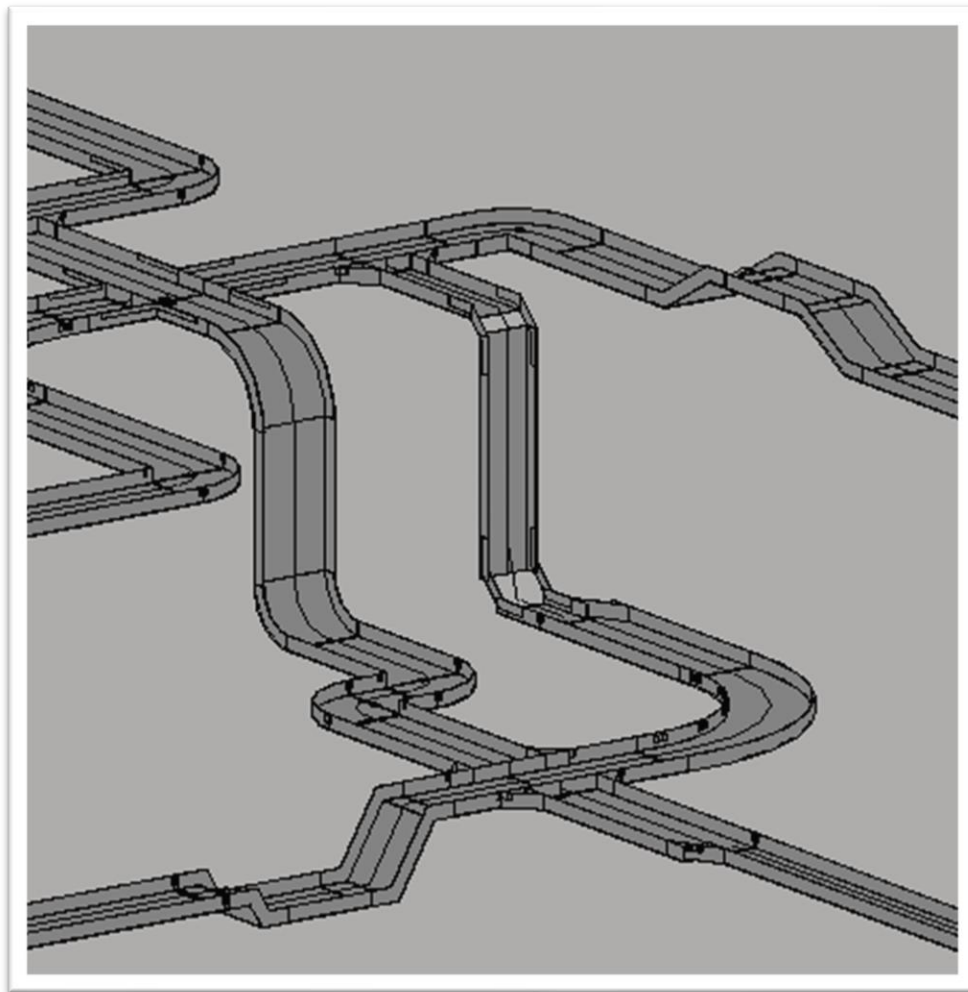


# GUIDE BOOK

for Mesh cable tray systems



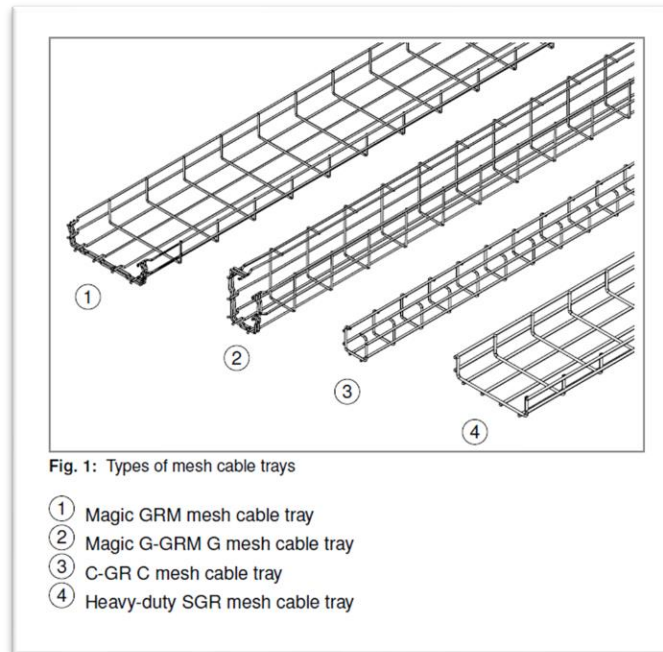
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## In general

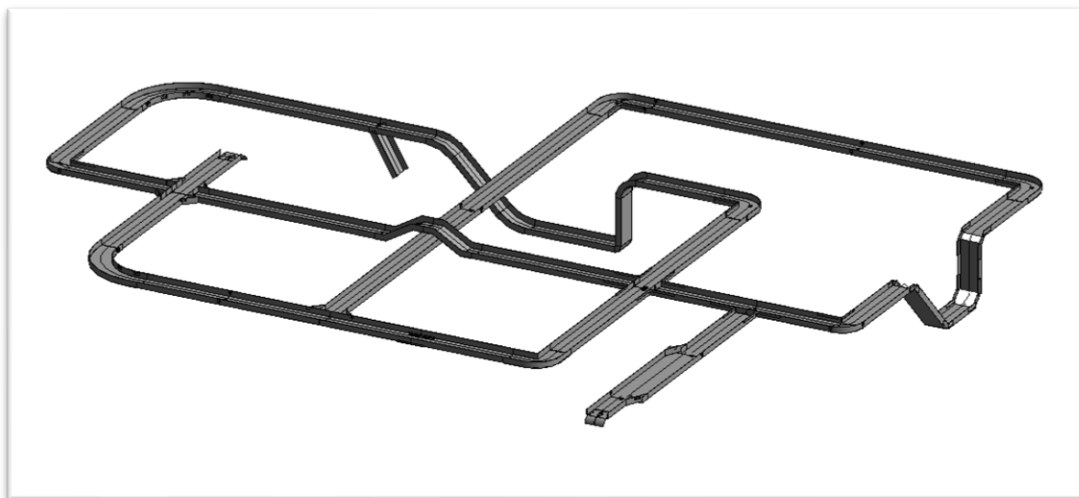
### OBO mesh cable trays

OBO Mesh cable trays are available in four different types (**GRM**, **G-GRM**, **C-GR** and **SGR**) with various heights and widths depending on the requirements, area of application and cable quantity. The first two are connected with a magic solution, while the other two require connecting fixing elements (such as connector element).










*1. figure Four different types of mesh cable trays*

The easily separable wires and the bending capacity of the mesh cable trays enable the simple creation of bends, branches and exits.



*2. figure An example for OBO mesh cable tray system in Revit*

Comprehensive system accessories enable flexible installation of the different mesh cable tray types, depending on the requirements on the construction site.

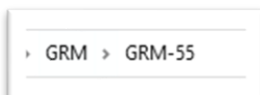
Accessories		Function	GRM	G-GRM	C-GR	SGR
Joint connector Type GSV 34		Screw straight connection of mesh cable trays screw connection of mesh cable trays with vertical exit/bend/T branch/cross-over/reduction	X	X	X	
Joint connector Type GUV 6		Screw straight connection of mesh cable trays, screw connection of mesh cable trays with vertical exit/corners/T branch/cross-over/reduction				X
Mesh cable tray connector, long Type GRV 245		Screwless straight connection of mesh cable trays	X			X
Corner connector Type GEV 36		Screw connection with elements created on-site, such as bends, cross-overs, branches, reductions	X		X	X
Slotted steel strap, bent		Creation of bends and T branches	X		X	
Cable exit plate Type KAB GR		For cable exit to maintain bend radii	X		X	X
Installation profile 90° Installation profile 45° Type MW 45/MW 90 with KS 23 35 hold-down clamp		Vertical exit from mesh cable tray	X		X	

Tab. 1: Accessories for connectors and exits

3. figure Accessories of mesh cable trays

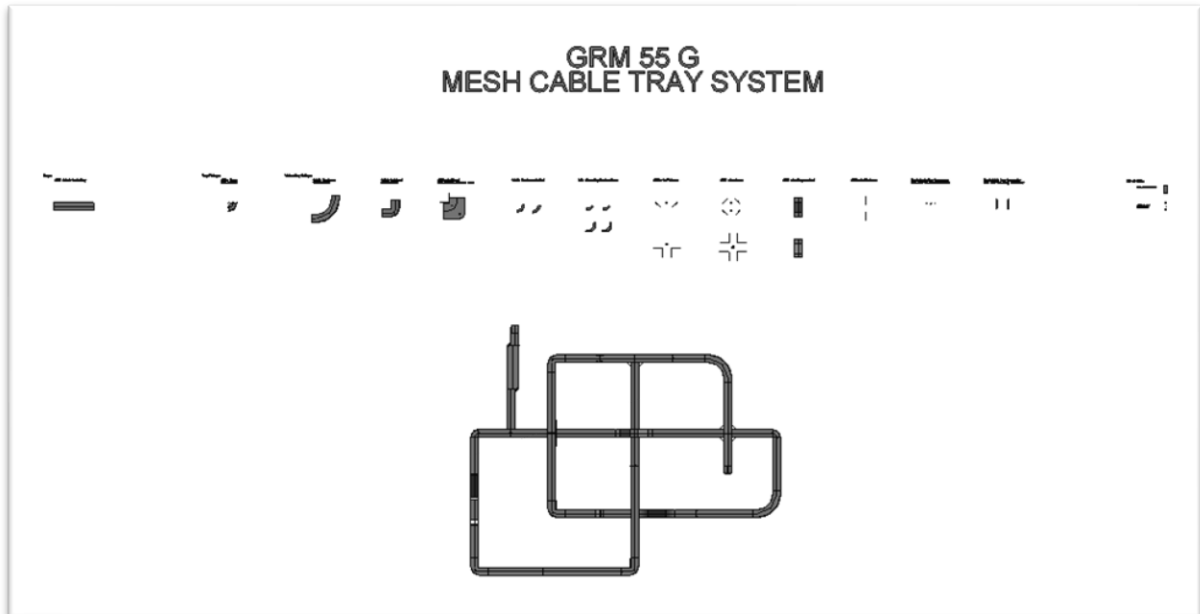
Specific manufactured 'Fitting elements' are not specifically available, except the GRB horizontal bend element (which can be used with the 55 mm and 15 mm side height GRM systems). All other elements can be formed by cutting, bending the tray and using fasteners (like GSV 34 Joint connector). Hereinafter, we will refer to these as virtual elements.

In the ZIP file you can find **RVT files** of the mesh cable tray systems according to material and side height of tray. (OBO\_GRM\_55\_G\_System\_Showcase\_MCT)

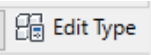


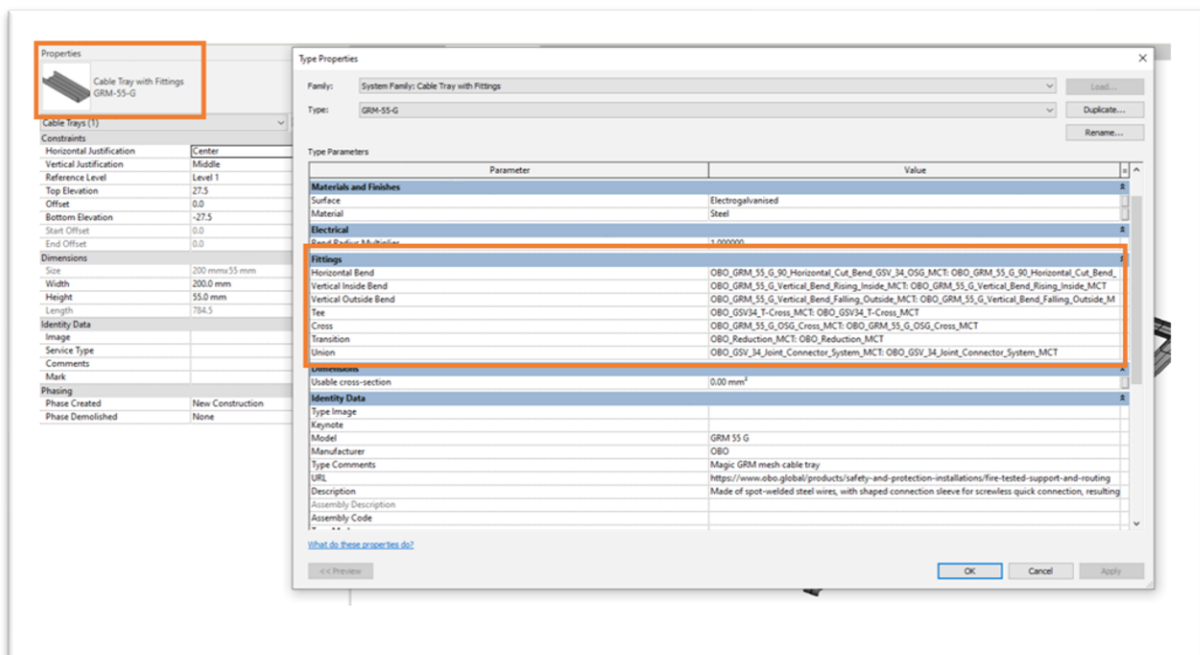
## Project file

When you open the project file (.rvt) first you can see the welcome page which gives an example for current system (for example GRM 55 G). Here you can find the available fitting elements and accessories.



