Revit for MEP Fabrication – The Process from Start to Finish

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About the speaker

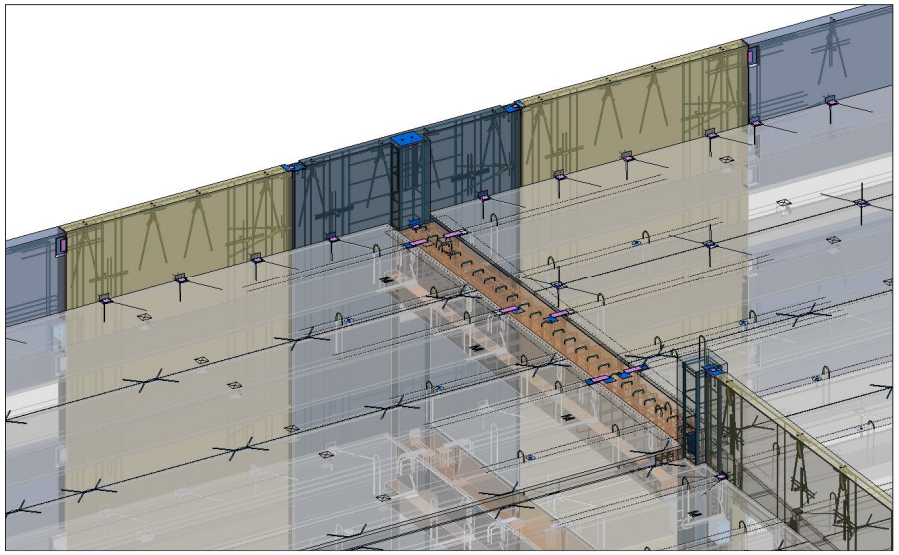
Bryan Strecker

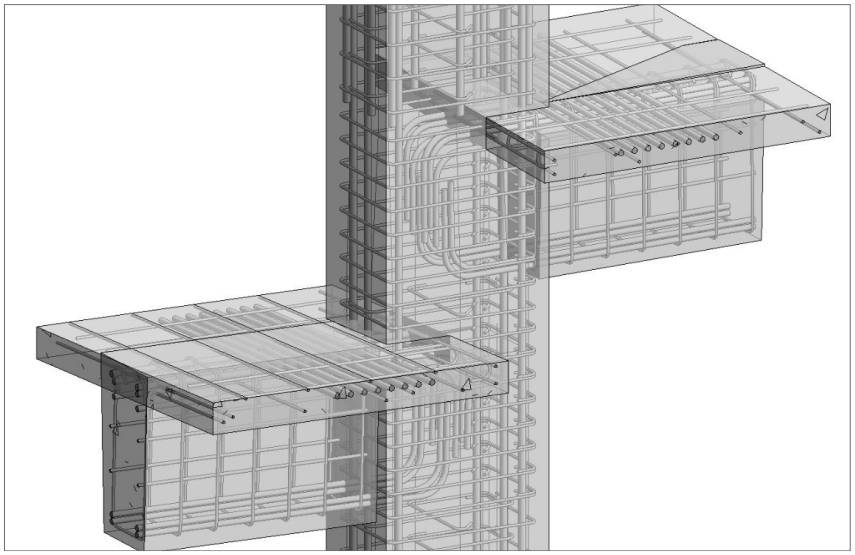
Bryan Strecker is a Mechanical/BIM Engineer with has two and a half years' experience in AEC BIM. Bryan has a combined six years' experience with Autodesk software, two of those with Revit MEP. Common project types include structural concrete lift drawings, precast detailing, Navisworks coordination, and of course, MEP modeling.

MB BIM Solutions

A Quick Overview of What We Do:

- Fabrication Level Models (and Shop Drawings from these models):
  - Rebar, Precast, Structural Steel and Miscellaneous Metals

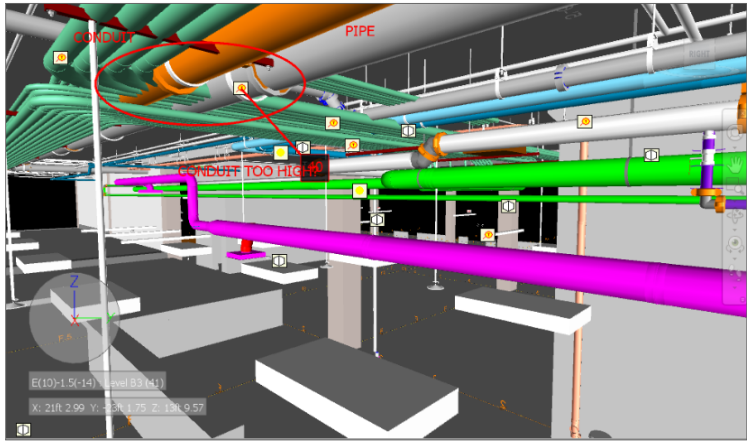


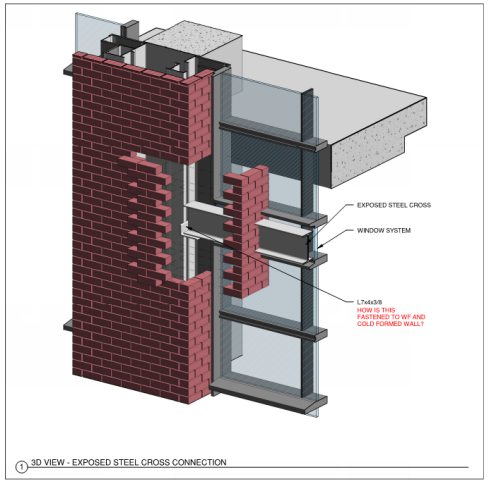


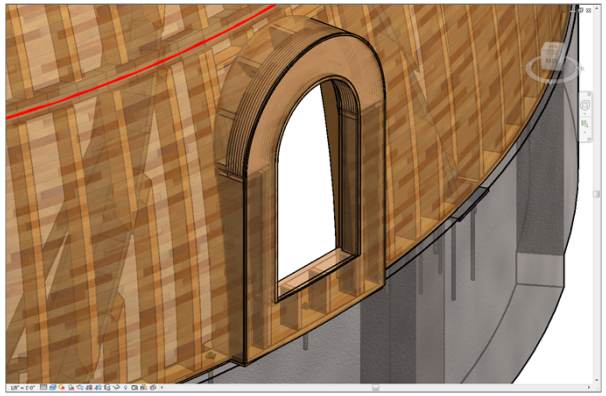
MB BIM Solutions

A Quick Overview of What We Do:

- Navisworks / 3D Coordination
- Custom Modeling
- Virtual Reality
- Virtual Mock-Ups, Constructability Studies







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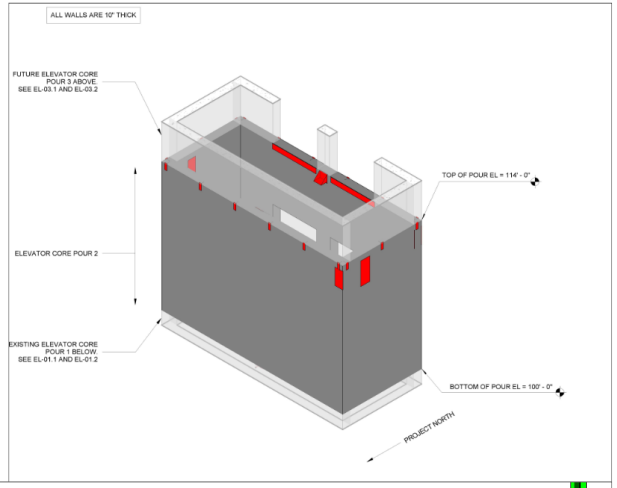
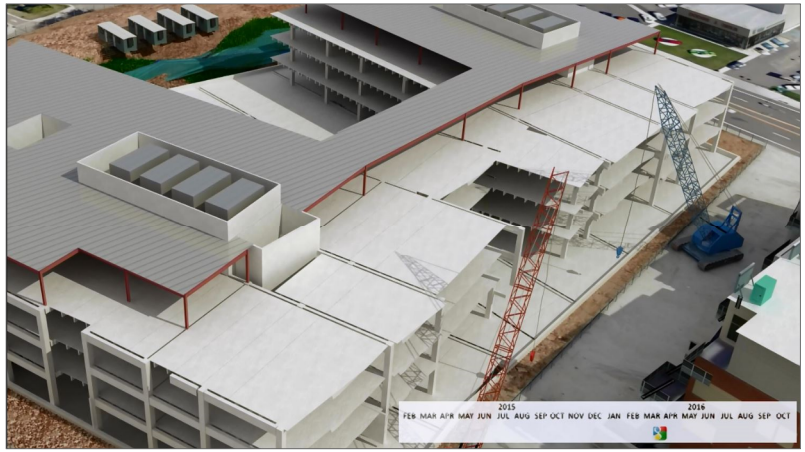
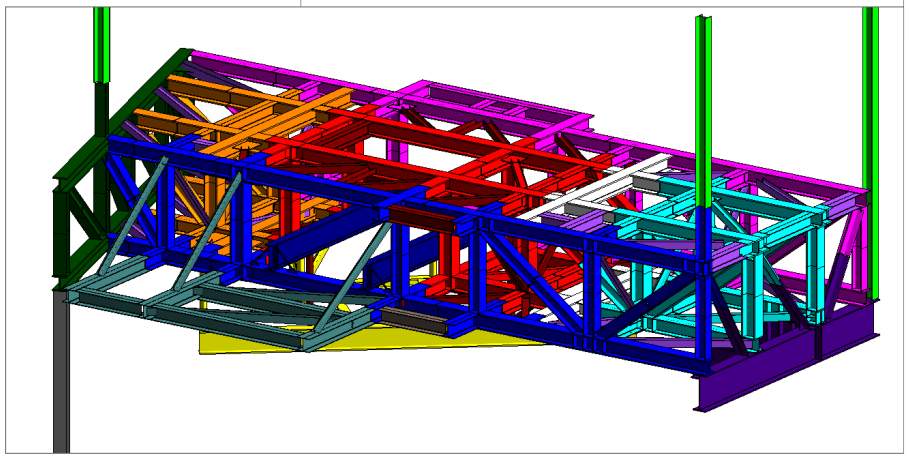


