



Perfecting the System in Revit MEP

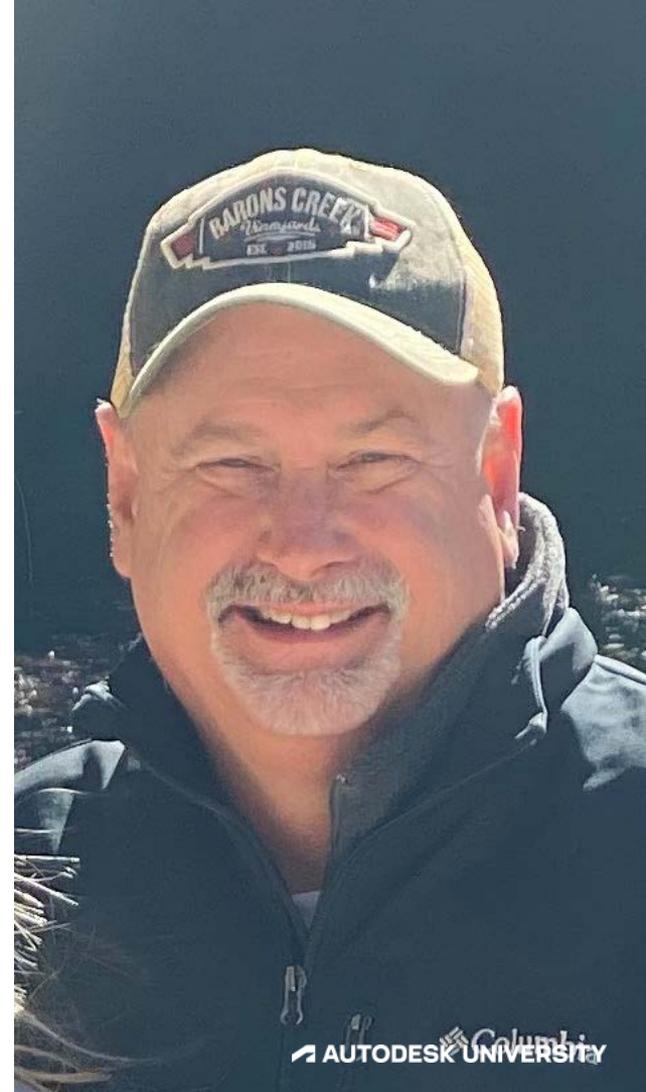
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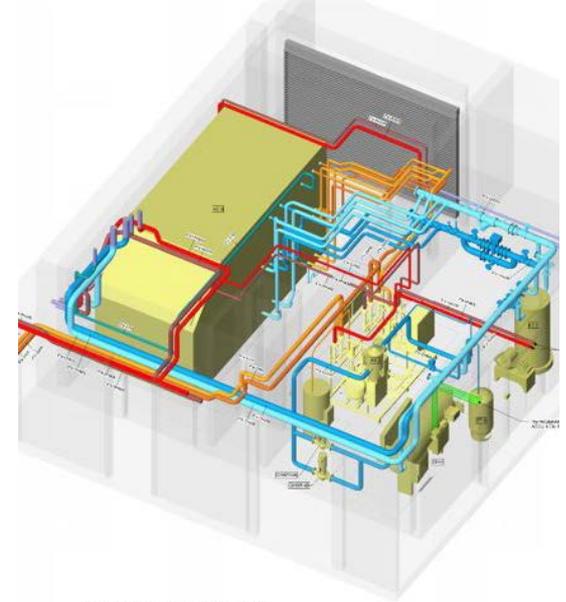
About Your Speaker

- David A. Butts
 - Engineering Technology Manager – Gannett Fleming
 - Autodesk Expert Elite
 - Revit Certified Professional – Electrical/Mechanical
 - Autodesk Certified Instructor
 - AU Speaker Mentor
 - AU Top Speaker (2011/2016/2019)

