AUTODESK UNIVERSITY

FAB22100 Fabrication Parts in REVIT: Making the JUMP from an MEP Contractors point of view

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Learning Objectives

- Discuss the struggles and obstacles encountered before and during the transition
- Learn how planning ahead helped us make the change
- Update on how it's going now…. Is everyone who made the change happy?
- Where do we go from here? Looking ahead, beyond tomorrow

Description

In this topic we will discuss making the JUMP from Fabrication CADmep to Fabrication Parts in REVIT from Comfort Systems USA's point of view. We will discuss getting started, the current state, the struggles we encountered, and the future forecast. We will also discuss how this transition has impacted our organization.

Your AU Expert(s)

Kevin Allen is currently employed at Comfort Systems USA (CSUSA)—a premier mechanical systems installation and service provider with annual revenue of $1.6 billion—as director of Building Information Modeling (BIM) and productivity. CSUSA is a national organization with over 7,000 employees and 36 operating companies (some being service only). Currently 24 of these locations utilize virtual design and construction (VDC), with 7 sheet metal fabrication shops, numerous pipe and plumbing shops, and 190 employees utilizing the Fabrication software products on a single database. Kevin is responsible for implementing, training, and advising on best practices for these companies, developing standards within the organization, and providing technology recommendations for the future, along with numerous other tasks. In the past, Kevin has trained Fabrication CADmep software, as well as utilized it as a 3D detailing and coordination package. Kevin enjoys helping others use the software to its fullest potential.

William Tucker is currently working as BIM trainer and product specialist at Comfort Systems USA, a premier mechanical-systems installation and service provider. CSUSA is a national organization with 24 companies, 7 sheet-metal fabrication shops, and 190 users currently sharing the Fabrication software products with one database. William is responsible for implementing, training, and advising on best practices for these companies, developing standards within the organization, and providing technology recommendations for the future. In the past, William has trained and implemented Fabrication CADmep software, Fabrication ESTmep software, and Fabrication CAMduct software, as well as utilized them as a 3D detailing and coordination package. William has been using Autodesk, Inc., products for 29 years. He enjoys helping others utilize the software to its fullest potential.

Struggles encountered before and during the transition to a new platform

As a team who leads Comfort Systems into the future, making decisions on which software platform will be “best in class” can be a difficult choice. We (William Tucker, Josh Asche and myself) look at many different options in order to find a solution that best fits the needs of our 24 companies for current projects, upcoming projects already on the books, and future projects not even awarded yet. As we are currently using the Fabrication Suite of Products: ESTmep, CADmep, CAMduct, Tracker and Remote Entry, the transition to Fabrication Parts in REVIT seems obvious, but IS IT?

Autodesk is taking a platform that is currently fully integrated between CADmep, CAMduct and ESTmep, then adding a fourth product to it…. REVIT! I would venture to say, we(MEP Construction folks) are the only industry that would have such a platform to work with. The possibilities this brings to the table are endless. We all know how the .maj file has been the “life line” for getting data to and from different modules, but when this is complete, we will have a 4th module with ALL the same information. NOW, as a contractor, you have choices on which platform best suites your needs.

One struggle we encountered is the People

Getting people out of their comfort zone is challenging. Some will hang on till the last possible minute, while others are eager to learn something new. The same question always arises; Can I be as productive with the new tools as I am now. My response has always been, in the beginning NO, but as you learn the new tool, YES, you WILL be, and more than likely you will be more productive in the future!

First, we needed them to be open to change

Change is difficult for anyone, especially when deadlines loom. Change takes a few things in order for it to happen. First we need Intelligence. The “How” of change. How do we move from Autocad to REVIT? Well it starts with training! Secondly, we need Motivation. I can’t teach this, but most people who are in the position of detailers/coordinators, have this already built in to their DNA. Thirdly, we need Means. The tools and resources to help facilitate the change. Here at Comfort, William Josh and myself develop and provide the Means for change, we just need some training and a little motivation. The fourth and final part, for change to be successful is Attitude. I personally think this is the most important, because if we provide the best tools, the best training and the best path for making the change, and the Attitude is not right, we are destined for failure.

