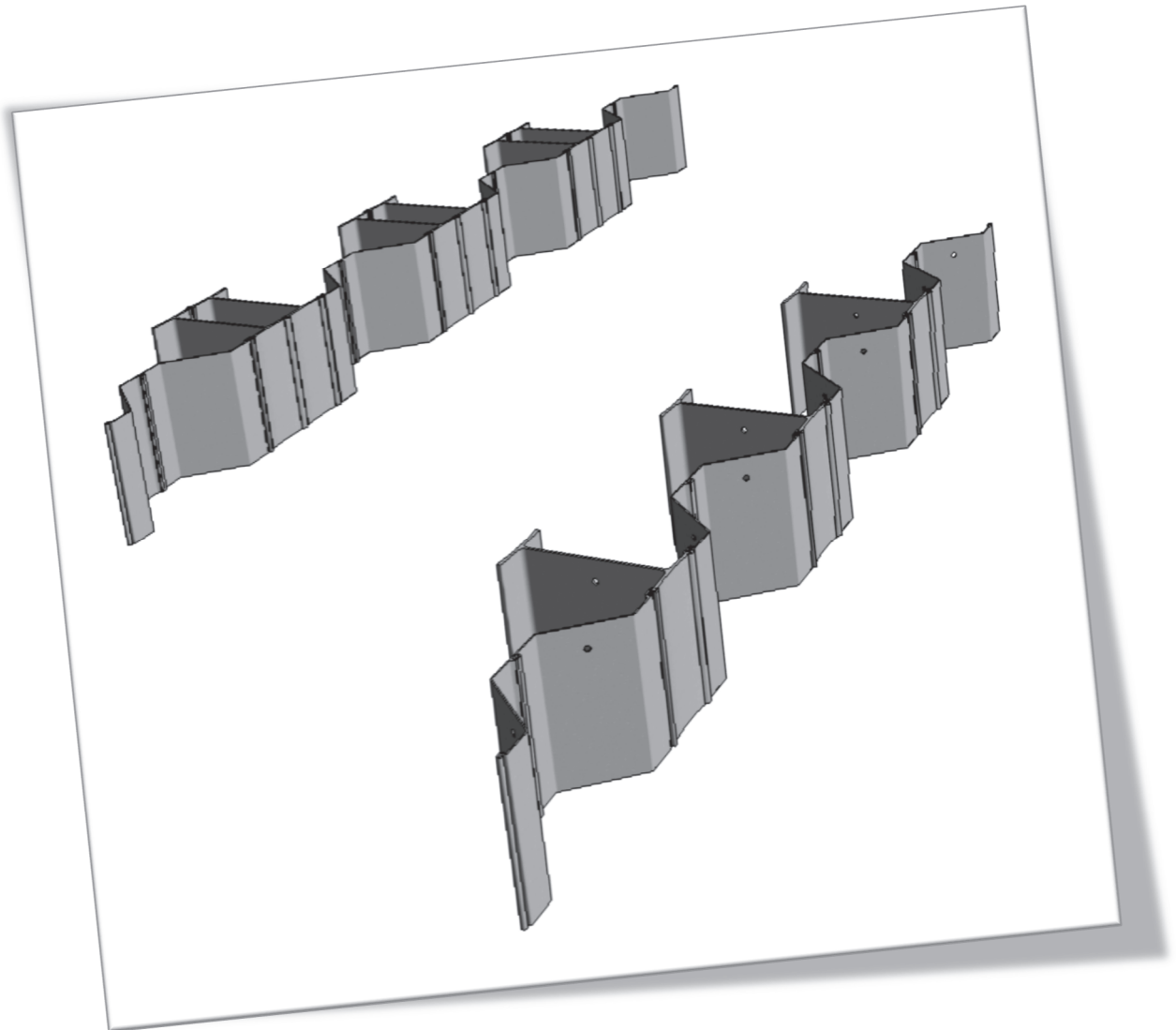


HZ[®]-M steel wall system

Family for Autodesk[®] Revit[®] 2018

User manual v.1.0 | June 18, 2018



Number of pages 20

Table of Contents

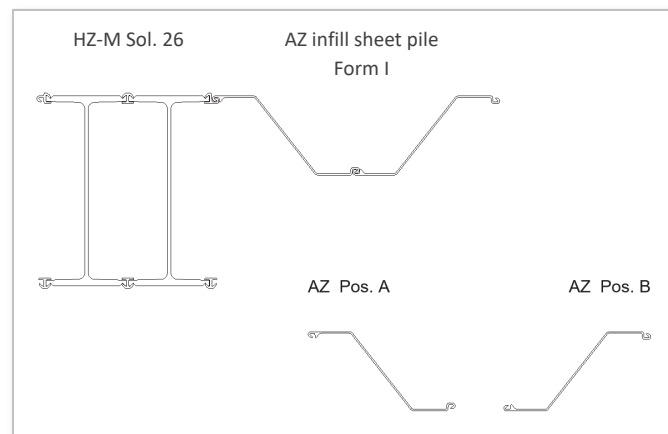
1	Introduction.....	3
2	Properties window	4
3	Selection of a system	6
4	Parameter length.....	7
4.1	Length of the wall.....	7
4.1.1	Use of handles.....	7
4.1.2	Use of the window Parameters.....	8
4.1.3	Special parameter Spacing	8
4.2	Length (height) of the components	10
4.2.1	HZ-M, AZ and connectors R1, R3, R4, R6.....	10
4.2.2	Connectors R2 and R5.....	11
5	Constraints on AZ and connectors.....	11
6	Handling holes.....	13
7	Steel grades	13
8	Duplication of elements of a system	14
9	Example	15
9.1	Insertion of a family 'HZ-M / AZ system' into a new project.....	15
9.2	Modification of the system (change HZ-M / AZ combination).....	15
9.3	Modification of parameters.....	15
9.4	Extraction of an AZ, pos. A	18
9.4.1	Step 1: copy a single element	18
9.4.2	Step 2: configure the copied element.....	18
10	General notes	19

1 Introduction

The *HZ-M steel wall system* is a combined wall comprising 2 or 3 different components

- **HZ-M** king pile, with 2 or 4 milled grooves
- **RZD, RZU, RH** connectors
- **AZ** infill sheet pile (double pile), used in most combinations

There are several HZ-M king pile sections. They can be assembled to form a *solution* (1 or 2 HZ-M combined to 2 to 6 connectors). A *solution* combined with an AZ infill sheet pile forms a *combination*. Below sketch shows a *combination 26: HZ-M Sol. 26* (2 king piles and 6 connectors) and AZ sheet pile.



There are also 2 combinations without AZ sheet piles: C 1 and C 23.

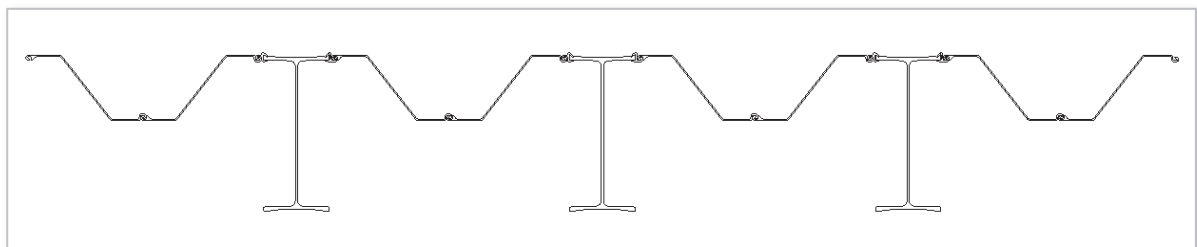
AZ infill piles are double piles, built up with 2 single piles, one being a *Pos. A* and the other a *Pos. B*. Double piles are either *Form I* or *Form II*.

