Smart Hangers

Powerful solution for placing hangers in BIM model

Working with MEP elements

Smart Hangers extension

Autodesk Revit® Architecture/Structure/MEP and Autodesk Revit® BIM software

Smart Hangers – powerful solution for Autodesk® Revit® that provides a set of tools that help to distribute Hangers or Supports to Ducts, Pipes, Cable Trays, Conduits or other line based Generic Model elements in various ways.

Hangers or Supports can be automatically attached to sloped Roofs, Floors, Structural Foundations, Structural Framings, Walls or even Reference Planes from the current or linked project. Using Smart Hangers you will not need to worry about modifications. Hanger and Support rods will be automatically updated if there are any changes in the project.
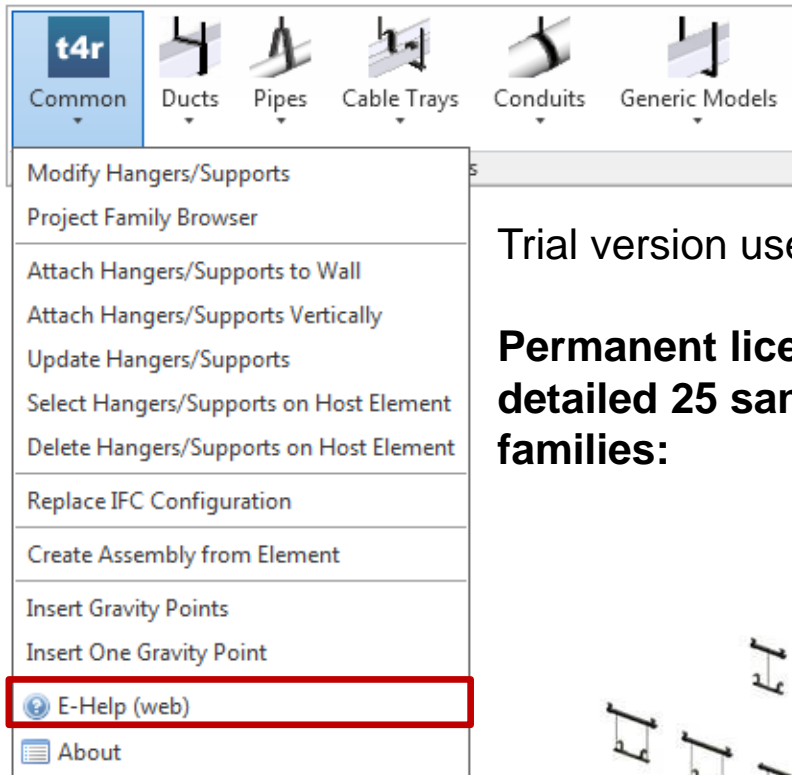
Smart Hangers
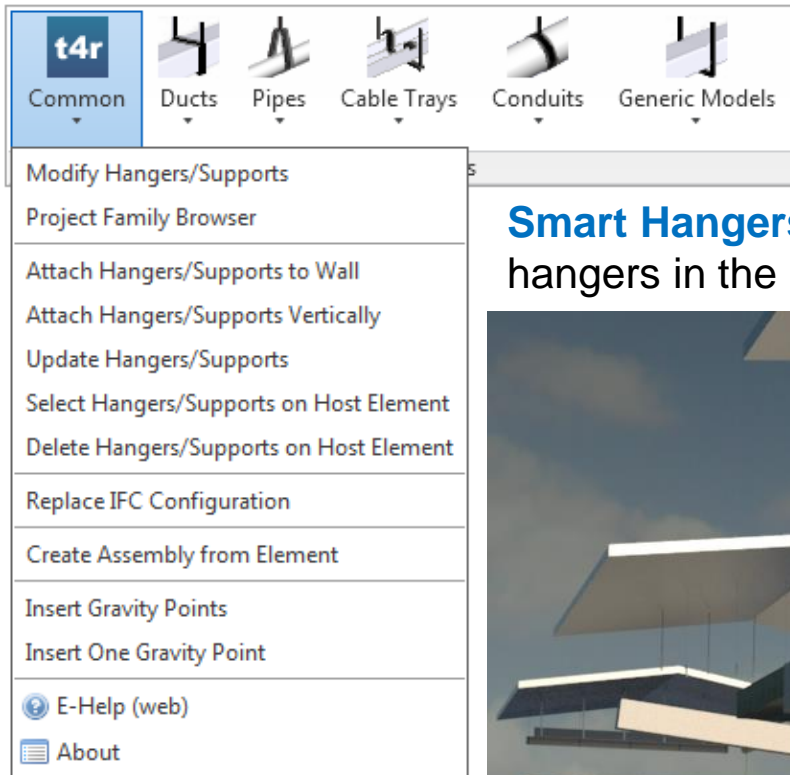
Smart Hangers - **powerful** Autodesk® Revit® solution for placing hangers in the BIM model
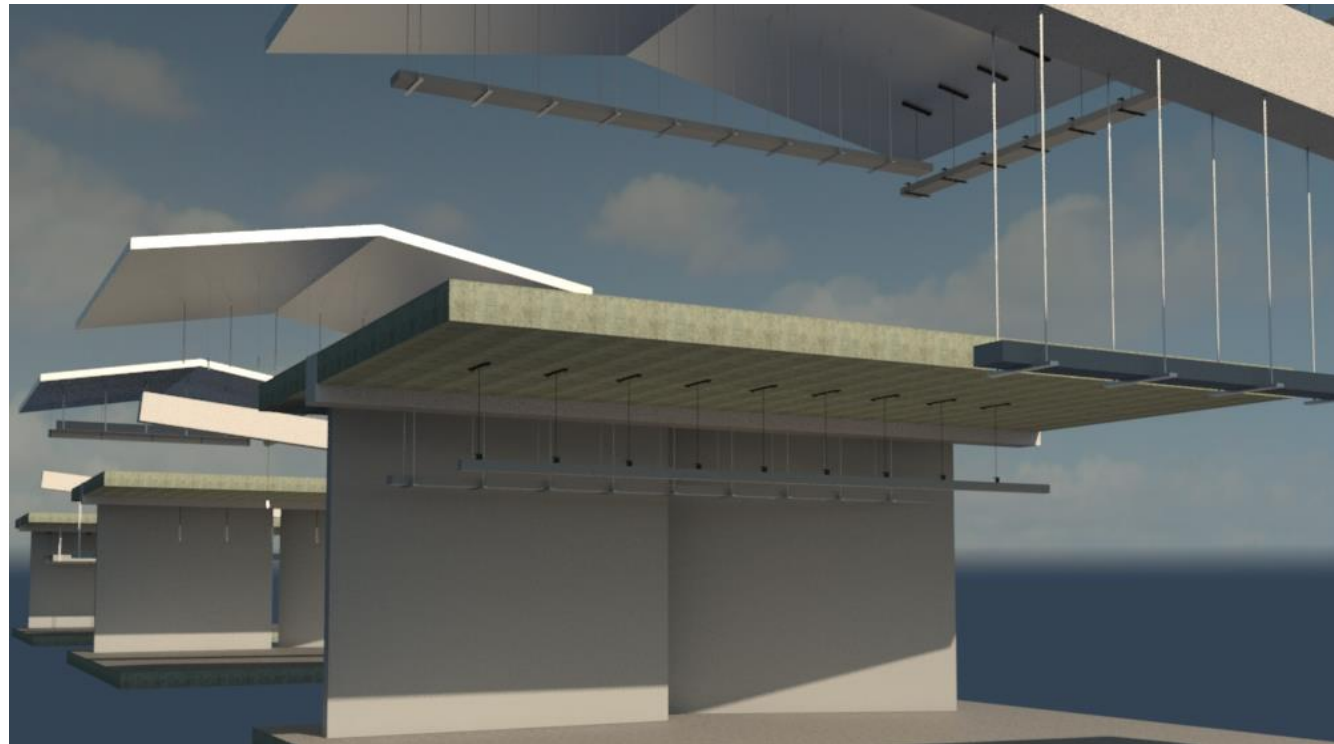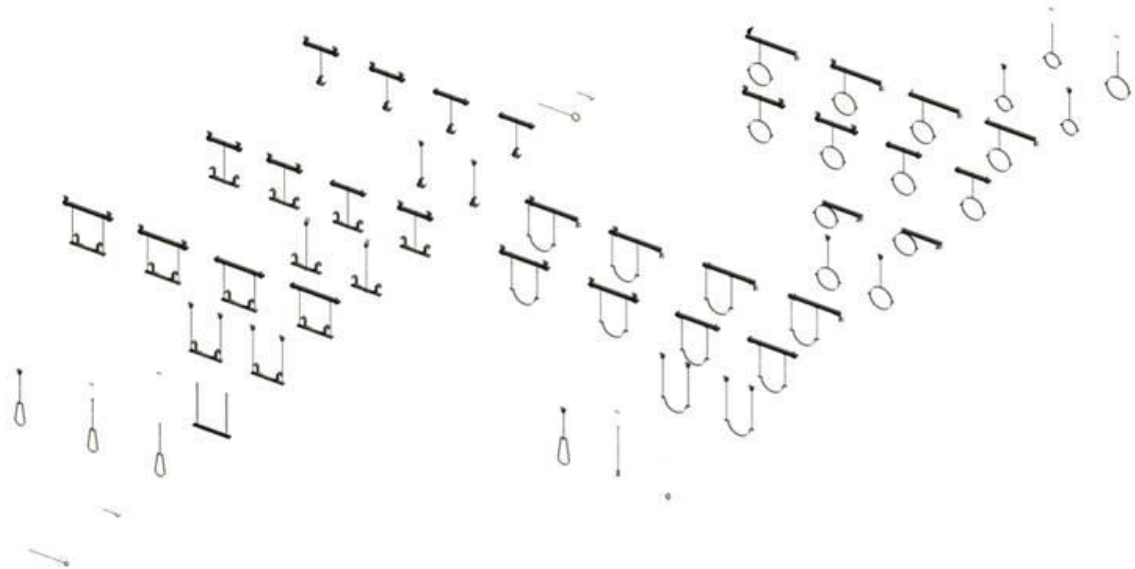
Smart Hangers

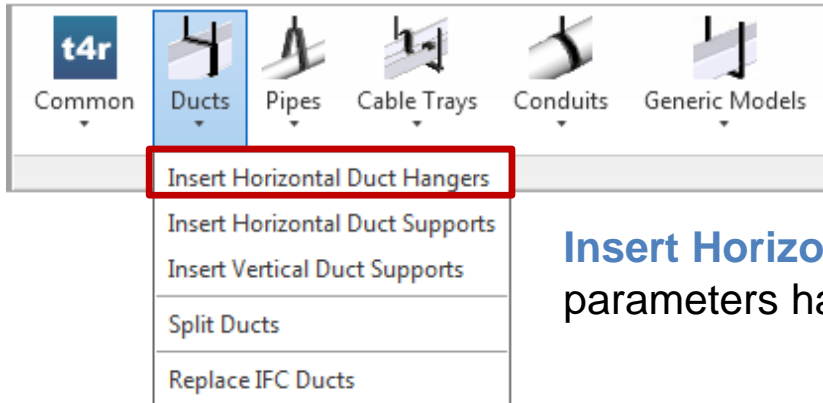Smart Hangers has an **E-Help** where users can find a sample project and explore it:

Trial version users will be provided with some kinds of hangers.

Permanent license users will be provided with highly detailed 25 sample Metric or Imperial Hanger and Support families:

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Smart Hangers

## Insert Horizontal Duct Hangers

Insert Horizontal Duct Hangers– inserts new rules and parameters hanging the segments

P. S. **Insert Horizontal Duct Supports** and **Insert Vertical Duct Supports** is based on the same methodology as the **Insert Horizontal Duct Hangers** function. Same methodology is used as well in all other line based MEP objects like **Pipes**, **Cable Trays**, **Conduits** and **Generic Models**.

