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Model-Based Earned Value Tracking for Keeping Projects on Budget and Schedule

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Learning Objectives

1. Use Assemble to track installation progress
2. Sort and filter the data by installation status and activity Ids to see quantities installed
3. Benefits of tracking earned value through a 3D model instead of 2D solutions
4. Utilize BIM meta data for construction management

Description

A project's success is often dependent on completing it on time and within budget. The construction phase of the project is usually the one that consumes the most resources, and its often this stage when projects can go off track. Earned value tracking—a methodical approach to keep your projects on track to meet tight deadlines—can help overcome these challenges. Earned value tracking helps the project teams answer tough questions regarding the health of the project and schedule. In this session, CJ Best, Director of Manufacturing, and Gary Mashburn, Project Director—both from leading MEP specialty contractor McKinstry—will share their approaches to accurately tracking field productivity. You'll learn how McKinstry uses the 3D model, project data, iPads, and software systems, including Assemble Systems, to manage project costs, material delivery, installation, scheduling, and inventory on multiple projects.

Speaker(s)

CJ currently serves as McKinstry's Director of Manufacturing. He oversees operations of the detailing and fabrication teams across the Pacific Northwest. CJ's leadership experience and technical acumen allows him to leverage Building Information Modeling software to increase the percentage of value-added activities throughout McKinstry's manufacturing team. CJ joined the McKinstry Portland team in 2013 after transferring from McKinstry's Energy Division in Spokane. His expertise has supported many colleges, universities, commercial, and industrial customers in achieving a superior product at a lower cost on a tighter delivery schedule. His experience in pre-fabrication and detailing allows him to visualize how a project will come together far in advance of the actual install date and identify ways to drive out waste from the installation process.

Gary currently serves as a Project Director in McKinstry's Portland, Oregon office. Gary is responsible for overall project oversight, reviewing budgets, schedules and logistics plans, interfacing with project team members, providing milestone updates, and supporting the construction team. Gary has more than 25 years of experience assuming increasingly responsible positions from general superintendent to operations manager. Gary's experience includes construction, maintenance, and turnaround projects involving piping, specialty welding, vessel retrofit modifications, and mechanical and structural component installations.

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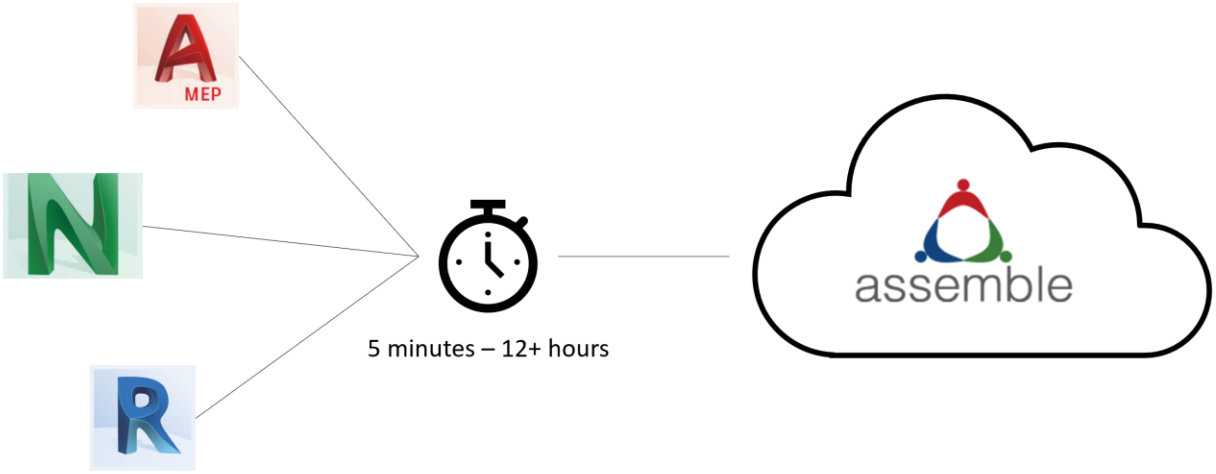
What does Assemble do?

Assemble enables companies to democratize its BIM data for use by anyone within the organization. For a MEP contractor, this means that project management can now access key information, like lineal feet of pipe or pounds of sheet metal, to increase the accuracy of their earned value tracking.

Using Assemble to Track Installation Progress

Publishing Models to Assemble

Currently, there are three primary ways to publish models to Assemble. For Step by Step instruction on how to publish, access 04 Publishing Models on Assembles website.



Navisworks, AutoCAD, and Revit are all able to publish model content to assemble.

