

Model-Based Earned Value Tracking

CJ Best, McKinstry Co, LLC

Gary Mashburn, McKinstry Co, LLC

for Keeping Projects on Budget and Schedule



About the speakers



CJ Best, Director of Manufacturing

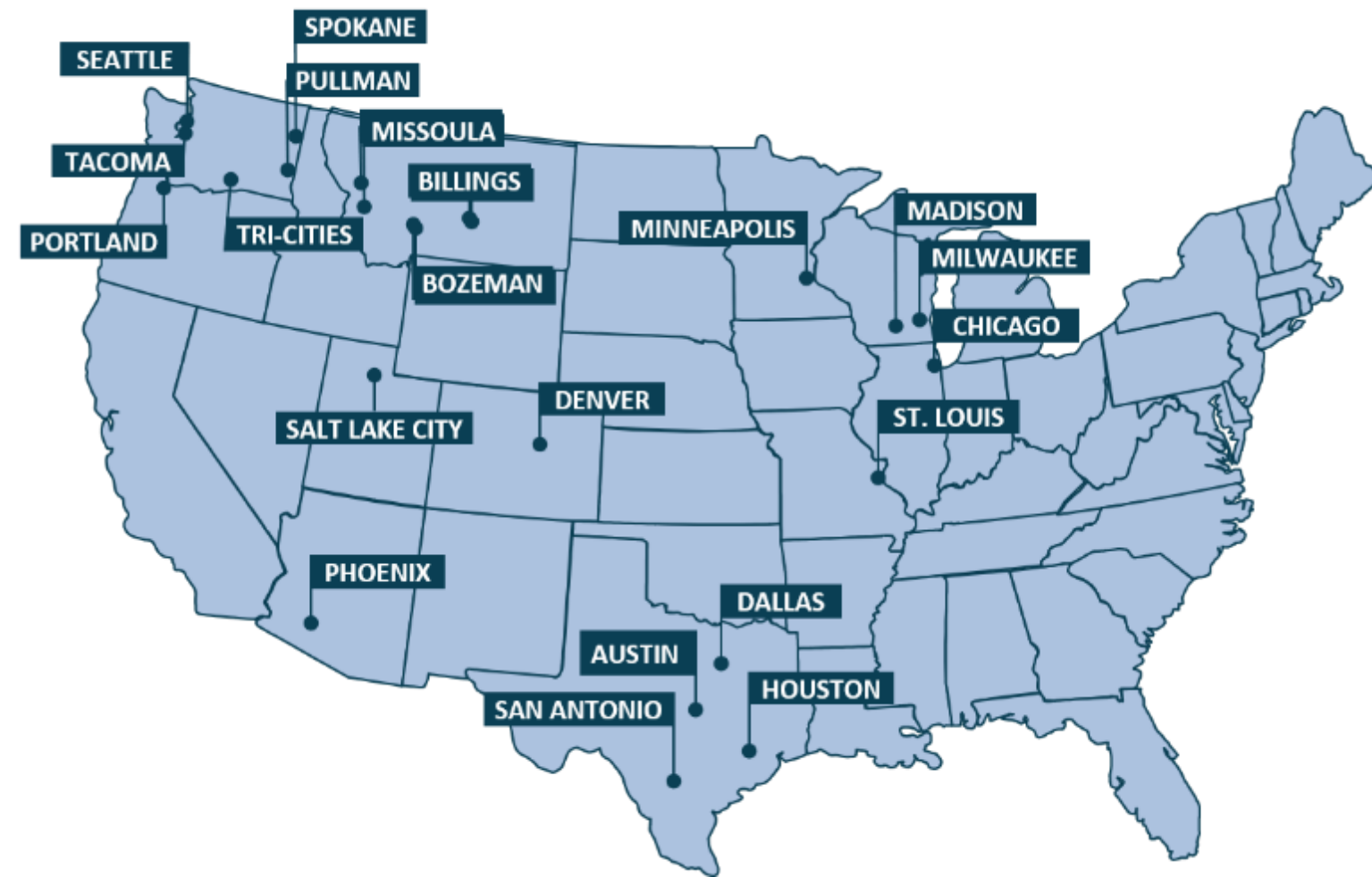
CJ currently serves as McKinstry's Director of Manufacturing. He oversees operations of the detailing and fabrication teams across the Pacific Northwest. CJ's leadership experience and technical acumen allows him to leverage Building Information Modeling software to increase the percentage of value-added activities throughout McKinstry's manufacturing team. Over 6 years of experience in the MEP industry.



Gary Mashburn, Project Director

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. Over 25 years of experience in the construction industry.

About McKinstry



50+ Years
Experience

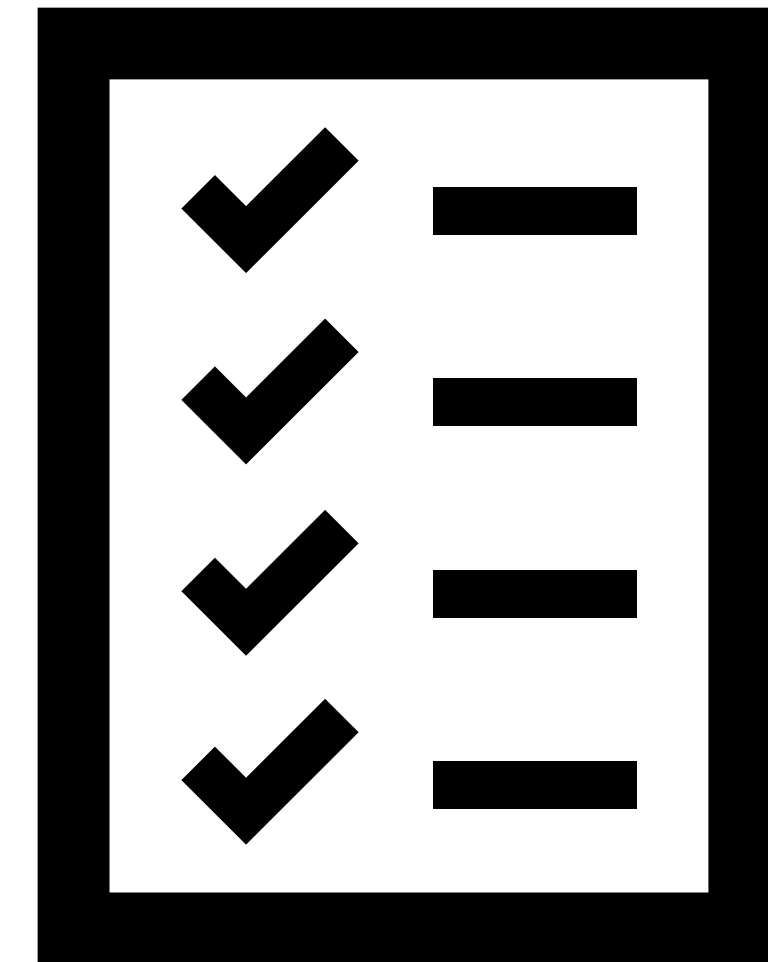
21
Office Locations

Seattle
Headquarters

- Founded in 1960
- National leader in designing, constructing, operating and managing high-performing facilities.
- 2,100+ employees, including 165+ licensed PEs
- Partnership mentality focused on customer successes
- Single point of accountability for the life of your building

Learning Objectives

1. Using assemble to track installation progress
2. Sort and filter data by installation status and activity id 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



