BES502491

Beyond Fabrication: Using Revit Fabrication Parts for Spec-Driven Design

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Learning Objectives

- Discover the benefits of spec-based piping design
- Learn about assessing the differences between and characteristics of Revit Families and Revit Fabrication Parts.
- Learn how to evaluate quality and efficiency gains on projects using Revit Fabrication Parts
- Learn about the challenges encountered during implementation of Revit Fabrication Parts at SSOE.

Description

Frustrated with repeated model quality and coordination issues with piping models on your projects? Come join this class to learn how SSOE has adopted Revit Fabrication Parts on many of its industrial and manufacturing projects for initial design modeling. Discover how Revit Fabrication Parts can enable specification-based modeling – something that traditionally would have been accomplished with other products such as AutoCAD Plant 3D software. We'll cover the benefits of using one common platform (Revit) to complete building design as well as when we should or should not use specification-based modeling. Finally, we'll discuss unique challenges SSOE faced as an AE firm as we adopted Revit Fabrication Parts, and how we overcame those obstacles to produce higher-quality designs for our clients-saving them time, trouble, and money.

Speaker(s)

Josh Churchill
VDC Technical Leader, SSOE
Josh Churchill is a VDC/BIM Professional well versed in new technology implementation and data transformation in the AEC space. Josh began his career in the design world over fifteen years ago completing redline markups in AutoCAD during his summer vacations during high school. Over the past fifteen years, he has progressed into various Mechanical Design roles designing Plumbing, HVAC, and Process Piping systems across various industries working directly with Fabrication Contractors to build constructible designs in the field. Josh currently holds the position of VDC Technical Leader with SSOE, serving as a technology champion implementing and improving workflows across various BIM Platforms such as the Autodesk Construction Cloud/BIM360, AutoCAD MEP, and Revit.

Claudia Calderón Quintero
Project VDC/BIM Specialist, SSOE
Claudia Calderón Quintero is a Project VDC/BIM Specialist at SSOE, supporting BIM pilots and transitioning projects to the 3D world. With broad experience in Revit, Fabrication Parts, Navisworks, BIM360 and ACC, among others, finding alternatives and new solutions have been her focus to make these transitions smoother. She is responsible for creating and maintaining BIM standards for specific clients, project support and troubleshooting, training and onboarding. Part of her background includes Architectural Design, Mechanical Design and Model Coordination. She has a Bachelors Degree in Architecture from the Tecnológico de Monterrey and has been working in the industry for 7 years. She loves spending time with friends, reading and traveling.

Spec-Based Piping Software – What is it and why do we care?

Utilization of Spec Based Piping Software (such as Revit Fabrication Parts or Plant 3D) has been a huge benefit to SSOE. These platforms help enforce that piping designs/routing are being created in accordance with a client or manufacturers specification. Having a Spec driven system on our projects also enforced that designs were constructable and significantly reduced "one-off" instances in the design. By not having Specs drive your piping design, users put themselves at risk of designing things that aren't either constructable or using parts (such as Piping Accessories) that simply don't exist in a particular application. While using a Spec Based Piping Software isn't a replacement for ever reading a specification, it reduces the back and forth between specs and helps onboard new designers to projects faster, especially if you are dealing with many specs across a complex industrial or manufacturing project.

Why Revit Fabrication Parts?

It's no secret that a large amount of design is done in Revit across the AE industry these days, from Architectural and Structural Design to a lot of Electrical and Mechanical layout. Early on, one of the goals of this endeavor for SSOE was to cut down the number of software platforms we use. While there will always be a time and place for certain platforms, we knew that a lot of our Piping layouts could be done in Revit…if only we had a true Spec Driven system like Plant 3D. Once Revit Fabrication Parts existed *and* was reliable (Revit 2019/2020) the decision to start running projects using Revit Fabrication Parts was easy. While this not only allowed us for unified content for Piping designs, it also allowed us to use one software platform – which eliminates numerous coordination headaches.

Revit Fabrication Parts vs "Normal" Revit (Family Content)

Revit (RFA Content)

Revit uses Revit Family Content and the piping systems are defined by Routing Preferences. With this type of content, we have limited control over users changing the properties or the geometry; it is easy for the users to edit in the model as needed. Custom fittings and accessories can easily be added without control or consulting. On the positive side Revit content offers more flexibility in 2D drawing deliverables.

