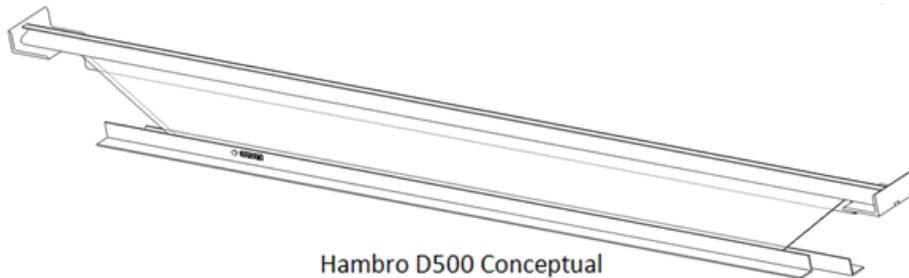
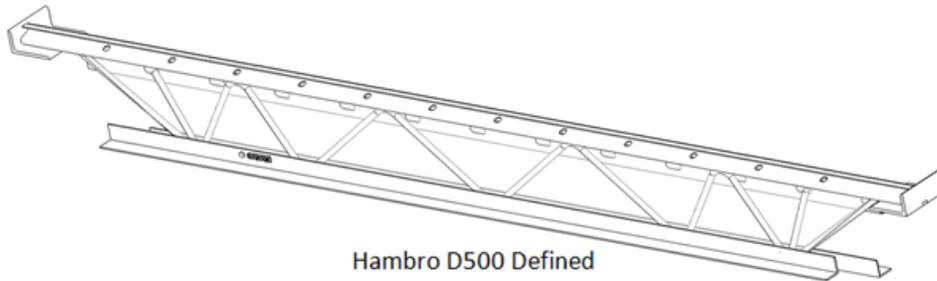


**REVIT 2012
Canam Parametric Families
Hambro Joists**



Hambro D500 Conceptual



Hambro D500 Defined



Hambro Mini-Joist SRTC



Hambro Mini-Joist RTC



Hambro Mini-Joist TC

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Introduction

The purpose of this project is to provide a series of Canam 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 2012.

For the first release of the Canam Parametric Hambro Joist Revit families, we have made available the most commonly used Hambro joists fabricated by Canam.

Here is the list of the Canam Parametric Hambro Joists available for Revit 2012:

Hambro Joist D500:

- Canadian imperial and Canadian metric

Hambro D500 Mini-Joist Series:

- TC, RTC & SRTC

1. General overview of Canam Parametric Hambro Joists

We have 2 kinds of Canam Parametric Hambro Joists. The first kind, we call them "Conceptual Joists" and the second kind, we call them "Defined Joists" (with webs).

For the "Conceptual Joists", the joist webs have been modeled as a half-tone volume that covers the entire web area of the Hambro D500 Joist.

For the "Defined Joists" (with webs), our Canam Parametric Hambro Joists reflect a more realistic three-dimensional representation of the Joist Panels (webs).

Important: Please note that the positioning of the webs that are shown in the web panels of the Defined Joists families is approximate. For this reason, the "Defined Joists" (with webs) also include a transparent shape that covers the entire web area.

1.1 Hambro Joist Shape (Envelope)

As you can see from the list of available Canam Parametric Hambro Joists, we have made available the Hambro D500 and the Hambro Mini-Joist series.

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

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

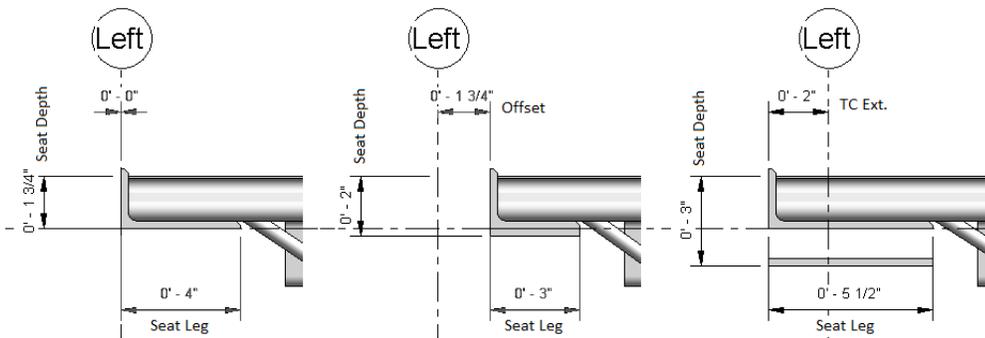
Combine with the Family Joist Shape, some customizable parameters like the Joist Depth, the Joist end conditions (Seat and TC & BC Extensions), etc., that are used to define what we call the "Envelope" of the joist.