A Quick Overview of What We Do:

- Concrete Lift Drawings
- Construction Sequence Modeling/Animations
- Model-Based Estimating





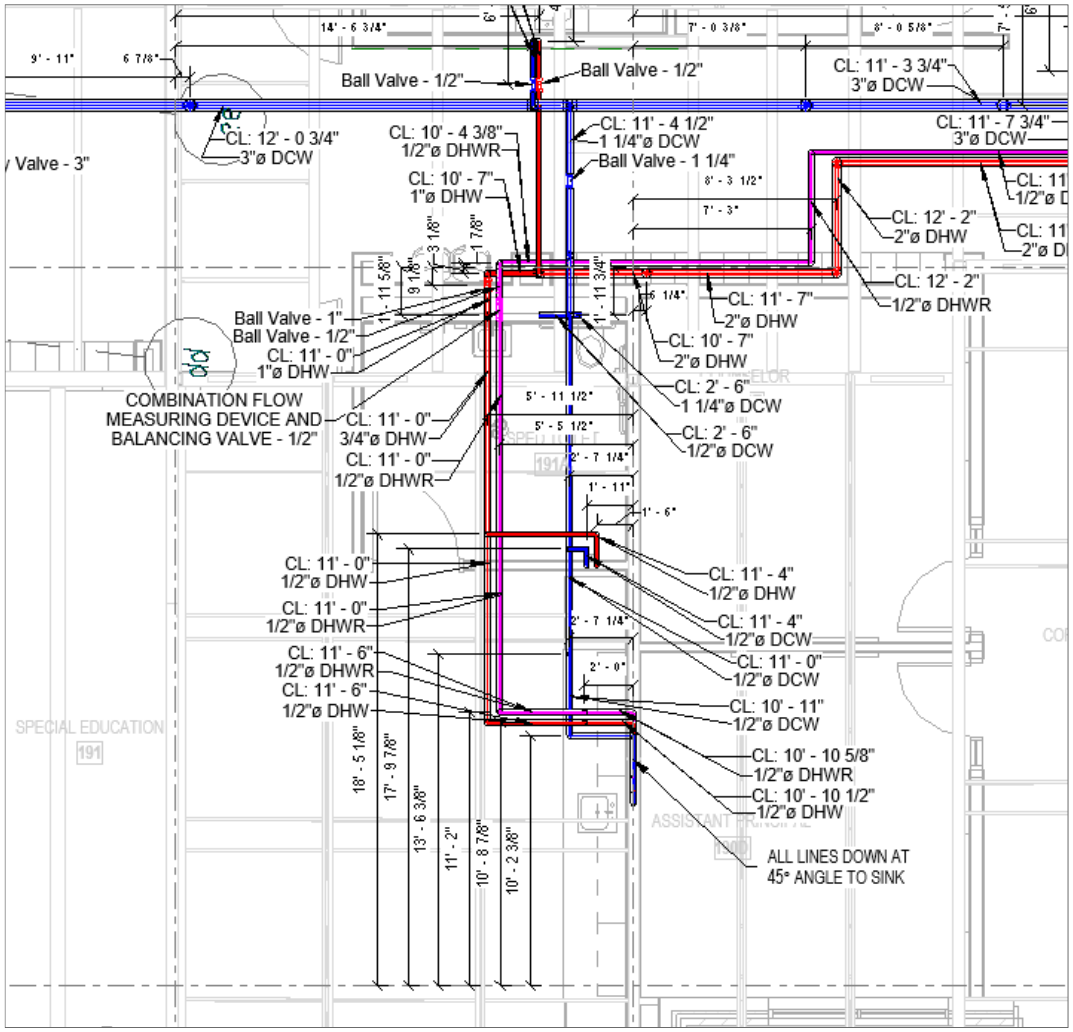
Learning Objectives

- Utilize Revit MEP Fabrication parts and assemblies to create various shop drawings to be utilized in the field.
- Understand workflow strategies to use Revit throughout the entire MEP subcontractor process.
- Demonstrate the use of Fabrication CADmep to develop custom Revit Fabrication Parts for each project.
- Learn about 3rd Party Revit Add-Ins that can facilitate faster workflow in creating accurate 3D models.

Goals for the Project

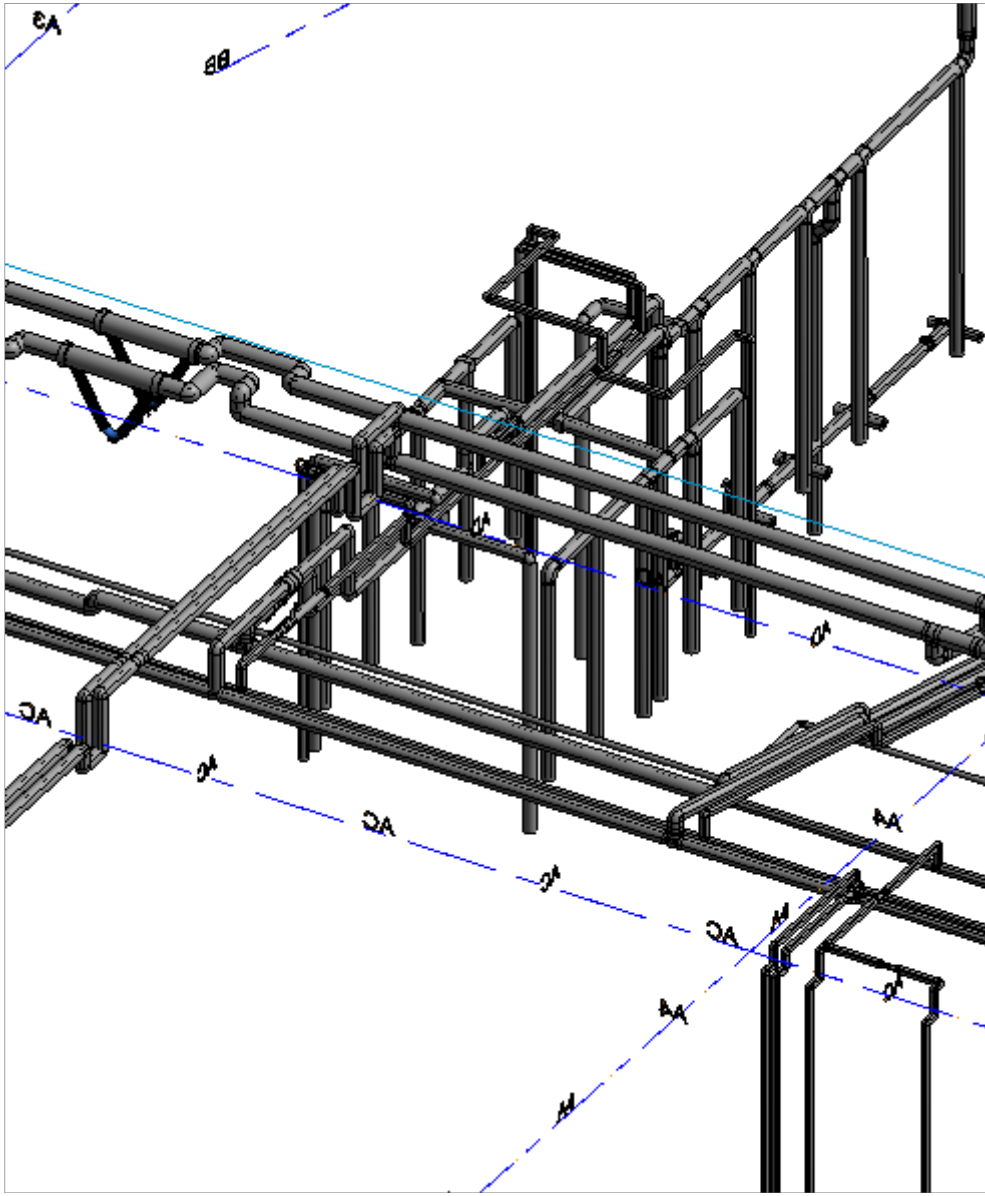
The overall goal of our projects has been to produce drawings that can be used in the field to install fully coordinated MEP systems.