PRO Tip: If you are using Fabrication parts, ensure you've installed the Object Enabler before publishing. This goes for users that already have Fabrication MEP installed on their machine.

Once your model is on Assemble, you can start adding custom Assemble properties to your project[1].

[1] Technically, you can create Assemble properties before you load a model, but we typically wait until we have a model to view so we can test our properties as we are creating them.

Adding Custom Assemble Properties

One of the most powerful features of Assemble is the ability to add custom properties to your model. This allows your company to no longer be dependent on a modeler or BIM professional to embed all of the data you want to use to track your projects. Some of the model properties that McKinstry uses to track its projects include:

Dates

- Plan date
- Material onsite
- Inspection complete
- Insulation start date

% Complete

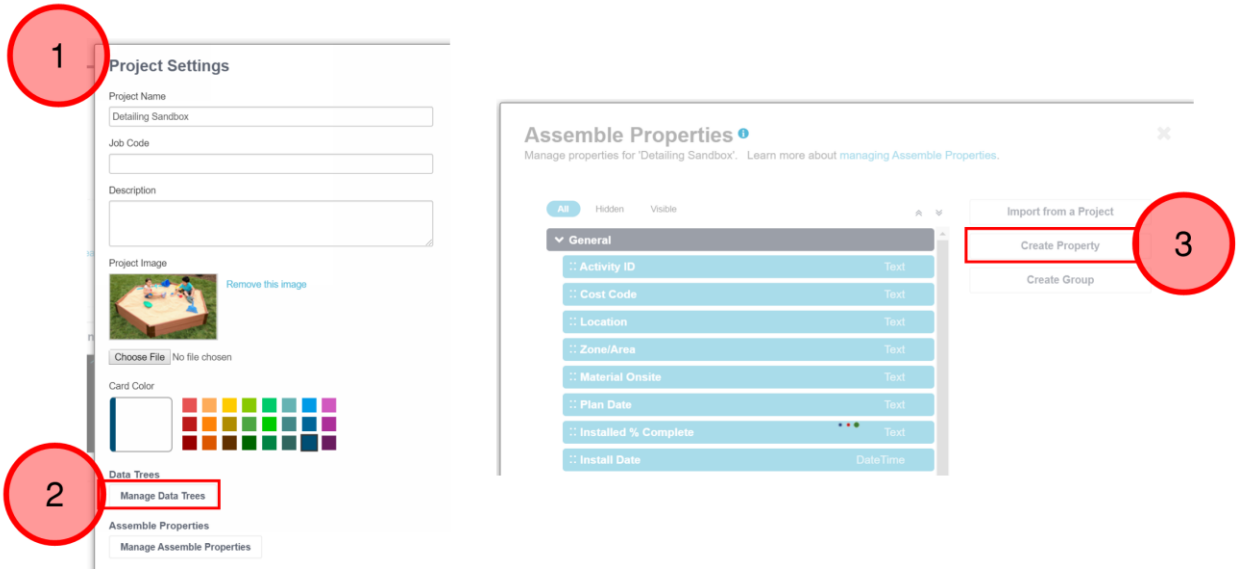
- Detailing
- Submittal
- DWG Review
- Layout
- Install

Other

- Issues/comments

As a power user for your company, be aware that any custom properties you create will be available to everyone else in your organization. Overall, this is a positive, but you want to build a strategy for your company when creating a lot of custom Assemble properties so it's easy to find what you are looking for and have consistency across projects.

You can modify the Assemble properties for a project by going to the Project Settings tab (under Edit Project). Note – you must be a project admin to create or modify assemble properties.



PRO Tip: Once you've built your company standard Assemble properties, save them in a "template project" (a project you use as an empty container), then you can import them into each new project that is setup.

Creating Assemble Views

Views are how you define what model content you are going to look at. For step by step instructions, check out 06 Creating Views. Views are how to identify which data fields you want to export later for progress tracking. Setting up a view consists of a few high-level steps.

1. Defining which models you want turned on
2. Filtering the models to view specific components/categories (if required)
3. Setting your columns in the Inventory View (this is what will export to excel when the time comes)
4. Changing color settings (if desired). Assemble allows you to color by any property that is a *string*.

Key Assemble Properties that McKinstry uses for Progress Tracking[2].

