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REVISIONS

Rev. No.	Date of Writing	Description of Revision	Author
1	2014/08/11	Initial draft	Martin Ericsson
2	2014/08/12	Minor edit to introduction and future development	MayLee, Lai
3	2015/08/10	Update data distribution section	MayLee, Lai

RevLink – Native Family Mapping

Introduction

The conventional RevLink uses DWG as an intermediate format to get 3D graphics from CET Designer to Revit. As such, certain limitations existed such as the objects were not parametric and they are only as detailed as the export LOD allowed.

Native Revit family mapping broadens the possibilities with RevLink and simplifies work further. By swapping out the DWG models with native Revit families, users benefit from faster import, more detailed models which yield better renderings and better work coordination as the native families would be parametric and therefore changes can be made directly in Revit. Aside from that, it is also possible to achieve a smoother transition along the BIM cycle as the completeness of the native family is controlled by manufacturers, thus allowing the models to fit for various stages of BIM.

To enable the native family mapping, the customization team needs to provide RevLink with information on how to do the mapping from CET Designer to Revit.

1. Revit Terminology

Name	Definition	Example
Family	All of the elements you use in Revit are families. Some families, such as walls or level datums, are included in the project environment.	Work chair Series 111
Family Type	Variations of the family element. For example, a family could be a chair, and the types are 2 different heights of that chair.	WCS 5" height range, WCS 7" height range
Family Instance	Instances are the actual items (individual elements) that are placed in the project and have specific locations in the building (model instances).	The chair placed in the general office is one instance of a "Work chair Series 111" Family Type.
Family Instance Properties	Contain information related to a specific instance of the family element in a project. For example, instance properties for a chair could include the lumbar option and the frame material. Changes made to instance properties affect only that instance of the family.	Without Lumbar = Yes/ No

Family Type Properties	Contain information that applies to all instances of the same family type in the project. For example, type properties for a chair could include the base type and arm type. Changes made to type properties affect all instances of the family created from that type.	Fixed arm = Yes/ No
Material Properties	Material properties are type or instance properties that are used to control the material of the object.	Shell material = Material032

2. Revit data distribution

Family files

To facilitate the import of the layout from CET Designer into Revit, family files along with their relevant family types that correspond to symbols used in CET Designer should be made available locally on the Revit machine. This can be achieve by the following approaches:

a. Using data catalogue (recommended)
Native Revit families that corresponds to symbols used in the drawing layout will be downloaded in the background as the user works in CET Designer. The families will then be packed with the exported layout and unpacked when imported into Revit.

b. As a CET Designer extension
Native Revit families will be downloaded at the start of CET Designer and made readily even before a layout is exported from CET Designer. Similar to the former approach, the families will then be packed with the exported layout and unpacked when imported into Revit.

c. User download
Manufacturers can make their native Revit families available online for users to perform a local download. Users will have to specify the location of the downloaded families in Revit prior to importing the floor layout.

Materials

If you have Revit materials available for your users, it can be distributed with any of the following:

a) One family file containing all Revit materials (recommended)
This family file containing all the Revit materials will be packed with the exported CET Designer layout. Users will not need to perform additional import of the materials in Revit.

b) Each family file is incorporated with the materials.

c) Materials are distributed as a separate Revit template that users have to manually import into Revit prior to layout import

When importing the CET Designer layout into Revit, the imported Revit materials will be mapped accordingly to the native families.

3. CET Designer snapper to Revit family instance mapping

CET Designer will attempt to translate each CET Designer symbol to a Revit Family Instance. For each symbol that should be mapped to a native Revit family, the customization needs to specify the following information:

1. Family and family type.
2. Manufacturer and what information to show the user if any native family file is missing.
3. How to place the family. If the object is drawn using different coordinate systems in CET and Revit, we need to map those.

It is recommended that properties (e.g. Height, width, surface material) should also be specified to preserve the Revit families' parametric array.

To map a snapper to a native family, the snapper to be mapped, must implement this method:

```
/**
 * getRevitNativeData
 */
extend public RevitNativeData getRevitNativeData() {}
```

A detailed description of RevitNativeData can be found in cm/abstract/RevLink/basic.cm. You can also try out custom.revLink.test to see some example implementations!

For information on positioning the families, please refer to Appendix A

4. Future development

We are looking at further improving our catalogue symbol support. Using the catalogue creator, we envision that it will be possible to define the mapping to native Revit families. This means that no coding will be needed to get the native family file mapping to work for catalogue symbols. Do contact us if you are interested to discuss the possibilities.

