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Beyond Fabrication: Using Revit Fabrication Parts for Spec Driven Design

BES502491

Josh Churchill
VDC Technical Leader - SSOE

Claudia Calderón
Project VDC/BIM Specialist - SSOE

About the Speakers – Josh Churchill

- Industry Experience - Mechanical Designer/VDC Specialist
  - Specializing in Mechanical Design (Plumbing/Process Piping Systems)
  - Have worked on both sides of the fence – both on the AE and Contractor sides
- VDC Technical Leader – SSOE (Toledo, OH)
  - Technical Champion – implementing new technologies, workflows, and training to users
  - An Internal SME for all things Revit/Revit Fabrication Parts, ACC/B360, Navisworks, and AutoCAD MEP

About the Speakers – Claudia Calderón

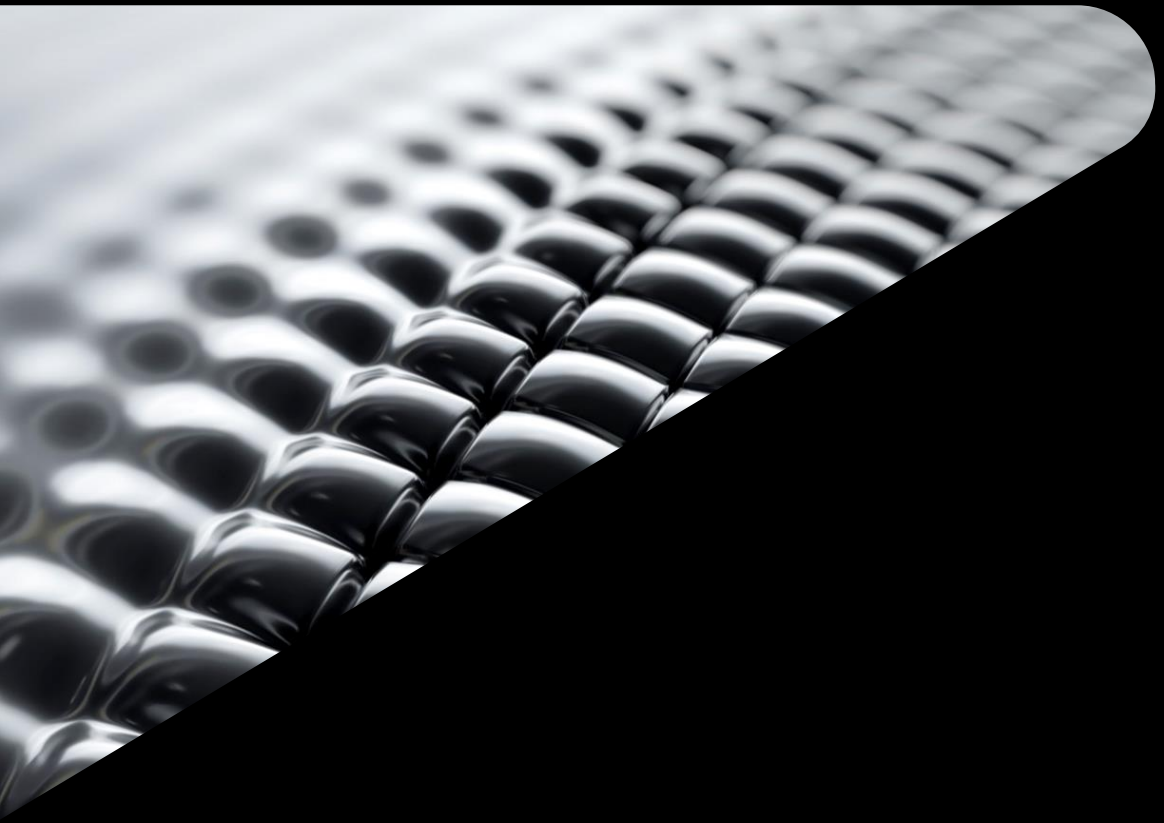
- Architecture/Mechanical Designer
  - Architectural Background (Residencial design).
  - Mechanical and HVAC design and coordination.
- Project VDC/BIM Specialist – SSOE (Leon, GTO, MX)
  - Model Coordination
  - Implementation of new technologies
  - Revit and BIM360/ACC pilots
  - BIM Standards

Course Overview & Learning Objectives

- Discover the benefits of spec-based piping design
- Assess the differences and characteristics between Revit families and Revit Fabrication Parts
- Evaluate quality and efficiency gains on projects using Revit Fabrication Parts
- Learn about challenges encountered during implementation of Revit Fabrication Parts at SSOE

Agenda

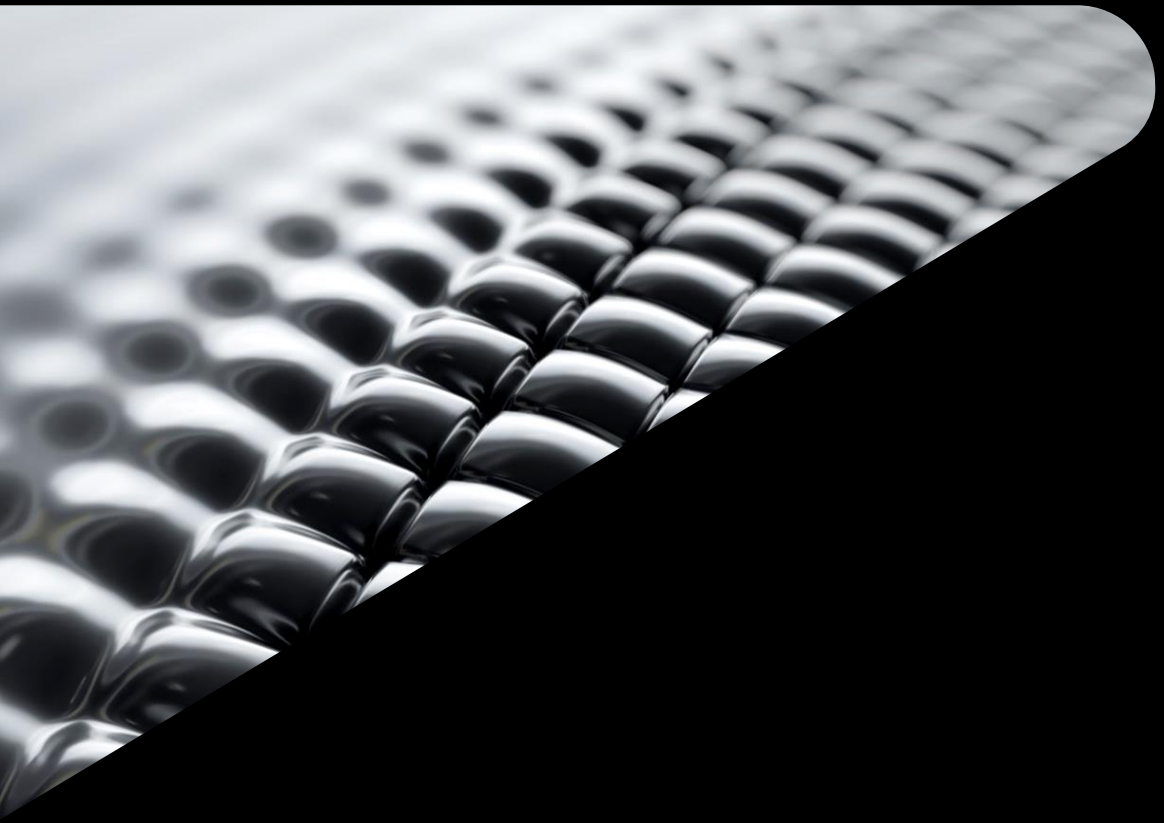
- About SSOE
- Discuss what led SSOE to Fab Parts
- Fab Parts 101 – What is it?
- SSOE’s Fab Parts Implementation Journey
- Lessons Learned / Outcomes
- Q&A