Assemble Properties

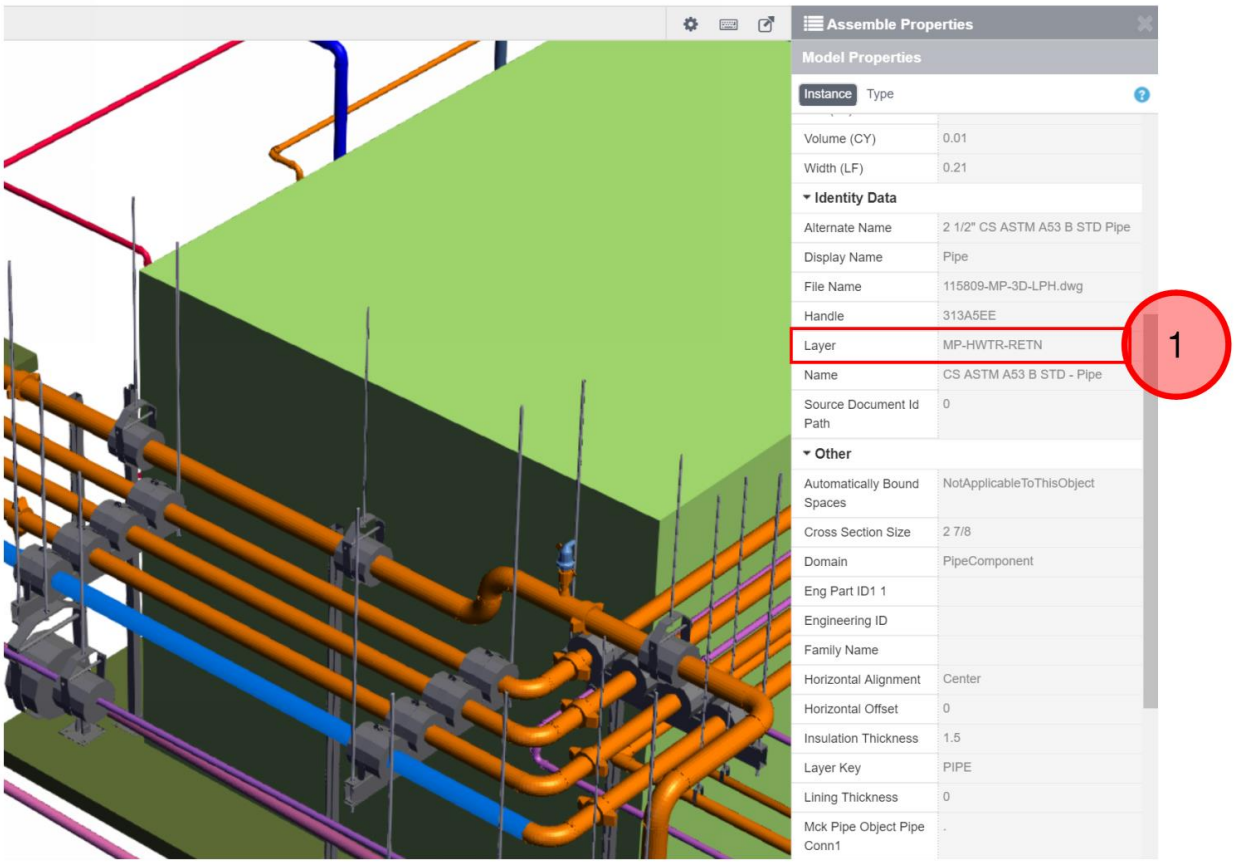
- Activity ID
- Cost Code
- Install Date
- Install % Complete
- Location
- Material Onsite [date]
- Plan Date
- Zone/Area

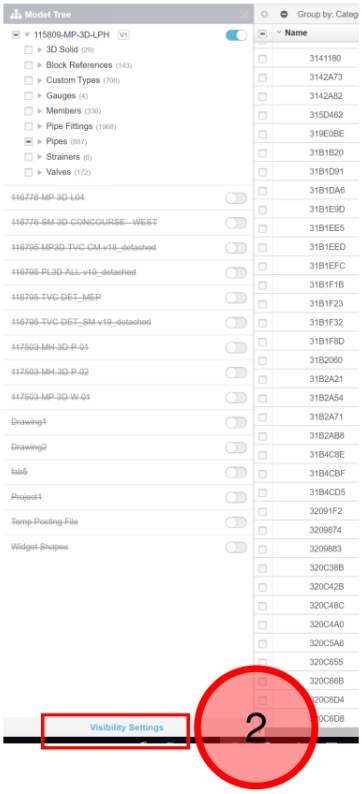
[2] These are the properties that are exported to feed our earned value workbook.