Agenda



2D Method

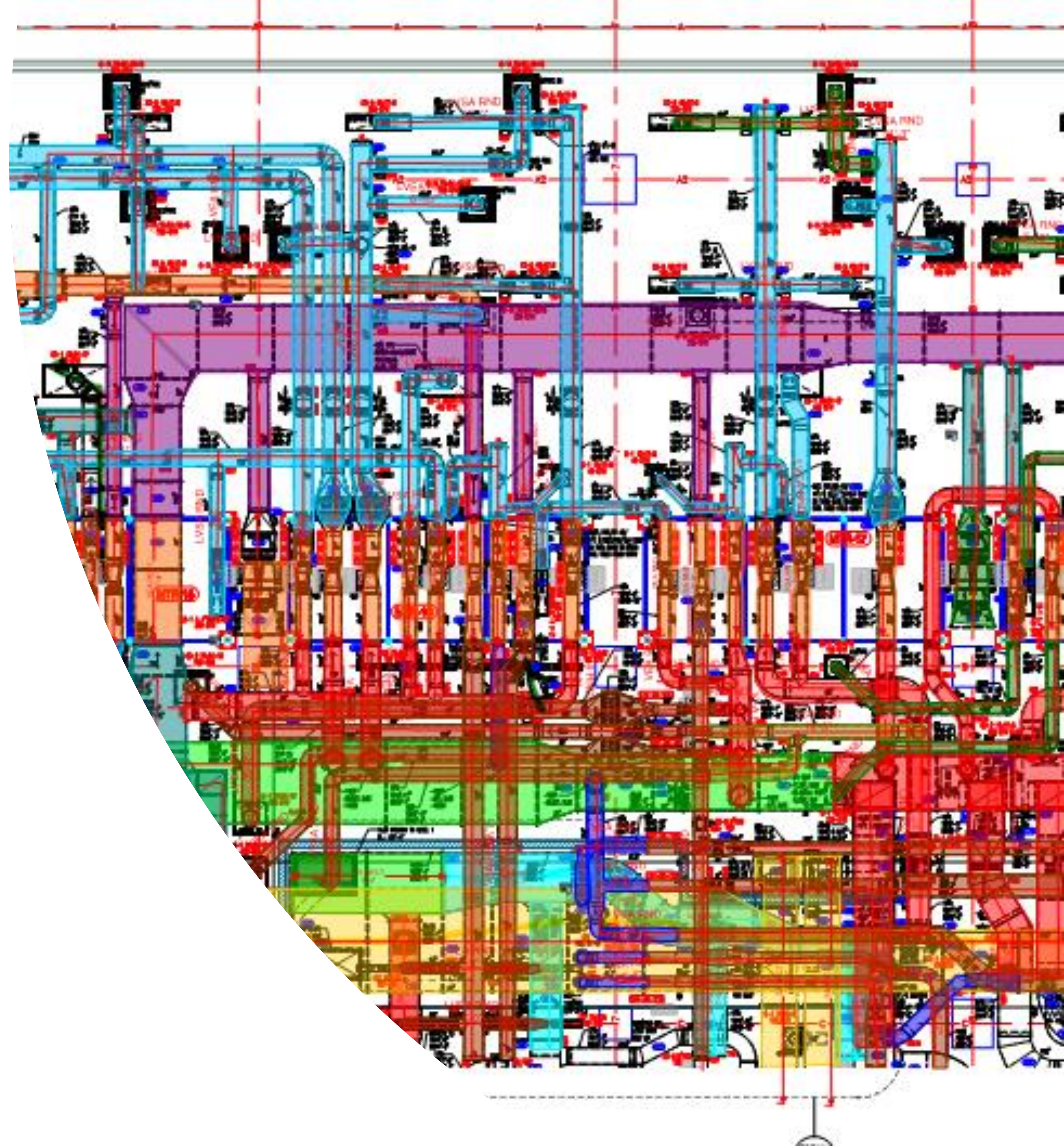
3D Assemble Workflow

Overall Benefits

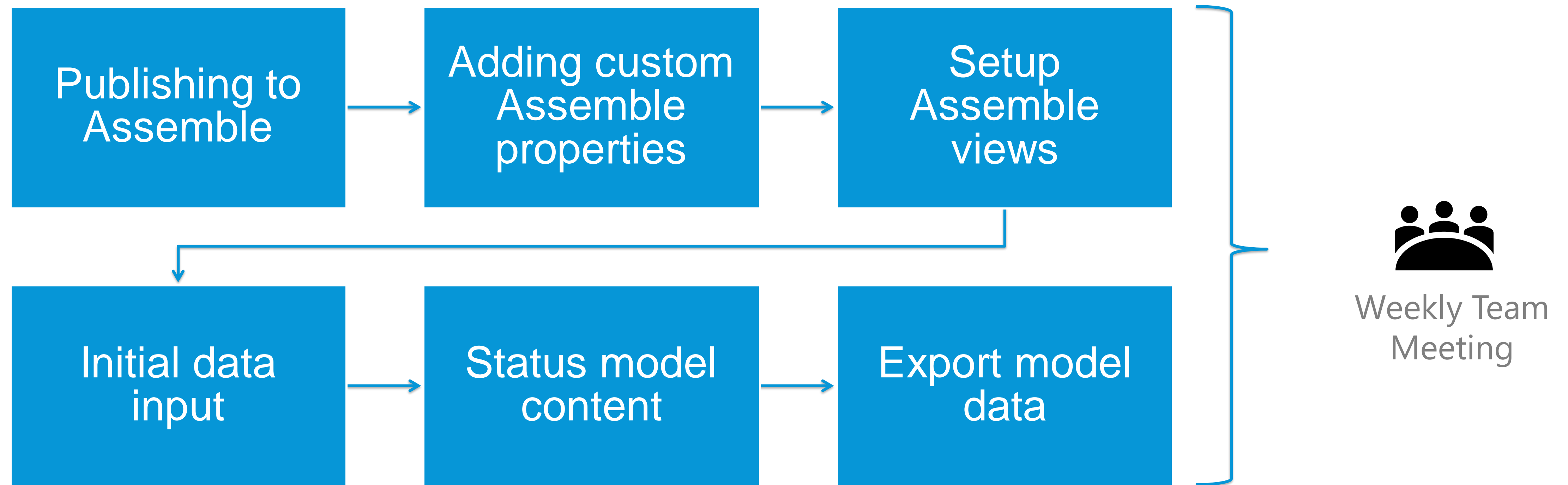
2D Earned Value Process

- Time consuming
- Inaccurate
- Challenging on complex buildings
- Unable to compare to budget

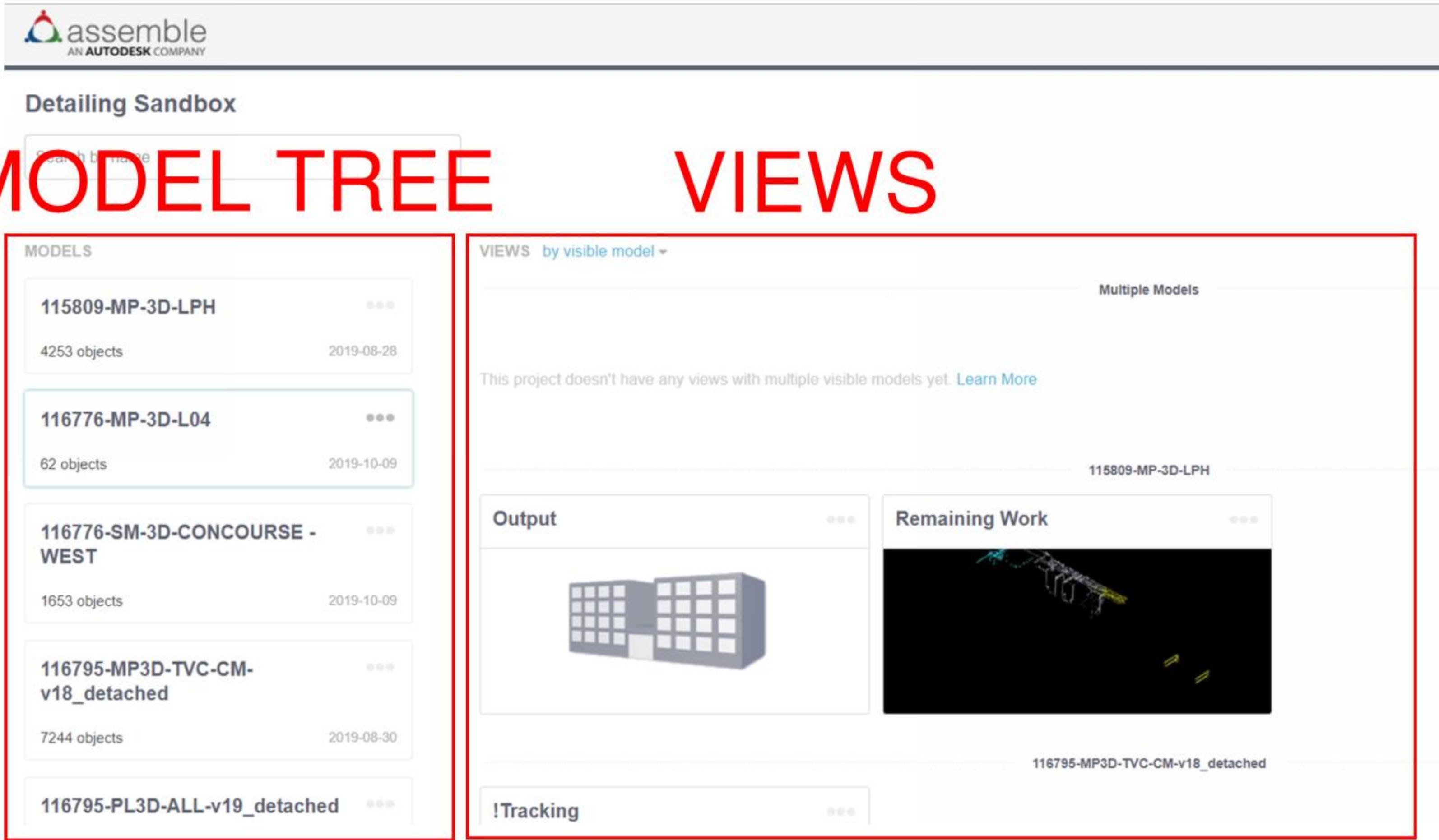
$$\text{Productivity } EV = \frac{\left(\frac{\text{Lbs. Installed}}{\text{Total Lbs.}}\right) * \text{Budget Hours}}{\text{Actual Hours}}$$