For more information on the *HZ-M / AZ system*, its design and installation, please refer to the brochure '*HZ-M steel wall system. 2014*' that can be downloaded from ArcelorMittal's website: [link](#).

The Revit family **HZ®-M / AZ®** was created in the Revit category **Generic Model**.

When inserting into a project, per default, the family consists of

3 HZ-M king piles & 4 AZ infill sheet piles



Due to the implementation of the family

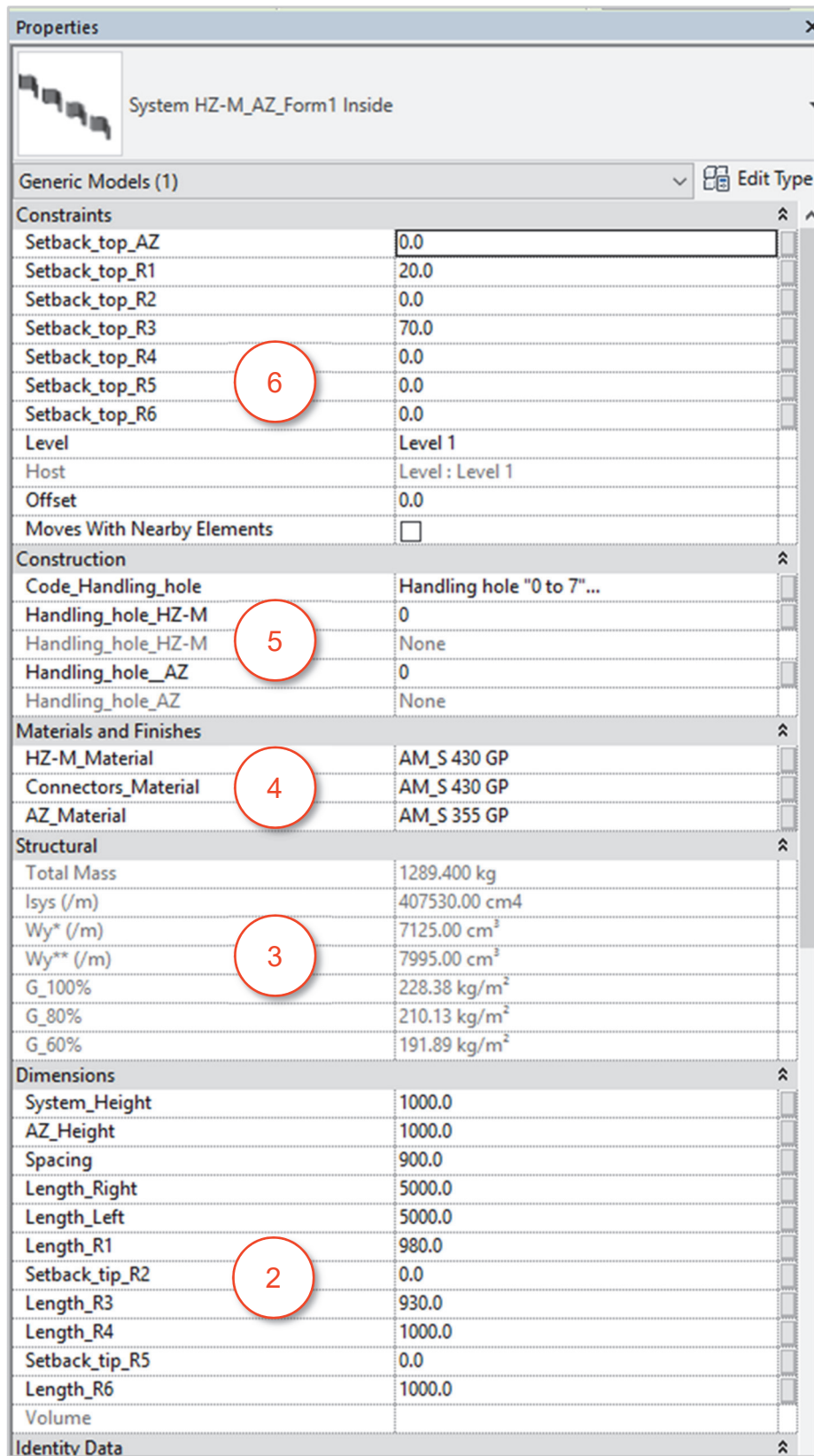
- it is not possible to go below this amount of piles,
- infill sheet piles in this Revit family are *Form I*.

If above assumptions do not fit your needs, you can copy an instance of the element and insert it in the model, and then modify it. Note that in this case you lose the link to the original family.

The default system is an HZ 1080M A - 12 / AZ 18-800. To change it, go to the **Properties** window.

2 Properties window

Parameters of the HZ-M / AZ system can be changed in this window.



Properties

System HZ-M_AZ_Form1 Inside

Generic Models (1) Edit Type

Constraints

Setback_top_AZ	0.0
Setback_top_R1	20.0
Setback_top_R2	0.0
Setback_top_R3	70.0
Setback_top_R4	0.0
Setback_top_R5	0.0
Setback_top_R6	0.0
Level	Level 1
Host	Level : Level 1
Offset	0.0
Moves With Nearby Elements	<input type="checkbox"/>

Construction

Code_Handling_hole	Handling hole "0 to 7"...
Handling_hole_HZ-M	0
Handling_hole_HZ-M	None
Handling_hole_AZ	0
Handling_hole_AZ	None

Materials and Finishes

HZ-M_Material	AM_S 430 GP
Connectors_Material	AM_S 430 GP
AZ_Material	AM_S 355 GP

Structural

Total Mass	1289.400 kg
Isys (/m)	407530.00 cm ⁴
Wy* (/m)	7125.00 cm ³
Wy** (/m)	7995.00 cm ³
G_100%	228.38 kg/m ²
G_80%	210.13 kg/m ²
G_60%	191.89 kg/m ²

Dimensions

System_Height	1000.0
AZ_Height	1000.0
Spacing	900.0
Length_Right	5000.0
Length_Left	5000.0
Length_R1	980.0
Setback_tip_R2	0.0
Length_R3	930.0
Length_R4	1000.0
Setback_tip_R5	0.0
Length_R6	1000.0
Volume	

Identity Data

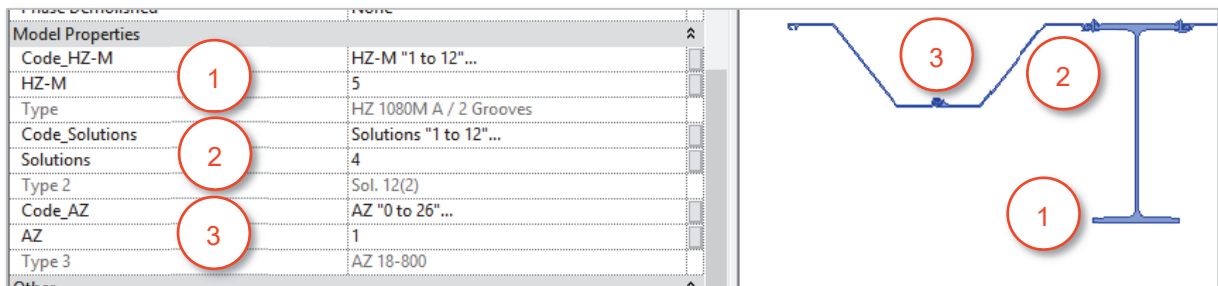
Identity Data	
Image	
Comments	
Mark	
Phasing	
Phase Created	Phase 1
Phase Demolished	None
Model Properties	
Code_HZ-M	HZ-M "1 to 12" ...
HZ-M	5
Type	HZ 1080M A / 2 Grooves
Code_Solutions	Solutions "1 to 12" ...
Solutions	4
Type 2	Sol. 12(2)
Code_AZ	AZ "0 to 26" ...
AZ	1
Type 3	AZ 18-800
Other	
DS	1000.0
HZ-M_N_D	2
HZ-M_N_G	2
AZ_N_1_D	2
AZ_N_1_G	2
AZ_N_2_D	2
AZ_N_2_G	2
w1	263.5
w2	263.5
w3	800.0
w4	520.0
az	<input checked="" type="checkbox"/>
T	20.4
ajv	1.7
ajh	0.0

