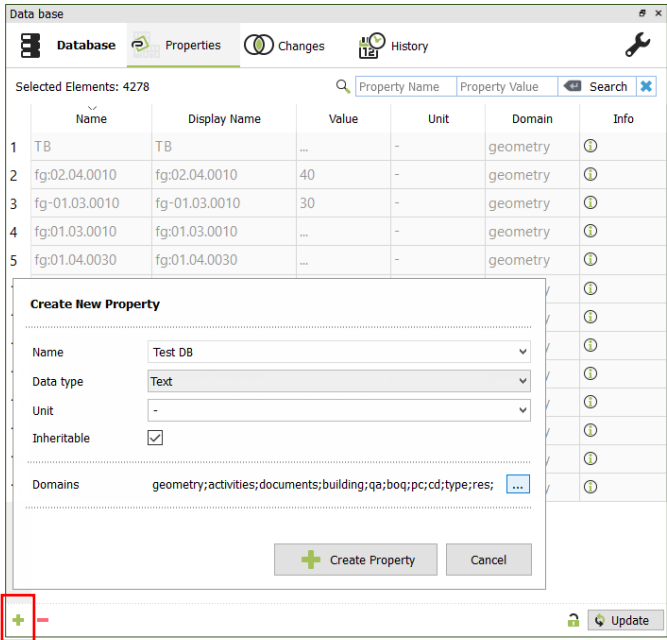
Once the project has been saved, standard project database can be integrated via the application menu. If the building model is linked to a database, you can add further information and data to your model.



Once your model is linked to a database, click on the Database button under Data menu tab.

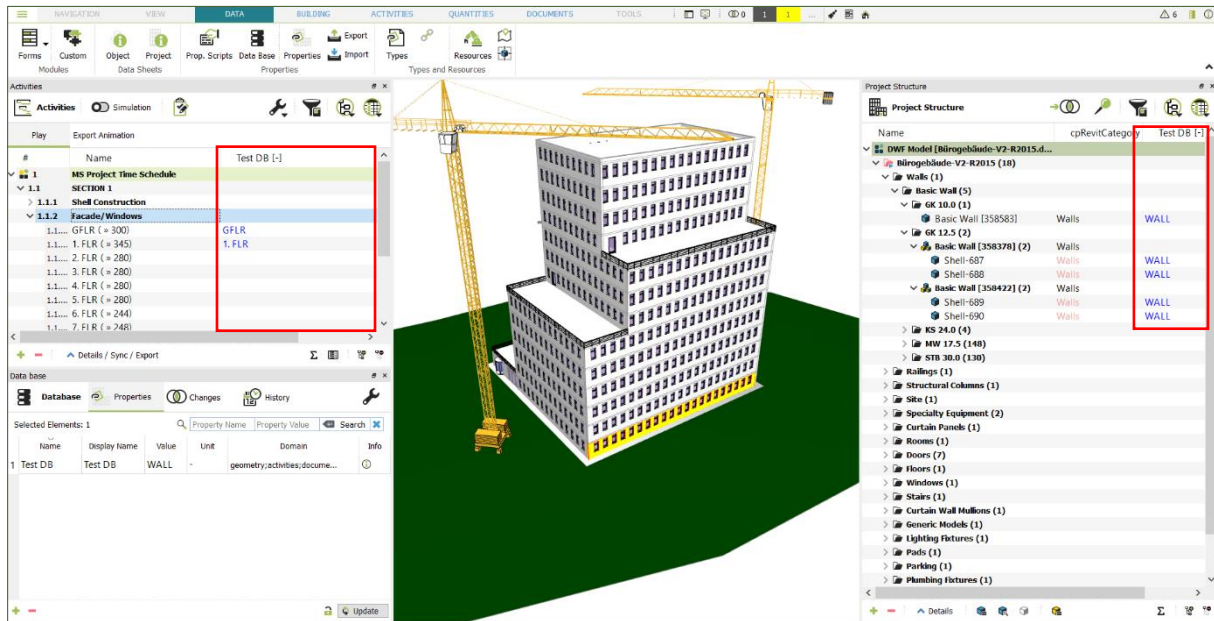


Click on '+' button to create a new property. Select name, data type, unit and domain in which the property is to be available.



**Note:** New attributes are saved only in the database and they are not present in the model. They can only be accessed by connecting the project to the database.

In the following example, a new property 'Test DB' is created and assigned to each domain. The attribute can be displayed in the tree view. Values that come from the database are shown in blue in the project.



## 6.5 DESITE cp-Properties

Properties of a 3D object or also of a container, which can be determined from the geometry of the object, are automatically available in DESITE. The names of these properties start with the abbreviation 'cp'. In the following these properties are described.

### 6.5.1 General properties for all domains

Property	Data Type	Description
<i>Identification</i>		
cpID	xs:ID	Object/Element ID
cpName	xs:string	Object/Element name
<i>Linking Rules</i>		
cpLinkRule	xs:string	Name of the Linking Rule
pcLinkRuleValue	xs:string	Value of the Linking Rule in evaluated form
<i>Counter / structure</i>		
cpCount	xs:long	Helper property to count objects/elements. The value is always '1'
cpCountLinkedObjects	xs:int	Number of linked geometric objects

cplsContainer	xs:boolean	'true' if the element is a container
---------------	------------	--------------------------------------

