Modeling – Estimating – Manufacturing How the Aussies Do It !

Dave Mangham

A2K Technologies - Senior MEP Solutions Consultant

CONNECT & CONSTRUCT SUMMIT

AUTODESK. UNIVERSITY

Modeling – Estimating – Manufacturing
How the Aussies Do It !

Class description – Industry Talk

During this session we will walk you through the workflows being used in the Australian MEP construction sector. Taking a standardised industry approach enables multiple stakeholders to collaborate in a simplified workflow. With the introduction of fabrication in Revit the Australian market has identified the benefits of adopting industry standards which we will explain during this session. Identifying the challenges presented with this approach we will demonstrate how these have been overcome & what challenges still remain. Come with us on this end to end journey where you will learn how all project stakeholder can benefit from adopting standards and reduce conflicts.

Learning Objectives

OBJECTIVE 1
Discover the benefits of adopting industry standards

OBJECTIVE 2
Learn about different workflows when using fabrication in Revit

OBJECTIVE 3
Learn about the benefits of a .MAJ export to Fabrication ESTmep

OBJECTIVE 4
Discover the benefits of a .MAJ export to Fabrication CAMduct

About the speaker

Originally from Ramsbottom, in the North West of England, Dave worked in both the CAM & CAD departments for a large HVAC construction company, instrumental in the development of M.A.P.'s & subsequently Autodesk's CAMduct, ESTmep & CADduct software.

He spent a period working at M.A.P. as their CAD support manager before moving to a mid-sized HVAC contractor as a project engineer.

He then spent 5 years cutting his teeth at a global multi-disciplinary design practice in central Manchester working alongside design engineers to provide design solutions on a variety of projects.

Following a move from the UK to Melbourne 8 ½ years ago, Dave spent 3 years configuring & deploying Autodesk's Fabrication ESTmep for one of Australia's Tier 1 Mechanical Contractors.

Dave joined A2K Technologies in May 2017 as a Senior MEP Solutions Consultant to promote both the BIMMEP^{AUS} initiative and MEP Revit & Fabrication solutions.

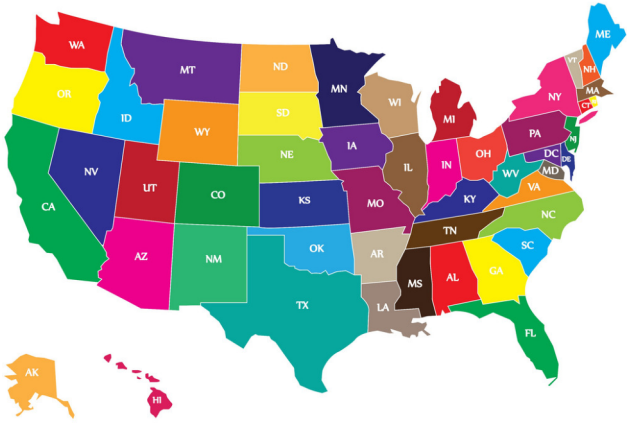
He brings 30 years' experience in the M.E.P. construction, design & manufacturing industry to Autodesk's Connect & Construct Summit.

Who are A2K Technologies?

AUTODESK. Platinum Partner

A2K provide end to end solutions for
the AEC and manufacturing industries.

U.S. CAD ACHIEVE MORE.



cadline

capricot

A2K Technologies

1800 223 562

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A2K Technical Partners for AMCA BIM-MEP^{AUS} Industry initiative

BIM-MEP AUS

Develop an industry based best practice approach to BIM for MEP

Enable integrated project delivery workflows (IPD) and supply chain engagement

Provide the data for AM/FM Building Information Management

Promote and drive construction innovation and efficiency

A2K

AUTODESK. **News Release**

Autodesk Acquires Micro Application Packages Limited

Acquisition Helps Extend Building Information Modeling Across the Building Lifecycle Beyond Design to Support Fabrication and Construction

SAN RAFAEL, Calif., Oct 20, 2011 (BUSINESS WIRE) --

AUTODESK®
FABRICATION CAMDUCT™

AUTODESK®
FABRICATION CADMEP™

AUTODESK®
FABRICATION ESTMEP™

AU 2015

AUTODESK. News Release

Mechanical, Electrical, and Plumbing Engineering Enhancements in Revit 2016

- **MEP fabrication detailing**: You can now use LOD 400 content from Autodesk Fabrication products (CADmep, ESTmep, and CAMduct) in Revit to create a more coordinated model. This functionality provides greater certainty for detailers in construction firms that the model accurately reflects the intended installation. See Fabrication Detailing.
- **Revit Extension for Autodesk Fabrication**: You can import and export fabrication jobs between Revit and the Autodesk Fabrication products. See Autodesk Revit Extension for Autodesk Fabrication.

Post AU 2015
US Study Tour

Peer Group Visits
Texas
Illinois

Australian MEP Industry

Leading Edge? Early adoption

Bleeding Edge? Functionality

Cutting Edge? Workflow benefits

Project Delivery Scenarios

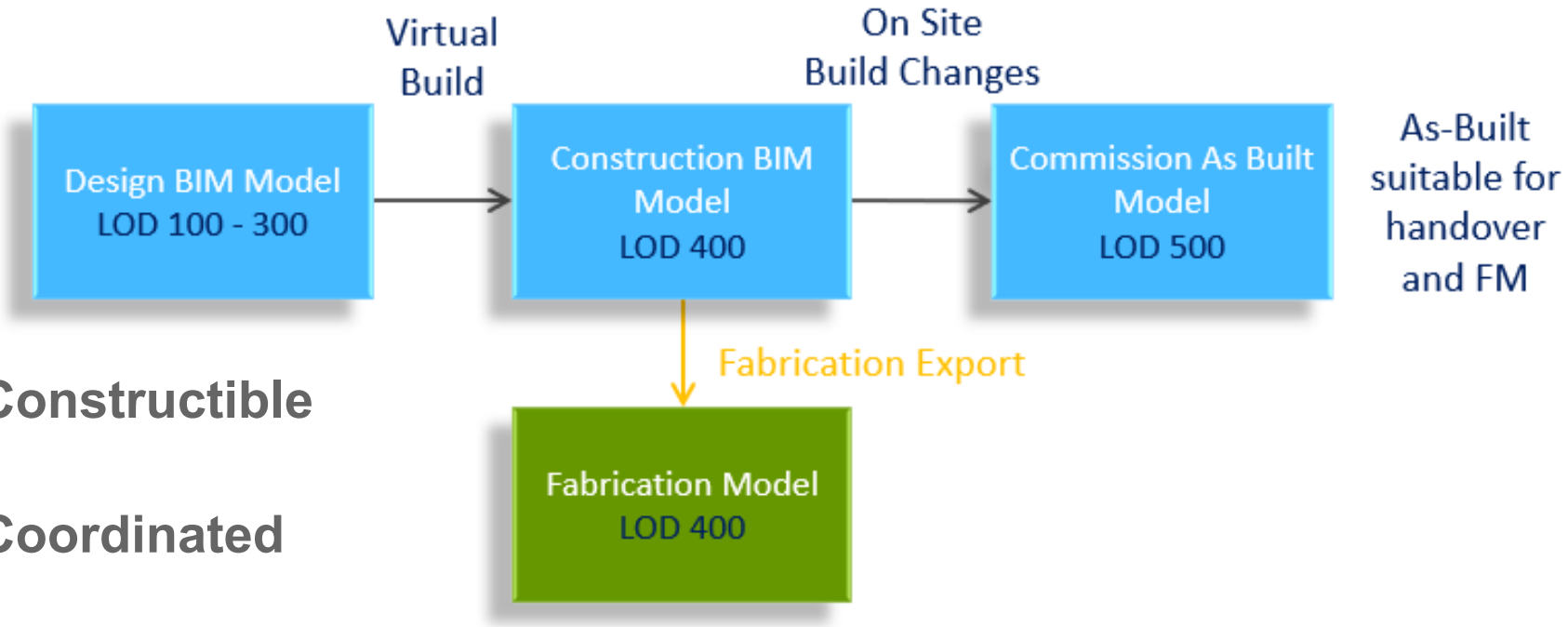
Designer – Contractor (MEP) – Fabricator - Installer

Self Deliver MEP Contractor (D&C)

Subcontract Fabrication

Subcontract Installation

Design To As-Built



Constructible

Coordinated

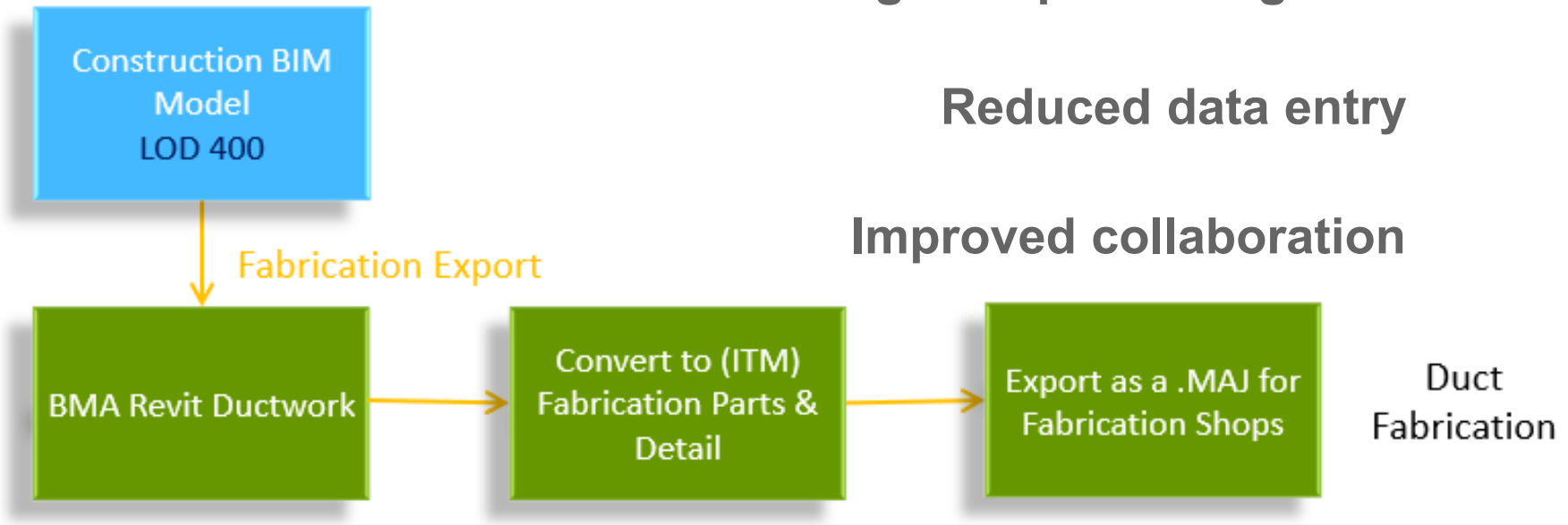
Accurate model and dataset for handover

Design To Fabrication

Reduced drafting / shop detailing time

Reduced data entry

Improved collaboration



Mechanical Duct Work Systems

Designation	System	Colour	Colour Name
CE	Car Park Exhaust		Coral
EA	Exhaust Air - General		Orange
HE	Hazardous Exhaust		Pale Violet Red
KE	Kitchen Exhaust		Pink
MA	Make-up Air		Light Green
OA	Outside Air		Light Green
PA	Pressurisation Air (Smoke Control)		Pale Green
RA	Return Air		Light Pink
SA	Supply Air		Light Blue
SE	Smoke Exhaust		Red
TA	Transfer Air		Yellow Green
TE	Toilet Exhaust		Light Salmon
SD	Sub duct		Red

Galvanised ductwork

Service Designation	Service Description
LP	Low Pressure ≤ 500 Pa
HP	High Pressure ≤ 1000 Pa
KE	Kitchen Exhaust (Low Pressure)
CA	Clean Room (High Pressure)
FR	Fire Resistant (Low Pressure)
SD	Sub duct