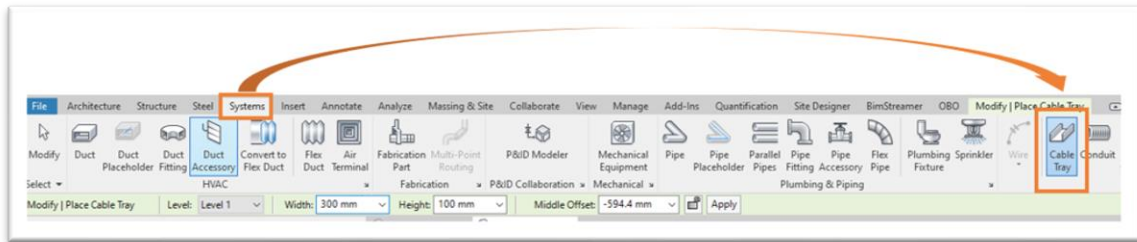
4. figure Welcome page in project of Revit

If you click on the straight element of tray and go to  (under the Properties) you can find the linked fittings of the system.



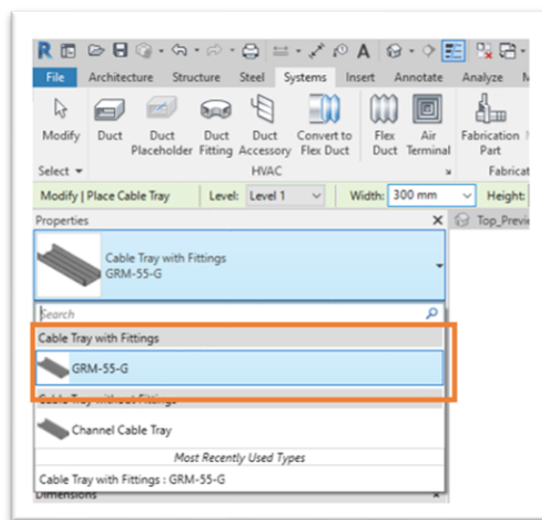
5. figure Linked fittings under the type properties label

Thanks to the linked elements, we can automatically create a cable tray support system in Revit. For this we have to click on the cable tray icon under the systems tab.



6. figure Creating cable tray system

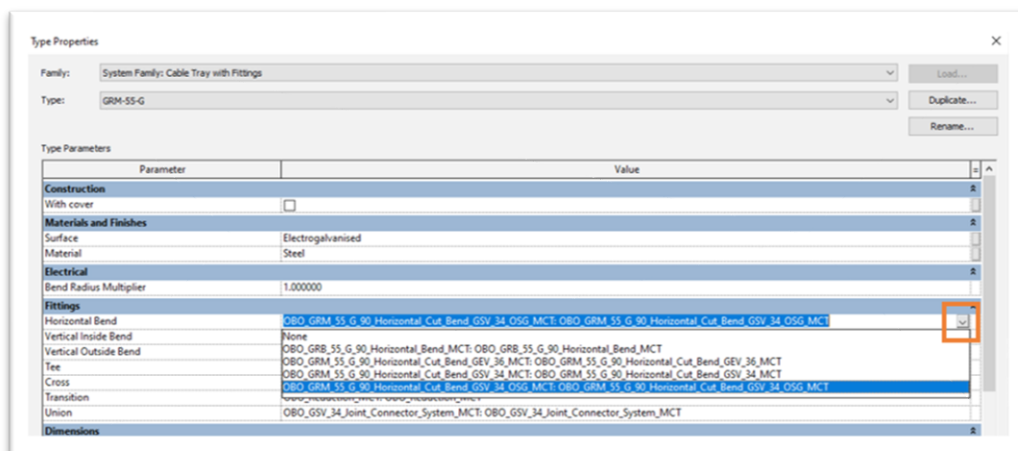
Then we need to choose the system to be used for planning.



7. figure Choosing the system

It is also possible in Revit to change the automatically placed elements. This can be interesting for the mesh cable tray system, as there are several ways to design the horizontal bend items, for example.

To do this we need to go the Fittings label and click on the icon of drop down menu.



8. figure Changing the automatically placed elements

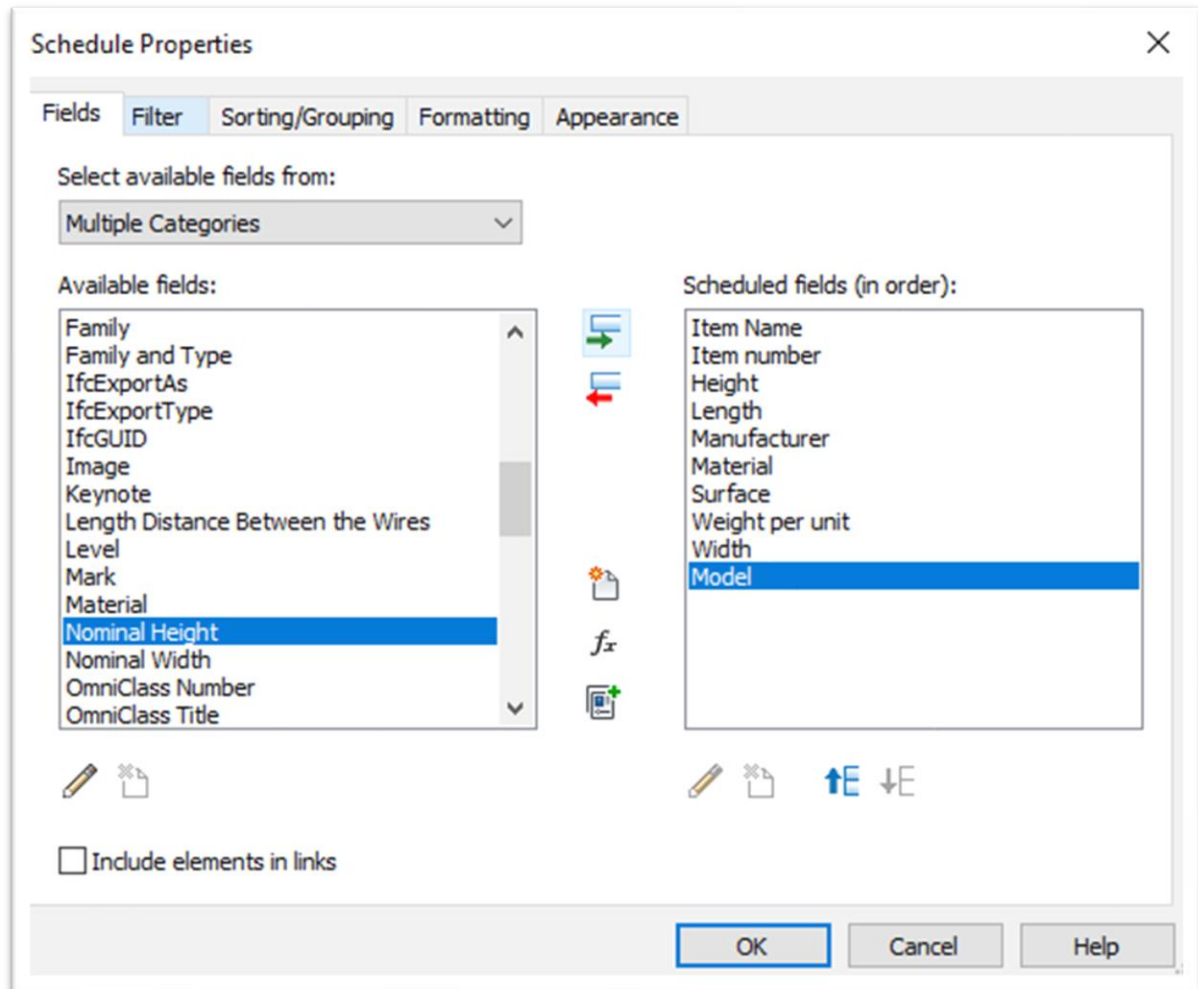
## Schedules – making list of the products

In Revit there is a option to making a list of the applied products.



Clicking on (under the Project Browser menu) and making a new shedule.

Under the Fields, the shared parameters can be added to the schedule list.



9. figure Adding attributes to the list of products in the schedule properties of Revit

By clicking OK button you will recieve the list with the set up and there you can add different filters according to your requirements.



<div> <div>{3D}</div> <div>View 1</div> <div>Front</div> <div>Multi-Category Schedule X</div> </div>						
<Multi-Category Schedule>						
A	B	C	D	E	F	G
Item Name	Item number	Length	Manufacturer	Surface	Weight per unit	Model
GRB 90 520 G	6001939		OBO	Electrogalvanised	0.19 kg	BEND
GEV 36 G	6016715		OBO	Electrogalvanised	0.03 kg	Corner connector
GSV 34 G	6016596	34	OBO	Electrogalvanised	0.03 kg	GSV 34
GSV 34 G	6016596	34	OBO	Electrogalvanised	0.03 kg	GSV 34
GSV 34 G	6016596	34	OBO	Electrogalvanised	0.03 kg	GSV 34
GSV 34 G	6016596	34	OBO	Electrogalvanised	0.03 kg	GSV 34
GRM 55 200 G	6001446	900	OBO	Electrogalvanised	0.91 kg	90 DEGREE CUT B
GEV 36 G	6016715		OBO	Electrogalvanised	0.03 kg	Corner connector
GEV 36 G	6016715		OBO	Electrogalvanised	0.03 kg	Corner connector
GEV 36 G	6016715		OBO	Electrogalvanised	0.03 kg	Corner connector
GEV 36 G	6016715		OBO	Electrogalvanised	0.03 kg	Corner connector
GRM 55 200 G	6001446	600	OBO	Electrogalvanised	0.60 kg	90 DEGREE CUT B
GSV 34 G	6016596	34	OBO	Electrogalvanised	0.03 kg	GSV 34
GRM 55 400 G	6001450	1000	OBO	Electrogalvanised	2.35 kg	90 DEGREE CUT B
GSV 34 G	6016596	34	OBO	Electrogalvanised	0.03 kg	GSV 34
GSV 34 G	6016596	34	OBO	Electrogalvanised	0.03 kg	GSV 34
OSG 20X3 FT	6017371		OBO	Hot-dip galvanized	0.16 kg	Slotted steel strap,
	6001446	300	OBO	Electrogalvanised	0.30 kg	Vertical Bend Fallin
	6001446	300	OBO	Electrogalvanised	0.30 kg	Vertical Bend
N/A	N/A	102	OBO			Mounting bracket s
MW 45 SL10 FT	6017320	177	OBO	Hot-dip galvanised	0.21 kg	MW 45
MW 45 SL10 FT	6017320	177	OBO	Hot-dip galvanised	0.21 ka	MW 45

10. figure An example for generated scheduled list in Revit

Here you can see that the Virtual Fitting elements don't have Item number or Item Name, but the data of all joined elements (such as GEV 36 corner connector) are listed, since their parameters have been shared in the main, virtual fitting families.

Schedule Properties

Fields

Filter

Sorting/Grouping

Formatting

Appearance

Filter by:

(none)

And:

(none)

And:

(none)

And:

(none)

And:

(none)

And:

(none)

And:

(none)

And:

(none)

And:

(none)

