Revit Tricks for Fabricators
Nicholas Bowley
IMAGINiT Technologies

Learning Objectives
- Import as-built conditions from Fabrication CADmep to Revit
- Model in Revit using Fabrication Parts
- Detail your model using annotations
- Create Spool Sheets
- Perform takeoffs using schedules
- Export from Revit to Fabrication CADmep

Description
Learn advanced skills capitalizing on the new Fabrication functionality in Revit 2017 software. Using Revit schedules, assemblies, tags, views, interference checking, and new features in Revit 2017 software, we can produce fabrication documentation inside of the Revit software interface, which enables us to be fully coordinated with design consultants. We’ll cover how to model using Fabrication Parts; how to convert the design model into Fabrication Parts; how to use assembly views to create spools sheets and details; how to annotate Fabrication Parts in plan view and 3D; how to coordinate with other consultants in Revit software; how new Revit 2017 software features relate to Fabrication Parts; and how to import existing as-built conditions from Fabrication CADmep software into a new renovation project. This session features Revit and Fabrication CADmep.

Your AU Expert
With more than a decade of experience, Nicholas works with clients to help them make the most of their design technology. Whether it’s through training, process improvements or custom content creation; Nicholas pulls on his background in architectural and MEP design as well as construction to provide the best service to clients.

Nick has been performing consulting for IMAGINiT Technologies since March 2014. Nick worked as a Mechanical Designer for a leading MEP Engineering firm in the Mid Atlantic area since 2001.

Twitter: @NicholasBowley
Blogs and Whitepapers can be found at: http://portal.imaginit.com/
Email: nbowley@rand.com
Session Handout and Presentation

Get the most current version of this handout and presentation using the A360 link below:
http://a360.co/2cKsNXv

Contents

Revit Tricks for Fabricators ............................................................................................................. 3

Why Would We Want to Work in Revit? .................................................................................................. 3

Import As-Built Conditions from Fabrication CADmep to Revit ......................................................... 3

Install the Revit Extension for Fabrication Add-In ............................................................................. 3

Import As-Built Fabrication Model into Revit ...................................................................................... 4

Converting the Design Model to a Fabrication Model ........................................................................ 4

Design to Fabrication – New in 2017 ..................................................................................................... 4

Model in Revit using Fabrication Parts ................................................................................................ 5

Loading Fabrication CADmep Services .............................................................................................. 5

Connect to Revit Elements .................................................................................................................. 5

Route and Fill ....................................................................................................................................... 5

Pipe and Duct Segment Lengths .......................................................................................................... 7

Global Revit Commands ...................................................................................................................... 9

Detail Your Model Using Annotations .................................................................................................. 12

Dimensions ........................................................................................................................................... 12

Tags ....................................................................................................................................................... 13

Add Color to Distinguish Between Systems or Hide ........................................................................... 15

Create Spool Sheets ............................................................................................................................. 17

Make a Selection ................................................................................................................................... 17

Turn Your Selection into an Assembly .................................................................................................. 18

Create Views ......................................................................................................................................... 19

Annotate the 3D View ............................................................................................................................ 24

Export from Revit to Fabrication CADmep .......................................................................................... 25

Install the Revit Extension for Fabrication Add-In .............................................................................. 25

Using the RME to FAB Add-In ............................................................................................................... 26
Revit Tricks for Fabricators

Why Would We Want to Work in Revit?
WWWWWR, I think I just create a new acronym.

Revit has become the primary documentation program of choice in the AEC industry for Architects, Structural Engineers, and MEP Engineers. One of the main reasons for this is the improved coordination of having all building model geometry on a single platform improving live coordination with all disciplines. Being able to view the entire building and all disciplines seamlessly is lacking in all other programs. To be able to create a fabrication model in Revit is an improvement not just for us, but also for all the other disciplines trying to understand the real world constraints involved with the installation.