Secondly, we needed them to attend training classes

REVIT is different than CAD….. really? Who would have thought. Here at Comfort Systems, we are asking each of our Operating Companies to get their own basic REVIT Training, then we as a team can teach them how FAB Parts in REVIT works.

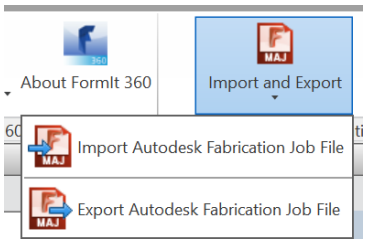
The second struggle we encountered is the software

Here are topics we needed to address, making sure the software is ready.

1. Has Autodesk done enough development to make Fabrication Parts in REVIT useable?
2. How long can we stay in REVIT before sending .maj for fabrication or preparing for prefabrication of piping systems?
3. Design to Fabrication, is it worth it? Hopefully most of you went to William class prior to this. FAB Parts in REVIT: Understanding How Design to Fabrication Works (MSF21097)
4. How to properly setup a REVIT Template?
5. Will Schedules work in REVIT for Fabrication Parts?
6. How do we spool in REVIT?
7. What does REVIT, without FAB Parts, bring to the table for sheet production, automation of processes that is NOT available in AutoCad?

1. Has Autodesk Done Enough development to make Fabrication Parts in REVIT useable?

We have found that currently in REVIT 2017.1, YES, Fabrication Parts in REVIT is completely useable by our detailers for coordination, production of shop drawings, documentation(annotating) and spooling or Assemblies as they are called in REVIT. There is still more ongoing development, but being able to import and export the .maj file into CADmep and CAMduct and back is huge. We can now produce shop drawings with proper documentation and dimensions, that was not available in the past.

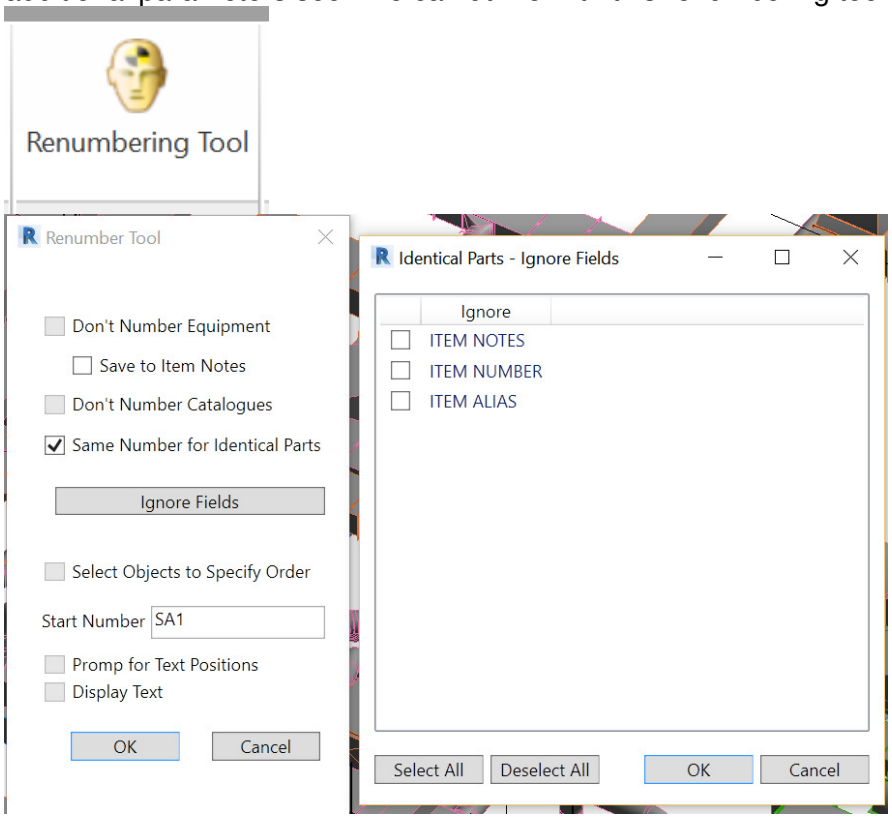


2. How long can we stay in REVIT before sending .maj file to CAMduct for fabrication or preparing for prefabrication of pipe systems?

