Managing BIM Projects Without Going CRAZY

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About the Speaker…

David Butts, BIM Specialist – Gannett Fleming

- 30+ Years experience with Autodesk software products
- AAS Architectural Technology
- 13 years – Autodesk Reseller, Senior Application Engineer/Training Manager
- 7 years with Gannett Fleming, manages the implementation/training/optimization of engineering applications

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Managing BIM Projects Without Going CRAZY

Course Description

Learn how AutoCAD software and Revit software have altered the traditional design workflows and processes, and discover how to manage the disruptive changes. The course will cover pre-project planning, as well as deal with project content and understanding what tools can really help a project’s bottom line. You will also review key CAD and BIM standards, and explore where Revit software alters typical project tasks for higher levels of development. The course is well suited for the first-time manager and experienced user.

Managing BIM Projects Without Going CRAZY

Learning Objectives

- Discover key points for the project execution plans and staffing
- Understand how to clearly define CAD and BIM tasks for a project, and learn how standardization between both should be approached
- Learn how to migrate third-party content and filter essential data into a project family
- Examine different levels of development, and understand when to use design versus fabrication tools

This Session Will Be Interactive!

FXP | touch

- Personalize
- Chat
- Ask questions
- Take notes
- Move to current slide

What types of projects are you most likely to use BIM for?

A Industrial

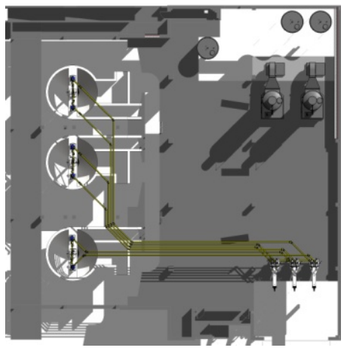
B Commercial

C Educational

D Residential

E Other

What types of projects does your firm design – and does BIM work for them?



Has this ever happened to you….

Managing the Project Execution Plan and Proper Staffing

Managing the Project Execution Plan and Proper Staffing

- The project type is important but does not limit BIM use
- Have a plan for integrating BIM into work process
- Learn to manage disruptive changes
- Learn how to select and train staff for successful outcomes

Deciding Go or No Go on BIM Projects – Before the Project Execution Plan

Risk Assessment – do your homework!

- ✓Required software package and version
- ✓If BIM, then the Level of Development required
- ✓Ancillary packages that are linked to the design software – energy analysis, specific object modeling (bridges, roadway, process, etc.)

Deciding Go or No Go on BIM Projects – Before the Project Execution Plan

Influencing Factors – Know them!

- ✓Is the client requiring BIM as a deliverable?
- ✓Does the client require specific software and version?
- ✓Does the client demonstrate understanding and expertise with the required software and deliverables?
- ✓Does the client include standard files, such as templates and content?
- ✓Does the client require interaction with data, which is associated with the model, for life cycle and asset management?

You WON – NOW what?

Understand the impact of using BIM

- More BIM projects fail due to poor design workflows and practice than software implementation
- BIM workflows uncover these weaknesses
- BIM workflows can also be restrictive

- Learn and understand the National BIM Standard

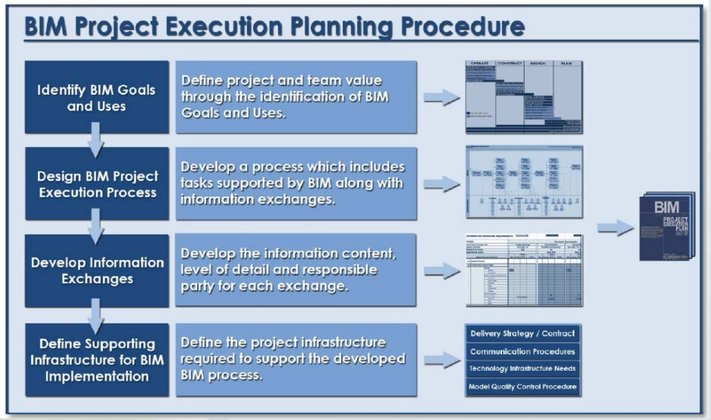
http://www.nationalbimstandard.org/

✓Learn how to use Project Execution Plans (PxP) to stay on track

Understanding the Project Execution Plan

How the plan helps:

- ✓Identify goals and high value BIM uses during each project phase
- ✓Design the BIM Execution process through the creation of process maps
- ✓Define the BIM deliverables in the form of information exchanges
- ✓Develop the infrastructure to support the implementation such as contracts, communication procedures, technology and quality control.