- Piping Layout Plans: The Workhorse
  - Show the routing for that system
  - Calls out service, elevation, and location w.r.t. grid
  - Pro: Closely mimics design drawings
  - Con: Can get quickly cluttered
- Hanger Plans, Slab Penetration Plans
  - Locate hangers and sleeves
  - Tags and elevations
  - Can produce points, Point Layout Plan



Drawings, Cont.

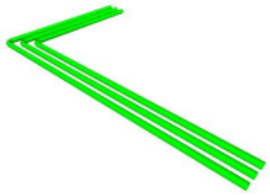
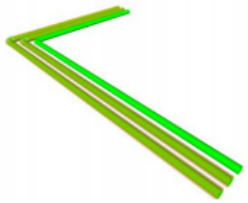
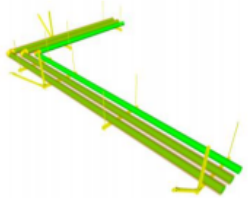
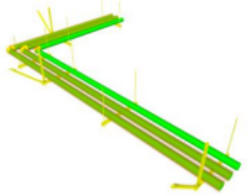
- 3D Isometric Views
  - Show all systems in 3D
  - Most helpful for the field
  - Pro: Simple to Produce
  - Con: Does not show annotation
- Spool Drawings
  - Allow for prefabrication
  - Assemblies and material takeoffs
  - Pro: Shows all elements of an assembly, fully constructed
  - Con: Only shows a small portion of the model



Revit Implementation

- LOD 300, 400, and 350 (on the right, BIM Forum's definition and graphic for domestic water piping LOD)
- Revit as the natural choice
  - We started in Structural BIM
  - Receive design drawings in Revit for most projects
- Design Parts
  - Can produce just about anything you could need
  - Does not quite meet LOD 350
- Fabrication Parts
  - Contains just about everything you need for LOD 350
  - Modify with Fabrication CADmep
  - Snap together like Legos
  - Add in hangers

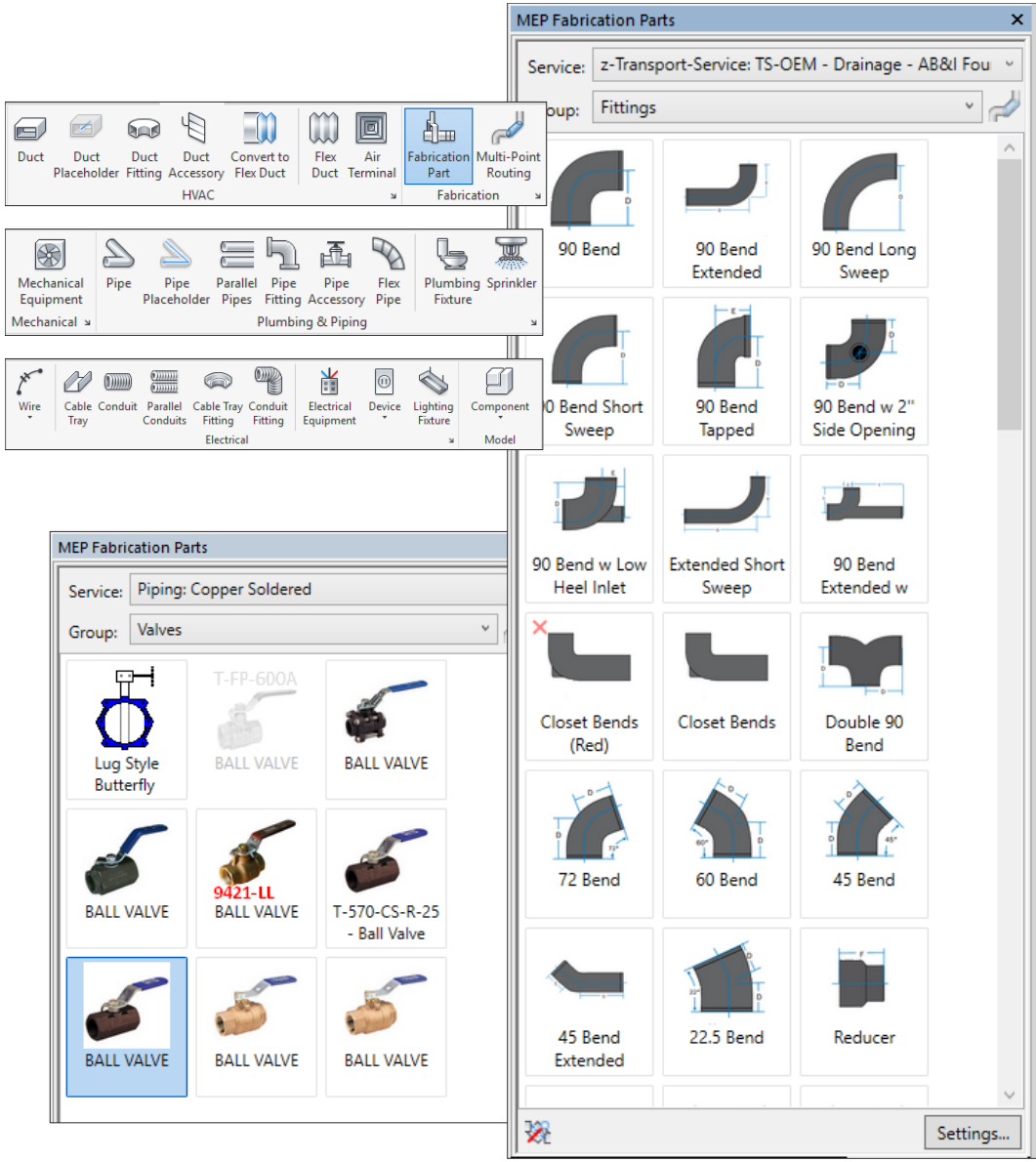
D2010.40 – Domestic Water Piping

100	Diagrammatic or schematic model elements; conceptual and/or schematic flow diagrams; design performance parameters as defined in the BIMXP to be associated with model elements as non-graphic information.	
200	Schematic layout with approximate size, shape, and location of mains and risers; shaft requirements modeled; design performance parameters as defined in the BIMXP to be associated with model elements as non-graphic information.	
300	Modeled as design-specified size, shape, spacing, and location of pipe, valves, fittings, and insulation for risers, mains, and branches; approximate allowances for spacing and clearances required for all specified hangers, supports, vibration and seismic control that are to be utilized in the layout of all risers, mains, and branches; actual access/code clearance requirements modeled.	
350	Modeled as actual construction elements; actual size, shape, spacing, and location/connections of pipe, valves, fittings, and insulation for risers, mains, and branches; actual size, shape, spacing, and clearances required for all hangers, supports, vibration and seismic control that are utilized in the layout of all risers, mains, and branches; actual floor and wall penetrations modeled.	
400	See D2010.10	

Design vs Fabrication Parts

Design families are built for MEP engineers, whereas fabrication parts are built more for MEP contractors.

