AUTODESK UNIVERSITY

MSF 20578-L

Capitalize on MEP Fabrication Workflow : Close the Loop with Revit Detailing Customization

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Autodesk

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Autodesk

Learning Objectives

- customize the existing MEP fabrication shared database
- Create your own content and use it in Revit
- to capitalize on the value of using new Revit detailing capabilities
- Understand the relationships between the needs of MEP contractors and the work of MEP fabricators

Description

This class is about the MEP Fabrication database customization:
How to create new services, new items from pattern templates, and so on.
The ultimate goal is to use it in Revit software, taking advantages of all new features and capabilities provided by Revit 2017 software—and figure out all the value of using Fabrication content in the detailing phase to capitalize on design, optimize construction, and save costs.
This session features Revit and Fabrication CAMduct and ESTmep

Your AU Expert(s)

Based in Autodesk, Inc.'s, Paris office in France, Julien Drouet is senior technical specialist in the EMEA (Europe, the Middle East, and Africa) Architecture, Engineering, and Construction (AEC) Team, focused on the construction and MEP (mechanical, electrical, and plumbing) portfolio.
Julien is an electrical engineer with 20 years experience in the building, engineering, and construction industry. He has been involved in Autodesk's MEP product adoption for 9 years, and he's been in charge of the MEP Fabrication Solutions since Autodesk's first MEP fabrication product release.

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TypePad Village BIM Blog

Beyond Design Blog

Olivier Bayle has over 19 years experience in structural design, in a variety of fields ranging from simple construction schemes to highly technical engineering projects.
Prior to coming to Autodesk (Robobat company acquisition), Olivier worked as civil engineer in steel, concrete and timber design.
At Autodesk, Olivier has further engaged clients with BIM solutions, workflow integration and developing best practices in 3D visualizations, clash/collision detection and 5D construction simulations.
Currently, he is one of writer of Village BIM Blog.
Olivier holds a Graduate civil engineer from Clermont Ferrand – France

LinkedIn https://www.linkedin.com/in/olivier-bayle

TypePad Village BIM Blog

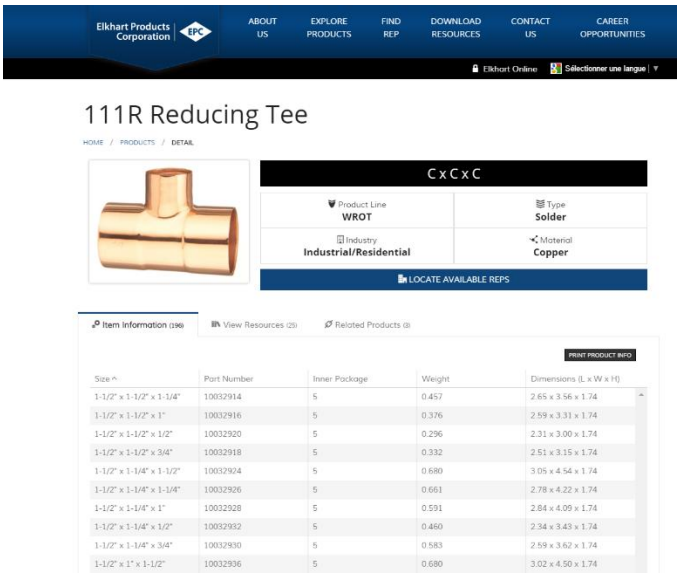
Create a new Item

Let's start with choosing the item we want to create.
The one we will create from scratch is providing by the Manufacturer ELKHART Product Corporation. The imperial database contains already most of the copper soldered content library Elkhart is currently selling.

We can notice that the N° 111R Reduced Tee item doesn't exist in the current database. We will focus on it.

Identify the Manufacturer Data

On [Elkhart's website], we will get the information needed to create the item.



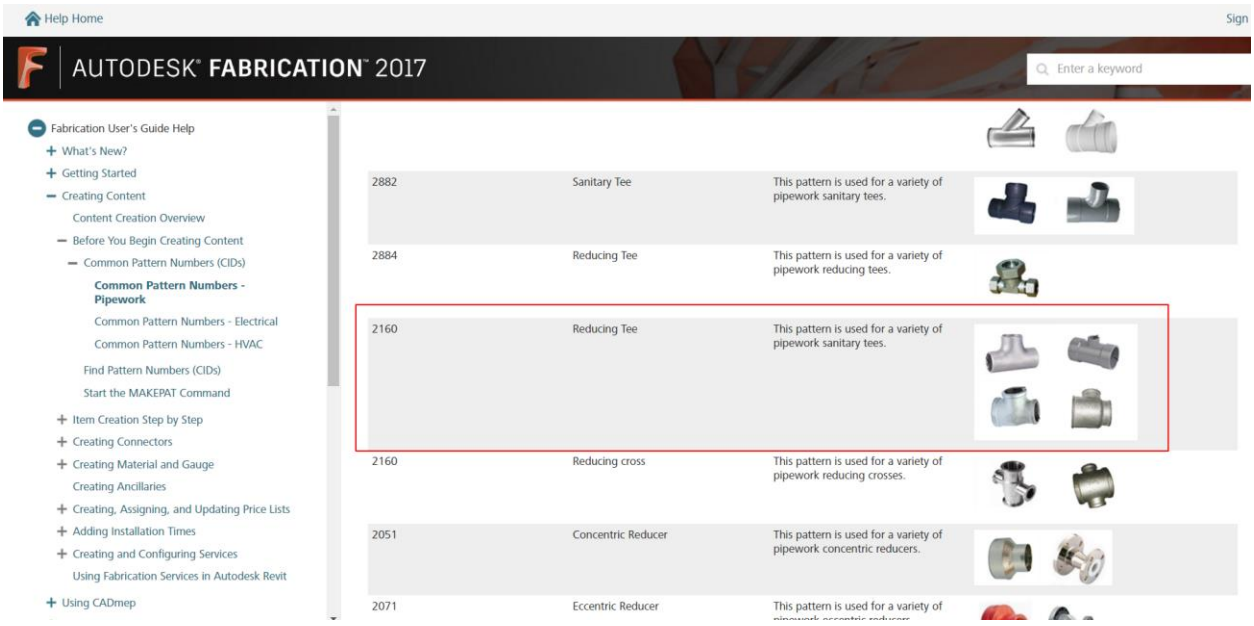
Information required are:

- Lay in dimensions :
  - Description
  - Weight
  - Code
  - dimensions

- Pricelist
- Picture

Identify the pattern template to be used

In Autodesk Fabrication solutions, new items have to be created from an item pattern template. So you need to identify which pattern template (CID) you will use to create the item you want to. To do so, go in the help and navigate to
"Fabrication User's Guide Help→ Creating Content→Before you Begin Creating Content→Common Pattern Numbers and select pipework
We want to create a Reducing Tee:



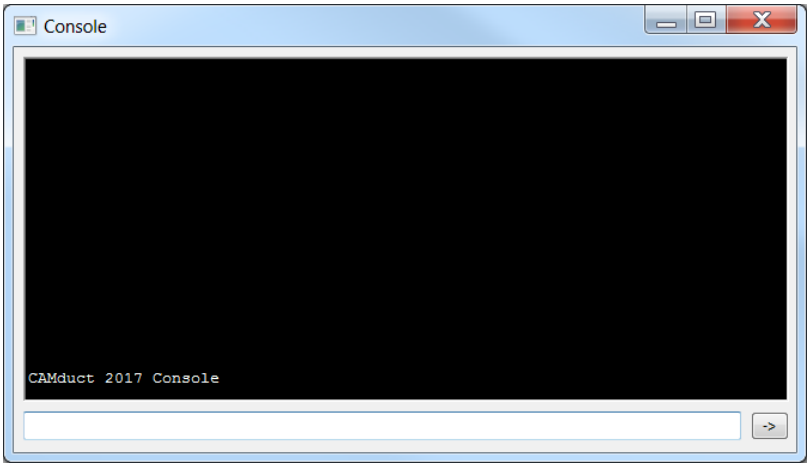
We will use CID 2160.

Start creating the item

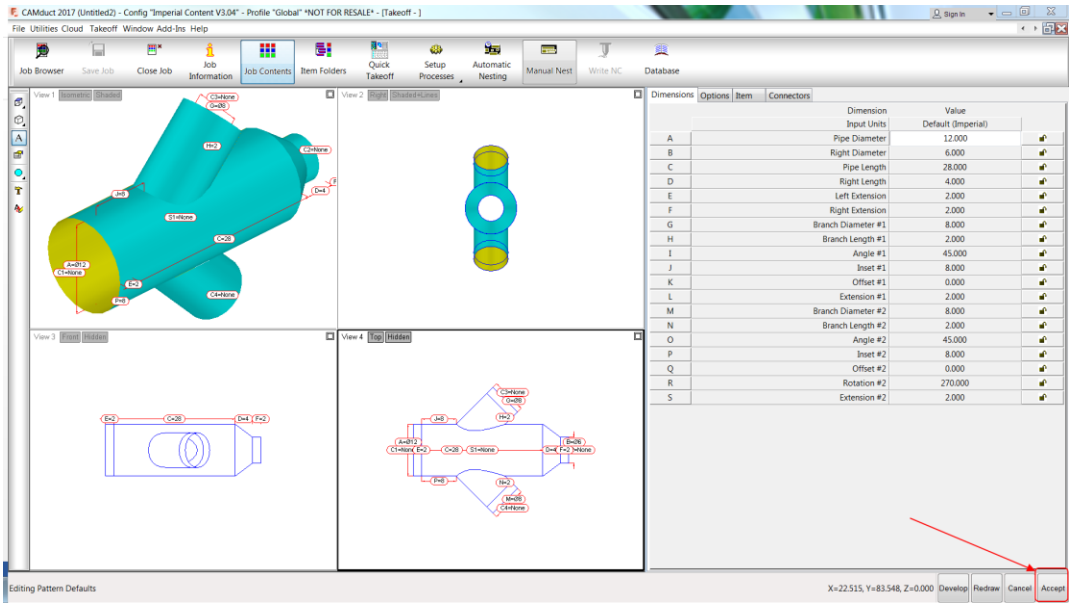
Now we have the manufacturer data, and the CID to use, let's start to create the item