We have found that currently in REVIT 2017.1, we can complete the coordination process, renumber ductwork(addin from Applied Software), document our sheets, create assemblies for pipe systems(spooling) and print out ALL necessary shop drawings and spool sheets for prefabrication of pipe and ductwork. We wait till the last possible minute, when everything else is completed, to make the .maj file. We have added some additional functionality with Dynamo(explained later) to ensure we do NOT select the same piece of ductwork twice. It also changes the status for us.

One other important aspect of having a renumber tool for ductwork in REVIT is the creation of our shop drawings. If we added annotations to FAB Parts like elevations and

ductwork sizes, then created the .maj file to take to Fabrication CADmep for renumbering, and brought that file back into REVIT, we lost our annotation tags and dimensions, which required us to perform the work twice. With the renumber tool from Applied Software, we OMIT this step, and can document our shop drawings one time and move on. The only time we create a .maj file is when we need to build the duct. Here is a screen shot of the Addin from Applied Software. Notice the similarities between CADmep and FAB Parts renumber dialog box? We do have some ignore fields, but this is limited to what Autodesk has exposed to us, so we are hoping we get additional parameters soon we can utilize with this renumbering tool.



3. Design to Fabrication…… Is it worth it?

Hopefully some or most of you here attended William Tuckers class, MSF21097 Fabrication Parts in REVIT: Understanding how Design to Fabrication Works in REVIT this morning at 8:45am. Currently, one of our companies is working on a Design Assist project, and they use this tool extensively. Once the design is complete(using generic REVIT elements), they convert to FAB Parts, annotate, renumber, create assemblies and print shop drawings and spool maps. So YES, Design to Fabrication is an extremely useful tool. It prevents redrawing the systems in REVIT using FAB Parts.

4. How to properly setup a REVIT Template?

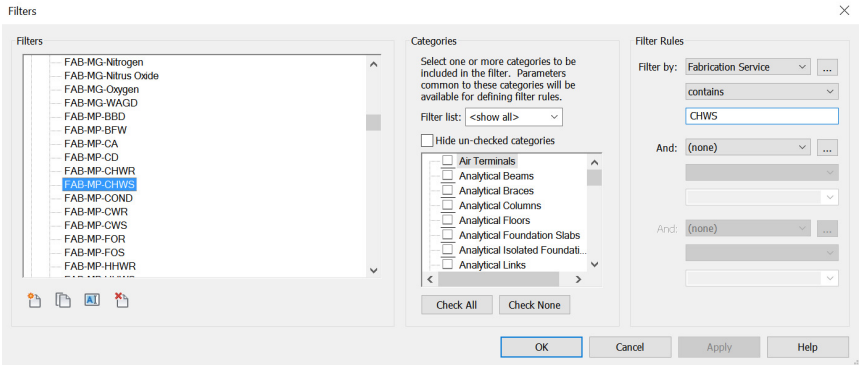
We found tons of information online about this topic. We had to digest what everyone was saying about setting up Architectural and Structural templates, then setup ours accordingly. This is one of the MOST important steps, just as it is in CADmep. We started with our families for Annotation. We made sure it was the proper text font, text size, and width factor we wanted. We made all the families for ductwork, piping(which includes plumbing). We also renamed these so they were easily identifiable within the project browser to load into each project. We created our title blocks in here as well, for each of the different sizes we use. We are constantly adding new features to this template as we come across them.

Graphics	
Color	Black
Line Weight	1
Background	Opaque
Show Border	☐
Leader/Border Offset	5/64"
Text	
Text Font	Arial
Text Size	3/32"
Tab Size	1/2"
Bold	☐
Italic	☐
Underline	☐
Width Factor	1.000000

Some additional things to keep in mind.