The BIM Project Execution Planning Procedure, National BIM Standard, Penn State

Identify BIM Goals and Uses, and Identify Staff

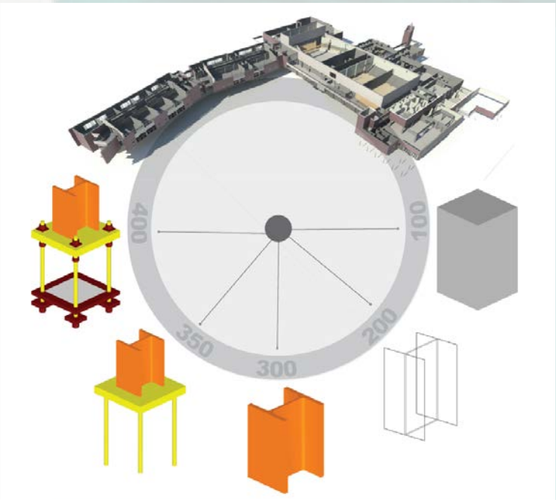
Credit: Rear Admiral Grace Hopper

Conquer Fear / Discover Relevance / Improve the Method

Identify BIM Goals and Uses, and Identify Staff

- Ask these questions:
  - ✓*What parts of a project will be modeled, and what part will continue to be produced in CAD?*
  - ✓*How accurately should the model represent the actual conditions of the finished product?*

    - Know your LOD – Level of Development
      - 100-200 – Existing
      - 300/350/400 – Design, Design Build
      - 500 – As-Built



Identify BIM Goals and Uses, and Identify Staff

Ask these questions:

- *How do I select the appropriate staff for the project?*
  - ✓ Your STAFF is the key to success
  - ✓ Your UNDERSTANDING of today's tools is critical
  - ✓ TRAINING is forever – it's better to train them and have them leave, than not train them and have them stay
  - ✓ IMPLEMENTATION is the BLOB – it goes on forever…!
  - ✓ **OVERCOMING THE FEAR OF CHANGE IS PARAMOUNT!**
- *Once the staff is assigned to the job, how do I make sure they can do the work the way it needs to be done?*

Identify BIM Goals and Uses, and Identify Staff

Today's Reality – Training is REQUIRED AND ONGOING!

- ✓*Start with Trusted Advisor!*
- ✓*Develop in house Expertise – the Subject Matter Expert(s)!*
- ✓*Have a well formed training plan, based on the staff:*

  - Management – Corporate and Project
  - Design – Engineering/Architecture/Industrial
  - Technical – Designers, not Drafters
  - BIM Management – Keep them in their cage…

Identify BIM Goals and Uses, and Identify Staff

Training Topics should include:

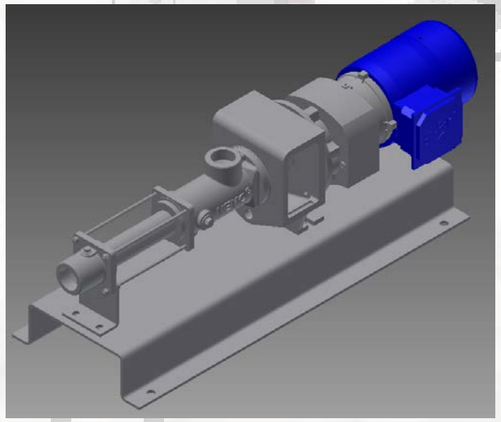
- BIM Overview
- ROI Areas – Cost/Benefits
  - ✓ Software
  - ✓ Hardware
  - ✓ Training
  - ✓ Support
- Workflow Adjustments – 4 Step
- Legal Requirements/Risk Assessment
  - ✓ Contractual
- Standards
- Tools to Task – Traditional versus BIM
  - ✓ Data – Excel vs. Model
  - ✓ Internal vs. External
    - ✓ Sizing
    - ✓ Analysis
- External Analysis Applications/Integration
  - ✓ Compatibility
  - ✓ Compliance
- CAD Integration
- Documentation Process
- Content Development