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

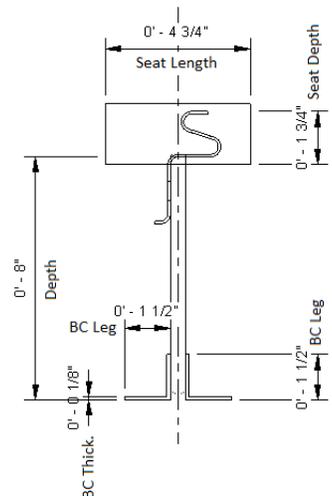
Instance parameters allow the user a better control over the different parameters as they can be modified independently for each instance of the joist.



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.

Most of the common parameters will automatically return a default suggested value depending on the joist length when this parameter is set to zero. Ex: 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 Canam Parametric Hambro D500 Joist is selected in a Revit model >>>

Construction	
Start Ceiling Ext Offset	0' 3"
Start BC Offset	0' 0"
End Ceiling Ext Offset	0' 3"
End BC Offset	0' 0"
Start Tie	<input type="checkbox"/>
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' 5"
End Tie	<input type="checkbox"/>
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' 5"
Dimensions	
Length Nested	8' 0"
Start Seat Thickness	0' 0"
Start Seat Leg	0' 0"
Start Depth	0' 8"
Longueur	8' 0"
End Seat Thickness	0' 0"
End Seat Leg	0' 0"
End Depth	0' 8"
BC Thickness	0' 0"
BC Leg	0' 11/2"
Unité	0.25 CF
Identity Data	
Disclaimer	These tools ar...
Commentaires	

You can modify the instance parameters of one or multiple selected Hambro Joists even if they are not of the same Canam 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 Disclaimer available in the Identity Data Parameter Group of every instance of Canam Parametric object. To display the Disclaimer, simply position your cursor over it.

1.1.1.2 Hambro Joist Families 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 Type Catalog file. The Hambro D500 Joist Parametric families are provided with a Type Catalog (.txt) file. This txt file contains the Type name (ex: H8, H10, etc., for Imperial Joist or ex: H200, H250, etc., for Metric Joist, etc.) and some specific values associated to every specific type (ex: Depth, Min Length, Max Length, etc.)

Revit uses this Type Catalog file when you load the family in your model to generate the different Joist Type 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 Joist 24" >>>

Parameter	Value
Dimensions	
Web Gap	0' 0"
MinLength	12' 0"
MinLengthEcono	12' 0"
MaxLength	43' 0"
MaxLengthEcono	43' 0"
Depth	2' 0"

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 - Canam Parametric Hambro D500**" for more details regarding the Length Validation.

1.1.1.3 Here is a Brief Description of the Common Parameters:

Parameter Name	Description
Start/End Elevation	Special parameter that is used in many of our formulas when joist is in sloped condition. This Special parameter is very important since it is used in the calculation of many of our instance parameters formula: TC Extension, and Offset, BC Tie, etc. (See 1.1.2 Sloped Joist Condition).
Start/End Tie:	Allows the user to extend the bottom chord along a vertical projection of the joist insertion point.
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 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.
Web Gab:	Distance between the angles of the bottom chord (Rod diameter).
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 Canam 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.

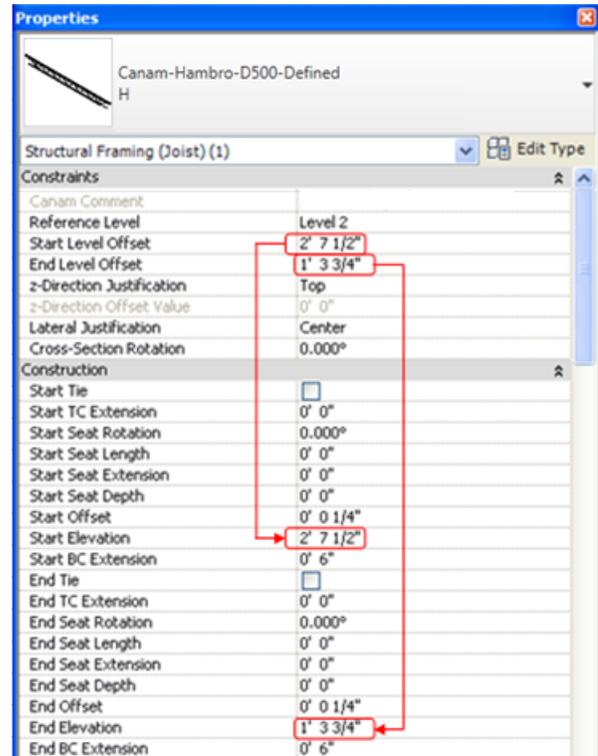
1.1.2 Sloped Joist Condition

Most of the parameter calculated values are given linearly on the theoretical line that runs between the start point and end point that define the joist. When the joist is in a sloped condition, the start point and the end point are not at the same elevation.