## Appendix A: How to decide the insertion point and rotation?

The trickiest part is to decide how to place the families. If we do it incorrectly, the furniture might end up in the wrong place with the wrong orientation. Example:
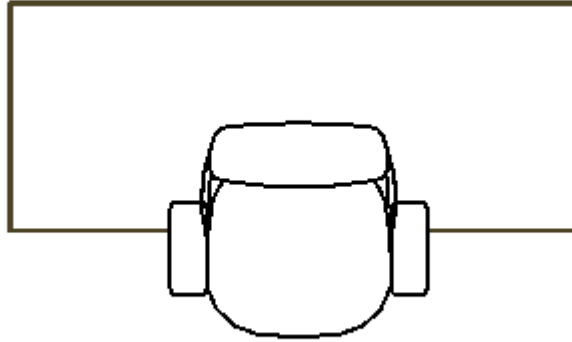
The picture below shows how a family is drawn in Revit. The intersection between the reference lines (the green dotted lines) is called the insertion point.
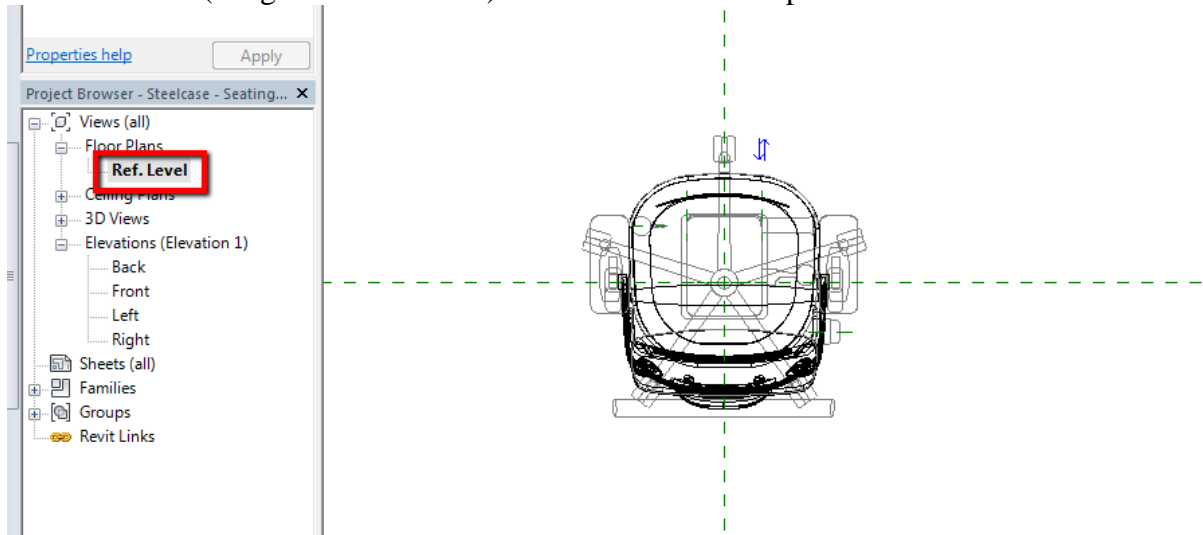

In CET the coordinate system of the snapper is defined like the picture below, with green representing the y axis and the red line representing the x axis.
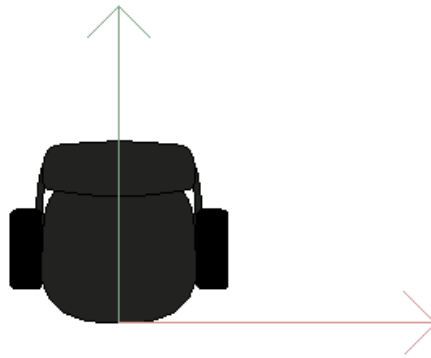
If we had been lucky, the coordinate systems for the snapper and Revit family would have been identical. Unfortunately, in this case, they were. So the first thing to do is to decide how much to rotate the Revit family to make it match the CET snapper. In this case the chairs are facing opposite directions. So the correct rotation is 180 degrees. In Revit, rotation is done around the insertion point. After rotating, we also need to move the model a little bit. In Revit the insertion point is at the center of the column, but in CET it's at the front of the seat. So the position needs to be (0, distance from column center, 0). Note that the move is done after the rotation.