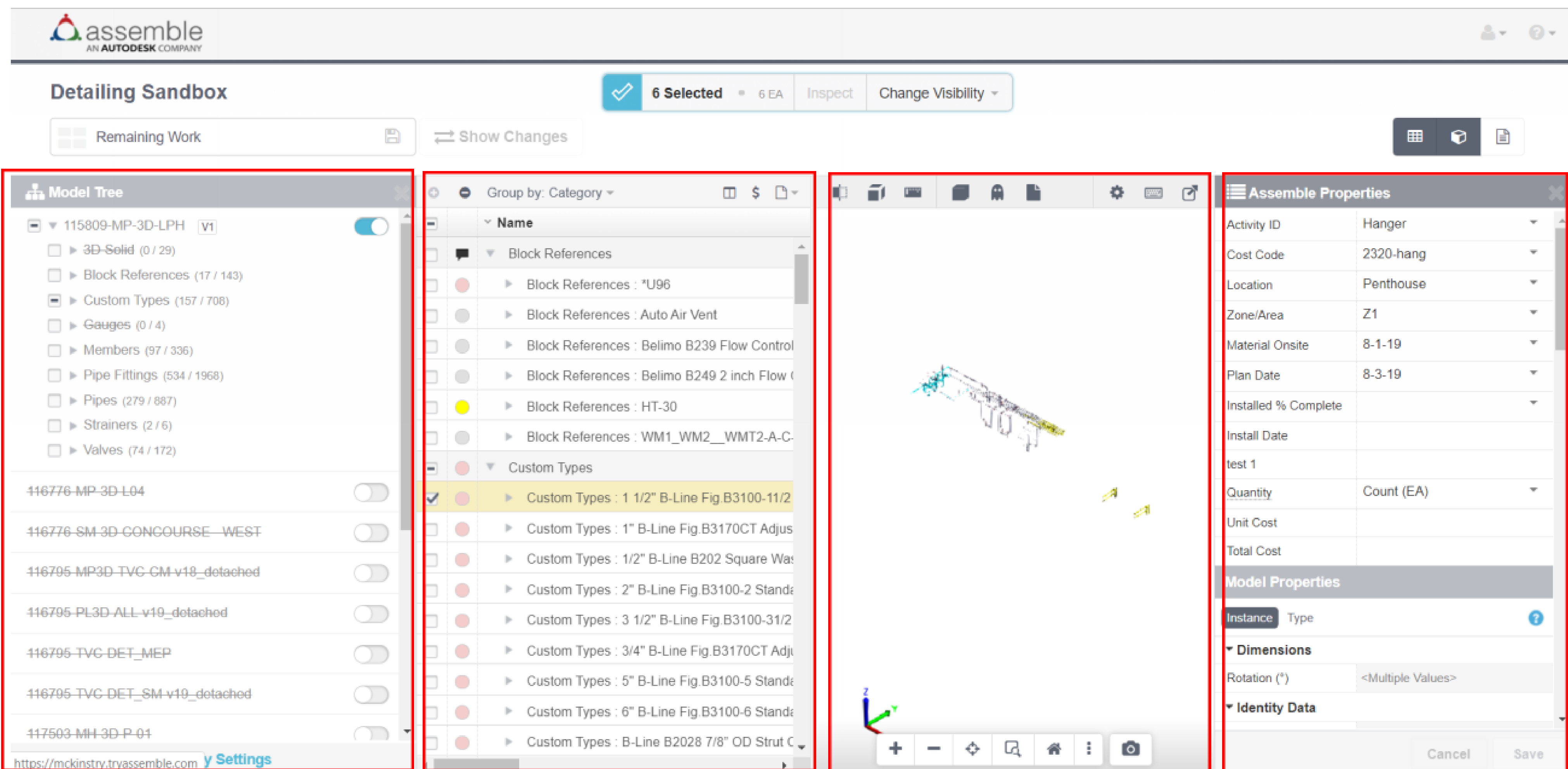
Assemble Workflow



Assemble User Interface



Assemble User Interface



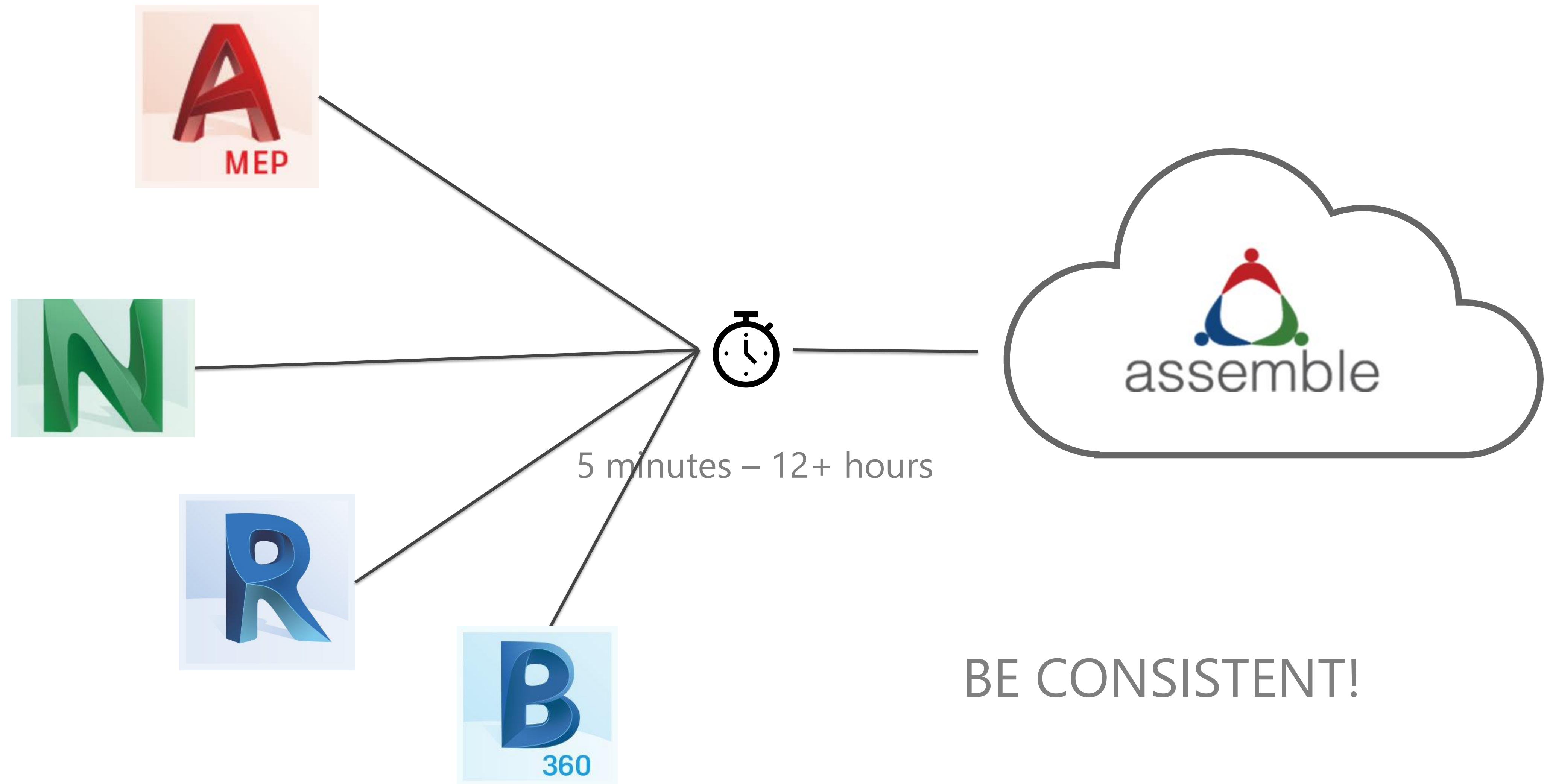
MODEL TREE

INVENTORY

3D VIEW

PROPERTIES

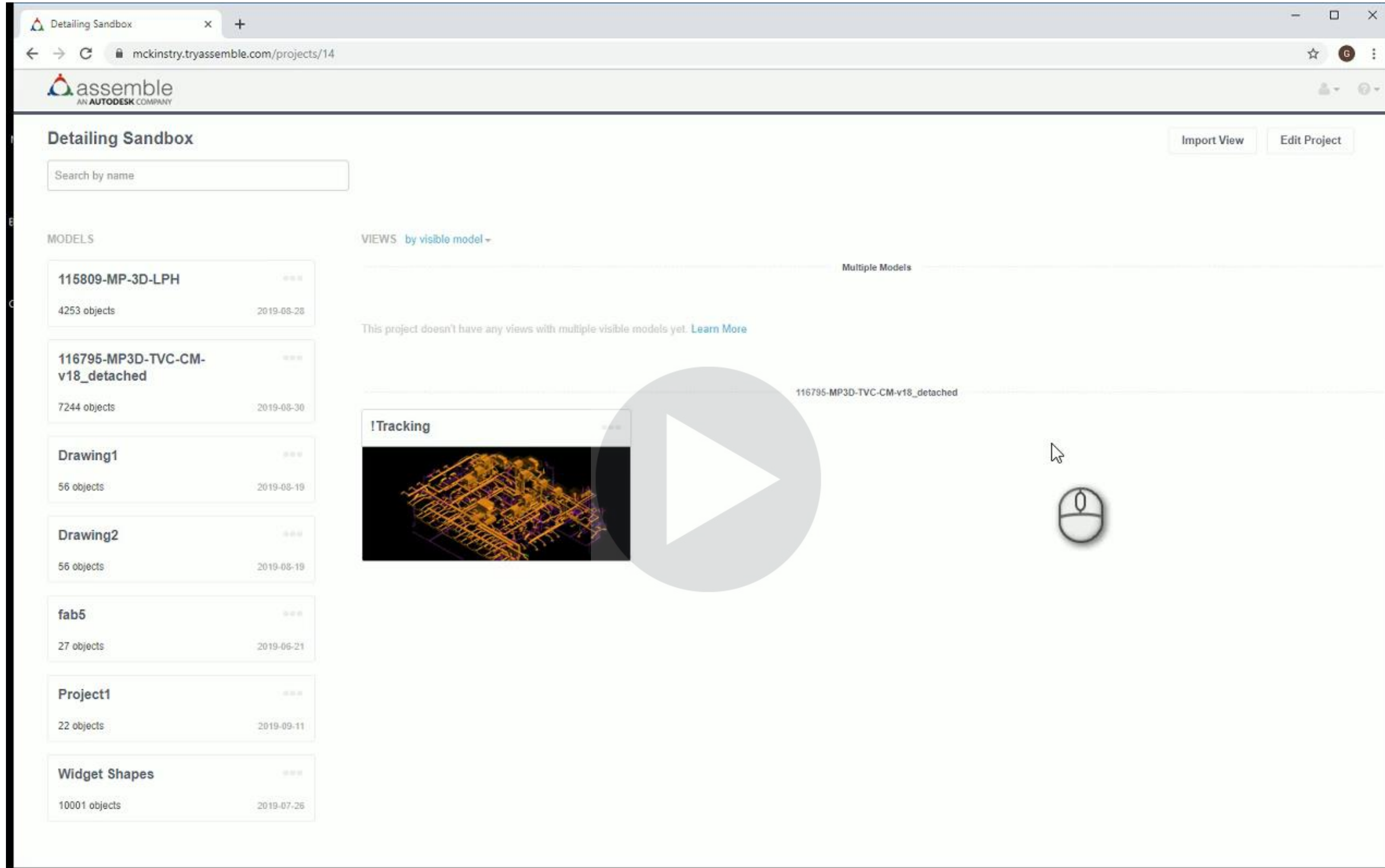
Publishing to Assemble



BE CONSISTENT!

💡 PRO TIP: If you are using Fabrication parts, ensure you've installed the Object Enabler before publishing.

Adding Custom Assemble Properties



Some Custom Assemble Properties McKinstry uses

Dates

- Plan [to install] date
- Material onsite
- Inspection complete
- Insulation start date

Key for EV

% Complete

- Detailing
- Submittal
- DWG Review
- Layout
- Install

Other

- Issues/comments

Setting up Assemble Views

Detailing Sandbox

mckinstry.tryassemble.com/projects/14#views/model/721

assemble
AN AUTODESK COMPANY

Detailing Sandbox

1 Selected 1 EA Inspect Change Visibility

Untitled View Show Changes

Group by: Category

Name	Quantity	Unit	Model Name	Layer	Count (EA)	Area (SF)	Volume (CY)	Length (LF)
3D Solid	29	EA	115809-MP-3D...		29			
3D Solid : 3DSOLID	29	EA	115809-MP-3D...		29		14.30	
Block References	143	EA	115809-MP-3D...		143			
Block References : *U109	1	EA	115809-MP-3D...	G-EQPM	1			
Block References : *U112	1	EA	115809-MP-3D...	M-STEM-LO...	1			
Block References : *U114	4	EA	115809-MP-3D...	M-PIPE	4			