Smart Hangers
Insert Horizontal Duct Hangers
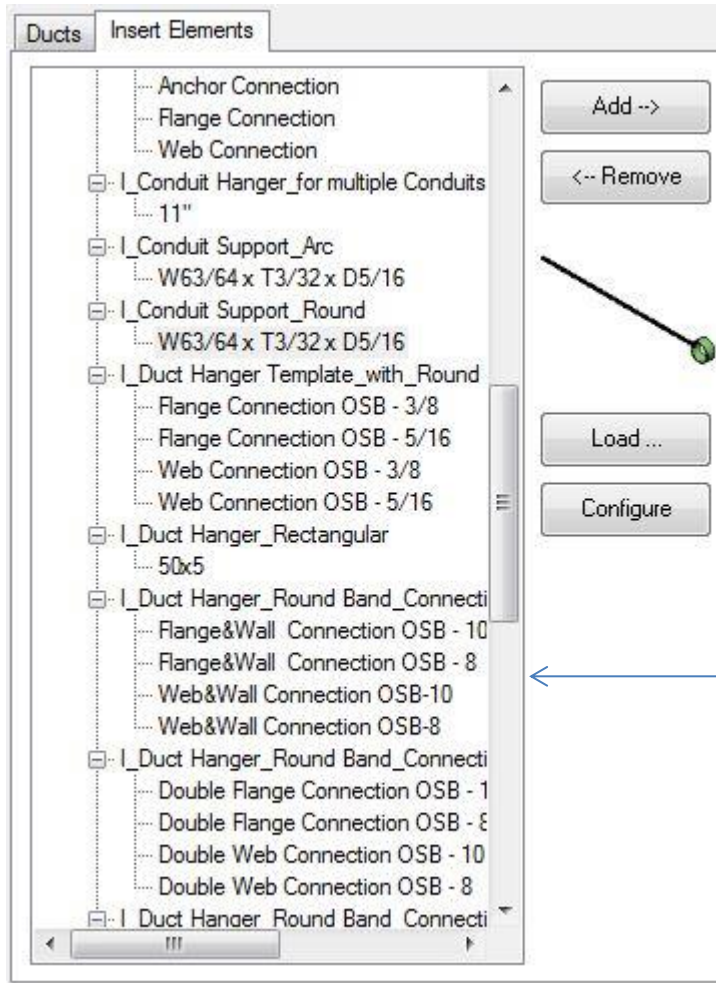
Easy control for adding or removing selected elements

Preview of selected element

Every element has location rules which can be viewed in the project or loaded from other directories

Simple browser to view the list of stuctural connections which are currently loaded into the project

Smart Hangers
Insert Horizontal Duct Hangers

Family	Type	Type Mark	Host Type
I_Cable Tray Hanger_Tray Connector_S...	Double Web Connection OSB - 10		Face
I_Cable Tray Hanger_Tray Connector_S...	Double Web Connection OSB - 8		Face
I_Conduit Hanger Template_ Vertical S...	Web Connection		Face

Rules
Array (Fixed Number) on the Duct Top Face - along Duct Line form Center to Ends (Hangers,...)
Array (Fixed Max Distance) on the Duct Top Face - along Duct Line form Ends to Center (Hangers,...)
Array (Fixed Max Distance) on the Duct Top Face - along Duct Line from Ends to Center wo S/E (Hangers,...)
Array (Fixed Distance) on the Duct Top Face - along Duct Line from Start to End (Hangers,...)
Array (Fixed Distance) on the Duct Top Face - along Duct Line from End to Start (Hangers,...)

Rule Parameter	Value
Elevation	0
Side Offset	0
Start/End Extension	-1
Insert at Start/End	Start End
Layout Rule	Fixed Number
Layout Value	5
Justification	Center
Connection Type	Vertical
Connection Direction	Top
Connect to Category	Everything
Intersection Category	(none)
Intersection Family Type	(none)
Intersection Maximal Dista...	120

- List of Rules according which hangers are inserted into the model

- Selected element for which following rules will be applied

- Additional parameters allow to adjust properties of each rule

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Smart Hangers
Insert Horizontal Duct Hangers

Rules
Array (Fixed Number) on the Duct Top Face - along Duct Line form Center to Ends (Hangers,...)
Array (Fixed Max Distance) on the Duct Top Face - along Duct Line form Ends to Center (Hangers,...)
Array (Fixed Max Distance) on the Duct Top Face - along Duct Line from Ends to Center wo S/E (Hangers,...)
Array (Fixed Distance) on the Duct Top Face - along Duct Line from Start to End (Hangers,...)
Array (Fixed Distance) on the Duct Top Face - along Duct Line from End to Start (Hangers,...)

- There are created most popular user predefined rules for placing hangers.

- User also can create his own rules

Smart Hangers

Insert Horizontal Duct Hangers

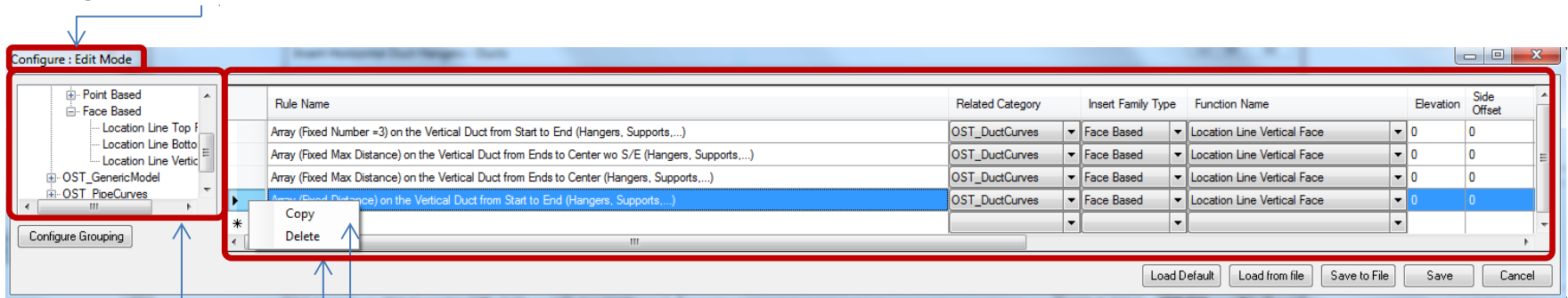For designers convenience there is possibility to create **own rules**.

To create own rules press **Configure** button.

New window occurs. For the moment window is inactive. The window is activating by pressing **F10** on the keyboard and it turns into **Edit Mode**.

Smart Hangers

Insert Horizontal Duct Hangers

Sign **Edit Mode** indicates that the window is activated.

List of specified rules.

To customize parameters select row of rules and click **right mouse button**. Not to alter the existing version of rules click copy button. The copy will occur automatically in the bottom of the rules list. All the rules parameters can be changed: Rule Name, Related Category, Function Name, etc.

Catalogue browser helps to quickly find wanted elements rules

Smart Hangers
Insert Horizontal Duct Hangers

Rule parameters

Rule Parameter	Value
Layout Rule	Fixed Number
Layout Value	3
Justification	Center
Start/End Offset	-3
Insert at Start/End	Start End
Side Offset	0
Connection Type	(none) ▾
Connection Direction	Top
Connect to Category	Everything
Intersection Category	(none)
Intersection Family and Type	(none)

Plan view
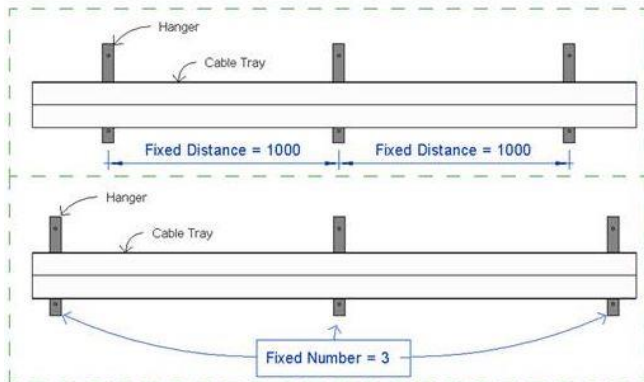
Layout Rule

The rule that indicates how the Hangers/Supports will be distributed. The setting comes from rule configuration - "Configure".

Possible values:
Fixed Distance – Hangers/Supports will be distributed with fixed distance.
Fixed Number – Hangers/Supports will be distributed with fixed number.

Fixed Distance or Fixed Number value will come from "Layout Value".

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Smart Hangers
Insert Horizontal Duct Hangers

Rule parameters

Rule Parameter	Value
Layout Rule	Fixed Number
Layout Value	3
Justification	Center
Start/End Offset	-3
Insert at Start/End	Start End
Side Offset	0
Connection Type	(none)
Connection Direction	Top
Connect to Category	Everything
Intersection Category	(none)
Intersection Family and Type	(none)

Layout Value

Add fixed distance or fixed number value. The layout rule that can be defined above.

Justification

Select the justification type. This value determines the placement of the Hanger/Support. Each subsequent Hanger/Support is placed with fixed distance from that point.

Possible values:
- Start
- End
- Center
- Start End

Smart Hangers

Insert Horizontal Duct Hangers

Rule parameters

Rule Parameter	Value
Layout Rule	Fixed Number
Layout Value	3
Justification	Center
Start/End Offset	-3
Insert at Start/End	Start End
Side Offset	0
Connection Type	(none) ▼
Connection Direction	Top
Connect to Category	Everything
Intersection Category	(none)
Intersection Family and Type	(none)

Start/End Offset

Hangers/Supports will be distributed with predefined distance from Duct, Pipe, Cable tray or Conduit Start or/and End points.
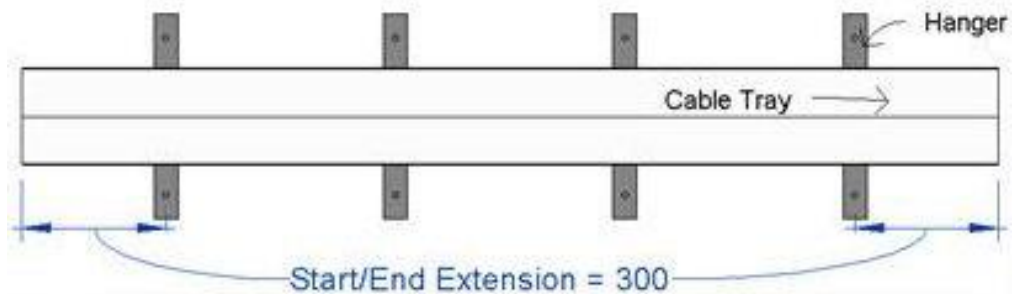
Smart Hangers
Insert Horizontal Duct Hangers

Rule parameters

Plan view
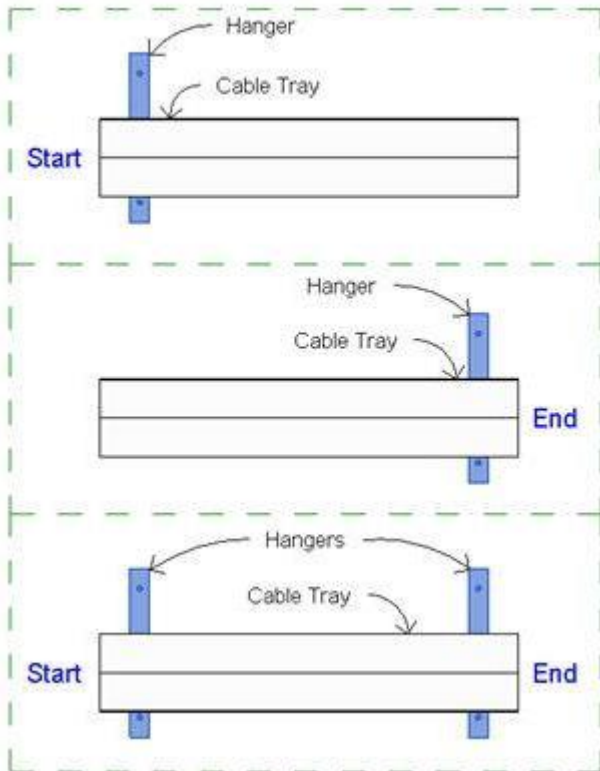
Insert at Start/End

Use this function if Hangers/Supports has to be inserted into Start, End or Start & End positions additionally. The setting comes from rule configuration - "Configure".

Possible values:
- Start – Hanger/Support will be inserted to Start point of Ducts, Pipes, Cable Trays or Conduits.
- End – Hanger/Support will be inserted to End point of Ducts, Pipes, Cable Trays or Conduits.
- Start End – Hangers/Supports will be inserted to both ends of Ducts, Pipes, Cable Trays or Conduits.

Smart Hangers
Insert Horizontal Duct Hangers

Rule parameters

Rule Parameter	Value
Layout Rule	Fixed Number
Layout Value	3
Justification	Center
Start/End Offset	-3
Insert at Start/End	Start End
Side Offset	0
Connection Type	(none) ▼
Connection Direction	Top
Connect to Category	Everything
Intersection Category	(none)
Intersection Family and Type	(none)

Side Offset

Hangers/Supports will be moved from Duct, Pipe, Cable Tray or Conduit center with predefined offset. For the horizontal elements the positive offset will go up, for vertical - to the right side.