OK

Cancel

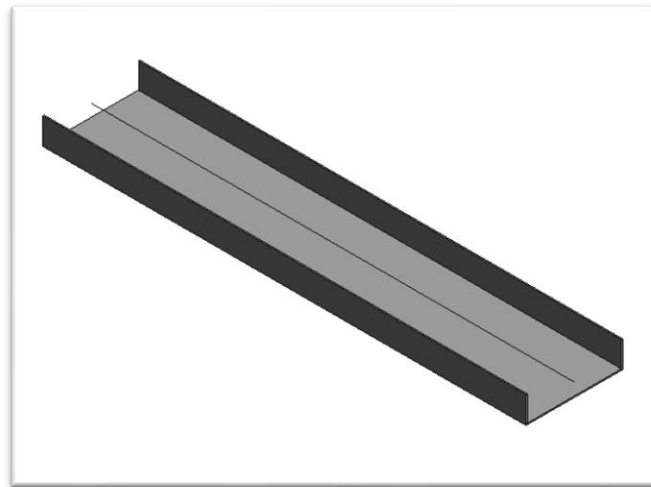
Help

11. figure Adding filters in the schedule properties



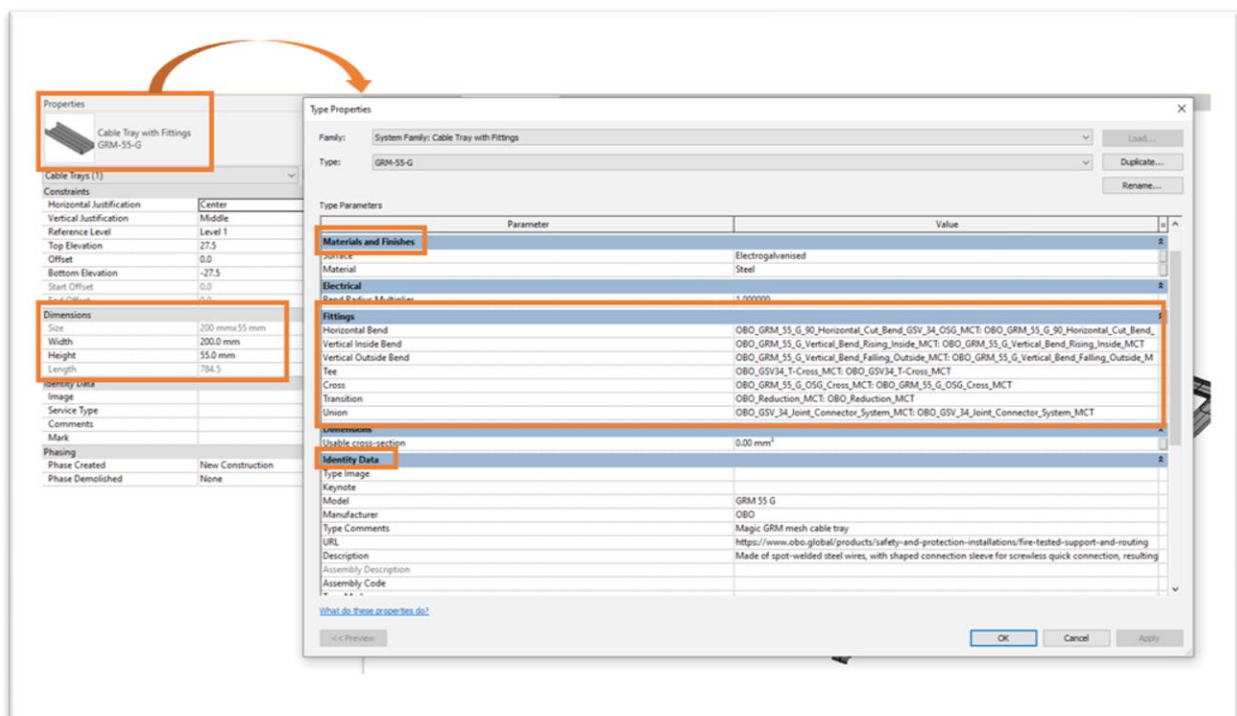
## Straight

The straight element is not created as a family (.rfa) in Revit. It is designed inside the project file (.rvt).



12. figure Straight mesh cable tray item in Revit

The straight item contains information of the mesh tray such as materials, dimensions, URL, model name, etc. Most of them are available in 3m long version.

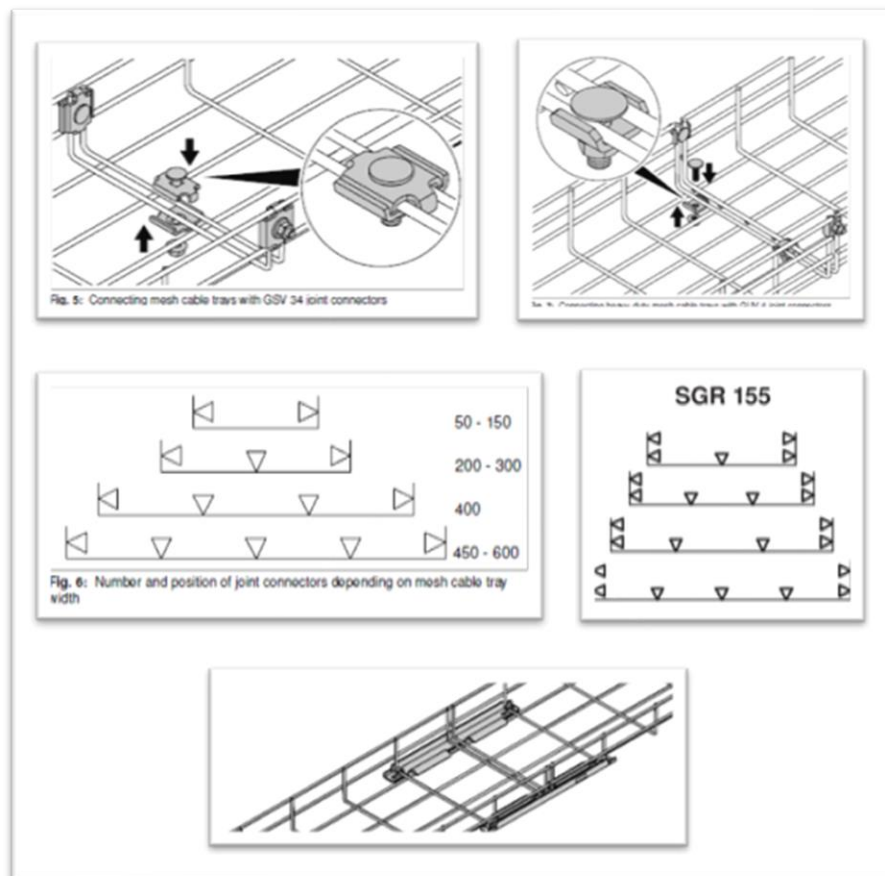


13. figure Properties of straight element in project file

## Connector

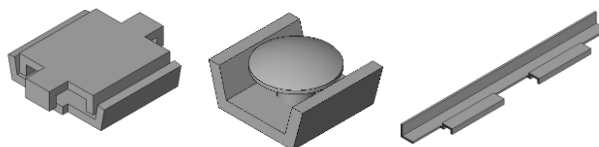
GSV 34 joint connectors suitable for GRM, G-GRM, C-GR. Mounting GUV 6 joint connectors suitable for SGR. GRV 245 long connectors suitable for GRM, SGR.

The cable trays can be connected with various fastening elements. Their amount is depends on the width and height of the tray. Their type can be different for each type of system. For example, GUV 6 joint connector can be used for SGR systems, while GSV 34 joint connector can be used for the other three systems. The cable trays are available in a 3m long version, so the connector elements must be placed every 3 meter (if it is not a Magic version) in the project.

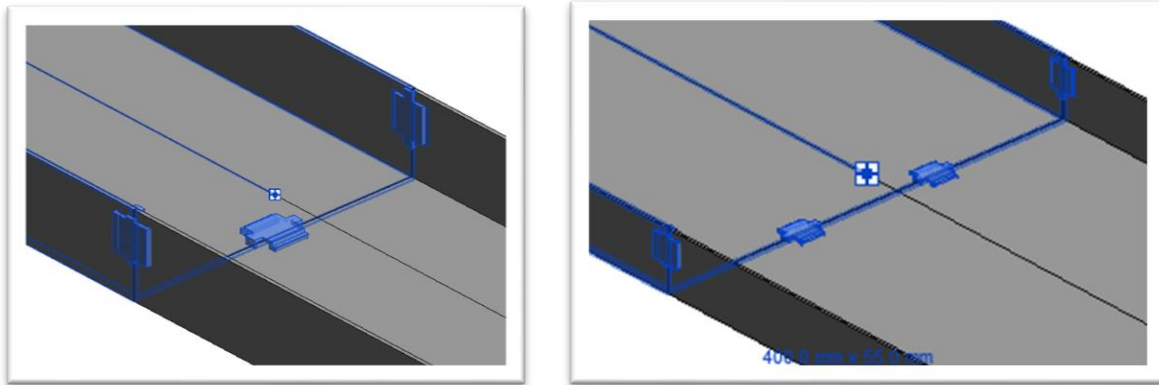


**14. figure** Installation of connecting elements

The connector items are integrated to the main 'Connector System' family as a nested family. The parameters of the nested family are shared so if you would like to make a schedule in Revit you can also list the informations of the connectors (for example item name, number, etc.).

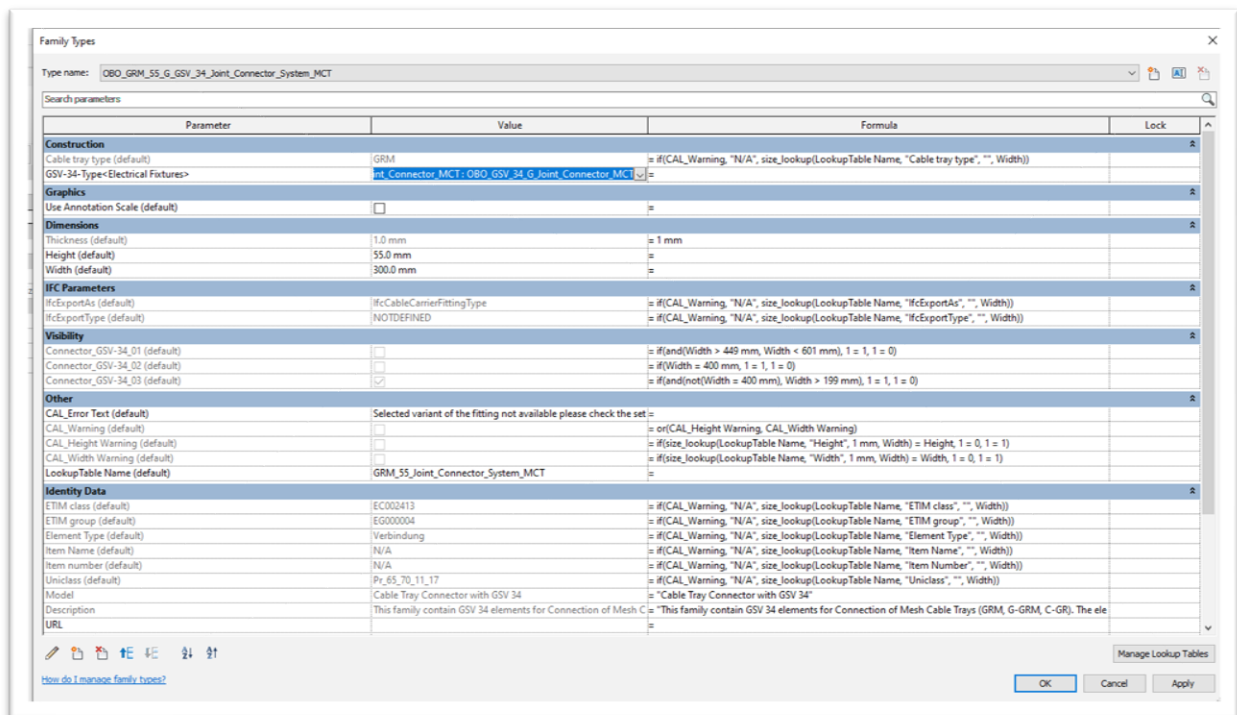


**15. figure** Connectors for mesh cable tray (GSV 34, GUV 6, GRV 245)



16. figure The number of connectors are automatically changed on the tray

The connector system family includes a Virtual Fitting (connectors) between trays with correct amount of clips. The amount of connectors are automatically arrayed when you placed on the tray in the project.



17. figure Family properties with the drop-down menu

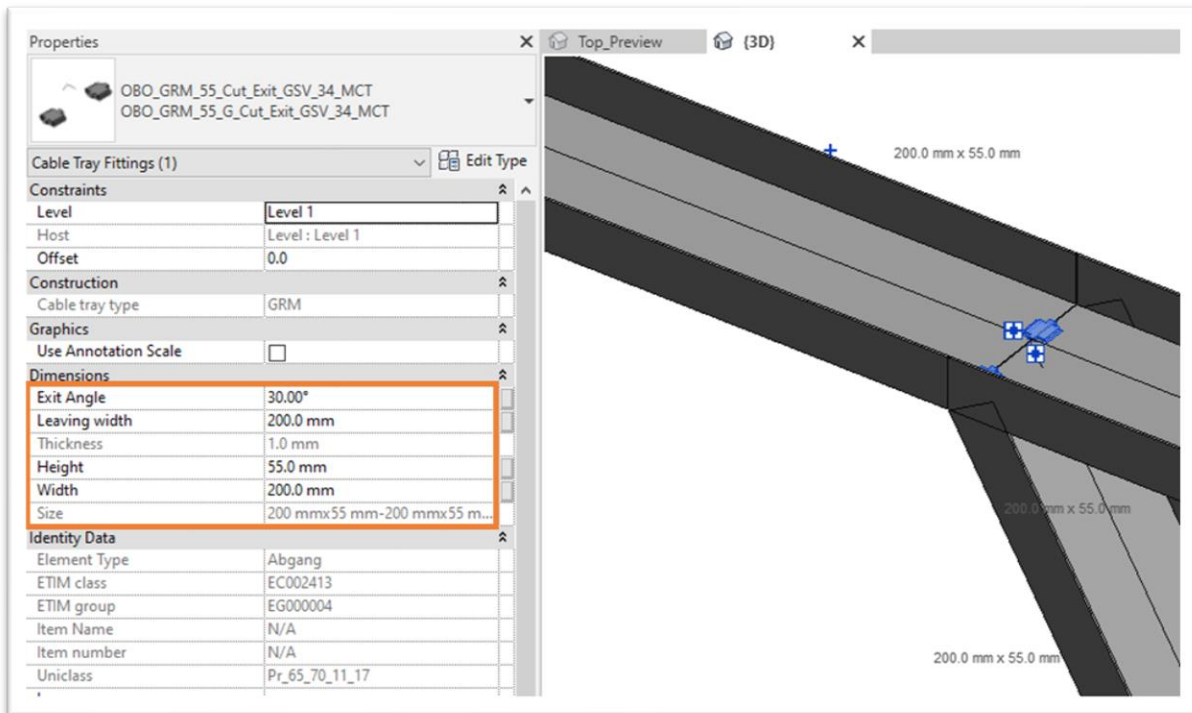
Under the Construction label you can see the chosen material of the connector element.