Stainless steel and aluminum ductwork

Service Designation	Service Description
304	Stainless Steel 304L (Low Pressure)
304KE	Kitchen Exhaust Stainless Steel 304L min thickness 0.9mm (Low Pressure)
316	Stainless Steel 316L (Low Pressure)
ALU	Aluminum (Low Pressure)

Mechanical Duct Work Services

Template Add-In	Fabrication	System	Specification
CE_LP_ BMA	CE_LP	Car Park Exhaust	LP
EA_LP_ BMA	EA_LP	Exhaust Air - General	LP
HE_LP_ BMA	HE_LP	Hazardous Exhaust	LP
KE_ BMA	KE	Kitchen Exhaust	KE
MA_LP_ BMA	MA_LP	Make-up Air	LP
OA_LP_ BMA	OA_LP	Outside Air	LP
PA_LP_ BMA	PA_LP	Pressurisation Air	LP
RA_LP_ BMA	RA_LP	Return Air	LP
RA_FR_ BMA	RA_FR	Return Air (Fire Resistant)	FR
SA_LP_ BMA	SA_LP	Supply Air	LP
SA_HP_ BMA	SA_HP	Supply Air (High Pressure)	HP
SA_FR_ BMA	SA_FR	Supply Air (Fire Resistant)	FR
SD_BMA	SD	Sub Duct	SD
SE_LP_ BMA	SE_LP	Smoke Exhaust	LP
SE_FR_ BMA	SE_FR	Smoke Exhaust (Fire Resistant)	FR
TA_LP_ BMA	TA_LP	Transfer Air	LP
TE_LP_ BMA	TE_LP	Toilet Exhaust	LP

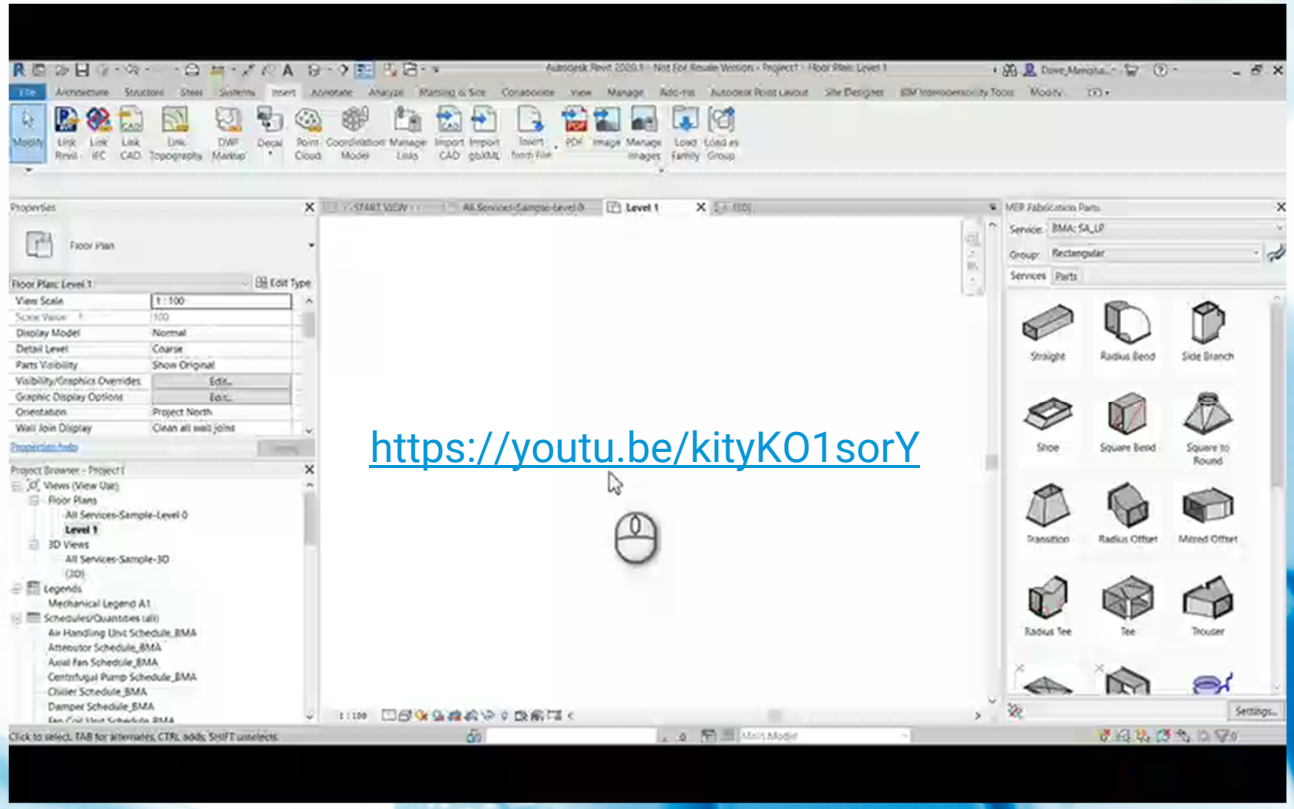
Workflow 1 PDF Tracing using MPR

Pros

- One common environment
- MAJ export – EST / CAM

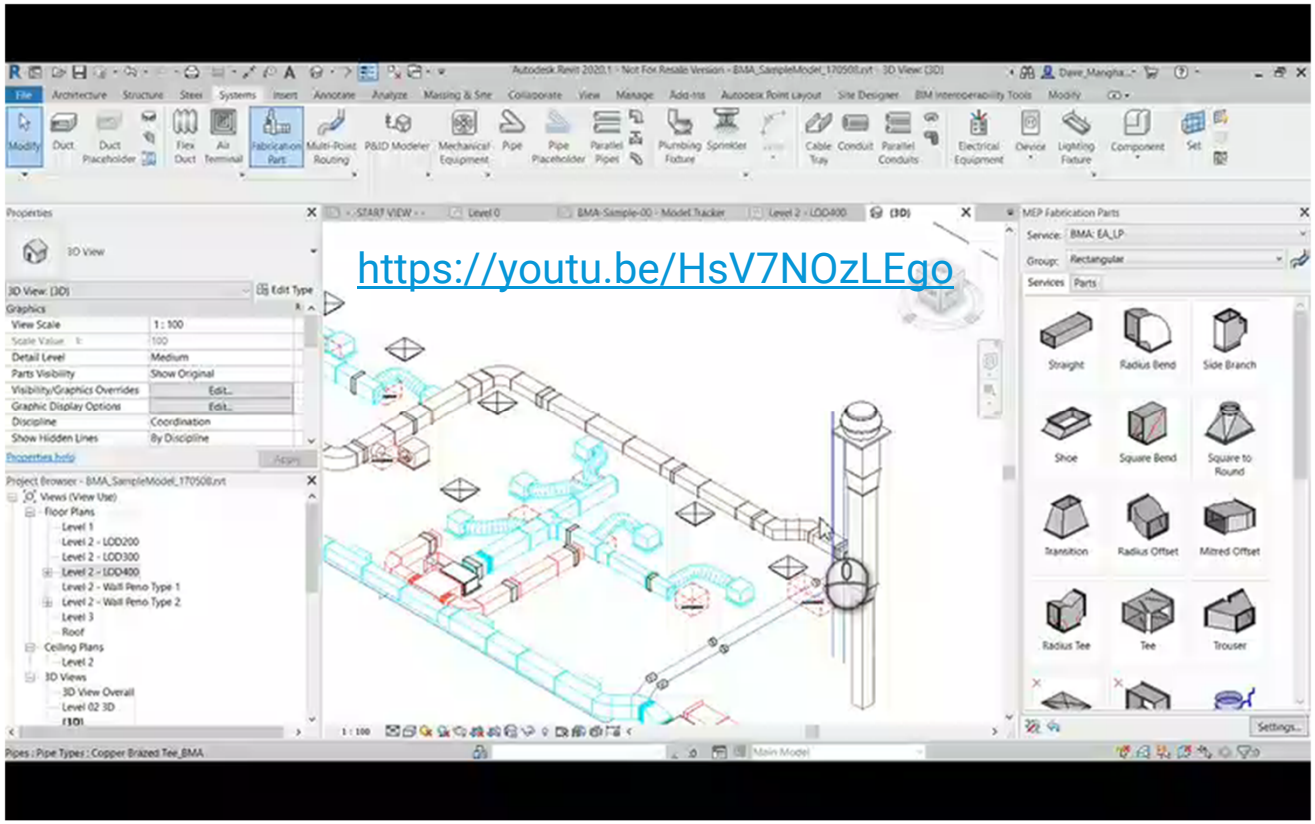
Cons

- Lacking Functionality
- Raster only
- Version 2020
- 2D
- LOD???



https://youtu.be/kityKO1sorY

Workflow 2 Converting Revit Design to Fab Parts



Pros

One common environment

MAJ export EST / CAM

Cons

Reliant on connected systems

Too many conversion fails

LOD???

Workflow 3

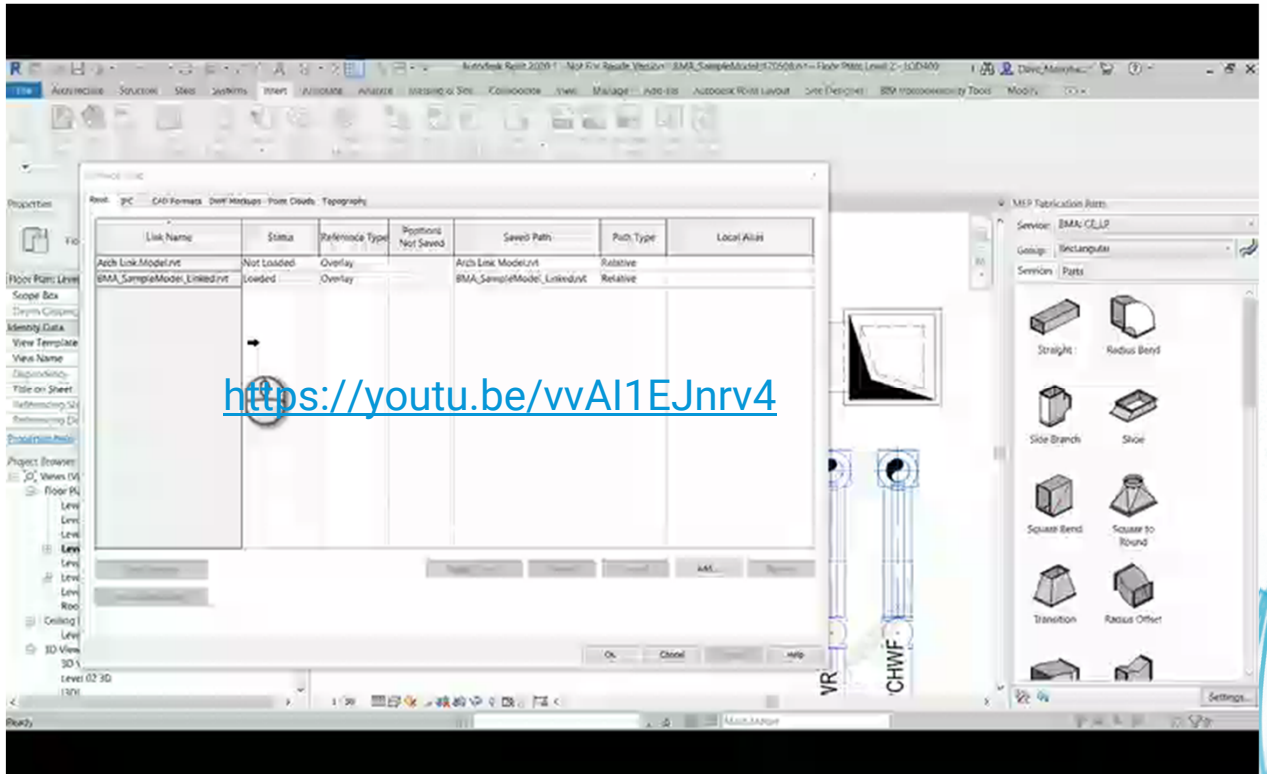
Modelling Fab Parts using linked Revit design model as guide

Pros

- One common environment
- MAJ export

Cons

- Modifications from Design to Construction
- Updating Design model
- LOD???