Plan view

Side Offset = 50

Hanger

Cable Tray

Side Offset = 50

Smart Hangers
Insert Horizontal Duct Hangers

Rule parameters

Rule Parameter	Value
Layout Rule	Fixed Number
Layout Value	3
Justification	Center
Start/End Offset	-3
Insert at Start/End	Start End
Side Offset	0
Connection Type	(none) ▼
Connection Direction	Top
Connect to Category	Everything
Intersection Category	(none)
Intersection Family and Type	(none)

Connection Type

Select connection type where the Hangers/Supports will be attached. Hanger and Support can be attached vertically or/and horizontally.

Vertical Connection
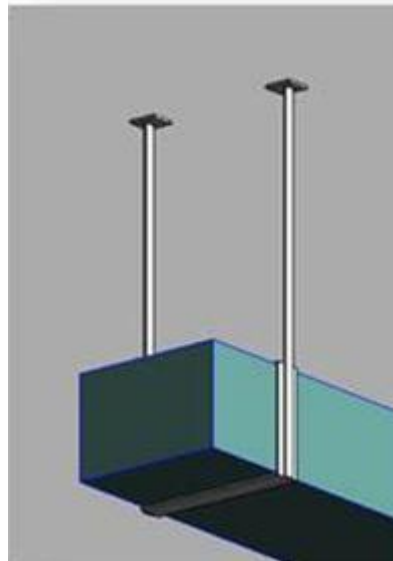
Horizontal Connection

Smart Hangers
Insert Horizontal Duct Hangers

Rule parameters

Rule Parameter	Value
Layout Rule	Fixed Number
Layout Value	3
Justification	Center
Start/End Offset	-3
Insert at Start/End	Start End
Side Offset	0
Connection Type	(none)
Connection Direction	Top
Connect to Category	Everything
Intersection Category	(none)
Intersection Family and Type	(none)

Connection Direction

Connection Type value will make influence on Connection Directory:
- If connection type is Vertical then Connection Directory can be Top or Bottom.
- If connection type is Horizontal then Connection Directory can be Left, Right or Both.

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Smart Hangers
Insert Horizontal Duct Hangers

Rule parameters

Rule Parameter	Value
Layout Rule	Fixed Number
Layout Value	3
Justification	Center
Start/End Offset	-3
Insert at Start/End	Start End
Side Offset	0
Connection Type	(none) ▾
Connection Direction	Top
Connect to Category	Everything
Intersection Category	(none)
Intersection Family and Type	(none)

Connect to Category

Select the category where Hangers/Supports will be attached.
Possible categories for the Vertical connection:
- Everything (Roofs, Floors, Structural Foundations, Structural Framings or Reference Planes)
- Roofs
- Floors
- Structural Foundations
- Structural Framings
- Reference Planes

Possible categories for the Horizontal connection:
- Everything (Walls, Structural Columns, Structural Framings or Reference Planes)
- Walls
- Structural Columns
- Structural Framings
- Reference Planes

Smart Hangers

Insert Horizontal Duct Hangers

Rule parameters

Rule Parameter	Value
Layout Rule	Fixed Number
Layout Value	3
Justification	Center
Start/End Offset	-3
Insert at Start/End	Start End
Side Offset	0
Connection Type	(none) ▼
Connection Direction	Top
Connect to Category	Everything
Intersection Category	(none)
Intersection Family and Type	(none)

Intersection Category

Hangers/Supports can be distributed according to Structural Framings or Lines that are above/below the Ducts, Pipes, Cable trays or Conduits.

Smart Hangers
Insert Horizontal Duct Hangers

Rule parameters

Rule Parameter	Value
Layout Rule	Fixed Number
Layout Value	3
Justification	Center
Start/End Offset	-3
Insert at Start/End	Start End
Side Offset	0
Connection Type	(none) ▼
Connection Direction	Top
Connect to Category	Everything
Intersection Category	(none)
Intersection Family and Type	(none)

Intersection Family and Type

Select Structural Framing Family and Type names or Line Type where Hangers/Supports will be attached.

Smart Hangers

Insert Horizontal Duct Hangers (Selection of ducts there the hangers will be placed)

Ducts	Insert Elements

Elements   Dynamic Section Box   Number of Rows   11

Project Name
— Level 1
— Level 2

	Level ▲	Mark	Insulation Thickness	Horizontal Justification	Hydraulic Diameter	Friction	Free Size
	Level 1	58	0	0	12	0	12"ø
	Level 1	60	0	0	9.6	0	12"x8"
	Level 1	68	0	0	12	0	12"ø
	Level 1	74	0	0	9.6	0	12"x8"
	Level 1	84	0	0	7.87	0	8"ø
	Level 1	85	0	0	7.87	0	8"ø
▶	Level 1	86	0	0	7.87	0	8"ø
	Level 2	70	0	0	12	0	12"ø
	Level 2	72	0	0	12	0	12"x12"
	Level 2	75	0	0	12	0	12"ø
	Level 2	88	0	0	7.87	0	8"ø

Configure Grouping   Export to Excel   Draw Table   Select Parameters

Show Selected Elements
Select Column
Filter by Selected Data
Distinct Values in Column
Remove All Filters

To make insertion of hangers easier filtering can by accomplished. By holding **CTRL** button and clicking on the parameters you want to filter you group those parameters.
To finish filtering of parameters click **right mouse button**

Smart Hangers
Insert Horizontal Duct Hangers

To increase the opportunity of filtering you can select parameters in **Configure Grouping**. Those groups occurs in the project browser also in the yellow tables. Filtering is done in project browser.

Smart Hangers
Insert Horizontal Duct Hangers

To increase the opportunity of filtering you can select more parameters:
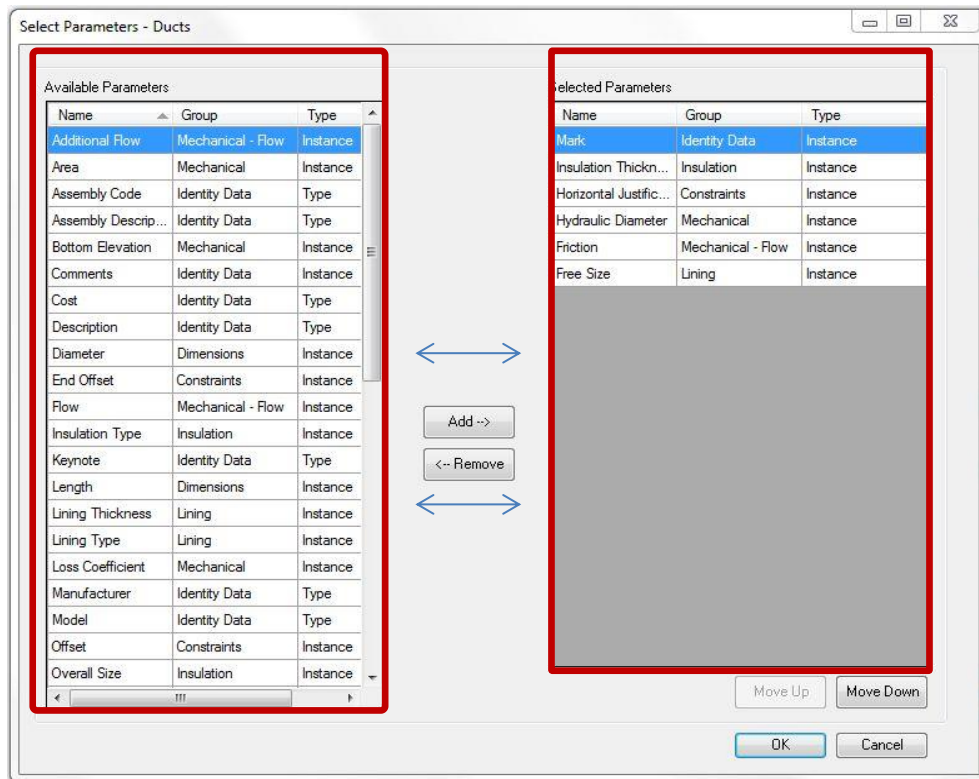
By clicking **Add -->** or **<-- Remove**
It is easy to insert more parameters for filtering

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Smart Hangers
Insert Horizontal Duct Hangers
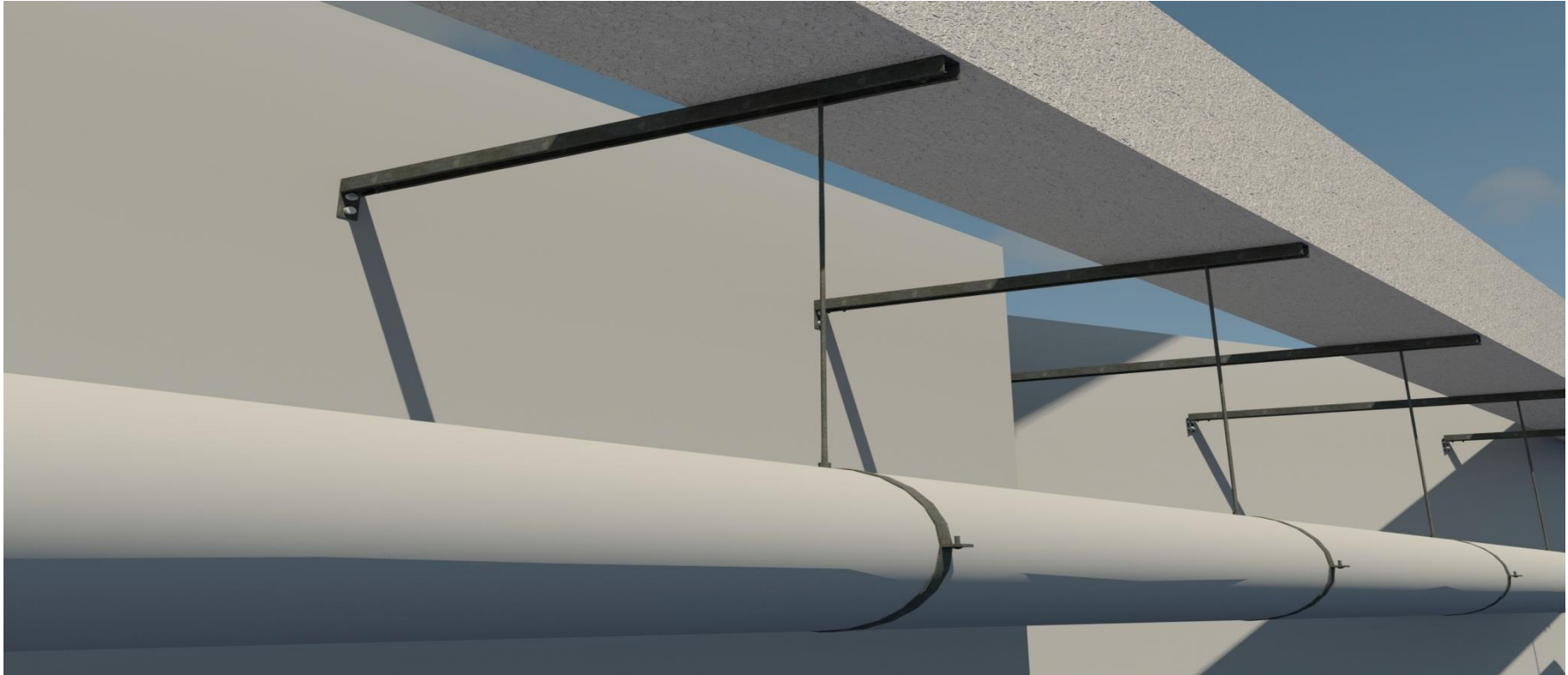
The Horizontal Duct Hangers was inserted into a model automatically!!!

Smart Hangers
Split Ducts
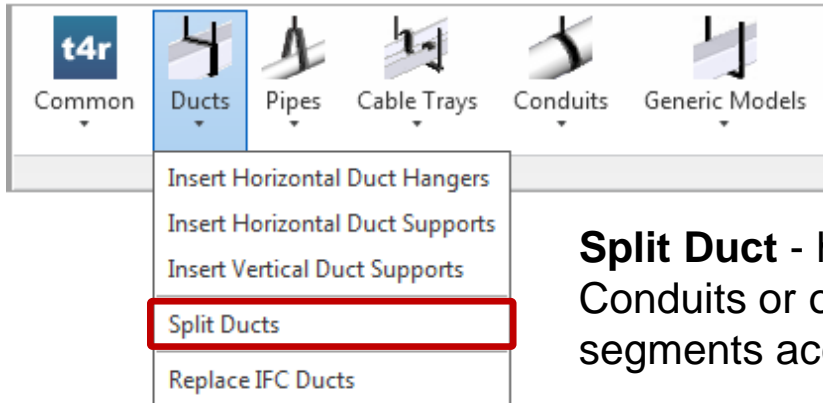
Split Duct - has possibility to split Ducts, Pipes, Cable Trays, Conduits or other line based Generic Models elements into segments according to manufacturer's specified lengths.