## Cut exit

Suitable for GRM, C-GR and SGR

It is possible to create exits by cutting out the bottom of the cable trays and adding clips. This method can be only used for GRM, C-GR and SGR systems.

The construction principle of the model is similar to the connector element, but there are no fixing elements on the side wall of the tray.



18. figure Parameters of cut exit in project

The 'Leaving width' parameter represents the width of the output tray.

The 'Exit Angle' can not be more than 90 degree. If it is more or less, it will be converted to 90 degree.

The material of the connector element are already chosen and integrated in the main family.

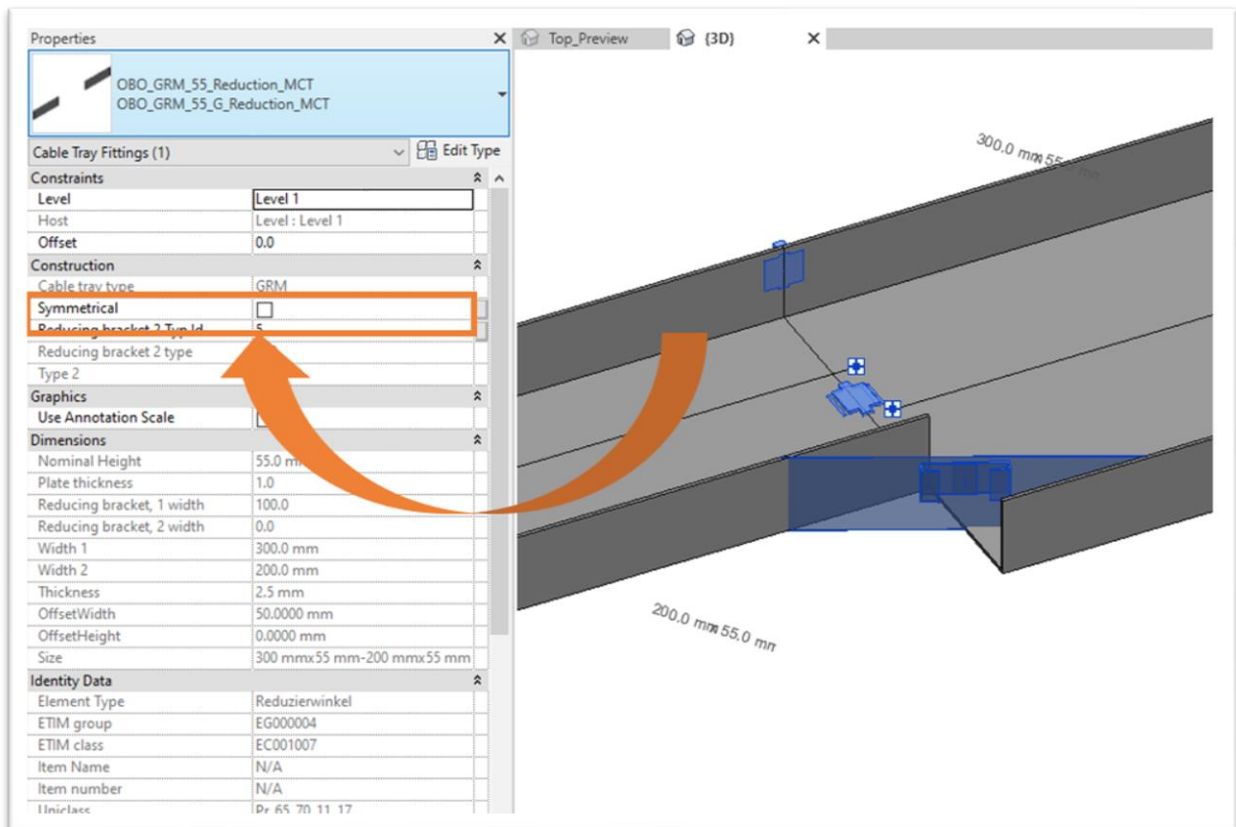
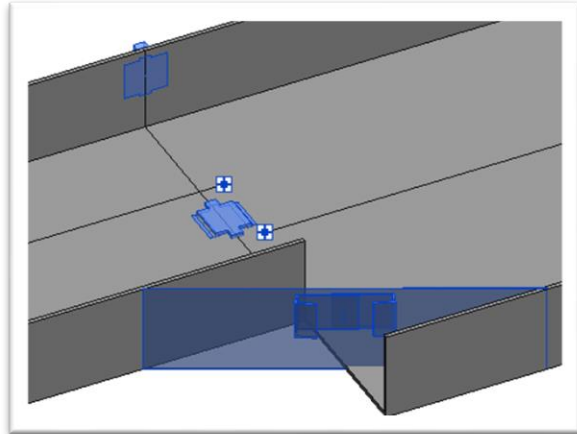
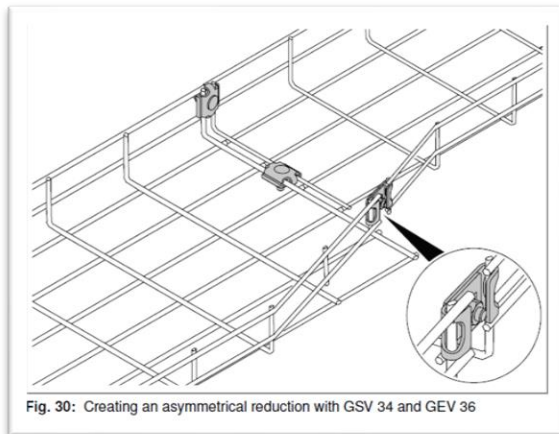
The 'Width' represents the width of the connected cable trays.

The 'Height' represents the height of the connected cable trays.

## Reducer

Suitable for GRM, C-GR and SGR system.

Mesh cable trays are cut and bent to create reductions on smaller mesh cable tray widths.



19. figure

The connector types (GEV-36 Type, GSV-34 Type) are set according to the available material of clips.

Furthermore with the Symmetrical 'yes/no' parameter there is a possibility to modify the fitting as symmetrical or asymmetrical.

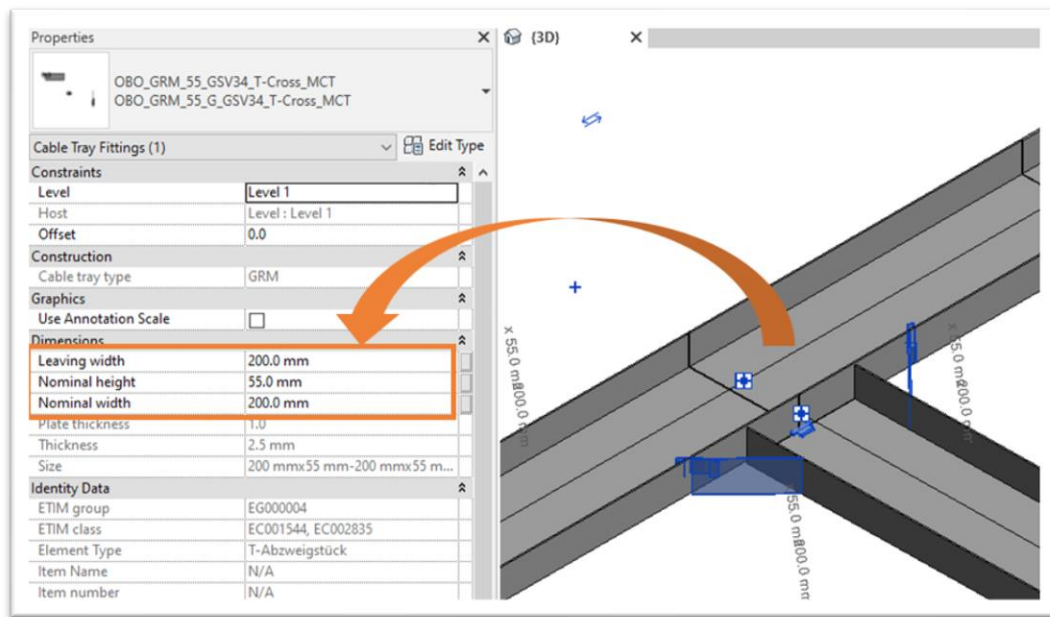
## Cut tee

Suitable for GRM, C-GR and SGR

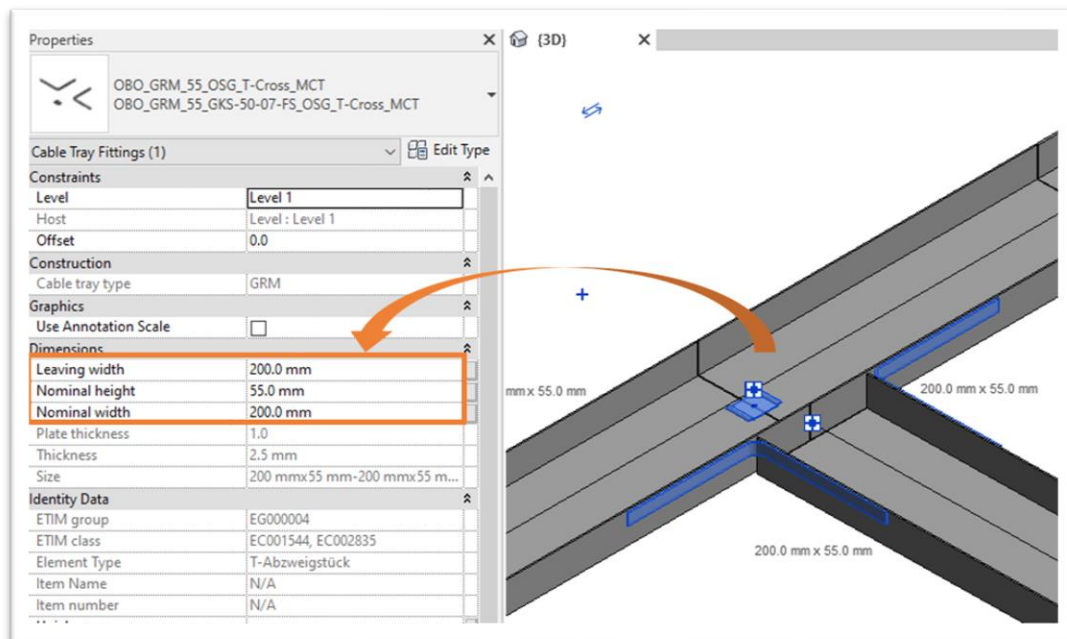
Two variation of the Tee fitting are provided, one with GSV 34 joint connector and GEV 36 corner connectors, and the other one with OSG slotted steel strap bent and GKS 50 hold down clamp.

The connector types (GEV-36 Type, GSV-34 Type) are set according to the available material of clips.

The 'Leaving width' parameter represents the width of the output tray.



20. figure T-Cross with GEV 36 and GSV 34 clips in Revit



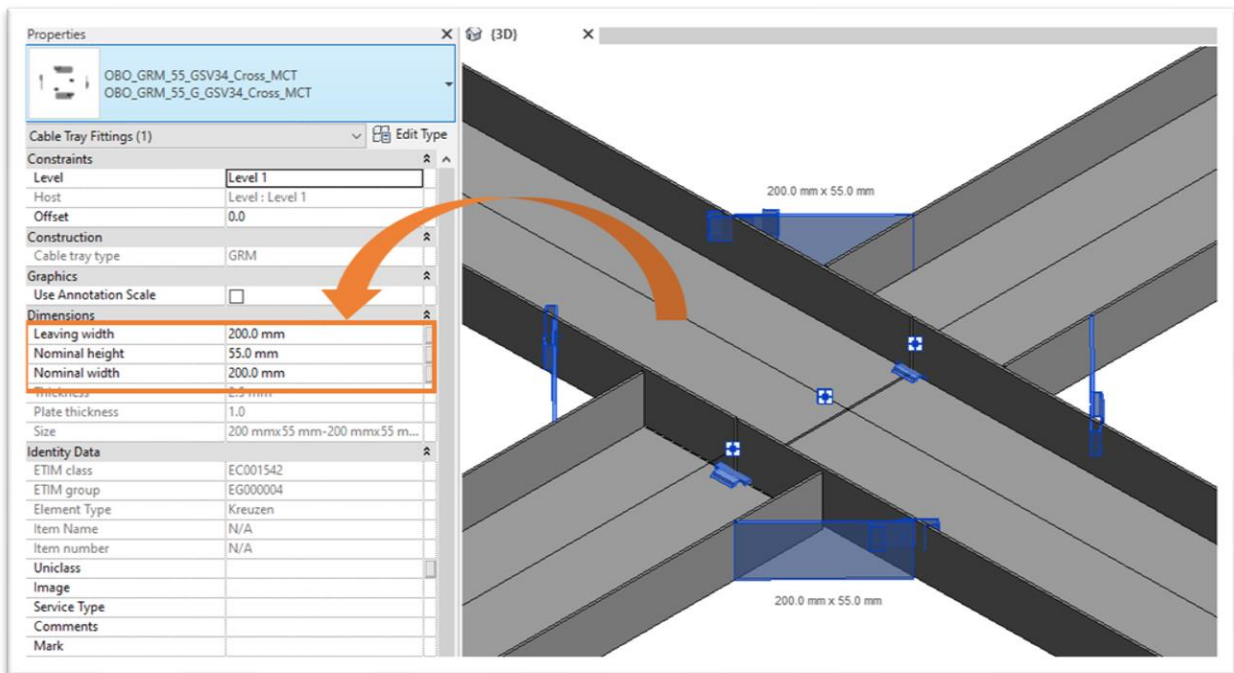
21. figure T-Cross with GKS 50 hold down clamp and OSG steel in Revit