Block References : *U117	2	EA	115809-MP-3D...	G-EQPM	2			
Block References : *U123	1	EA	115809-MP-3D...	G-EQPM	1			
Block References : *U125	1	EA	115809-MP-3D...	G-EQPM	1			
Block References : *U127	2	EA	115809-MP-3D...	G-EQPM	2			
Block References : *U131	2	EA	115809-MP-3D...	G-EQPM	2			
Block References : *U92	1	EA	115809-MP-3D...	G-EQPM	1			
Block References : *U96	2	EA	115809-MP-3D...	G-EQPM	2			
Block References : .75_inch_Y-Strainer_Stainless Steel	2	EA	115809-MP-3D...	MP-STEM-HI...	2			
Block References : 0-200 psi Pressure Gauge	3	EA	115809-MP-3D...	M-PIPE	3			
Block References : 2in PLACE HOLDER ONLY	2	EA	115809-MP-3D...	M-PIPE	2			
Block References : 30 Gallon Dike Tank	1	EA	115809-MP-3D...	G-EQPM	1			
Block References : A\$C4B252488	3	EA	115809-MP-3D...		3			
Block References : A\$C5BC376D8	9	EA	115809-MP-3D...	MP-NGAS-L...	9			
Block References : AHU-1E	1	EA	115809-MP-3D...	G-EQPM	1			
Block References : AHU-2-S	1	EA	115809-MP-3D...	G-EQPM	1			
Block References : Auto Air Vent	28	EA	115809-MP-3D...	M-PIPE	28			
Block References : B&G Pump Stand 1inch basewith ISO...	8	EA	115809-MP-3D...	G-EQPM	8			
Block References : BG-DC-3X-suction-diffuser-for-P-4A-4B	2	EA	115809-MP-3D...	MP-HWTR-R...	2			

Assemble Properties

Activity ID Blank

Cost Code

Location

Zone/Area

Material Onsite

Plan Date

Installed % Complete

Install Date

Quantity Count (EA)