CAMduct console

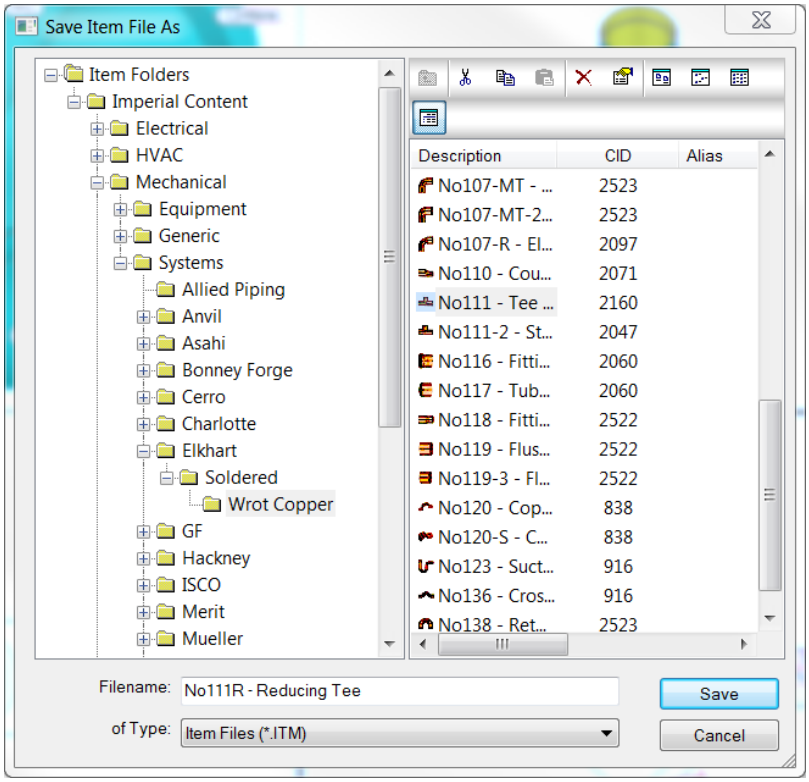
Launch CAMduct, and open a blank Job (it could be done with ESTmep as well).
To create a new item from a pattern template, we have to launch the CAMduct console.
To do so, maintain CTRL + Shift and type C



Type the following command: MAKEPAT 2160
It opens the following takeoff window:

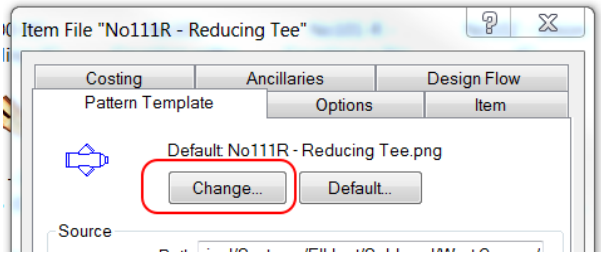


Click on “accept” in the bottom right corner. Browse in the folders to the one where you want to save your item, give him a name and click on Save



Customize the thumbnail

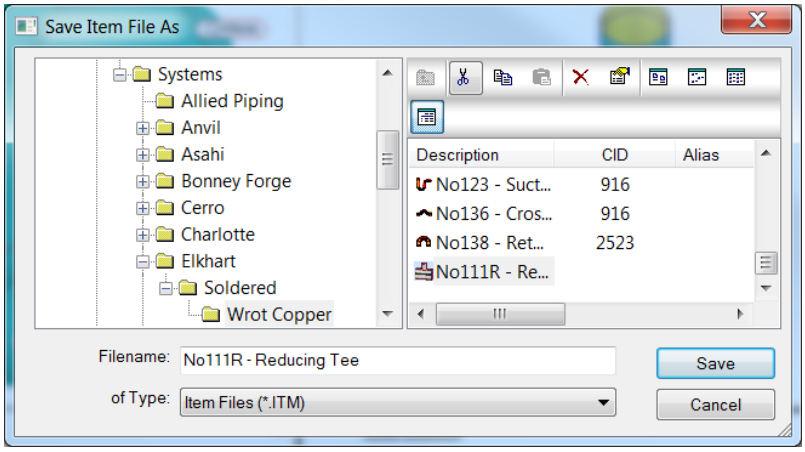
Next step will be to customize the thumbnail displayed in the item folder.
First you have to save the thumbnail in the appropriate folder.
In the dataset folder, copy the file “111R.png”
Then go to:
C:/Users/Public/Documents/Autodesk/Fabrication 2017/Imperial Content/V3.04/ITEMS/Imperial Content/Mechanical/Systems/Elkhart/Soldered/Wrot Copper/
Paste the file “111R.png”.
Rename it with the same name as the ITM file you’ve created a couple of minutes ago. Here, rename it like this: “No111R - Reducing Tee.png”
As the system already created a png file with this name, you will be asked to save it as “No111R - Reducing Tee (2).png”. Do it.
Then, go in the Item Folders, select the new item you’ve just created, right click and select “properties”.
In the pattern template tab, click on the “Change” button



Select the No111R - Reducing Tee (2).png and save.

Create a product list

Select the item and right click: create a product list. Close the product list windows and click on “accept. Select the file in the list and save

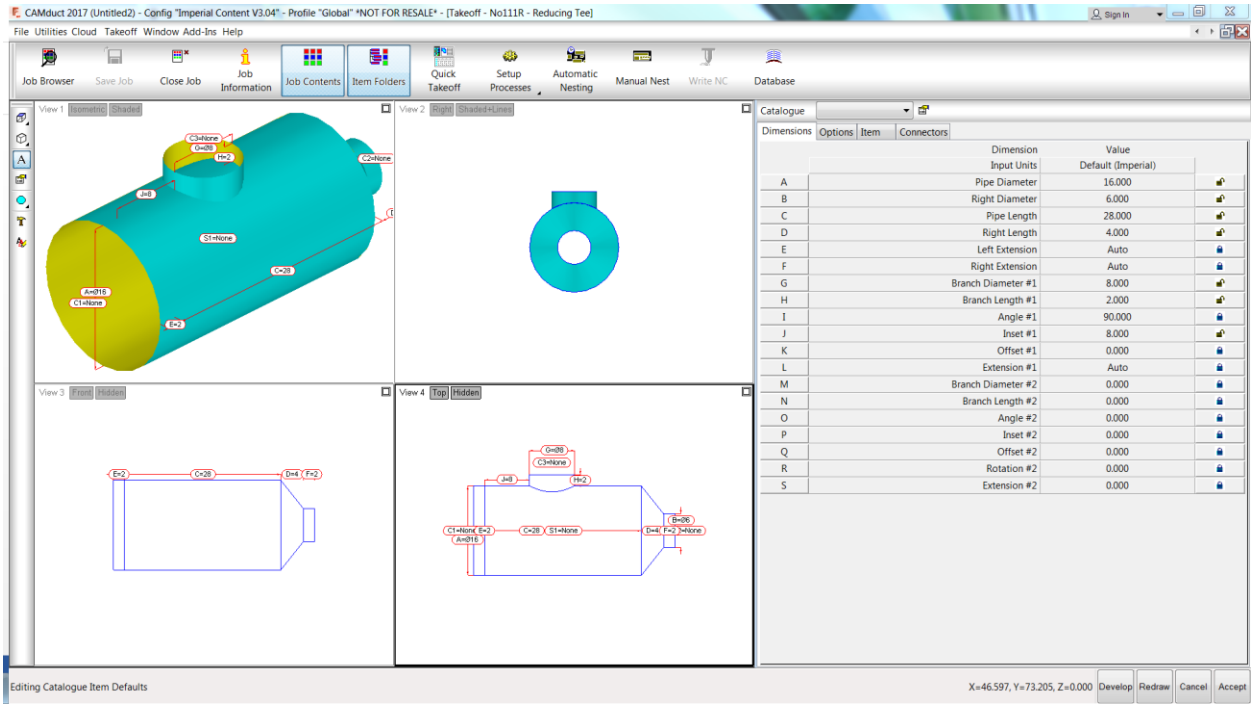


Set the options

Now we will set the common options, those that doesn’t depend on the item dimension.
Right click on the item and select “Edit”
On the Dimension tab:

Set “Left” and “Right Extension” on auto and lock the padlock
Set the Angle #1 to 90. And lock.
Lock “Offset #1” to 0
Set “Extension #1” on “auto” and lock
Set from “Branch diameter #2” to “Extension #2” on 0 and lock

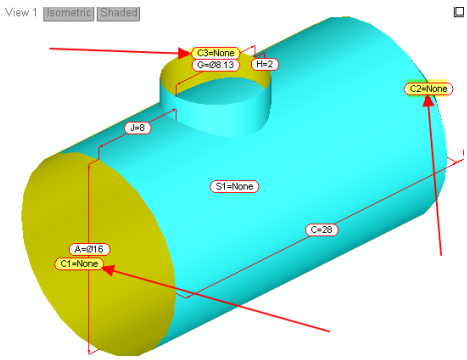
Click on “redraw”.
It should look like this:



On the Item tab:
Set material on Copper and Standard on ASTM B88 (Elkhart).
To know how to create a new material, click here.
Don't forget to check the "Centreline Input box.