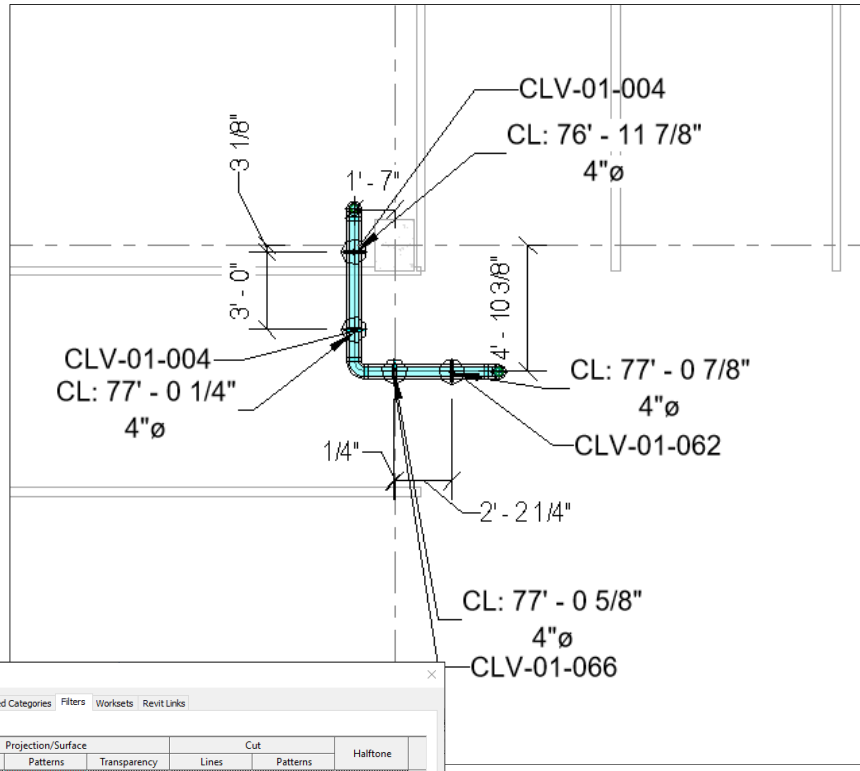
- Fabrication Parts
  - Con: Cannot perform calculations
  - Con: Must rely on Fabrication CADmep to add new items
  - Pro: Achieves LOD350 with minimal effort
  - Con: Lack of useful parameters
- Design Parts
  - Con: Does not represent real-world components
  - Con: Must have a mapped corresponding part to use the "Convert to Fab Parts" tool.

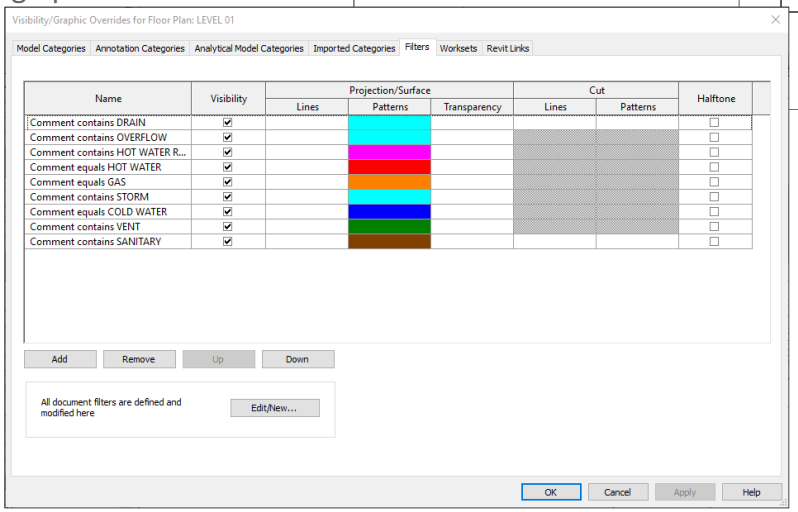


Get the Most from your Model

The lack of useful parameters for Fabrication Parts can be quite limiting. Use Shared Parameters to replace what we lose from Design Parts

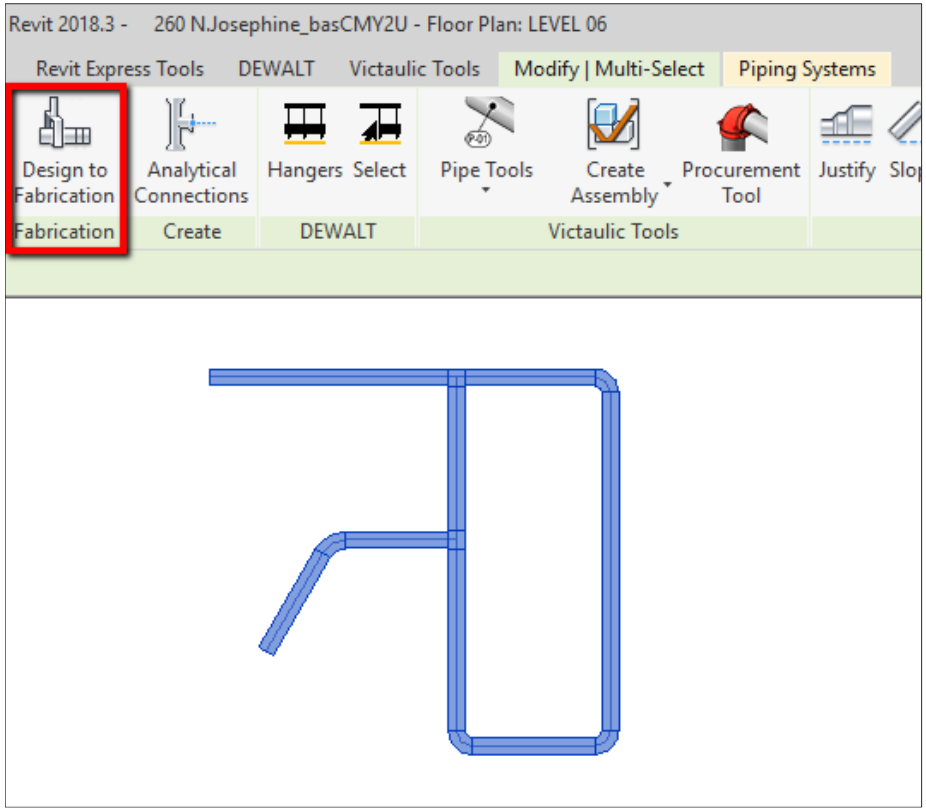
- Tagging
  - You will need separate tags for Fabrication and Design parts
  - Hanger drawings as an example
    - Tag the hanger for tag number
    - Tag the pipe it supports for elevation and size
- Filters
  - Cannot use System Filters
  - We use “Comments” for these
    - Requires filling out for every part used

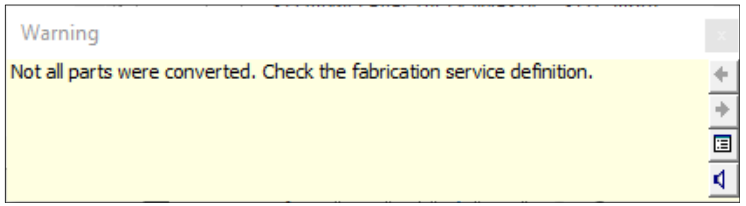




The Project Process

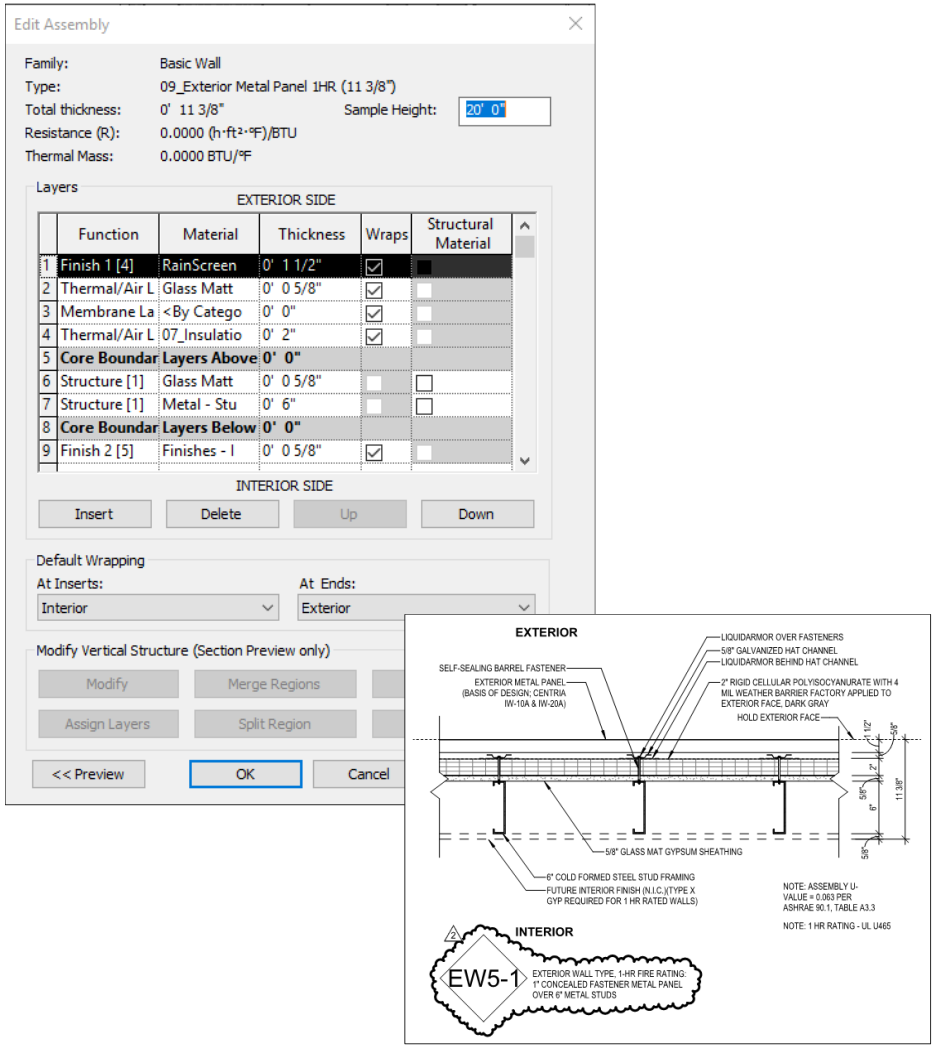
- Revit Architectural, Structural, and MEP Design Models
  - Architectural and Structural models provide a perfect background for our model.
  - MEP Design models come in using Revit families
    - This means we must convert to fabrication parts to achieve LOD350.
- Conversion Process
  - By far the most laborious process
  - “Design to Fabrication”
  - Must manually add custom fabrication parts