This situation will cause some of the length parameters used in our parametric joist families to return their value in a plan that is not parallel to the ground. This can become a complex task for the users to perform all these calculations to obtain the accurate length expected.

The solution to this situation is simply to copy/paste the Revit Built-in "Start/End Level Offset" parameter value in our "Start/End Elevation" parameter. When these values are accurate and reflect the real joist elevations condition, the joist parameter formulas will adjust the length parameters calculation accordingly.

The Start/End Elevation parameters will affect the following parameters: TC Extension, Joist Offset, and the BC Tie Joist calculation.



1.1.2.1 Sloped BC Condition

The Hambro Joist Depth is always calculated perpendicular to the Bottom Chord. The Canam 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:

- For the Hambro D500 Joist

ex: for Hambro D500 Joist								
Imperial	Joist Length	Seat Depth	Seat Leg	Web Gap	BC Thick	BC Leg	Seat Thick	Seat Length
	< 10'			1/2"				
	< 15'			5/8"	15/128"	1 1/2"		
	< 20'			11/16"				
	< 22'				5/32"	2"		
	< 25'			3/4"				
	< 28'				25/128"	2 1/2"		
	>= 28'				15/64"	3"		
	< 35'			7/8"				
	>= 35'			1"				
	< 40'	1 3/4"	4"				1/4"	4 3/4"
	>= 40'	1 3/4"	4"				3/8"	4 3/4"

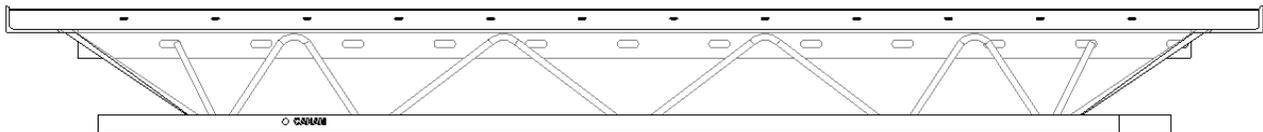
2. Canam Parametric Hambro Joist Families

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

2.1 Canam Parametric Hambro D500

The Canam Hambro D500 Joist families allow the creation of Hambro Joists using two Working Points (Placement Points). These Joist Families reflect the Canam Hambro Joists available depths as listed in the Canam Hambro Catalog. They are available in both Imperial and Metric units of measure.

The Canam Hambro D500 Families are also available as Families that include the Joist Panels (webs).

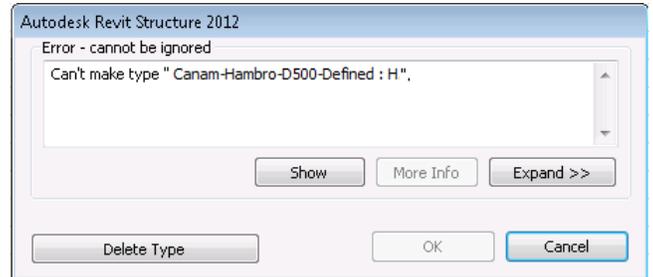


Important: A Revit Type Catalog file is provided with the Canam Hambro D500 family. The Type Catalog file (.txt file) must always be located in the same folder as the Revit family (.rfa file) it is associated to and both files must have the exact same name. If these conditions are not respected, the Type Catalog file will not be found when you load the family in your model.

When loading a Canam Joist family associated to a Type Catalog file in your Revit model, you can select some specific Type required for your project or you can select all the available types.

Joist Length Validation

While the joist is being created, the joist length is validated according to the minimum and the maximum 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".



Special Type

The Canam Hambro D500 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.

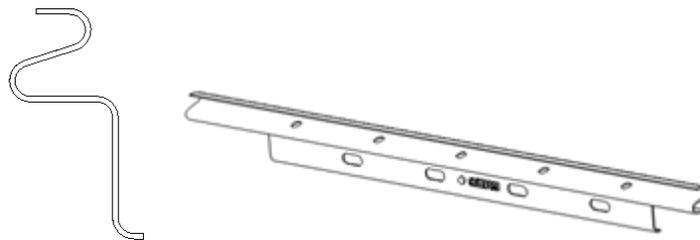
2.2 Canam Parametric Hambro D500 Mini-Joist Series

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 Type Catalog file.