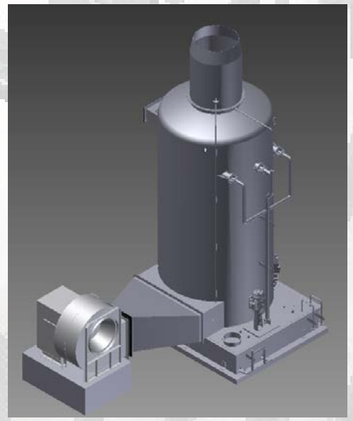
Selecting and Adding Equipment – It’s Time to GO!

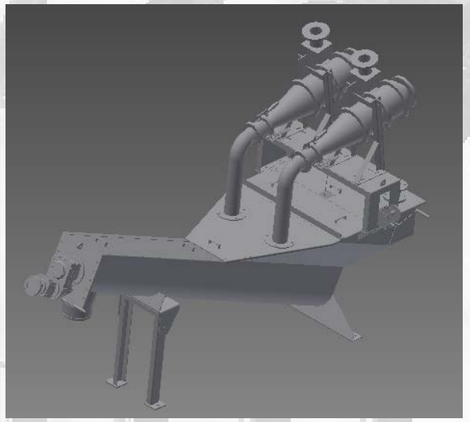
How likely are your vendors to provide 3D content?

Selecting and Adding Equipment

- The Biggest Area of Culture Change!
- Getting the Models/Data/Information you need
- Basis of Design versus Final Selection
- GET IT EARLY – AS MUCH AS POSSIBLE