Set the connectors

New Connectors Creation is described in this Autodesk Fabrication Help chapter
In our case, we will use existing connectors and set them to our item.
To do so, let's go in the connectors tab.
We have 3 connectors to set: C1, C2 and C3



For the example we are working on, we will use the same connector:

ELK_C-WCU. You can find it in the drop down list, in Elkhart group.
Set each connector on ELK_C-WCU and lock them

Fill the list

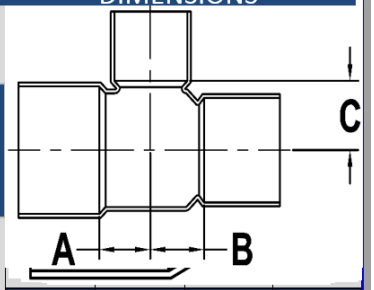
For the next step we will fill the product list.

Open the excel spreadsheet with manufacturer product information
“111R_Reducing_Tee_Wrot_Lay_In_Dimensions.xlsx”

Elkhart Products Corporation
1255 Oak Street, Elkhart IN 46514
Customer Service (574) 264.3181
www.elkhartproducts.com

WROT COPPER

111-R CxCxC Tee



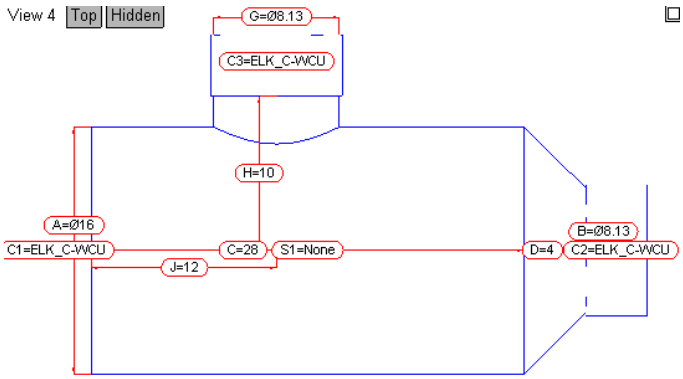
DESCRIPTION	WGT	BOX QTY	MASTER	SKID	UPC CODE	DIMENSIONS A	DIMENSIONS B	DIMENSIONS C	DIMENSIONS D
111-R 1/4X1/4X1/8 CXCXC TEE	0.0276	50	1000	48000	683264326484	17/64	17/64	13/32	N/A
111-R 1/4X1/8X1/4 CXCXC TEE	0.0276	50	1000	48000	683264326569	17/64	13/32	1/4	N/A
111-R 1/4X1/8X1/8 CXCXC TEE	0.0276	50	1000	48000	683264326644	17/64	13/32	13/32	N/A
111-R 3/8X3/8X1/4 CXCXC TEE	0.0448	50	500	24000	683264326743	5/16	5/16	15/32	N/A

We have to understand the manufacturer drawing and match the dimensions provided with those of the pattern template.

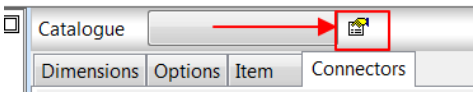
A	Pipe Diameter
B	Right Diameter
C	Pipe Length
D	Right Length
E	Left Extension
F	Right Extension
G	Branch Diameter #1
H	Branch Length #1
I	Angle #1
J	Inset #1

Pipe diameter is the pipe size that will connect from the left to the Tee. So it is the 1st size indicated in the description

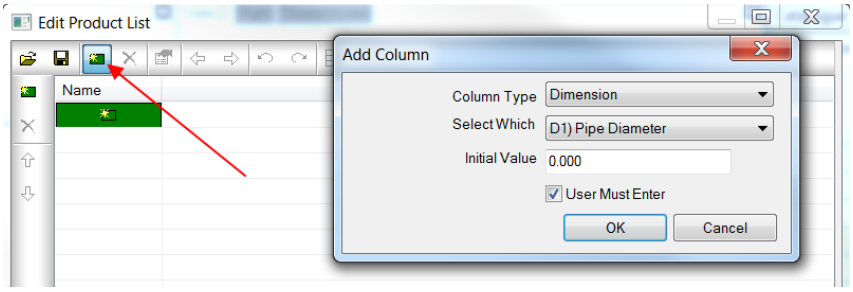
Right diameter is the pipe size that will connect from the right to the Tee. So it is the 2nd size indicated in the description
Branch diameter is the pipe size that will connect from the top to the Tee. So it is the 3rd size indicated in the description



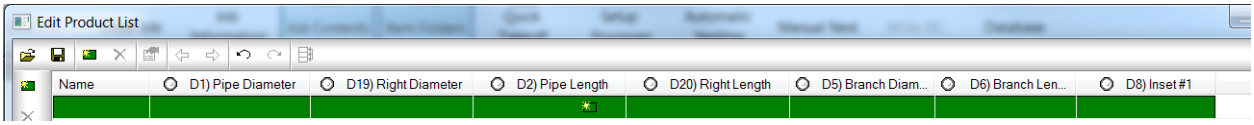
"A" from the Manufacturer drawing is the Inset #1
"A+B" from the Manufacturer drawing is "pipe length + right length"
"C" from the Manufacturer drawing is Branch Length #1
"Pipe length" is "A" from the manufacturer + ½ branch diameter
"Right length" is "A+B-pipe length = A+B-A-½ branch diameter = B-½ branch diameter
Reopen the product list window



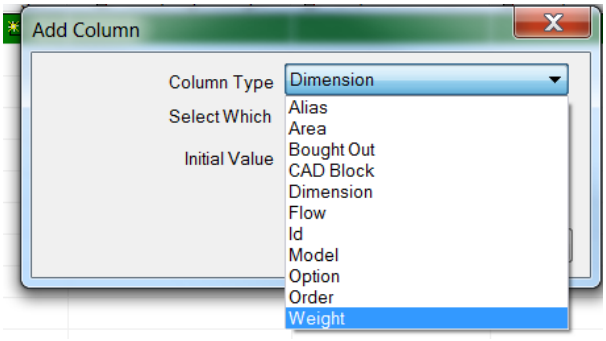
We will first create the columns needed.
Click on the new button



Click ok.
Then redo it and enter the following column:



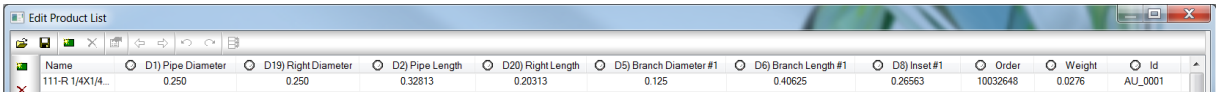
We will add new columns, that won't be dimensions. To do so, re-click on the new column button



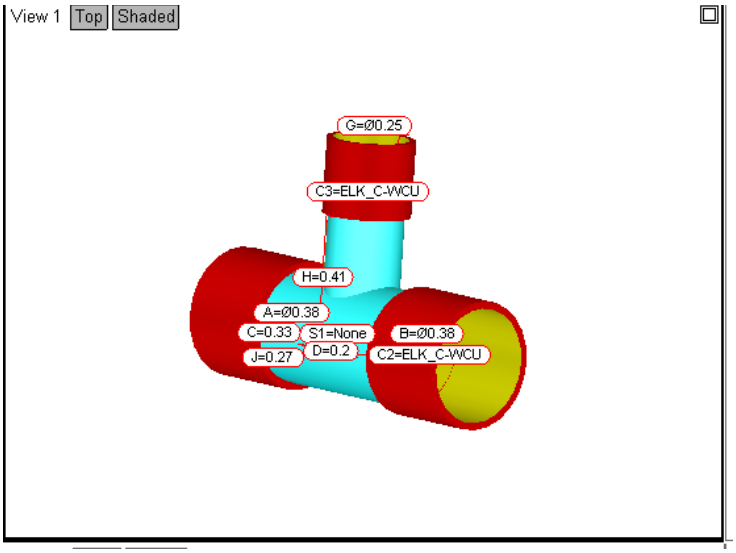
Select Weight, Order and Id

Manually

Let's fill the first line manually.