[Properties help](#) Apply

The parameters and data of the system are spread across different sections

- ① **Model Properties** select the combination (HZ-M pile, HZ-M solution and AZ)
- ② **Dimensions** select length of wall and length (height) of components
- ③ **Structural** geometrical / structural data of the HZ-M combination
- ④ **Material and Finishes** select steel grades
- ⑤ **Construction** select handling hole dimension
- ⑥ **Constraints** select constraints on components: setbacks at top of HZ-M

3 Selection of a system



For example, to select combination HZ 1080M A-12 / AZ 18-800

- ① field **HZ-M** 5 ⇒ HZ 1080M A / 2 Grooves
- ② field **Solutions** 4 ⇒ Sol. 12(2)
- ③ field **AZ** 1 ⇒ AZ 18-800

Hover the mouse over the field of the parameter **Code_HZ-M**, **Code_Solutions** or **Code_AZ** to show a tooltip with the associated data.

The associated data for the different components is shown here below.

Model Properties	
Code_HZ-M	HZ-M "1 to 12"...
HZ-M	5
Type	HZ 1080M A / 2 Grooves
Code_Solutions	Solutions "1 to 12"...
Solutions	4
Type 2	Sol. 12(2)
Code_AZ	AZ "0 to 26"...
AZ	1
Type 3	AZ 18-800

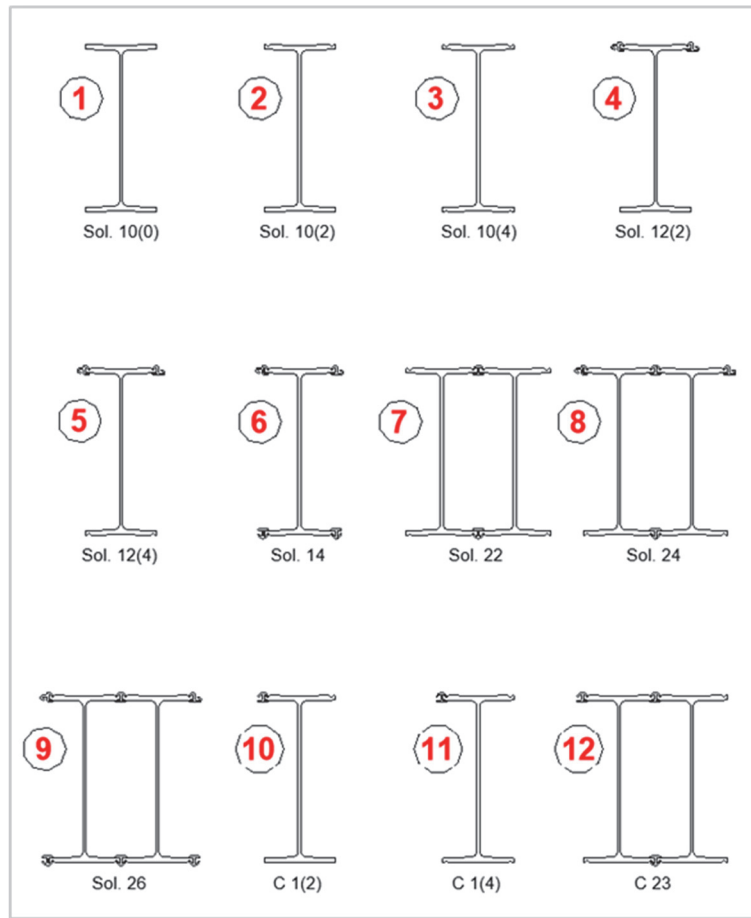
HZ-M "1 to 12"	
1 =	HZ 680M LT
2 =	HZ 880M A
3 =	HZ 880M B
4 =	HZ 880M C
5 =	HZ 1080M A
6 =	HZ 1080M B
7 =	HZ 1080M C
8 =	HZ 1080M D
9 =	HZ 1180M A
10 =	HZ 1180M B
11 =	HZ 1180M C
12 =	HZ 1180M D

Solutions "1 to 12"	
1	= Sol. 10(0)
2	= Sol. 10(2)
3	= Sol. 10(4)
4	= Sol. 12(2)
5	= Sol. 12(4)
6	= Sol. 14
7	= Sol. 22
8	= Sol. 24
9	= Sol. 26
10	= C 1(2)
11	= C 1(4)
12	= C 23

AZ "0 to 26"	
0=	None
1=	AZ 18-800
2=	AZ 20-800
3=	AZ 22-800
4=	AZ 23-800
5=	AZ 25-800
6=	AZ 27-800
7=	AZ 28-750
8=	AZ 30-750
9=	AZ 32-750
10=	AZ 12-770
11=	AZ 13-770
12=	AZ 14-770
13=	AZ 14-770-10/10
14=	AZ 12-700
15=	AZ 13-700
16=	AZ 13-700-10/10
17=	AZ 14-700
18=	AZ 17-700
19=	AZ 18-700
20=	AZ 19-700
21=	AZ 20-700
22=	AZ 24-700
23=	AZ 26-700
24=	AZ 28-700
25=	AZ 18
26=	AZ 18-10/10

Note: **Solutions 1, 2, 3, 5, 7 and 11** are not standard solutions and should only be considered in special cases.

Below are the cross sections of the available *solutions*.

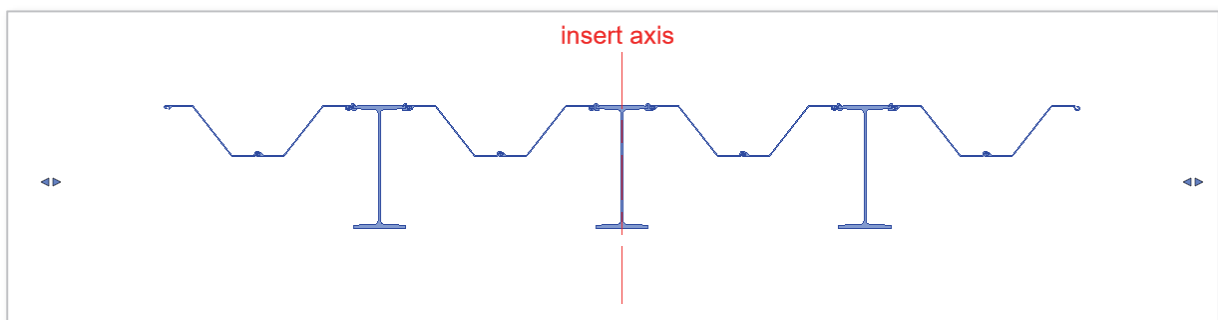


4 Parameter length

4.1 Length of the wall

There are two ways to modify the length of the wall.

4.1.1 Use of handles



Handles on both ends of the system allow modifying the wall length to the left and/or to the right. Select the system and the two handles appear both ends.

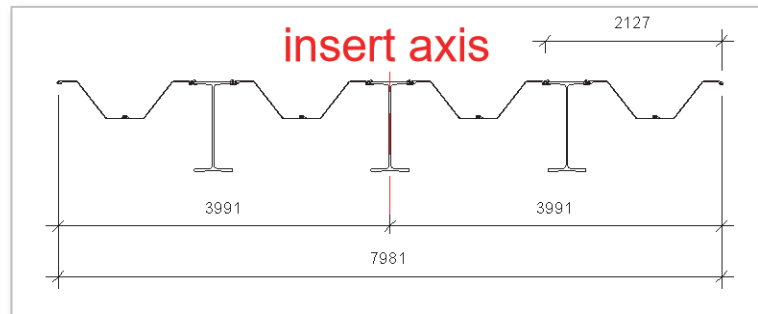
Select one of the handles and move it to stretch or to reduce the wall length.