About SSOE

Quick Facts

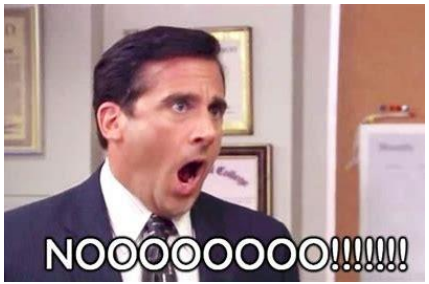
- Full Service AE Firm with a large presence in Industrial Markets such as:
  - Automotive
  - Battery Manufacturing
  - Chemical
  - Food & Beverage
  - Glass
  - High Tech Manufacturing/Semiconductor
  - And many more!
- 1200 + Employees across 18 + offices in the US, Mexico, and India
- Heavy users of Revit, Inventor, and AutoCAD Plant 3D



The Problem

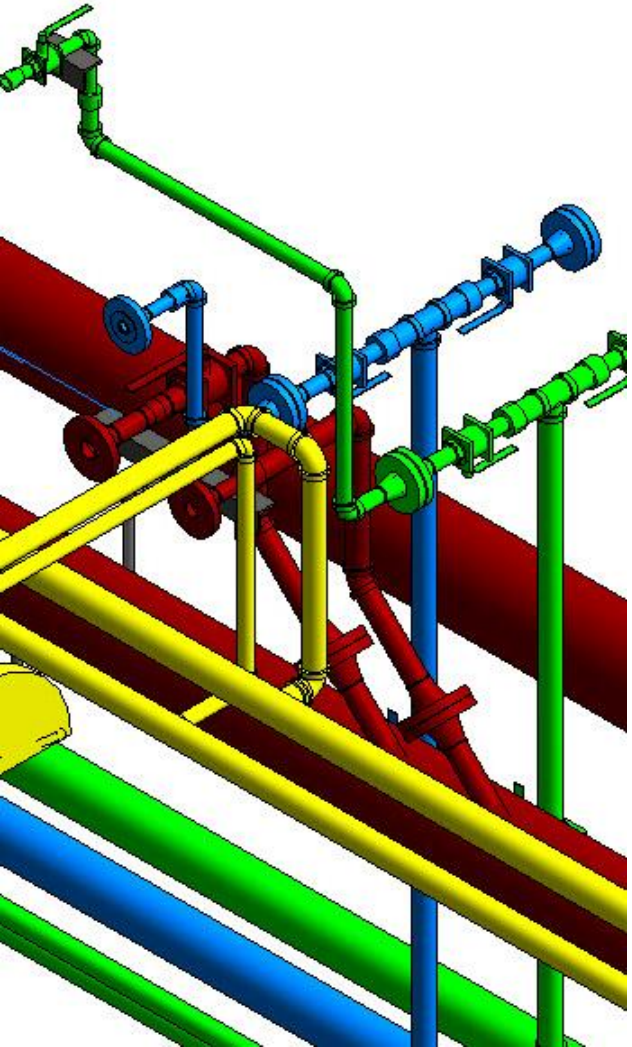
Platform Nightmares

- Being a full service AE Firm, SSOE often is tasked with a design scope ranging from Architectural and Structural Building design to all of the Process Piping Utilities contained within a building
- With an excessive amount of design authoring platforms available, “Technical Skill Silos” have occured
- Almost all scope outside of Process Piping had been modeled in Revit, with Process Piping varying between both Revit and AutoCAD Plant3D Platforms. Sometimes even other platforms were put into the mix!
- Coordination Nightmares – “Please geolocate this Plant3D Model with the Civil 3D Model”