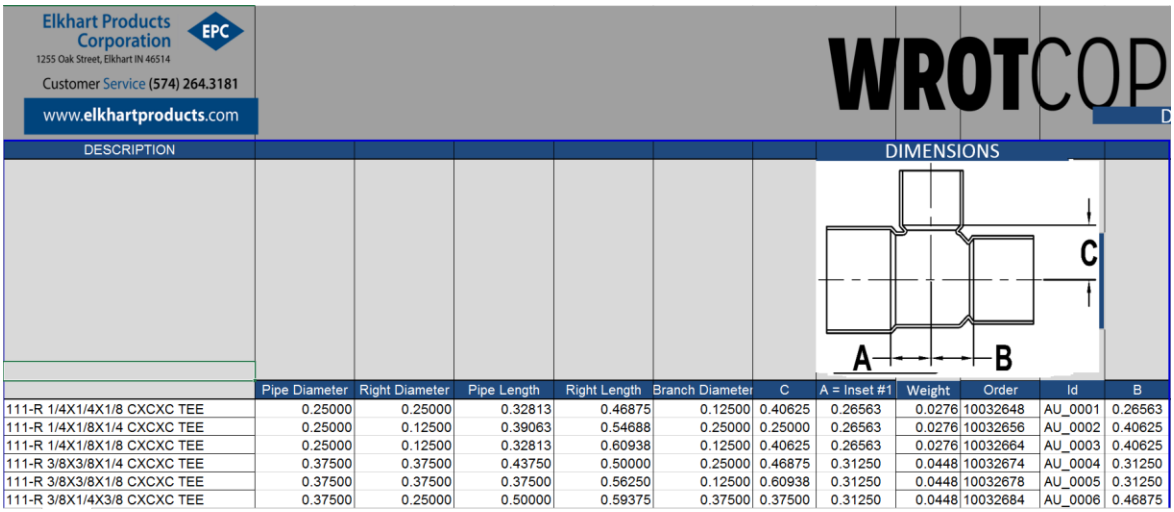
Click ok and have a look on the geometry:



By copy and paste an excel file

To save maximum of time, the best is to prepare the excel spreadsheet that will fit with the product list in CAMduct.
In our case, it would mean add columns for pipes sizes, set format value to number, remove columns unnecessary, add missing one (Id) and move it to fit with the product list organization

It will look like this:



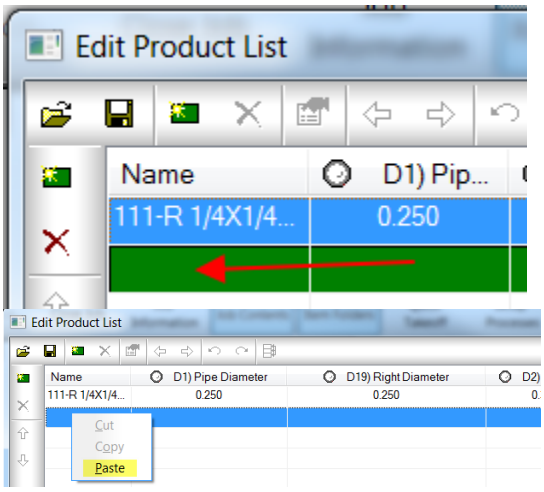
Elkhart Products Corporation
1255 Oak Street, Elkhart IN 46514
Customer Service (574) 264.3181
www.elkhartproducts.com

WROTCOP

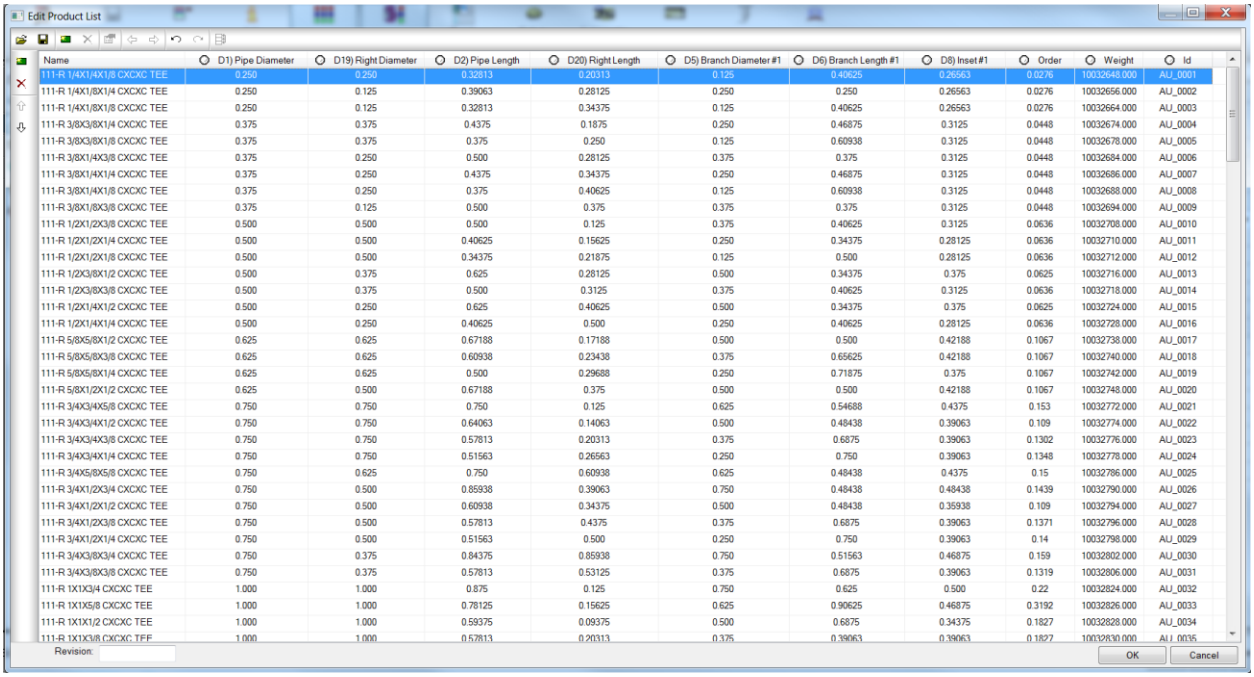
DESCRIPTION	DIMENSIONS										
	Pipe Diameter	Right Diameter	Pipe Length	Right Length	Branch Diameter	C	A = Inset #1	Weight	Order	Id	B
111-R 1/4X1/4X1/8 CXCXC TEE	0.25000	0.25000	0.32813	0.46875	0.12500	0.40625	0.26563	0.0276	10032648	AU_0001	0.26563
111-R 1/4X1/8X1/4 CXCXC TEE	0.25000	0.12500	0.39063	0.54688	0.25000	0.25000	0.26563	0.0276	10032656	AU_0002	0.40625
111-R 1/4X1/8X1/8 CXCXC TEE	0.25000	0.12500	0.32813	0.60938	0.12500	0.40625	0.26563	0.0276	10032664	AU_0003	0.40625
111-R 3/8X3/8X1/4 CXCXC TEE	0.37500	0.37500	0.43750	0.50000	0.25000	0.46875	0.31250	0.0448	10032674	AU_0004	0.31250
111-R 3/8X3/8X1/8 CXCXC TEE	0.37500	0.37500	0.37500	0.56250	0.12500	0.60938	0.31250	0.0448	10032678	AU_0005	0.31250
111-R 3/8X1/4X3/8 CXCXC TEE	0.37500	0.25000	0.50000	0.59375	0.37500	0.37500	0.31250	0.0448	10032684	AU_0006	0.46875

The final Excel document is available in the dataset, open it:
111R_Reducing_Tee_Wrot_Lay_In_Dimensions_reorganised_and_filled.xlsx

We are now able to copy and paste the spreadsheet content into the product list
To proceed, first select the cells in Excel
Then right click once here:



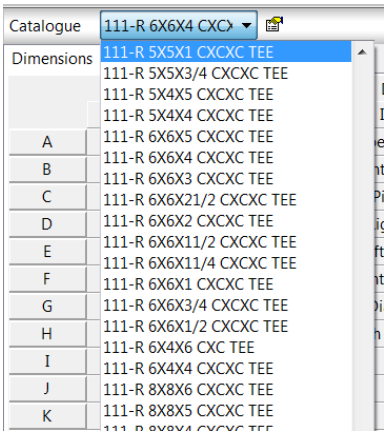
It's done:



Click ok.

Test the item

You can now have access to the different references you've just create, through the drop down menu near Catalogue:



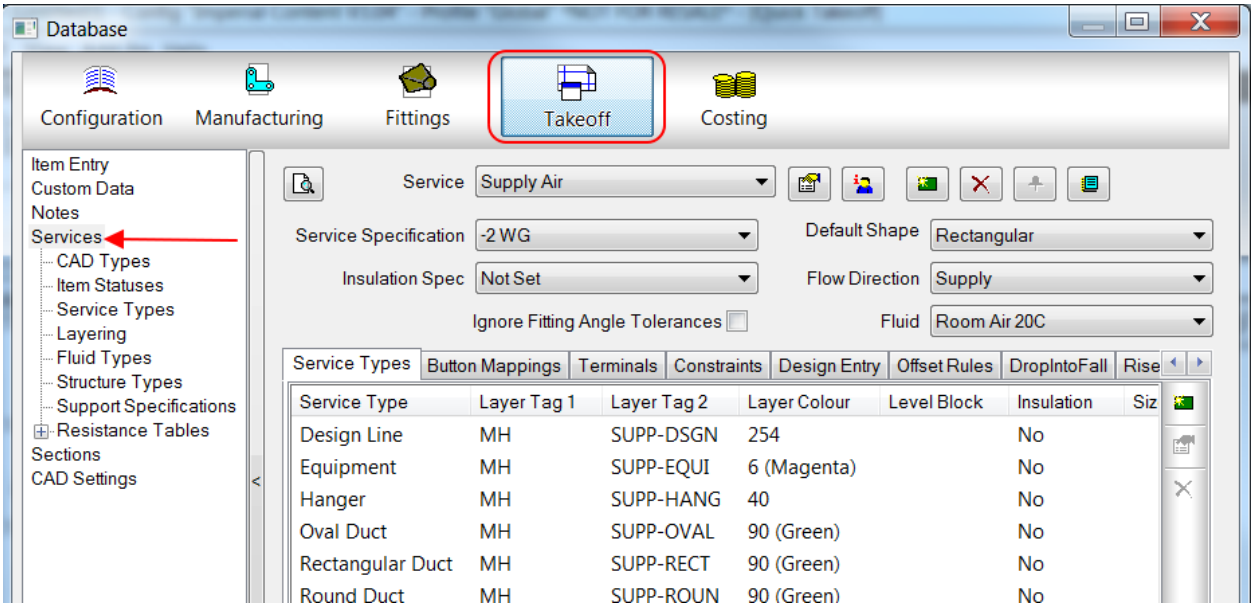
Test with different references, click on accept to save the modifications