- Use Copy/Monitor on Levels from Architect to your model
- Name views as you want them on your sheets
- Create view templates to control colors
  - We were able to setup filters to mimic layers/colors from CADmep
- Use view template to create spool map view

Screen Shot of Filter setup



Partial list of Filters

FAB-D-Insulation	☑
FAB-D-Liner	☑
FAB-D-EA	☑
FAB-D-FA	☑
FAB-D-KE	☑
FAB-D-OA	☑
FAB-D-RA	☑
FAB-D-REL	☑
FAB-D-SALP	☑
FAB-D-SAMP	☑
FAB-MP-CHWS	☑
FAB-MP-CHWR	☑
FAB-MP-CWS	☑
FAB-MP-CWR	☑
FAB-MP-COND	☑
FAB-MP-HHWS	☑
FAB-MP-HHWR	☑
FAB-MP-LPS	☑
FAB-MP-HPS	☑
FAB-MP-MPS	☑
FAB-MP-LPC	☑
FAB-MP-MPC	☑
FAB-MP-HPC	☑
FAB-MP-NG	☑
FAB-MP-WMU	☑
FAB-MP-BBD	☑

5. Will Schedules work for Fabrication Parts?

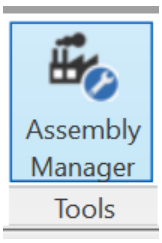
We found some schedules to work fine, but others NOT so well. We have limited parameters to filter/report on at this time. Building schedules is cumbersome and not very functional at this time, so we currently report in CADmep. We could use assistance in convincing Autodesk that the print objects and custom data we have in the Fabrication Products are essential within REVIT. For instance, we find that we use Service Type as a filter in just about EVERY report we build in the Fabrication Products, but this parameter is NOT available in FAB Parts in REVIT currently. Here is a sample of our Pipe BOM for Assemblies.

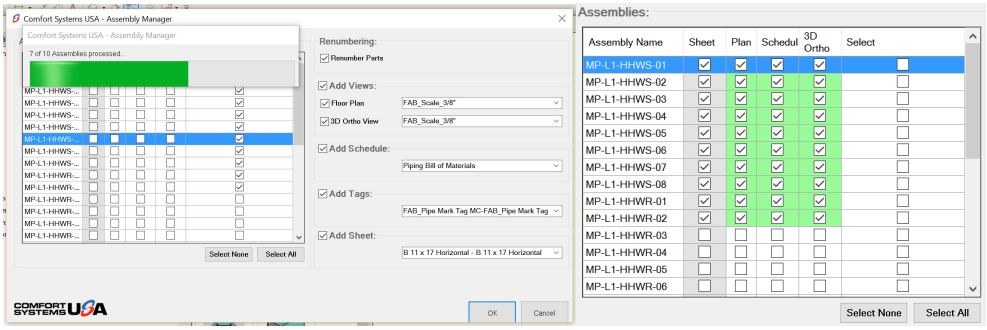
<Piping Bill of Materials>

A	B	C	D	E	F	G
Item #	Qty	Size	Length	Description	Material	Install Type
	2	1 1/2"-1 1/2"		Anvil 90 Ell	Forged Steel	SocketWeld
	1	1"-1"		Anvil 90 Ell	Forged Steel	SocketWeld
	3	1 1/2"-1 1/2"	0' - 1 1/2"	Anvil Coupling	Forged Steel	SocketWeld
	7	1"-1"	0' - 1 1/2"	Anvil Coupling	Forged Steel	SocketWeld
	2	2"-2"	0' - 2"	Anvil Coupling	Forged Steel	SocketWeld
	6	2 1/2"-1 1/2"	0' - 1 3/8"	Anvil Thread-O-Let	Forged Steel	Threaded
	2	3"-1 1/2"	0' - 1 3/8"	Anvil Thread-O-Let	Forged Steel	Threaded
	2	3"-2"	0' - 1 1/2"	Anvil Thread-O-Let	Forged Steel	Threaded
	8	4"-1 1/2"	0' - 1 3/8"	Anvil Thread-O-Let	Forged Steel	Threaded
	12	4"-1"	0' - 1 3/8"	Anvil Thread-O-Let	Forged Steel	Threaded
	4	4"-2"	0' - 1 1/2"	Anvil Thread-O-Let	Forged Steel	Threaded

6. How do we spool in REVIT?

We found that Assemblies work for us in REVIT, but the problem is, there is NOT an automated way to process assemblies. We hired a programmer to develop our Assembly Manager. This is also our QA/QC for assemblies in our model. Our Assembly Manager allows us to renumber parts, add views to sheets, add schedules and pick the layout we want for our sheets. Processing assemblies in REVIT will be WAY faster than batch spooling in CADmep with this tool. The pic at on the left below shows processing spools, then on the right, we can see what has processed, and what is on that Assembly Sheet without needing to open up the sheet and look. More work needs to be done here but well on its way!