Split Duct has same system of rules. There are created most popular user predefined rules for splitting the duct. User also can create his own rules by clicking **Configure** button.

New window occurs. For the moment window is inactive. The window is activating by pressing **F10** on the keyboard and it turns into **Edit Mode**.
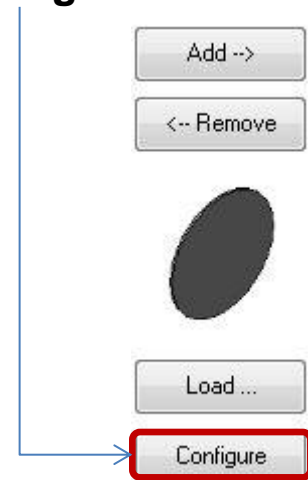
Smart Hangers
Split Ducts

Family	Type	Type Mark	Host Type
M_Round Union	Standard		Location Point

Rules	Rule Parameter	Value
Split Ducts by Fixed Max Distance from Ends to Center of Duct Location Line	Elevation	0
Split Ducts by Fixed Distance from Start to End of Duct Location Line	Side Offset	0
Split Ducts by Fixed Distance from Center to Ends of Duct Location Line	Start/End Extension	0
	Insert at Start/End	(none)
	Layout Rule	Fixed Distance
	Layout Value	1000
	Justification	Start End
	Connection Type	(none)
	Connection Direction	Top
	Connect to Category	Everything
	Intersection Category	(none)
	Intersection Family Type	(none)
	Intersection Maximal Dista...	120

Layout value – main value for splitting ducts.
It shows distance in between several segments. In other words – length of a segment.

- List of Rules according which hangers are inserted into the model
- Selected element for which following rules will be applied
- Additional parameters allow to adjust properties of each rule
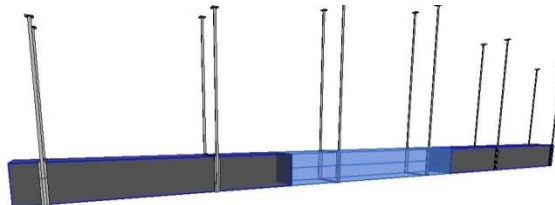
*Picture shows **Split Duct** function*

Smart Hangers
Common possibilities
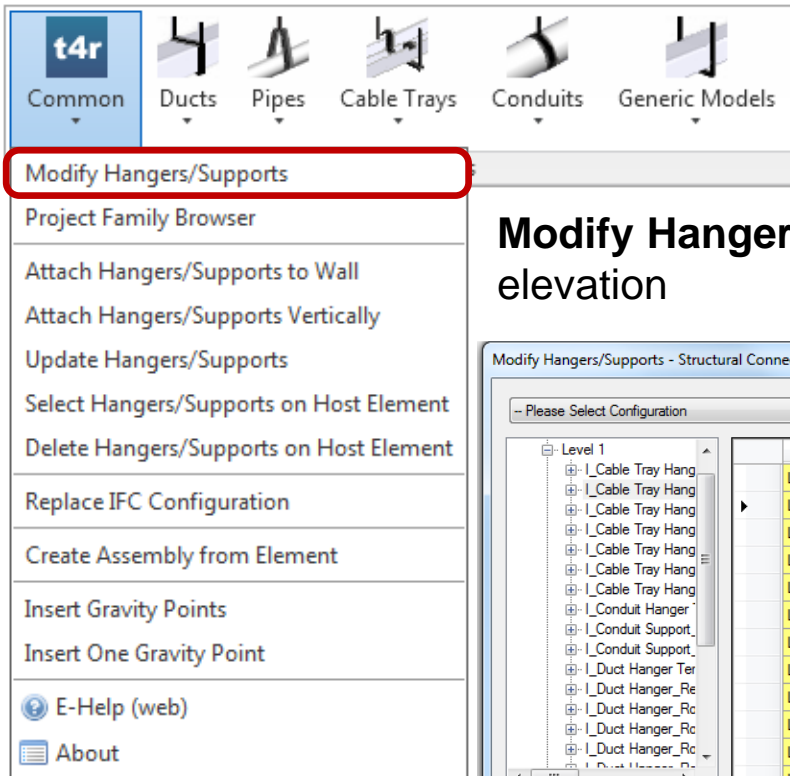
Modify Hangers/Supports – functionality to get real hanger elevation
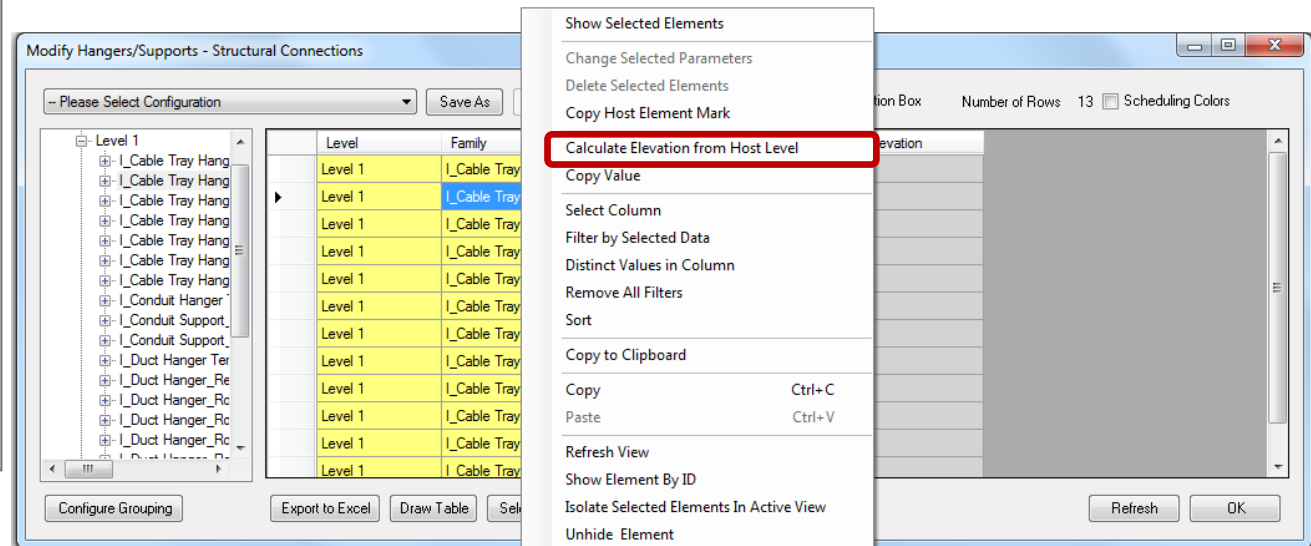
Right click menu **Calculate Elevation from Host Level**:

Smart Hangers

Common possibilities

You can run this function on your needed parameter or create new one directly from this dialog:
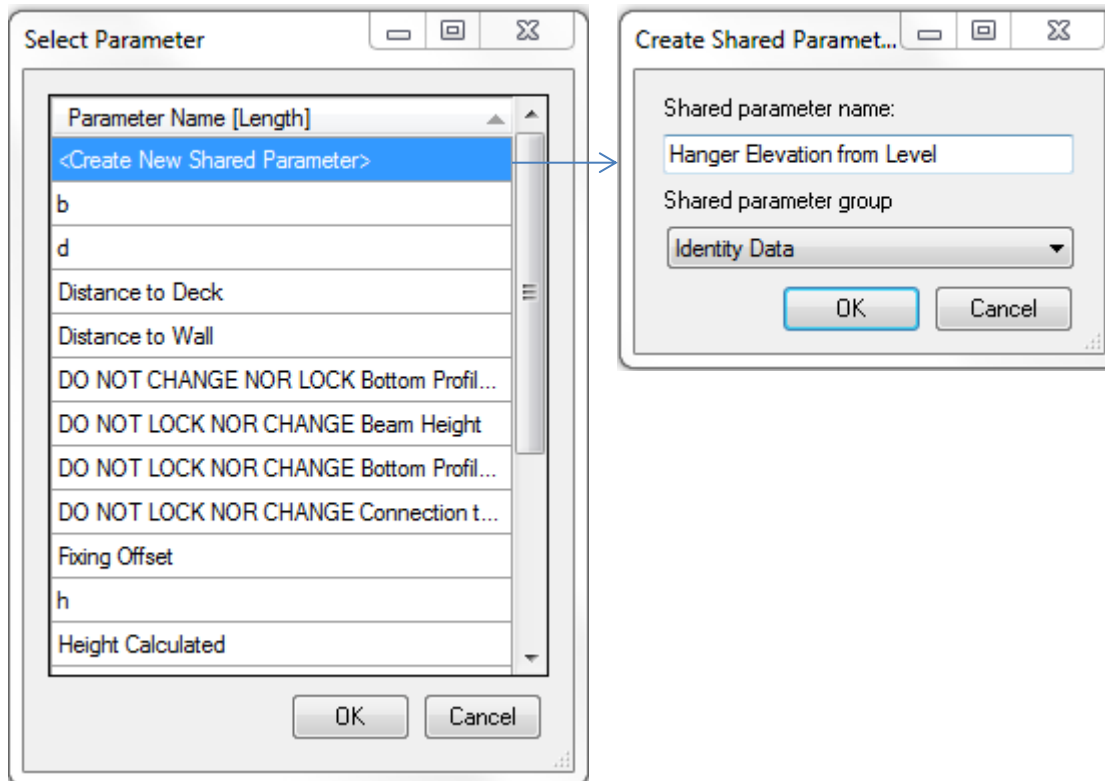
Smart Hangers
Common possibilities

Parameter Hanger Elevation from Level occurs as a new parameter in a table

Smart Hangers
Common possibilities
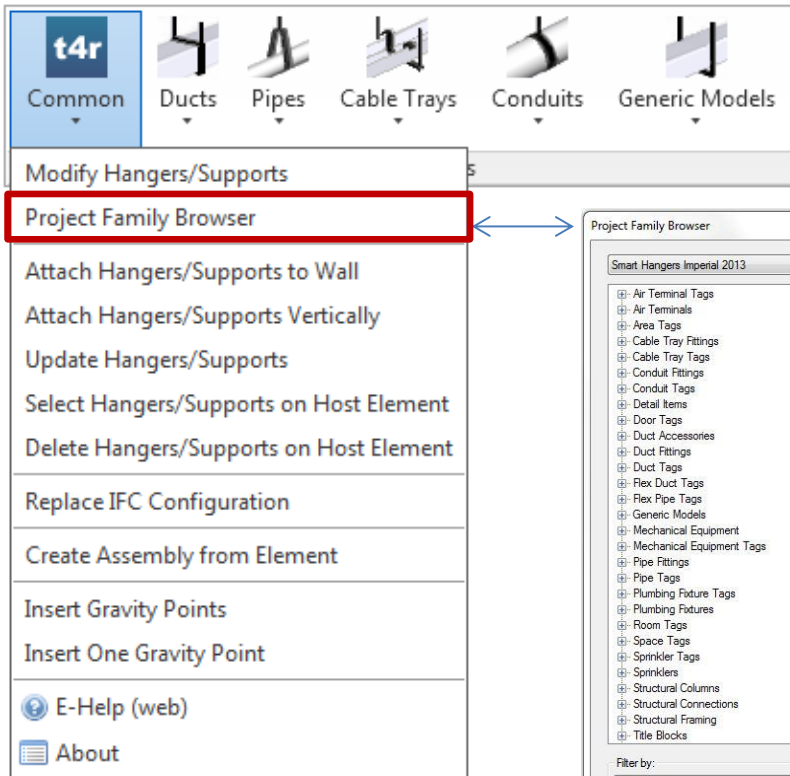
Simple tool which allows to **browse** families
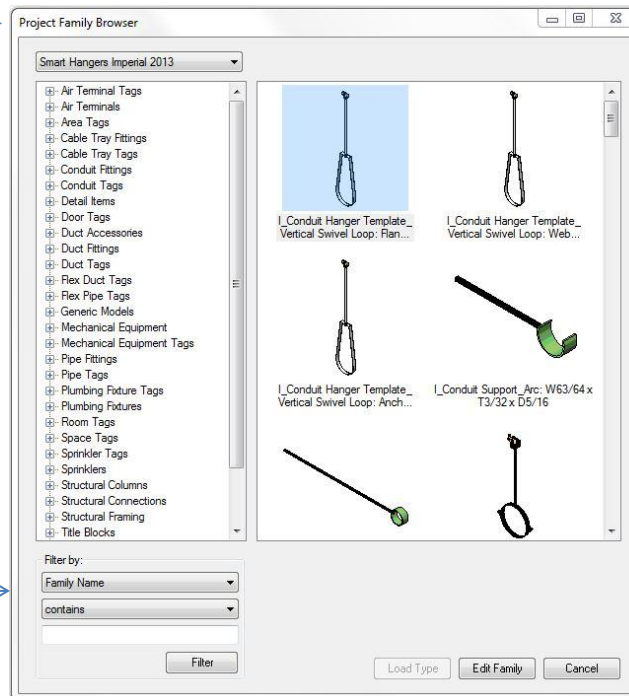
To simplify the search of a family user can use filters.