Create the New Service

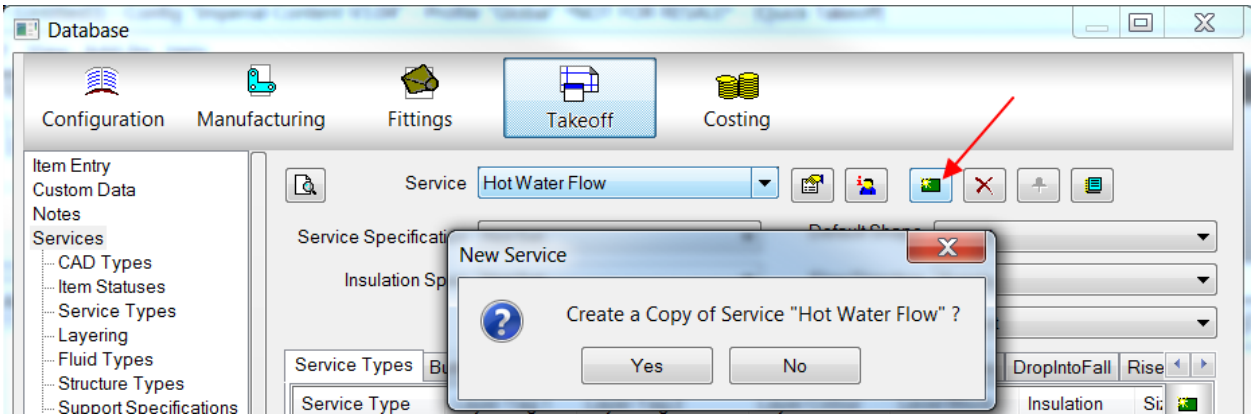
To use the new item we've just created, we have to create a new service to put it in.
Let's launch ESTmep for that.

Select the Service from which you will start

In ESTmep, create a blank job and click on the database button.
Click on the takeoff button and on the left hand side, select Services



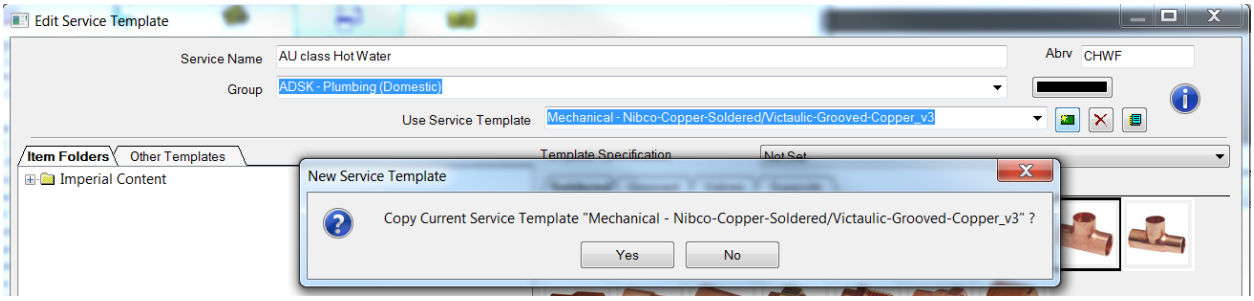
The item is a copper Tee, which can be used for Sanitary Hot Water for instance. Let's select the existing Hot Water Flow Service, and click on New.



Answer yes to the question. Change the name of the Service.

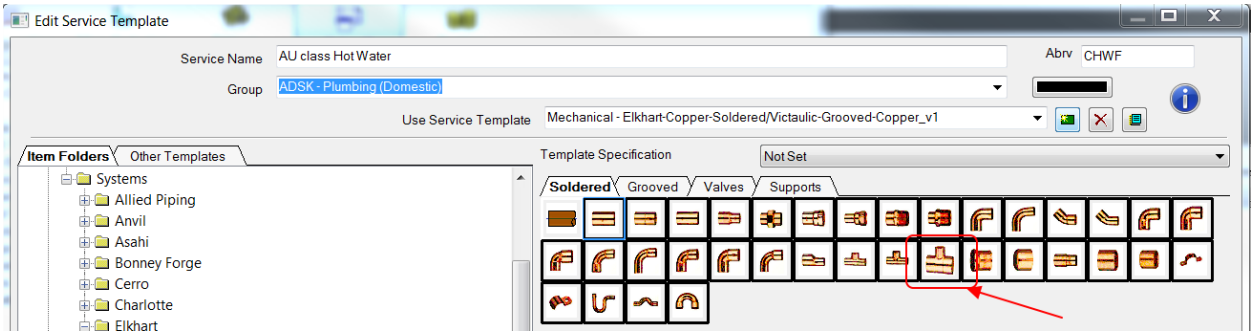
Create the Service template you will use

The new service created is using the same Service template as the Hot Water Flow. If we don't want to modify the way the existing service is working, we have to create a new Service Template to apply to our new Service.
Click on the New Service template button:



Adjust the Service template

Rename the new template, for instance "Mechanical - Elkhart-Copper-Soldered/Victaulic-Grooved-Copper_v1"
Delete the existing button in the soldered tab, except the straight one
Browse the Item Folders to Elkhart folder, and drag and drop the "Wrot Copper" folder to the soldered tab on the right hand side

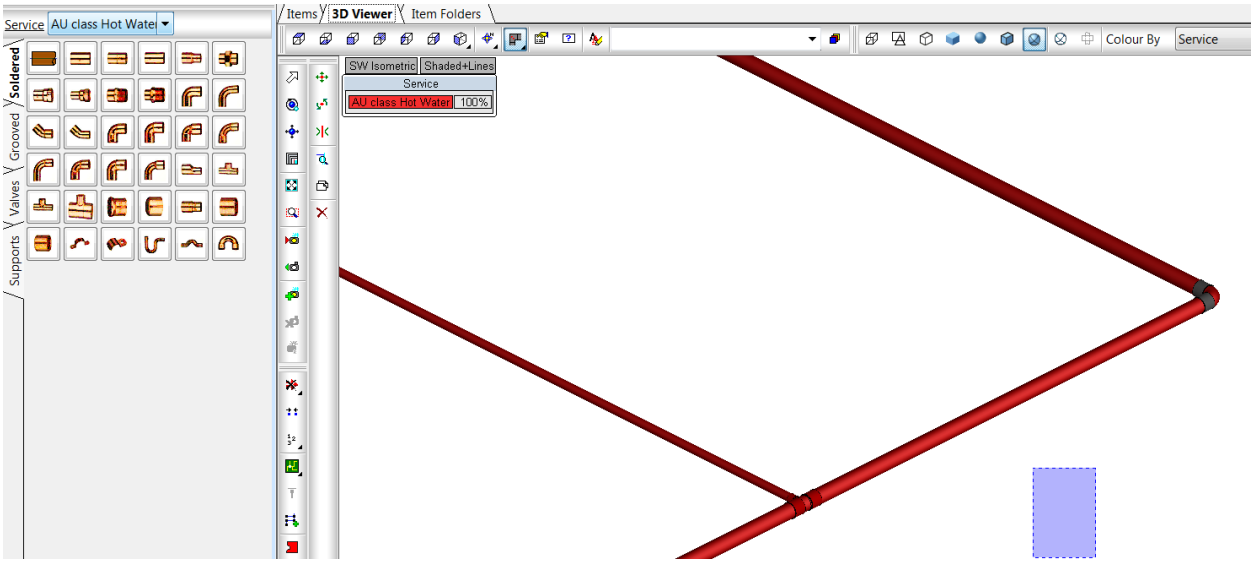


You can see your item creation in the list of items available in the Service. Click on ok (twice)

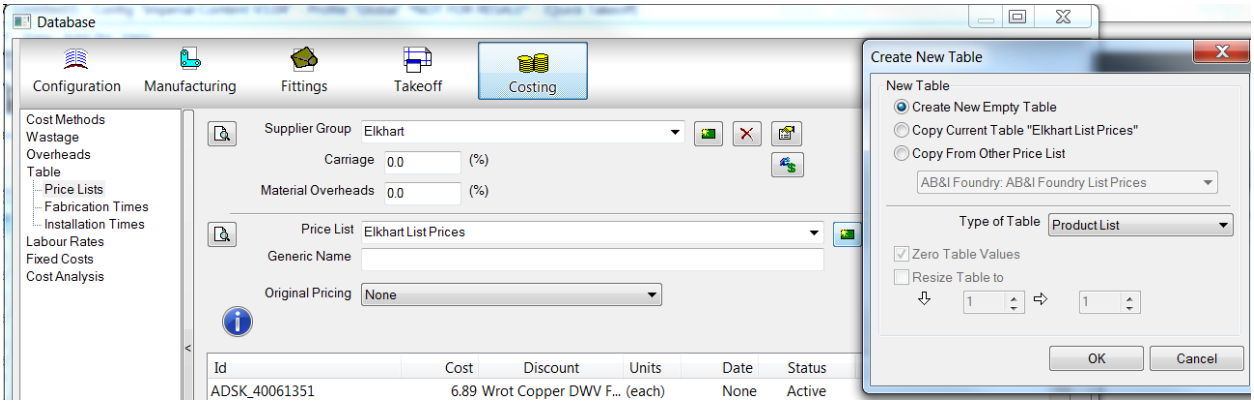
Test it with ESTmep

Now let's test the new service in ESTmep, and especially the new item we've created.
On the left hand side, select the service. Click on the straight pipe, choose 1" diameter.
Then connect an elbow, a pipe and insert your Tee. You have to right click on your Tee

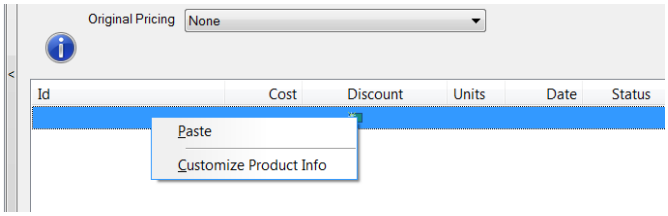
button, select “takeoff as a cut in”, and choose a relevant size (e.g. 1x1x1/2). Then connect a pipe on the branch.