Reminder: there is a minimum length of the system.

4.1.2 Use of the window *Parameters*

When inserting the family into a project, two parameters related to the wall length appear under **Dimensions**: **Length_Right** and **Length_Left**. Default values are 5 000 mm.

System HZ-M_AZ_Form1 Inside	
Generic Models (1)	
G_60%	191.89 kg/m ²
Dimensions	
System_Height	1000.0
AZ_Height	1000.0
Spacing	900.0
Length_Right	5000.0
Length_Left	5000.0
Length_R1	980.0
Setback_tip_R2	0.0
Length_R3	930.0
Length_R4	1000.0
Setback_tip_R5	0.0
Length_R6	1000.0
Volume	



These values are only indicative, and can be modified to meet the length of the wall. Revit adapts the number of components that fit within this length.

Notes

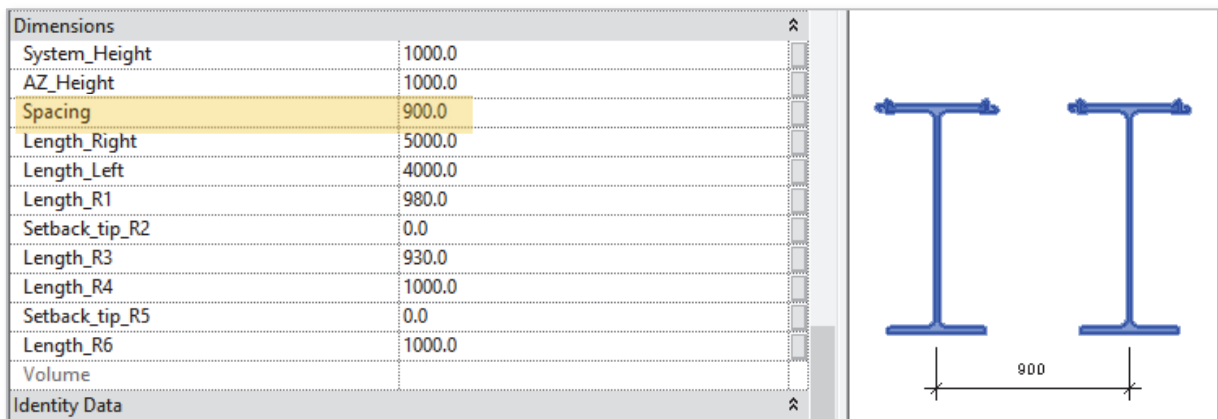
- Revit adds as many elements as will fit in the additional space. Matching perfectly a specific length requires most often special piles.
- There is a minimum number of components on the left and on the right of the insertion axis of the system.
- If you enter a value below the length corresponding to the basic system (3 HZ-M and 4 AZ), Revit will not fix the value in the field, hence the field contains a wrong value! There are no warning nor error messages.
- If you need to draw a wall shorter than the basic system length, you need to duplicate single elements (see Chapter 8).
- The wall can end on both sides with an HZ-M, a single AZ or a double AZ.

4.1.3 Special parameter *Spacing*

The value **Spacing** represents the distance between the axis of adjacent HZ-M profiles. The user needs to distinguish two different cases.

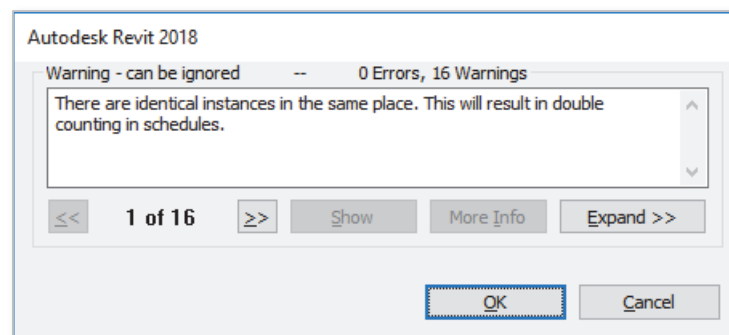
4.1.3.1 Solutions 10(0), 10(2), 10(4), 22, C 1(2), C 1(4) and C 23

Infill sheet piles AZ are automatically deactivated, although a height might be shown in the field **AZ_Height**.



By default, the value of **Spacing** is 900 mm, but can be modified as required.

Note: it is possible to reduce the spacing to move the HZ-M closer together. However, it is not foreseen to overlap them. A warning will inform you of issues.



4.1.3.2 Solutions 12(2), 12(4), 24 and 26

Although these solutions are almost exclusively combined to AZ infill sheet piles, it is possible to model such combination without AZ infill sheet piles: just select the value **0** as the choice of the AZ.

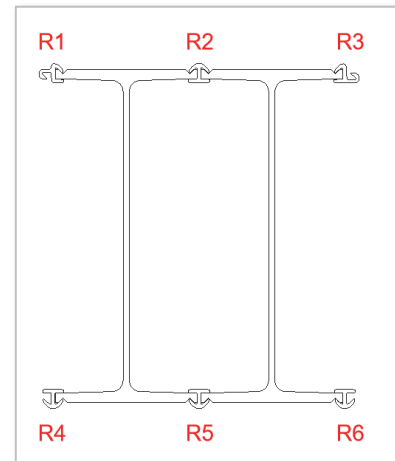
The minimum spacing between adjacent king piles is

- Solutions 12(2) and 12(4): 560 mm (527 mm corresponds to threaded HZ-M)
- Solutions 12(2) and 12(4): 1 040 mm (998 mm corresponds to threaded HZ-M)

4.2 Length (height) of the components

The reference level of the system is the top of the HZ-M. The user can define the length of the other components, and add a setback length at the top of the elements. The setback of the RZD and RZU connectors simplifies the threading of the infill sheet piles at the jobsite.

The sketch on the right shows the naming convention of the connectors. Note that only box piles have connectors R2 and R5.

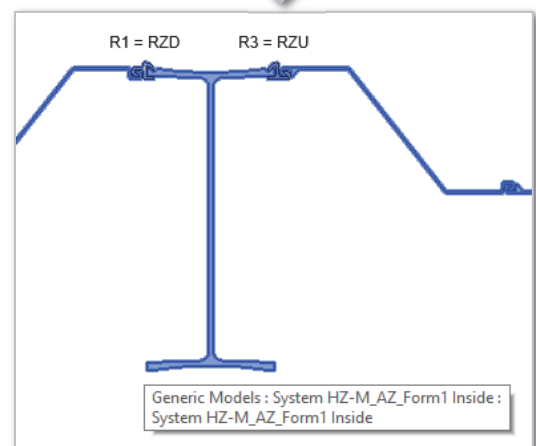
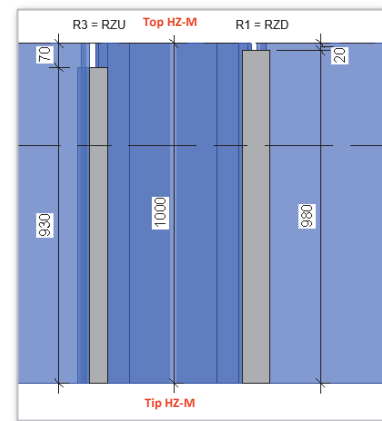


4.2.1 HZ-M, AZ and connectors R1, R3, R4, R6

The sequence of the selection of the lengths of the different components should be

- **System_Height** (= HZ-M height)
- **AZ_Height**
- **Length_R1** and **Length_R3**, and if applicable (Solutions 14 and 26) **Length_R4** and **Length_R6**

System HZ-M_AZ_Form1 Inside	
Generic Models (1)	
G_60%	191.89 kg/m ²
Dimensions	
System_Height	1000.0
AZ_Height	1000.0
Spacing	900.0
Length_Right	5000.0
Length_Left	5000.0
Length_R1	980.0
Setback_tip_R2	0.0
Length_R3	930.0
Length_R4	1000.0
Setback_tip_R5	0.0
Length_R6	1000.0
Volume	



The height of connectors R1 and R3 are usually identical.