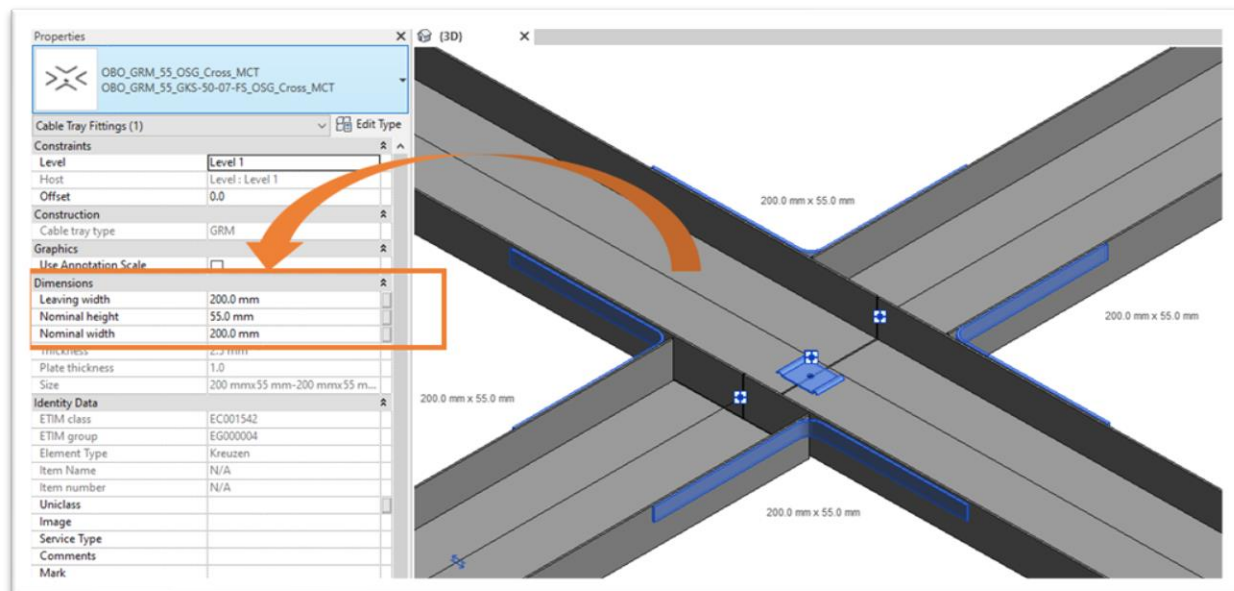
## Cut cross

Suitable for GRM, C-GR and SGR

The structure is the same as Cut tee, but with a double-sided solution.



22. figure Cross with GEV 36 and GSV 34 clips in Revit



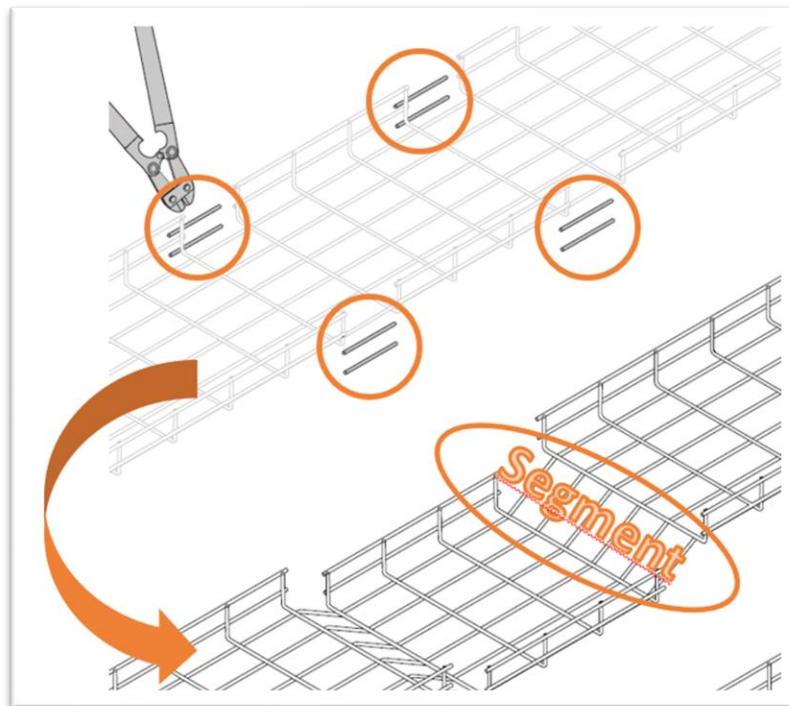
23. figure Cross with GKS 50 hold down clamp and OSG steel in Revit



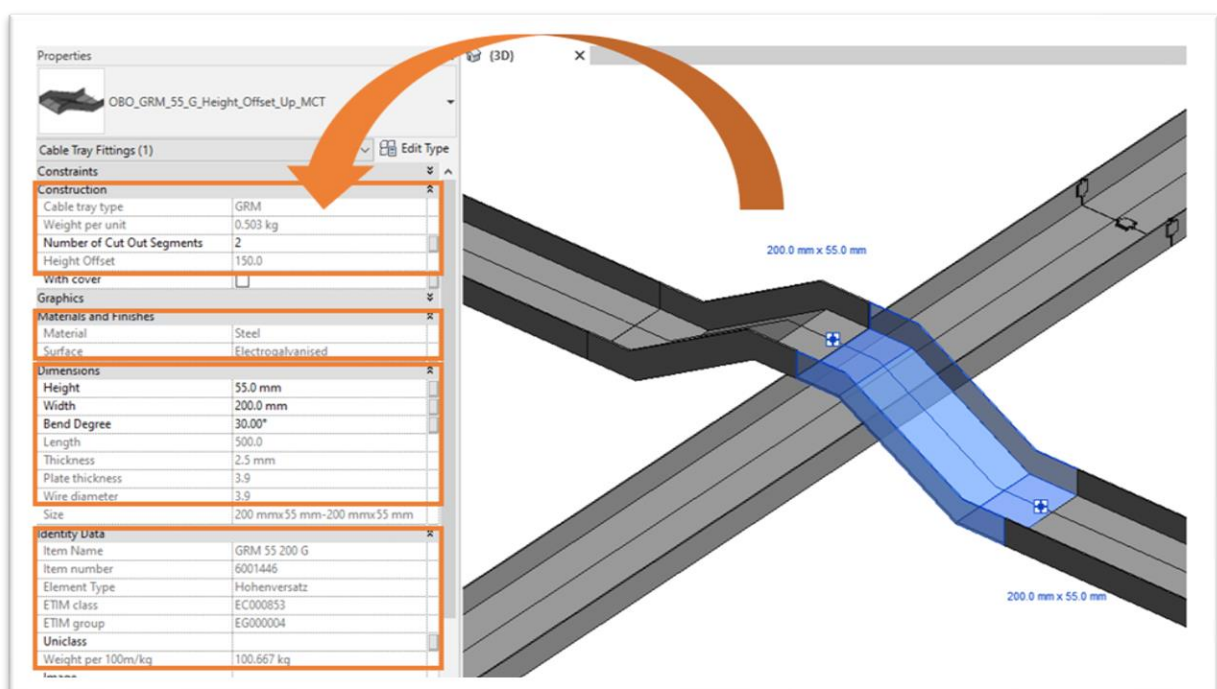
## Height offset

Suitable for GRM, C-GR and SGR.

Mesh cable trays are cut and bent to create height offsets. The height offset can be falling or rising and have different angles of 30-60 degree. (Only bend the mesh cable tray up to 60 degree to prevent the wires from breaking!)



24. figure Segment of mesh cable tray



25. figure Height offset fitting element in Revit

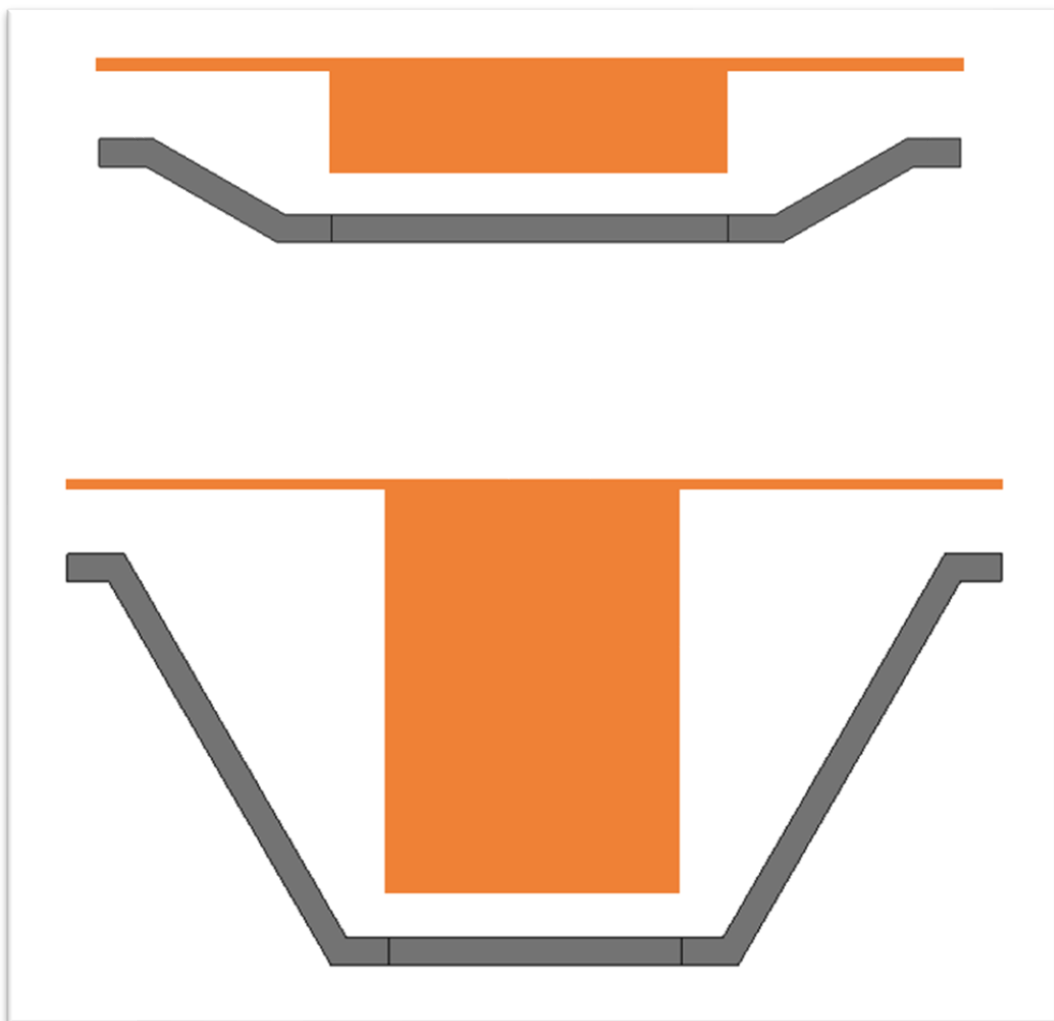
There are some variable parameter of height offset fitting.

**Bend Degree:** the value can be modify between 30-60 degree

**Number of Cut Out Segment:** this is an integer parameter, the model will redesigned according to the amount of segment. Based on this, we can set the length of the height offset.

**Length:** This is the length of the entire cut tray without bending

**Weight per unit:** This is the weight for the length of the cut tray



*26. figure Height offset with different Bend degree and with different number of segments*

Under the Identity Data label there are some information about the used mesh cable tray such as Item Name, Item Number, etc.