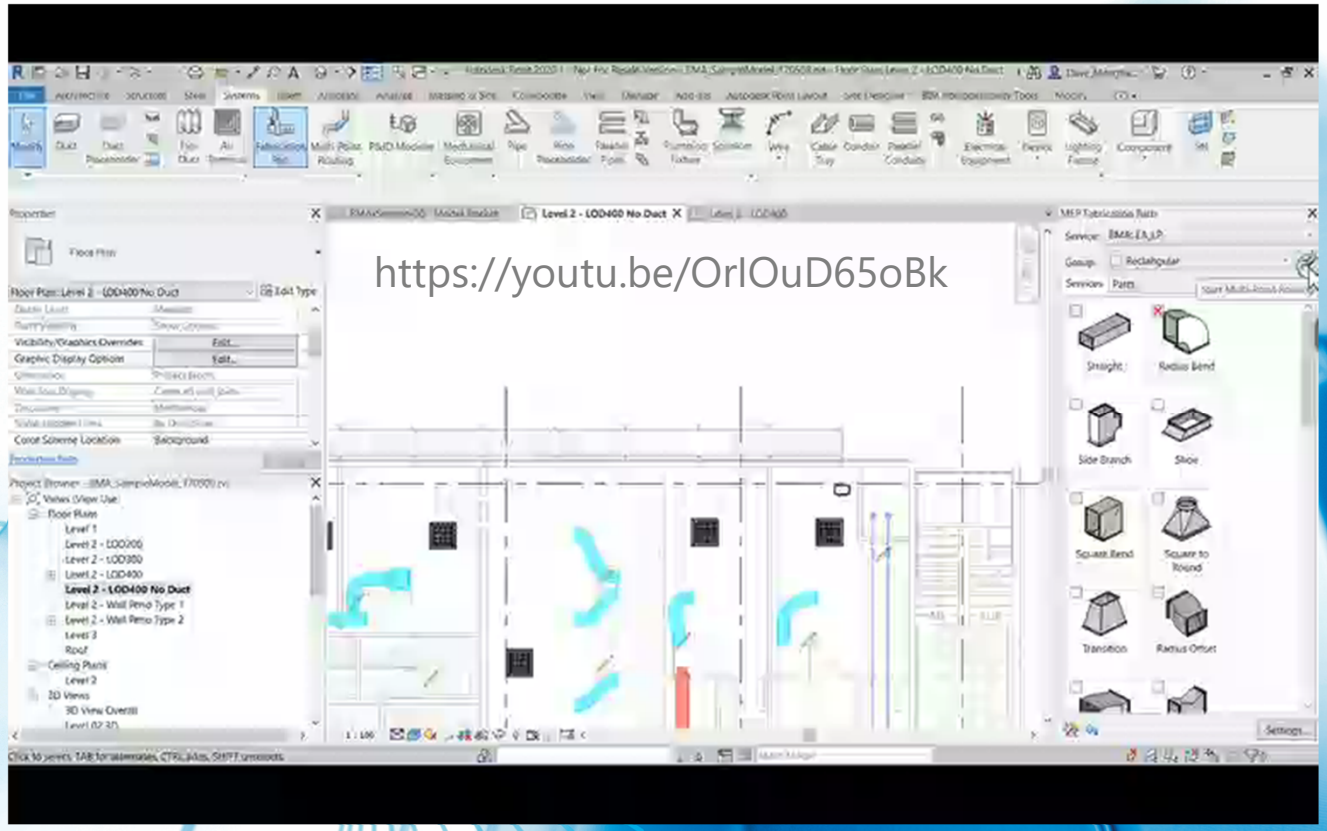
Workflow 4 Modelling Fab Parts from design stage

Pros

- One common environment
- MAJ export EST / CAM

Cons

- No Design Capability
- LOD???



Workflow 5 Detailing Revit model for construction

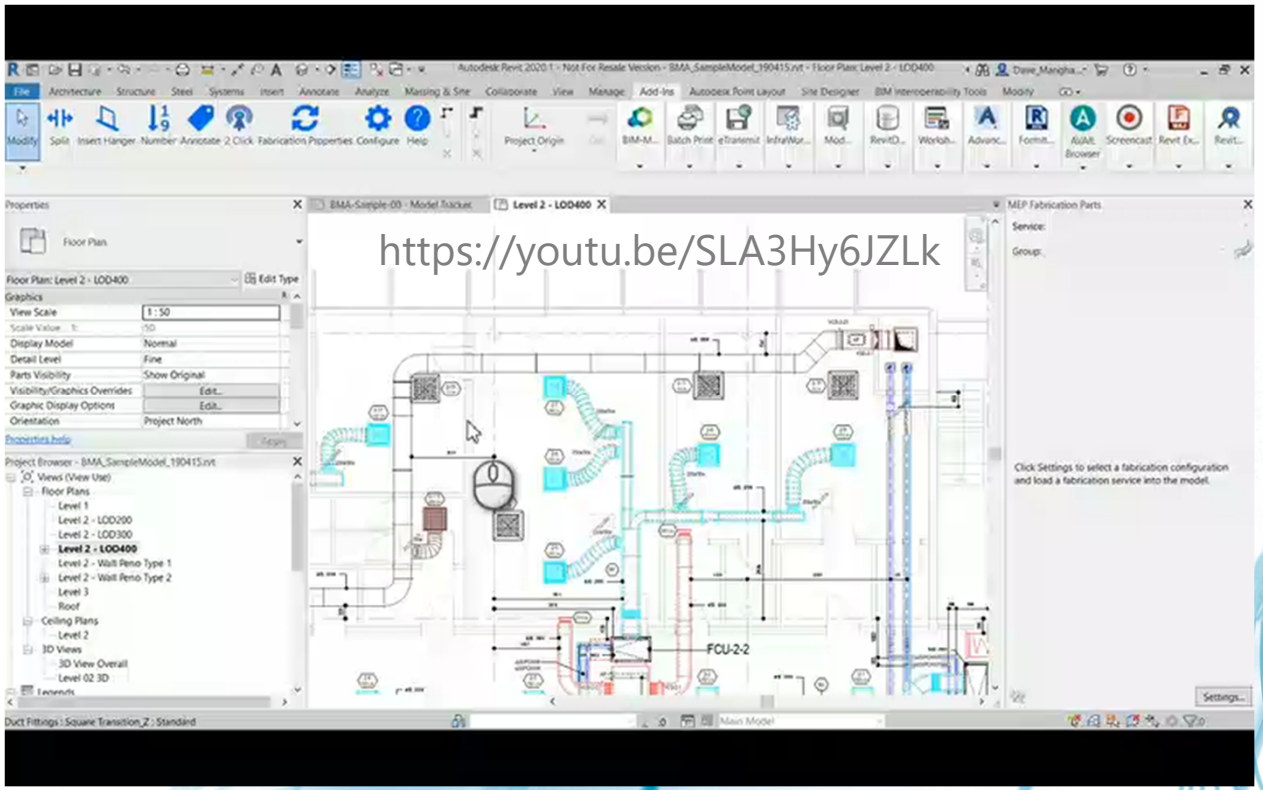
Pros

One common environment

Design Capability

Cons

LOD???



YOU ASKED FOR IT, WE'VE DONE IT!

INTRODUCING...

REVTAG

REVIT API TAGGING TOOL

After months of research, testing and consultation, we've delivered the first prototype for a NEW Revit API Tagging Tool.

FREE FOR 30 DAYS

REVTAG VERSION 4 COMING SOON!

WWW.A2KTECHNOLOGIES.COM.AU

WHAT IS REVTAG?

REVTAG is an exciting new API Plugin for Revit. This innovated splitting tool will enable you to achieve greater productivity and workflow efficiencies. Specifically, REVTAG will improve your daily tasks to aid production of MEP design and construction drawings.

- Spilt Revit Systems duct and pipe systems into manufacturers lengths prior to issue for manufacturing
- Number split, allowing you to sequentially number a split system prior to annotating the system
- Annotation of objects enable you to annotate the systems using Revit Family tags
- Ability to assign the number piece mark tags, resulting in number tagged system
- Two click tag placement tool – enabling fully customised tag configuration

NEW FEATURES COMING SOON IN VERSION 4!

FABRICATION HANGER INSERTION

Enables auto population of fabrication hangers on straights to user specified spacing.

OBJECT ANNOTATION INTERVAL STEPPING

User configured skipping to start annotation type tagging at different object spacings.

CONTINUOUS TAGGING

Enables multiple system tagging until Esc is used.

REASSIGN STRAIGHT LENGTHS

Update finished split lengths to new lengths.

TAG LENGTH OVERRIDE

Ability to ignore tagging of straights with +/- tolerance.

FABRICATION PART FIELDS

Ability to tag Fab part unexposed fields via UI and custom shared parameters.