The tip of the AZ should not be lower than the tip of connectors R1 and R3.

The tip of the AZ and of the connectors should never be lower than the tip of the HZ-M.

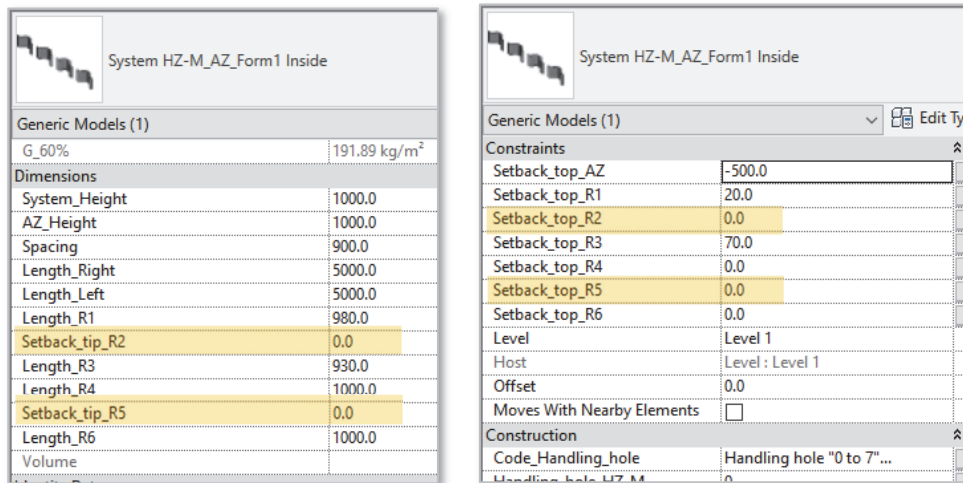
Pay attention to the setback length when entering the height of a connector. Revit does not warn the user when a value in a field is not compatible with the setback!

The software will curtail the AZ and the connectors at the tip of the HZ-M!

4.2.2 Connectors R2 and R5

Connectors R2 and R5 connect two HZ-M to form a box-pile (Solution 22, 24, 26, C 1 and C 23), and have the same length as the HZ-M. However, for fabrication purposes, a short setback at the top and at the tip is foreseen.

Typical setback at the top and the tip for R2 and R5 is 20 mm.

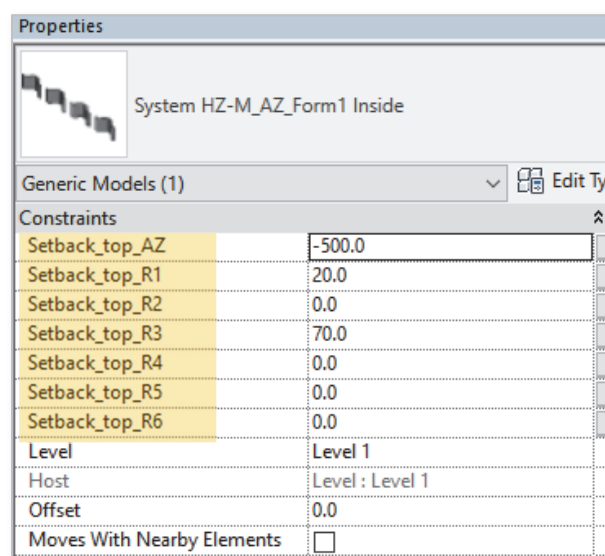


5 Constraints on AZ and connectors

A setback at the top of the connectors allows the correct positioning on the HZ-M of the connectors R1 to R6.

A negative setback for the AZ allows the simulation of the installation. It is rare that the final elevation of the top of the AZ is above the top of the HZ-M (reference level).

Note that the tip of the AZ should never be below the tip of the HZ-M.



Default values for the setbacks at the top for R1 (RZD) is 20 mm, and setback for R3 (RZU) is 70 mm.

Example of a constraint

- $Setback_top_R1 + Length_R1 \leq System_Height$
- $Setback_top_R2 + Length_R2 + Setback_Tip_R2 = System_Height$

Properties

System HZ-M_AZ_Form1 Inside

Generic Models (1) Edit Ty

Constraints

Setback_top_AZ	-500.0
Setback_top_R1	20.0
Setback_top_R2	0.0
Setback_top_R3	70.0
Setback_top_R4	0.0
Setback_top_R5	0.0
Setback_top_R6	0.0
Level	Level 1
Host	Level : Level 1
Offset	0.0
Moves With Nearby Elements	<input type="checkbox"/>

Construction

Code_Handling_hole	Handling hole "0 to 7"...
Handling_hole_HZ-M	0
Handling_hole_HZ-M	None
Handling_hole_AZ	0
Handling_hole_AZ	None

Materials and Finishes

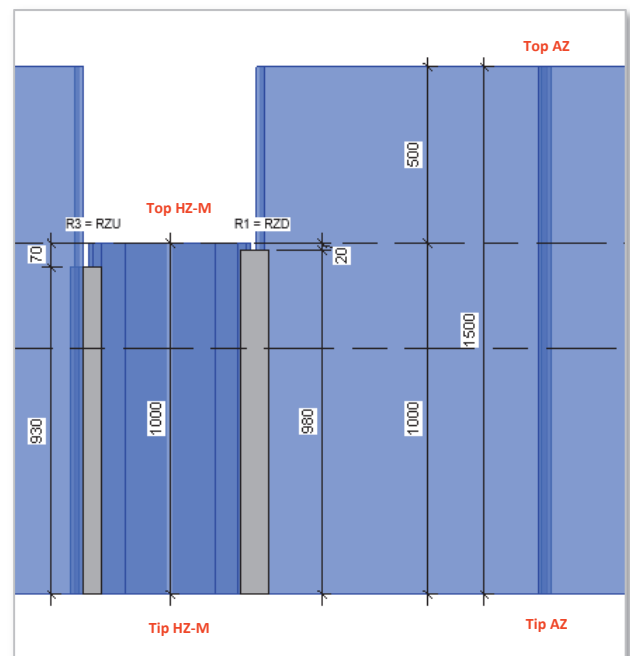
HZ-M_Material	AM_S 430 GP
Connectors_Material	AM_S 430 GP
AZ_Material	AM_S 355 GP

Structural

Total Mass	1450.900 kg
Isys (/m)	407530.00 cm ⁴
Wy* (/m)	7125.00 cm ³
Wy** (/m)	7995.00 cm ³
G_100%	228.38 kg/m ²
G_80%	210.13 kg/m ²
G_60%	191.89 kg/m ²