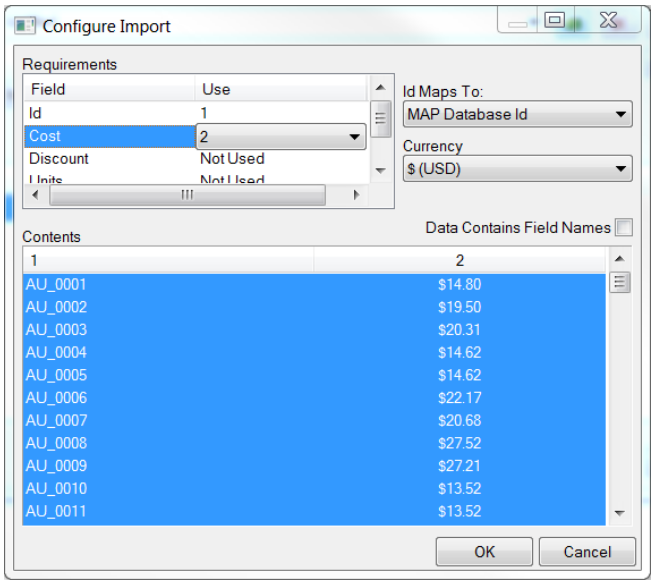
Now go to the Item tab, right click on your tee and select “cost breakdown”
All values are equal to zero. It’s because you didn’t map your item product list with the manufacturer pricelist.
Click on the database button, then on Costing button and select pricelist. In the supplier Group, select Elkhart and then click on the New Pricelist button and chose “New empty table”



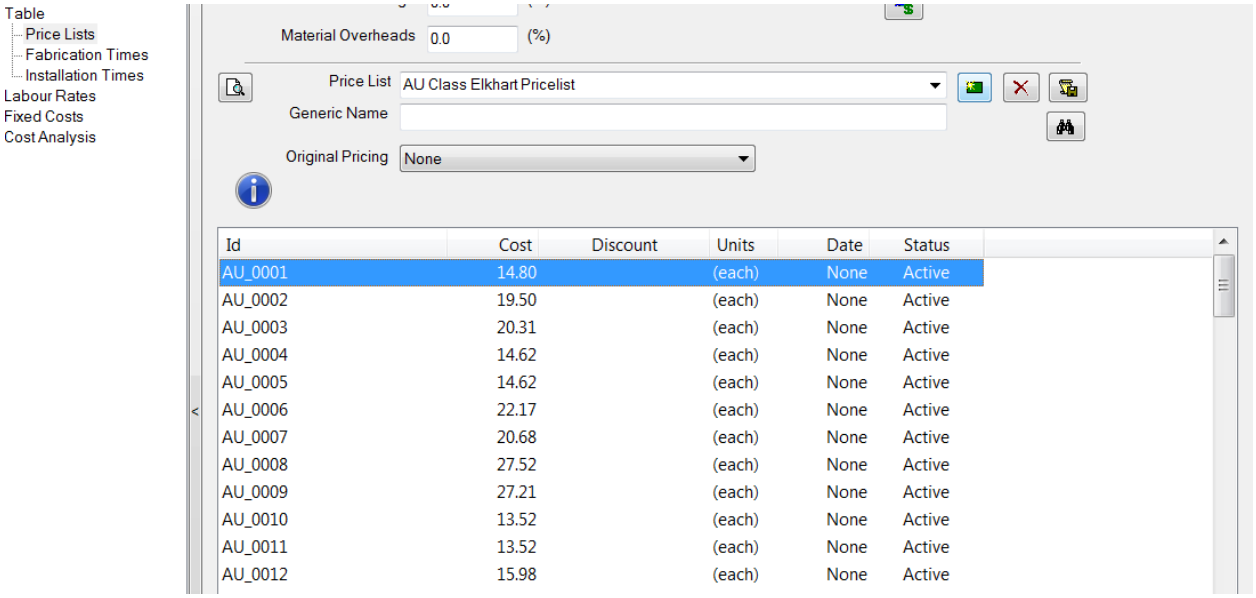
Name the pricelist “AU Class Elkhart Pricelist”
Open the Excel “111R_Reducing_Tee_Wrot_pricelist.xlsx” file (combination of “111R_Reducing_Tee_Wrot_Lay_In_Dimensions_reorganised_and_filled.xlsx” and “plist_WROT.xls”.
Select all the filled cells and copy. In ESTmep, right click in the green area and past



Map Field Id on Use 1 and Field Cost on Use 2, as below:

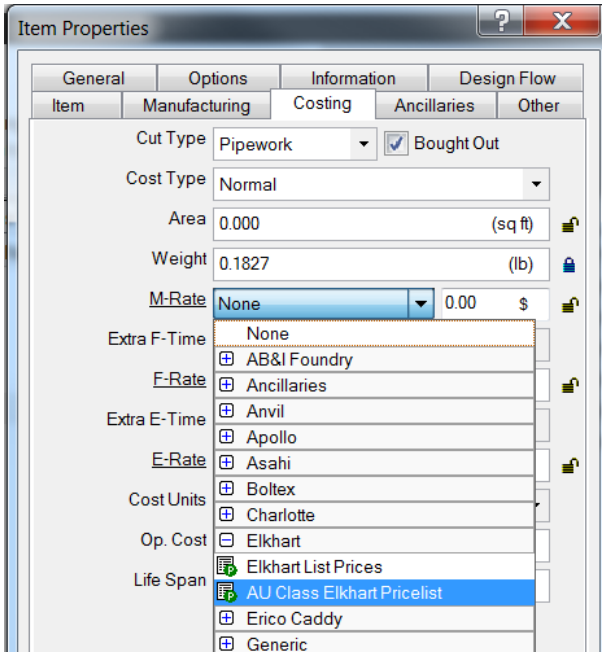


Here is the result:

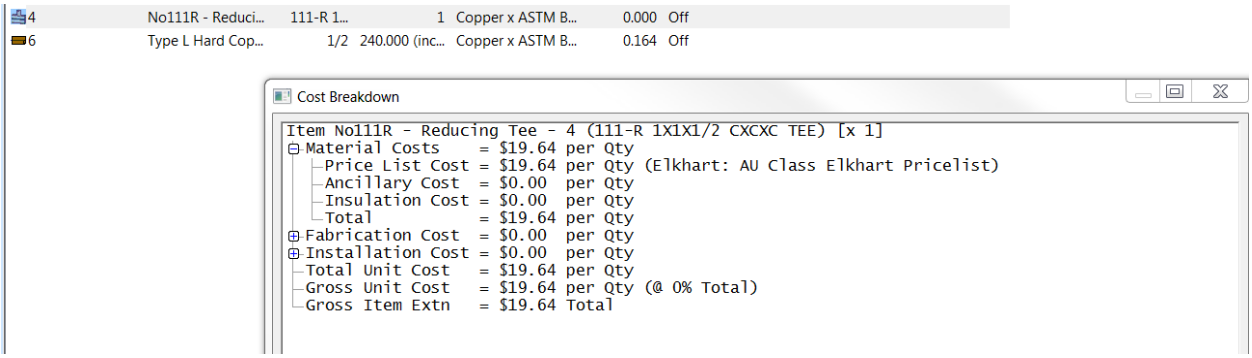


Click Ok

Back in the Items tab, reselect your Tee, and right click, properties.
Select the costing tab, and in the "M-Rate" dropdown menu select the pricelist you've just created

