



CANAM

Better Building Solutions

**REVIT 2013
Canam Parametric Families
MD2000 Hambro Joists**

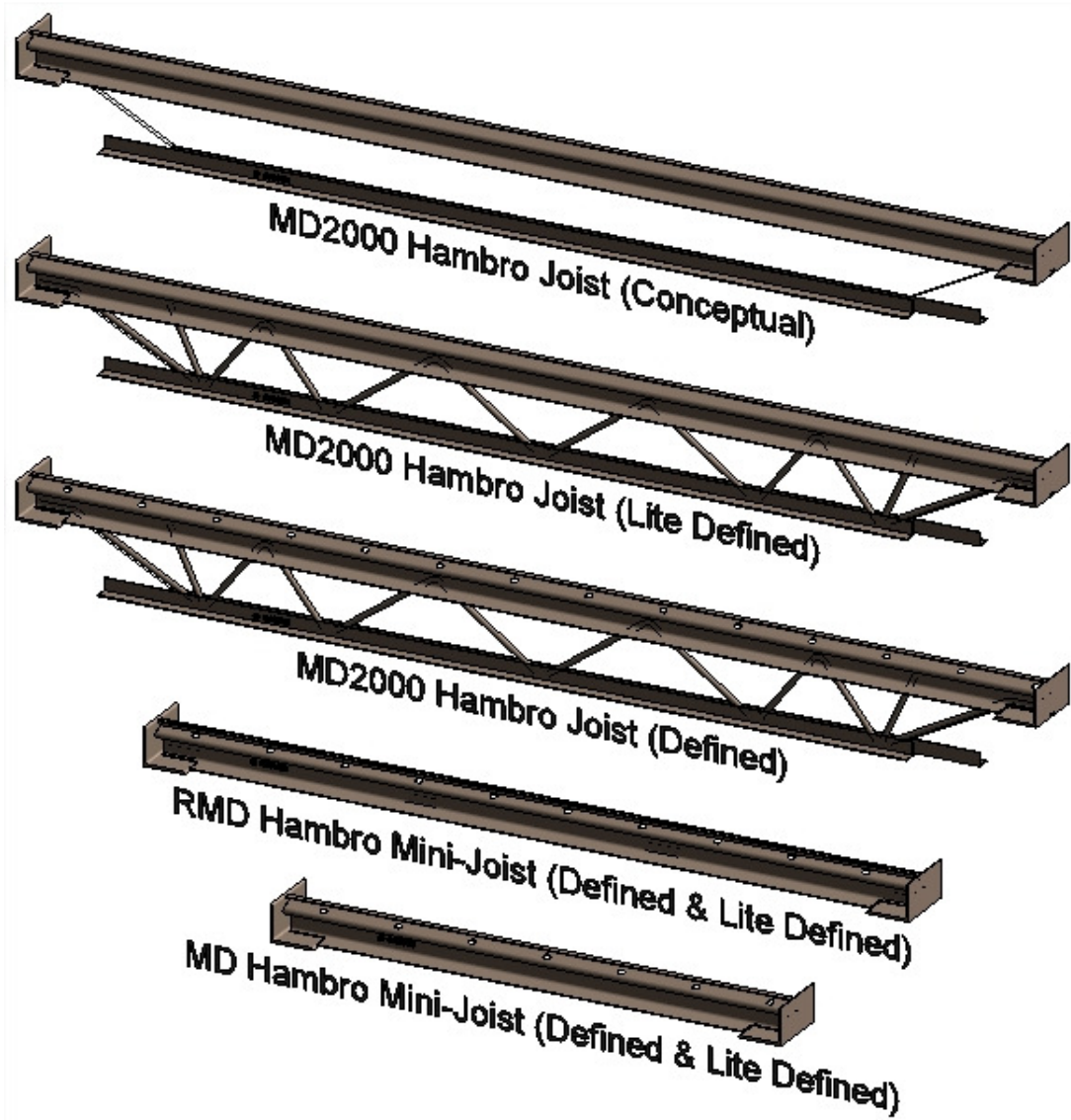


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Disclaimer

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Introduction

The purpose of this project is to provide a series of Parametric Revit families to help architects and engineers who want to specify our joist products in their Revit models. The release chosen for this development is Revit 2013.