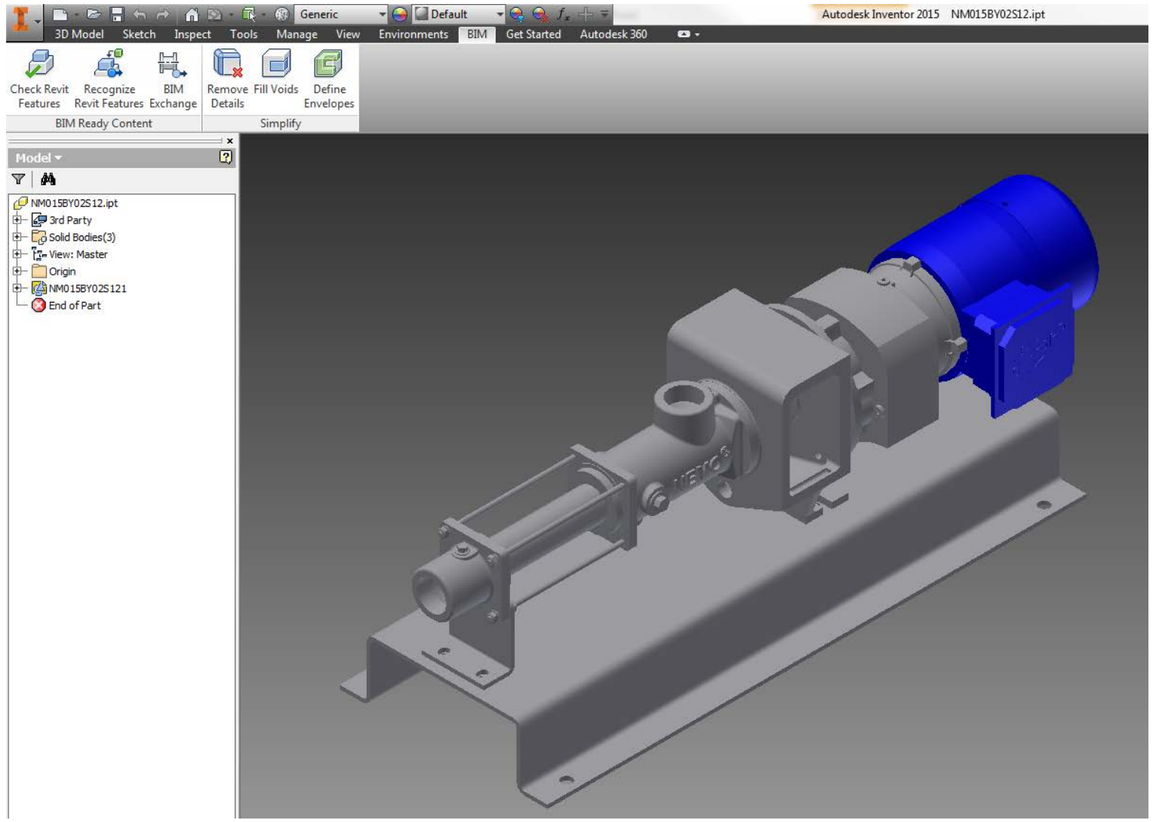


Equipment Lists

- Know the Revit Categories
  - Mechanical/Electrical Equipment
    - Fans/AHU/Pumps/Panels – Building Service/Process/Controls
    - Internal Connections
  - Specialty Equipment
    - Owner Provided
    - External Connections
- Excel is Common
- SQL is Preferred
- Define what Data is to be Shared
  - Shared vs. Project vs. Family

Working with Vendors

- The Relationship CHANGES
- Look for Representations for Basis of Design
- Key Items to Ask:
  - *Does the vendor provide equipment models through their website, to go with their equipment selection tools?*
  - *Can the vendor provide the file in a format you can edit?*
  - *Leverage Inventor to convert content!*



Working with Vendors

- Using Online or Provided RFA Families/Edited Models
  - Add MEP connectors
  - Remove non-standard parameters from families
  - Add/Associate standard shared parameters based on default schedules
  - Set classification/OmniClass numbers
  - Limit text-based versions to specific model(s) as need for design
  - Leverage Dynamo programing to automate file cleanup
- **Get the pertinent data that’s associated with the equipment!**

Revit versus CAD – CAGE MATCH!!

At what stage do you stop using CAD and only use BIM?

A Pre-design

B Schematic

C Design Development

D Construction Documents

E NEVER EVER EVER

Revit versus CAD – CAGE MATCH!!

- Learn how Revit alters traditional design tasks
  - Forget everything you know about how to put a project together in CAD
  - Plan on spending more time in the schematic phase and less time in the document phase.
  - Break your work down into the four step process – select and add equipment (targets and sources) define systems, create connecting geometry and annotate.

Revit versus CAD – CAGE MATCH!!

- Pre-design/Schematic Phase
  - For the architect:
    - Set the site and orientation!
    - Perform massing studies for solar/shadow impact, airflow, etc.
    - Define bounding elements and datum levels in the arch model – can be generic (LOD 100-200) until materials are selected – includes floors, slabs and roofs
    - Add room objects to arch model, space and zone objects to MEP model – sync room and space data

Revit versus CAD – CAGE MATCH!!

- Pre-design/Schematic Phase
  - For the MEP/Process engineer:
    - Develop and refine schematic layouts – hydraulic profile, process schematic
    - Best time to perform analytical studies – energy, airflow (CFD), lighting, LEED, etc.
    - Don’t over-detail or over-model!
    - Select BOD equipment as early as possible based on programming/criteria
    - Locate major equipment, targets/sources and define preliminary systems – HVAC, piping, electrical, plumbing, process

Revit versus CAD – CAGE MATCH!!

- Design Development Phase
  - For the Architectural/Interior/Industrial Designer:
    - Add more detail to bounding elements – wall, door, window types, etc. based on analysis results
    - Add owner required equipment and built-in components – casework, furniture, industrial, etc.
  - For the Structural Designer:
    - Develop/Refine structural model to show minimum of primary concrete/steel/etc. materials
    - Coordinate openings/penetrations for major components

Revit versus CAD – CAGE MATCH!!