Unit Cost

Total Cost

Model Properties

Instance Type

Identity Data

Effective Name SV5708 Series Bronze Safety Valv

File Name 115809-MP-3D-LPH.dwg

Handle 30F25DE

Layer M-STEM-LOW~

Name *U112

Source Document Id 0

Path

Other

Family Name

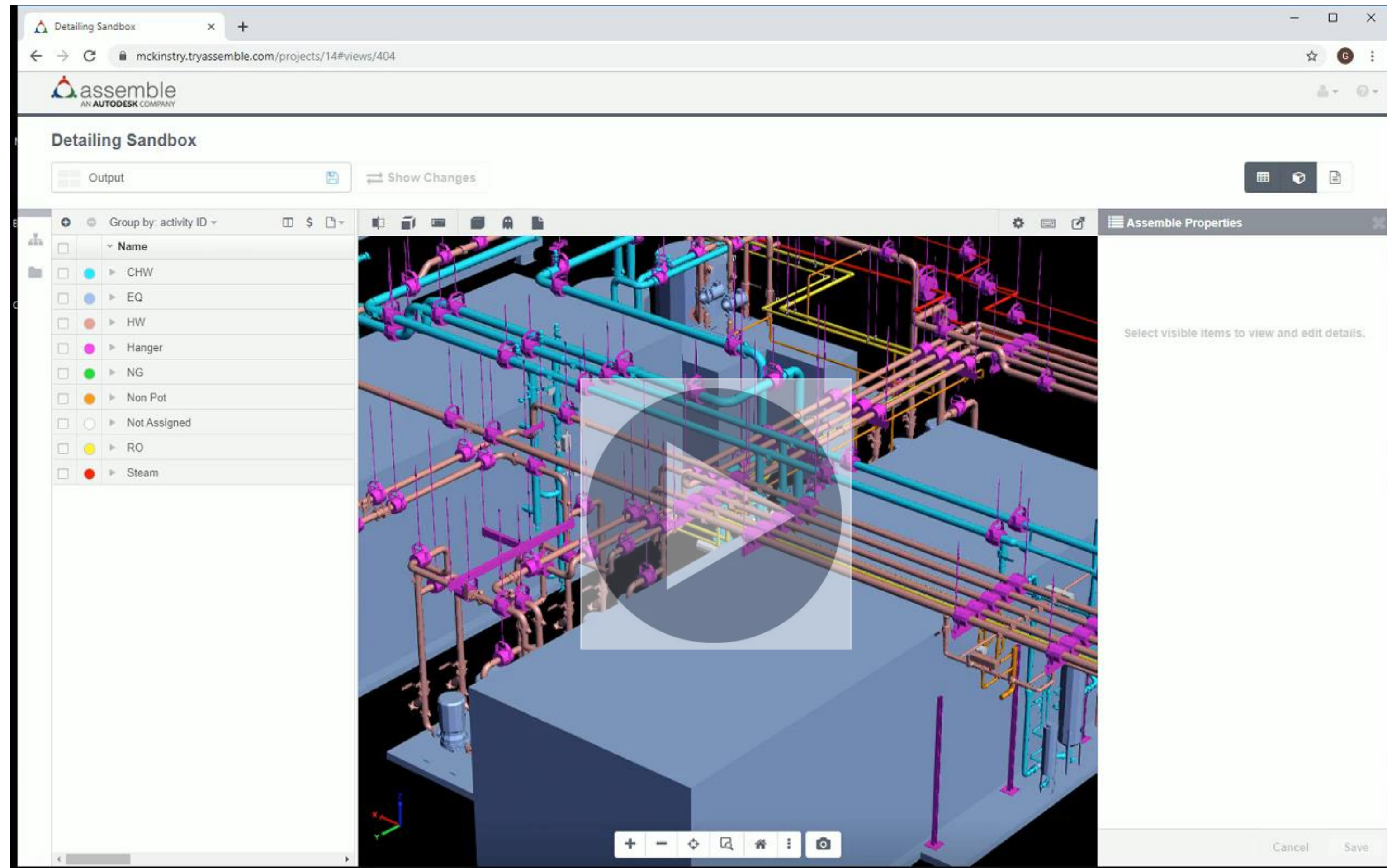
Ins Units Inches

Cancel Save

Loading up Assemble Properties

Assemble Properties that are filled out at the beginning of a McKinstry project.

- Cost Code
- Activity ID
- Zone
- Location



Creating Views - Remaining Work View

Detailing Sandbox

Untitled View Show Changes

Group by: Category Columns Estimate Import/Export

Name	Quantity	Unit	Model Name	Layer
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3D Solid : 3DSOLID	29	EA	115809-MP-3D...	
Block References	143	EA	115809-MP-3D...	
Block References : *U109	1	EA	115809-MP-3D...	G-E
Block References : *U112	1	EA	115809-MP-3D...	M-S
Block References : *U114	4	EA	115809-MP-3D...	M-I
Block References : *U117	2	EA	115809-MP-3D...	G-E
Block References : *U123	1	EA	115809-MP-3D...	G-E
Block References : *U125	1	EA	115809-MP-3D...	G-E
Block References : *U127	2	EA	115809-MP-3D...	G-E
Block References : *U131	2	EA	115809-MP-3D...	G-E
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Block References : A\$C4B252488	3	EA	115809-MP-3D...	
Block References : A\$C5BC376D8	9	EA	115809-MP-3D...	MP
Block References : AHU-1E	1	EA	115809-MP-3D...	G-E
Block References : AHU-2-S	1	EA	115809-MP-3D...	G-E
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Block References : B&G Pump Stand 1inch basewith ISO...	8	EA	115809-MP-3D...	G-E
Block References : BG-DC-3X-suction-diffuser-for-P-4A-4B	2	EA	115809-MP-3D...	MP

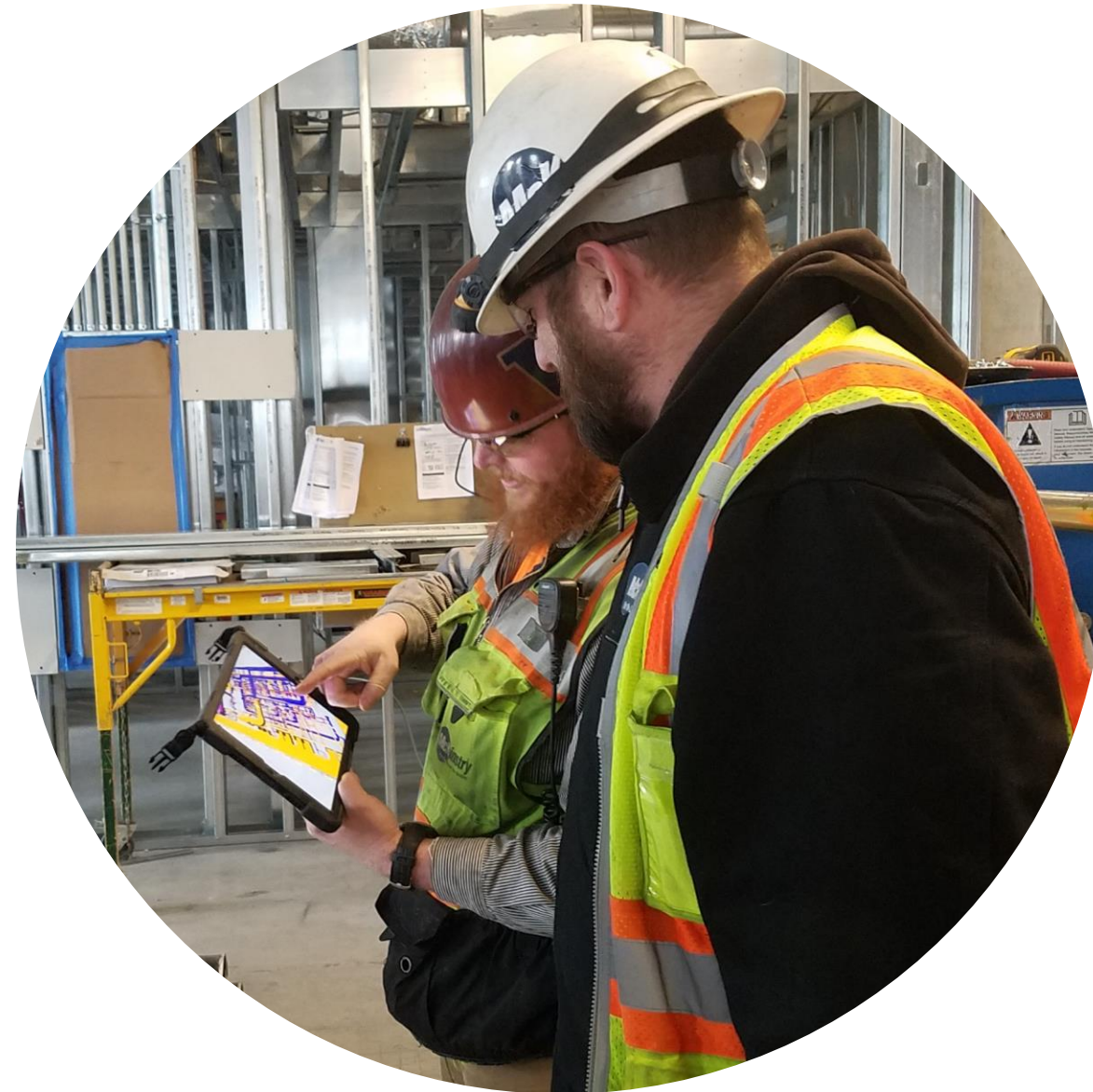
3D View



Status Model Content

Methods for updating model content:

- Field leads can update via tablet or phone
- Prints can be highlighted and model statused by others
- Site walks can verify claimed quantities to maintain accuracy