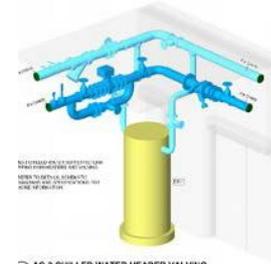


Perfecting the System In Revit MEP

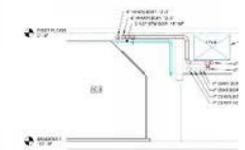
- Our Goals today:
 - Reviewing HVAC/Electrical/Piping Analytical Systems in a Revit project
 - Understanding the Four-Step Process and Workflows for HVAC, Piping and Electrical Systems and Circuits
 - Evaluate Engineering Component Families for best system performance and data management
 - Examine Guidelines for Sharing MEP Data for System Analytics and with External Resources



1 MECHANICAL EQUIPMENT ROOMS ISO 1



3 AC-3 CHILLED WATER HEADER VALVING



4 MECHANICAL EQUIPMENT ROOM R-864 SECTION

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HVAC/Electrical/Pipe Analytical Systems

The New Kickoff – Building the Analytical Data

HVAC and Electrical System Analysis Tools

Revit Tools to help with early-stage design analysis and decision process

HVAC Analytical System

- Water Loop – Demand Side
 - Hot/Chilled Water Piping system
 - Condenser Water Piping system
- Air System – Supply Side
 - Mechanical ventilation system (usually central air)
 - Includes coils, pumps, fans on supply side
- Zone Equipment – Distribution equipment
 - AHU, VAV, Reheat Coil, Terminal Unit, etc.
- All feed the system zones for HVAC load sizing
- ***Let's see how this works...***

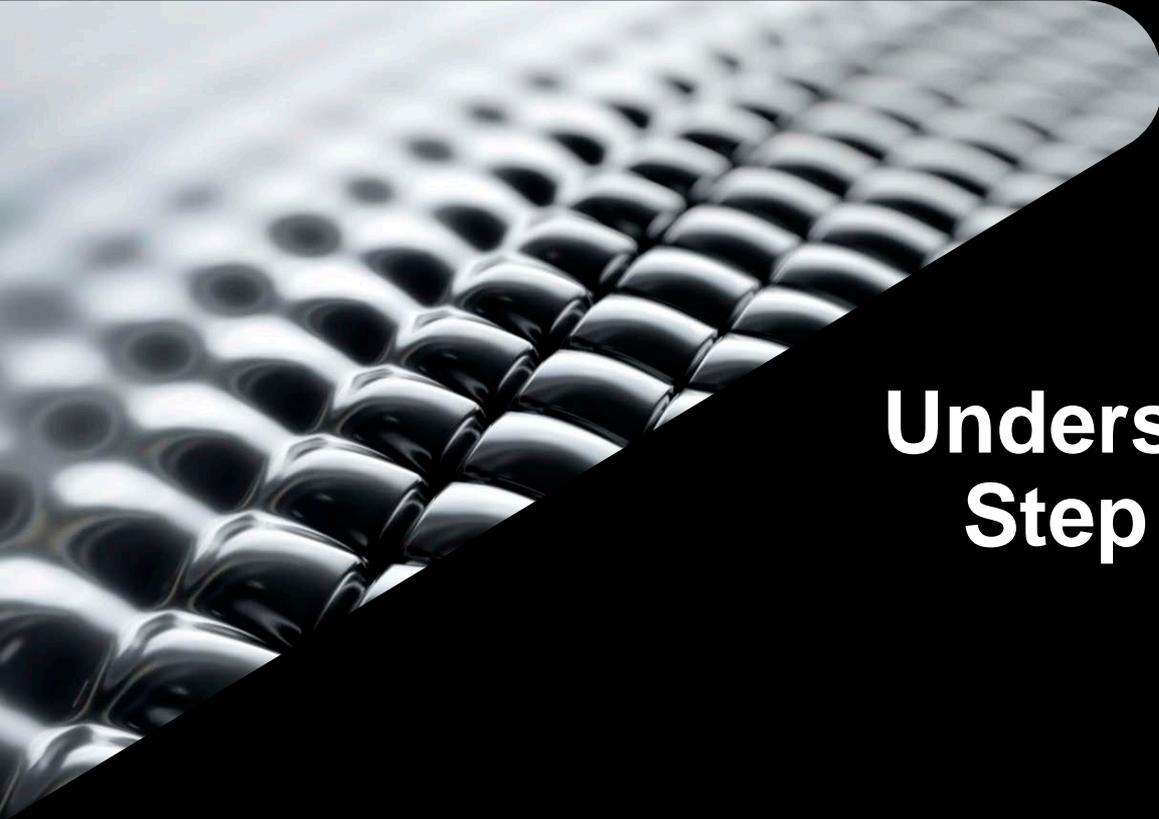
Building the Analytical Data

HVAC and Electrical System Analysis Tools

Revit Tools to help with early-stage design analysis and decision process

Electrical Load Analysis

- Equipment Load – conceptual distribution system (source/busses/transformers/switches)
 - Preliminary load summary
- Area Load – based on area and power density requirements
 - Assign loads to supplement power requirements