Dimensions

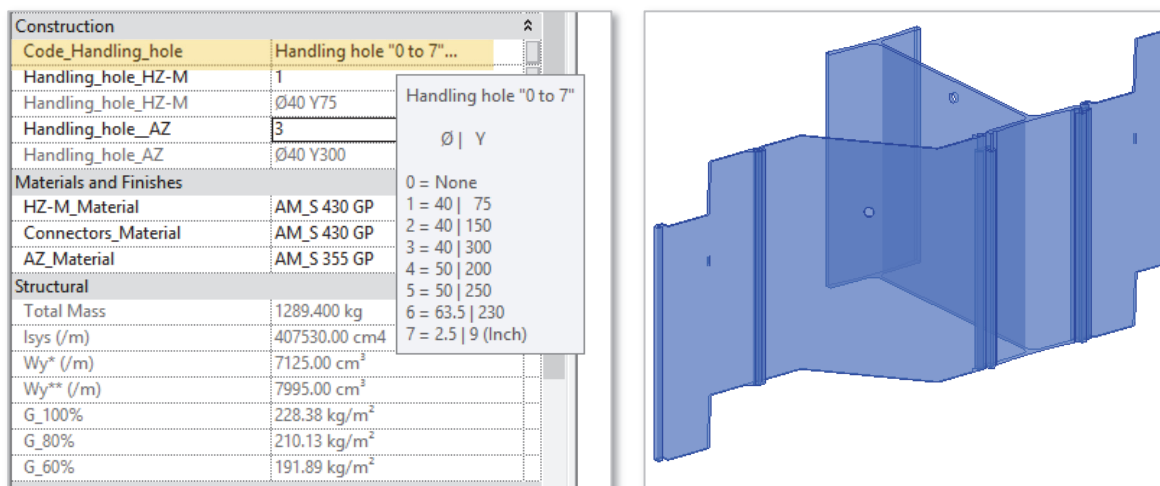
System_Height	1000.0
AZ_Height	1500.0
Spacing	900.0
Length_Right	5000.0
Length_Left	5000.0
Length_R1	980.0
Setback_tip_R2	0.0
Length_R3	930.0
Length_R4	1000.0
Setback_tip_R5	0.0
Length_R6	1000.0
Volume	



6 Handling holes

Hover the mouse over the field to show the tooltip containing the standard handling holes **Handling hole "0 to 7"**.

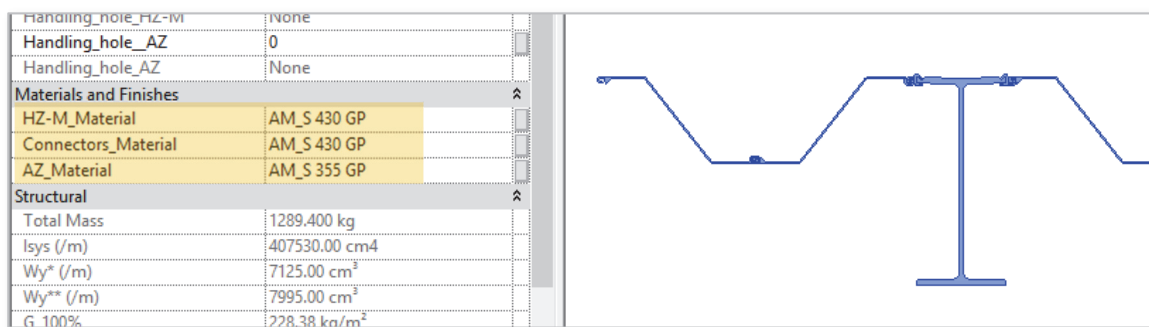
The list is valid for the HZ-M and for the AZ.



Select the handling holes for the HZ-M and AZ: **Handling_hole_HZ-M** and **Handling_hole_AZ**.

7 Steel grades

Choose the steel grade under the section **Materials and Finishes** for the HZ-M, AZ and connectors.



Default values correspond to the standard solution

- HZ-M S 430 GP
- AZ S 355 GP
- Connectors S 430 GP

Additional steel grades for the HZ-M and AZ according to the European and American standards are available in the file 'ArcelorMittal.adsklib' that is supplied with the .rfa file. You can contact us if you need help on how to add the steel grades database to your library.

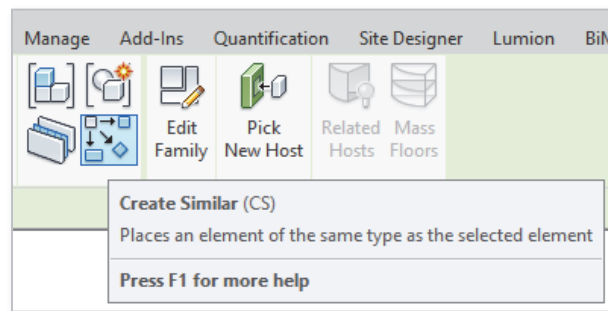
8 Duplication of elements of a system

It is not possible to configure an HZ-M / AZ combination with single components.

However, you can extract from the HZ-M / AZ combination a single *solution* HZ-M or a single sheet pile AZ, Pos. A or Pos. B,

The easiest way to extract a *solution* HZ-M is to open the directory tree of the project (/ Families / Generic Models / Solutions F1 / Solution.rfa), and to insert the *solution* into the project.

For the AZ, you should use the tool **Create Similar**. Select the combination in your model, isolate the single component to be duplicated (via the *Tab* key), and activate the tool to create a similar element.

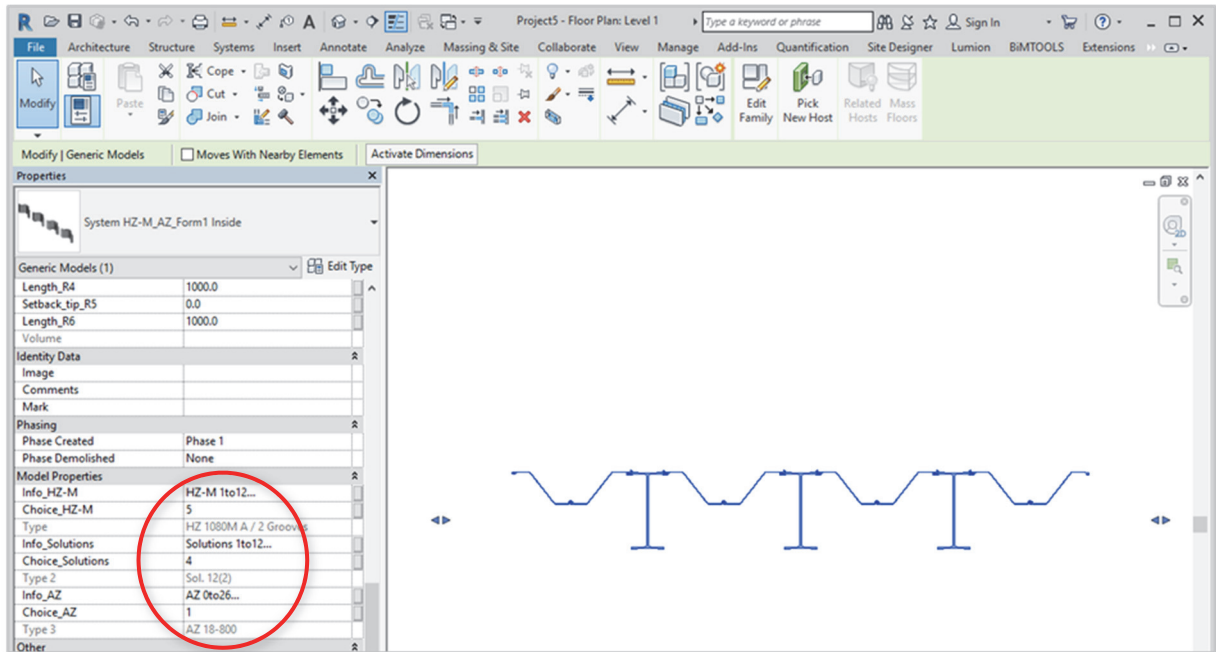


Notes

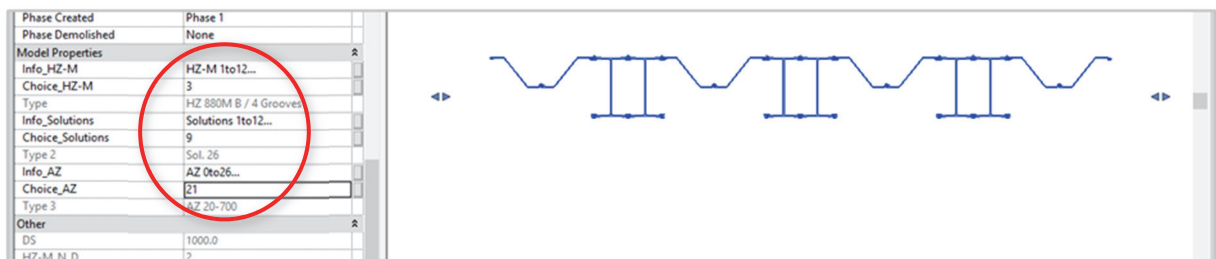
- the **Create Similar** tool works also for a *solution* HZ-M,
- all the parameters are reset (lengths, setbacks,...).