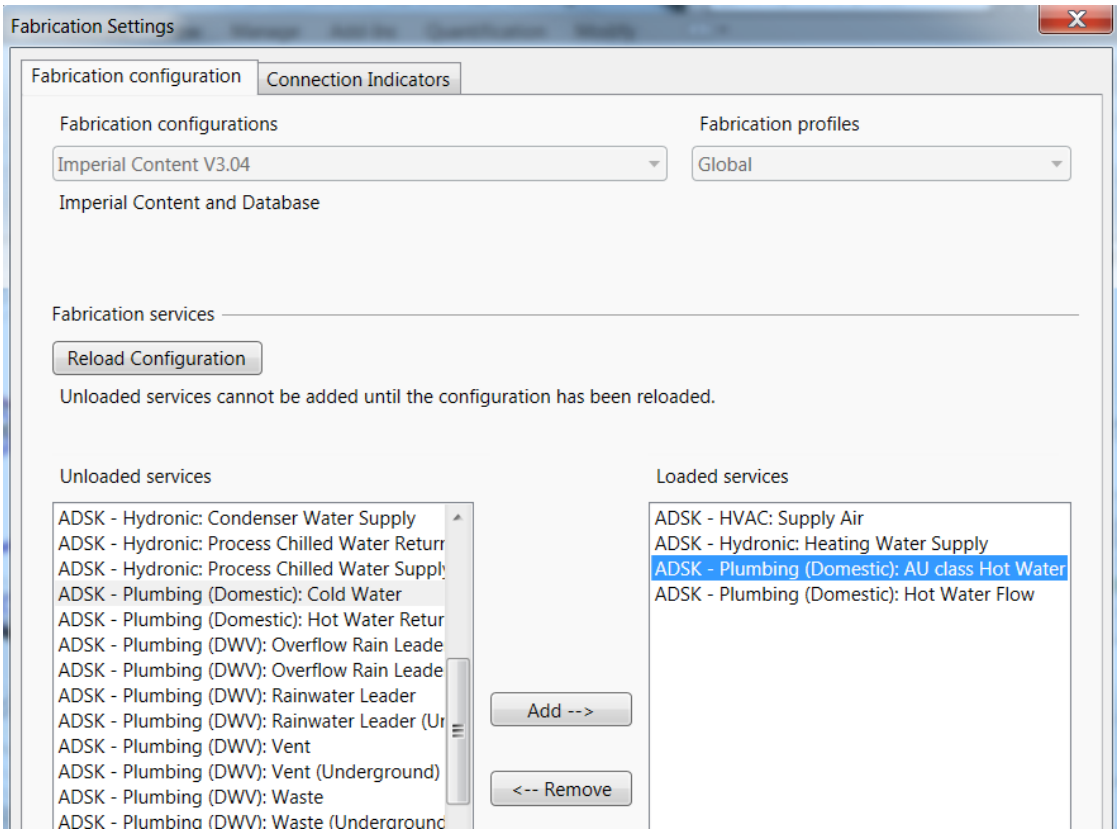


Back in the costbreakdown: you have now the price for your Tee:



Use in Revit

Let's move to Revit now.
Open "56750_M_Systems - 2017 - Start.rvt" and open the 3D Plumbing view.
In the MEP Fabrication Part Palette, click on Settings. Reload configuration and add the new service we've created.

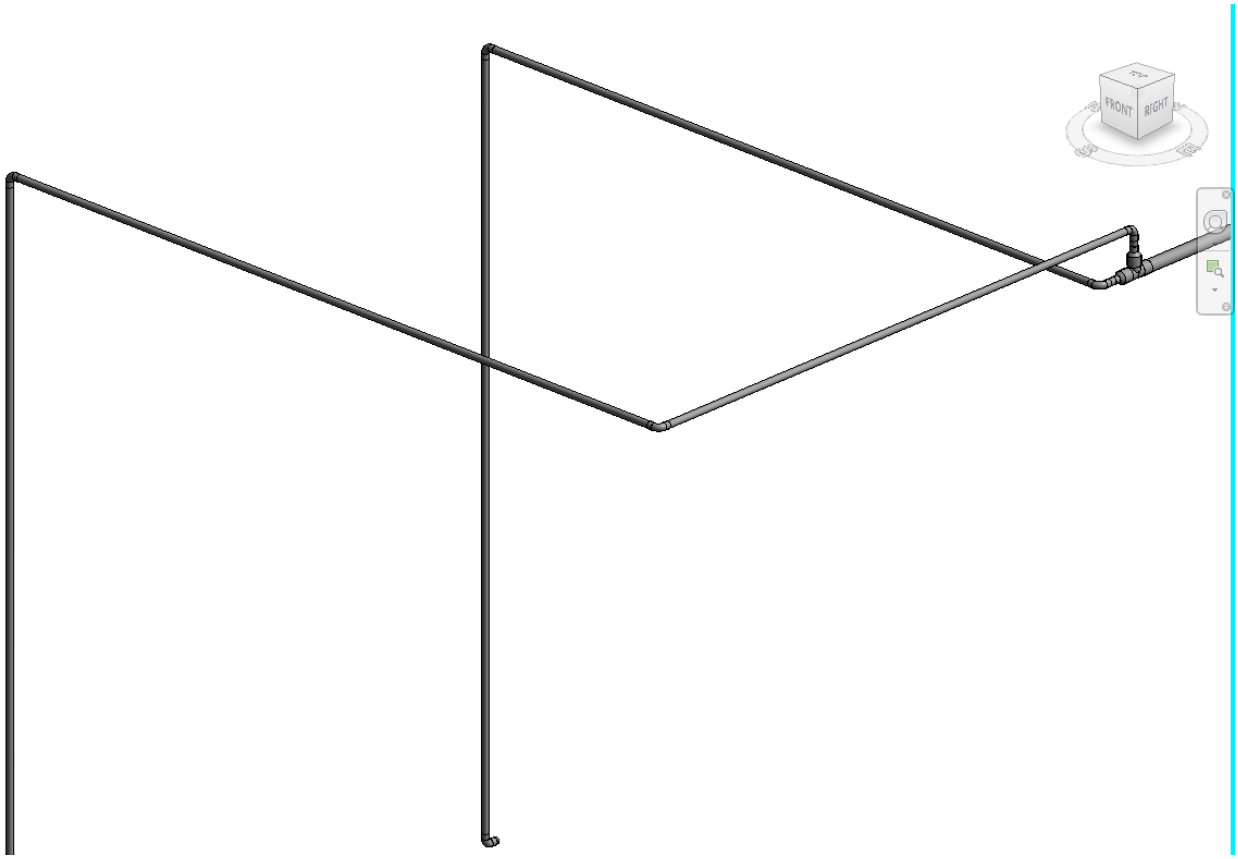


Conversion tool

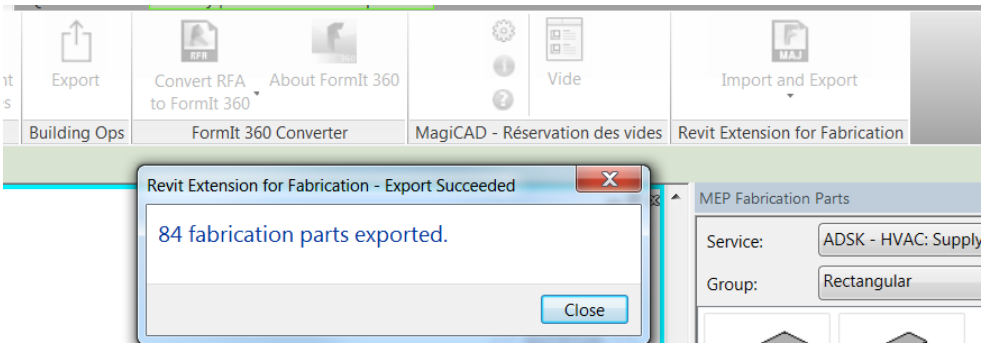
Now we will use the nice conversion feature launched with Revit 2017.

Revit pipework selection

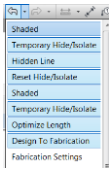
Select the full hot water system. Click on "Design to fabrication" button". Choose "Hot Water Flow" service and then Ok
The full hot water system has been converted into a fabrication service. Select the longest straight pipe and click on "Optimize length".
Select the full service and isolate it:



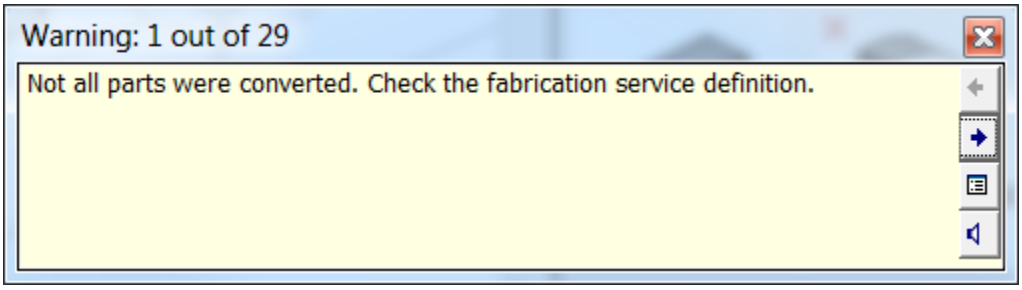
Then export the fabrication elements you've just converted, with the add-ins tool "Revit Extension for Fabrication"