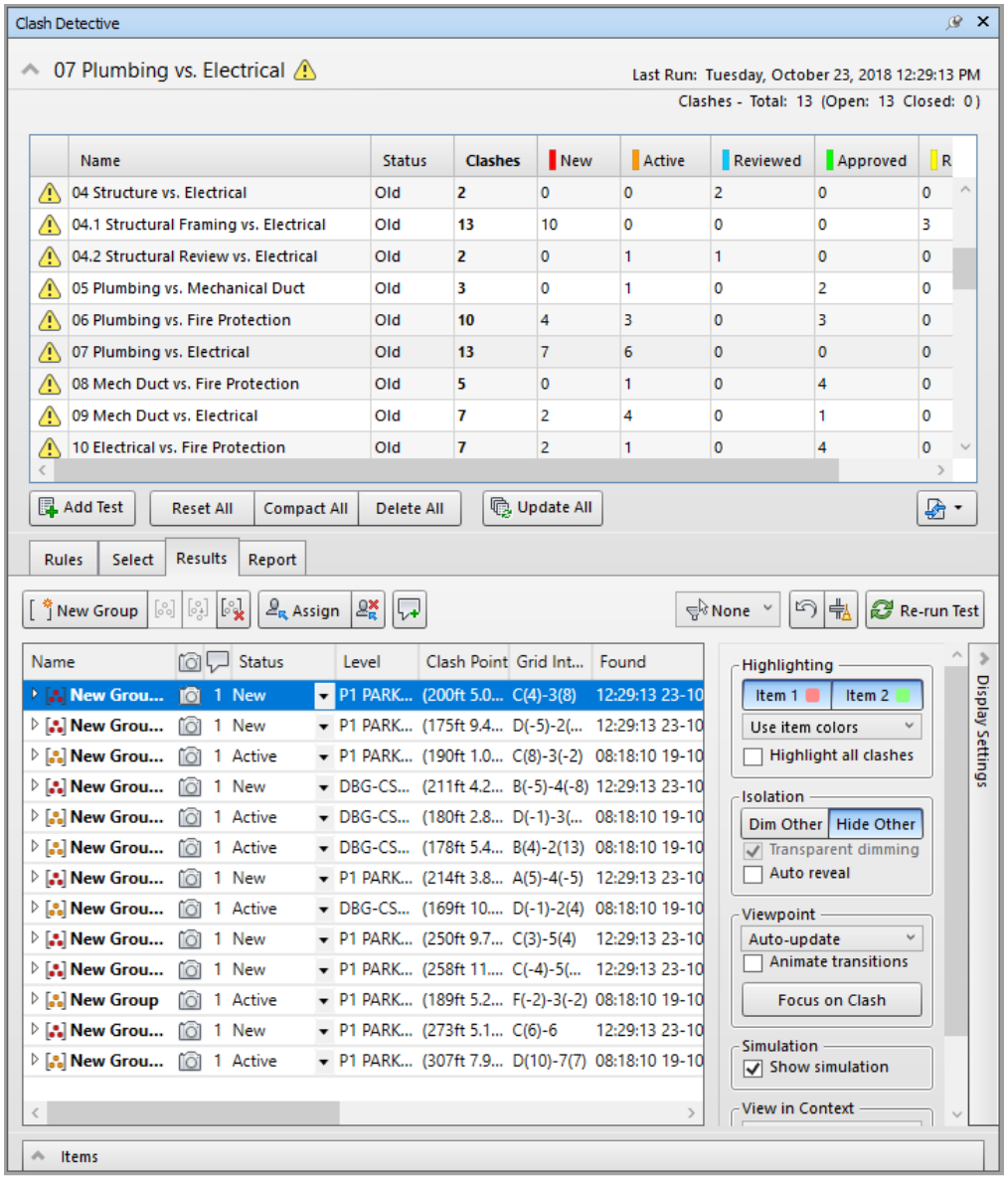
Coordination Process

- Coordination Process
  - Involves the subcontractors, general contractor, and coordinator.
  - We often control more than one aspect
    - Expedited coordination process
- Architectural and Structural Model QC
  - Checking ceilings, walls, and doors for location, size, and makeup.
  - Common discrepancies
  - Supplemental Modeling
- Initial check on MEP systems
  - Insulation as an example
  - Easier to change now than later



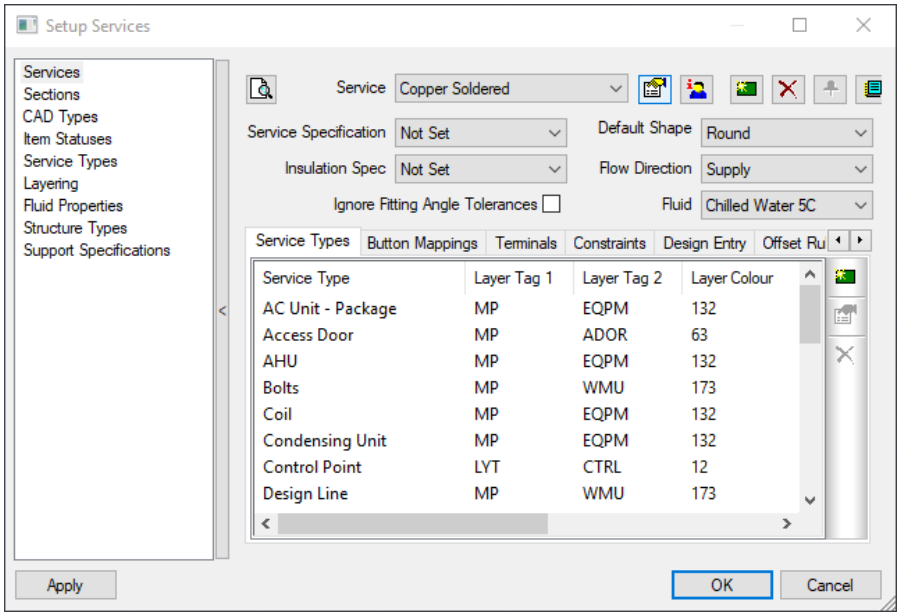
Navisworks Coordination

- Goal is to produce a clash-free model for all trades
  - Must include MEP systems, clearance zones, hangers, as well as anything else requiring space.
  - Coordinate with our supplemental modeling
- LOD 300 vs LOD 400
- Coordination Process
  - Two meetings per week to expedite the process
  - First meeting looks at general nature of the model
  - Second meeting checks every clash individually
- Ultimately depends on the subcontractors
  - Lead a horse to water, but the horse must own his model