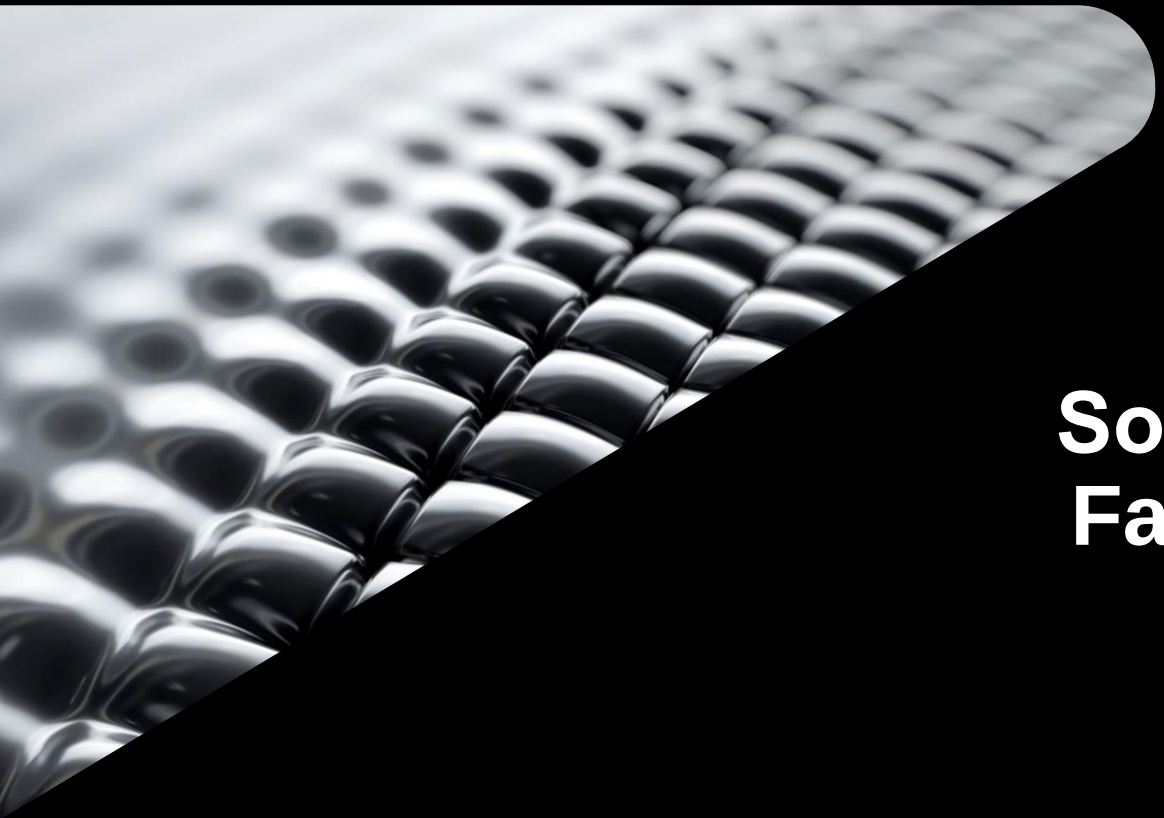
Data and Modeling Inconsistencies

- Without a Spec Driven system, it was very common to see data inconsistencies on project to project
  - While these data inconsistences (BOM Outputs) were caught at the checking stage (or before) – it was an extra step that really shouldn't be occurring
  - Traditional Revit RFA Content didn't utilize a Spec Driven "Single Source of Truth"
- SSOE wanted an avenue to produce accurate, construction ready models that Spool Drawings could be generated from. Eliminating or significantly reducing the trade contractor remodeling was important to us and our clients
- Even if we didn't generate Spool Drawings – We still wanted to produce constructable models being produced for the client without incurring additional cost to a project



The Answer – Fabrication Parts

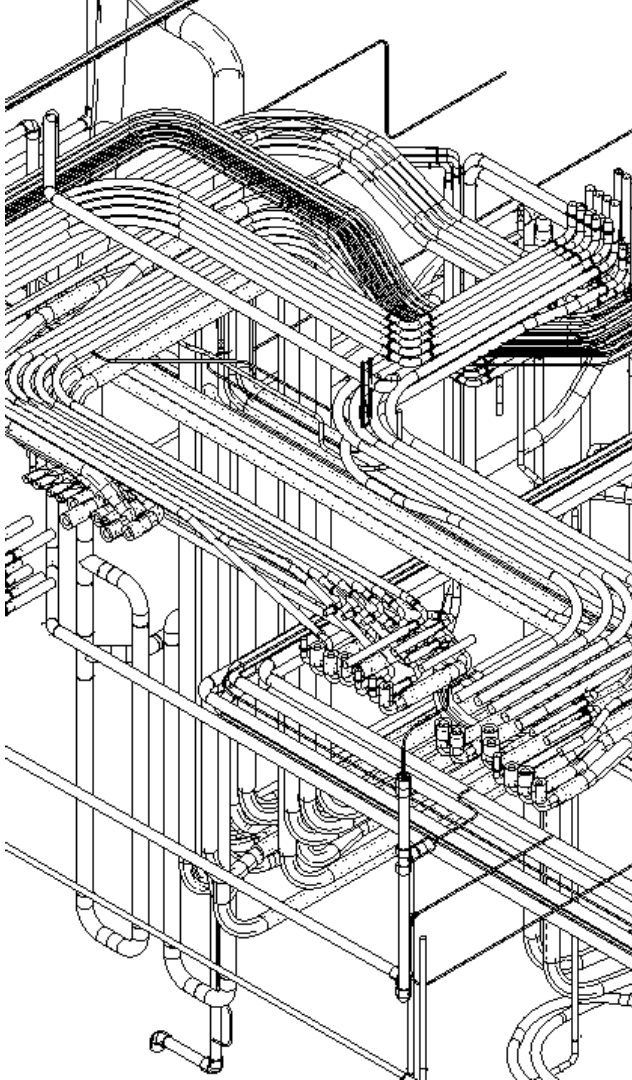
- Revit Fabrication Parts checked off many items SSOE was looking for such as:
  - A Revit based, “Spec Driven” solution for pipe routing, similar to P3D
  - A Centralized Database of Specs/Content to load into a model
  - Data integrity with metadata and BOM outputs
  - Real connectivity rules! – No more un-constructable designs
  - Easier coordination between all other disciplines who use Revit
  - Providing a pathway to Fabrication Intent design and spooling
- Finally, one less piece of software to train users on! The learning curve as a Revit user using Fabrication Parts is significantly less then training a user in a completely different platform such as Plant 3D



So…What are Revit Fabrication Parts ?

In a Nutshell…

- Revit Fabrication Parts is built into Revit, but does NOT utilize traditional Revit Family (.RFA) Content
- Content is created/sourced from Fabrication CADmep (.ITM Files)
- Service Templates “Specs” can be applied to Services giving the designer a “Palette” of content to model with
  - Copper Pipe Service Template “Spec” which drives Services such as CW, HW, and HWR systems
- Database Driven – Meaning an Admin controls the Specs and users in Revit cannot deviate from the Spec



What are the major differences between Revit and Revit Fabrication Parts?

Revit (RFA Content)

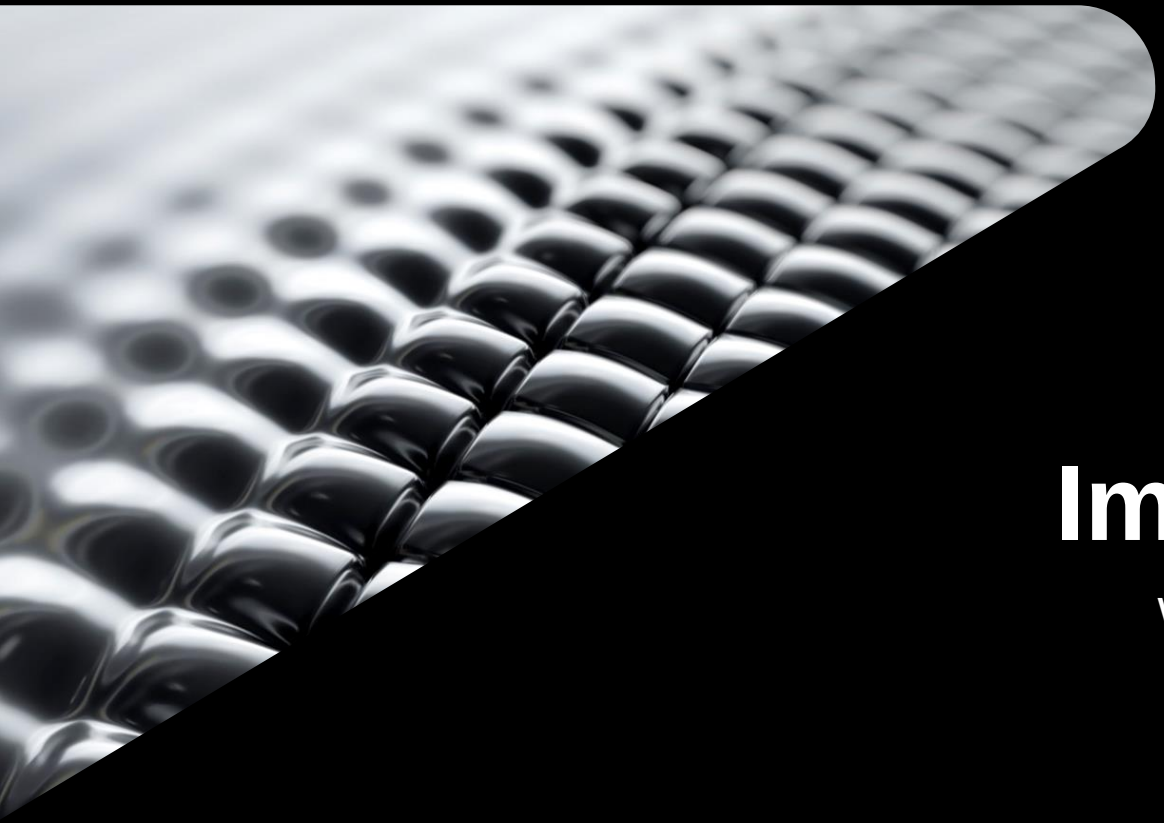
- Piping systems are defined by Routing Preferences
  - Easy for user to edit in the model (Good/Bad)
  - Limited on what can be controlled (Ex. Piping Accessories)
- More flexibility in 2D Drawing Deliverables