Here is the list of the Parametric MD2000 Hambro Joists families available for Revit:

Hambro MD2000 Joists

- Canadian Joists - Imperials and Metrics

Hambro Mini-MD2000 Joists

- MD and RMD

1. General Overview of Parametric Hambro Joists

We have 3 kinds of Parametric MD2000 Hambro Joists. The first kind, we call them « Conceptual » Joists, the second kind, we call them « Lite Defined » Joists (with webs) and the third kind, we call them « Defined » Joists (with webs and holes).

For the « Conceptual » Joists, the joist webs have been modeled as a halftone volume that covers the entire web area of the Hambro MD2000 Joist.

For the « Lite Defined » Joists (with webs), our parametric Hambro Joists reflect a more realistic three-dimensional representation of the Joist Panels (webs) excluding the holes in the top chord of the joist.

For the « Defined » Joists (with webs and holes), our parametric Hambro Joists reflect a more realistic three-dimensional representation of the Joist Panels (webs) and the holes in the top chord of the joist.

Important : Please note that the positioning of the webs that are shown in the Web Panels of the « Lite Defined » (with webs) and « Defined » (with webs and holes) Joists families is approximate. For this reason, the « Lite Defined » Joists (with webs) and the « Defined » Joists (with webs and holes) also include a transparent shape that covers the entire web area.

Canam Parametric Families – MD2000 Hambro Joists

1.1 Hambro Joist Shape (Envelope)

Depending on the Parametric Hambro Joists family you select, the shape of the joist varies.

Please refer to the D500 Hambro Joists documents for more information regarding this product.

Please refer to the topic « **2 - Parametric MD2000 Hambro Joist Families** » for a short description of the different MD2000 Hambro Joist Shapes.

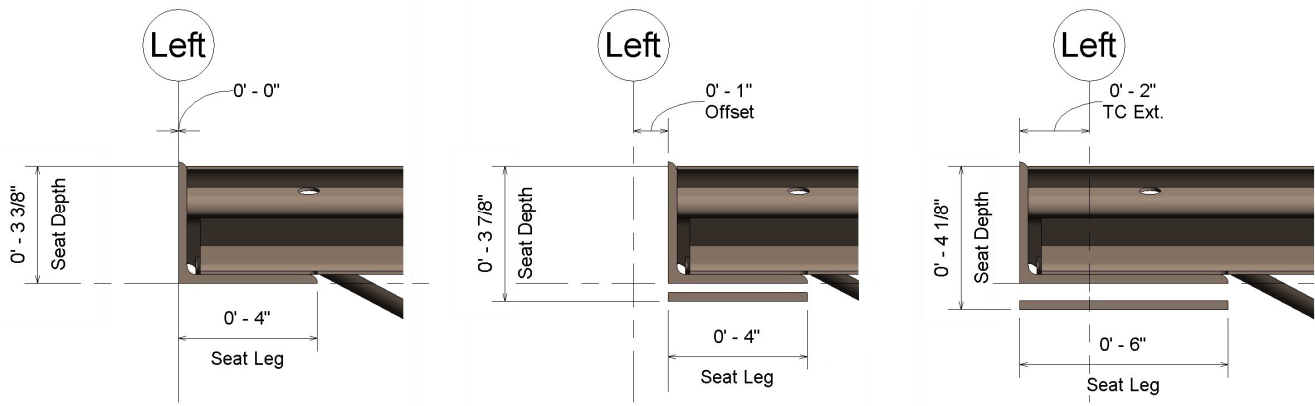
Combine with the family joist shape, some customizable parameters like the joist depth, the joist end conditions as seats and extensions of the top chord (TC: top chord) and bottom chord (BC: bottom chord), etc., are used to define what we call the « Envelope » of the joist.

1.1.1 Common Parameters

Most of the common parameters that have an effect on the Joist Envelope are modeled as instance parameters.