Fabrication Parts

Revit Fabrication Parts Piping utilizes ITM content created and managed from CADmep and the piping systems are defined by Service Templates, or Specs. These Templates/Specs are driven from the CADmep Database and users cannot create content in the Revit models. Revit users cannot edit the part geometry or the metadata in a Revit model either, giving a more database centric approach to these items. This control enforces more consistency in each Spec (like defining Specific Piping Accessories for each Spec), and the metadata, on the Database Admin side. It is, however, less flexible in the 2D drawing deliverables.

Why would an AE Firm such as SSOE want to use "Fabrication" Software for design?

Being a full-service AE Firm, SSOE is often tasked with a design scope ranging from Architectural and Structural Building design to all the Process Piping Utilities contained within a building. Almost all scope in the projects except for Process Piping had been modeled in Revit, with Process Piping design varying between both Revit and AutoCAD Plant3D Platforms. This scenario is not optimal from both a user knowledge and coordination standpoint. First off, coordination between Revit and Plant 3D is complicated at best. Coordinate issues often reared their ugly head between the two platforms and while not impossible to overcome, it creates some frustration with users. Secondly, trying to mange two different applications and have users trained in both applications is redundant and never allows users to get fully immersed in all the features of the respective software packages. While there will likely always be a need for Plant3D, we found many projects could be accomplished in Revit. With that being said, it simply made sense to further adopt Fabrication Parts in Revit for more of our work.

Deliverable Considerations

With any new technology implementation, it is critical to know the end goal and what deliverables are needed and expected. If it's not contemplated from the beginning, the effort will certainly face an uphill battle or even fail. Revit Fabrication Parts is no exception to this, even though it is still "Revit" at the end of the day. Working with stakeholders and project teams was and still is vital to the success of Fabrication Parts at SSOE. Some items that must be considered are:

- Understanding of LOD and Design Intent vs Fabrication Models. Fabrication Parts can produce Fabrication/Construction models all the way to spool drawings, but integration with the end contractor is absolutely required to make it work properly.
- Drawing Deliverables – what does the end user or client expect to see on a drawing? Revit Fabrication Parts *does not* have as much flexibility as Revit Family Content when it comes to 2D drawings.

SSOE Implementation – What is really required to make Fabrication Parts Work?
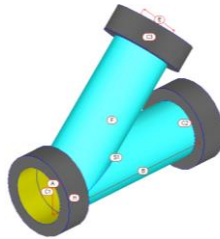
Content Creation

Fabrication Parts use .ITM content that is created in Fabrication CADmep - not Revit, and there are two ways to effectively create this content: Native Content (using Patterns) and Model Converted (using 3D DWGs in a Container Pattern). Out of the Box Content is available in CADmep to use as a starting point and .ITM content can also be purchased from 3rd parties as well. While having every possible fitting, valve, flange, etc. created and ready to go on day one is not realistic, we found it was very important to have a substantial amount complete (80-90%) of what a designer would use in a project. When we initially started the Fabrication Parts endeavor on projects, we tried to take a Just In Time approach to content creation…*we would highly recommend NOT doing this!*

These Fabrication Parts are then added to the Service Template or Spec in the CADmep Database to be used in Revit. It is important to note that Revit Families content can still be used in conjunction with .ITM content for the design, but it cannot be loaded into a Service Template/Spec.
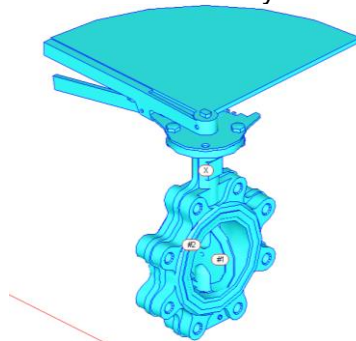
Native Content

This is the preferred way to create and handle content creation as it delivers lightweight and performant files for Revit. Native content is created in CADmep using a Pattern, which works as a Template to start from. There are many patterns available in CADmep and typically there is a pattern for each type of part (Pipe, Elbows, Reducers, etc.) In these templates, parameters such as diameter, angles, and length amount other things can be manipulated; Material and Connectivity rules are assigned to the part in this creation phase.

Model Conversion

This is also created in CADmep from a 3D DWG and can sometimes be a bit of a complex process. We like to call this the Necessary Evil – it might be necessary, but it should be avoided as there is typically a lot of cleanup work needed on the files used. For example, Embossed or Engraved text on an object would need to be cleaned up in an additional software, like Inventor, or the part will kill Revit performance when modeled.

This method is used when a pattern isn't available or compatible for Revit use, or if an extraordinary level of detail is required for a part. Diameter, angles, and length cannot be manipulated, but the Material and Connectivity rules must be assigned accordingly.