Fabrication Parts

- Piping systems are defined by Service Templates “Specs”
  - Driven from the CADmep Database – users cannot edit in the model.
  - Can control more in each Spec (Ex. Defining Specific Piping Accessories for each Spec)
- Less flexible in 2D Drawing Deliverables – Know your end goal!

Know your end goal!

- Contrary to the name, Fabrication Parts **does not** mean “Fabrication Ready”!
- While Spooling or Installing from a Revit Model using Fabrication Parts **IS** possible, it requires upfront planning with all parties involved!
- Fabrication Parts **DOES** mean modeled components are accurate!
  - Connectors are Correct (Unlike RFA’s)
  - Dimensionally Accurate
  - Correct Metadata



Implementation

Where the Real Journey Started

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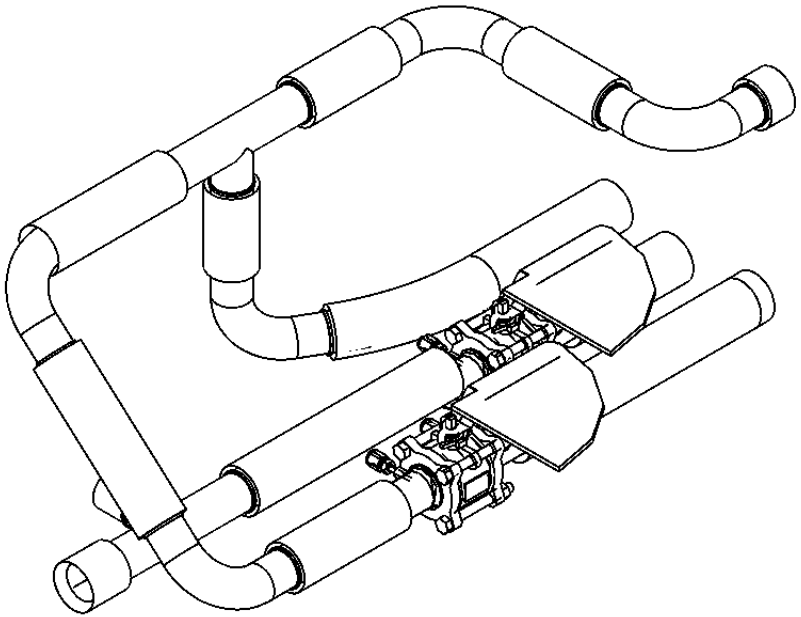
Content Creation

Database/Specs

Drawing Outputs

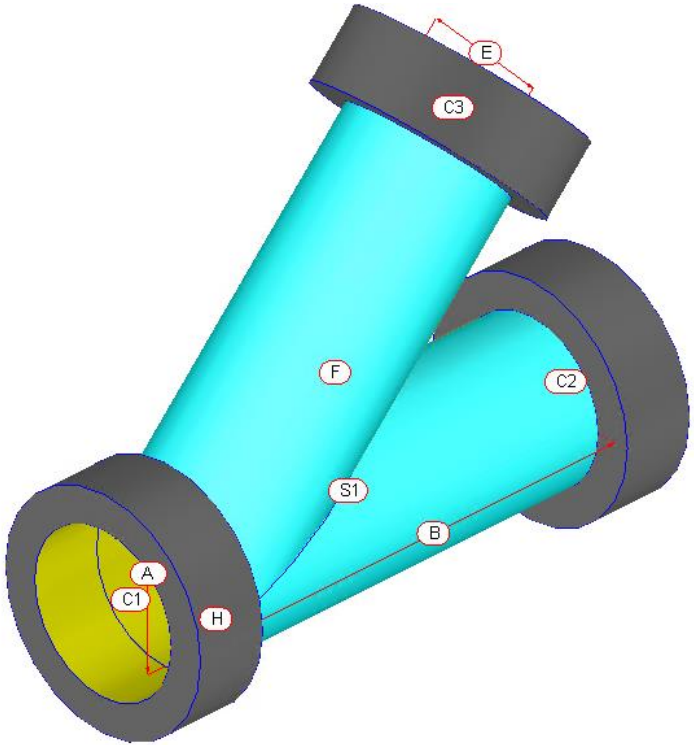
Content Creation – Where to begin?

- Fabrication Parts use .ITM Content – this is created in Fabrication CADmep, **not** Revit
- There are effectively two different ways to create Fabrication Parts: Native Content (Patterns) and Model Converted (3D DWG's in a "Container")
- OOTB Content exists as a starting point and ITM content can also be purchased from 3rd Parties as well
- Don't underestimate what content you need