9 Example

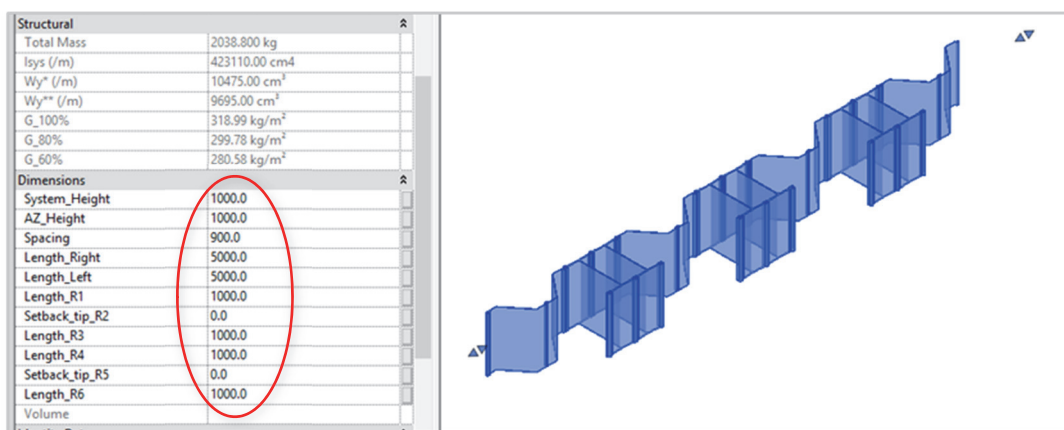
9.1 Insertion of a family 'HZ-M / AZ system' into a new project

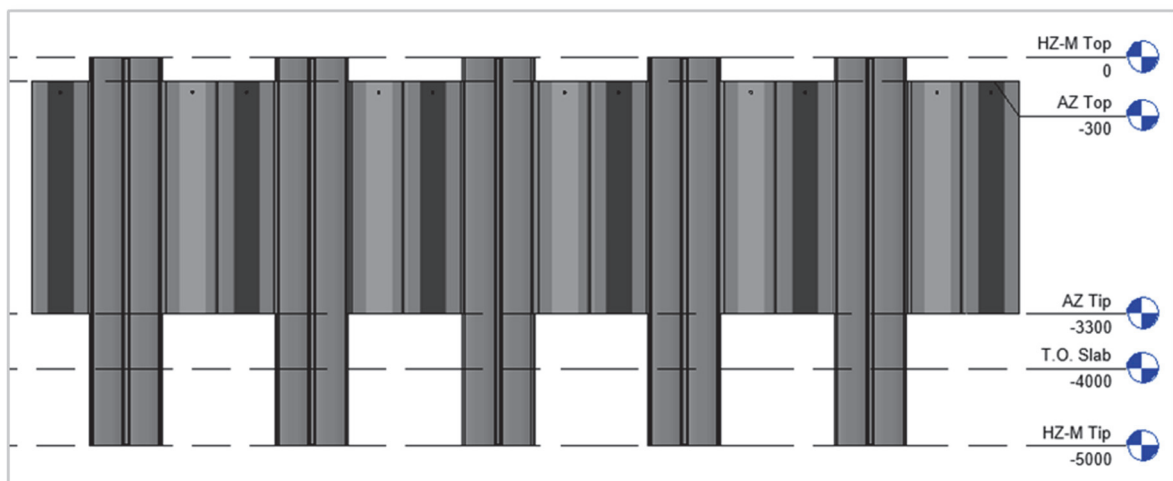
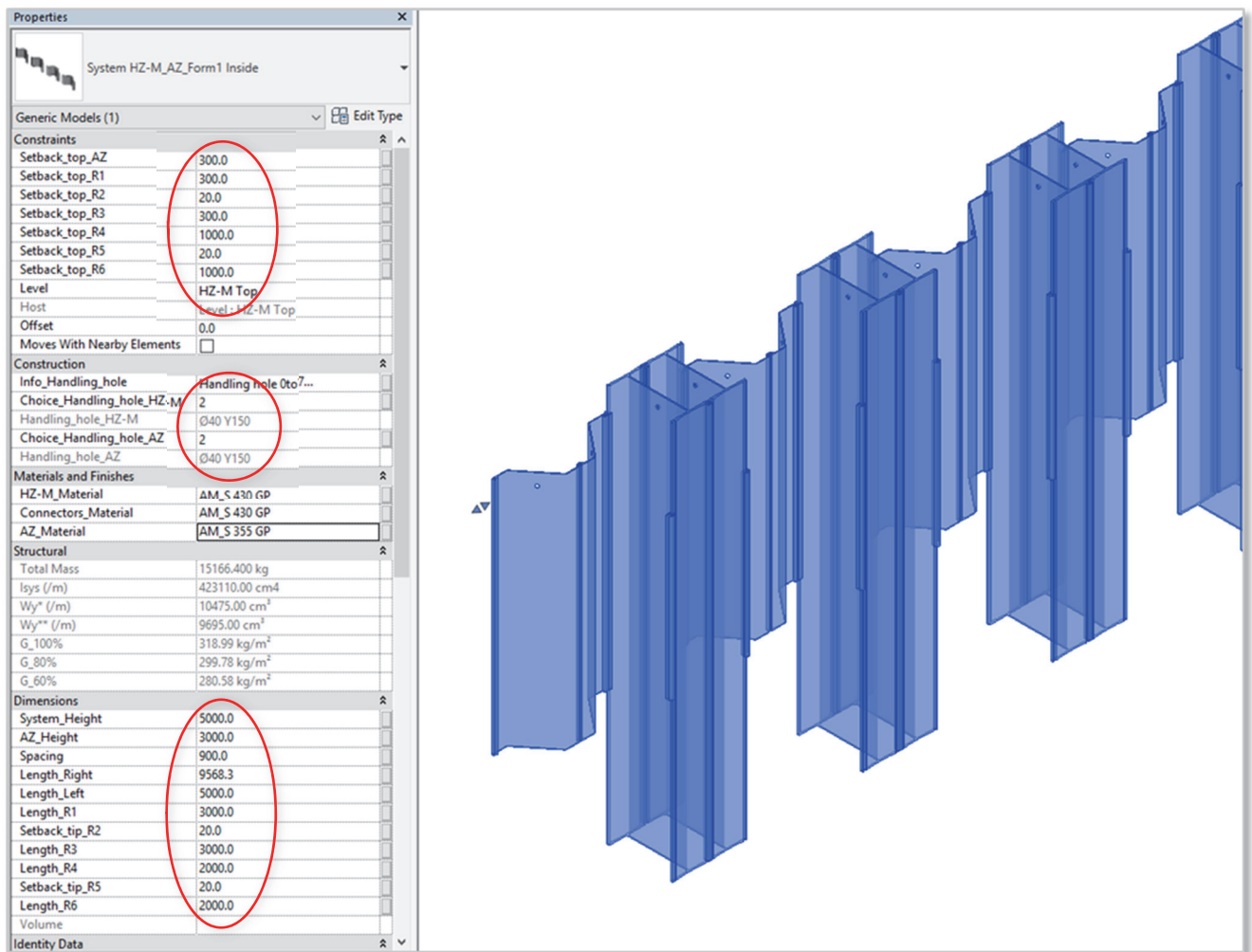