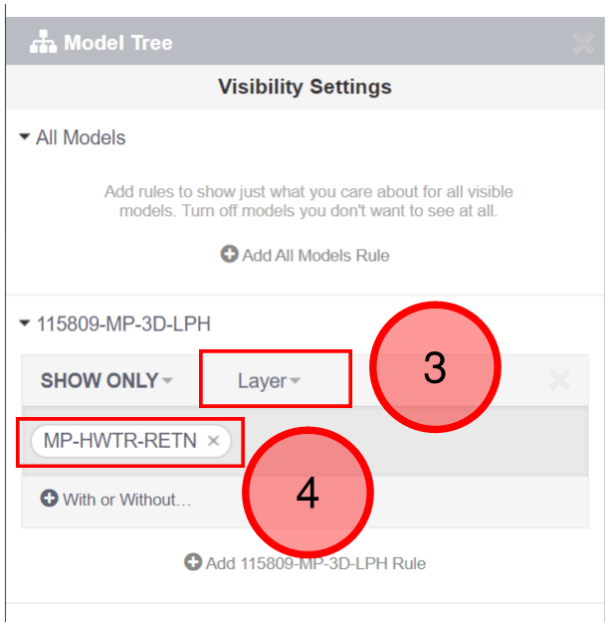
Initial Assemble Property Upload

The initial property upload in Assemble can be quite time consuming, depending on the number of objects you are updating. Knowing your model properties and using the visibility settings can vastly expedite the process.

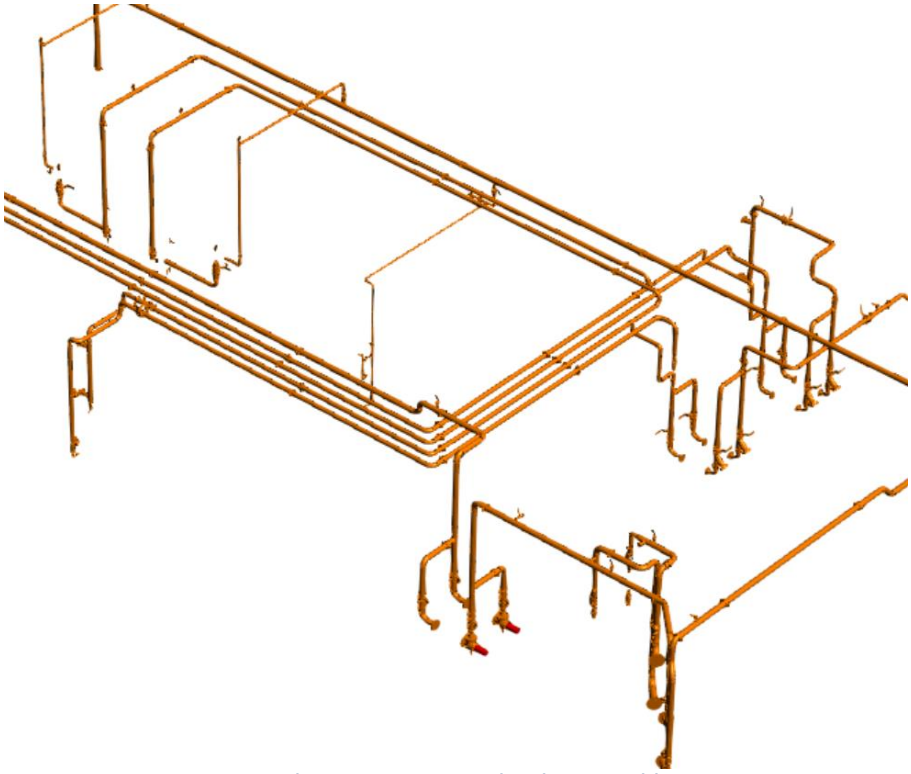
For example, we publish a lot of models from AutoCADmep. Knowing that the model property [Layer] aligns with the system, we can quickly set visibility settings to a specific layer and set the cost code for that entire system on a given floor.







The result is a 3D view that only has the Heating Water Return model content on it.



Heating Water Return View in Assemble

Once you have only the content you are interested in, you can right click and draw a box over the entire model, then update the Assemble properties for every single item you selected. This makes the process go much faster than if you were to update model objects piece by piece.

PRO Tip: Selecting from right to left will only grab parts within you selection. Selecting from left to right will grab the entire part even if its not entirely selected.