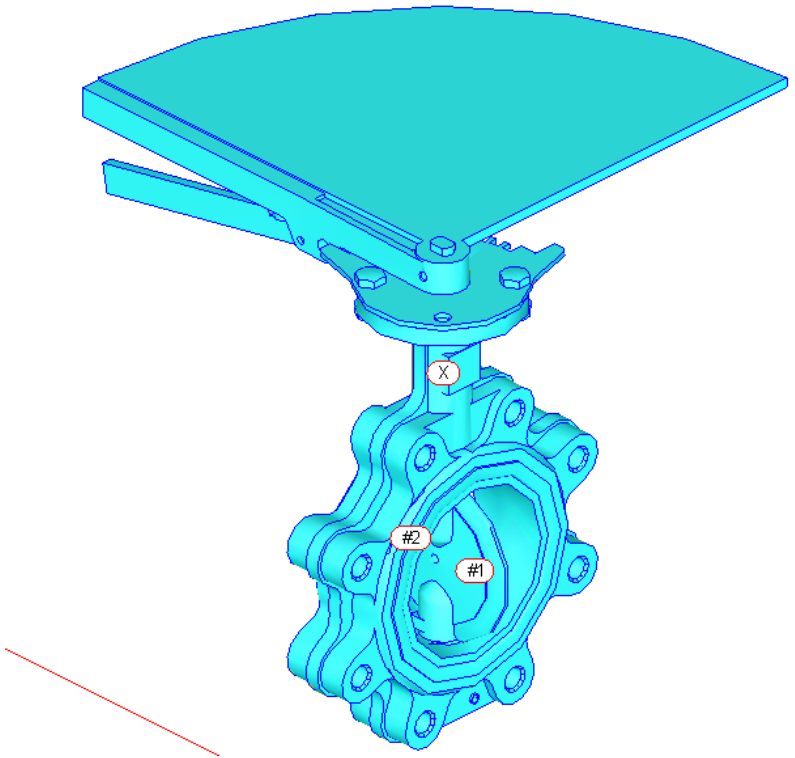
Content Creation – Native

- Created in CADmep using a Pattern – more or less a template to start from
- There are MANY patterns that exist – typically there is a pattern for each type of part (Pipe, Elbows, Reducers, etc.)
- Content contains both Material and Connectivity rules
- The preferred way to handle content creation – creates lightweight, performant files for Revit
- **Caution: Not all patterns work in Revit!**



Content Creation – Model Conversion

- Created in CADmep from a 3D DWG - Sometimes a bit of a complex process
- Used in situations where a pattern isn't available, or an extraordinary level of detail is required for a part
- The necessary evil – it may be necessary but avoid if possible. Some cleanup of the file may be needed (For example, Embossed or Engraved text on an object will KILL Revit performance)
- Content contains both Material and Connectivity rules
- **Caution: Limitations in Revit – make sure it works!**



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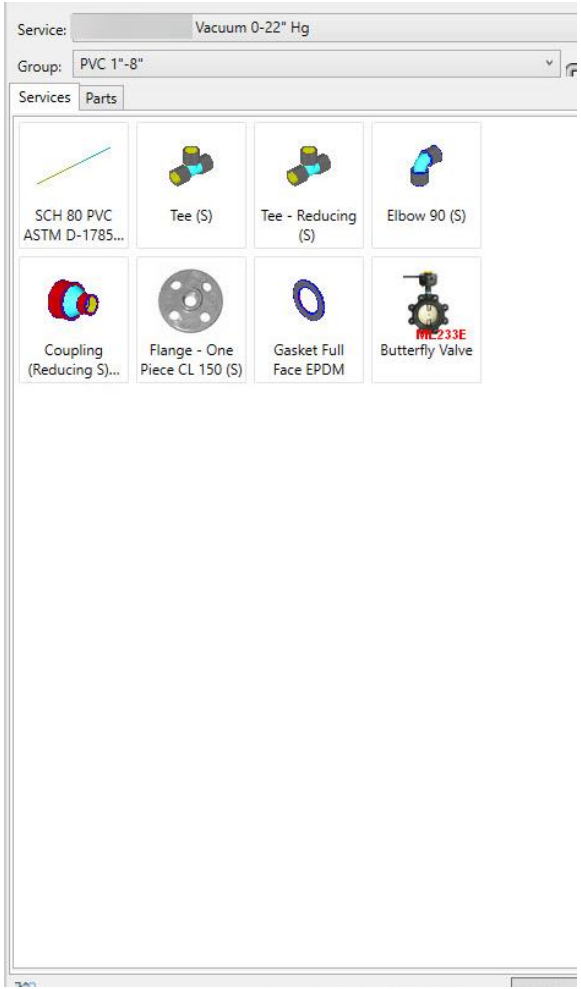
Content Creation

Database/Specs

Drawing Outputs

The Database – Putting the “Spec” into Revit

- Revit Fabrication Parts requires a Database. This is created within Fabrication CADmep and includes items such as:
  - Material Specifications – Controls items such as Material Data and Geometry OD
  - Connectivity Rules – Enforcing only compatible elements can connect. No Copper Pipe being “welded” to a Carbon Steel Elbow
  - MAPPROD – Controls a variety of Metadata, typically BOM outputs. Ensures data integrity and no surprises in our Revit Schedules ☺
- Service Templates – Defines what content is allowed in a given Spec
- Services – Piping systems such as CW, HW, HWR, etc. that reference a Service Template/Spec
- CADmep Database must be loaded into Revit models – not a live link



A note on Database Creation…

- Limit Database (Admin) Access to one or very few individuals. Having multiple people editing a Database at once is just asking for trouble…don't ask how we know

- Individuals editing the Database should have a good understanding of piping design and how it is built. One minor mistake or wrong assumption in a Spec can wreck havoc on a project as designers are relying on the specs to be correct!

- Make sure your CADmep Database is being backed up regularly

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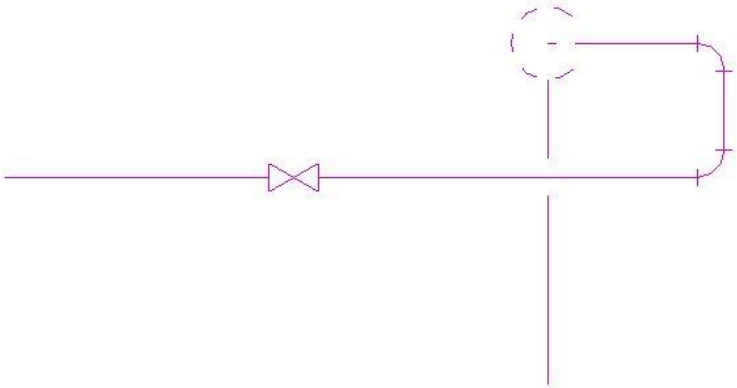
Content Creation

Database/Specs

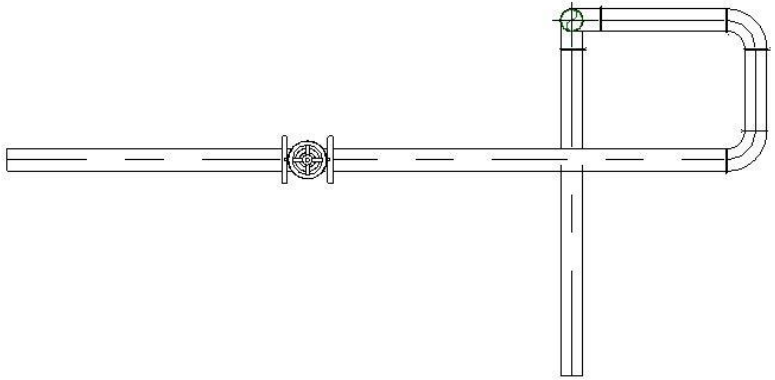
Drawing Outputs

Drawing Outputs

Is it a Valve…or is it a Valve?