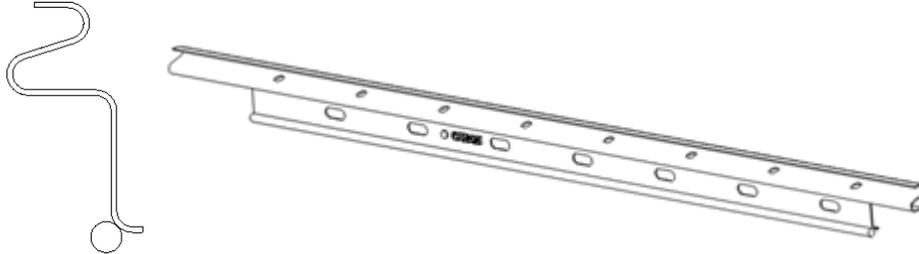
2.2.1 Hambro Mini-Joist TC

The Hambro TC is available when the length of the mini-joist is more than 2'-0" and less than 4'-0". It is simply a plain Hambro D500 Top Chord.



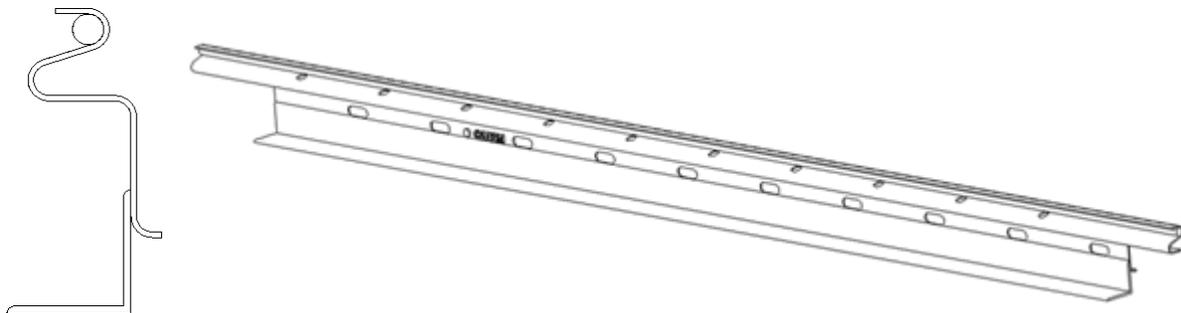
2.2.2 Hambro Mini-Joist RTC

The Hambro RTC is available when the length of the mini-joist is more than 4'-0" and less than 6'-0". It is simply a plain Hambro D500 Top Chord with a Reinforcing Rod as Bottom Chord.



2.2.3 Hambro Mini-Joist SRTC

The Hambro SRTC is available when the length of the mini-joist is more than 6'-0" and less than 8'-0". It is simply a plain Hambro D500 Top Chord with an Angle as Bottom Chord and a Reinforcing Rod.



3. Best Practices for Canam Parametric Joist

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

3.1 When to Use the Canam Parametric Joist Family "without web " vs. "with webs"

- When it is time to add the Canam Parametric Hambro Joists in your Revit project, we strongly suggest specifying the joists using the appropriate Joist Family "without web".
- The "Conceptual" families (without web) are lighter than the corresponding "Defined" family (with webs).
- We suggest to use the "Conceptual" family (without web) 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 "Defined" family (with webs). 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" Joist will be transferred to the Joist when you switch it for the corresponding "Defined" family.
- It is still possible to modify the adjustments in the joists when they are specified with a "Defined" family " but the modification takes more time to process since the joist web geometry will have to be recalculated.

3.2 The Type Catalog file of the Standard Shape Families

- The Canam Hambro D500 Joist Parametric families are provided with a Type Catalog (.txt) file. This txt file contain the Type names (ex: H8, H10, 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 type.

3.3 The 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 D500 Joist family with the Depth value set to zero.

For Hambro D500 Joist families, this type is named "H".

Types:

Type	Depth	Wt	MinLength	MinLengthEcono	MaxLengthEcono	MaxLength
	(tous) ▼	(tous) ▼	(tous) ▼	(tous) ▼	(tous) ▼	(tous) ▼
H	0' 0"	0	12' 0"	12' 0"	43' 0"	43' 0"
H8	0' 8"	0	12' 0"	12' 0"	18' 0"	18' 0"
H10	0' 10"	0	12' 0"	12' 0"	24' 0"	24' 0"
H12	1' 0"	0	12' 0"	12' 0"	28' 0"	28' 0"

- When this special type is selected to create a joist or if you change an existing Joist type (ex: H12) for the "H" special type, 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.