## 6.5.2 Properties for Geometry domain

Property	Data Type	Description
<i>General Properties</i>		
cplsPart	xs:boolean	'true' if the object is part of another object, e.g. it's the result of <b>Cutting</b>
cplsOpening	xs:boolean	'true' if the object is an opening (negative object) and child of another object
cpNegRefID	xs:IDREF	If the object is an opening, the ID of the object that contains this opening.
cplsComposite	xs:boolean	'true' if the object is a Composite
cplsPartOfComposite	xs:boolean	'true' if the object is a part of a Composite
cpCompositeID	xs:ID	ID of the Composite object (parent) in which the object (child) is included
cpCompositeIndex	xs:ID	Index assigned by DESITE for a Composite. All parts of a composite have the same index.
cpCompositePartIndex	xs:int	Index number assigned by DESITE for all parts of a Composite starting with 'o'
cplsProxy	xs:Boolean	'true' if the object is a Proxy, a copy of another object
cpRefID	xs:IDREF	ID of the source object, if the object is a Proxy
<i>Geometry counter</i>		
cpCountTriangles	xs:long	Number of triangles of a geometric object
cpCountVertices	xs:long	Number of vertices of a geometric object
cpCountLines	xs:long	Number of lines of a geometric object
<i>Linking counter</i>		

cpCountLinkedBuildingStructureElements	xs:int	Number of Building structure elements to which the object is linked
cpCountLinkedDocuments	xs:int	Number of Documents to which the object is linked
cpCountLinkedProcessComponents	xs:int	Number of Process Components to which the object is linked
cpCountLinkedResources	xs:int	Number of Resources to which the object is linked
cpCountLinkedTasks	xs:int	Number of Tasks to which the object is linked
cpCountLinkedWorkScopeItems	xs:int	Number of elements in the BoQ domain to which the object is linked
<i>Geometric properties</i>		
cpCOGx	xs:double	Coordinates of the center of gravity of a 3d body
cpCOGy	xs:double	
cpCOGz	xs:double	
cpVolume	xs:double	The volume of a 3D body. If the volume cannot be calculated (e.g. the shell of the object body is not closed), the value is taken from a possibly existing attribute 'Volume' (which can be part of the import)
cpVolumeUnchecked	xs:double	The unchecked volume of a 3D body. Calculated regardless of whether the 3D body is topologically correctly closed, and may be wrong in this case.
cpVolumeInterval	xs:string	The volume of a 3D body as string for the intervals '0-5', '5-10' etc. This can be used to filter objects by it's size. If the body is topologically not correctly closed, the value is 'not closed'
cpLinesLength	xs:double	Length of line elements. If several lines are contained in the object, the sum of the lengths of the contained lines is calculated.
cpHasCurvedSurfacePart	xs:boolean	'True' if there is at least one curved subarea in the object. The subarea is curved if at least one normal vector of a triangle deviates more than 2° from the average normal vector of the subarea.

cpCircumference	xs:double	Perimeter of a surface. Edges of holes in the surface are also counted.
cpSurfaceArea	xs:double	Total surface. For composites, the sum of the surfaces of the child objects.
cpSurfacePartAreaMax	xs:double	Largest connected part of the surface.
cpSurfacePartAreaMin	xs:double	Smallest connected part of the surface.
cpSurfacePartList	xs:double	List with the size of connected subareas in JSON format (unordered)
cpTopArea	xs:double	Surface area whose normal vector has a deviation of less than 45° from the positive z-axis. For composites the sum of the corresponding surfaces of the parts (child objects).
cpTopAreaPartMax	xs:double	Largest partial surface area in positive z-direction.
cpTopAreaPartMin	xs:double	Smallest partial surface area in positive z-direction
cpTopAreaContact	xs:double	Surface area in the direction of the z-axis that has a distance from the largest z-coordinate of the object of less than 1 cm. E.g. for a wall with openings, the upper surface without the parts of the window openings.
cpBaseArea	xs:double	Surface area whose normal vector has a deviation of less than 45° from the negative z-axis. For composites the sum of the corresponding surfaces of the parts (child objects).
cpBaseAreaPartMax	xs:double	Largest partial surface area in negative z-direction.
cpBaseAreaPartMin	xs:double	Smallest partial surface area in negative z-direction
cpBaseAreaContact	xs:double	Surface area in the direction of the z-axis that has a distance from the smallest z-coordinate of the object of less than 1 cm. E.g. for a wall with openings, the footprint without the parts of the window openings.



cpLateralArea	xs:double	Lateral surface area. For composites, the sum of the lateral areas of the child objects.
cpLateralArea2	xs:double	Half lateral surface area. For composites, the sum of the half lateral areas of the child objects.
<i>Material properties (see also Materials)</i>		
cpMaterialID	xs:IDREF	ID of the material
cpMaterialName	xs:string	Material name
cpMaterialTransparency	xs:double	Material transparency between 0 (completely transparent) and 1 (completely opaque)
cpMaterialAmbient	xs:string	Ambient color as string
cpMaterialAmbientRed	xs:double	Red portion of the ambient color
cpMaterialAmbientGreen	xs:double	Green portion of the ambient color
cpMaterialAmbientBlue	xs:double	Blue portion of the ambient color
cpMaterialDiffuse	xs:string	Diffuse color as string
cpMaterialDiffuseRed	xs:double	Red portion of the diffuse color
cpMaterialDiffuseGreen	xs:double	Green portion of the diffuse color
cpMaterialDiffuseBlue	xs:double	Blue portion of the diffuse color
cpMaterialHasTexture	xs:boolean	Material has a texture yes/no
<i>Bounding Box</i>		
cpBBoxDX	xs:double	Dimensions and largest/smallest values of the bounding box aligned with the coordinate axes. For composites and containers, the common bounding box of all child objects.
cpBBoxDY	xs:double	
cpBBoxDZ	xs:double	
cpBBoxMinX	xs:double	
cpBBoxMinY	xs:double	
cpBBoxMinZ	xs:double	
cpBBoxMaxX	xs:double	
cpBBoxMaxY	xs:double	
cpBBoxMaxZ	xs:double	
<i>Optimized oriented bounding box (OOBB)</i> (For composites and containers, the common optimized oriented bounding box of all child objects; see also <b>Fehler! Verweisquelle konnte nicht gefunden werden.</b> )		
cpHasOOBB	xs:boolean	,True' if the object already has an optimized, oriented bounding box.
cpHasOOBBxy	xs:boolean	,True' if the object already has an optimized, oriented bounding box in xy-plane.
cpOOBBxyArea	xs:double	Surface area of the xy-plane of the OOBB in xy-plane