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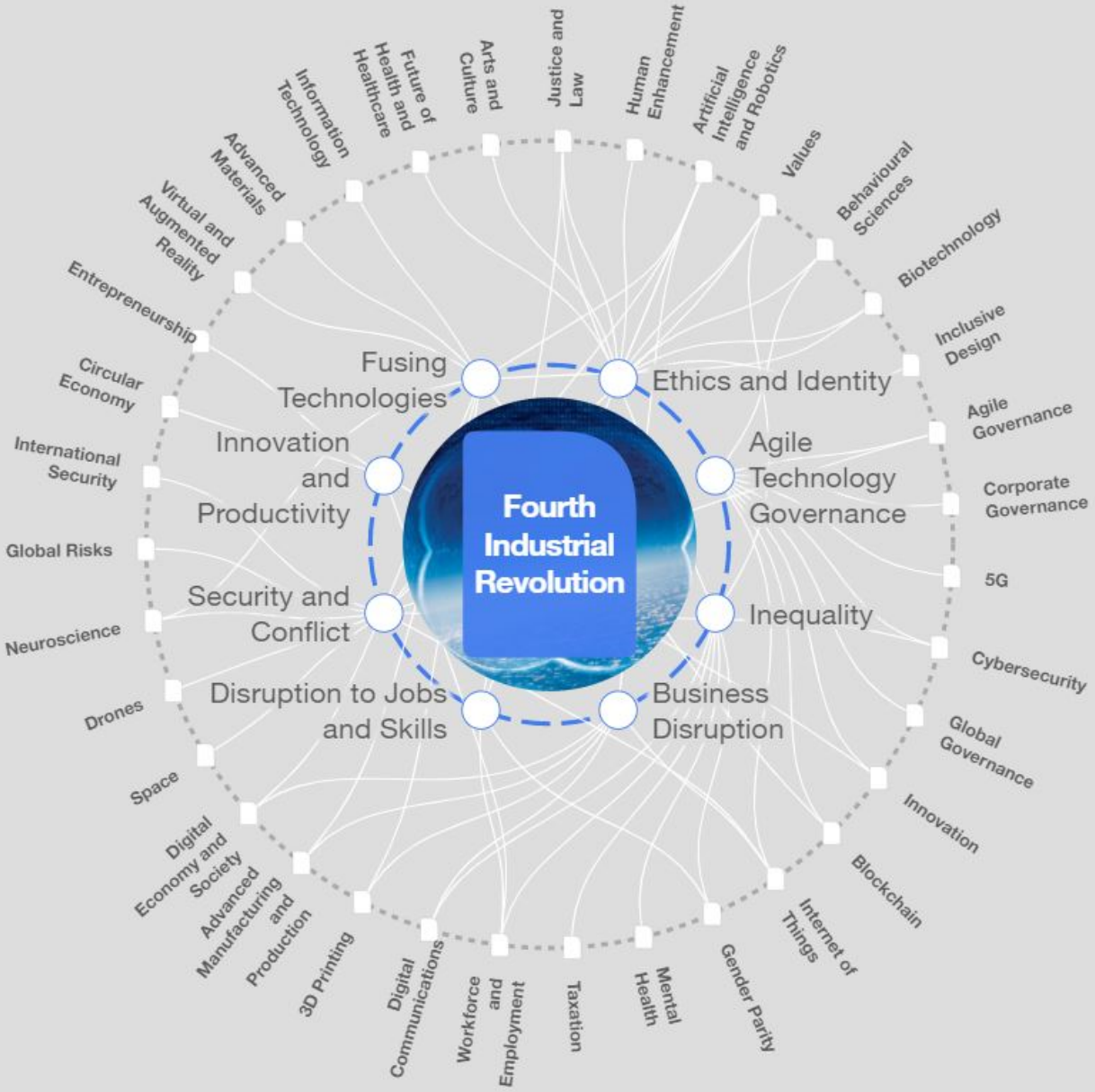
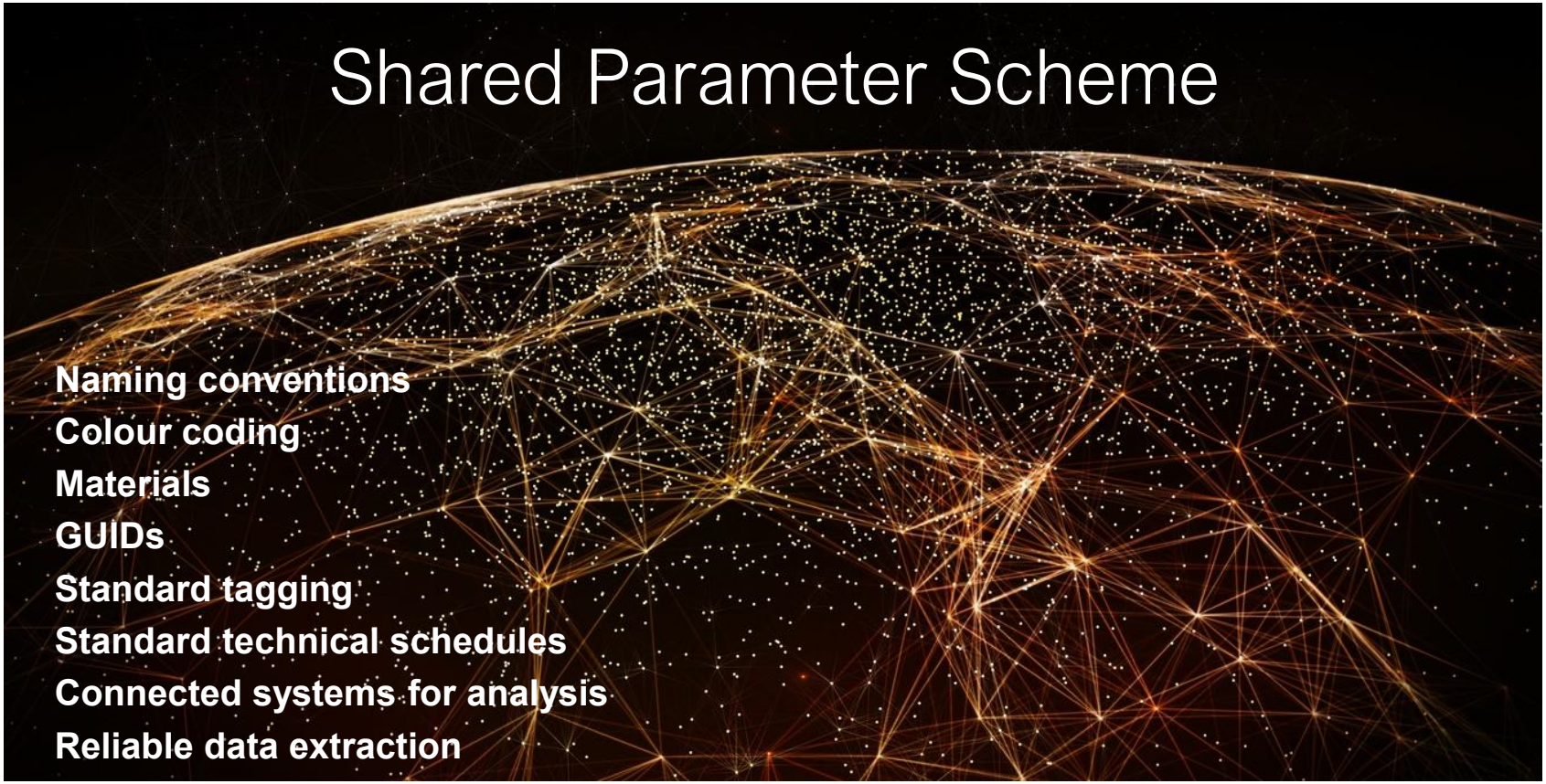


WORLD ECONOMIC FORUM

BIM-MEP AUS

Shared Parameter Scheme



- Naming conventions
- Colour coding
- Materials
- GUIDs
- Standard tagging
- Standard technical schedules
- Connected systems for analysis
- Reliable data extraction

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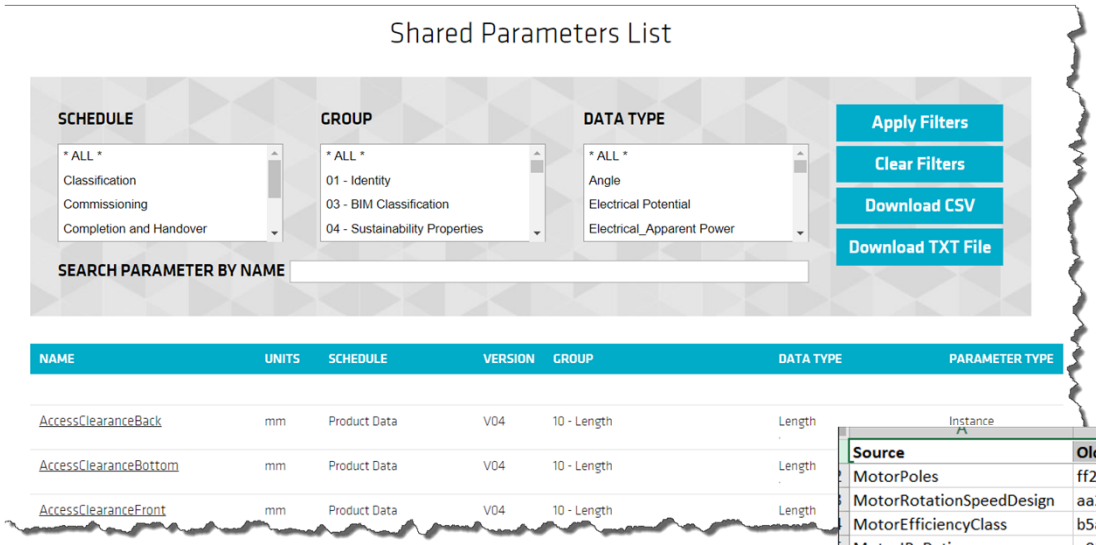
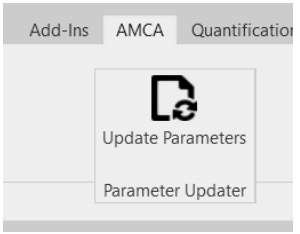
BIM-MEP AUS shared parameters

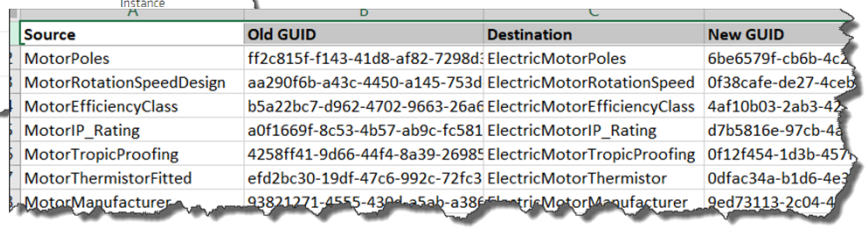
Parameter Manager

https://www.bimmepaus.com.au/shared/parameters/



Parameter Update tool for Revit

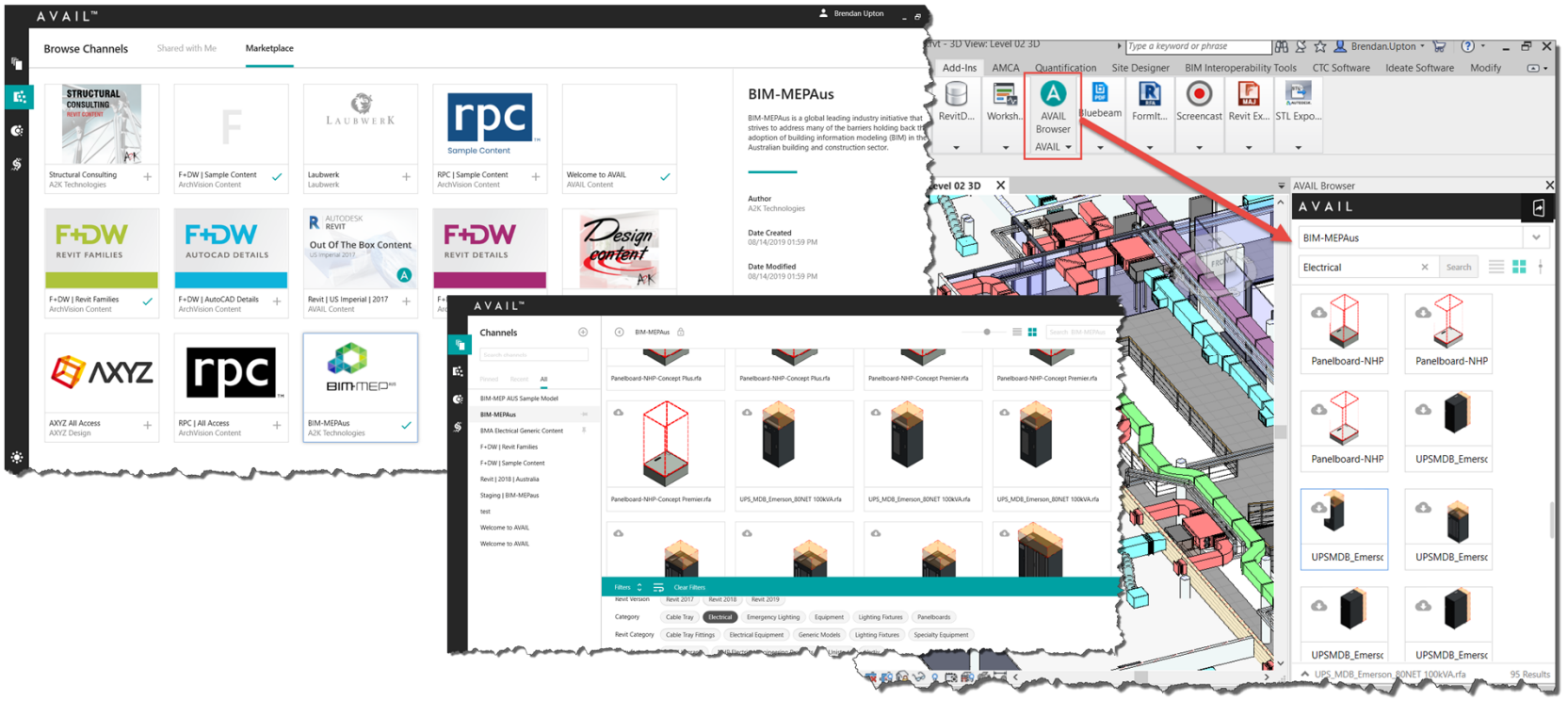




Source	Old GUID	Destination	New GUID
MotorPoles	ff2c815f-f143-41d8-af82-7298d	ElectricMotorPoles	6be6579f-cb6b-4c
MotorRotationSpeedDesign	aa290f6b-a43c-4450-a145-753d	ElectricMotorRotationSpeed	0f38cafe-de27-4ceb
MotorEfficiencyClass	b5a22bc7-d962-4702-9663-26a6	ElectricMotorEfficiencyClass	4af10b03-2ab3-42
MotorIP_Rating	a0f1669f-8c53-4b57-ab9c-fc581	ElectricMotorIP_Rating	d7b5816e-97cb-4a
MotorTropicProofing	4258ff41-9d66-44f4-8a39-2698	ElectricMotorTropicProofing	0f12f454-1d3b-457
MotorThermistorFitted	efd2bc30-19df-47c6-992c-72fc3	ElectricMotorThermistor	0dfac34a-b1d6-4e3
MotorManufacturer	93821271-4555-430d-a5ab-a386	ElectricMotorManufacturer	9ed73113-2c04-4

AVAIL™

BMA content management in revit



Kavanagh Industries

Kavanagh Industries

Question - What percentage of projects leverage Revit in your business?