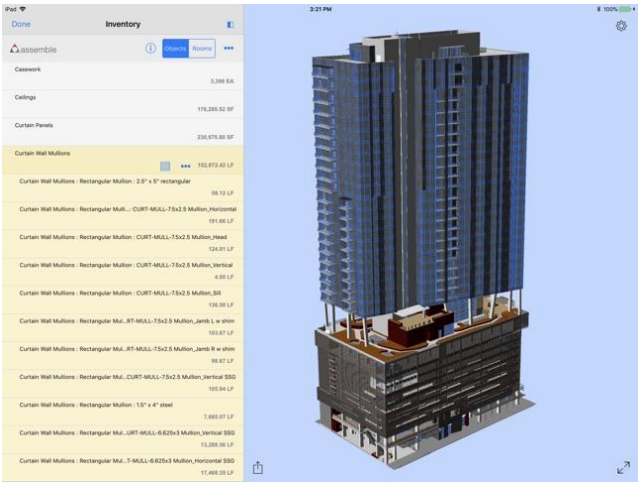
Status Model Content

Updating the status on your model content uses the same tools as the initial upload. Using visibility settings will be your friend.

You have three different ways to update your model content:

1. Bring a tablet or iPad out into the field to conduct the model updates. Assemble is a web-based viewer, so it can technically be viewed from any mobile device. We've had the best success with iPads and touch screen Windows 10 tablets for updating model content.
2. Highlight 2D drawings in the field, bring them back to your trailer, and update assemble on your laptop/desktop.
3. Take progress photos/video with your phone or a 360 camera, then update assemble on your laptop/desktop.

If you are going to be using the Assemble mobile app (available on iOS), you'll want to ensure that you login to the app and download the views you plan on updating BEFORE you head out into the field. This allows you to work on offline mode, and sync changes when you get back to the trailer (or any Wi-Fi connection).



View of Assemble Mobile App on an iPad.

PRO Tip: Make sure your add all of the columns to your view that you plan on updating in the field. Once in offline mode, you can only modify assemble properties that have been downloaded in your view.

McKinstry primarily uses options 1 and 2, but we are starting to experiment with option 3.

Exporting Model Data

Assemble's ability to export model data allows users to plug it into any Excel based workflow. Assemble does have an Excel data connector, but we've elected to use the standard "export to Excel" function because the Excel data connector can be very tedious to setup when we are tracking over 10,000 objects.

The steps of exporting data to Excel are very straight forward. Presumably, you've done all the work to ensure you have the model and assemble properties you want in the view you are exporting. You can find a step by step guide at 08 Exporting/Importing Data.

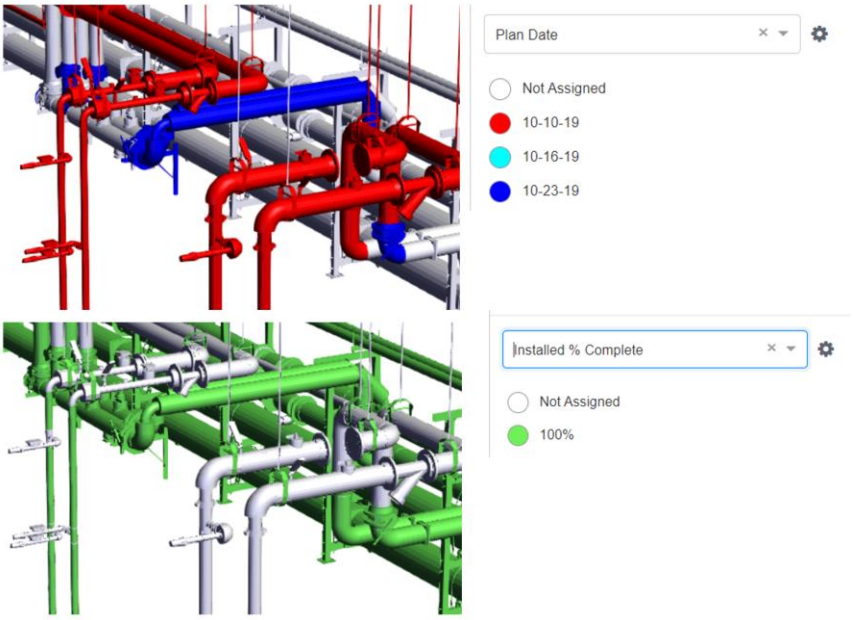
PRO Tip: Change all of the text to black on the Excel report to see the data in each field.

It is a good practice to export your key assemble properties periodically to ensure you have a "data backup" in case any source document ID's get changed in the next publish. We won't go into too much detail here but be aware that if an object gets deleted and then redrawn (in the exact same spot), your Assemble properties will NOT transfer to the new object. This is because Assemble uses the Source Document ID and Source ID to create a unique identifier for each model object.

Overall Benefits

We have seen a lot of benefits come from tracking our productivity this way. Some of those benefits include:

- Reviewing plan vs. actual work complete in weekly team meetings



Plan vs. Actual for three weeks of installation.

- Remaining work to be installed on a project
- Remaining scope to be pressure tested
- Overall inspection status for MEP scope
- Quality control issues