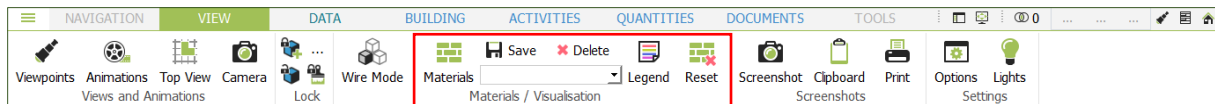
cpOOBBxyLength	xs:double	Length of the OOB in xy-plane
cpOOBBxyWidth	xs:double	Width of the OOB in xy-plane
cpOOBBHeight	xs:double	Height of the OOB. The height is based on the axis that has the smallest deviation from the z-axis and thus points upwards.
cpOOBBLength	xs:double	Length of the OOB. The length is calculated from the longer of the two remaining axes.
cpOOBBWidth	xs:double	Width of the OOB. The width is calculated from the shorter of the two remaining axes.
cpOOBBMaxLength	xs:double	Maximum length of the OOB
cpOOBBMidLength	xs:double	Medium length of the OOB
cpOOBBMinLength	xs:double	Minimal length of the OOB
cpOOBBVolume	xs:double	Volume of the OOB.
cpOOBBArea-LH	xs:double	Surface area of the OOB, calculated from length and height values
cpOOBBArea-LW	xs:double	Surface area of the OOB, calculated from length and width values
cpOOBBArea-HW	xs:double	Surface area of the OOB, calculated from height and width values
cpOOBBMaxArea	xs:double	Maximum surface area of the OOB
cpOOBBMidArea	xs:double	Medium surface area of the OOB
cpOOBBMinArea	xs:double	Minimal surface area of the OOB
cpSurfaceArea_OOBB_LH_Max	xs:double	Surface parts of a 3D object that point in the corresponding direction of the side surfaces of the OOB (deviation of the surface normal less than 45°). As long as the face portions are parallel to the sides of the OOB, there is no difference between min and max.  These attributes only provide a value if the OOB is present for the 3D object and are not calculated for containers and composites.
cpSurfaceArea_OOBB_LH_Min	xs:double	
cpSurfaceArea_OOBB_HW_Max	xs:double	
cpSurfaceArea_OOBB_HW_Min	xs:double	
cpSurfaceArea_OOBB_LW_Max	xs:double	
cpSurfaceArea_OOBB_LW_Min	xs:double	

cpSurfacePartAreaOOBB_LH_Max	xs:double	<p>Largest/smallest parts of the surfaces of a 3D object pointing in the corresponding direction of the side faces of the OOBB. If a surface is curved, only the portions of the surface with a deviation from the normal of +/- 5° are taken into account.</p> <p>These attributes only provide a value if the OOBB is available for the 3D object and are not calculated for containers and composites.</p>
cpSurfacePartAreaOOBB_LH_Min	xs:double	
cpSurfacePartAreaOOBB_HW_Max	xs:double	
cpSurfacePartAreaOOBB_HW_Min	xs:double	
cpSurfacePartAreaOOBB_LW_Max	xs:double	
cpSurfacePartAreaOOBB_LW_Min	xs:double	
cpSurfaceContactAreaOOBB_LH_Max	xs:double	<p>Parts of the surfaces of a 3D object that are in contact with the corresponding side faces of the OOBB within a tolerance range of 1 cm.</p> <p>These attributes only provide a value if the OOBB is available for the 3D object and are also calculated for composites but not for containers.</p>
cpSurfaceContactAreaOOBB_LH_Min	xs:double	
cpSurfaceContactAreaOOBB_HW_Max	xs:double	
cpSurfaceContactAreaOOBB_HW_Min	xs:double	
cpSurfaceContactAreaOOBB_LW_Max	xs:double	
cpSurfaceContactAreaOOBB_LW_Min	xs:double	

## 7. Materials and Colors

### 7.1 Materials

Material information for model objects can be managed and expanded via Materials tool under View menu tab.



Open the Material dialogue

*Drop  
Down list*

Select the active Color scheme



Save current Materials in a new Color scheme



Delete the active Color scheme



Turn on/off the legend for the current Color scheme in 3D View



Resets the displayed Materials in the 3D View to the Materials stored in the imported model files

In the 'Default' setting, 16 materials with associated colors are generated in DESITE md. In addition, materials that are provided in the uploaded partial models are also imported into the project.