- Design Development Phase
  - For the MEP/Process Designer:
    - Develop and refine power and piping/plumbing riser diagrams, initial P&ID’s
    - Refine Equipment placement, locations, parameters
    - Associate equipment with rooms
    - Add connecting geometry for MEP elements
    - Add power/air/fluid source connectors for industrial/architectural components, not in MEP model
    - Coordinate data between disciplines for MEP requirements
    - Associate and confirm loads with equipment

Revit versus CAD – CAGE MATCH!!

- Construction Document Phase
  - Complete model layouts with accessories, supports, etc.
  - Track and quantify Power loads, HVAC loads, Lighting Loads
  - Associate by Hyperlink
    - Reports
    - Specs
  - Complete schedules with additional data and parameters
  - Add 2D details where 3D isometric, section, elevation and enlarged plan views don’t cover it – CAD/Drafting View – set up CAD Detail projects!
  - Complete view annotation with labels based on information derived from parameters in the objects, adding text and dimensions where needed
  - Complete constructability reviews using interference detection tools built into modeling tools

Revit versus CAD – CAGE MATCH!!

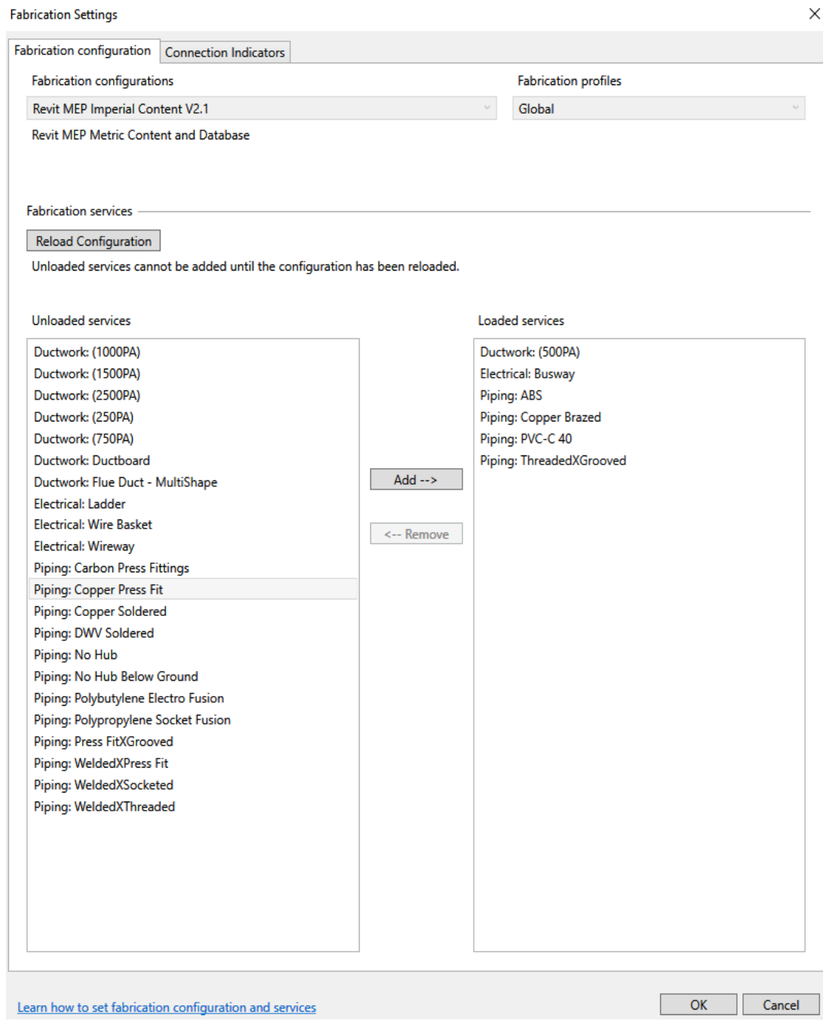
- Beyond BIM
  - The model lives beyond the design
  - Advantages for the design team include:
    - Return Work - Renovations
    - Construction Management
    - Asset Management
    - Future Studies
    - Municipal Integration
  - Advantages for the owner include:
    - Single Source/Fabrication
    - OMMS
    - Lifecycle Management
    - Space Planning
    - Ownership

Enter the Contractor – Fabrication in Revit

Have you ever shared your model with a contractor for fabrication?