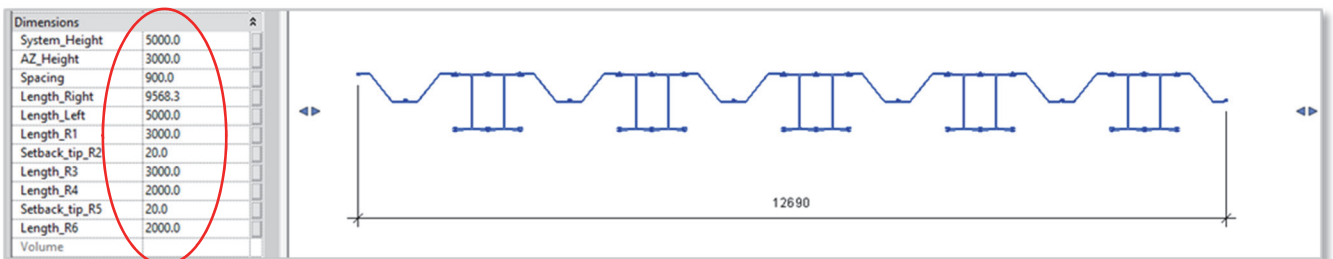
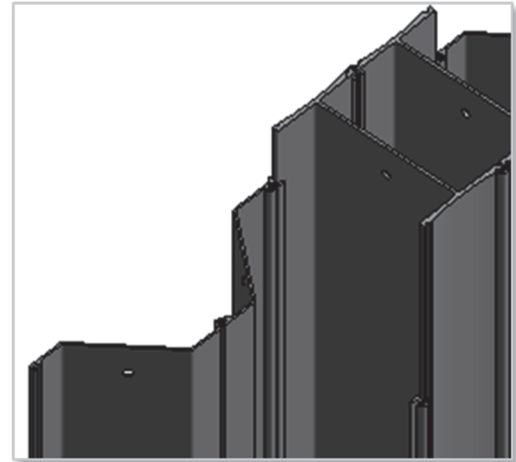
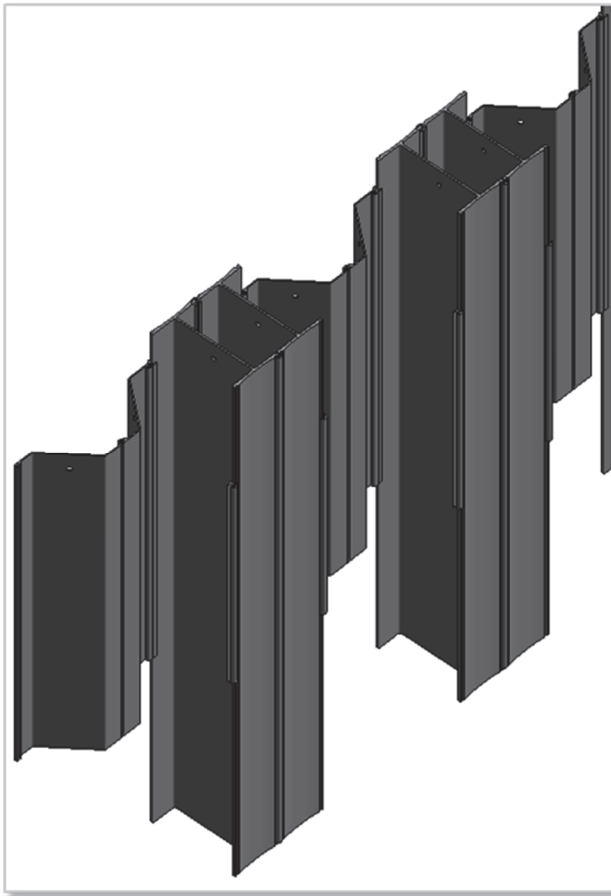
9.2 Modification of the system (change HZ-M / AZ combination)



9.3 Modification of parameters

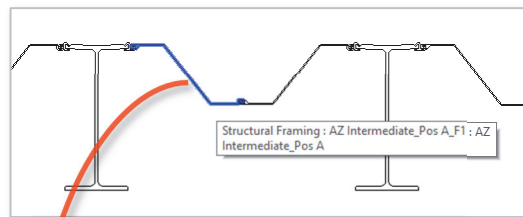






9.4 Extraction of an AZ, pos. A

Phase Demolished	None
Model Properties	
Code_HZ-M	HZ-M "1 to 12"...
HZ-M	5
Type	HZ 1080M A / 2 Grooves
Code_Solutions	Solutions "1 to 12"...
Solutions	4
Type 2	Sol. 12(2)
Code_AZ	AZ "0 to 26"...
AZ	1
Type 3	AZ 18-800
Other	
DS	1000.0
HZ-M_N_D	2

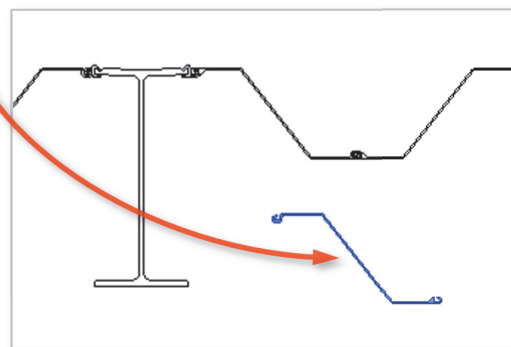
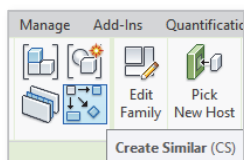


9.4.1 Step 1: copy a single element

Select the HZ-M/AZ system.

Use the key *Tab* to select the element AZ pos. A.

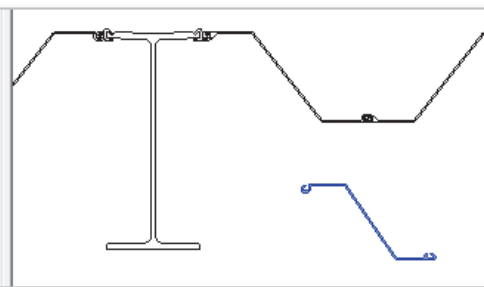
Activate the tool **Create Similar**.



Create the element.

9.4.2 Step 2: configure the copied element

Phase Created	Phase 1
Phase Demolished	None
Model Properties	
Code_AZ	AZ "1 to 26"...
AZ	25
Type	AZ 18
Other	
ac	22.0
gr	44.0
r1	20.0
r2	15.0



Select the correct section, and modify parameters as needed, ...

Notes

- To create a double pile AZ, *Form I* or *Form II*, create one AZ Pos. A and one AZ Pos.B, and then assemble them.
- Did you notice the change in the copied element? **AZ "1 to 26"...** instead of **AZ "0 to 26"....** Logical, as in the original HZ-M / AZ system, you can choose a combination without an infill sheet pile.

10 General notes

Revit families are not protected and can be modified by any user. We do recommend using ArcelorMittal's original .rfa files (download available on our website) before using the families. You can adapt the families to your specific needs, but please do not change the original data (section properties such as section modulus, mass, ...) nor the geometry of the profiles.

If you plan to use a Revit model to issue an accurate material list of the HZ-M / AZ system, then avoid using the tool **Mirror**. Mirroring a sheet pile may change the form of the sheet piles. This is not a major concern for the layout itself, but it can definitely mess up a material list.

Parameters **Spacing**, **Length_Left** and **Length_Right** are indicative values. You can modify them but pay attention to values which are not compatible with the basic system (low values).

The HZ-M / AZ system is a quite complex sheet pile system, with several components, and consequently it needs many parameters. It requires a rigorous modelling approach and verification of the final model.

This Revit family might not fit all the specific needs of every project. Our technical department may be able to work out a specific family for your project.

ArcelorMittal Sheet Piling's technical team can assist BIM modelers with detailing. This service is free of charge.

If you have any comments or suggestions, feel free to contact us at sheetpiling@arcelormittal.com

More information about steel sheet piles on <http://sheetpiling.arcelormittal.com>

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