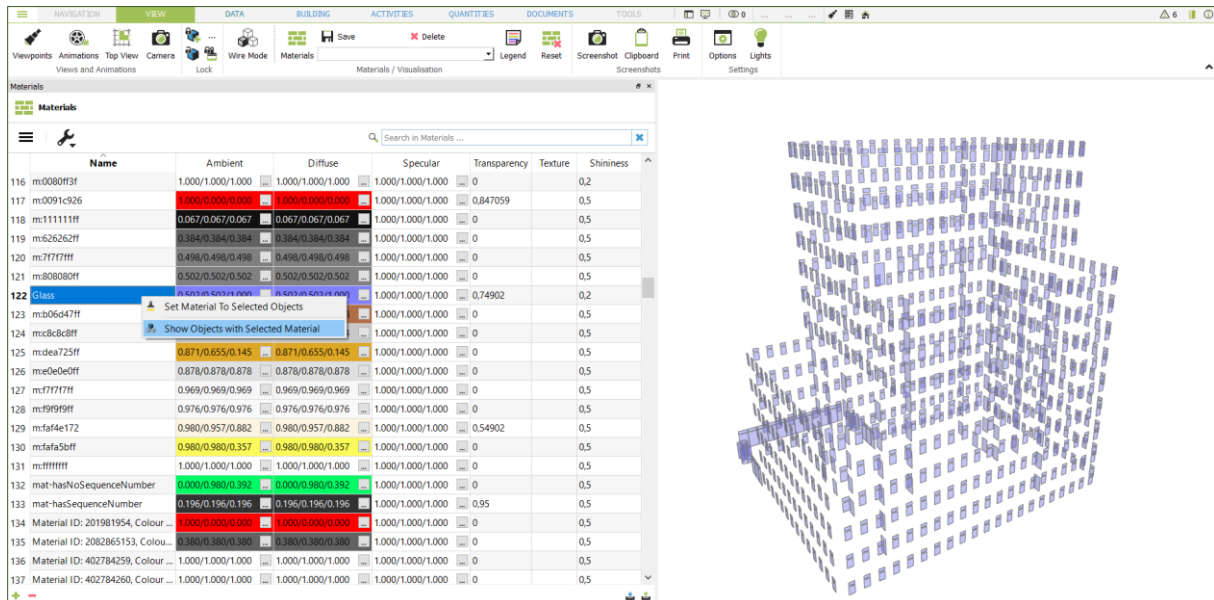
Name	Ambient	Diffuse	Specular	Transparency	Texture	Shininess
1 default-mat-01	0.353/0.353/0.549	0.353/0.353/0.549	1.000/1.000/1.000	0		0.5
2 default-mat-02	Set Material To Selected Objects		1.000/1.000/1.000	0		0.5
3 default-mat-03	Show Objects with Selected Material		1.000/1.000/1.000	0		0.5
4 default-mat-04	0.824/0.624/0.373	0.824/0.624/0.373	1.000/1.000/1.000	0		0.5
5 default-mat-05	0.000/0.502/0.753	0.000/0.502/0.753	1.000/1.000/1.000	0		0.5
6 default-mat-06	0.722/0.698/0.494	0.722/0.698/0.494	1.000/1.000/1.000	0		0.5
7 default-mat-07	0.094/0.698/0.886	0.094/0.698/0.886	1.000/1.000/1.000	0		0.5
8 default-mat-08	0.878/0.306/1.000	0.878/0.306/1.000	1.000/1.000/1.000	0		0.5
9 default-mat-09	0.392/0.392/0.494	0.392/0.392/0.494	1.000/1.000/1.000	0		0.5
10 default-mat-10	0.047/0.392/0.494	0.047/0.392/0.494	1.000/1.000/1.000	0		0.5
11 default-mat-11	0.549/0.588/0.157	0.549/0.588/0.157	1.000/1.000/1.000	0		0.5
12 default-mat-12	0.118/0.549/0.392	0.118/0.549/0.392	1.000/1.000/1.000	0		0.5
13 default-mat-13	0.996/0.306/0.494	0.996/0.306/0.494	1.000/1.000/1.000	0		0.5
14 default-mat-14	0.878/0.698/1.000	0.878/0.698/1.000	1.000/1.000/1.000	0		0.5
15 default-mat-15	0.878/0.306/0.494	0.878/0.306/0.494	1.000/1.000/1.000	0		0.5
16 default-mat-16	0.486/0.502/0.494	0.486/0.502/0.494	1.000/1.000/1.000	0		0.5

You can customize material properties such as name, color or transparency.

Using '+' button at the bottom left corner, you can create your own, user-defined materials. By right-click on a material in the list allows you to:

- Set the material to selected objects
- To show all objects with the material assigned to by filtering in 3D View.

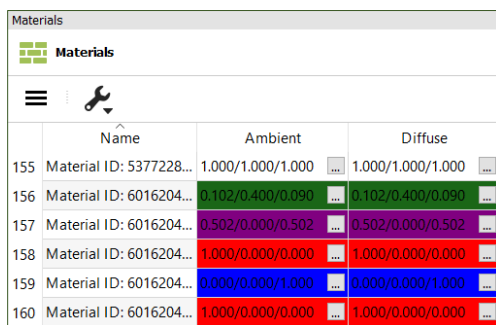
In the following example, only elements assigned to material property Glass are displayed in 3D view.



## 7.2 Color schemes

You can organize multiple materials for one object with Color scheme s. Depending on the selected Scheme, the material assigned to this Scheme is shown in the 3D View.

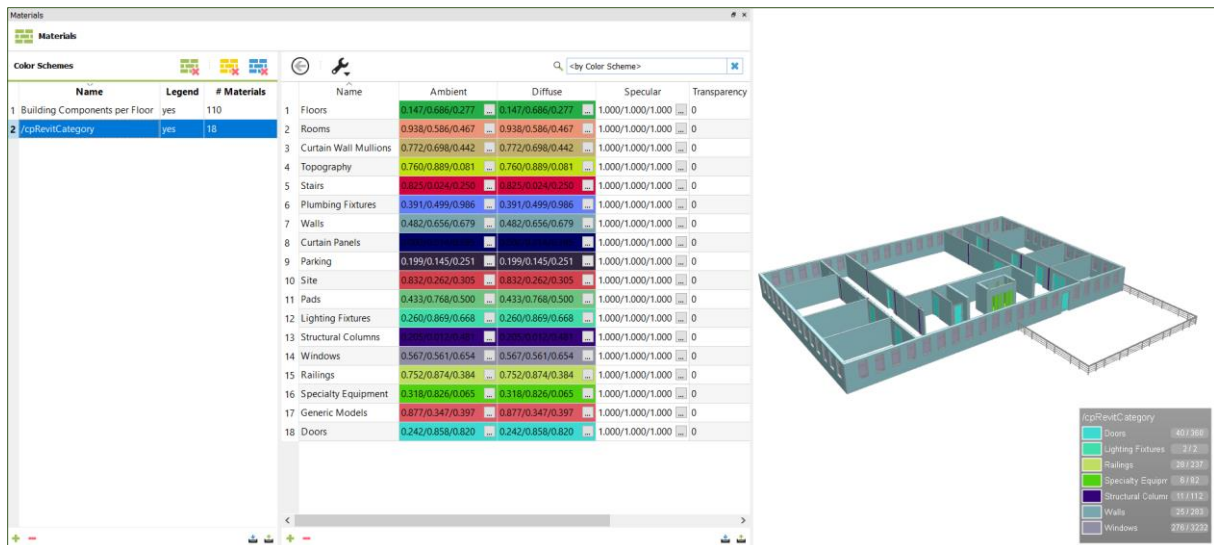
Click on Show/Hide Color scheme list icon in order to create a Color scheme .