Smart Hangers
Common possibilities
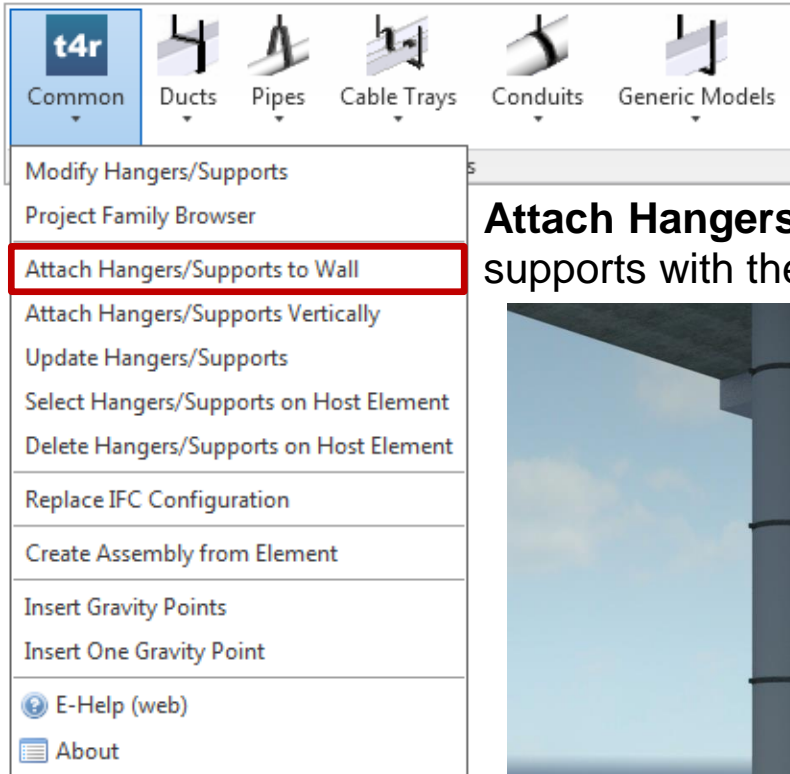
Attach Hangers/Supports to Wall - easily connects hangers or supports with the wall you pick.
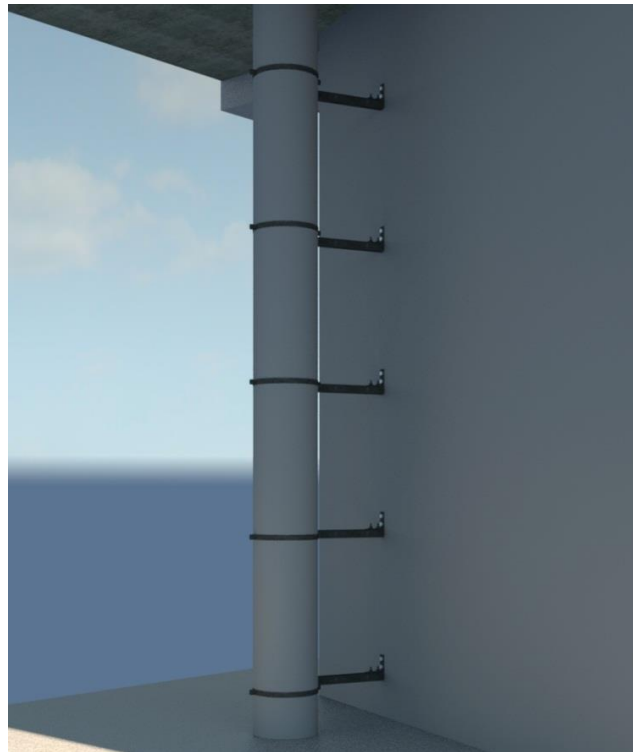
Smart Hangers
Common possibilities
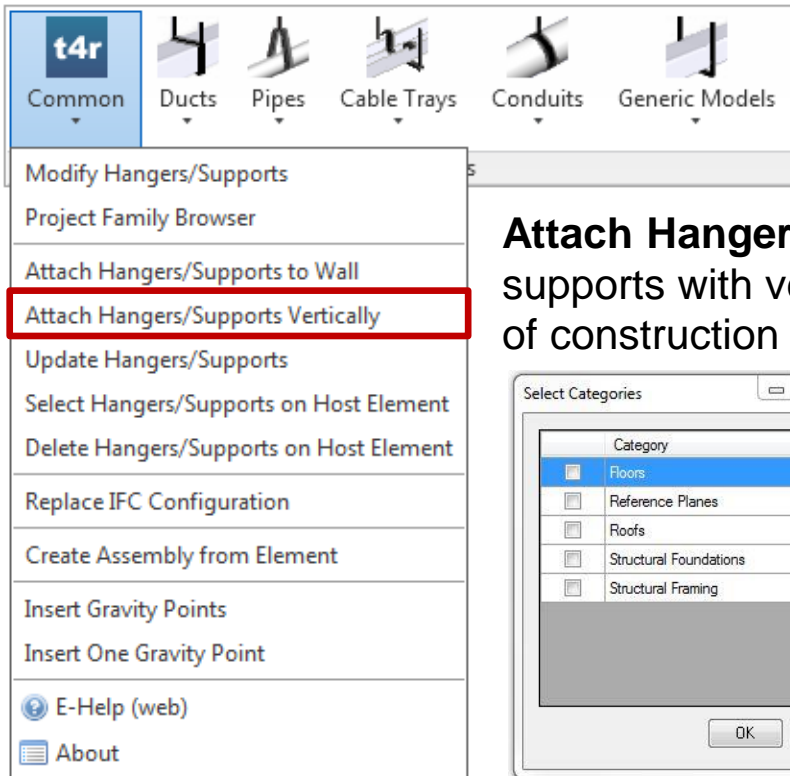
Attach Hangers/Supports Vertically - easily connects hangers or supports with vertical constructions. You can choose to which type of construction hanger should be connected.
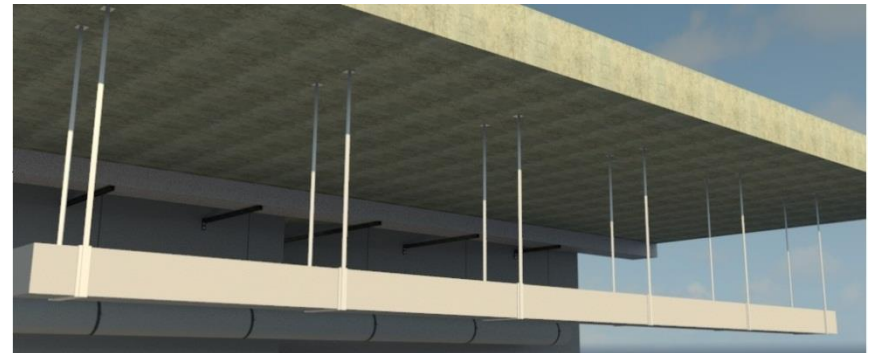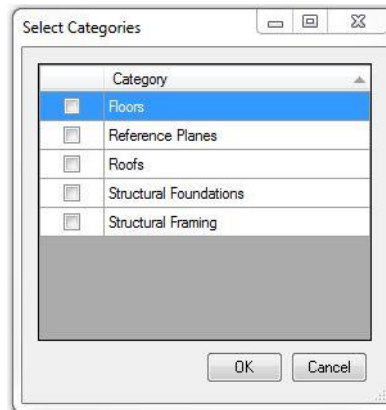
Smart Hangers
Common possibilities
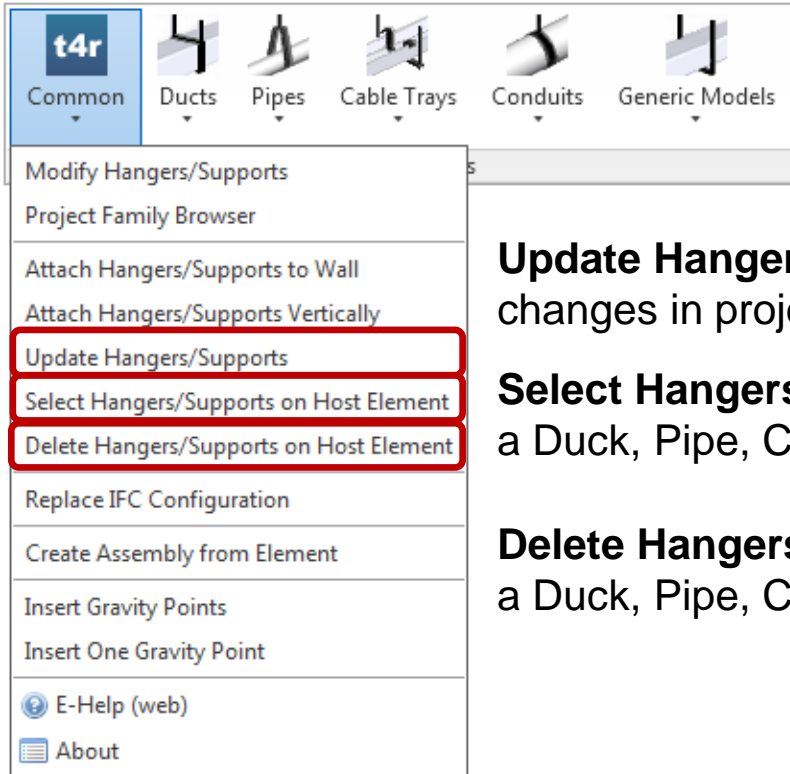
Update Hangers/Supports – updates hangers or supports after changes in project.

Select Hangers/Supports – selects hangers or supports by picking a Duck, Pipe, Cable tray, Conduits, Generic Models .

Delete Hangers/Supports – deletes hangers or supports by picking a Duck, Pipe, Cable tray, Conduits, Generic Models .

Smart Hangers
Replace IFC (Prepare Import IFC Options)
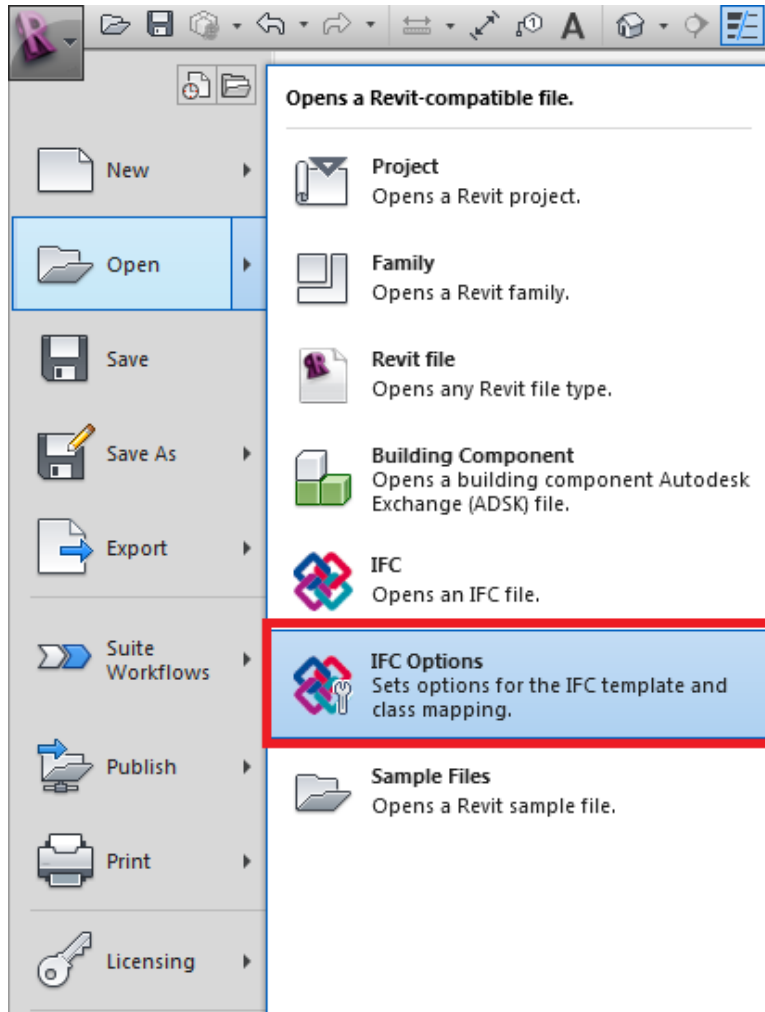
Click icon R →Open →IFC Options

Mapping settings will appear.