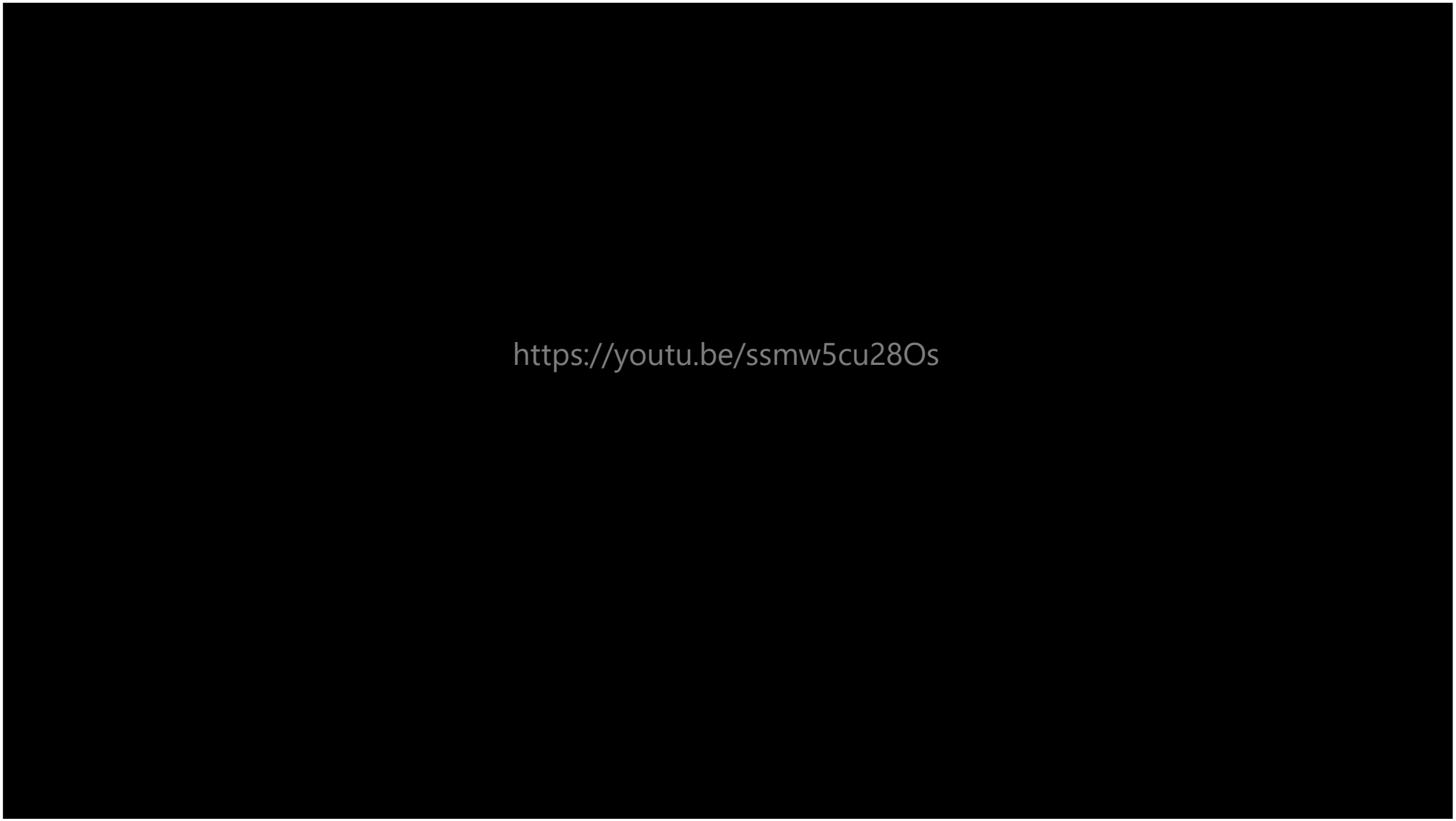
https://youtu.be/3KoW8iA8b_Q

Mark Miltenburg – Kavanagh Industries Operations Manager

Question - What percentage of projects leverage Revit in your business?

Geoff Thew – AG Coombs
'for the past 7 years we have shop detailed Major projects using Revit MEP, small scale jobs were still running with CADmep until recent improvements in Revit and the ability to use the fabrication component to a similar level to perform the task at hand'

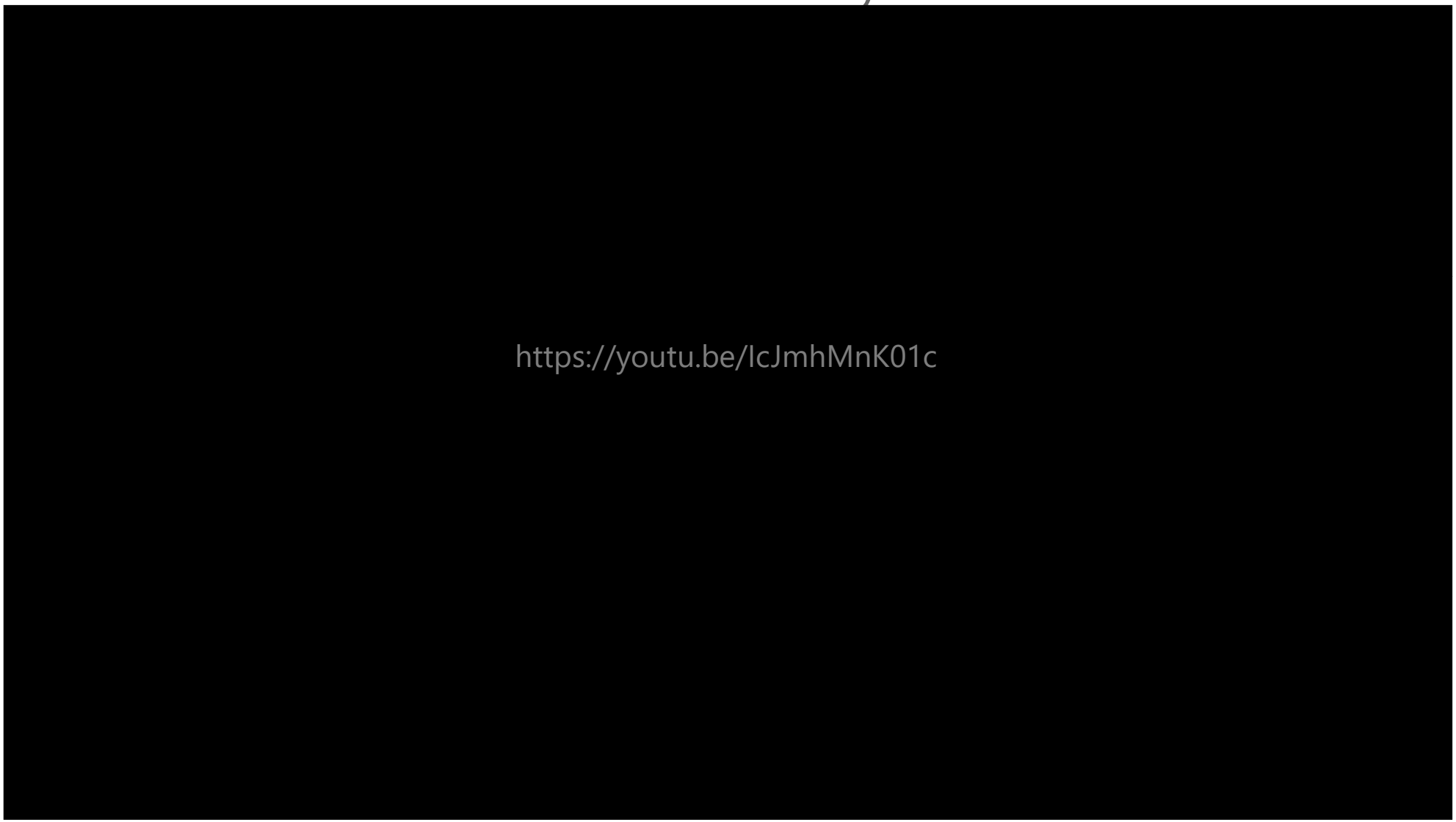
Question - When your business embraced & adopted the implementation of Fabrication in Revit how difficult a transition was it?



Question - When your business embraced & adopted the implementation of Fabrication in Revit how difficult a transition was it?

Geoff Thew – AG Coombs
'being that we had spent the time transitioning over the past few years, the step change to move to Fabrication Parts only ticked a box with how our details worked, this brought back the ability to produce MAJ's for fabrication and even Estimation checks through construction relating to variation or what nots'

Question - Do you see any benefits from stakeholders leveraging the BIM-MEP^{AUS} initiative & if so what are they?



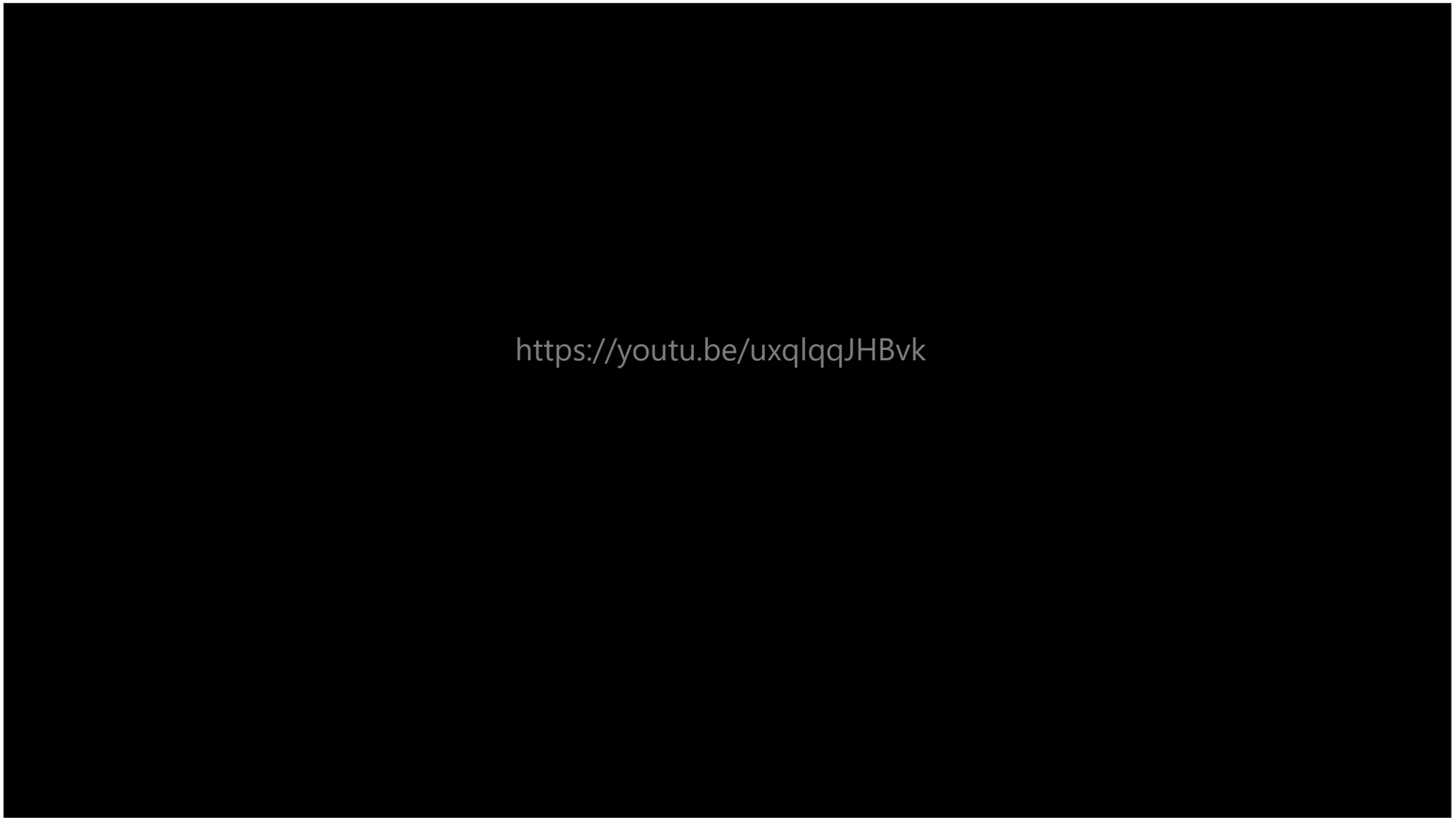
Question - Do you see any benefits from stakeholders leveraging the BIM-MEP^{AUS} initiative & if so what are they?