Figure 1 (The flow of Revit models)

Import As-Built Conditions from Fabrication CADmep to Revit

We have the ability to take an as-built condition model created using Fabrication CADmep and import that model into Revit. This process will turn those objects into Fabrication Parts in Revit which can be modified in Revit.

Install the Revit Extension for Fabrication Add-In
You can find the add-in under this link: https://apps.autodesk.com/RVT/en/Detail/Index?id=6548483740320612761

Even though Autodesk Apps site shows it as compatible for Autodesk Revit 2016, it will also work in Revit 2017.
It will be added to the Add-Ins ribbons as show in Figure 2

Import As-Built Fabrication Model into Revit
When you execute the Revit Extension for Fabrication add-in, you will be looking for a .maj file type. This file was exported from Fabrication CADmep using the CreateCam. This is not really an import or export because it is the same content and format and doesn’t not require any mapping.

Note: You cannot import to a project that already has Fabrication Parts. Import into a new file then copy into your project.

Converting the Design Model to a Fabrication Model

Design to Fabrication – New in 2017
If you are able to starting with a well modelled MEP design model in 2017, this will change your life.

When you select and design level duct or pipe, you will notice a new button in the Modify/Multi-Select contextual ribbon.

When you click on this button, you will be prompted with a dialogue box to choose which service to map those elements.
Only services that have already been loaded will show up in the list. Only one person needs to load services, someone without Fabrication CADmep can model using those services once they have been loaded. Someone with Fabrication CADmep can load any of the same services they have setup in CADmep in Revit. They use the same registries and locations.

Recommend: **MSF21097 - Fabrication Parts in Revit: Understanding How Design to Fabrication Works in Revit**
By: Kevin Allen & William Tucker

**Model in Revit using Fabrication Parts**

**Loading Fabrication CADmep Services**
Any configurations being used in Fabrication CADmep can be loaded into Revit. Once loaded, any Revit user can place those elements but not reload updated services. Install a network license of Fabrication CADmep to allow users the ability to at least reload services.

Recommend: **MEP21505-L - Fabrication Boot Camp: Hacking ITM Content / Content "Management"**
By: Darren Young

**Connect to Revit Elements**
You may connect fabrication parts to Revit elements like mechanical equipment. The piping will size, orientate, and elevate itself automatically to match the connectors of the elements.

![Figure 5 (Connecting to Revit Elements)](image1)

**Route and Fill**
We don’t have design lines in Revit but what we do have it the Route and Fill command. This can be used as an alternative to placing each individual part, but this tool can hugely helpful with offsets, and branches.

Select a Fabrication part with an open connection, choose Route and Fill, then draw a line from the open connection to another open connection or duct/pipe.
You can also use this for breaking into a duct or pipe with a Tee by activating the Cut Into option found in the Route and Fill – Solutions contextual ribbon.

Select a Fabrication part with an open connection, choose Route and Fill, activate then draw a line from the open connection to the center of a duct/pipe.

Here is the use of Route and Fill to perform an offset.
When using Route and Fill you may cycle thru Solutions using different fittings and routes by using the arrows in the Route and Fill contextual ribbon, clicking the on-screen nodes, or in the Fabrication Parts palette.

Pipe and Duct Segment Lengths
Without the Route and Fill Option, you need to place each segment of duct and pipe. For a long run this can be tedious compared to Design Lines. In the cases of long runs I will often draw a segment and stretch it to the desired length.

Then use to turn it into the segment lengths as set by the service. can be found in the Modify Fabrication Ductwork/Pipe contextual ribbon after selecting a duct/pipe.
Edit Part
If you want to place ductwork at a length segments other than what the service is set to, before placing a duct or pipe, click Edit Part which can be found in the Modify I Place Duct/Pipe contextual ribbon. Change the Length Setting to Value and adjust the Value as desired. If you have manually assigned segment lengths here, do NOT use optimize lengths otherwise the lengths will be overridden with the length set by the service. Change the Setting back to Auto when finished.
Better Coordination Between Fabrication and Design Disciplines

Being able to model and coordinate in the same program as the design disciplines allows better communication and what I like to call “Clash Prevention”.