About Autodesk Fabrication Tools

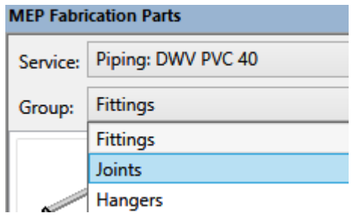
- Beyond Design
  - Fabrication is a higher level of development (LOD)
  - More accurate representation of system equipment
  - Based on configurations and services, which are developed with the Fabrication MEP tools
  - Includes Imperial, Metric and Revit Content

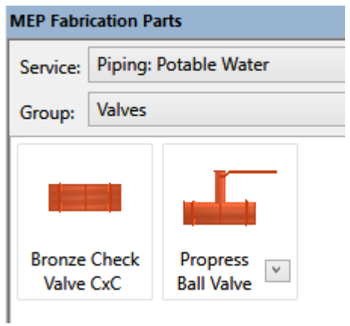


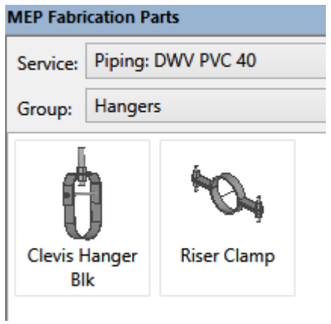
About Autodesk Fabrication Tools

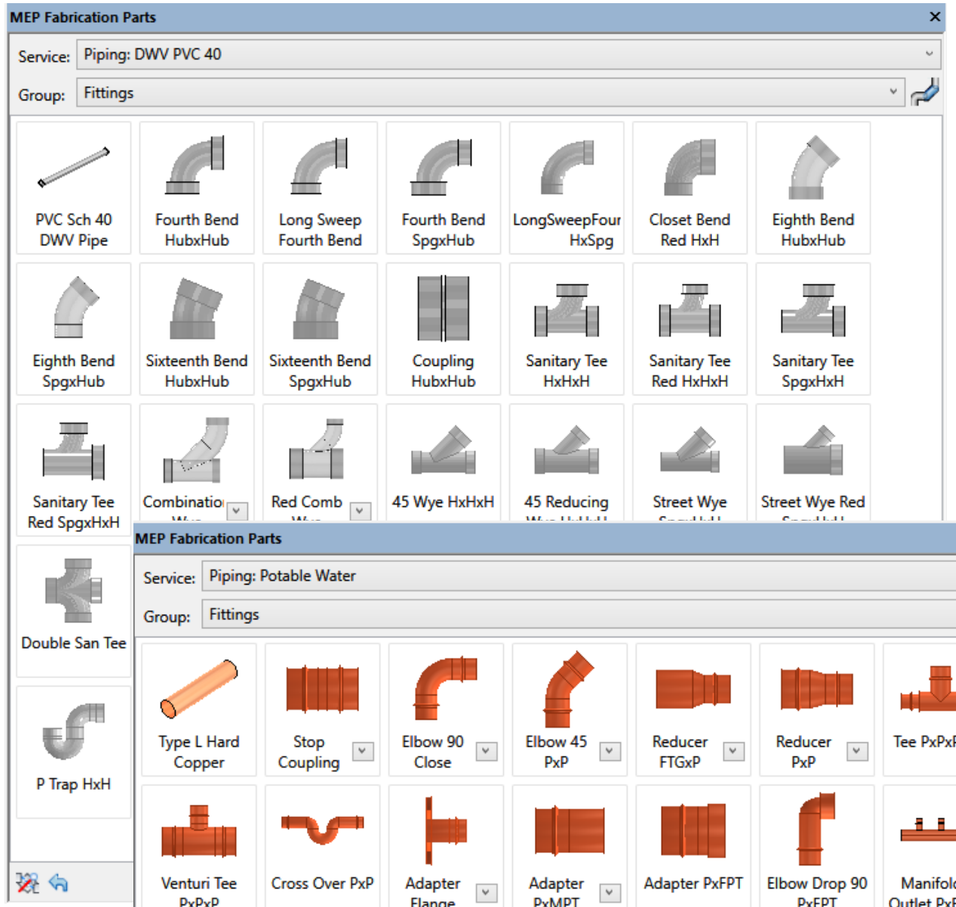
- Fabrication Parts
  - Duct/Pipe/Conduit/Cable Tray Fittings
  - Joints
  - Hangers
  - Valves for Piping