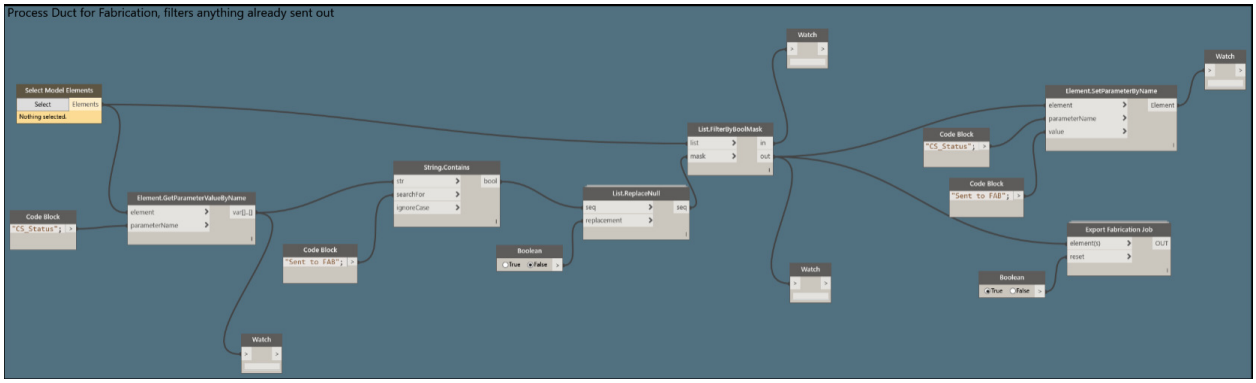




7. Another useful tool we have found so far!

We found that some things are quite monotonous in REVIT, like creating views, cropping those views for ¼" scale views to place on sheets, creating sheets, applying views to those sheets, renaming views etc. Enter: DYNAMO! All I can say is WOW! This tool has tremendous potential moving forward. We are currently utilizing Dynamo to send ductwork to fabrication, create views for sheets, create sheets and place views on sheets. You can learn more at www.dynamobim.org We can see where this tool will automate many more processes in the very near future.

As an example, here is a graph showing how we process ductwork for Fabrication. This graph will deselect any duct that has already been sent, then set the status on ductwork that is being sent to "Sent to FAB". This also gives us the ability to add a filter for a view and show what has been sent and what has not.



Planning ahead has saved the day in many cases

As with anything you accomplish, making a plan and sticking to that plan with minor deviations is a must do! Here are some things we(William Josh and myself) have done to try and stay ahead of our companies, providing them with the best possible tools. Our goal is to stay in REVIT thru Coordination, Shop Drawing production, and spooling. We needed to test this and figure out what we needed to change in order to accomplish this goal.

Creating Annotation Families

We started with this as the #1 step in building our REVIT template. We found out quickly that more were needed than what Autodesk provided OOTB(Out of the Box). So, in creating tag families, we found out there are Single Category Annotation Tags, and then there are Multi-Category Tags. Single Category work for Size, Elevation, Offset, Length etc, but if you are using assemblies and want to tag your Spool Name, you need a Multi-Category Tag.

Creating Standards and workflows in REVIT

We first need to understand what type of project we are working with. Is it a Design Build/Design Assist project or is it Plan/Spec? We see two different templates being utilized, depending on these types of projects

Design Build/Design Assist

In this type of project, we start with our Comfort Systems USA template which has modified generic parts in it. This gives us the ability to “design” and produce a model that is much closer to a constructible/fabricatable model than what we would normally get from a design firm who is NOT thinking about the constructability nature of the model. With this approach, we significantly improve the “Design to Fabrication” process! For instance, on a Rectangular Elbow – Mitered : Standard, we change the “shoulder” parameter from 1” to 6”. This prevents a designer from being able to connect two elbows together in an offset situation, then we cannot fabricate it without additional costs. We also go into Routing Preferences and change the Types of default fittings that get placed in a project.