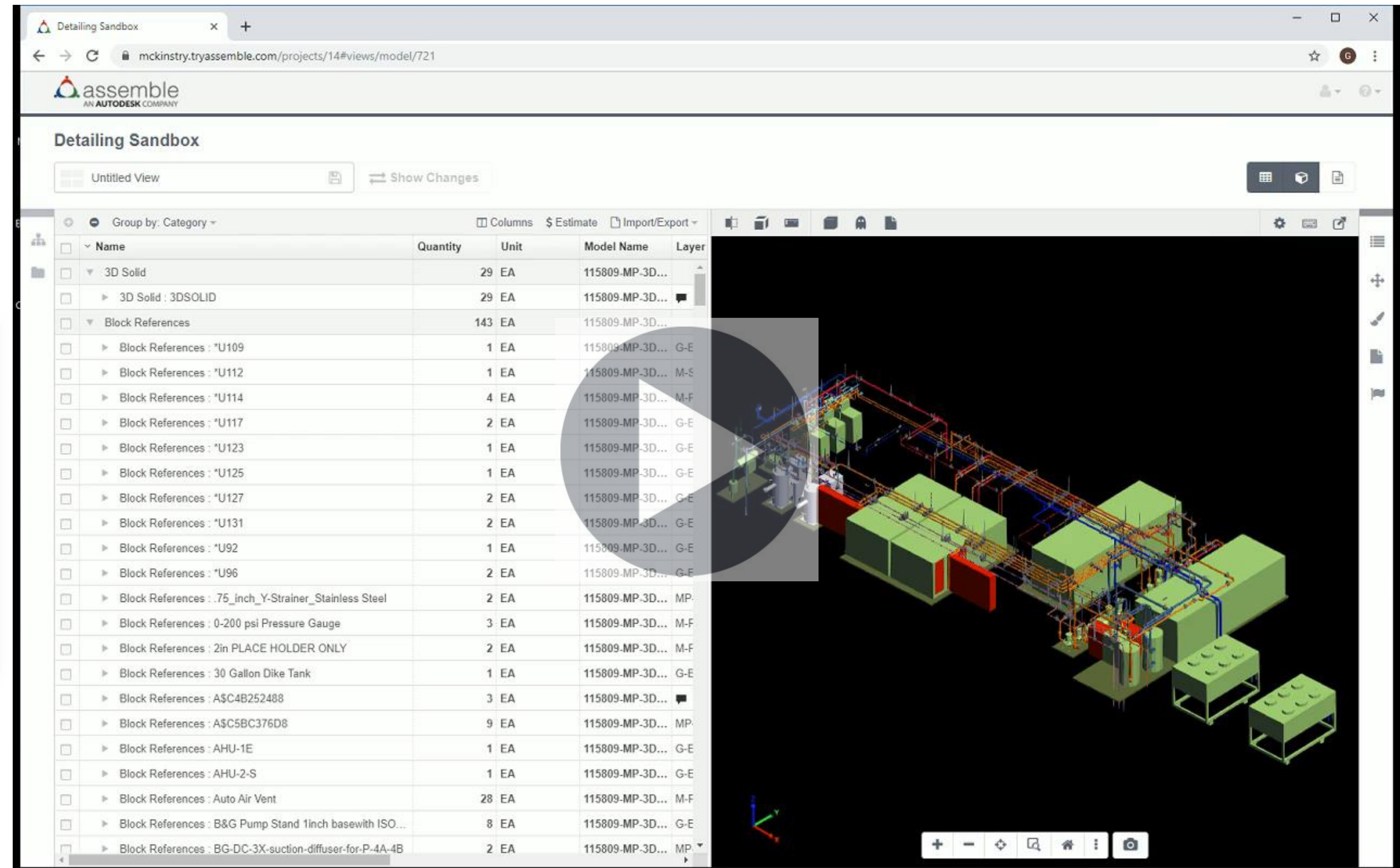
Updating Model Content on iOS



Data Export Process

- Open in the view you created
- Export to excel

Color	Category Name	Item	Model Name	Source ID	Quantity	Unit
	Air Terminals				231.00	EA
	Custom Types				91.00	EA
	Duct Accessories				117.00	EA
	Duct Fittings				363.00	EA
	Ducts				2,186.72	LF
	Electrical Equipment				1.00	EA
	Flex Ducts				886.13	LF
	Mechanical Equipment				66.00	EA
	Pipe Fittings				260.00	EA
	Pipe Flex				8.00	EA
	Pipes				1,074.75	LF
	Plumbing Fixtures				12.00	EA
	Pumps				2.00	EA