Smart Hangers
Replace IFC (Prepare Import IFC Options)
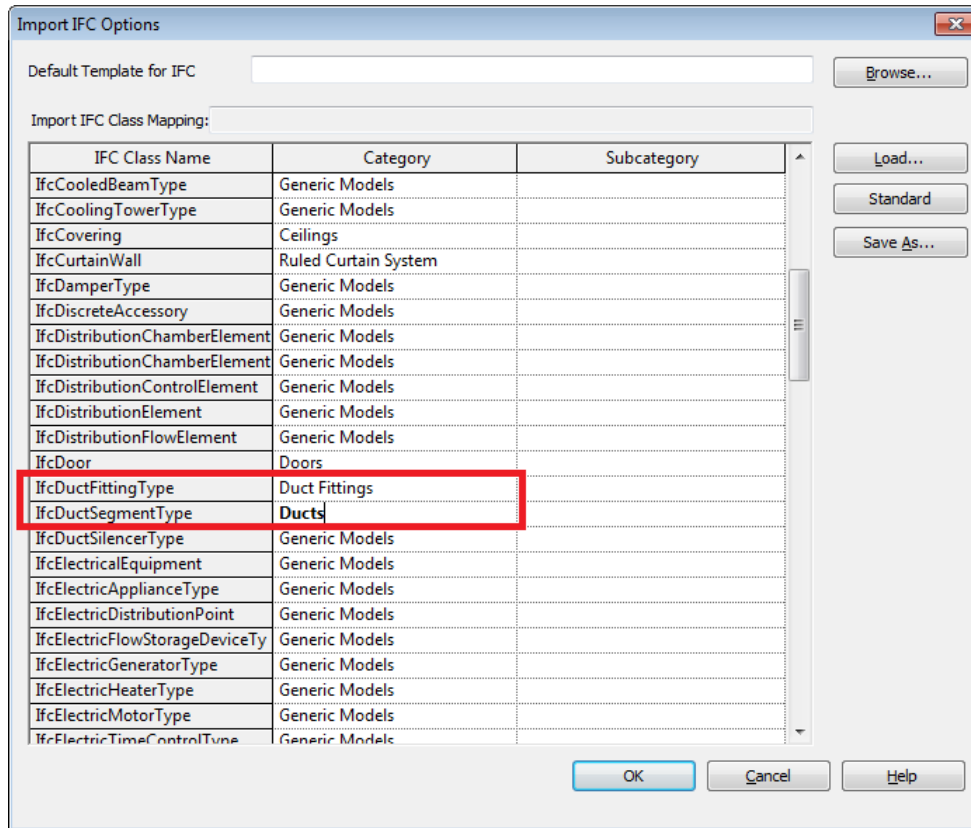
Change mapping settings.
Near IFC Class name write real Revit category name. You need to create openings around ducts, pipes etc., so here you need to add those categories of Ducts, Pipes etc.

Smart Hangers
Replace IFC (Prepare Import IFC Options)
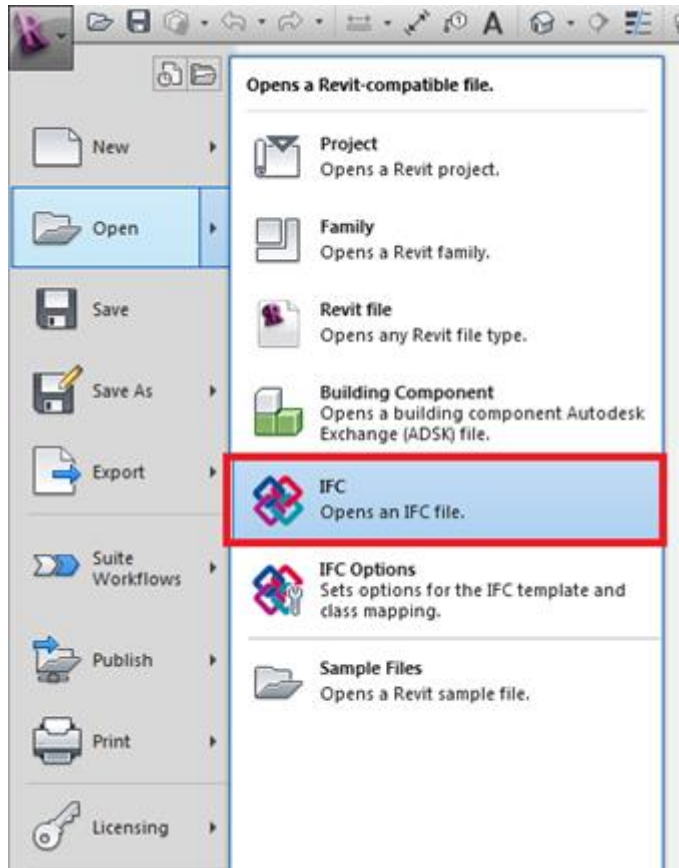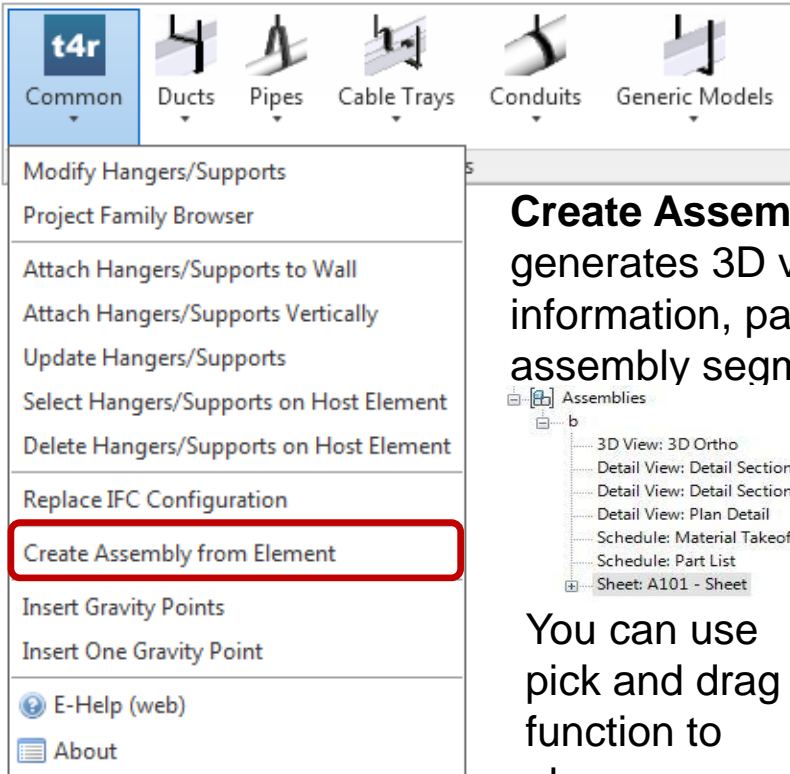

Open IFC file

Smart Hangers
Replace IFC
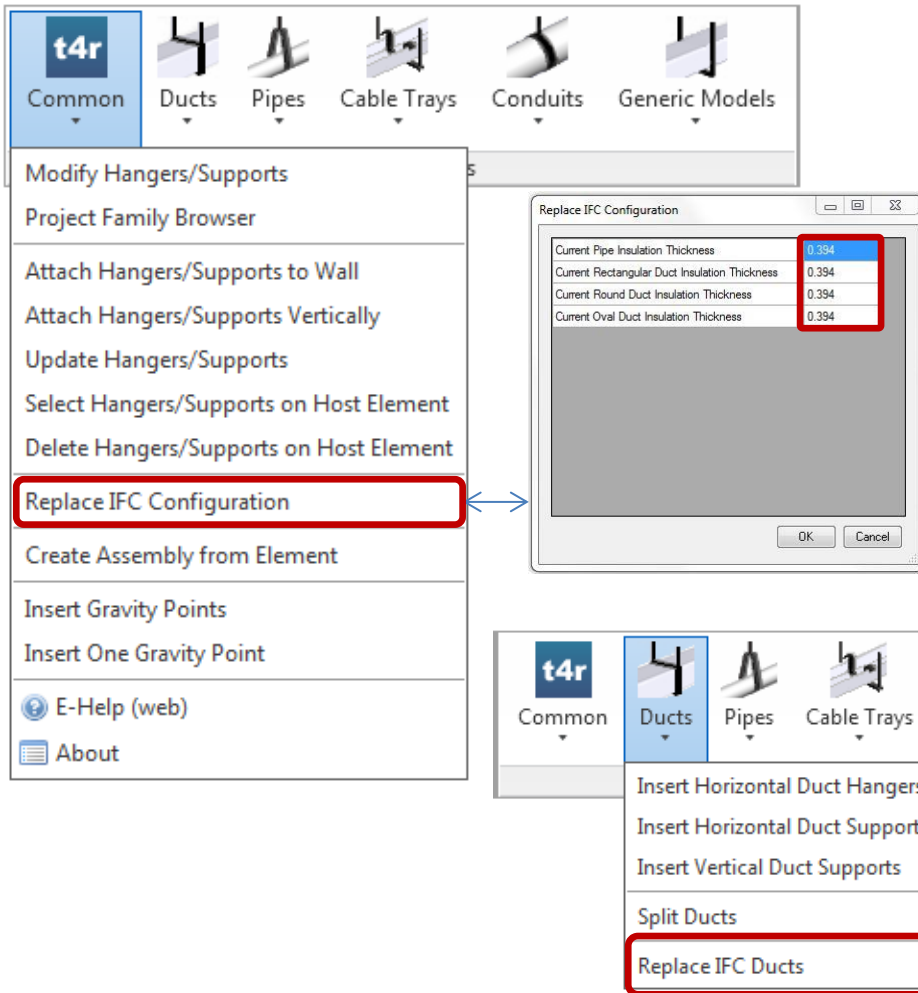
Replace IFC Configuration – easily changes thickness of insulation of current pipes or ducts.

By clicking **Replace IFC Ducts** program automatically replace IFC file.