Plan Spec

In this type of project, we will start with our Comfort Systems USA template which does NOT have any modified families of design elements, but does have our Company Standard families loaded for production of shop drawings. We are at the mercy of the designer here so we start converting pieces of a model at a time. We have found, fixing some things in the design model, PRIOR to Design to Fabrication improves results dramatically. Within this template, we have only 1(one) level to start with. We then link the Architectural model in, use Copy/Monitor to add ALL Levels for the building, setup our working views from there for the different trades, open the Design MEP model, copy

1 trade per floor at a time, and paste into our model, THEN convert to FAB Parts. This process ensures we keep a clean, manageable REVIT model at all times, and eliminates the extra "trash" that could/would come in from this engineers drawing.

Our Assembly Manager is one example of this

We started with putting a layout together of how we wanted it to look. We first needed to determine the best process within REVIT to produce spools, which turned out to be Assemblies. Once we started building them, we found out you could only process one(1) assembly at a time, which was slow. We found a developer who helped us automate processing Assemblies, which is great, but now we need to refine and polish it. One day we got a call saying, "How do we spool in REVIT?" We installed the Assembly Manager for them, showed them how it worked, and were off and running! Another example of trying to stay one step ahead.

Update: How it is going now? Is everyone happy with the new tools/software?

For those who have made the switch to REVIT, they are NOT looking back! Currently here at Comfort Systems we have 4 companies who are using FAB Parts in REVIT. It is still a work in progress we are learning, but here are some things to be aware of.

Development is still ongoing!

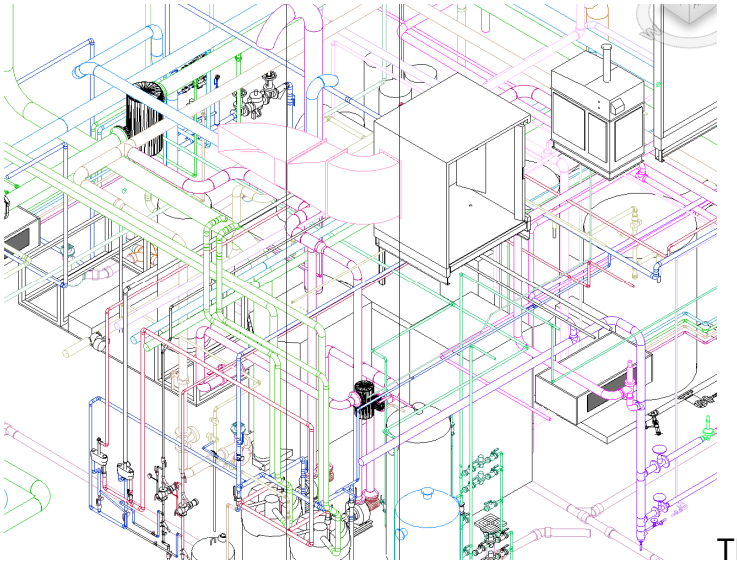
Autodesk is continuing to make changes to FAB Parts in REVIT, adding additional functionality, making it better and better. We like where the overall direction and plan, although just like most of you, we wish it could happen faster…..

We find ways to Make it Happen!