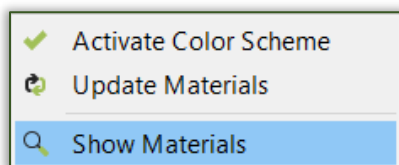
To create a new Color scheme :

1. Select the desired objects in 3D view
2. Assign a material to the selected objects (right-click on the material)
3. Repeat steps 1 and 2 to assign other materials to other objects
4. Create a new scheme using '+' button at the bottom left corner in Color scheme s window

The newly created Color scheme contains now all the materials that were assigned to the objects in the 3D View.






In order to customize a Color scheme, right-click on a Color scheme and select Activate Color scheme. Equip the objects with new materials in the 3D view and then update the Color scheme with right-click and the 'Update Materials' option.



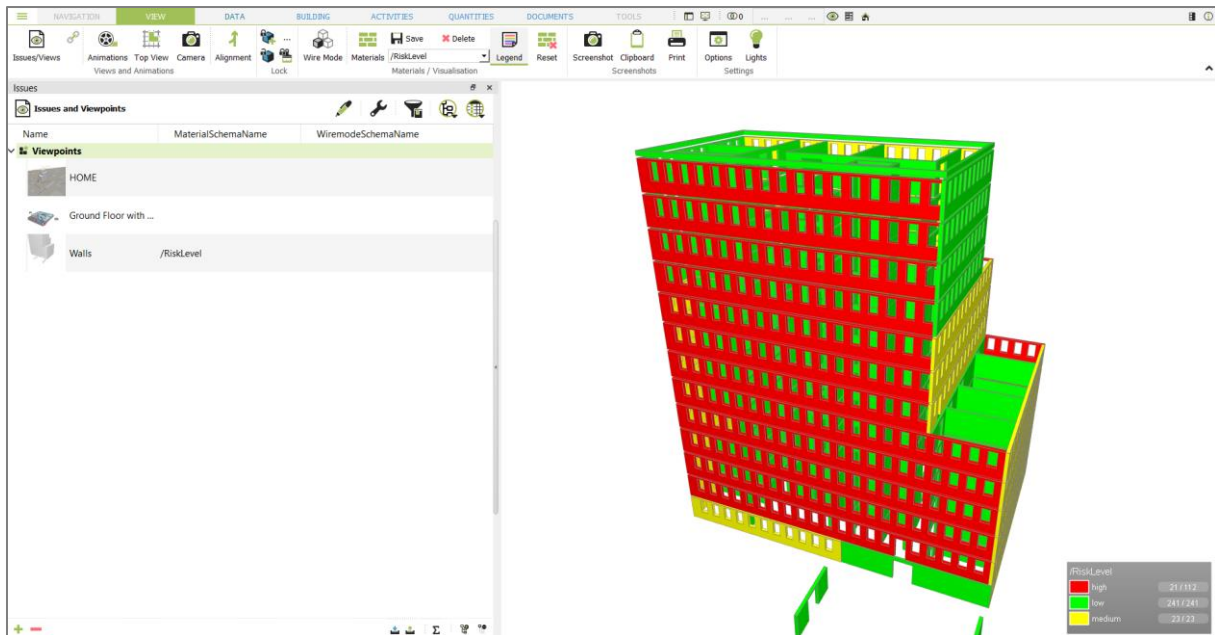
With the option 'Show Materials', you can filter the Materials list to display only materials that belong to selected Color scheme.

While working with the Color scheme dialogue you have following additional options:

-  Resets the Materials in the 3D View
-  Resets the Materials of the selected objects in the 3D View
-  Resets the Materials of the visible objects in the 3D View

**Tip:** As an alternative to creating a color scheme manually, it is also possible to create based on **Selection Sets**.

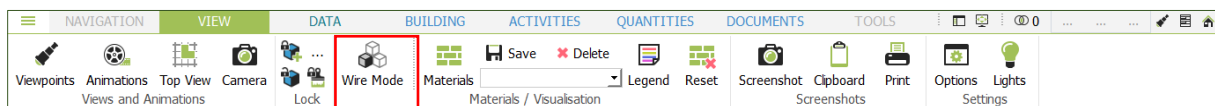
In order to associate a 3D Viewpoint with a Color scheme, add the name of the corresponding Color scheme into the 'MaterialSchemeName' property in the **Issues and Viewpoints** domain:




When the 3D viewpoint is applied, the associated color scheme will also be applied. It will remain active until you deactivate it again.

### 7.3 Wire Mode Schemes

In a similar way to color scheme, a scheme for wireframe representation of model elements can also be created with Wire Mode function under View menu tab.