To make it easier to find the correct values, there is a helper function in home/custom/revLink/test/debug.cm. By calling that from the 2D method in your snapper, you can easily find out the correct value. Before you have specified any rotation and position, it looks exactly as the CET snapper above. If you specify 180 degrees as rotation, it will look like this:
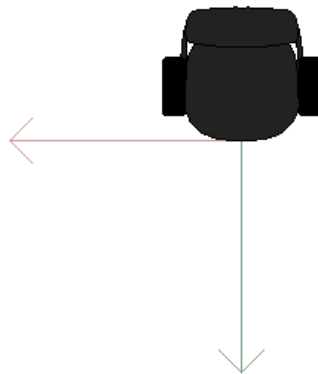
If you compare that to the Revit family, you can see that the y-axis now has the same direction. But the center points are still off. So to correct that, we need to specify a position. The easiest thing is to measure in Revit. Sometimes we can use the dimensions of the snapper to calculate this position (like d/w, w, etc), but in this case, the easiest thing is probably to measure in Revit.
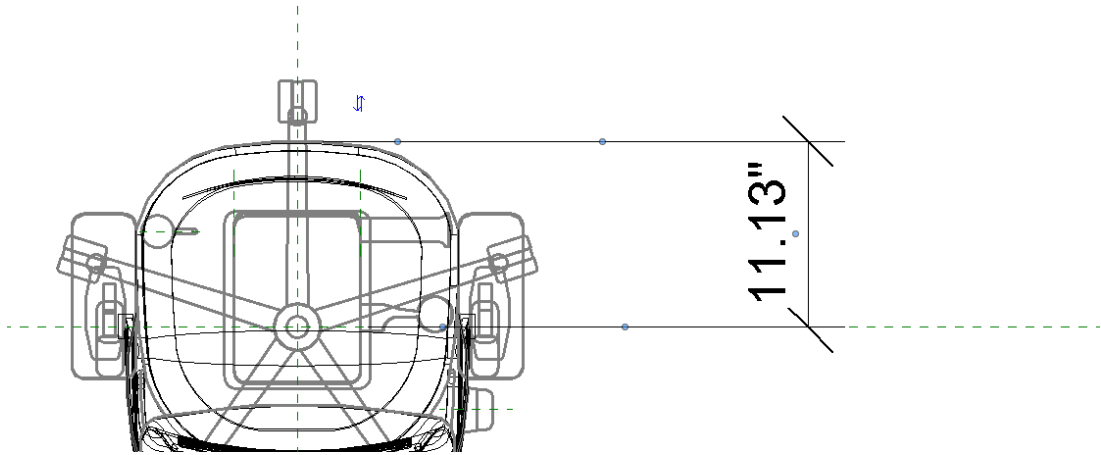
So by specifying (0, 11.13", 0), we now get this:
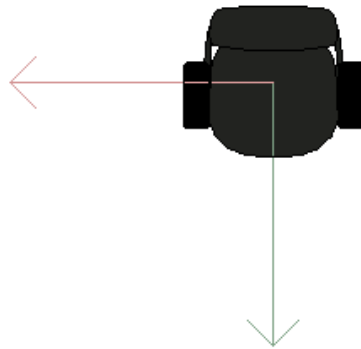
And if we rotate the snapper to make the y axis point up, we can now see that it's the same coordinate system as we use in Revit.
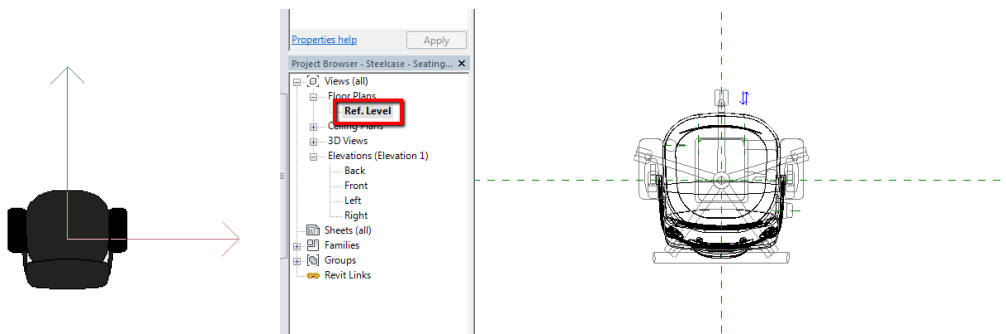
Tip: If possible, we recommend that you try to make the CET and Revit support team cooperate to agree on coordinate system. That way the mapping will work automatically without having to specify any position and rotation offsets.