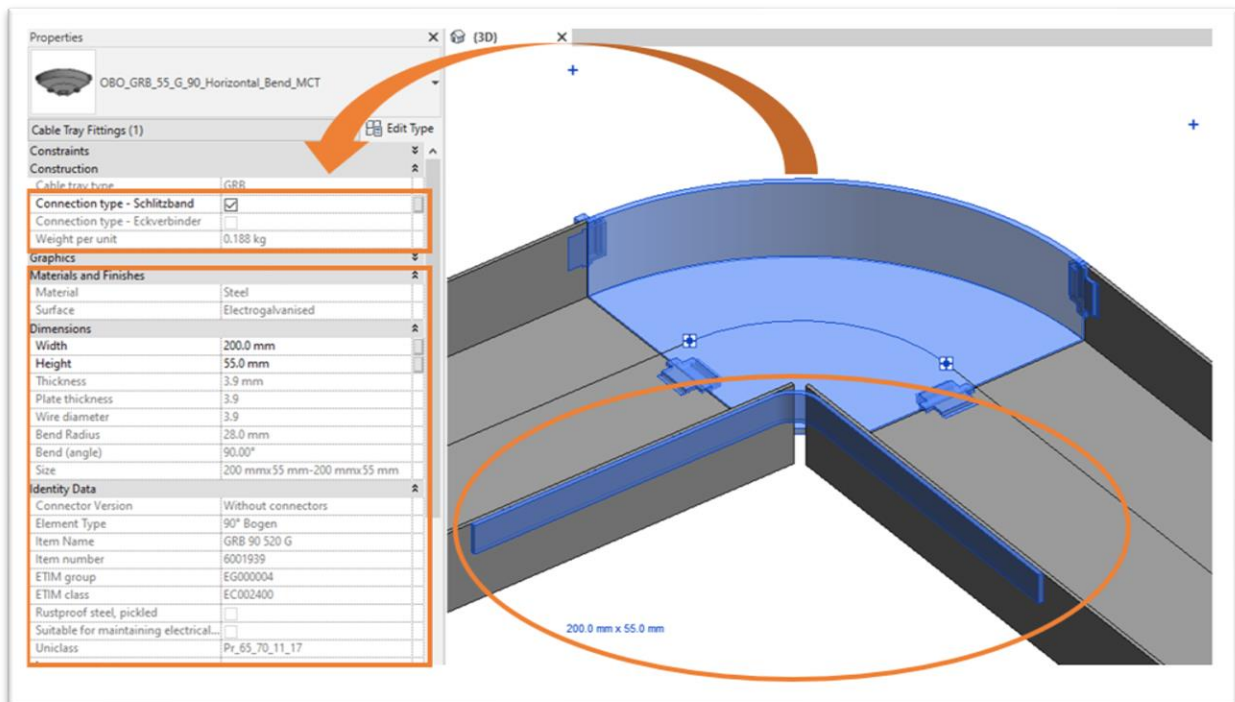
## Bend

### Horizontal bends

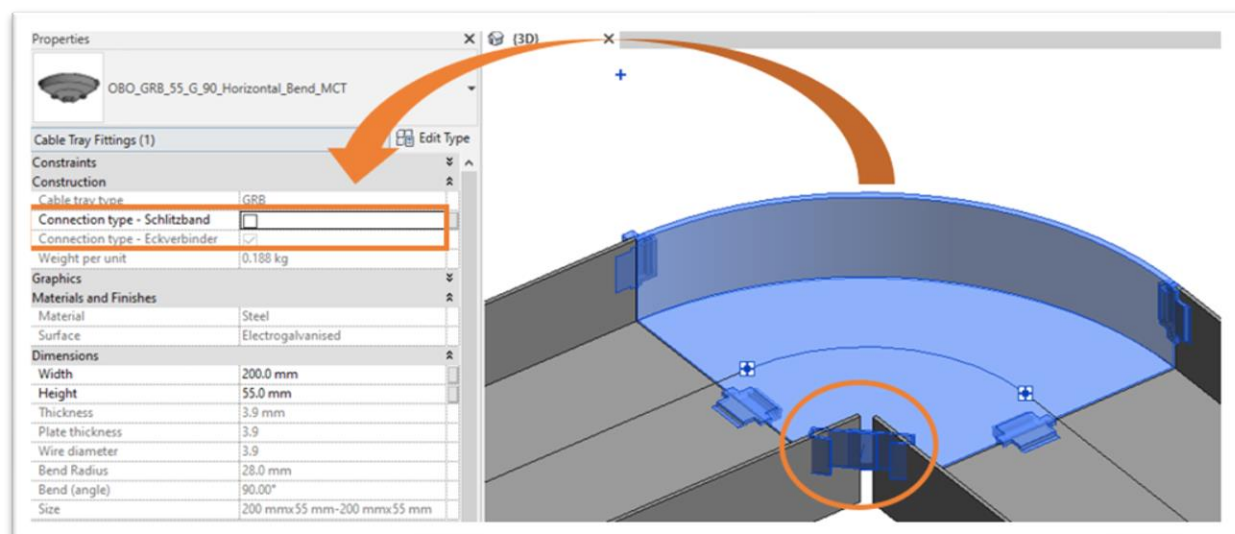
#### GRB bend

This is the only one manufactured 90 degree horizontal bend for mesh cable trays.

This can only be used for GRM trays with side wall heights of 55 and 105 mm. It can be attached to the system in two ways: on the one hand with an OSG corner strap, and on the other hand with a GEV 36 corner connector. On the connection line, it can be attached with clamps like GSV 34, the number of the clip depends on the width of the tray.

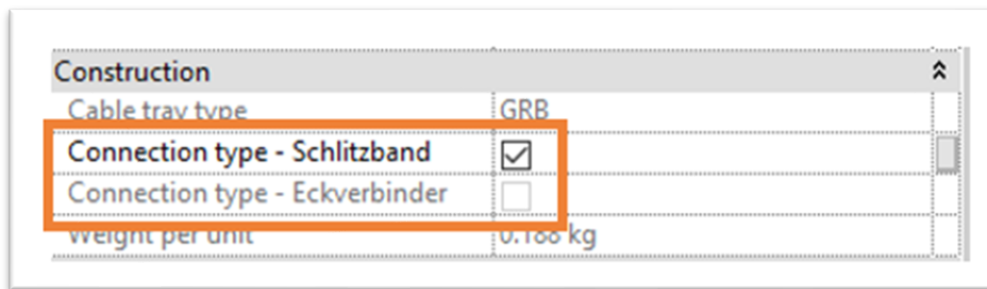


27. figure GRB Horizontal bend with corner strap connection



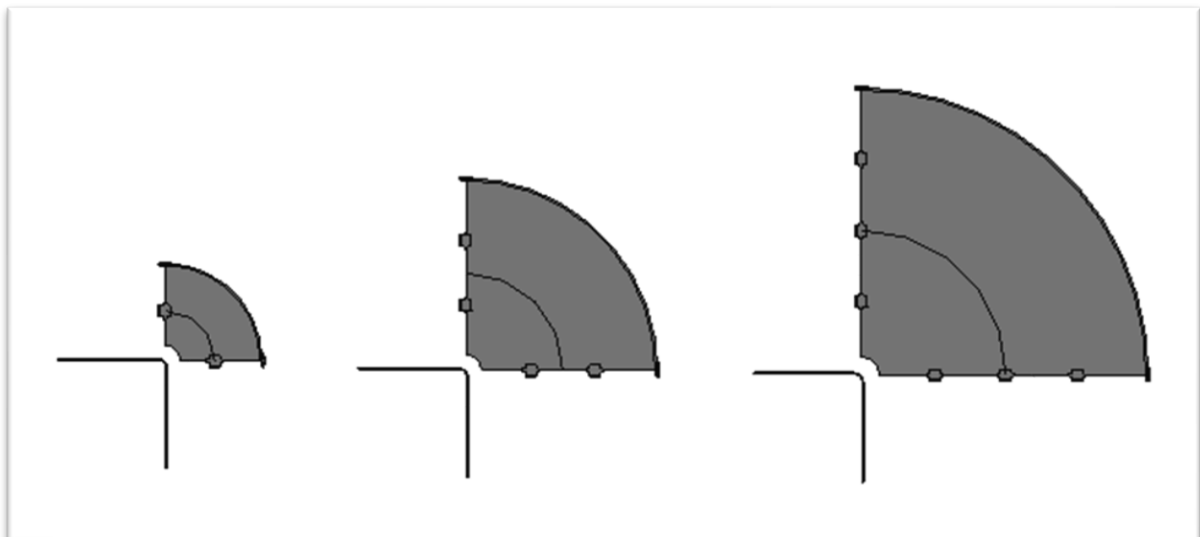
28. figure GRB Horizontal bend with GEV 36 corner connector element connection

To change the type of connection of mesh cable trays the chosen type should be checked or unchecked. If the Connection type – Schlitzband is uncked the Connection type – Eckverbinder will be automatically checked.



29. figure Setting connection type

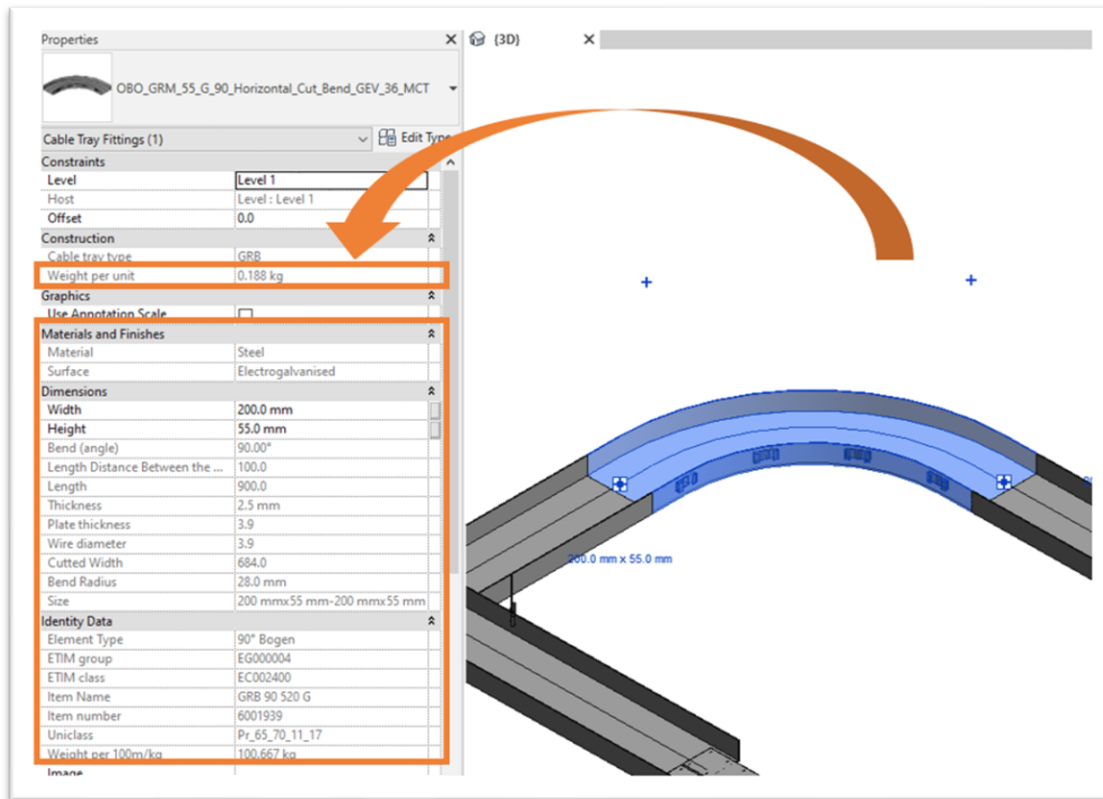
The number of the clips are automatically calculated and arrayed according to the width of tray.



30. figure GRB bends with different width (200, 400, 600 mm)

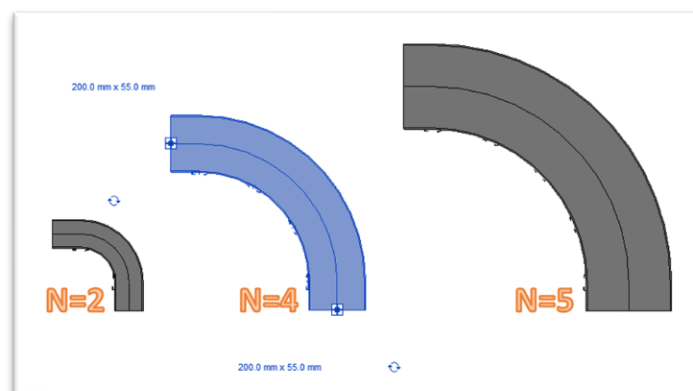
## Cut bend - GEV 36

This is a 90 degree virtual fitting element. It is made from mesh cable tray by cutting and bending and attached with GEV 36 corner clips. The number (N) of connector elements depends on the tray width.



31. figure 90 degree bend with GEV 36 corner connectors

The connector types (GEV-36 Type) are set according to the available material of clips.