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Smart Hangers
Common possibilities

Create Assembly from Element – program automatically generates 3D view, section views, plan views, material takeoff information, part list (information occurs in project browser in assembly segment).
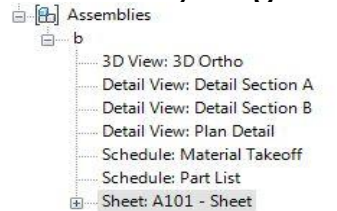
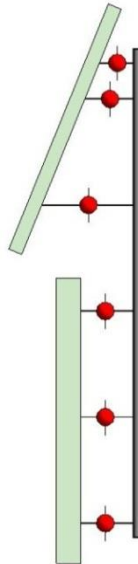You can use pick and drag function to place information onto the drawing
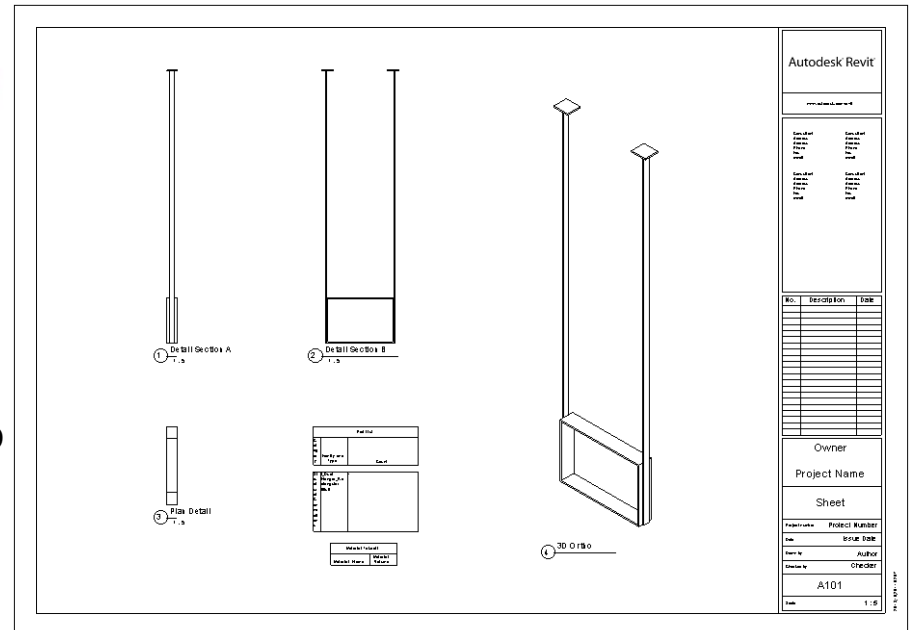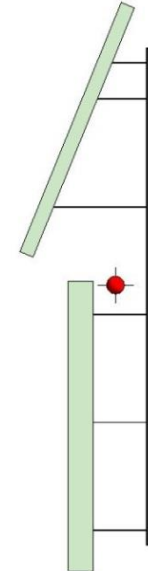
Smart Hangers
Common possibilities
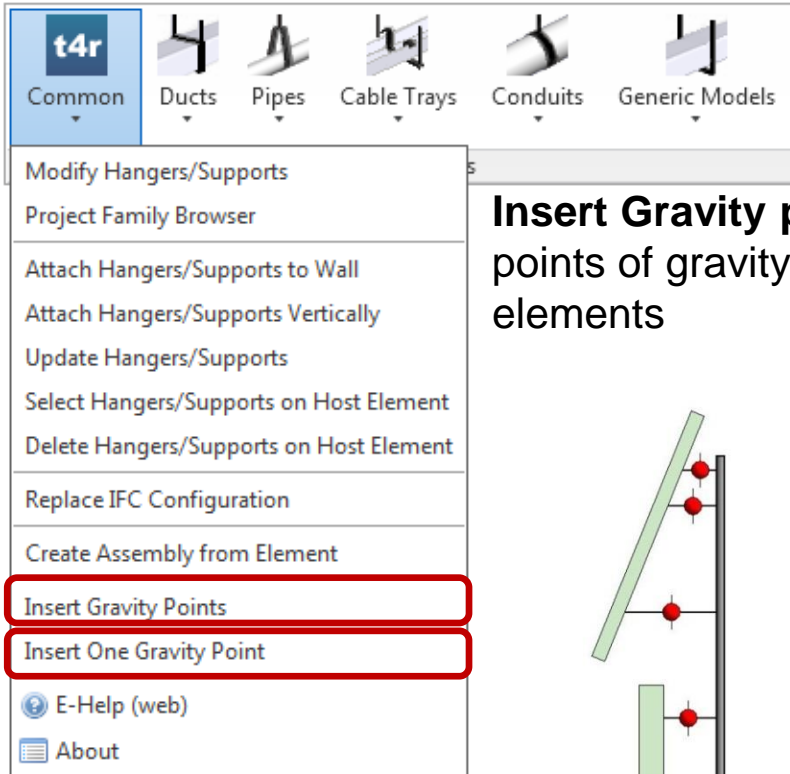
Insert Gravity points – inserts a points of gravity on several elements

Insert One Gravity Point – inserts one point of gravity on several elements according to their gravity force
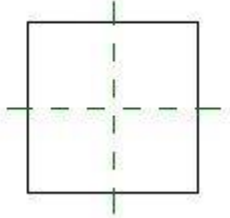
Smart Hangers
Necessary conditions to create custom hanger

We prepared most popular hangers and their examples are shown in a sample project. We discovered a methodology of creating new hangers correctly. To create your own hanger you should follow tips to create your own family:

Tip #1

Creating a new family in Revit select **Face Based** template
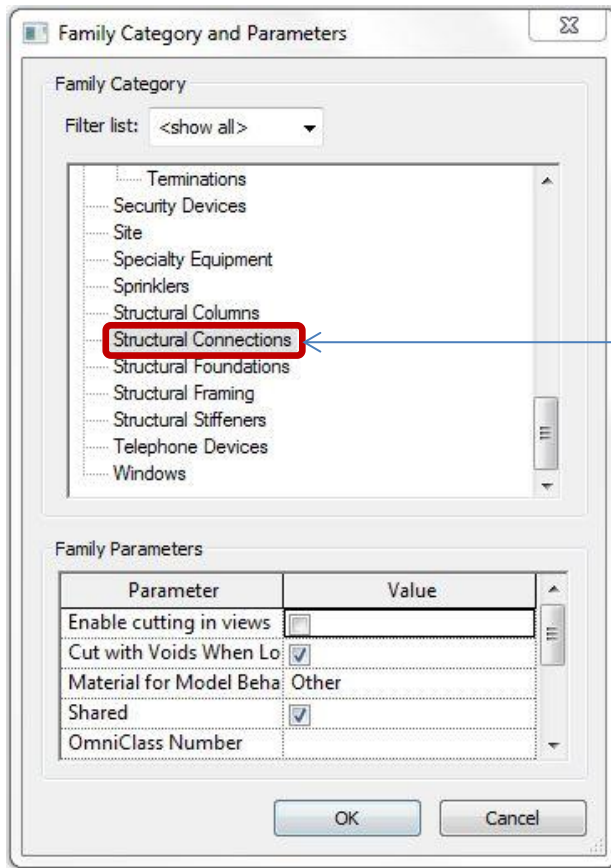

P.S. You also can use our already created hangers.

Smart Hangers

Necessary conditions to create custom hanger

Tip #2

Creating a new family in Revit select **Structural Connections**
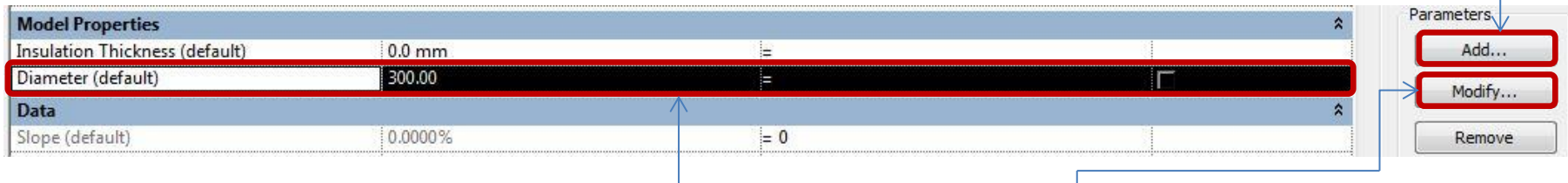

P.S. Most suitable Material for Model hangers is Steel

Smart Hangers
Necessary conditions to create custom hanger

Tip #3

To fix hangers dimensions (height, length, diameter) with the Pipes, Cable Trays, Conduits and Generic Models dimensions you have to set some necessary parameters:

You have to create your own property by adding new parameter

Model Properties				⌃
Insulation Thickness (default)	0.0 mm	⊨		
Diameter (default)	300.00	⊨	⌐	
Data				⌃
Slope (default)	0.0000%	⊨ 0		

Parameters

Add...

Modify...

Remove

In the Family Type column highlight **Diameter** row and click **Modify** button or it pops up automatically after adding new parameter.

P.S. Dimensions of hangers changes not only with MEP segment but also with thickness of insulation.

Smart Hangers
Necessary conditions to create custom hanger

Tip #3

When the **Parameter Properties** window occurs you have to set parameters as follows:

1. Parameters has to be the same as in MEP elements (like Ducts, Pipes etc). :

- **Parameter name;**
- **Discipline**
- **Type of Parameter**

2. Parameters has to be **Instance**
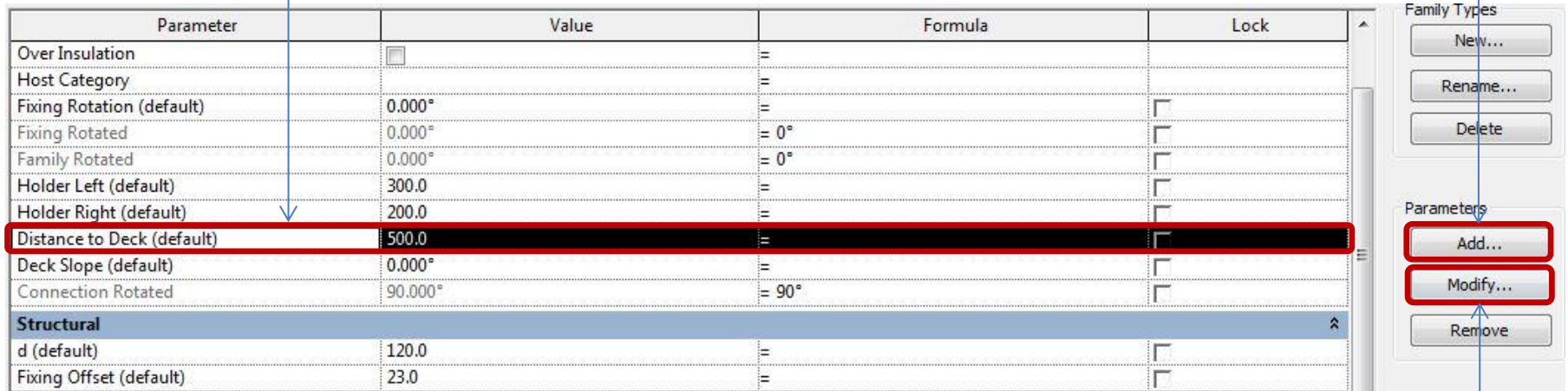
3. Parameter group has to be **Model Properties**

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Smart Hangers

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Tip #4

You have to create your own property by adding new parameter

Creating a new family in Revit to perform connection between variable constructions you have to indicate distance to it by creating parameter **Distance to Deck**.

Parameter	Value	Formula	Lock	
Over Insulation	☐	=		
Host Category		=		
Fixing Rotation (default)	0.000°	=	☐	
Fixing Rotated	0.000°	= 0°	☐	
Family Rotated	0.000°	= 0°	☐	
Holder Left (default)	300.0	=	☐	
Holder Right (default)	200.0	=	☐	
Distance to Deck (default)	500.0	=	☐	
Deck Slope (default)	0.000°	=	☐	
Connection Rotated	90.000°	= 90°	☐	
Structural				☆
d (default)	120.0	=	☐	
Fixing Offset (default)	23.0	=	☐	

Family Types
- New...
- Rename...
- Delete

Parameters
- Add...
- Modify...
- Remove

In the Family Type column highlight **Distance to Deck** row and click **Modify** button or it pops up automatically after adding new parameter.

The program will automatically connect hangers with the constructions of the building.

Smart Hangers
Necessary conditions to create custom hanger

Tip #4

When the **Parameter Properties** window occurs you have to set parameters as follows:

1. Parameters has to be as follows:

- **Parameter name;**
- **Discipline**
- **Type of Parameter**

2. Parameters has to be **Instance**

3. Parameter group has to be **Construction**

Picture shows Distance to Deck

Smart Hangers
Necessary conditions to create custom hanger

Tip #4

You have to create your own property by adding new parameter

Creating a new family in Revit to perform connection between variable constructions you have to indicate distance to it by creating parameter **Distance to Wall**.