Using a tool introduced in 2016 call “Selection Box” we can quickly isolate an area of work to view and coordinate in 3D. The selection box can be located in Modify ribbon AFTER making a selection of elements in Revit.

Figure 19
Click on the edge of the box to view grips that can be used to adjust the viewing area.
Create and Modify elements in either plan view or 3D view to avoid collisions.
Tile windows to see changes occur in 3D and Plan view simultaneously.

Why find wait to find clashes in Navisworks when you can prevent and correct clashes in the same program as the original model.

Global Revit Commands
Some of my favorite Revit commands work just as well with Fabrication Parts.

Create Similar (CS) – after selecting a single object, right click on your mouse and choose Create Similar. This will being the command to place another version of the same object you selected with the same properties.

Space Bar to Rotate – When placing a Fabrication Part like a pipe elbow for example, tap the space bar to rotate the elbow at 45 degree increments.
**Arrow Keys to Nudge** – Use your arrow keys to move an object. Objects connected inline will adjust with that object similar to performing a Stretch in AutoCAD. There is no stretch command in Revit and it isn’t needed. The nudge distance is incremental to how close you are zoomed in. Use Shift+Arrow to nudge at greater increments.

Fun Fact: Use Ctrl+Arrow to nudge in AutoCAD.

**Feet no Inches** – When entering lengths in Revit, the default is feet. So when you type 2 during an action it would mean 2'-0". When entering feet and inches my preferred input is “feet <space> inch <space> fractional-inch”.

For example 2'-6 ½" can be entered as 2 6 ½ or 2 6.5

**Detail Your Model Using Annotations**

Annotations are one of the many great tools in Revit. In many ways they are very similar to the functionality in Fabrication CADmep.

**Dimensions**

In most cases you will want to use the Aligned dimension type. Aligned dimensions can be pulled from surfaces or points as opposed to Linear Dimensions which require endpoints. The Aligned dimension does not have the same behavior as it did in AutoCAD.

Find the Aligned dimension command in the Annotation ribbon. Click on two surfaces or points to place the dimension. If you want to reference a different part of an element, hit the tab button to cycle thru different references. After picking two or more references to dimension, click in a blank area to place the dimension.

A distinct difference from AutoCAD is that dimensions in Revit can be used to modify elements and geometry.

1. You must select an object that will be modified by the change in the dimension.
2. The dimension text will become small and blue which indicates it is now editable
3. Click on the text and change the value.
Modify or add dimension references by selecting a dimension and click which can be found in the Modify Dimension contextual ribbon.

Tags
Tags is the Revit term for text that is reading information from modelled elements. In Revit 2016 we only had one tag category but New in Revit 2017 we now have four.

In Revit 2016 we had 19 labels, most of which are generic for all Revit elements. New in Revit 2017 we have 43 labels across 4 categories effectively adding 24 new labels for Ductwork Tags alone not to mention the other 3 categories. What this means is that you need to use Revit 2017.
We can create a single tag or multiple tags for the category with any combination of the available parameters available to us in Revit 2017. Don’t feel limit to the tags pre-made with the Revit install.

Let’s make a custom tag.

1. Click the Application Menu and choose New / Family.

2. Use the Generic Annotation.rft from the Annotations folder.

3. Change the Category to MEP Fabrication Ductwork Tag using the button from Figure 30.

4. On the Annotation ribbon click Label and in the middle of the screen to place the label.

5. Use the parameters and changes matching Figure 31 below.
6. Click “Load Into Project and Close” to bring it into the project. Use the Tag by Category command to place it in the model.

| 24”x12” |
| BOD: 8” - 6” |
| TOD: 9” - 6” |
| Length: 4’ - 11” |

Add Color to Distinguish Between Systems or Hide

You will want to setup filters in Revit to perform 2 tasks. Filters enable you to graphically distinguish systems by finding a system based on a rule and allowing you to assign a color to the elements the rule finds. You can also use filters to turn off systems on a plan in order to have another plan dedicated to that system. For example, we don’t want to show Sanitary and Vent piping on our plan with the HVAC Piping.