A close-up, black and white photograph of a textured surface, possibly a metal mesh or a woven fabric, with a grid of rounded, raised squares. The surface is slightly out of focus, creating a sense of depth. The image is partially obscured by a black diagonal shape that serves as a background for the text.

Understanding the Four Step Process for MEP

Why follow this process?

By following the same repeatable process, you can get more efficient at completing projects on time and under budget. The primary steps are:

- **Define, Select and Locate Equipment** – the targets and sources that define a system;
- **Create and Refine the System** – creating the system that connects the equipment together;
- **Add Connecting Geometry** – adding the ducts, pipe, conduit, cable tray and wire;
- **Annotate the Model** – adding tags, schedules and other annotations in views for the construction documents.

Before you start – follow these rules:

- Always start from a template (or starter project)
- Include in the template families that require **predefined type mark values** (but don't overload the template)
- Include in the template predefined **system types** for duct, pipe, etc.
- NEW Step – Start to build out your analytical systems to establish the database
- Once the analytical systems are defined, begin by selecting and adding **target** and **source** equipment model elements
- Systems are defined by **targets**, but do not require a source to complete the system

Equipment Placement Notes:

- Equipment has MEP connectors included and assigned.
 - Located in the **host** model if you are using nested families.
- Check your elevations!
 - Have a plan and section view open at the same time
- Understand “hosted” versus “non-hosted”
 - All families have a host. Includes workplane, face or level they are placed on, such as a first floor.
- Be aware of your environment – make sure you have the
 - Correct worksets active,
 - Visibility graphics defined
 - View range clearly defined.
- No Connecting geometry first (Duct, pipe, etc.)
- Use Placeholders for early layout and design - review your Level of Development (LOD) requirements for the project
- ***Let’s see an example...***

Define the system:

- **Select** several targets at once and use them to define a system – for example, selecting several air terminals that will all belong to the same system saves several steps.
- Track the **load data** from the **target** devices back to the **sources**, exposing overall system data.
- *Let's see another example...*

Create the Geometry

- Check your MEP settings for layouts first
- Once a system is created, use the **tab selection** tool - place their cursor over a device, tap the tab key, and see the structure of the system.
- Create **simple** layouts, based on preset preferences for materials and routing elevations.
- Control **visibility properties** throughout a project, based on **system type settings** or **view filters**.
- *And now, another example!*

Annotate!

- TAGS not TEXT!!!
- Preload your common annotation types to save time in your templates
- Items can be tagged during placement
- Changing the tag will change the data associated with the system
- ***What, another example?!?***

A close-up, black and white photograph of a metallic mesh or woven fabric texture, showing a grid of rounded, interlocking elements. The texture is slightly out of focus in the background, creating a sense of depth. The image is partially obscured by a black diagonal shape that frames the text on the right.