1.1.1.1 Instance Parameters

Instance parameters allow the user a better control over the different parameters as they can be modified independently for each instance of the joist.



The Start Offset and the End Offset parameters are used to position the joist ends from the axis. The Joist Seat position is calculated according to the Offset value. The TC Extension parameter is also used to position the joist ends from the axis.

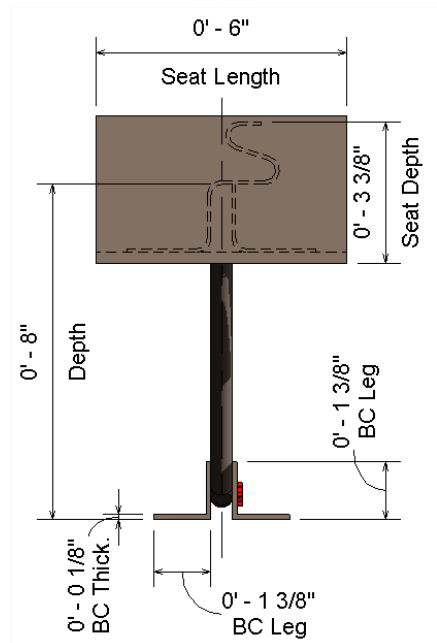
Canam Parametric Families – MD2000 Hambro Joists

Most of the common parameters will automatically return a default suggested value depending on the joist length when this parameter is set to zero.

Here some examples of parameters returning default values: Seat Depth, Seat Length, Seat Leg, etc.

If the user inputs a custom value in a parameter that use suggested values, the user custom value will overwrite the suggested value.

Please refer to the topic « **1.1.3 - Automatic Calculated Values Based on Length** » to have the values that will apply for these parameters when the parameters value is set to zero.



The instance parameters are located in the instance properties palette.

Here is an example of the parameters available in the instance properties palette when a Hambro MD2000 Joist is selected in a Revit model >>>

You can modify the instance parameters of one or multiple selected Hambro Joists even if they are not of the same Parametric Hambro Joist family. To modify an instance parameter, click on the parameter value and input the new value.

Important: Please take the time to read the « Disclaimer » that is located at the beginning of this document and/or the one available in the « Identity Data » parameter Group of every instance of the Parametric Objects.

To display the disclaimer, simply position your cursor over the text.

Construction	
Start Tie Bottom Chord	<input type="checkbox"/>
Start Seat Tie	<input type="checkbox"/>
Start Seat Shoe Gage	0' 4"
Start Seat Half Beam Gage	0' 2"
Start Ceiling Ext Offset	0' 3"
Start BC Offset	0' 0"
End Tie Bottom Chord	<input type="checkbox"/>
End Seat Tie	<input type="checkbox"/>
End Seat Shoe Gage	0' 4"
End Seat Half Beam Gage	0' 2"
End Ceiling Ext Offset	0' 3"
End BC Offset	0' 0"
Start TC Extension	0' 0"
Start Seat Rotation	0.000°
Start Seat Length	0' 0"
Start Seat Depth	0' 0"
Start Offset	0' 0"
Start Elevation	0' 0"
Start BC Extension	0' 3"
End TC Extension	0' 0"
End Seat Rotation	0.000°
End Seat Length	0' 0"
End Seat Depth	0' 0"
End Offset	0' 0"
End Elevation	0' 0"
End BC Extension	0' 3"
Dimensions	
Length Nested	12' 0"
Start Seat Thickness	0' 0"
Start Seat Leg	0' 0"
Start Depth	0' 10"
Length	12' 0"
End Seat Thickness	0' 0"
End Seat Leg	0' 0"
End Depth	0' 10"
BC Thickness	0' 0"
BC Leg	0' 0"
Volume	0.013 m ³
Elevation at Top	6' 0"
Elevation at Bottom	4' 3 7/8"
Identity Data	
Detail Mark	
Design Mark	
Disclaimer	These tools ...
Bundle Number	
Image	
Comments	
Mark	

Canam Parametric Families – MD2000 Hambro Joists

1.1.1.2 Type Parameters

The type parameters are available in the Type Properties Dialog.