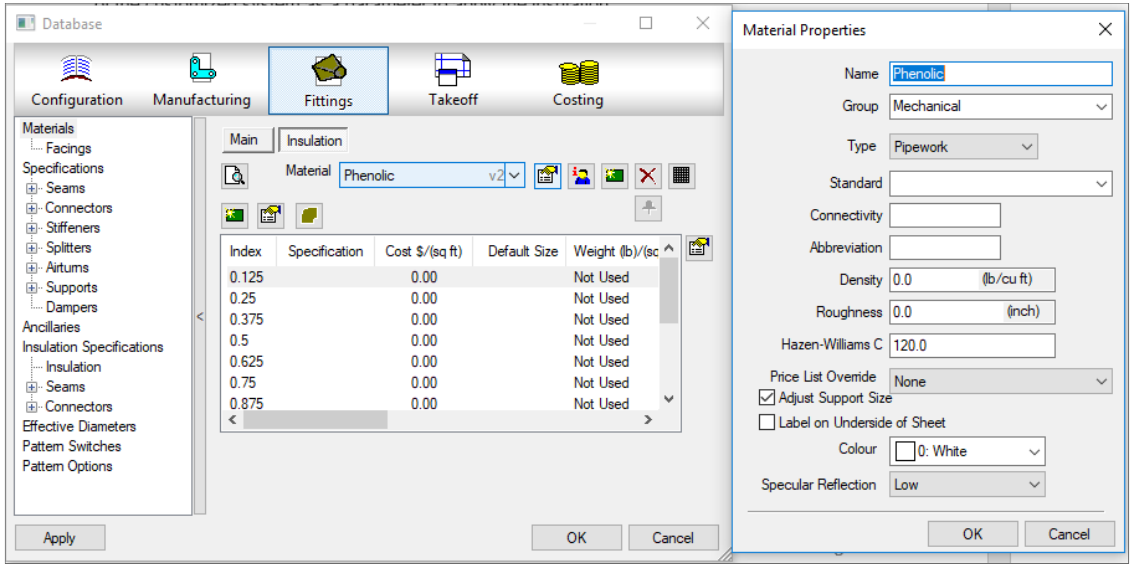
Fabrication CADmep

- Absolutely vital for Fabrication model accuracy
  - Use CADmep to make the parts more powerful, controllable, and useful overall
  - Revit cannot add parts, custom insulation, or use real-world parts off the shelf.
- Design Parts and Revit Families
  - Once again, comes down to achieving LOD350.
  - Next section describes how to:
    - Create insulation specs
    - Add new parts to our catalog
    - Not necessarily difficult, but different from Revit



How To: Custom Insulation

- Design Parts
  - Simply adjust the insulation either before or after adding it to your pipe/duct
  - Wrap or Lining, either way is simple.
- Fabrication CADmep
  - Select your configuration
  - Edit the Global Database
  - Select “Fittings,” then “Insulation Specifications”
  - Duplicate and modify
    - Name your new spec
    - Wrap or Liner
    - Select Thicknesses for Sizes



Custom Insulation in Fabrication CADmep

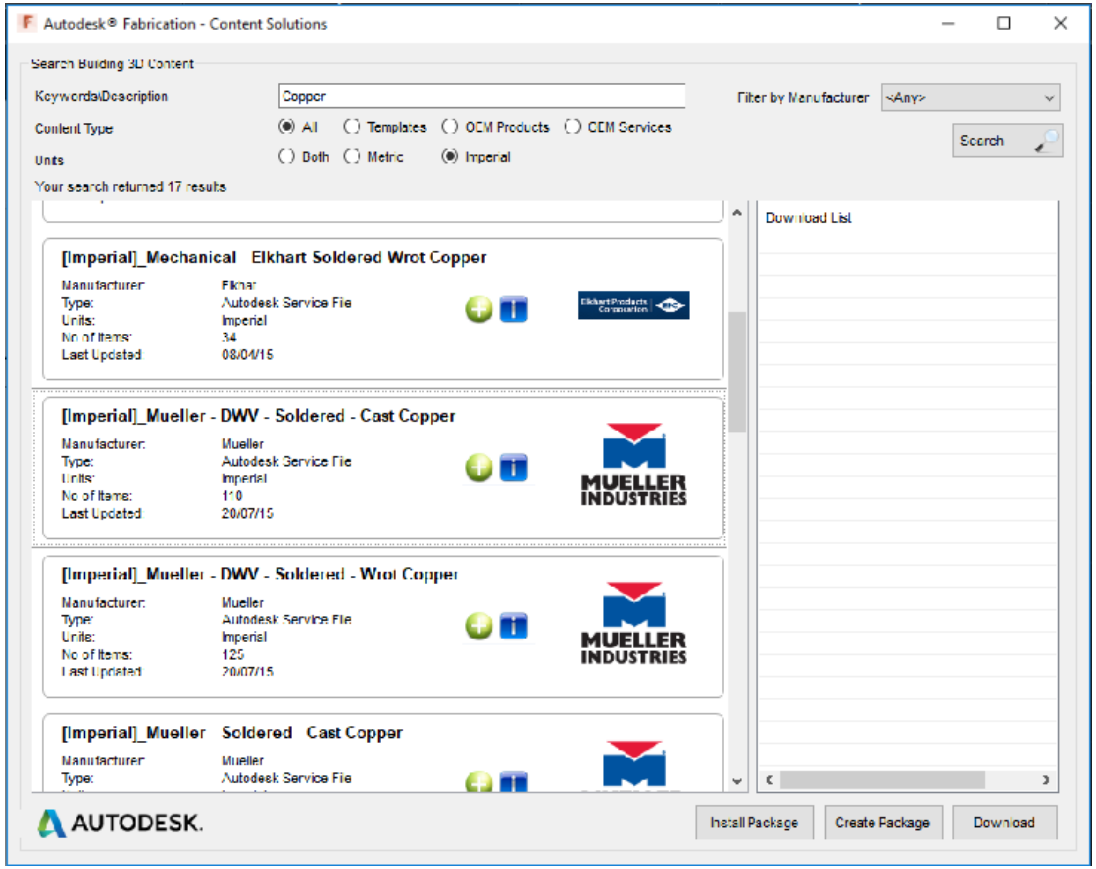
Video details the process for adding a new insulation specification to our Fabrication Parts database in Revit.

Custom Insulation in Fabrication CADmep

Video details the process for adding a new insulation specification to our Fabrication Parts database in Revit.

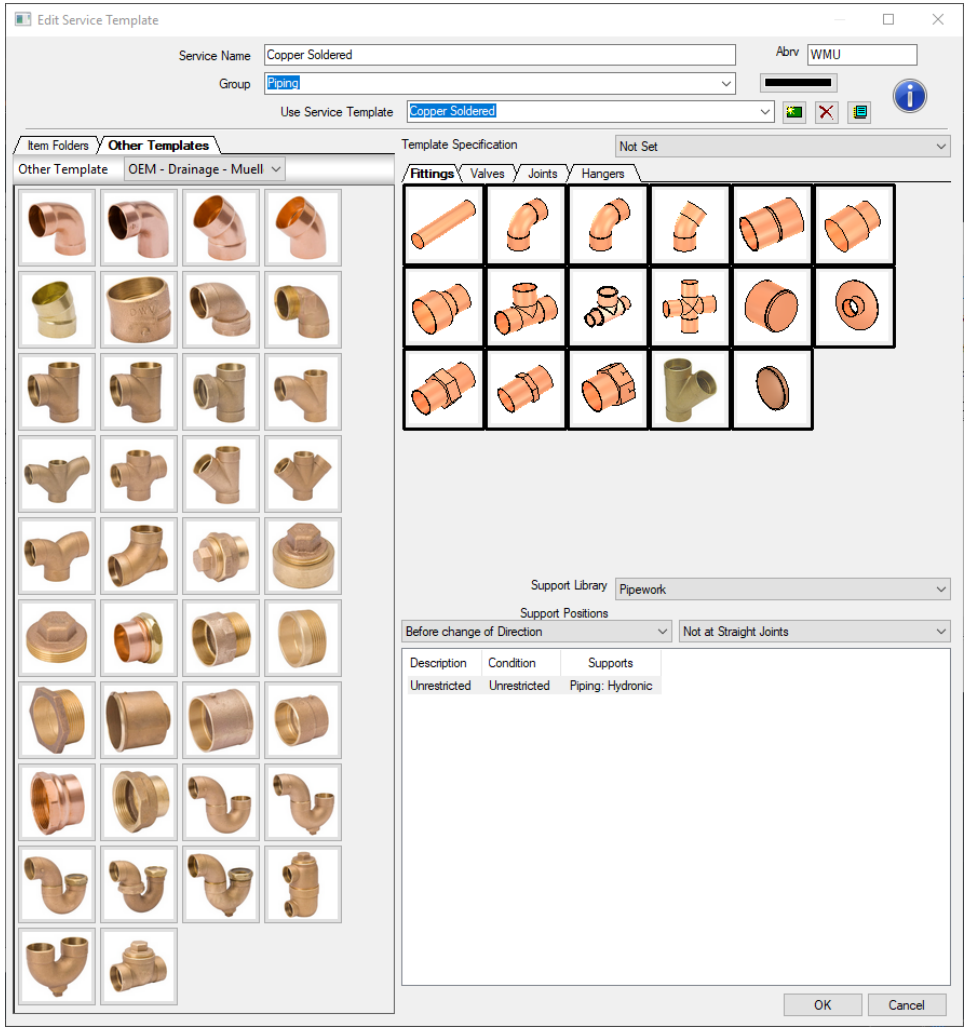
How To: Download Parts from the Web

- Manufacturers Parts available online
  - Two steps:
    - Download the parts
    - Add them to our specifications
  - “DOWNLOADCONTENT” command
    - Filter your search
    - Add keywords
    - Select your components and click “Download”
  - Now add them to our database and modify if necessary



How to: Add New Parts in Revit

- Select your Service
- Edit Service Database
- Select “Service Information”
- Edit the name of the service if necessary
- Select our Services
  - On the left, select the service to pull parts from
  - On the right, select the service to add parts to
- From here, it is a simple drag-and-drop to add parts
- Now to edit our parts for connectivity



Download Parts from the Web

Video details how to download custom parts from the web, as well as to add them to our Fabrication Parts service.