Geoff Thew – AG Coombs
'utilising the BMA standards has given AGC advantages in a number of areas through the design to construction workflow,

1.Leveraging design model content produced utilising these standards lead to a reduction in up front efforts on design imput review and drafting,

2. the ability to exchange or convert BMA content (Duct or Families) quickly with out procurement content aided in getting to market quickly and easily after contracts sign off'

Question - What benefits have you seen from a workflow perspective with the integration of Fabrication Parts in the Revit environment?

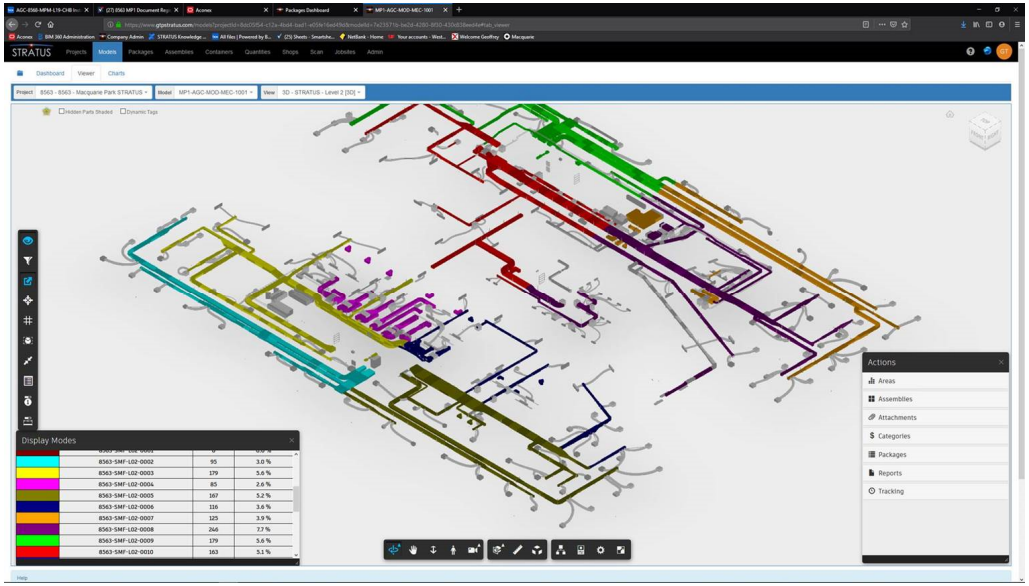


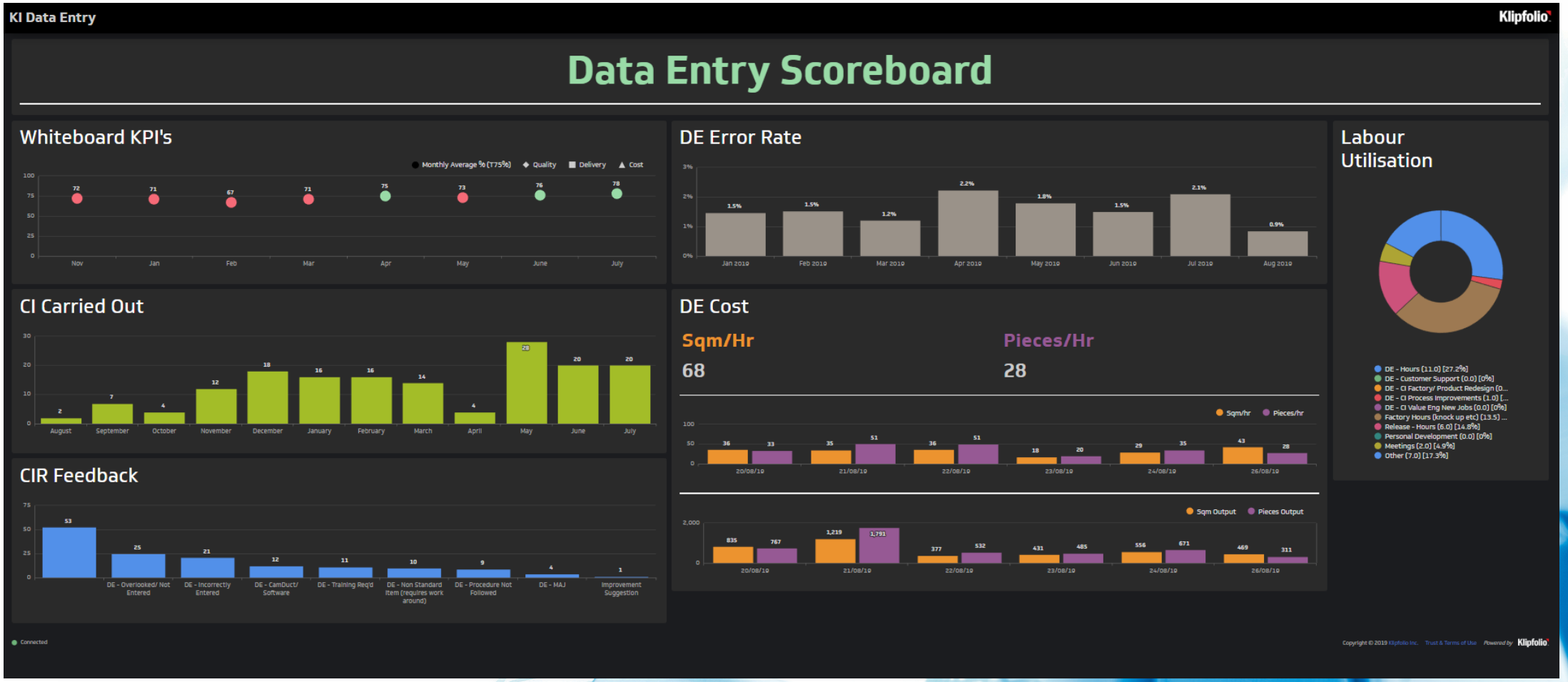
Question - What benefits have you seen from a workflow perspective with the integration of Fabrication Parts in the Revit environment?

Geoff Thew – AG Coombs

Our current workflow from incoming design to manufacture and deliver to site, significant benefits from our old CADmep process days, we now have:-

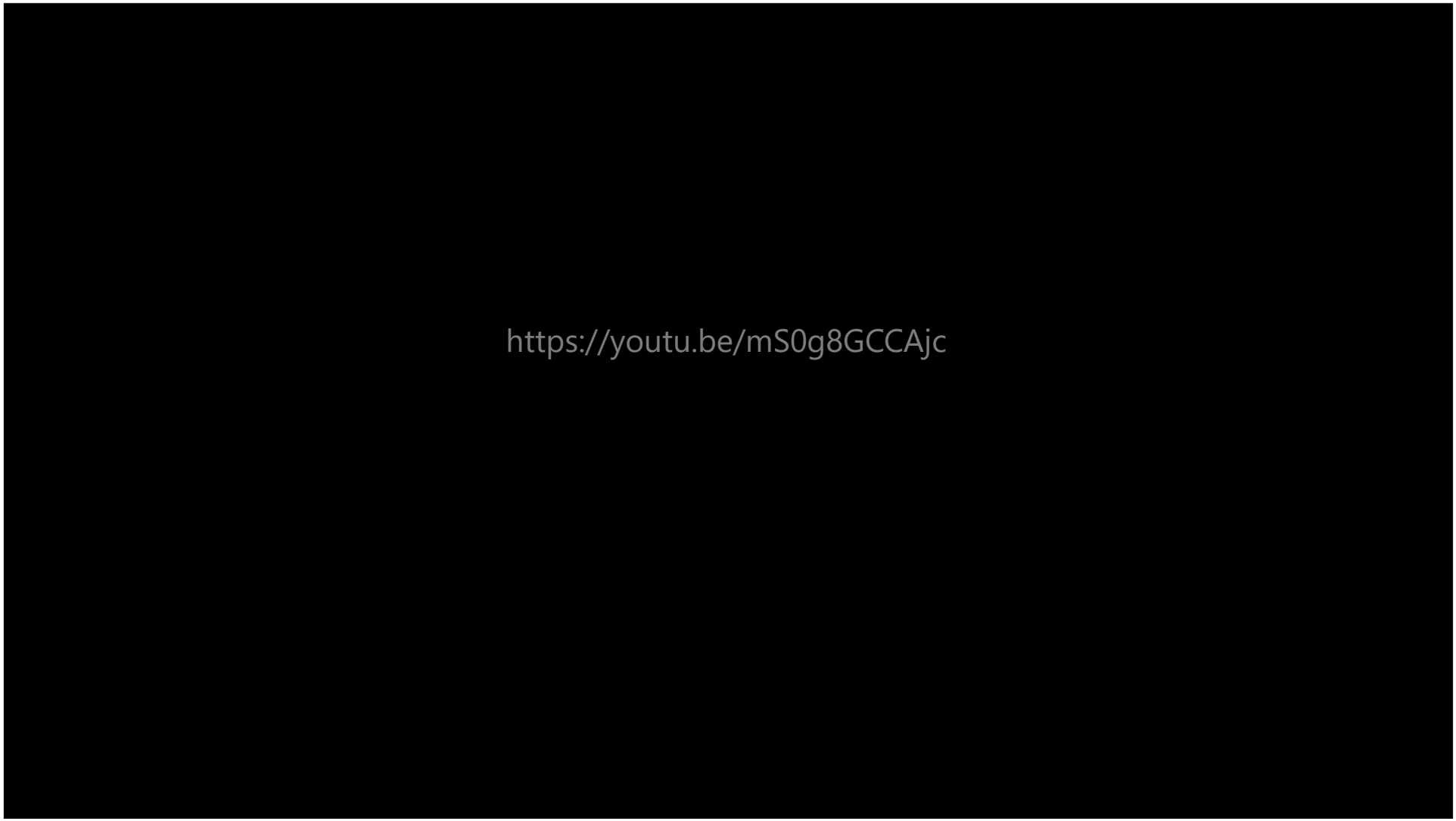
- *linked QA validating our fabrication content is $$ optimised across the floor,*
- *QTO Check points from BID – Deign – Detail – Delivered on site*
- *Even the ability to capture accumulative variation cost within the model environment*





KI Revit to CAMduct

Question - What challenges have you encountered during the implementation of Fabrication Parts in Revit?