You can access the Type Properties Dialog by clicking on the icon  .

The modification of a Type Parameter value will affect all the instances of the same type created in your model.

Usually, for Hambro Joist Families, you should not have to modify the Type Parameters values because these values are coming from a Types Catalog file. The Hambro MD2000 Joist Parametric families are provided with a Types Catalog (.txt) file. This txt file contains the Type name (ex: MDH8, MDH10, etc., for Imperial Joist or ex: MDH200, MDH250, etc., for Metric Joist, etc.) and some specific values associated to every specific type (ex: Depth, Min Length, Max Length, etc.)

Revit uses this Types Catalog file when you load the family in your model to generate the different Joist Types using the Name and the values specified in the txt file.

Here is an example of the Type Parameters available in the Type Properties Dialog for a Hambro MDH24 Joist >>>

As you can notice, the Hambro Joist families also have some Length validation features that are based on the Joist Depth. The Min & Max Length validation will restrict the Hambro Joist creation depending on the Joist Depth vs. Length.

Please review the topic « **2.1 - Parametric Hambro MD2000 Family** » for more details regarding the Length Validation.

Parameter	Value
Constraints ^	
MinLength	6' 0"
MinLengthEcono	36' 0"
MaxLength	45' 0"
MaxLengthEcono	45' 0"
Materials and Finishes ^	
Structural Material	Metal - Steel
Structural ^	
Wt	0.000000
Section Shape	Not Defined
Dimensions ^	
Web Gap	0' 0"
Depth	2' 0"
Identity Data ^	
Version	v4.3
URL	www.canam-construction.com/en

1.1.1.3 Description of the Common Parameters

Parameter Name	Description
Start/End Seat Tie :	Display symbols representing holes in the joist seat.
Start/End Tie Bottom Chord :	Allows the user to extend the bottom chord along a vertical projection of the joist insertion point.
Start/End Seat Shoe Gage :	Distance between holes in the joist seat (perpendicular to the joist).
Start/End Seat Half Beam Gage :	Distance between holes in the seat and the vertical part of the angle (joist seat).
Start/End Offset :	Move the reference point from which the seat and the top chord extension reference is taken. The Offset always moves towards the inside of the joist from the left or right axis.
Start/End TC Extension :	Extension length of the top chord with respect to the Start/End Offset.
Start/End BC Extension :	Extension length of the bottom chord with respect to the first panel reference plane.
Start/End Ceiling Ext Offset :	If Start/End Tie Bottom Chord is checked = Distance from the vertical part of the angle (joist seat) to the end of the bottom chord. If Start/End Tie Bottom Chord is unchecked = Distance from the horizontal part of the angle (joist seat) to the end of the bottom chord.
Start/End Seat Leg :	Length of the seat from the offset reference plane towards the inside of the joist.
Start/End Seat Depth :	When Seat Depth = 0", suggested values for seat depths will be used based on joist span. When Seat Depth > 0", user-defined values will be used.
Start/End Seat Thickness :	Thickness of seat angles.
BC Thickness :	Thickness of the bottom chord.
Start/End Seat Length :	Length of the seat angle. If 0", suggested value will be used based on joist span.
BC Leg :	Length of the bottom chord leg. If 0", suggested value will be used based on joist span.

1.1.1.4 Shared Parameters

In our Parametric Hambro Joists Families, most of the Instance Parameters have been defined as « Shared Parameters ». This provide you the ability to switch an existing joist from one Parametric Joist Family to another (ex: from the « Conceptual » to the « Defined » family) keeping all the custom values that have been input by the user in an instance parameter (ex: Start TC Extension, Seat Depth, etc.), these values will be kept and transferred in the new joist instance.

The « Shared Parameters » also give the possibility to update these parameters in batch (multiple selections) even if the selected joists are created using different Parametric Joist Families or if they have different types of the same family.