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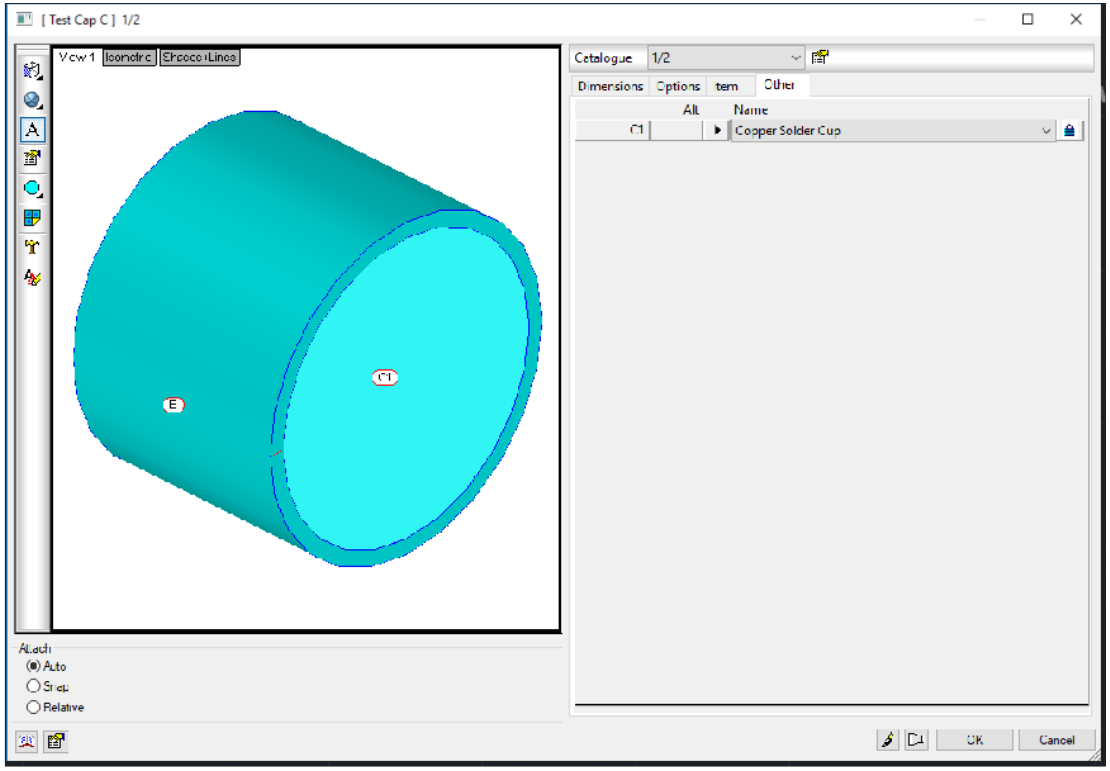
Video details how to download custom parts from the web, as well as to add them to our Fabrication Parts service.

Edit Your New Parts

- We must edit our parts for connectivity, and also for dimensions
  - Right-click, “Edit,” then the part
  - Edit the connector
    - Click “Other”
    - Click the dropdown, select your new connector
  - Edit the Dimensions
    - “Edit Product List”
    - Edit the dimensions for our part and connectors
    - Add new sizes to our list of available sizes
- Add these new parts to Revit
  - “Settings…”
  - “Reload Configuration”



Revit Add-Ins: Our Best Friend

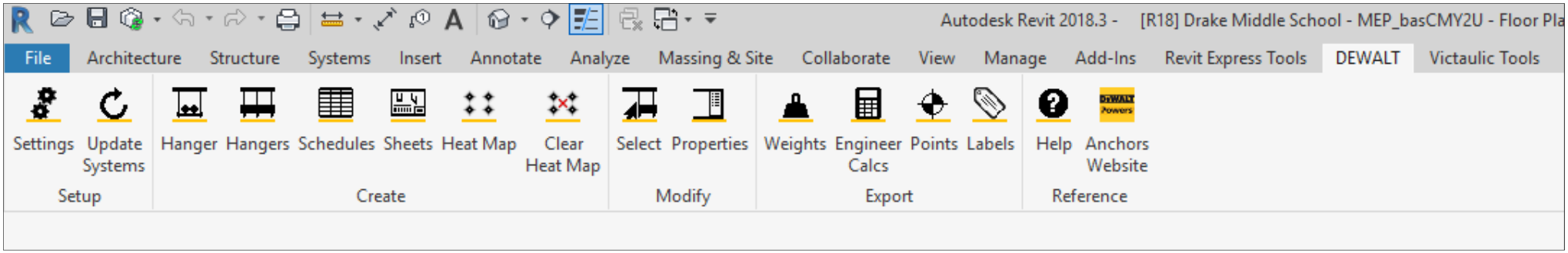
- Drastically speed up the modeling and coordination process
- DeWALT's Hangerworks
  - Set up a list of rules, then add hangers for an entire system in one click
  - Export/Import these rules to/from other projects
- Victaulic's Pipe Tools
  - Main focus is in creating spooling drawings
    - Create schedules and views to describe your assemblies
    - Automatically tag your assemblies in your views
  - A number of additional tools that can be very useful
  - Built-in shared parameters