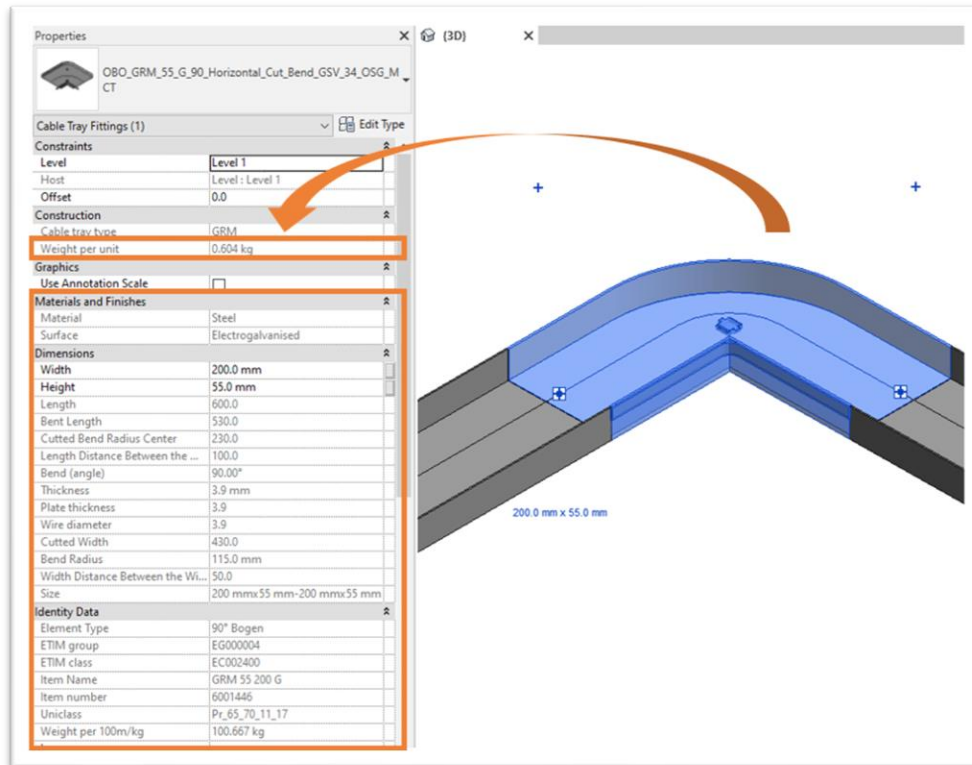
32. figure Bend with GEV 36 connectors with different widths

**Length:** This is the length of the entire cut tray without bending

**Weight per unit:** This is the weight for the length of the cut tray

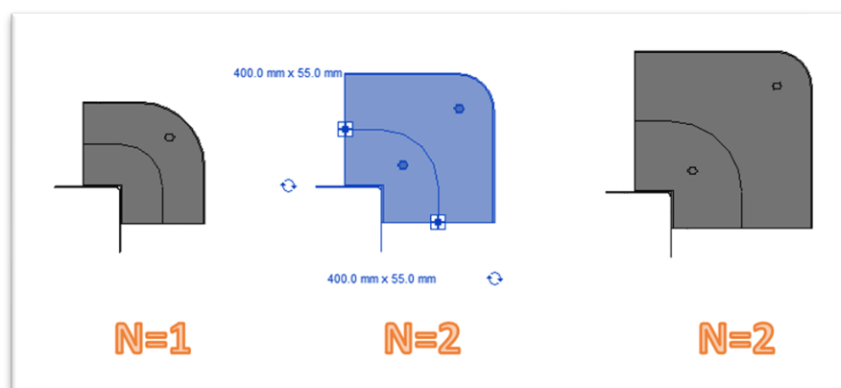
## Cut bend – GSV 34 & OSG

This is a 90 degree virtual fitting element. It is made from mesh cable tray by cutting and bending and connected with GSV 34 joint clips and OSG steel strap. The number (N) of joint connector elements depends on the tray width.



33. figure 90 degree bend with GSV 34 joint connectors and OSG steel strap

The connector type (GSV-34 Type) is set according to the available material of clips.



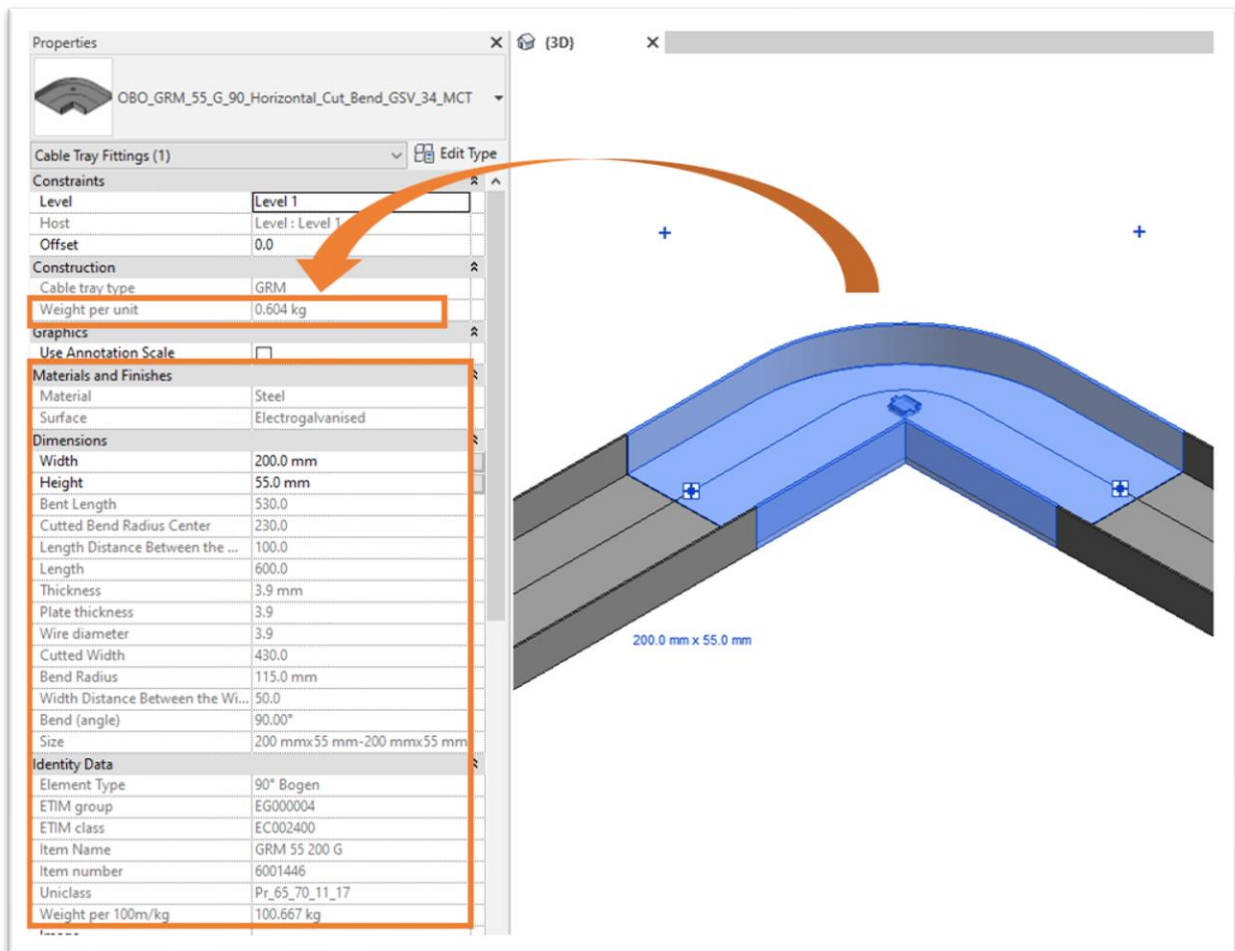
34. figure Bend with GSV 34 connectors and with steel strap width different widths

**Length:** This is the length of the entire cut tray without bending

**Weight per unit:** This is the weight for the length of the cut tray

## Cut bend – GSV 34

Same construction as 'Cut Bend – GSV 34 & OSG' but without OSG Steel strap bent item.



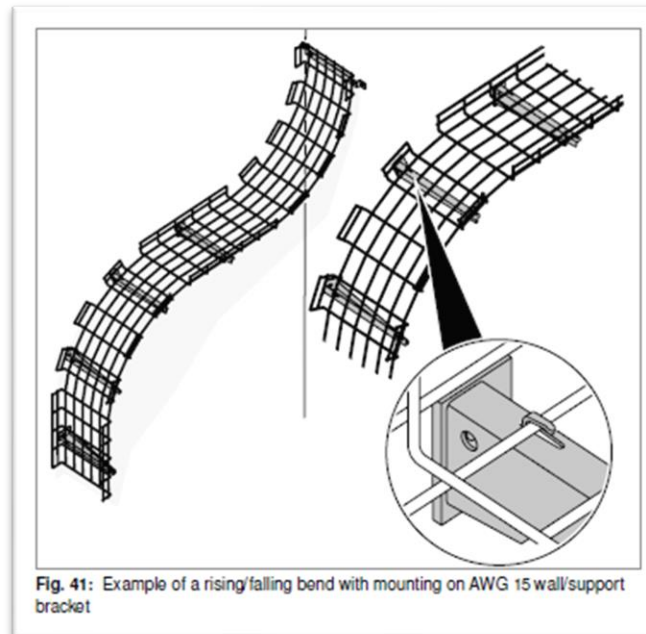
35. figure 90 degree bend with GSV 34 joint connectors



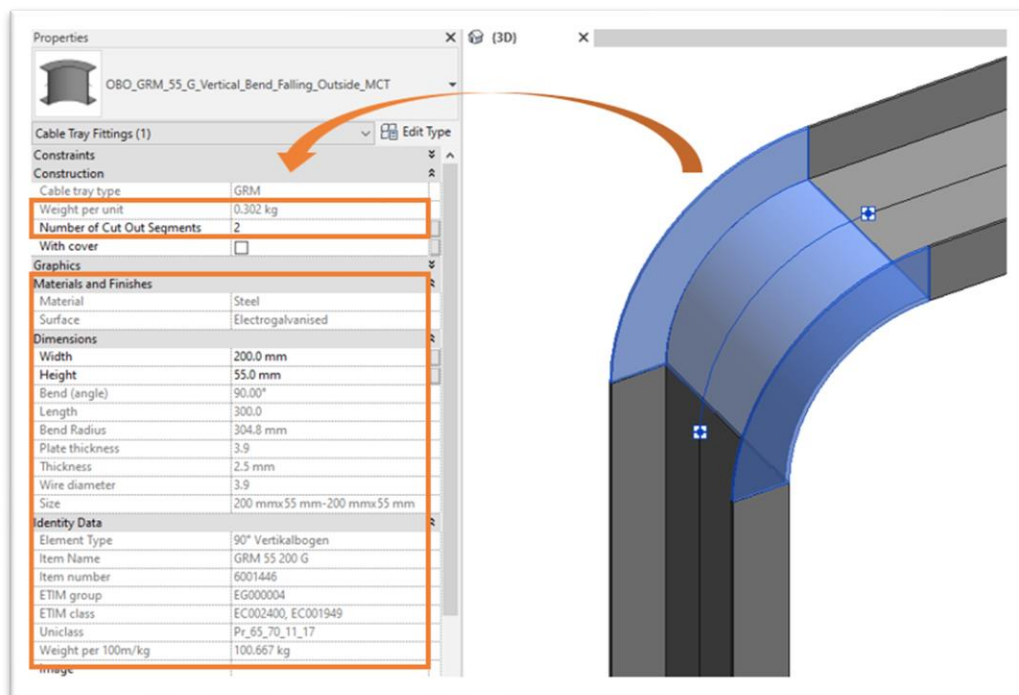
### Vertical bend with mounting on wall support bracket

Suitable for GRM, C-GR and SGR

Mesh cable trays are cut and bent to create rising or falling bends with different radius. The rising and falling bends are mounted on wall and support brackets.



**36. figure** Example of a rising or a falling bend



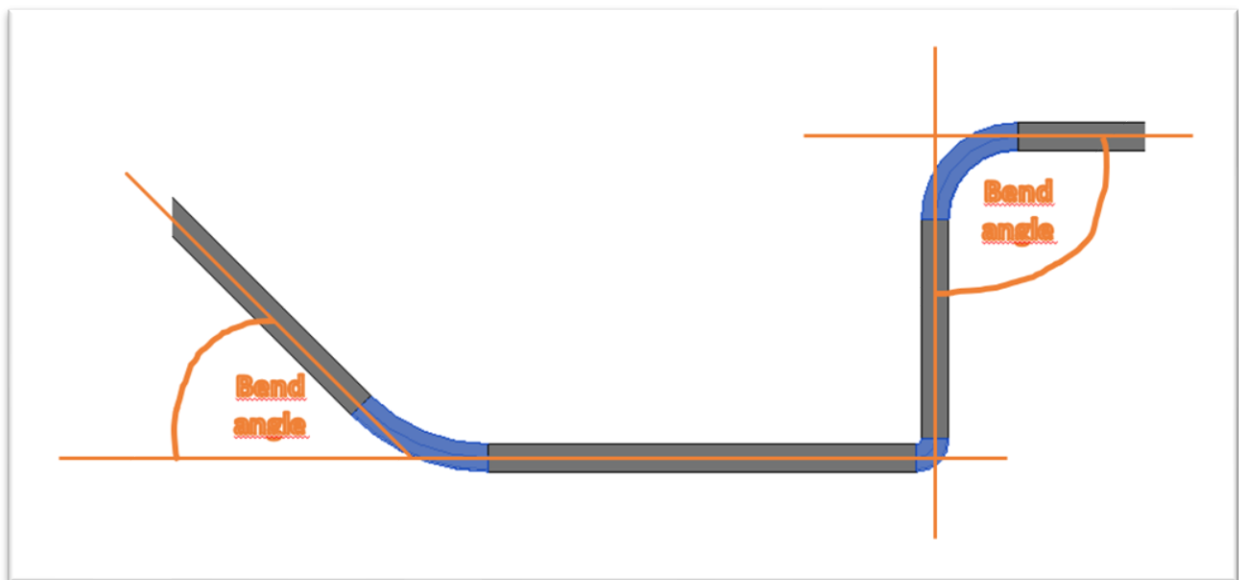
**37. figure** Virtual vertical bend of mesh cable tray in Revit

**Bend (angle):** the value can be automatically modify if the joined trays angle will be changed

**Number of Cut Out Segment:** this is an integer parameter, the model will redesigned according to the amount of segment. Based on this, we can set the length of the vertical bend.