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1.1.2 Sloped Bottom Chord Condition (Not Supported)

The Hambro Joist Depth is always calculated perpendicular to the Bottom Chord. The Parametric Hambro Joist **DO NOT SUPPORT** to have the Bottom Chord sloped (to have a different Start Depth & End Depth for the joist).

1.1.3 Automatic Calculated Values Based on Length

Here are the default automatic calculated values that will apply to a parameter when a parameter value is set to zero:

Imperial	Joist Length	Seat Depth	Seat Leg	Web Gap	BC Thick	BC Leg	Seat Thick	Seat Length
	< 10'					1 1/4"		
	< 15'			1/2"				
	< 20'					1 3/8"		
	< 22'			5/8"				
	< 25'					1 1/2"		
	< 28'					1 5/8"		
	< 35'			11/16"	15/128"	1 3/4"		
	>= 35'			3/4"	5/32"			
	< 40'	3 3/8"	4"			1 7/8"	1/4"	6"
	>= 40'	3 3/8"	4"			2"	1/4"	6"

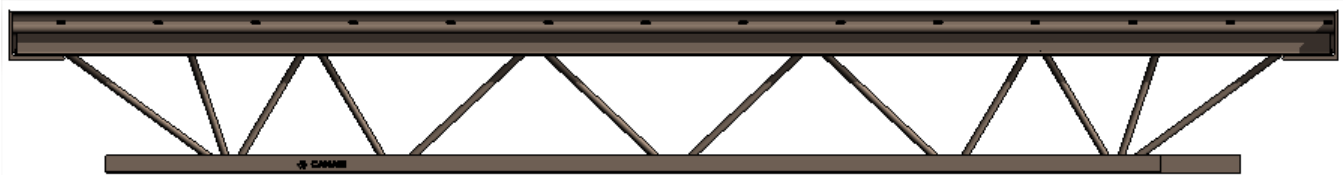
2. Parametric MD2000 Hambro Joist Families

Here is a brief description of the available Parametric Hambro Joist Families.

2.1 Hambro MD2000

The Hambro MD2000 Joist families allow the creation of Hambro Joists using two Working Points (Placement Points). These Joist Families reflect the Hambro Joists available depths as listed in the Hambro Catalog. They are available in both Imperial and Metric units of measure.

The Hambro MD2000 Families are also available as families that include the Joist Panels (webs).

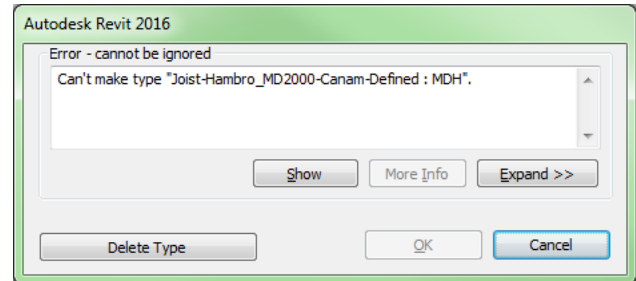


Important: A Revit Types Catalog file is provided with the Hambro MD2000 family. The Types Catalog file (.txt file) must always be located in the same folder as the Revit family (.rfa file) it is associated to and both files must have the exact same name. If these conditions are not respected, the Types Catalog file will not be found when you load the family in your model. When loading a Hambro Joist family associated to a Types Catalog file in your Revit model, you can select some specific types required for your project or you can select all the available types.

Canam Parametric Families – MD2000 Hambro Joists

Joist Length Validation

While the joist is being created, the joist length is validated according to the minimum (MinLength) and the maximum (MaxLength) length values for the selected type. If the Joist Length is outside the min-max range, a Revit Error will be displayed « Can't make type ».



A « Special » Type

The Hambro MD2000 Joists families also contain a type where the Joist depth is set to zero. When using this special type, the joist depth will automatically adjust to a suggested depth based on the joist length.

2.2 Hambro Mini-MD2000

The Hambro Mini-Joist family allows the creation of Hambro Mini-Joists using two Working Points (Placement Points).