Database Efforts

The database Revit Fabrication Parts uses is pulled from Fabrication CADmep and is arguably the glue that holds together all the specs and content for Revit to consume. No different than other Spec drive software platforms (such as Plant 3D), it is *critical* that the individual(s) setting up the database or building specs are experienced in Piping Design and Construction. We have found that without that experience it is near impossible to build an accurate, well-functioning database. All of the Specs built out in the database are relied on by many designers and projects across the board, so any mistakes are detrimental for a few reasons. First off, rework is costly, frowned upon, and generally not expected to occur when using a Spec driven software. Any rework caused by improperly built specs is an immediate black eye on Fabrication Parts when you are selling a "Spec Driven" system. Secondly, incorrect specs in our experience begins to create trust issues with designers and engineers. Simply put, if users can't trust the database – how do you expect them to use it?
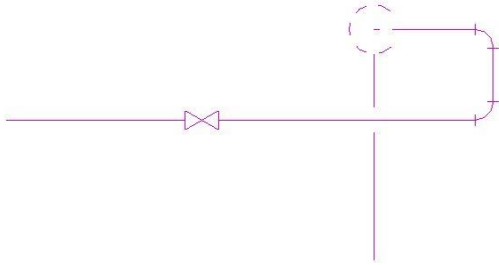
Database Considerations

Aside from having the right experienced individuals setting up a database, there are other items that must be considered both from a Company and Project level such as:

Model Updates – This really can make or break a project if the correct expectations aren't set with project teams up front. The most important item for everyone to understand is that the Fabrication Database and the Revit model *are not live linked!* Content and specs shown in Revit Fabrication Parts is a snapshot in time so when updates to a database occur Revit models will need to be updated. While the task is simple, we have found that everyone must be out of the Revit models. Additionally, the further along a project is (and the more content placed), the longer this task may take – anywhere from a few minutes to twenty minutes in our experience. Of course, updating one or two Revit models isn't the end of the world from time to time, expectations and priorities have to be aligned as to how often a database update is needed in a Revit model. In a perfect world, nothing ever changes during a project and no update is needed but that is simply not the reality unfortunately.
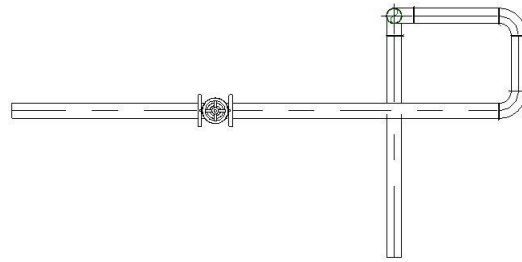
Database Structure – Like any database, being organized, consistent, and well-structured is key. Being new to Revit Fabrication Parts when SSOE started looking into it as a possible solution to our modeling, we found that sketching out the database structure from an Out Of The Box database was very helpful. The Fabrication Database has many intricacies and having a visual understanding of how not only an example works, but your companies database might work is important. It is always easier to make large database changes on paper as opposed to a database already in use on projects.

Drawing Outputs

This was, by far, the most challenging part of implementing Fabrication Parts at SSOE; and if someone had told us that at the beginning, we wouldn't have believed it. The main issue? Fabrication Parts do not have a Course/Medium/Fine Display, meaning that a Single Line for pipework and symbology for fittings, drops, and accessories do not display as typical symbology most are familiar with – different than what Revit RFA or even Plant3D Isometric drawings do. You simply get a 2D view of the part geometry is shown as it is in a view.

RFA Content – Course View   Fab Parts Content – The Only View

Project Teams were caught off guard when creating and delivering drawings. This is the reason why it's so important to know and keep in mind the deliverables ahead of time.

Creating a Plan View with Fabrication Parts in Revit is straightforward, it's very similar to using Revit Family Content. Spool drawings, however, represented some unique challenges; Out of the Box Revit is not very useful to create Spool or "Assembly" Drawings. For Spool drawing creation, it's highly recommended to go with a third party add-in. Some Options we researched were:

- GTP Stratus
- Msuite BIMPro
- Victaulic Tools

All of the above are great products, but ultimately the end deliverable will make some better than others depending on what a project is trying to achieve. Some third party options are more Revit Centric, while others allow spool drawing creation outside of the Revit platform. Essentially, there are pros and cons to each program, and a successful implementation of Fabrication Parts really requires knowing the deliverable well and choosing a solution based on the deliverable requirement.