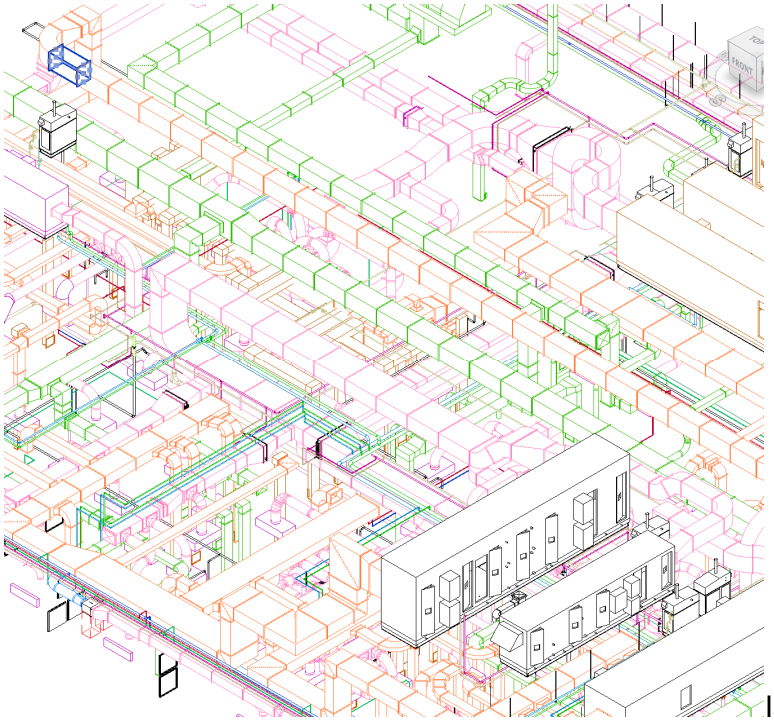
We are approached constantly by our users asking if we can develop tools or find a way to make the software do something it is currently not capable of doing. As a result, we test options and find work arounds for the current situation, then evaluate the need for a long term solution. We try solving most things internally, but when required, we reach out and hire development.

Here is a project and its current state!

The current project "FLASH" is being done by one of our companies in Greensboro NC.



This is a view of the Mechanical Room



Isometric view of the entire building

Fabrication Parts still lack Data!

Autodesk is continuing to make changes to FAB Parts in REVIT, but currently, there is little "data" that can be accessed within FAB Parts. This is a concern as currently we cannot complete our reporting capabilities within REVIT.

A few quotes from our users!

"Fabrication parts in Revit 2017 are easy to use and act in many ways like regular Revit parts. However, unlike regular Revit parts, the Fabrication Parts are exact representations of what we will build and install in the field. The "route and fill" and "optimize length" commands were great additions to the 2017 update. The ability to edit parts still needs improvement."

"Editing Fabrication Parts in REVIT takes longer than making the same changes with REVIT design elements, but there was significant improvement from 2016 to 2017 release."

Where do we go from here? Looking ahead, beyond tomorrow!

So, at this point, we wait and see what Autodesk has in store for us. Our hope is that integration continues to be a major factor in development. Until then, here at Comfort Systems USA, we will continue to develop tools that make us more productive for the future. We see Dynamo continuing to be one of our tools in the tool bag. It has proven already to be very valuable.

REVIT Training

Since we only have a few companies who have made the switch, our next year will be filled with helping additional companies learn the REVIT environment and take advantage of FAB Parts in REVIT. As there is continued development, we will be making changes to our templates, views, filters, etc to take advantage of what Autodesk is providing to us. Once we get a few more companies switched over, we will have a better handle on the best practices, training courses, and pain points of this transition.

REVIT template

We know that our template is not complete so we will continue to update this as needed. Since this will be the foundation for ALL projects moving forward, we want it to be as robust and complete as possible.

Dynamo

We will continue to develop process workflow improvements with Dynamo. We like to use it to "prove the process", refine and test in a production environment, then look at whether these processes need to be written into a macro or compiled into a .dll file and added to a ribbon within REVIT.

Impact on our organization

As with any change, the full impact of making the JUMP to FAB Parts in REVIT is still out for discussion, but what we can tell you is it prevents tons of work on project setup, converting files to .dwg format, cleaning up these files, then setting up the project in Autocad so we can use CADmep. Since most project these days are drawn in REVIT, we can utilize the Architectural background "as-is" and start modeling on the project right away. With the Design to FAB tool, and IF we get the mechanical design model, this further enhances our ability to get coordination completed faster, and within the same environment as the rest of the project team. As this matures, we see HUGE impact in our ability to take on a project late in the game and be ready for installation of systems quite rapidly.