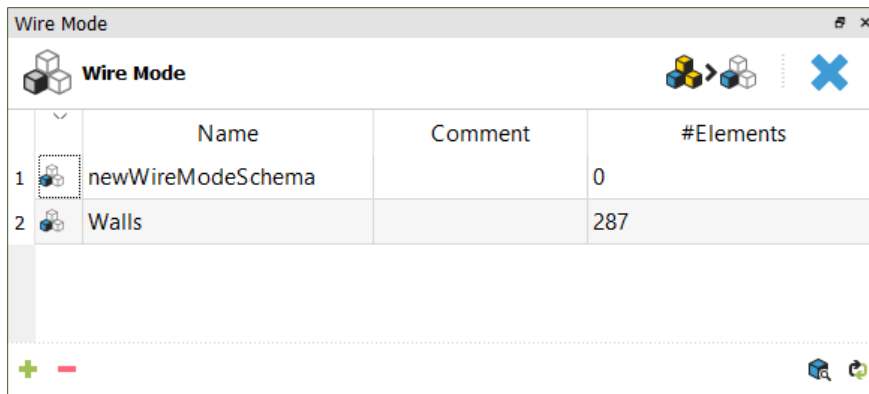


With wire mode scheme selected elements will be displayed in transparent only with edges, while rest of model objects are displayed in standard colors.

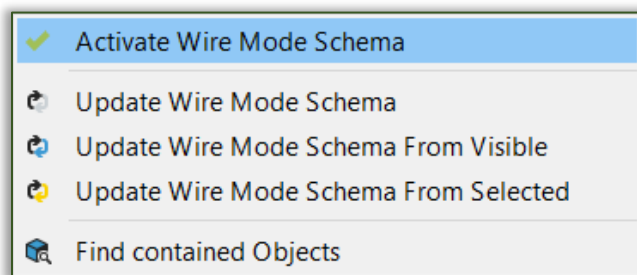
 Using Show Selected Objects in Wire Mode. Only selected elements will be displayed with wireframes without working with a specific scheme.

 Reset Wire mode.

To Create a new wire mode schema, click on the '+' button at the bottom left corner of the wire mode dialogue.



Similar to color scheme, you can activate or update a wire mode scheme by right-click.



**Tip:** These wire mode schemes can also be associated to a viewpoint. For that, type the name of the corresponding wire mode scheme into the 'WiremodeSchemeName' property in the **Issues and Viewpoints** domain.



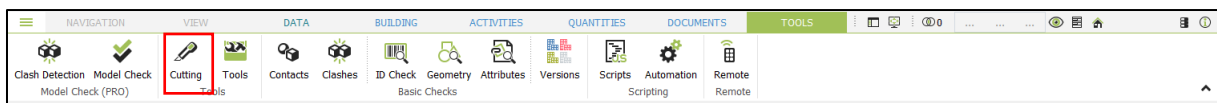
## 8. Tools

### 8.1 Cutting

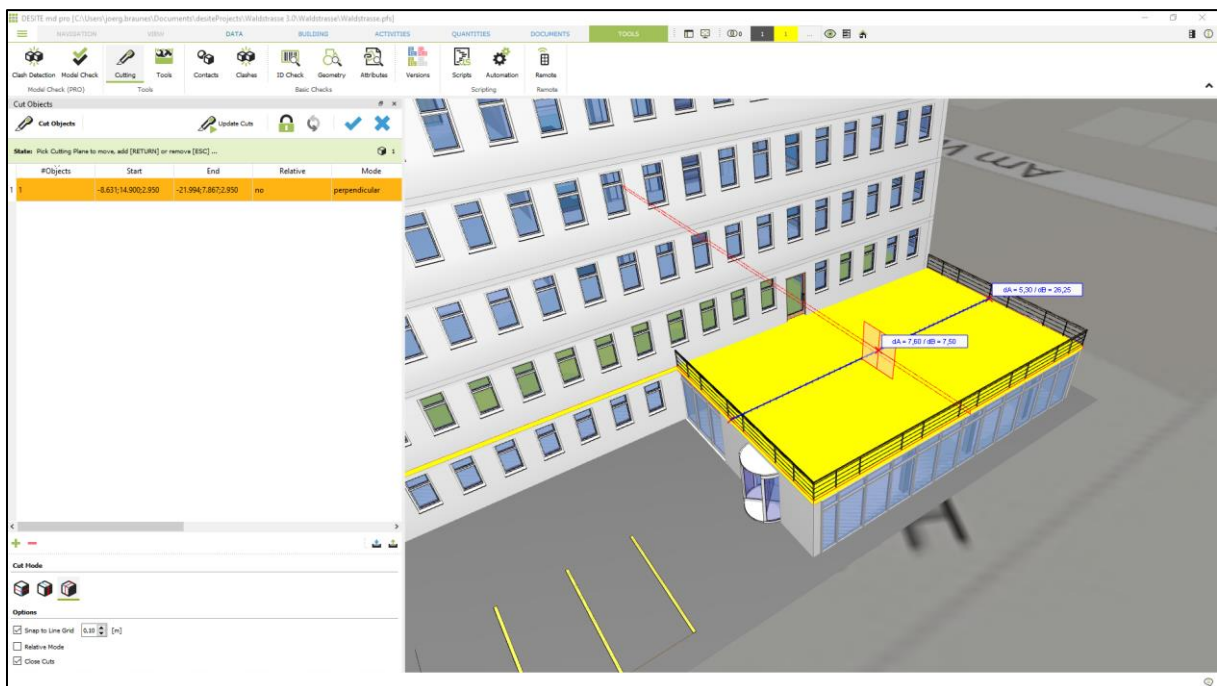
The Cutting tool allows you to cut a 3d object into parts. This could be useful, e.g. if a large object like a slab is produced in several steps and this should be mapped to multiple tasks in a schedule.