1. Locate your Revit filters by accessing your view template, or if you are not using a view template by clicking “Visibility Graphic Overrides – Edit” in your Properties palette.

2. Locate the Filters tab.
3. Click on the Add button then Edit/New
4. Click the New Filter button to create a new filter
5. Here are some examples of two rules, one for ductwork and one for piping.

6. After creating your filters, click OK.
7. In the next dialogue box, select the filters you want to add to your view and click OK.
8. Now you can use these filters to assign a color to turn off everything on that system.
Create Spool Sheets

There is an under-utilized tool in Revit called Assemblies. Assemblies allow us to create a dedicated set of views for a selection.

Make a Selection
There are several ways to make a selection. You can select individual elements using Ctrl+Left Mouse Button, deselect elements by holding Shift+Left Mouse Button.

Just like AutoCAD you can perform a window selection. Picking a window from left to right means objects completely in the window are selected. Picking a window from right to left
means any objects inside the window or crossing the window will be selected. Just like AutoCAD.

You may also hover your mouse cursor over a duct or pipe and hit the tab key. Hitting the tab key once selects the branch, twice will select the branch and main and other branches, three times will select the branch and main all the way back to the source equipment, a four time will select all elements connected to the object you are hovering over. Finalize your selection by clicking the left mouse button.

**Figure 44**

**Turn Your Selection into an Assembly**

After making your selection, click on the Create Assembly button in the Create Panel under the Modify ribbon.

**Figure 45**

Name your assembly when prompted.
With the Assembly selected, you can click in the Modify ribbon. While in this edit mode you may add or remove elements from your assembly or draw additional ones.

Create Views
With your Assembly selected, click Create Views in the Modify ribbon.
When prompted match the selection in Figure 39.

Figure 50

Make 3 copies of the MEP Fabrication Pipework Schedule and name them:
The properties for each schedule are here:

**Bill of Materials (Fittings)**

Scheduled fields (in order):
- Item Number
- OEM
- Fabrication Fitting Description
- Part Material
- Angle
- Length
- Main Primary Diameter
- Main Secondary Diameter
- Instal Type

*Figure 51*

**Schedule Properties**

*Figure 52*

**Schedule Properties**

*Figure 53*

**Appearance**

*Figure 54*

**Bill of Materials (Pipe)**
Scheduled fields (in order):
- Item Number
- Size
- Fabrication Fitting Description
- OEM
- Part Material
- Install Type
- Length

Figure 55

Schedule Properties

Figure 56

Schedule Properties

Figure 57

Schedule Properties

Figure 58

**Bill of Materials (Welds)**

Scheduled fields (in order):
- Count
- Size
- Fabrication Fitting Description

Figure 59

Schedule Properties

Figure 60
Right click on each schedule in the project browser and choose Create View Template from View. Name each view template.

Click on each schedule in the project browser and assign the view template for each one in the properties palette.
Your next set of Spool schedules can simply have the correct view template assigned and they will already be setup. **New in Revit 2017**, view templates can store all schedule properties.