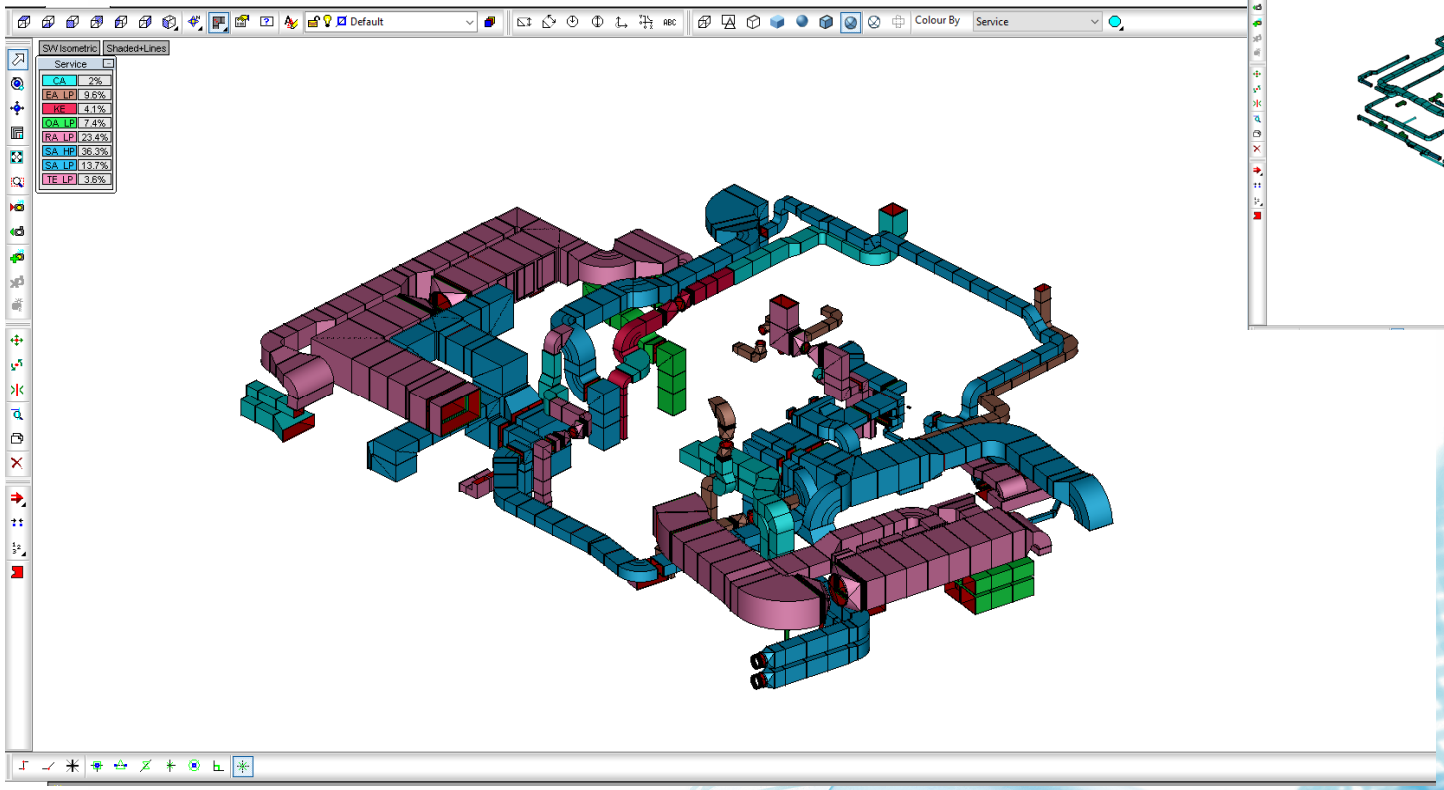
Question - What challenges have you encountered during the implementation of Fabrication Parts in Revit?

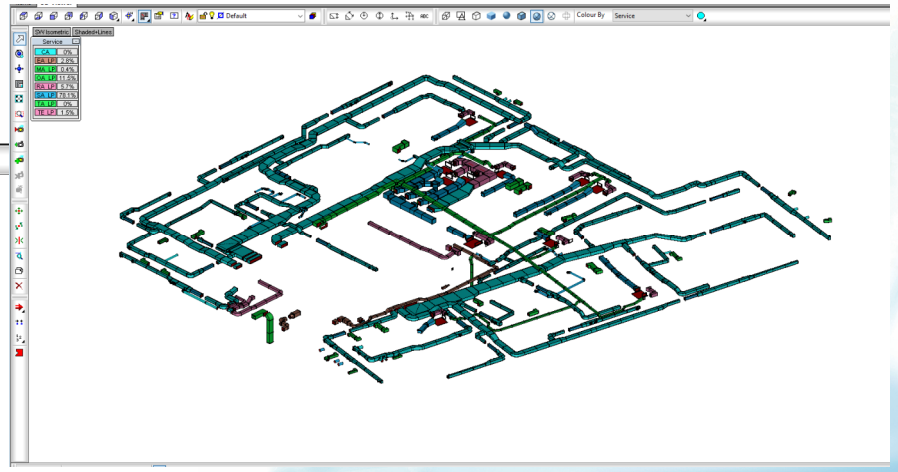
Geoff Thew – AG Coombs

Many, the list goes on – what we work on is the 80/20 principle for effort vs reward, good relationships with our trade partners such as Kavanagh Industries resulting in good processes of capture on both sides of design to construction,

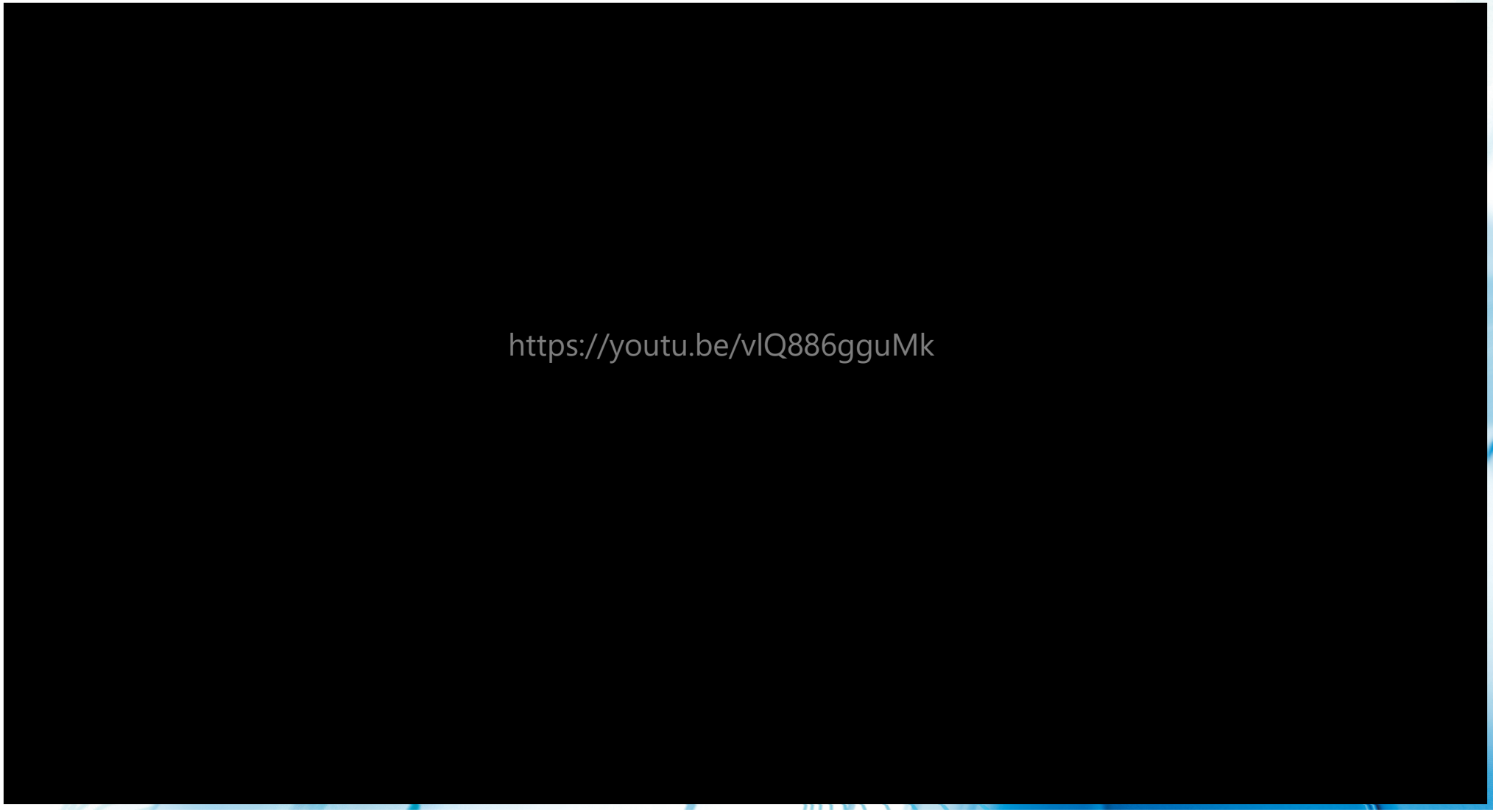
- *management of multiple versions at any one time – 5 x 4+story towers across Sydney running 3 different versions of software and Database's – challenging*
- *conceding areas of development while waiting for ADSK to resolve, Access through API to DB fields – we needed to wait, I don't like waiting*
- *CADmep users cross over very well, Revit Users want back there flexibility of the Revit Duct – good that's is going I say*
- *With out Industry standards we have reduced our common duct fitting options down to 25, this created a storm amongst the old school but the results are more efficiency from Coordination to detailing, even labour on site. More tetras less bespoke.*