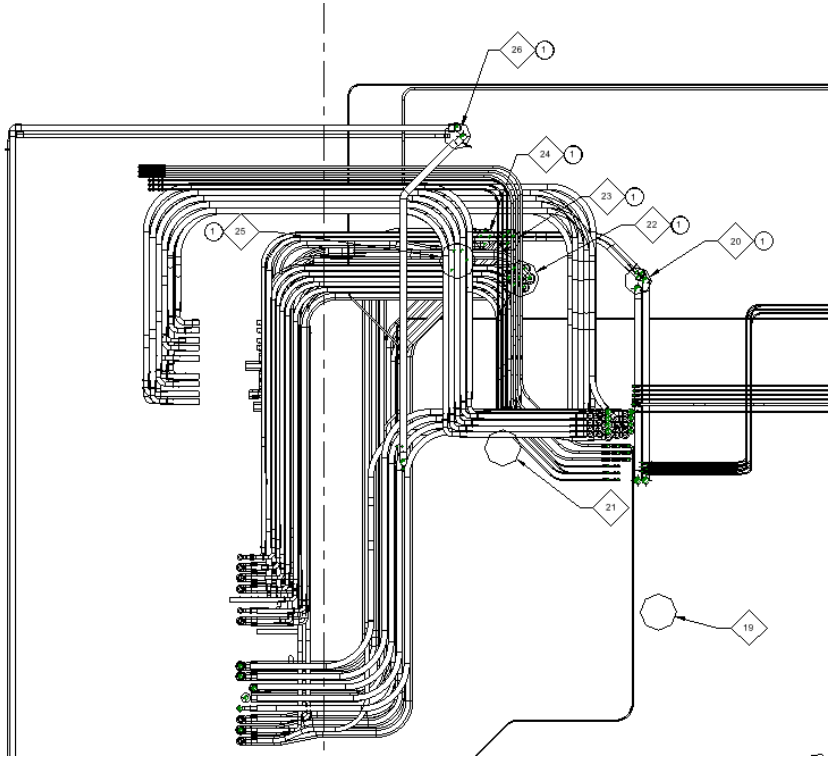
RFA Content – Course View



Fab Parts Content – This is what you get View

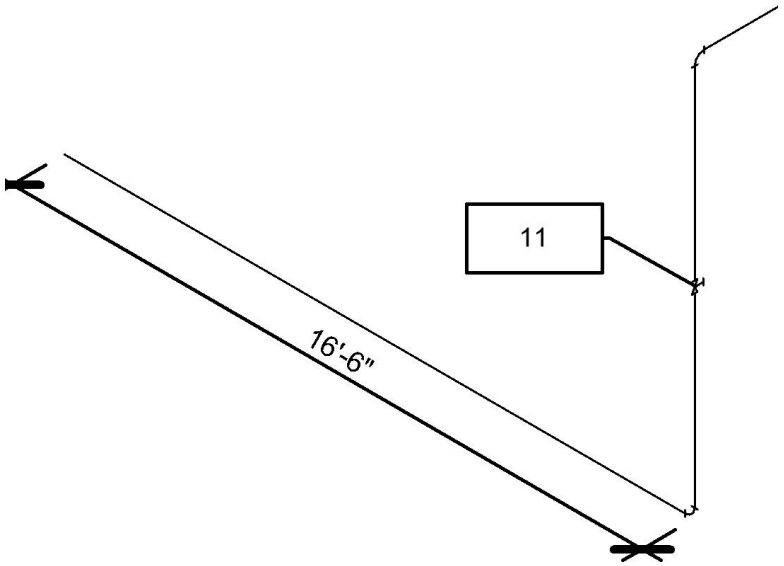
Drawing Outputs – Where the struggle began

- By FAR, the most challenging part of implementing Fab Parts at SSOE
- Fab Parts does not have a Course/Medium/Fine Display
  - Single Line Symbology does not display – different than Revit RFA or even Plant 3D Isometric drawings
  - Part geometry is displayed as in in a view
- Project Teams were caught off guard when creating drawings
- Know your deliverables ahead of time!