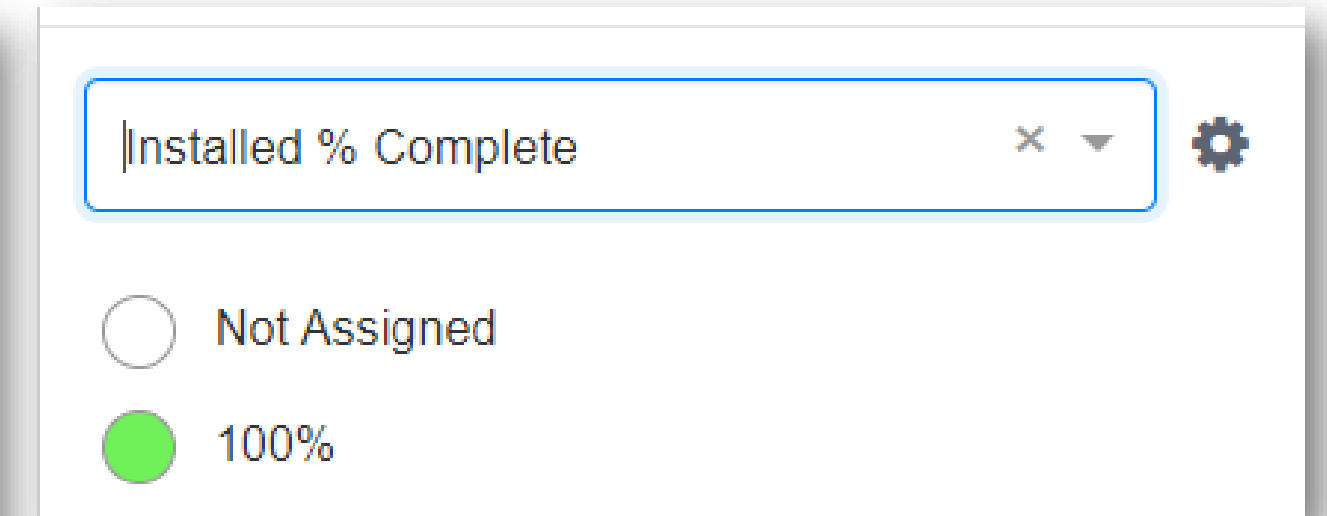
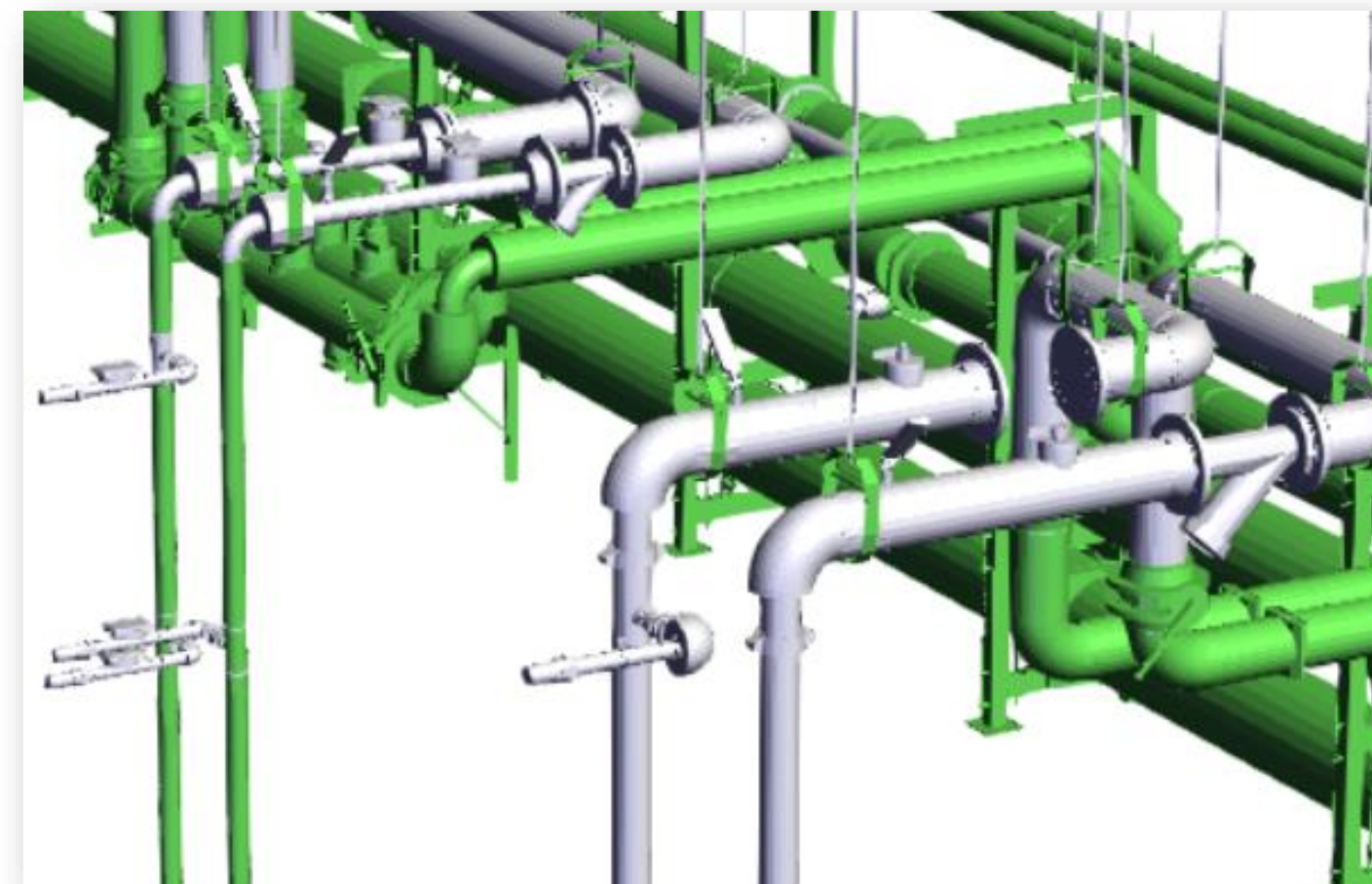
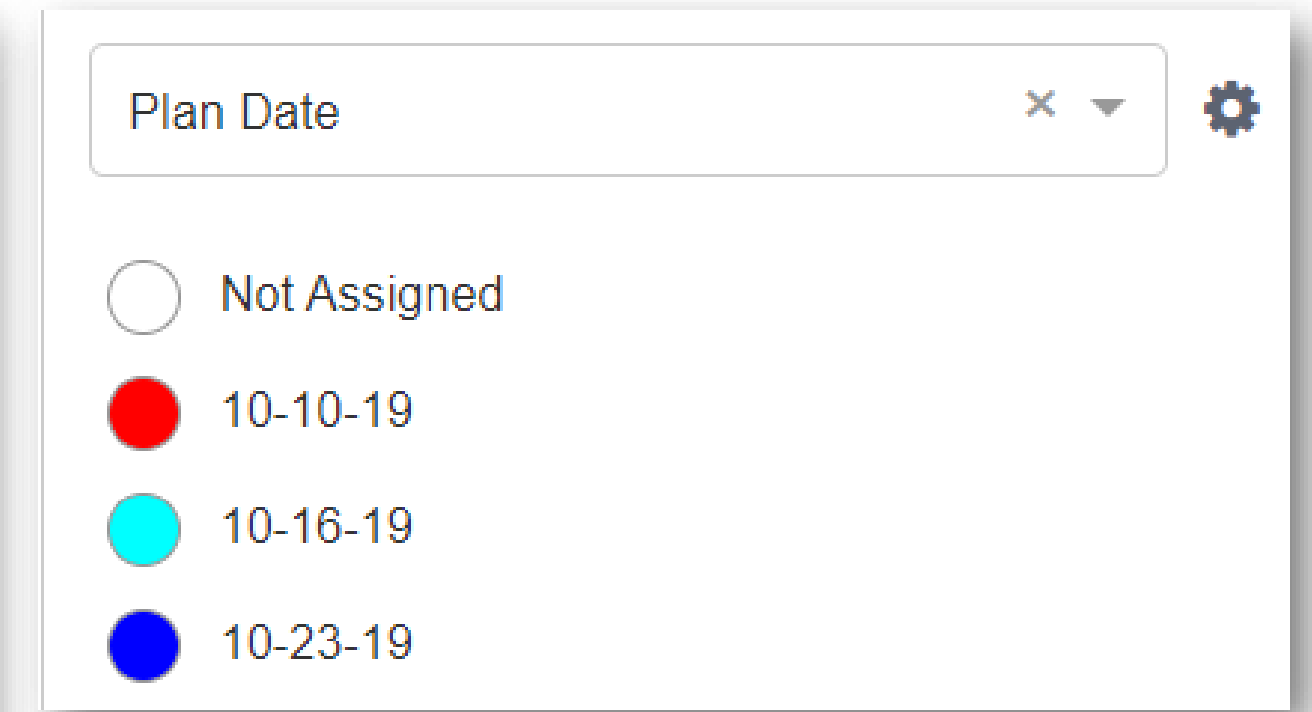
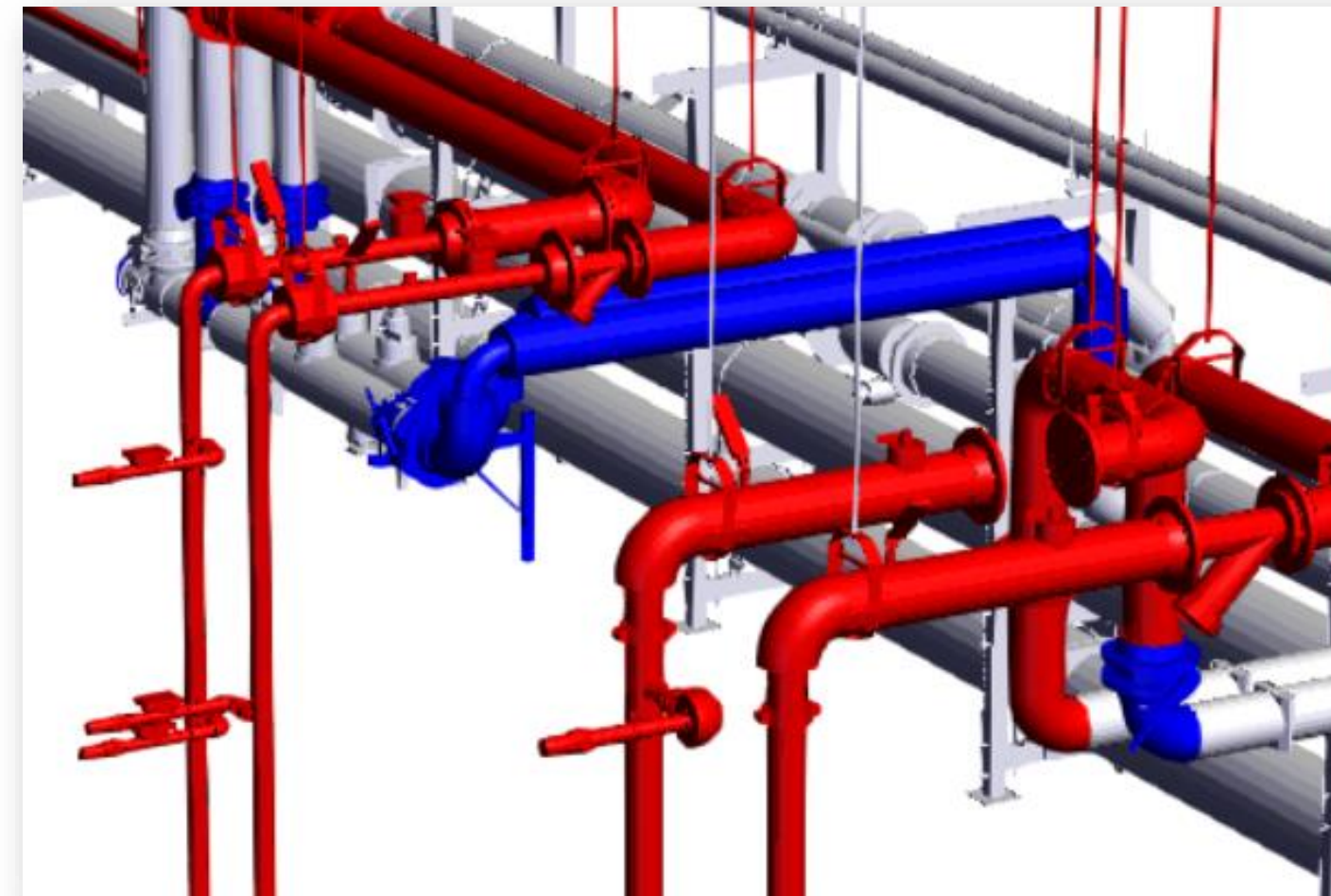


💡 PRO TIP: Change all of the text to black on the excel export to see the data

Benefits

Help facilitate weekly team meeting

- Plan vs Actual complete
- Remaining work
- Pressure testing status
- Inspection status
- QC issues