#### 8.1.1 Using the Cutting Tool

Start the 'Cutting' tool from the Tools Ribbon bar:



The cursor turns into a 'slicing icon'. Now click on an object that you want to cut, this will be selected and marked with a red boundary. The cut itself is defined by a help line. Start drawing this help line by clicking a start and end point on any geometry:

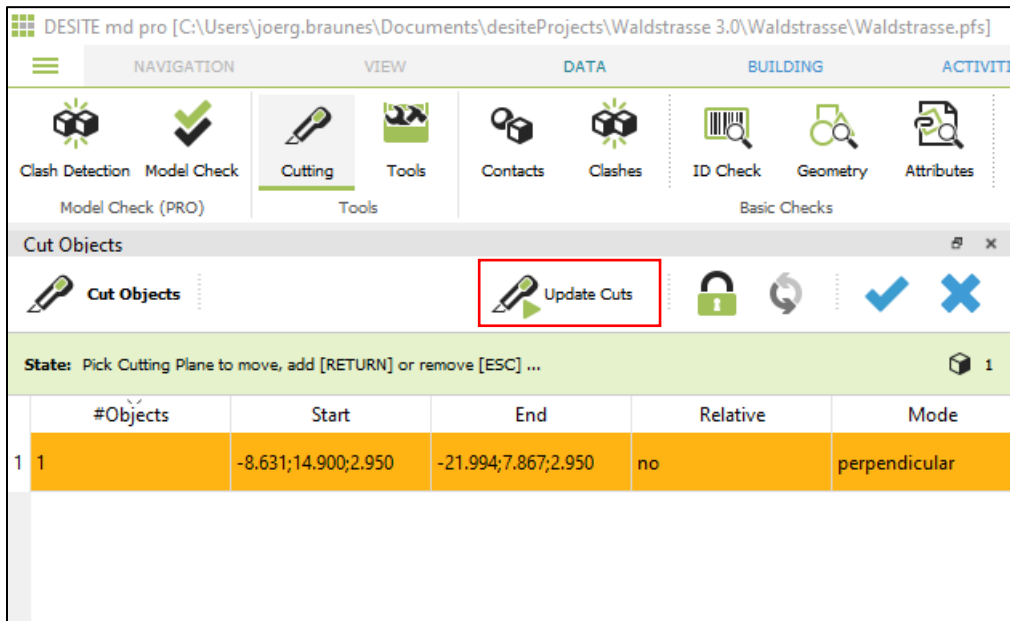


#### Hint:

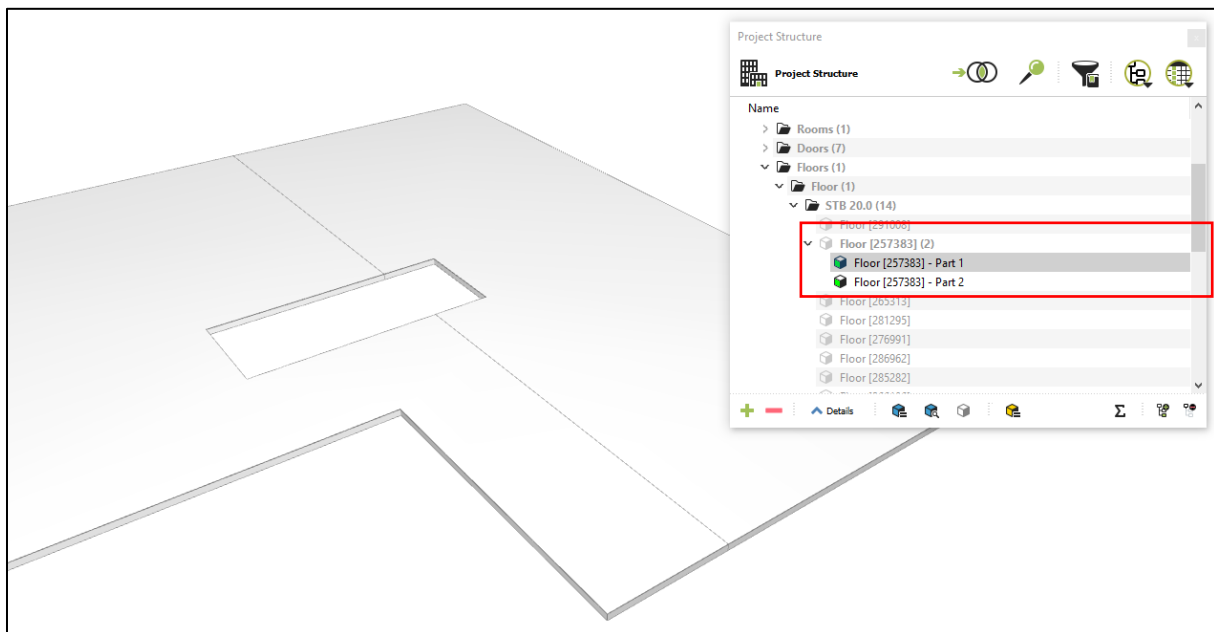
To pick the start and end point of the help line, DESITE uses the point snap settings that are defined for the measuring tool (see: **Measuring**).

As soon as the blue helper line is defined, the cut is shown as a preview in the 3d view and is also listed in the Cutting tool. In the 3d view, a red plane indicates the cutting plane and a red boundary the cut through the selected object. The cutting plane can be moved with drag & drop along the blue help line.

To perform the cut, click on 'Update Cuts' in the Cutting Tool:



The cut creates new 'Parts' of the selected object in the project structure:



**Hint:**

Selection behavior of the 'Parts' can be defined in **Selection Settings**.