**Length:** This is the length of the entire cut tray without bending. It will calculated in Revit by an integrated formula.

**Weight per unit:** This is the calculated weight for the length of the cut tray

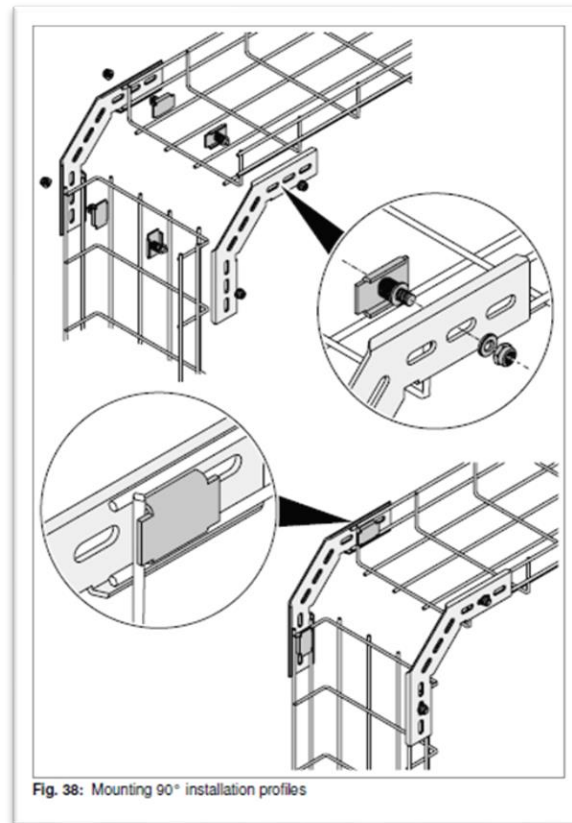


*38. figure Bend angle of vertical bend*

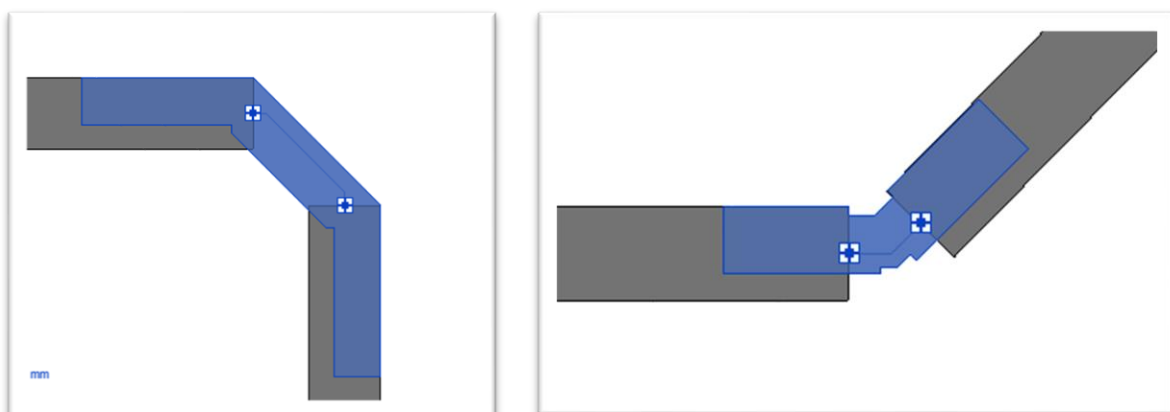
## Vertical bend and exit with installation profiles

Suitable for GRM, C-GR mesh cable trays

The MW 45 and MW 90 installation profiles are mounted to create an exit at 45 and 90 degree angles. The profiles are each mounted using KS 25 35 hold-down clamps. The installation method is the same for both angles.

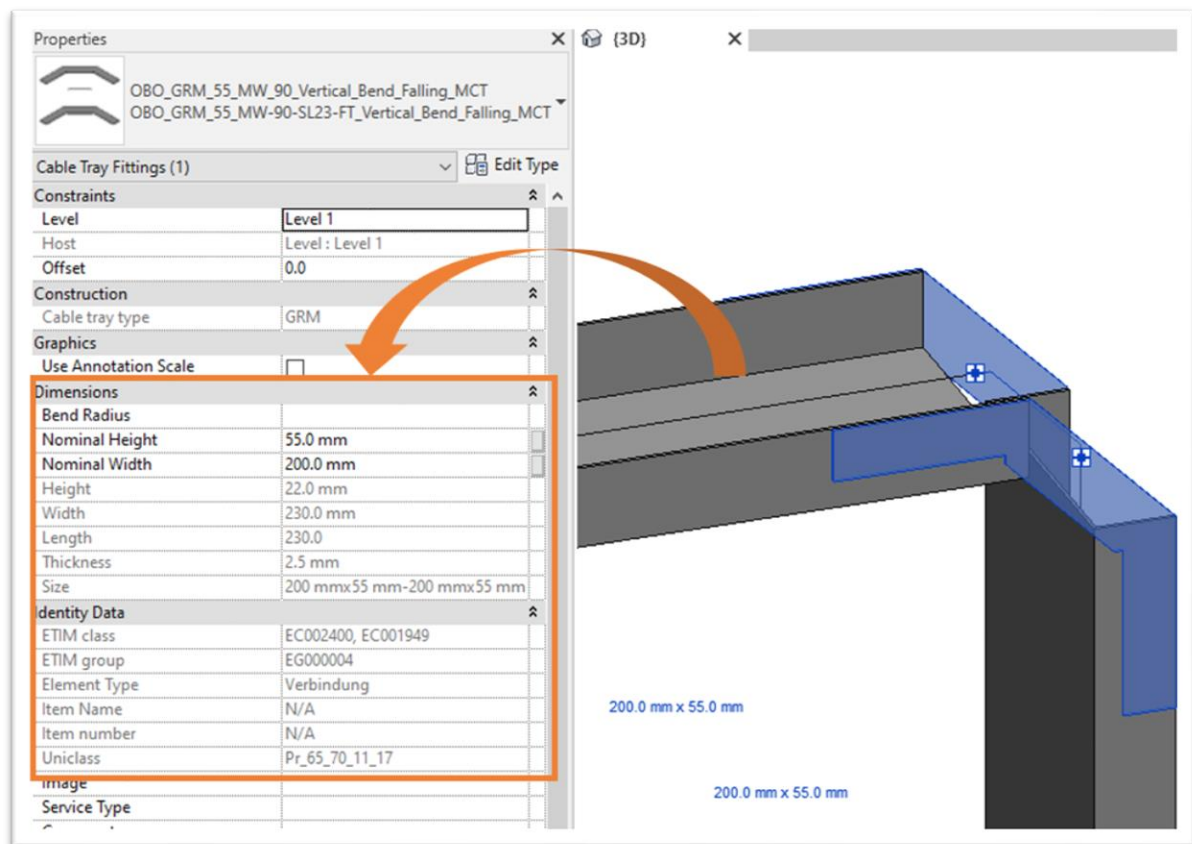


*39. figure Mounting 90 degree installation profiles*



*40. figure 90 and 45 degree installation profiles in Revit*

The installation profile type (eg.: MW-90 Type) are modified according to the provided material of profiles.

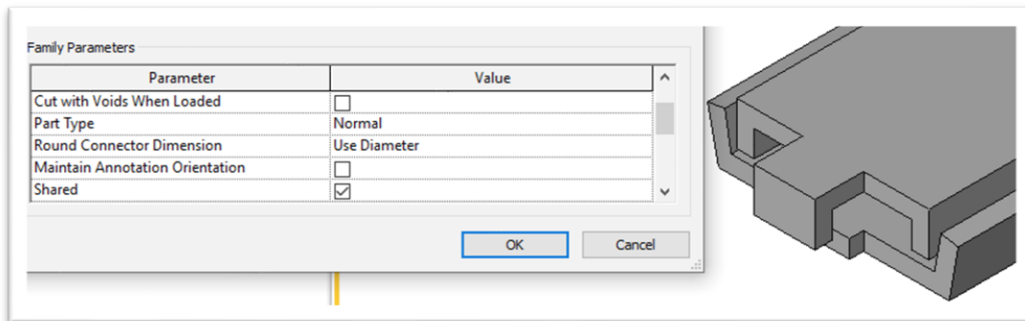


41. figure Vertical bend with profiles in Revit

The width can be changed according to the available mesh cable tray widths.

## System accessories

Every accessories which are implement to a virtual fitting families have shared parameters. If the checkbox is active in the accessory family, its shared parameters can be visible in the scheduled list of products.

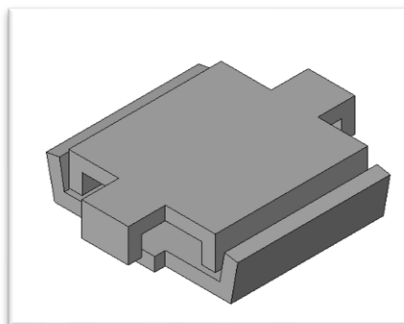


42. figure Setting up parameters for sharing

## Accessories for mesh cable tray connection

### Joint connector – Type GSV 34

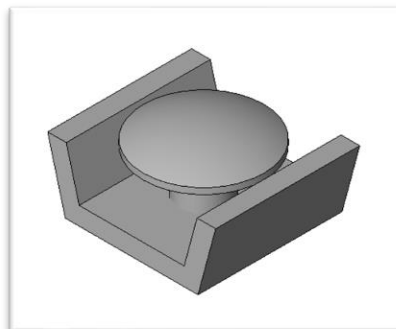
Suitable for GRM, G-GRM, C-GR



43. figure GSV 34 joint connector

### Joint connector – Type GUV 6

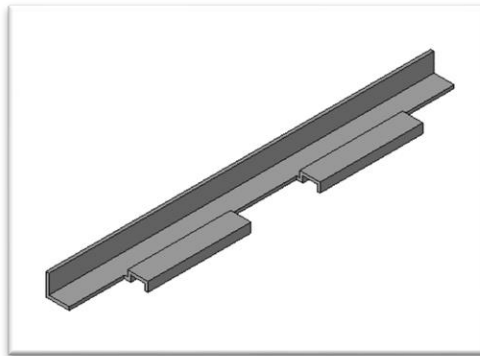
Suitable for SGR



44. figure GUV 6 joint connector

*Long connector – Type GRV 245*

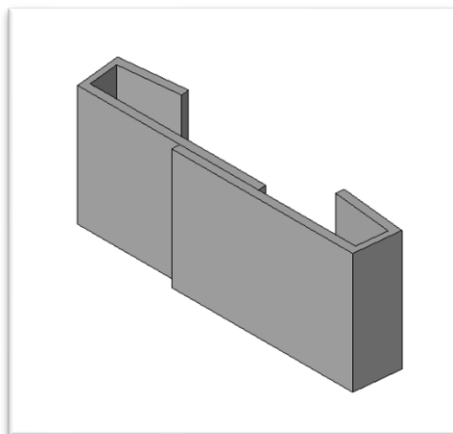
Suitable for GRM, SGR



**45. figure** GRV 245 long connector

*Corner connector – Type GEV 36*

Suitable for GRM, C-GR and SGR



**46. figure** GEV 36 corner connector

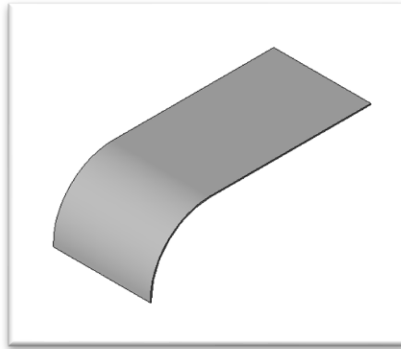
*Slotted steel strap, bent – Type OSG*

Suitable for GRM, C-GR



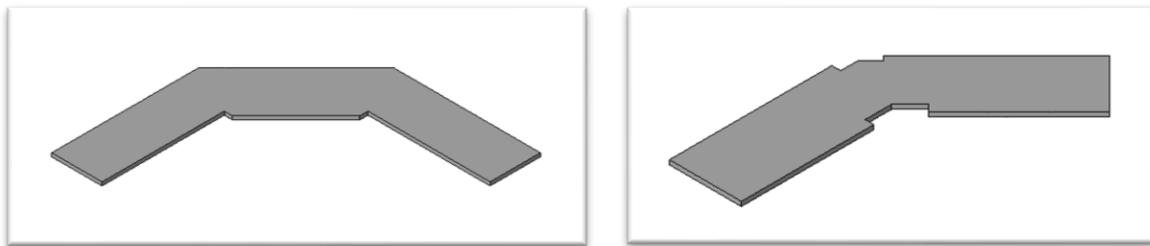
**47. figure** OSG slotted steel strap, bent

*Cable exit plate – Type KAB GR*  
Suitable for GRM, C-GR and SGR



**48. figure** KAB GR cable exit plate

*Installation profiles – Type MW 45/MW 90*  
Suitable for GRM, C-GR. Available for 55 mm side height of tray.



**49. figure** MW 90 and MW 45 installation profiles