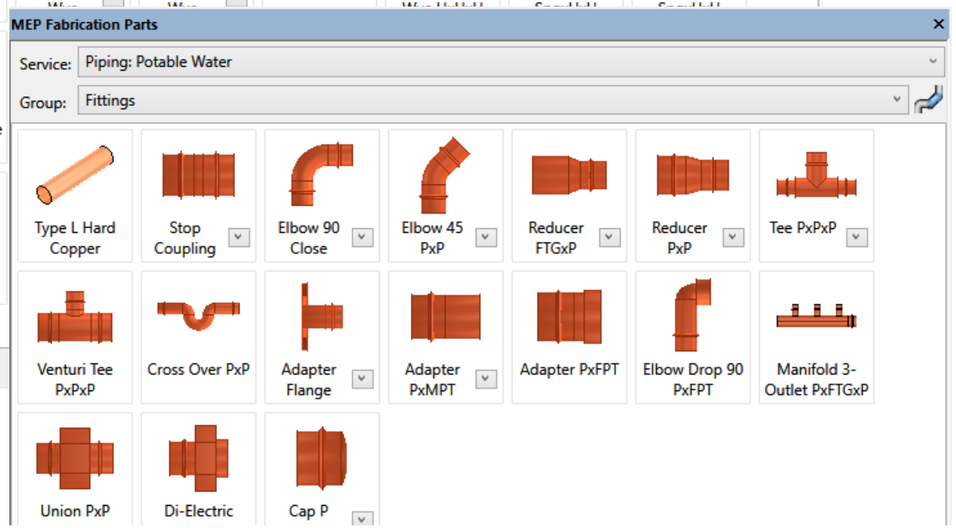
- All based on industry standard materials











Using Fabrication Tools

- Use Revit MEP OOTB Tools:
  - When limited LOD of 350 or less is required, and a **placeholder representation** is adequate for **design** intent
  - When piping or duct **system data** is required for sizing, schedules, flow data and other design specific tools related to the system
  - When duct/pipe routing needs to be **system based**
  - When the services for the specific duct/pipe/conduit/cable tray types are not developed for the fabrication tools – project must allow time for the content to be developed
  - When the BIM management/project team does not have the training/expertise to develop custom fabrication services and groups – but get it anyway!
  - When the project does not require **as-built** conditions that are modeled to LOD 400 or higher in the Revit model

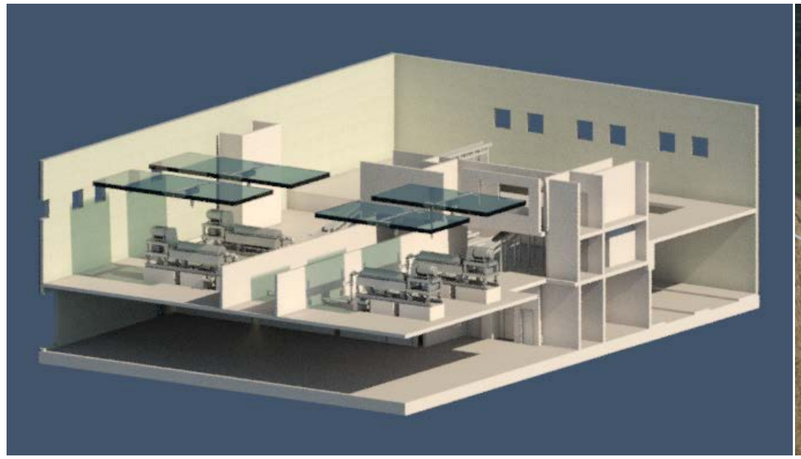
Using Fabrication Tools

- Use Fabrication Tools:
  - When the contract is **design-build**, and **LOD 400** or higher is required
  - When the **contractor** is providing the BIM model
  - Where **system information** is not relevant to the contract deliverable
  - When the layouts are going to be used by the contractor for fabrication (shop or field) – note that design system elements can be converted to fabrication elements by the Fabrication MEP tools, saving time for both the designer and contractor

Wrap Up – Bonus Features!