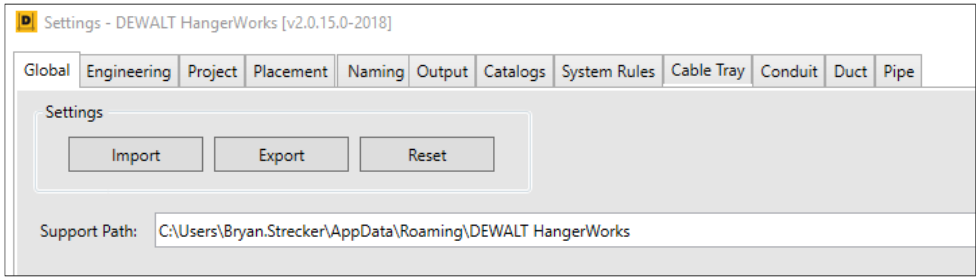
AUTODESK® REVIT®

HangerWorks SOFTWARE

VICTAULIC TOOLS FOR REVIT®

Bringing Generic Revit Models To Life





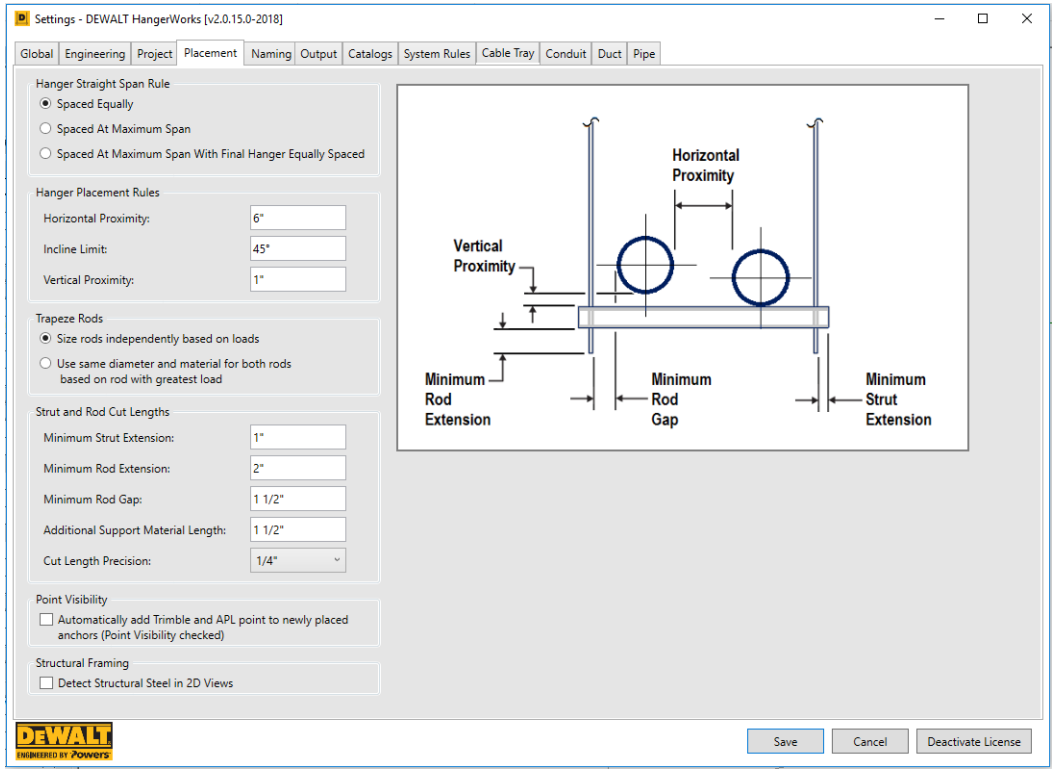
DeWALT's Hangerworks Ribbon

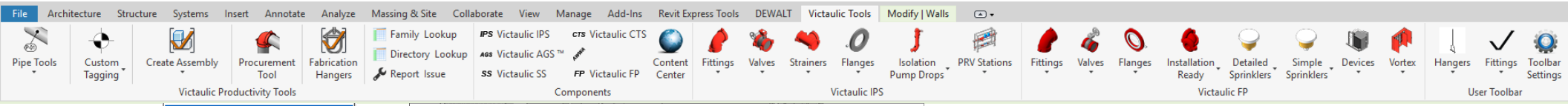
- Hangerworks Ribbon
- "Global" tab – Export/Import your settings
- "Project" tab – Set your elevations/slab thicknesses
- "Placement" tab – pipe span, placement rules
- "Naming" tab – name your hangers, prefixes, hanger mark.

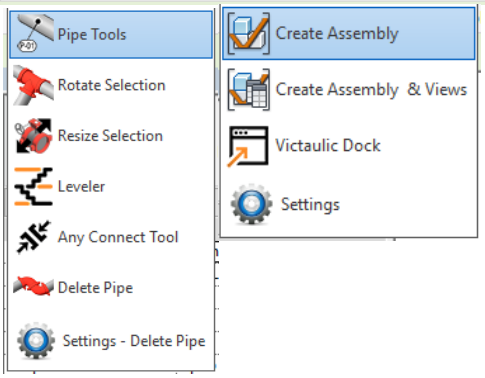
- "Naming" tab – name your hangers, prefixes, hanger mark.
- "Output" tab – Dictates how hanger drawings look
- "Catalogs" tab – select your hanger brands/manufacturers
- "System Rules" tab – Set up more placement rules – use what where
- Spacing rules tabs

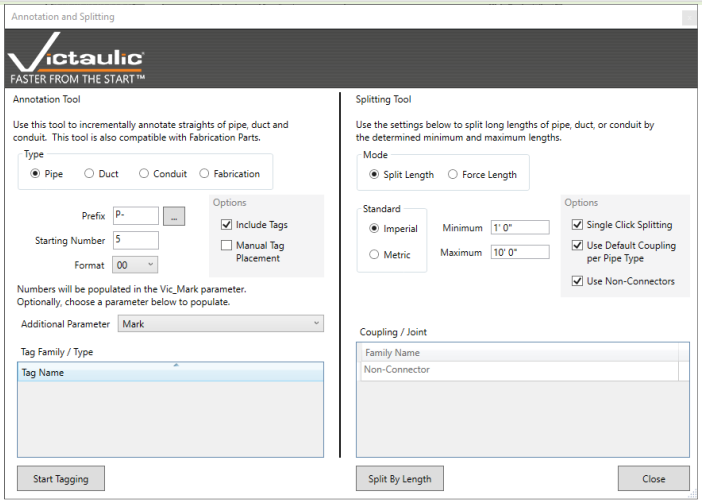
DeWALT's Hangerworks, Cont.

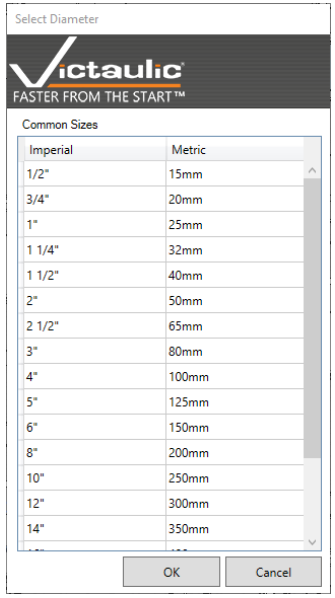
- Now that rules are set up, simply click "Hangers" to add hangers to an entire selected system.
- Hangerworks Points
  - Adds both Trimble and GTP points to hanger anchors
    - Gives location in plan and elevation of anchors
    - Hangerworks hangers automatically give rod length and diameter.
  - Use the "Schedule" button to get listings of all hangers
- Many other tools
  - Labels for your hangers in the field
  - Assembly drawings for your hangers
  - Heat map for reaction forces

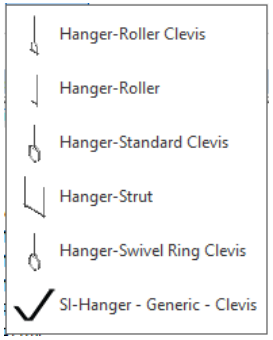










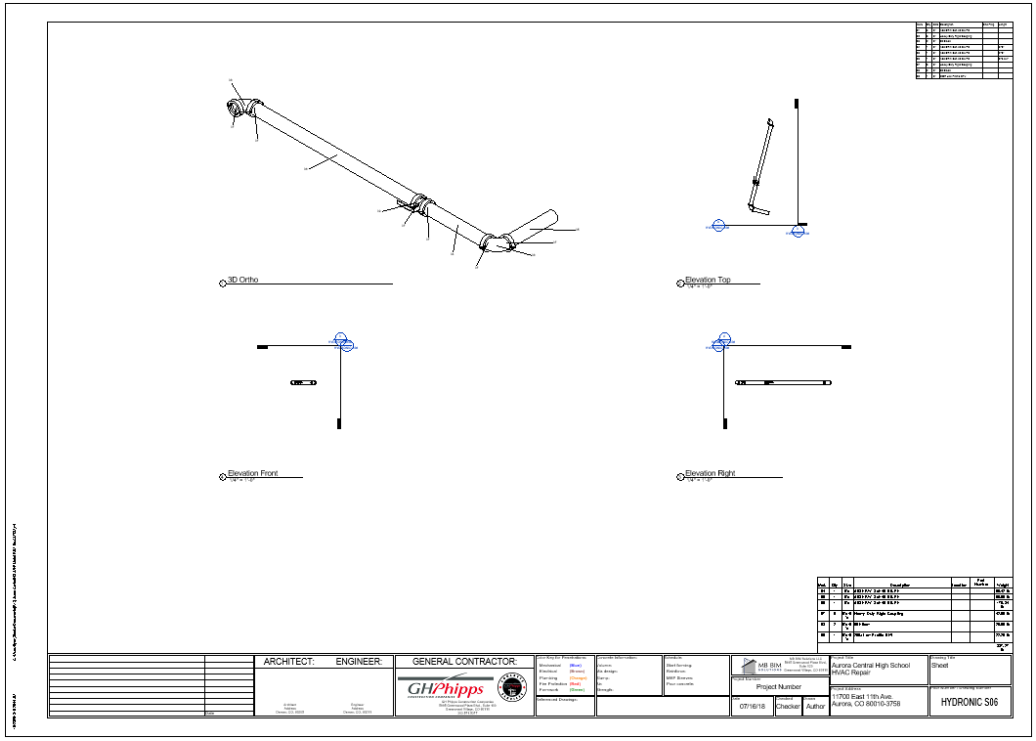


Victaulic Tools for Revit

- Tagging your fabrication parts using built-in shared parameters
- “Splitting Tool” – split straight run pipes into segments
- “Rotate Selection” – Rotate parts and keep them connected
- Resize a system
- Fabrication Hangers – not quite as good as Hangerworks
- Pipe with Victaulic Fittings
- “Create Assembly & Views” tool
  - Our most used tool, and our reason for using VTfR

Victaulic Tools for Revit, Cont.

- “Create Assembly & Views” tool
  - First set up your settings
    - Select your Views based on previously-created templates
    - Give the views a name and set your tagging
    - “Vic_Mark” parameter
    - Set up Schedules
    - Set up Legends
    - Static Bill of Materials
    - Set the title block
    - Export/Import settings
    - Click “Create Assembly & Views”



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