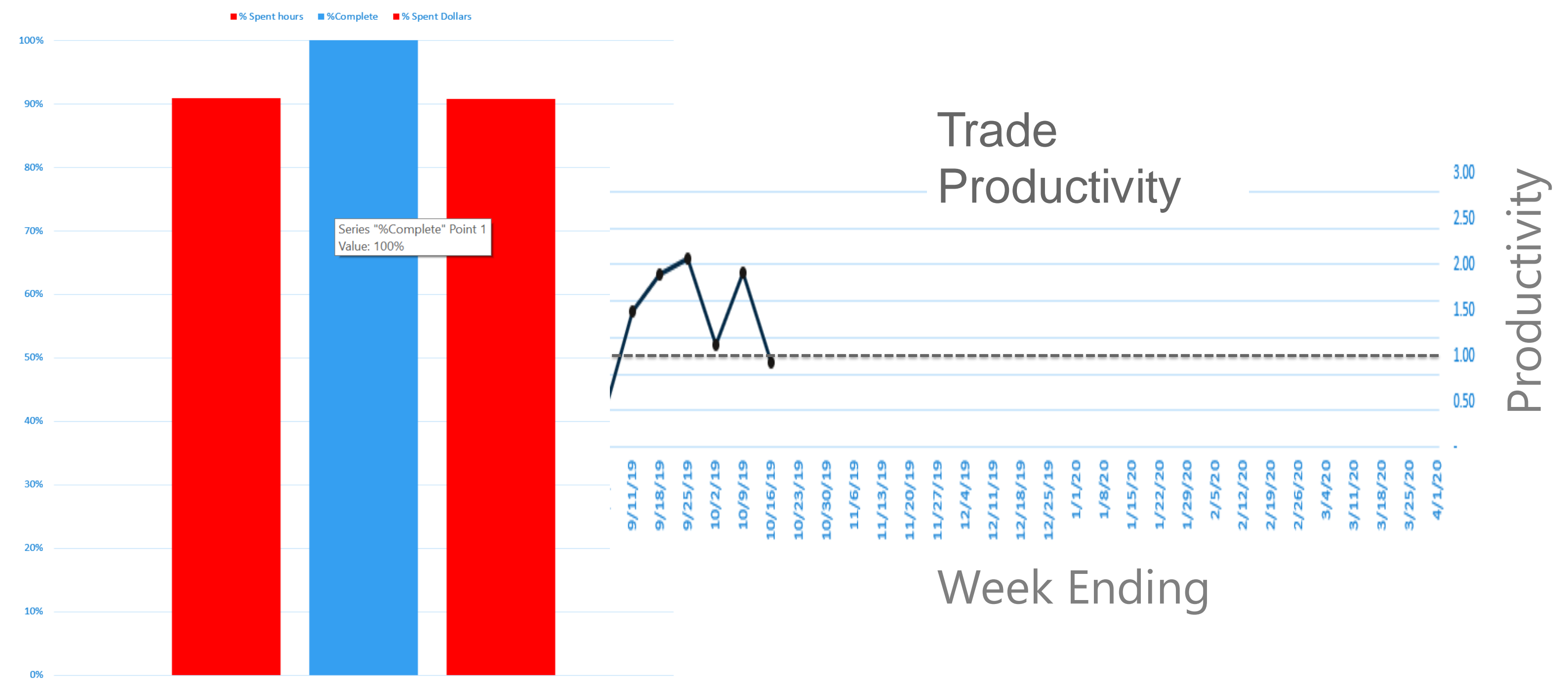


Benefits

Project Tracking

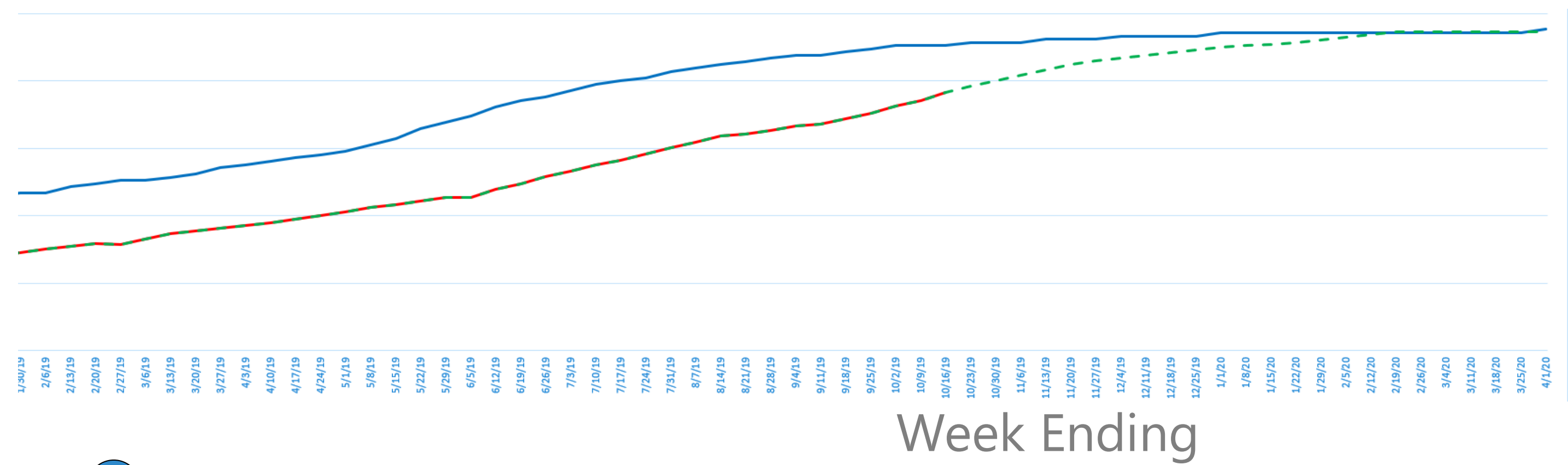
- Speed and accuracy of quantities
- Weekly productivity by trade
- Man hour plan
- Financial tracking – “middle finger” graph

$$EV = \frac{\left(\frac{Lbs. Installed}{Total Lbs.}\right) * Budget Hours}{Actual Hours}$$



“Middle Finger” Graph

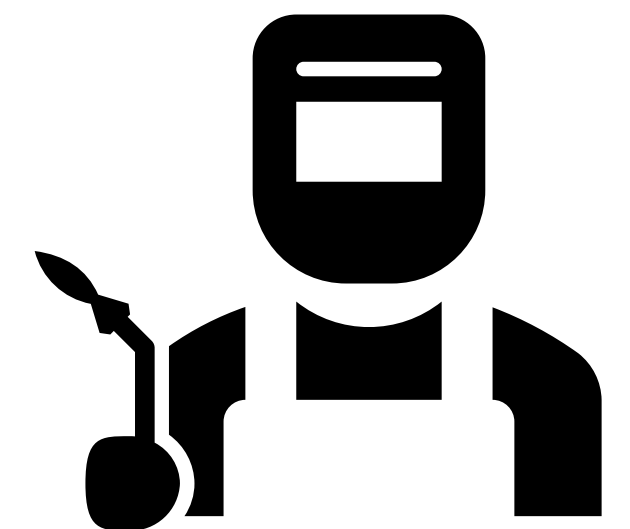
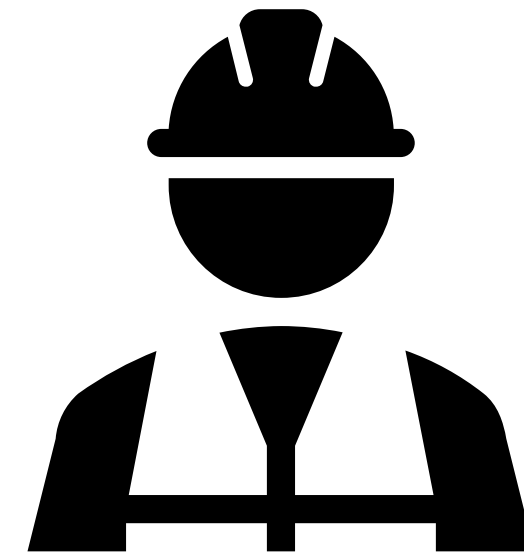
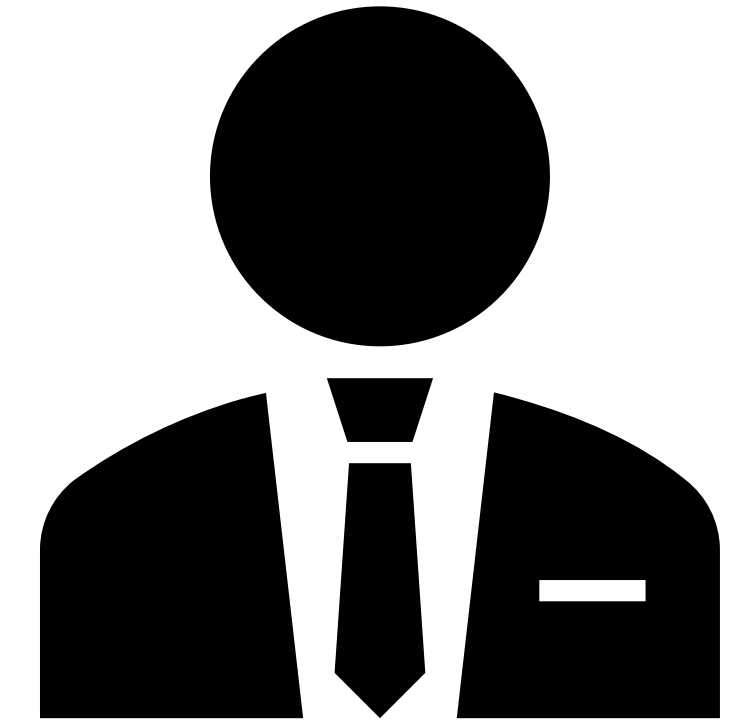
Man hour plan



- Original Estimated Hours
- Forecasted Hours
- Actual Hours

Benefits

- Project Team Collaboration
 - Minimal technical skills required to navigate the model
 - 3D environment fosters discussion between staff and field
 - Updates to Assemble properties is real-time, so everyone can stay on the same plan



Recap of what we discussed

Using Assemble
to Track
Installation
Progress

Publishing
models
and
project
setup

Weekly
update
process

Sort and filter
data by
installation status
and activity id to
see quantities
installed

Setting up
views

Excel
data
export

Benefits of
tracking earned
value through a
3D model instead
of 2D solutions

Increased
accuracy

Enhanced
speed

Utilize BIM meta
data for
construction
management

Hosting
weekly
team
meetings

Breaking
silos
between
staff and
field

What's Next?

1. Connect Assemble to hours for work to be performed
2. Identify “at risk” work



Questions?



Reminder - Take the class survey in the app!



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