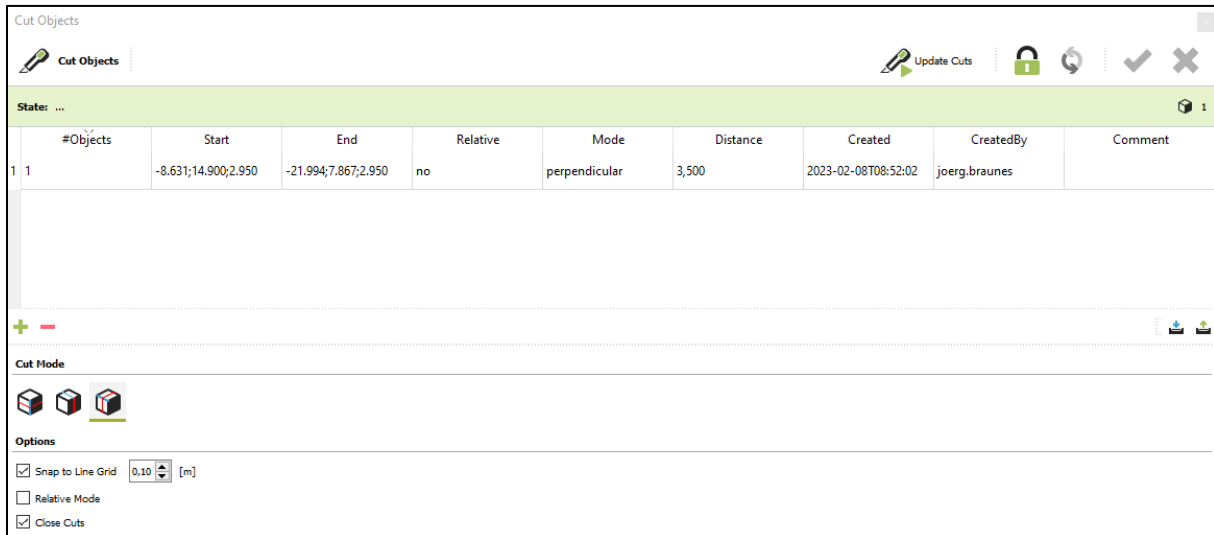
To perform another cut on the same object, you can either click again on the corresponding icon in the Ribbon bar, or on the '+' icon in the Cutting tool dialogue.

**8.1.2 Cutting Tool options**

The Cutting tool dialogue shows all cuts that were performed on the currently selected objects. Cuts are not permanent and can be deleted or edited at any time.

**Tip:**

If you select multiple objects before you start the Cutting tool, you can perform cuts on multiple objects at the same time. The cut lines are saved per object and can be edited individually afterwards.



Update Cuts. If a cut line was added, edited or deleted, click on this button to perform the changes on the selected object.



If the lock is closed, the list of cut lines will automatically be updated, if the selection in the 3d view changes.



If the lock icon is not closed, you can update the list of cut lines



If a cut line is active (marked as red in the list), you can accept changes on the parameters.



Discard changes on the active cut line.



You can export and import cut lines. When exporting, a possible object reference is lost, therefore the cut lines are always absolutely defined.

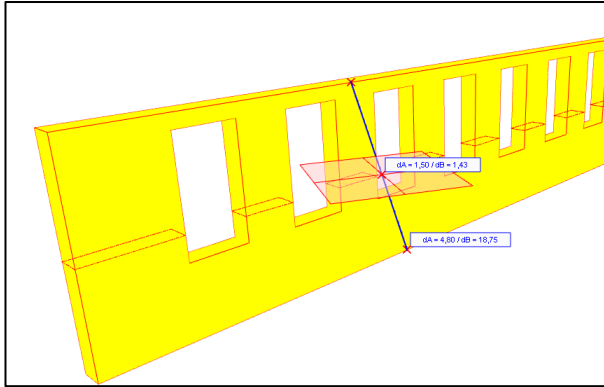
When importing a file with cut lines, they are assigned only to currently selected objects.

DESITE uses the file format \*.xml and provides each cut object with the extension \*cut.xml.

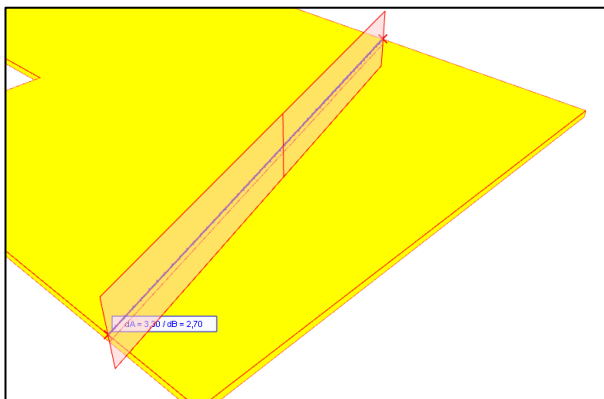
**Cut modes**



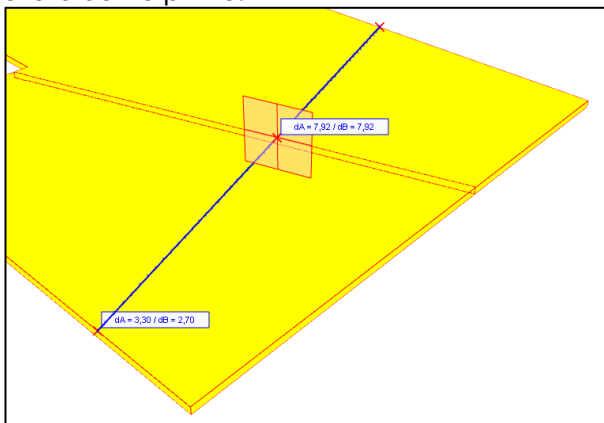
Cut mode horizontal. The selected object will be cut horizontally (parallel to X-Y plane).



Cut mode vertical. The selected object will be cut vertically (along the blue help line).



Cut mode perpendicular. The selected object will be cut perpendicular to the blue help line.



## Options

- **Snap to Line Grid:** Point snap on the help line is performed according to the defined value
- **Relative Mode:** If this option is enabled, the cut planes are defined relative to the object, i.e. if the object is moved (e.g. after a model update), the cut plane moves with it, relative to the center of the object's bounding box.
- **Close cuts:** Closes the cut surface of the resulting parts