Evaluating Engineering Component Families

Evaluating and Improving Engineering Component Families

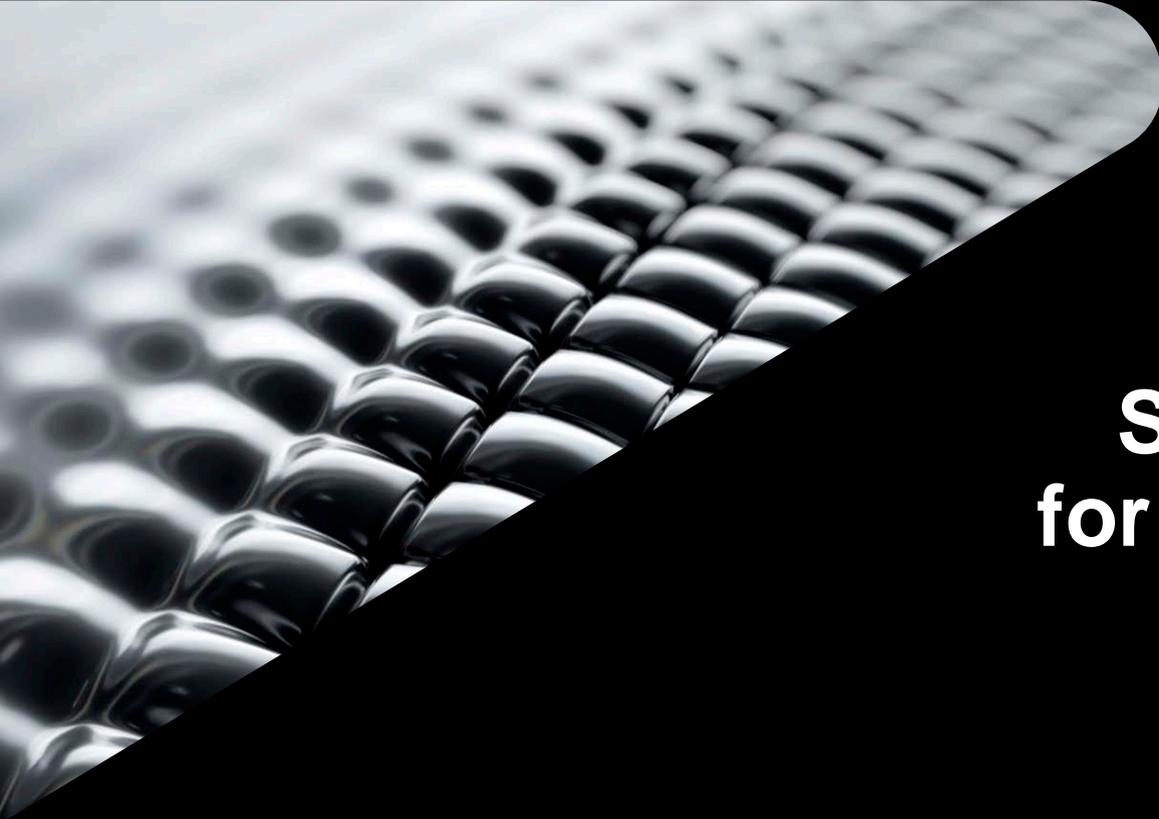
What is FLOW...?

- In the system, the direction that air/fluid/power take does not necessarily follow “logical” design thinking
- Example: A sink faucet’s flow is not “Out” but it is actually “In”
- Targets have flow that comes IN to the device
- Sources have flow that goes OUT to the device
- Well-formed connectors are critical!!
- ***Here’s another example!***

Evaluating and Improving Engineering Component Families

Exposing the Data

- Once the data is defined, associate it!
- Data from connectors must be associated to be visible and editable in a project
- Data from nested families must also be associated out to the host before the project
- ***Yes, another Example!***

A close-up, black and white photograph of a textured surface, possibly a metal mesh or a grid of rounded, metallic-looking elements. The perspective is from an angle, showing the depth of the grid. The background is dark, and the foreground elements are brightly lit, creating a strong contrast and highlighting the texture.

Sharing MEP Data for System Analysis

Sharing MEP Data for System Analysis

Understand how to share data between models and external applications

- Role of the Shared Parameters and data in MEP Families
- Methods and processes for exporting data in today's cloud and document products

Sharing MEP Data for System Analysis

Shared versus Family and Project Parameters

- Family Parameters – best use for dimensions, graphics
- Project Parameters – global application of data to all examples in a category or categories
 - Use Shared when scheduling AND exporting/tagging/etc.
 - Project applies to ALL items in a category, so use sparingly – watch out for equipment family use
- Shared Parameters – Exported/shared data – calculated values, schedules
 - Assign Scheduling shared parameters in the family and NOT as project parameters unless applying to all examples

Sharing MEP Data for System Analysis

Best Methods for Sharing Data

- SCHEDULE IT!
- Can be exported to CSV/TXT for Excel, other values
- Additional options:
 - Export to ODBC/DB Link
 - Dynamo
 - Forge Data Exchange (BETA)
- ***And here's the last example!***



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