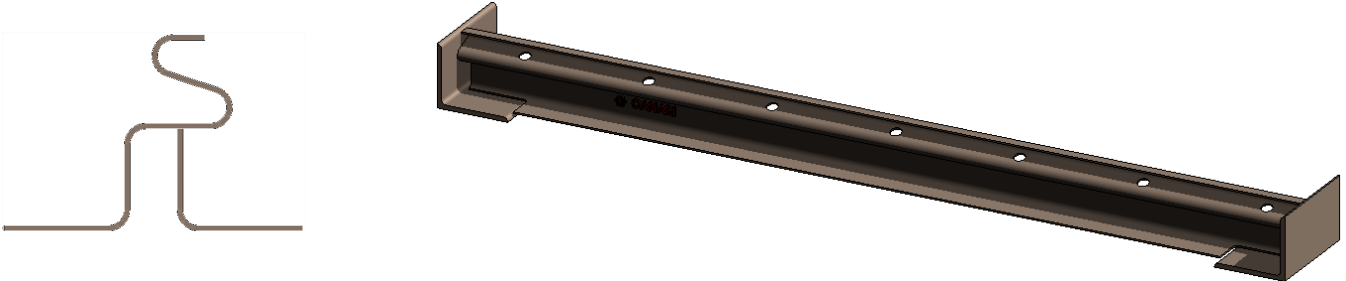
This Family can be used for both imperial or metric and Canadian or American projects. Depending on the joist length, the shape of the Mini-Joist will adjust.

Note: The Mini-Joist Series Families don't have a Types Catalog file (.txt).

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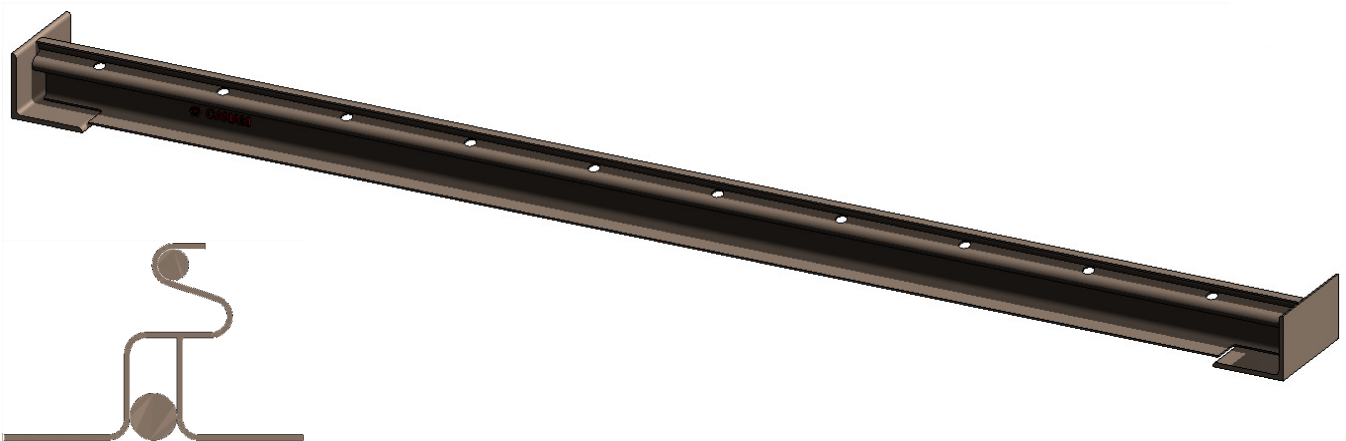
2.2.1 Hambro Mini-Joist MD

The Hambro MD is available when the length of the Mini-Joist is more than 2'-0" and less than 8'-4". It is simply a plain Hambro MD2000 Top Chord.



2.2.2 Hambro Mini-Joist RMD

The Hambro RMD is available when the length of the Mini-Joist is more than 2'-0" and less than 8'-4". It is simply a plain Hambro MD2000 Top Chord with Reinforcing Rods.



Note that the family automatically propose a mini-joist type (MD or RMD) depending on the length of the mini-joist. However, this automatic type can be overwritten from the instance parameters of the mini-joist.