Parameter	Value	Formula	Lock
Over Insulation	☐	=	
Host Category		=	
Holder (default)	-150.0	=	☐
Fixing Rotated	0.000°	= 0°	☐
Fixing Rotation (default)	0.000°	=	☐
Family Rotated	0.000°	= 0°	☐
Distance to Wall (default)	500.0	=	☐
Distance to Deck (default)	500.0	=	☐
Deck Slope (default)	0.000°	=	☐
Connection Rotated	90.000°	= 90°	☐
Structural			⌃

Family Types
- New...
- Rename...
- Delete

Parameters
- Add...
- Modify...
- Remove

In the Family Type column highlight **Distance to Deck** row and click **Modify** button or it pops up automatically after adding new parameter.
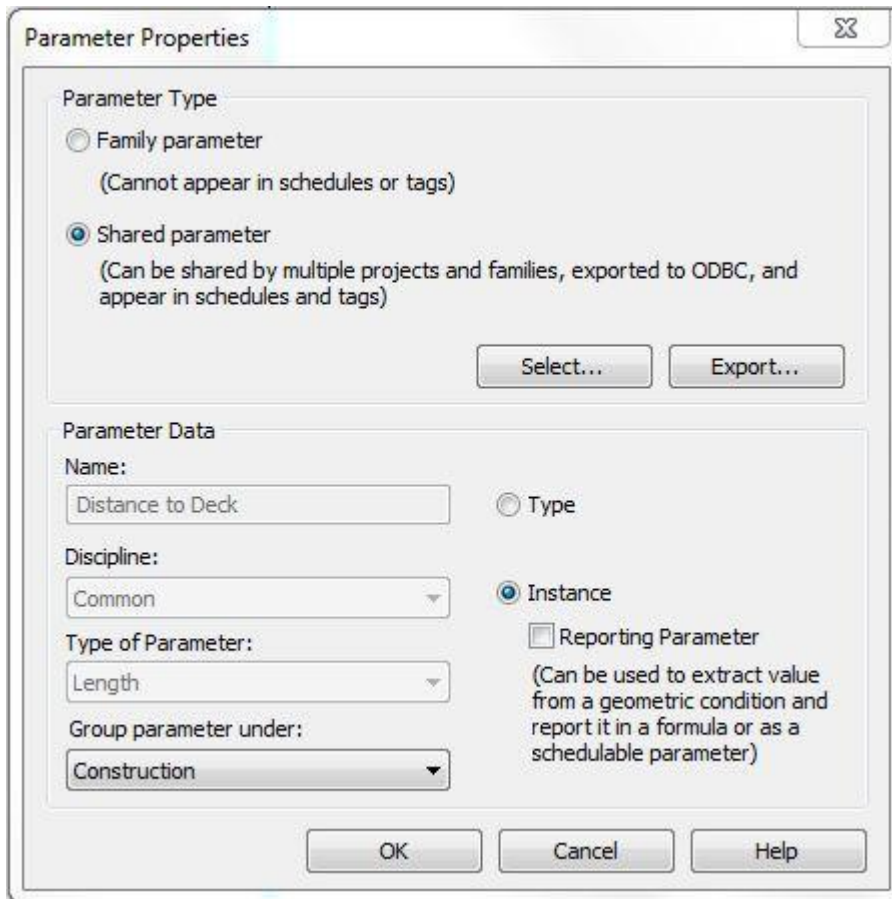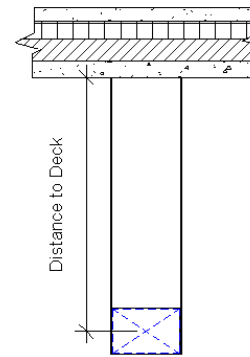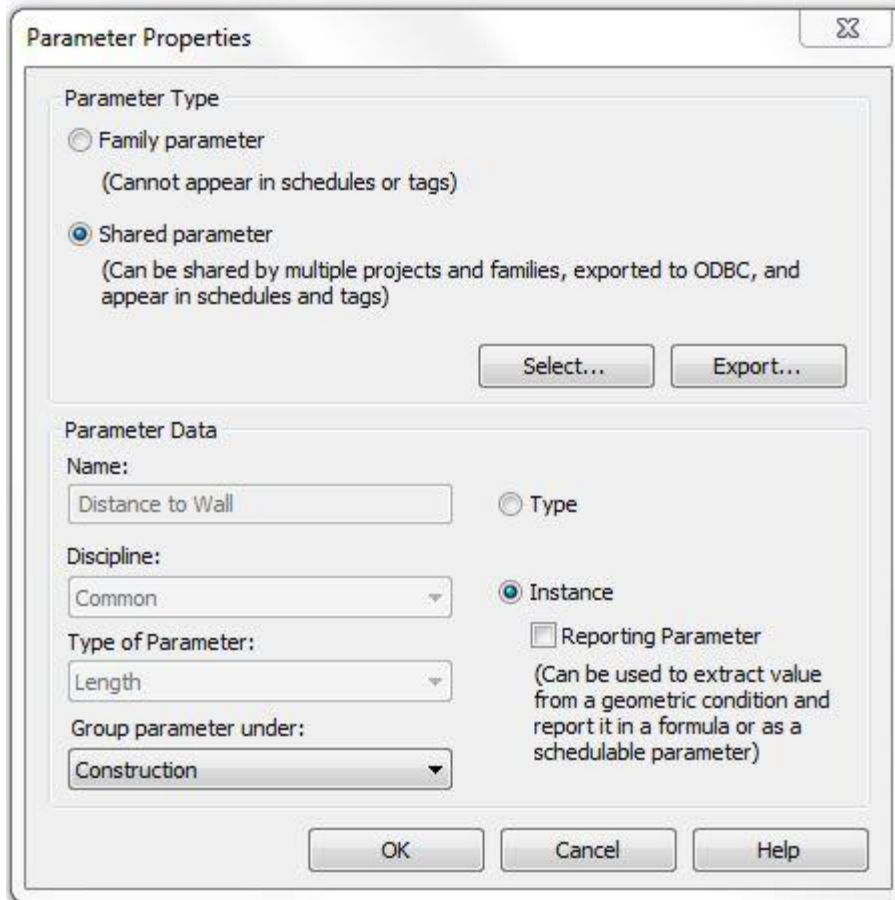
The program will automatically connect hangers with the walls of the building.

Smart Hangers

Necessary conditions to create custom hanger

Tip #4

When the **Parameter Properties** window occurs you have to set parameters as follows:

Parameter Properties

Parameter Type
- Family parameter
  (Cannot appear in schedules or tags)
- Shared parameter
  (Can be shared by multiple projects and families, exported to ODBC, and appear in schedules and tags)

  Select...   Export...

Parameter Data
Name:
Distance to Wall   ○ Type

Discipline:
Common   ● Instance

Type of Parameter: ☐ Reporting Parameter
Length   (Can be used to extract value
                          from a geometric condition and
Group parameter under: report it in a formula or as a
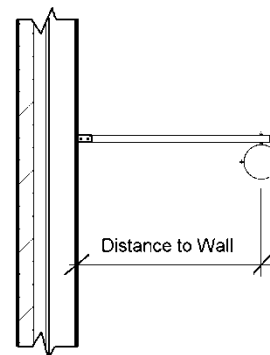Construction   schedulable parameter)

OK   Cancel   Help

1. Parameters has to be as follows:

- **Parameter name;**
- **Discipline**
- **Type of Parameter**

2. Parameters has to be **Instance**

3. Parameter group has to be **Construction**

Picture shows Distance to Wall

Distance to Wall

Smart Hangers
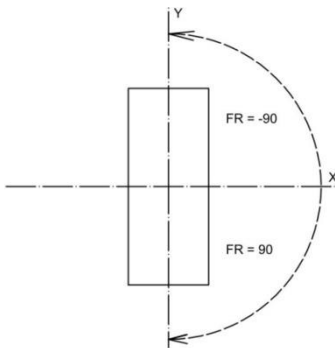## Necessary conditions to create custom hanger

Tip #5

This property is used to describe
You have to create your own property by adding new parameter
Creating a new family in Revit to perform **Family Rotation** you have to indicate rotation angle.

Parameter	Value	Formula	Lock	
Construction				⌃
Subcategory		=		
Over Insulation	☐	=		
Host Category		=		
Holder (default)	-150.0	=	☐	
Fixing Rotated	0.000°	= 0°	☐	
Fixing Rotation (default)	0.000°	=	☐	≡
Family Rotated	0.000°	= 0°	☐	
Distance to Wall (default)	500.0	=	☐	
Distance to Deck (default)	500.0	=	☐	
Deck Slope (default)	0.000°	=	☐	
Connection Rotated	0.000°	= 0°	☐	

Family Types
New...
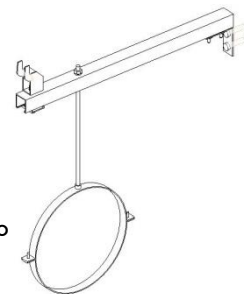Rename...
Delete

Parameters
Add...
Modify...
Remove

This picture shows Family Rotated = 0°

Arrows shows the possible rotation of family:
If you rotate family clockwise - Family Rotated = 90°
If you rotate family counterclockwise - Family Rotated = -90°

FR = -90

FR = 90

Smart Hangers

Necessary conditions to create custom hanger

Tip #5

You have to create your own property by adding new parameter

Creating a new family in Revit to perform **Connection Rotation** you have to indicate rotation angle.

Parameter	Value	Formula	Lock
Construction			⌄
Subcategory		=	
Over Insulation	☐	=	
Host Category		=	
Holder (default)	-150.0	=	☐
Fixing Rotated	0.000°	= 0°	☐
Fixing Rotation (default)	0.000°	=	☐
Family Rotated	0.000°	= 0°	☐
Distance to Wall (default)	500.0	=	☐
Distance to Deck (default)	500.0	=	☐
Deck Slope (default)	0.000°	=	☐
Connection Rotated	0.000°	= 0°	☐

Family Types
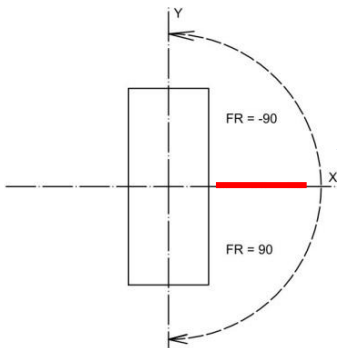- New...
- Rename...
- Delete
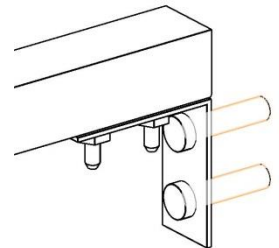
Parameters
- Add...
- Modify...
- Remove

This picture shows Connection Rotated = 0° (connection is RED).

FR = -90

FR = 90

Arrows shows the possible rotation of connection:
If you rotate connection in positive axis direction –
Connection Rotated = 90°
If you rotate connection in negative axis direction –
 Connection Rotated = -90°

Smart Hangers

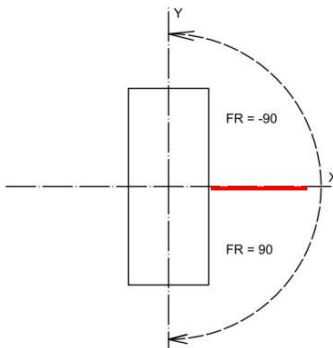## Necessary conditions to create custom hanger

Tip #5

You have to create your own property by adding new parameter

Creating a new family in Revit to perform **Fixing Rotation** you have to indicate rotation angle.

Parameter	Value	Formula	Lock
Construction			⌄
Subcategory		=	
Over Insulation	☐	=	
Host Category		=	
Holder (default)	-150.0	=	☐
Fixing Rotated	0.000°	= 0°	☐
Fixing Rotation (default)	0.000°	=	☐
Family Rotated	0.000°	= 0°	☐
Distance to Wall (default)	500.0	=	☐
Distance to Deck (default)	500.0	=	☐
Deck Slope (default)	0.000°	=	☐
Connection Rotated	0.000°	= 0°	☐

Family Types
- New...
- Rename...
- Delete
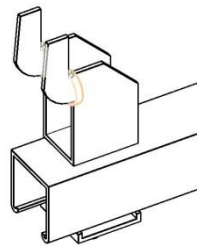
Parameters
- Add...
- Modify...
- Remove

This picture shows Fixing Rotated = 0° (connection is RED).

FR = -90
FR = 90

Arrows shows the possible rotation of connection:

If you rotate connection clockwise - Connection Rotated = 90°
If you rotate connection counterclockwise - Connection Rotated = -90°

Smart Hangers
Results

- **Smart Modeling** – Instantly inserts Hangers or Supports into a project by predefined rules.

- **Reduction of Errors** – Hangers or Supports will be updated according to the changes in the current or linked project.

- **Saved Settings for Future Projects** – Easy to produce and modify distribution rules. Rules can be saved and shared with other users in the company.

- **Simple** – Simple selection and filtering of Ducts, Pipes, Cable Trays, Conduits or other line based Generic Models where the Hangers or Support has to be distributed.

- **Speed** – You will not need to place Hangers or Supports one by one. Smart Hangers will do that automatically for you.

- **Adaptation by Producer** – Smart Hangers can use any user created Hangers, Support and Unions.

- **Other formats** – Hangers and Supports can be distributed according to IFC Ducts, Pipes, Cable Trays or Conduits.

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