![Revit 2017 View Template Parameters](image)

**Figure 65 (Revit 2017 View Template Parameters)**

**Figure 66 (Revit 2016 Parameters)**

### Bill of Materials (Fittings)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Diameter</th>
<th>Material</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>90° Elbow</td>
<td>3&quot;</td>
<td>Cast Steel</td>
<td>90°</td>
</tr>
<tr>
<td>4</td>
<td>90° Elbow</td>
<td>4 1/2&quot;</td>
<td>Cast Steel</td>
<td>90°</td>
</tr>
<tr>
<td>6</td>
<td>90° Elbow</td>
<td>6&quot;</td>
<td>Cast Steel</td>
<td>90°</td>
</tr>
<tr>
<td>8</td>
<td>90° Elbow</td>
<td>8&quot;</td>
<td>Cast Steel</td>
<td>90°</td>
</tr>
<tr>
<td>10</td>
<td>90° Elbow</td>
<td>10&quot;</td>
<td>Cast Steel</td>
<td>90°</td>
</tr>
</tbody>
</table>

**Figure 67 (BOM Schedules Placed on Spool Sheet)**

### Bill of Materials (Pipe)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Material</th>
<th>Bend Type</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3&quot; Schedule 40 Steel</td>
<td>Cast Steel</td>
<td>Fig Bend</td>
<td>10'</td>
</tr>
<tr>
<td>3</td>
<td>4&quot; Schedule 40 Steel</td>
<td>Cast Steel</td>
<td>Fig Bend</td>
<td>10'</td>
</tr>
<tr>
<td>5</td>
<td>6&quot; Schedule 40 Steel</td>
<td>Cast Steel</td>
<td>Fig Bend</td>
<td>10'</td>
</tr>
<tr>
<td>7</td>
<td>8&quot; Schedule 40 Steel</td>
<td>Cast Steel</td>
<td>Fig Bend</td>
<td>10'</td>
</tr>
</tbody>
</table>

### Bill of Materials (Welds)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>90° Wedge</td>
<td>General Shop Weld - C0435</td>
</tr>
</tbody>
</table>

Annotate the 3D View

We can dimension and tag our pipe and duct. In this exercise we will tag each element with a different Mark value.

**Create a Mark Tag**

Create a new family using the steps we performed earlier in the lesson. Use a Multi-Category Tag.rft view template.

In the Create ribbon, click the Label button
In the dialogue box add the Mark parameter to the Label Parameters column.

Draw linework around the label to match Figure 60.

Load the tag into the project and save it.

Tag the Pipe and Fittings
Use the Tag by Category button to tag the elements in the assembly.

Export from Revit to Fabrication CADmep

This is going to sound familiar to the beginning of this class. We can use the Revit Extension for Fabrication to send your Fabrication Parts to Fabrication CADmep.

Install the Revit Extension for Fabrication Add-In
You can find the add-in under this link:
Even though Seek shows it as compatible for Autodesk Revit 2016, it will also work in Revit 2017.

It will be added to the Add-Ins ribbons as show in Figure 2

![Figure 71 (Revit Extension for Fabrication as shown in Revit)](image)

This is not really an export as nothing will change with the model elements. They are the same objects as they were simply being saved in a format to be opened in another program.

**Using the RME to FAB Add-In**

For elements in Revit that are not Fabrication Parts which may include Mechanical Equipment, Air Terminals, Plumbing Fixtures, and other categories. You can use the “RME to FAB” add-in. For this we use the “Store Graphic Elements” button in the ribbon. The store Design Line elements is a way to send Revit design ductwork and piping to FAB CADmep, however using the Design to Fabrication button we don’t need to use this button.

![Figure 72](image)

After using the Store Graphics Elements and Store Design Line Elements, click the Out button in the ribbon to export the elements to a .rif file type.

Open Fabrication CADmep.

Use the ProcessRun command to browse and import your .rif export from Revit.

Refer to the following AU Classes for more info on these steps:
MSF21097 - Fabrication Parts in Revit: Understanding How Design to Fabrication Works in Revit
MSF21377-L - The Optimal Revit-to-Fabrication Workflow

**CONCLUSION**

While we have many great tools in the Fabrication Suite toolbelt, Revit has been added to our set of tools we can benefit from. We now have enough tools to perform all coordination and documentation in Revit. We still use the other products in the Fabrication Suite for advanced tools such as Fabrication CADmep for Shop Drawings, ESTmep for bids and costs, and CAMduct for production.