3. Best Practices for Hambro Parametric Joists

Here are some of the Best Practices & Tips on how to use the Parametric Hambro Joists.

3.1 When to Use the Hambro Parametric Joist Family « Without webs » vs « With webs »

- When it is time to add the Parametric Hambro Joists families in your Revit project, we strongly suggest specifying the joists using the appropriate Joist Family « Conceptual » (Without webs).
- The « Conceptual » families (Without webs) are lighter than the corresponding « Lite Defined » (with webs) or « Defined » (with webs and holes) family.
- We suggest to use the « Conceptual » (Without webs) family as a placeholder for the joists in your 3D Model and to adjust the parameters that define the Joist envelope and the seats (extensions, offset, depth, etc.)
- When adjustments are done to the joists, you can then switch Joists for the corresponding « Lite Defined » (with webs) or « Defined » (with webs and holes) family. To do so, proceed the same way you would switch a Beam from a « W-Wide Flange » to a « C-Channel » family.
- Note: All the adjustments made in a « Conceptual » (Without webs) Joist will be transferred to the Joist when you switch it for the corresponding « Lite Defined » (with webs) or « Defined » (with webs and holes) family.
- It is still possible to modify the adjustments in the joists when they are specified with a « Lite Defined » (with webs) or « Defined » (with webs and holes) family, but the modification takes more time to process since the joist web geometry will have to be recalculated.

3.2 The Types Catalog file of the Standard Shape Families

- The Hambro MD2000 Joist Parametric families are provided with a Types Catalog (.txt) file. This txt file contain the Type names (ex: MDH8, MDH10, etc.) and some values associated to the type (ex: Depth, Min Length, Max Length, etc.)
- Revit uses this file when you load the family in your model to generate the different Joist Type using the names and the values specified in the txt file. This allows you to select the Joist Type you wish to load in your model without having to load all types.

3.3 « Special » Joist Type That Suggests an Economical Joist Depth Based on the Joist Length

- We have also added a special Joist type in the Hambro MD2000 Joist family with the Depth value set to zero. For Hambro MD2000 Joist families, this type is named « MDH ».

Type	Depth	Wt	MinLength	MinLengthEcono	MaxLength	MaxLengthEcono
	(all) ▾	(all) ▾	(all) ▾	(all) ▾	(all) ▾	(all) ▾
MDH	0' 0"	0	4' 0"	4' 0"	45' 0"	45' 0"
MDH6	0' 6"	0	4' 0"	7' 0"	17' 0"	14' 0"
MDH8	0' 8"	0	4' 0"	12' 0"	22' 0"	16' 0"
MDH10	0' 10"	0	4' 0"	14' 0"	28' 0"	18' 0"
MDH12	1' 0"	0	4' 0"	16' 0"	33' 0"	20' 0"
MDH14	1' 2"	0	5' 0"	18' 0"	39' 0"	24' 0"
MDH16	1' 4"	0	5' 0"	22' 0"	45' 0"	30' 0"
MDH18	1' 6"	0	6' 0"	28' 0"	45' 0"	34' 0"
MDH20	1' 8"	0	6' 0"	32' 0"	45' 0"	38' 0"
MDH22	1' 10"	0	6' 0"	36' 0"	45' 0"	45' 0"
MDH24	2' 0"	0	6' 0"	36' 0"	45' 0"	45' 0"

- When this special type is selected to create a joist or if you change an existing Joist type (ex: MDH12) for the special type (ex.: MDH), the Joist depth will be adjusted automatically depending on the Joist Length. This allows creating many joists that will have different depths with the same family type (ex: when you are using Beam Systems, with skewed boundaries).
- This special type is more permissive than the other Joist type of the family for the MinLength & MaxLength values. This special type will allow creating all available lengths for the family compared to the other types of the family that have the Depth value already defined and that have the MinLength & MaxLength values set for a specific Joist Depth.
- When the joists are created and positioned, you can then change the joist type from the special type to the specific types that have been specified by the engineer.