Wrapping Up

- Check your handout for Bonus Content – Revit Tools that Make a Difference!
  - Tips on Revit Views
  - Tips on Revit Schedules



<...VENTILATION SCHEDULE>

A	B	C	D	E	F	G	H	I	
Number	Name	Number of People	Area	Unbounded Height	Volume	Actual Exhaust Air	Actual Supply Airfl	Calculated Supply	Actual F
9	Stair	0.158516	Not Placed	0' - 0"	Not Placed	0 CFM	0 CFM	Not Computed	0 CFM
11	Stair	0.298888	92 SF	28' - 8 11/16"	2619.27 CF	0 CFM	0 CFM	Not Computed	0 CFM
101	NEW	2.928037	900 SF	14' - 2"	11716.25 CF	0 CFM	0 CFM	Not Computed	0 CFM
102	ELECTRICAL ROOM	1.742861	536 SF	11' - 4"	6074.67 CF	0 CFM	0 CFM	Not Computed	0 CFM
103	MOTOR ROOM	1.463267	450 SF	11' - 4"	5100.15 CF	0 CFM	0 CFM	Not Computed	0 CFM
104	MECHANICAL & GENERATOR R	1.151069	354 SF	11' - 4"	4012.00 CF	0 CFM	0 CFM	Not Computed	0 CFM
105	OFFICE & LABORATORY	1.37267	422 SF	11' - 4"	4784.38 CF	0 CFM	0 CFM	Not Computed	0 CFM
106	CHLORINE ROOM	0.898256	276 SF	11' - 4"	3130.83 CF	0 CFM	0 CFM	Not Computed	0 CFM
107	MEN'S TOILET & LOCKER ROOM	0.424536	131 SF	11' - 4"	1479.70 CF	0 CFM	0 CFM	Not Computed	0 CFM
108	LAVATORY	0.087808	27 SF	11' - 4"	306.05 CF	0 CFM	0 CFM	Not Computed	0 CFM
109	BLOWER ROOM	2.677923	824 SF	11' - 4"	9333.79 CF	0 CFM	0 CFM	Not Computed	0 CFM
X1	LOWER CONTROL ROOM	3.791099	1166 SF	20' - 1 5/8"	18137.83 CF	0 CFM	0 CFM	Not Computed	0 CFM
X4-1	EQUIPMENT ROOM-1	1.092133	336 SF	14' - 2"	3068.28 CF	0 CFM	0 CFM	Not Computed	0 CFM
X4-2	EQUIPMENT ROOM-2	0.872118	268 SF	17' - 2 7/32"	3235.78 CF	0 CFM	0 CFM	Not Computed	0 CFM
X7	CONTROL ROOM	4.395251	1352 SF	14' - 2"	17121.14 CF	0 CFM	0 CFM	Not Computed	0 CFM
X8-1	FILTER ROOM-1	2.442242	751 SF	14' - 2"	9513.76 CF	0 CFM	0 CFM	Not Computed	0 CFM
X8-2	FILTER ROOM-2	0.287183	88 SF	24' - 3 21/32"	1683.84 CF	0 CFM	0 CFM	Not Computed	0 CFM
X9	CHEMICAL STORAGE & WORKS	2.542553	782 SF	17' - 5 3/4"	12494.43 CF	0 CFM	0 CFM	Not Computed	0 CFM
X10	TOILET ROOM	0.098669	30 SF	14' - 2"	384.37 CF	0 CFM	0 CFM	Not Computed	0 CFM

BIM Changes Everything….

BIM represents the same culture change:

- ✓ When the Beatles arrived in America,
- ✓ When disco finally died,
- ✓ The drafting table became a sheet storage facility and coffee cup holder,
- ✓ And working on a computer became a daily “thing”.

The key is not to let yourself be intimidated by the change, but instead learn to embrace it, and take advantage of the positive changes it can bring!

Questions!

Remember – ES122794 is the class –
please remember to complete the survey!

Thanks for attending!

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Make anything.