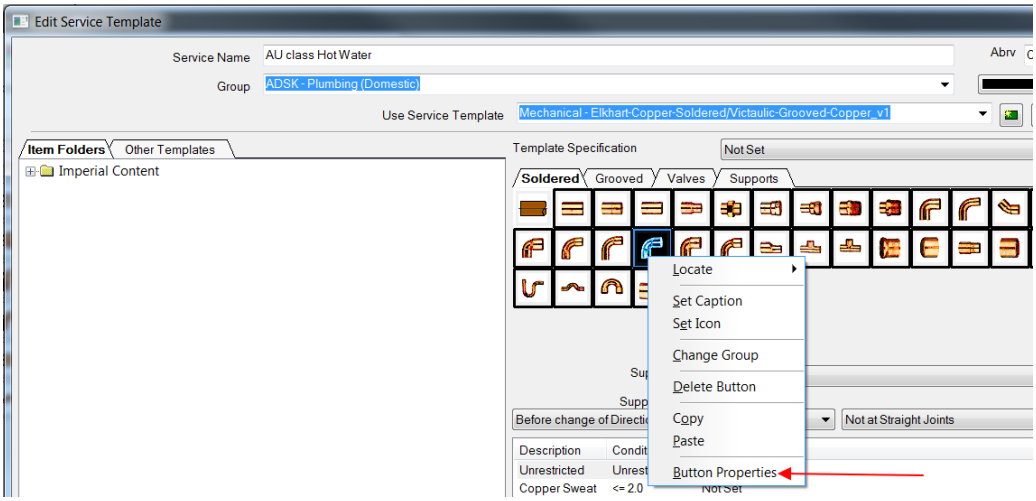
Then undo the conversion



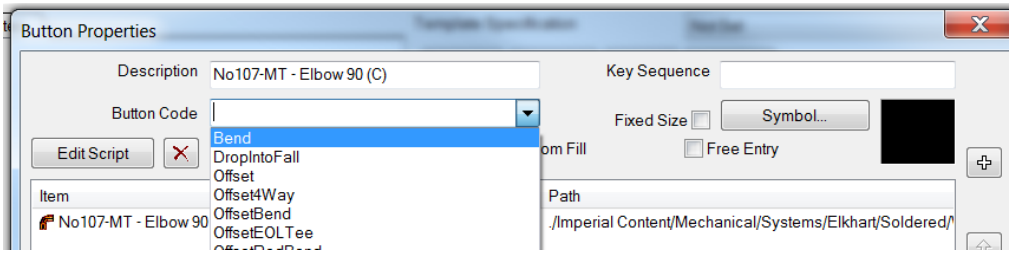
Reselect the hot water system, and convert it in the new service we created “AU Class Hot Water”:
You get a warning message:



Fittings weren’t recognized, only straight pipes have been converted.
To fix this issue, back in ESTmep and go to the service template settings, and right click on a button, an elbow for instance and select “button properties”:

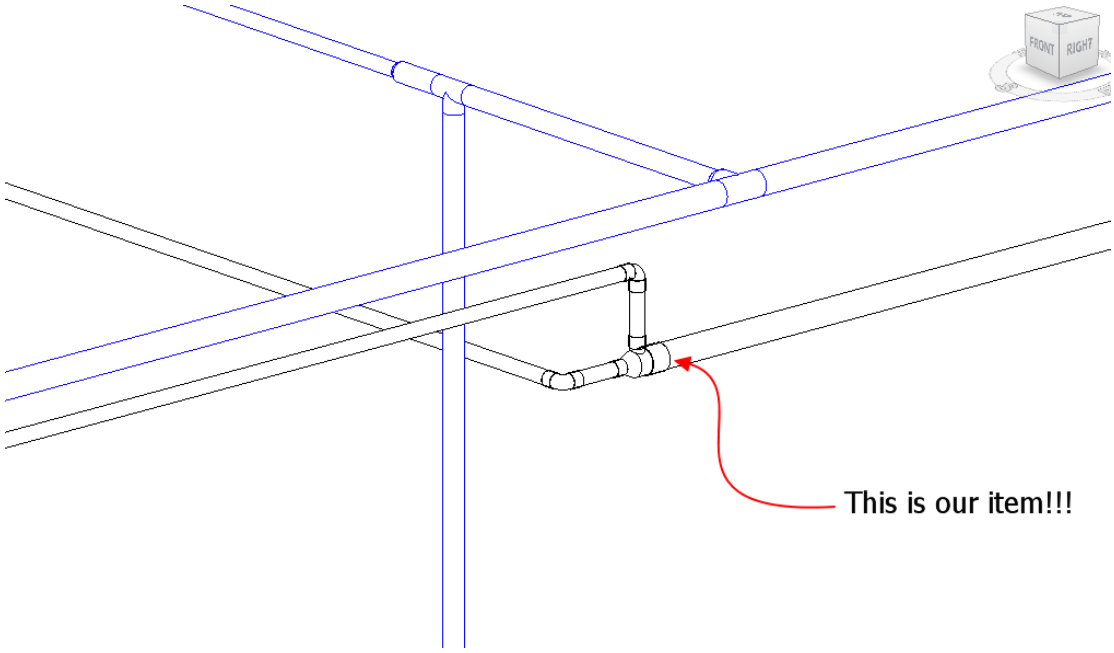


The field “Button Code” is empty. The button code is used by the Design Line technology to map nodes definition with compatible fittings. This technology is used by Revit as well in the conversion process. So we need to put the right button code for each fittings that will be used in Revit.
For this elbow, the code is “Bend”



Fill the button code for our reduced Tee, with code “RedILTee” and the equal Tees with code “RedBranch-90”.
Click on ok to save the modifications.

Back in Revit, undo the design to fabrication conversion.
Reload the MEP Fabrication configuration to load the Database modifications in your Revit project.
Reselect the hot water system, and convert it in the new service we created “AU Class Hot Water”. You don’t have the message, the conversion process worked.



Optimize length, reselect the full service and export it in a different name than previously.

Export & comparison

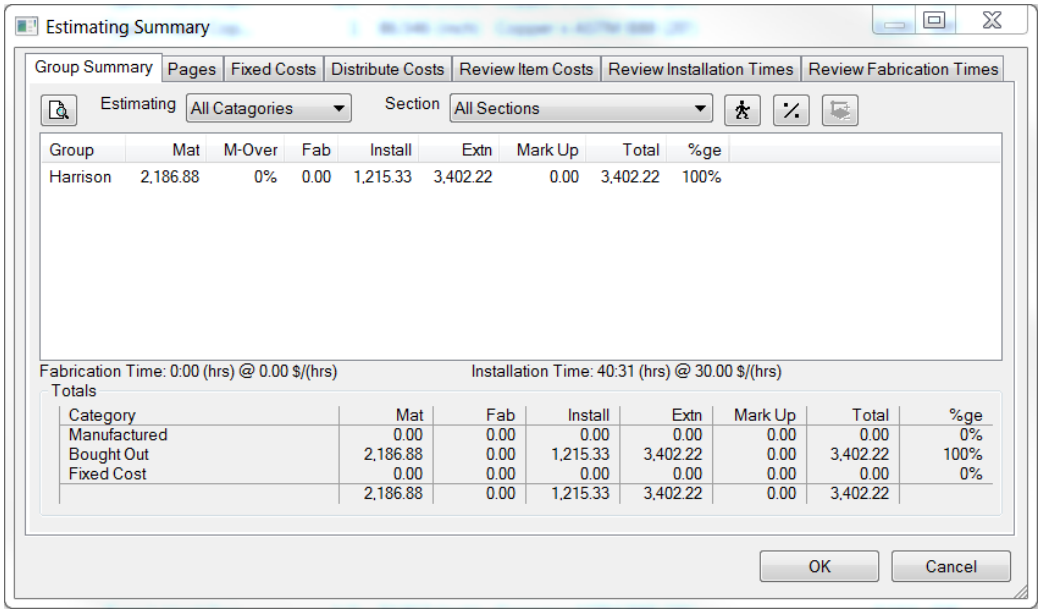
Why did we convert the hot water system twice?

Actually, the goal was to emphasize the optimization introduced by the presence of a Reducing Tee in the 2nd service. Number of parts exported is a first clue.

To verify this optimization, let’s compare the 2 jobs we’ve created in ESTmep.

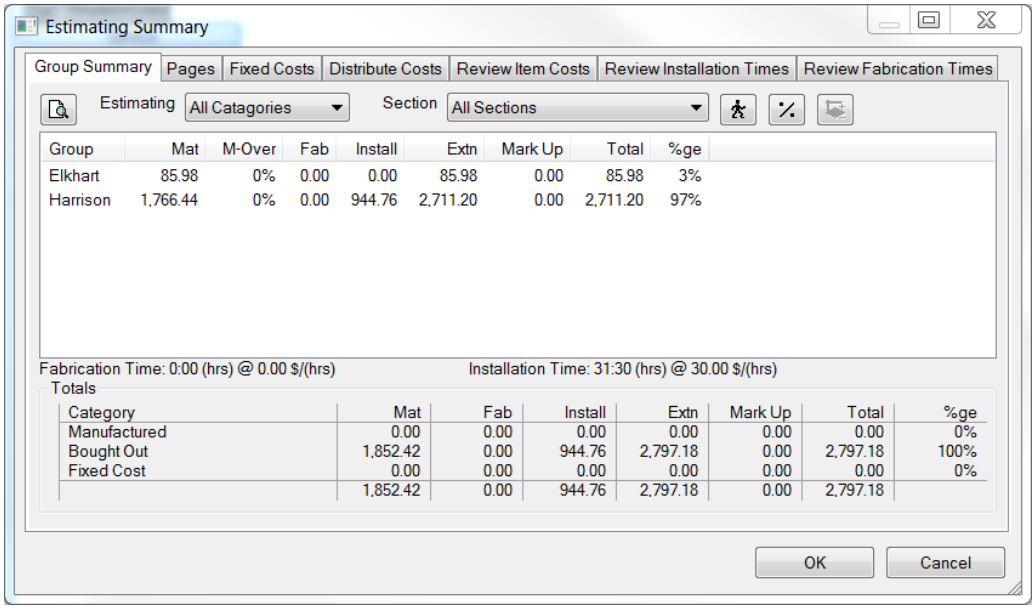
Launch ESTmep and open the first Job, containing 84 parts.

Click on “Estimated Summary.



Now close the job and open the 2nd job, obtained with our service.

Click once again on Estimating summary:



Using our New Service “AU Class Hot Water” saved 17.7% of money

End