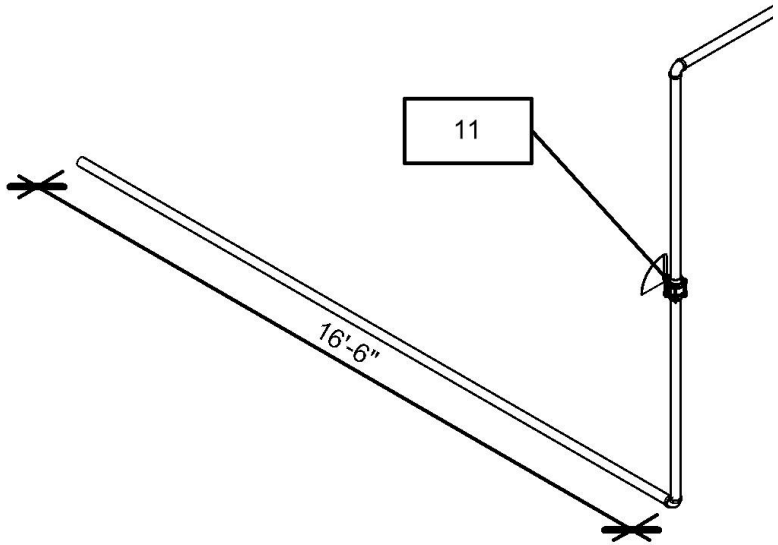


Drawing Outputs

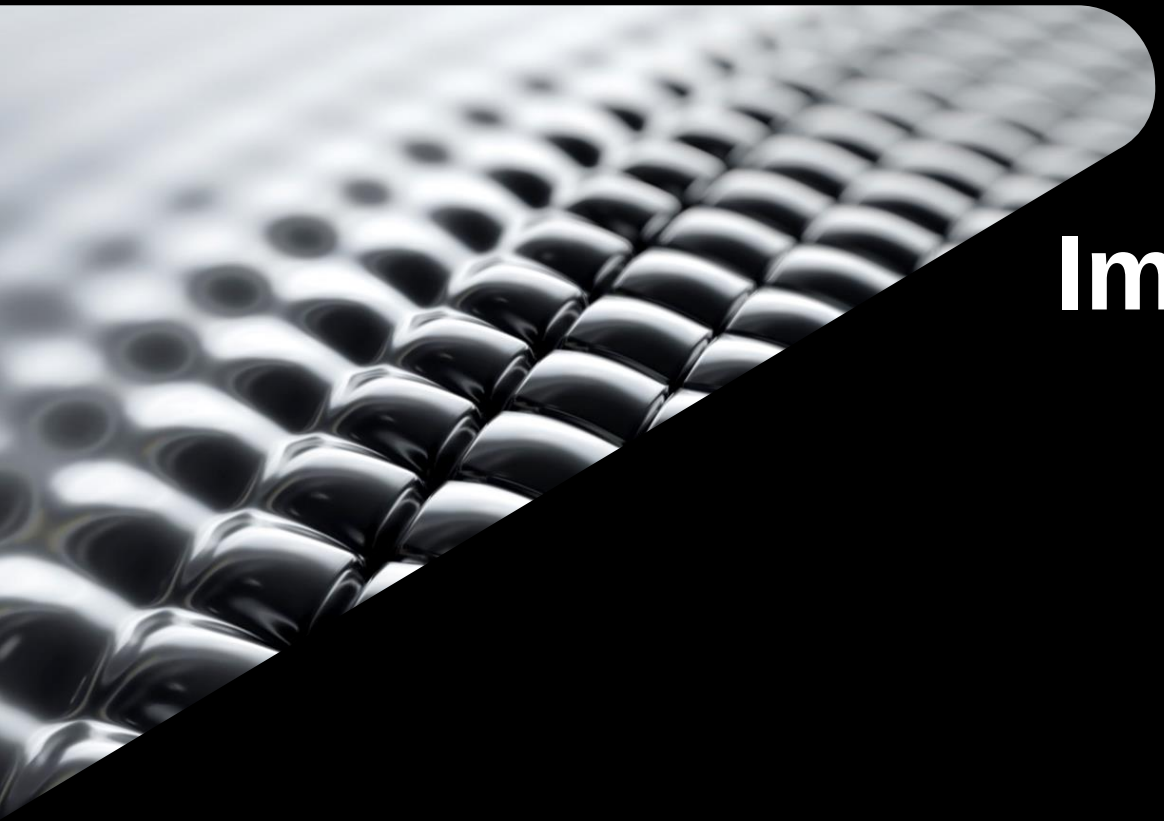
- Plan views are no issue in Revit to create – very similar to using Revit Family Content
- Spool Drawings – OOTB Revit is NOT very useful to make “Assembly” Drawings
- When SSOE was using RFA Content for some spooling work, we had an in-house custom add-in developed. This, however, did not work with Fabrication Parts (RFA Driven only)
- So…Do we invest custom development time, or look for an external solution? For SSOE, the external solution made more sense
- Some of the Revit/Spool Drawing Options out there:
  - GTP Stratus
  - Msuite BimPro
  - Victualic Tools
- There is no one size fits all solution – each application has its pros and cons depending on your workflow. Again, it is critical to know the end goal/deliverable of your project!



Single Line Iso (RFA)



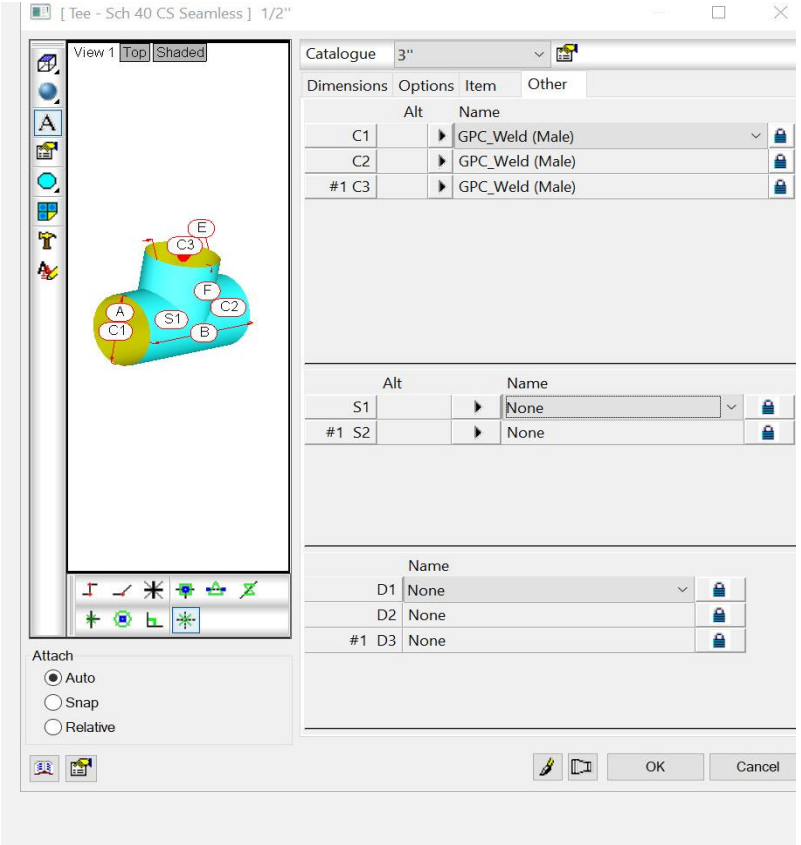
Fab Parts Iso



Implementation Lessons Learned

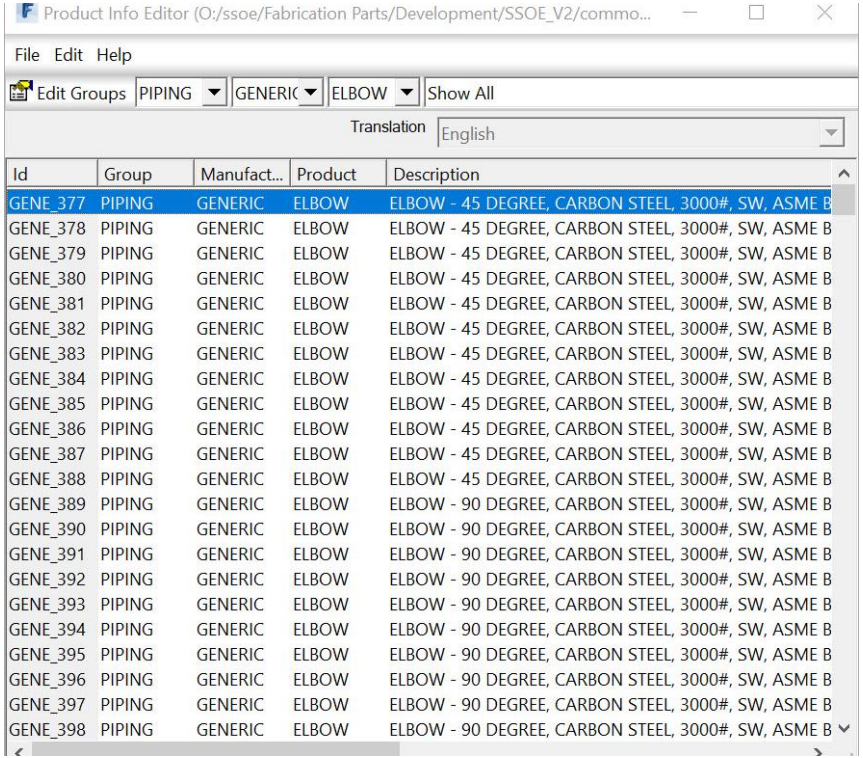
Lessons Learned – Content Creation

- Content Creation – There's a lot that you need to build (or Purchase) for a successful Fab Parts Implementation
  - From an AE Perspective, building every manufacturer's content isn't always needed. We chose to build out items governed by a Standard (Such as ASME B16.9) as a generic item to cut down on parts
- Get your database folder structure set first before creating ANY content. Changing folder structures around after building Service Templates/Specs adds additional hassle
- Every item needs a custom ID assigned



Lessons Learned – Database Development

- MAPPROD - use this to control your BOM outputs. If something changes (such as a Part #), it is much easier to update when that data is in MAPPROD
- Limit access to your CADmep Database!
- Updating the database in a Revit model – Everyone needs to be out of the Revit model!
  - Avoid excessive database update frequency in Revit Models



Id	Group	Manufact...	Product	Description
GENE_377	PIPING	GENERIC	ELBOW	ELBOW - 45 DEGREE, CARBON STEEL, 3000#, SW, ASME B
GENE_378	PIPING	GENERIC	ELBOW	ELBOW - 45 DEGREE, CARBON STEEL, 3000#, SW, ASME B
GENE_379	PIPING	GENERIC	ELBOW	ELBOW - 45 DEGREE, CARBON STEEL, 3000#, SW, ASME B
GENE_380	PIPING	GENERIC	ELBOW	ELBOW - 45 DEGREE, CARBON STEEL, 3000#, SW, ASME B
GENE_381	PIPING	GENERIC	ELBOW	ELBOW - 45 DEGREE, CARBON STEEL, 3000#, SW, ASME B
GENE_382	PIPING	GENERIC	ELBOW	ELBOW - 45 DEGREE, CARBON STEEL, 3000#, SW, ASME B
GENE_383	PIPING	GENERIC	ELBOW	ELBOW - 45 DEGREE, CARBON STEEL, 3000#, SW, ASME B
GENE_384	PIPING	GENERIC	ELBOW	ELBOW - 45 DEGREE, CARBON STEEL, 3000#, SW, ASME B
GENE_385	PIPING	GENERIC	ELBOW	ELBOW - 45 DEGREE, CARBON STEEL, 3000#, SW, ASME B
GENE_386	PIPING	GENERIC	ELBOW	ELBOW - 45 DEGREE, CARBON STEEL, 3000#, SW, ASME B
GENE_387	PIPING	GENERIC	ELBOW	ELBOW - 45 DEGREE, CARBON STEEL, 3000#, SW, ASME B
GENE_388	PIPING	GENERIC	ELBOW	ELBOW - 45 DEGREE, CARBON STEEL, 3000#, SW, ASME B
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GENE_391	PIPING	GENERIC	ELBOW	ELBOW - 90 DEGREE, CARBON STEEL, 3000#, SW, ASME B
GENE_392	PIPING	GENERIC	ELBOW	ELBOW - 90 DEGREE, CARBON STEEL, 3000#, SW, ASME B
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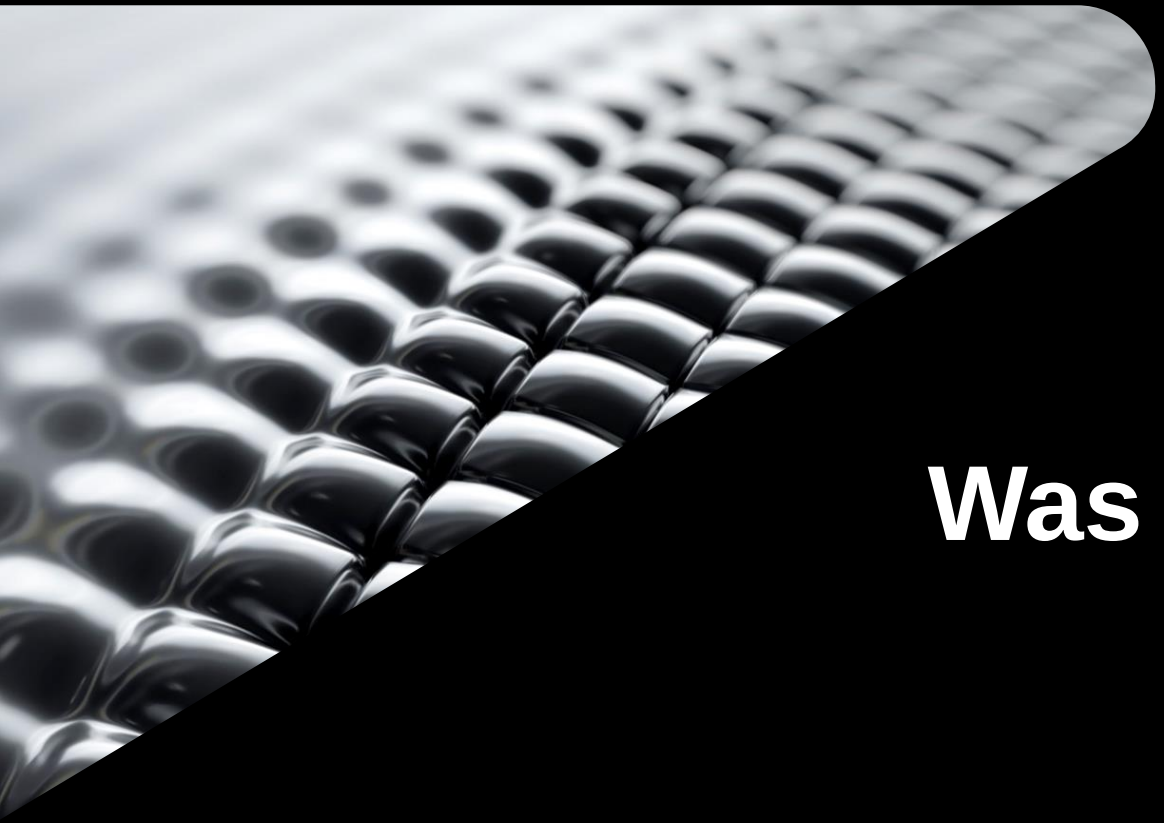
GENE_396	PIPING	GENERIC	ELBOW	ELBOW - 90 DEGREE, CARBON STEEL, 3000#, SW, ASME B
GENE_397	PIPING	GENERIC	ELBOW	ELBOW - 90 DEGREE, CARBON STEEL, 3000#, SW, ASME B
GENE_398	PIPING	GENERIC	ELBOW	ELBOW - 90 DEGREE, CARBON STEEL, 3000#, SW, ASME B

Lessons Learned – Final Observations

- EVERYONE has a different opinion on how a 2D Drawing should look
- There is a learning curve for Revit designers who have not used Fabrication Parts. It’s not huge, but don’t expect success without some training
- There is no one size fits all solution – sometimes RFA Content or even Plant3D may still make sense



Was this worth it?

YES!

Positive Outcomes

- Model accuracy increased significantly. The Spec Driven nature of Fab Parts ensured accurate, constructable modeling was being reinforced
  - Due to the Spec Driven nature, we saw modeling productivity increases over similar projects using RFA content
  - Enabled a path to generate Spool Drawings for Fabrication
- Fab Parts provided a single source of content for the model. Users no longer had to search for numerous Revit Families to load into models – *Huge Time Savings*
  - Only accurate content could be modeled – no more non-existent parts snuck into a design
- Designers took more interest in how they were modeling which has led to numerous Continuous Improvement conversations
- Designers prefer using Fabrication Parts over RFA content after adoption at SSOE

Q&A

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