KI Revit to ESTmep

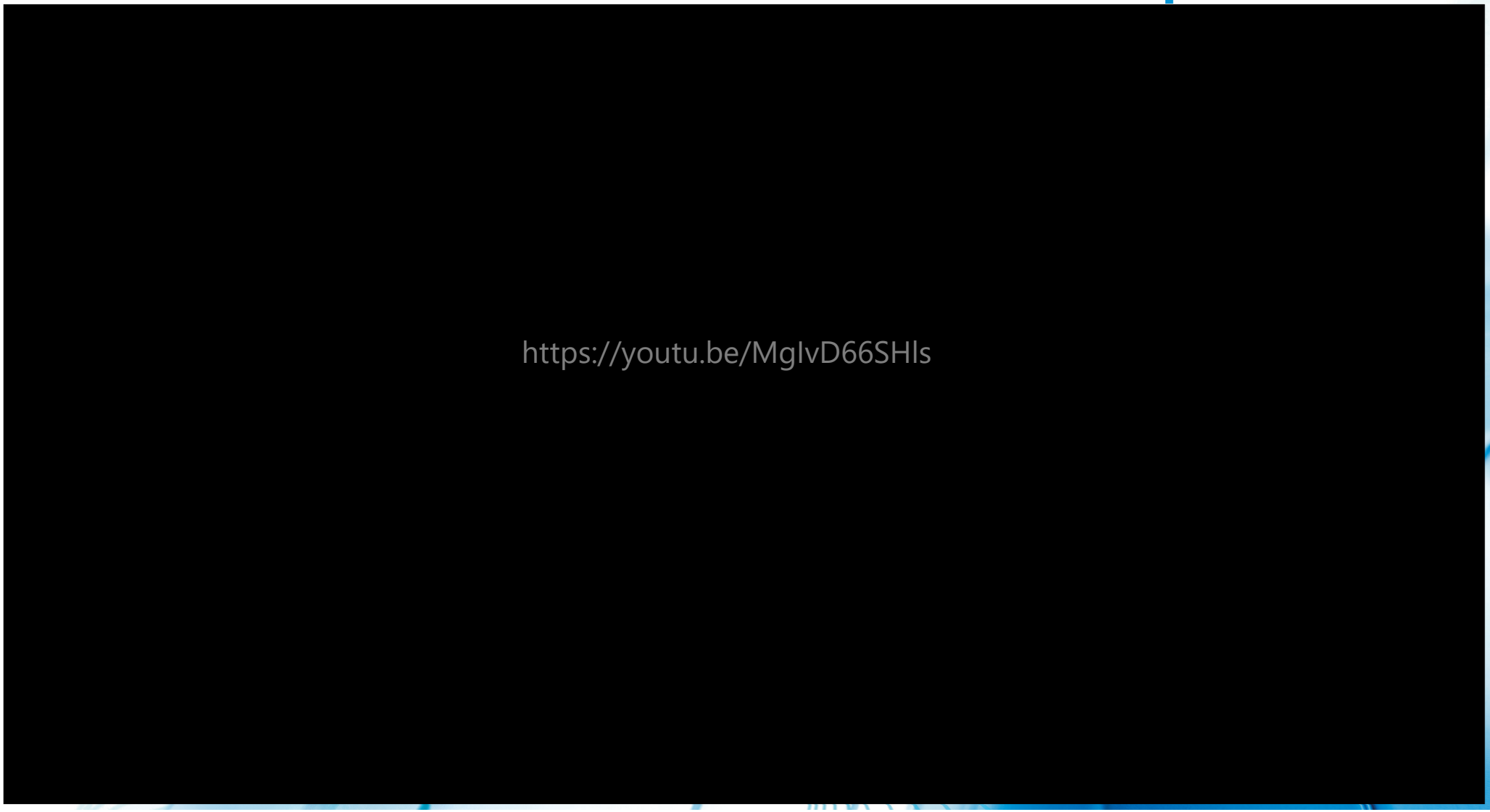




Revit to ESTmep via MAJ Export



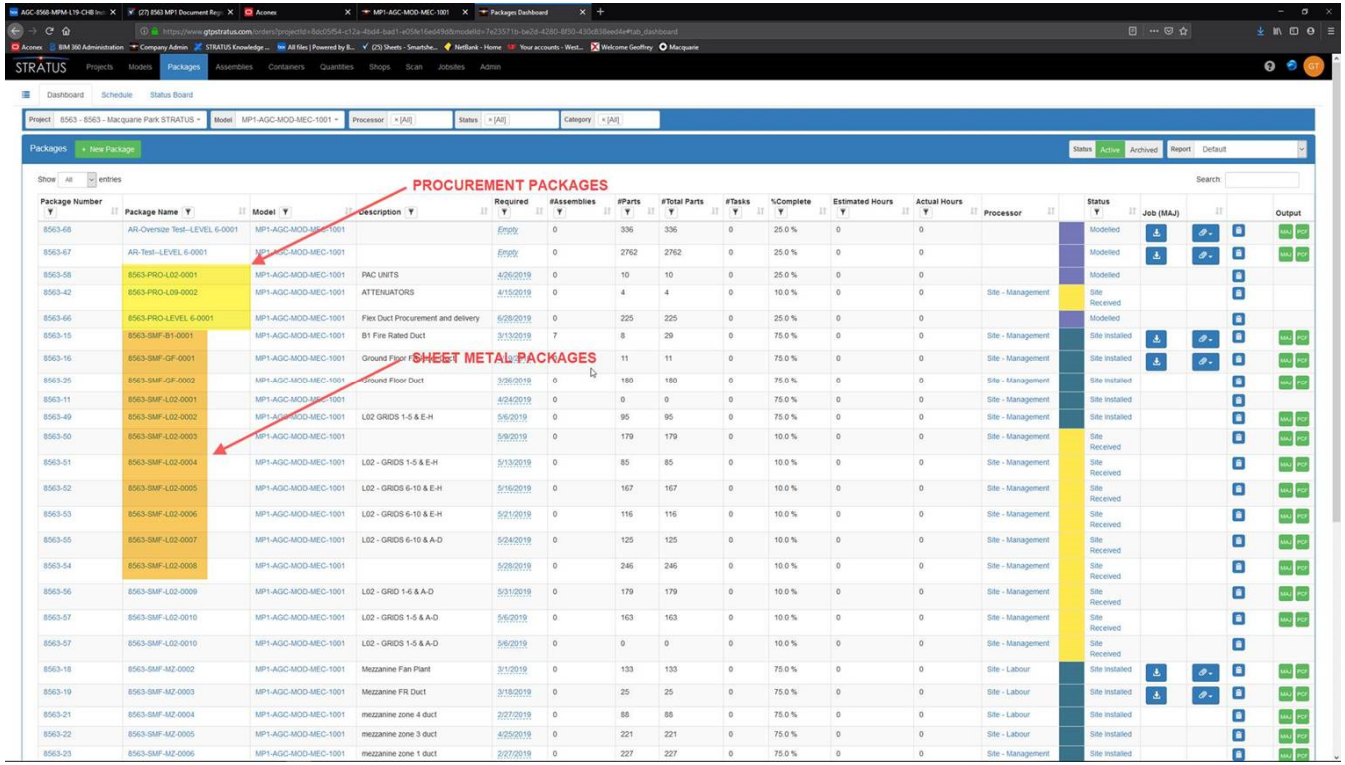
Revit to CAMduct via MAJ Export



Question - What additional features & functionality, if any, do you feel would be beneficial to the Fabrication in Revit workflow?

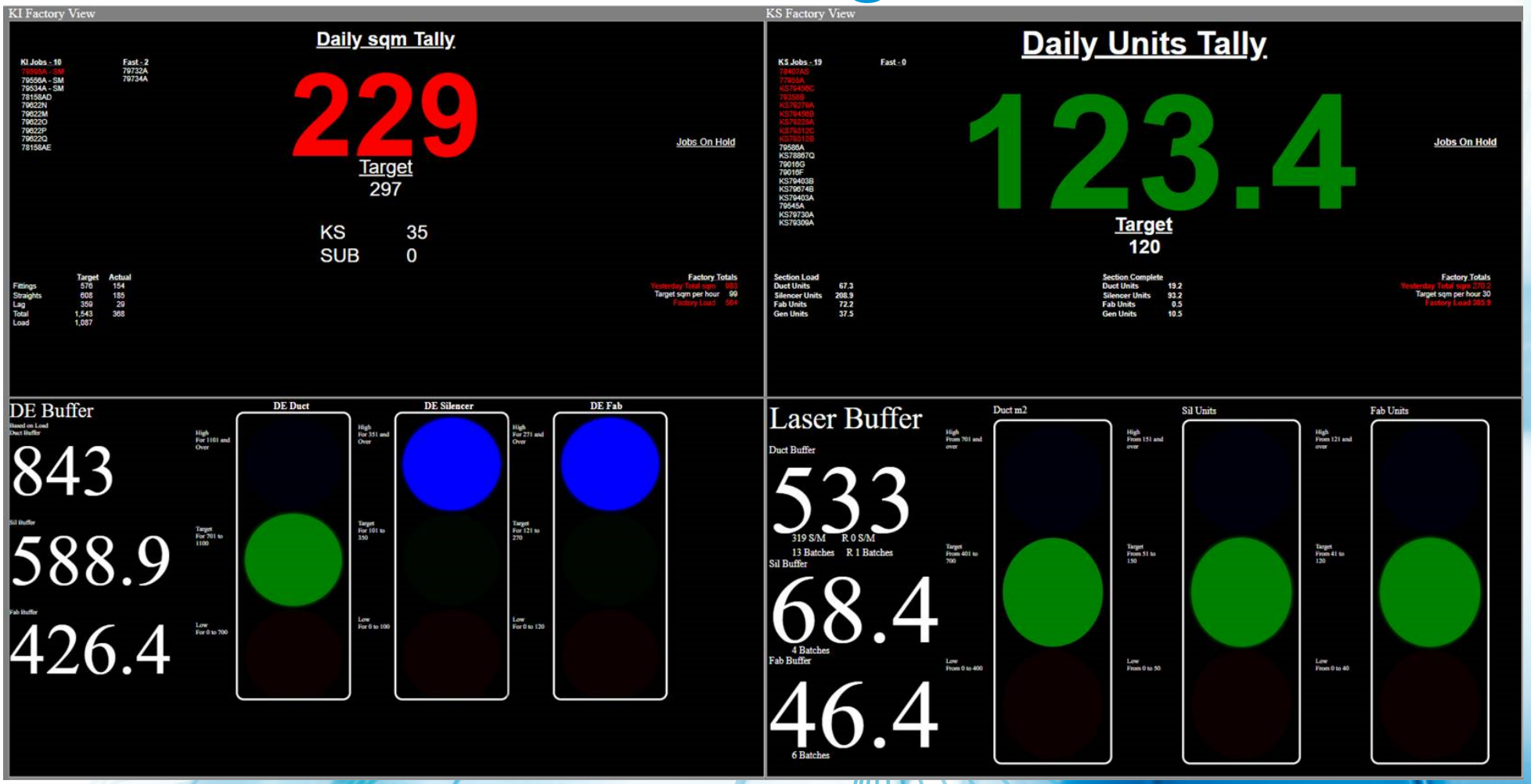
Question - What additional features & functionality, if any, do you feel would be beneficial to the Fabrication in Revit workflow?

Geoff Thew – AG Coombs
Status control out of the box, automated numbering,
fabrication ITM's such as plenums functioning correctly.

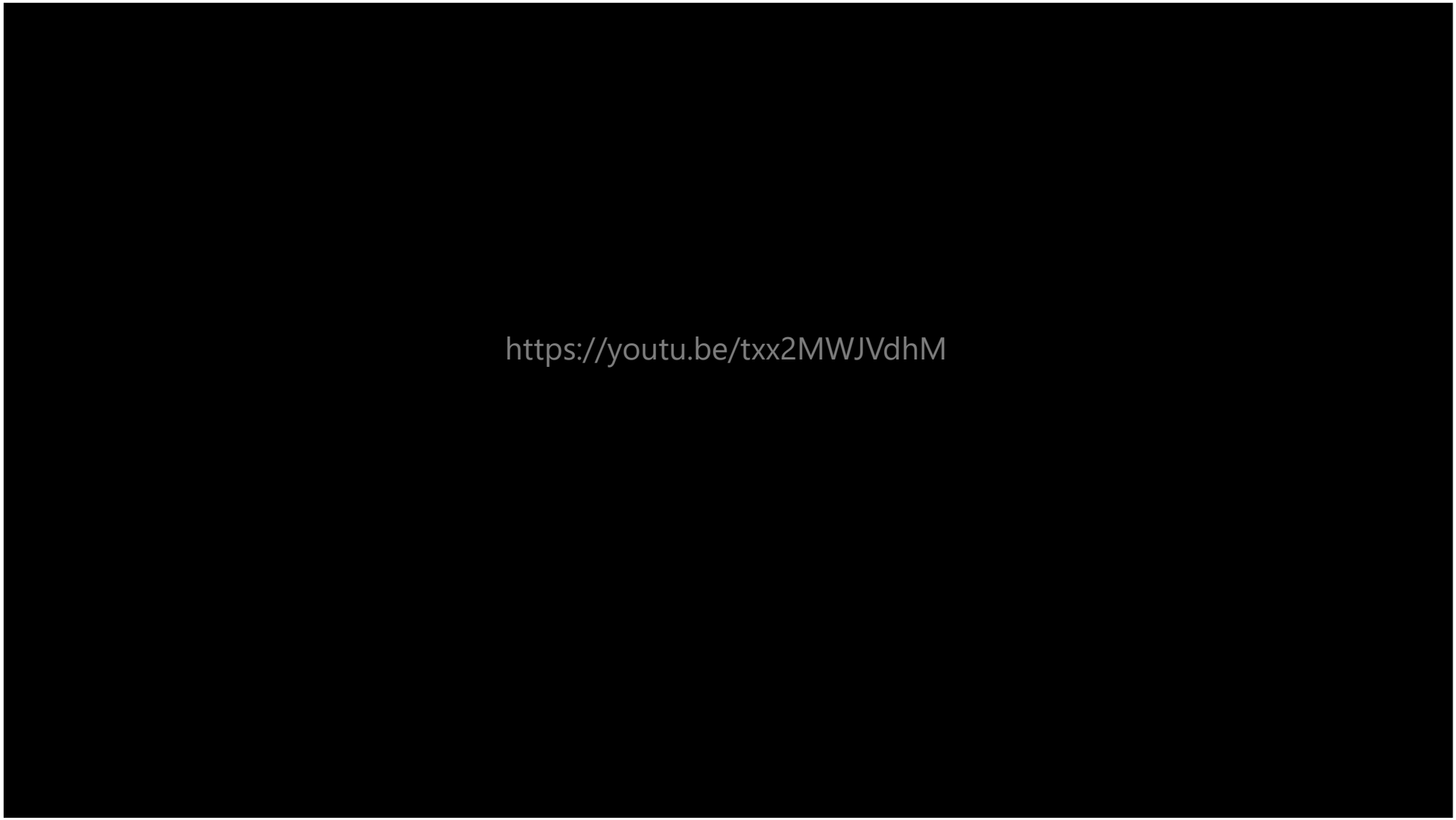


Question - Does the implementation of Fabrication in Revit assist with procurement during the construction stage of projects?

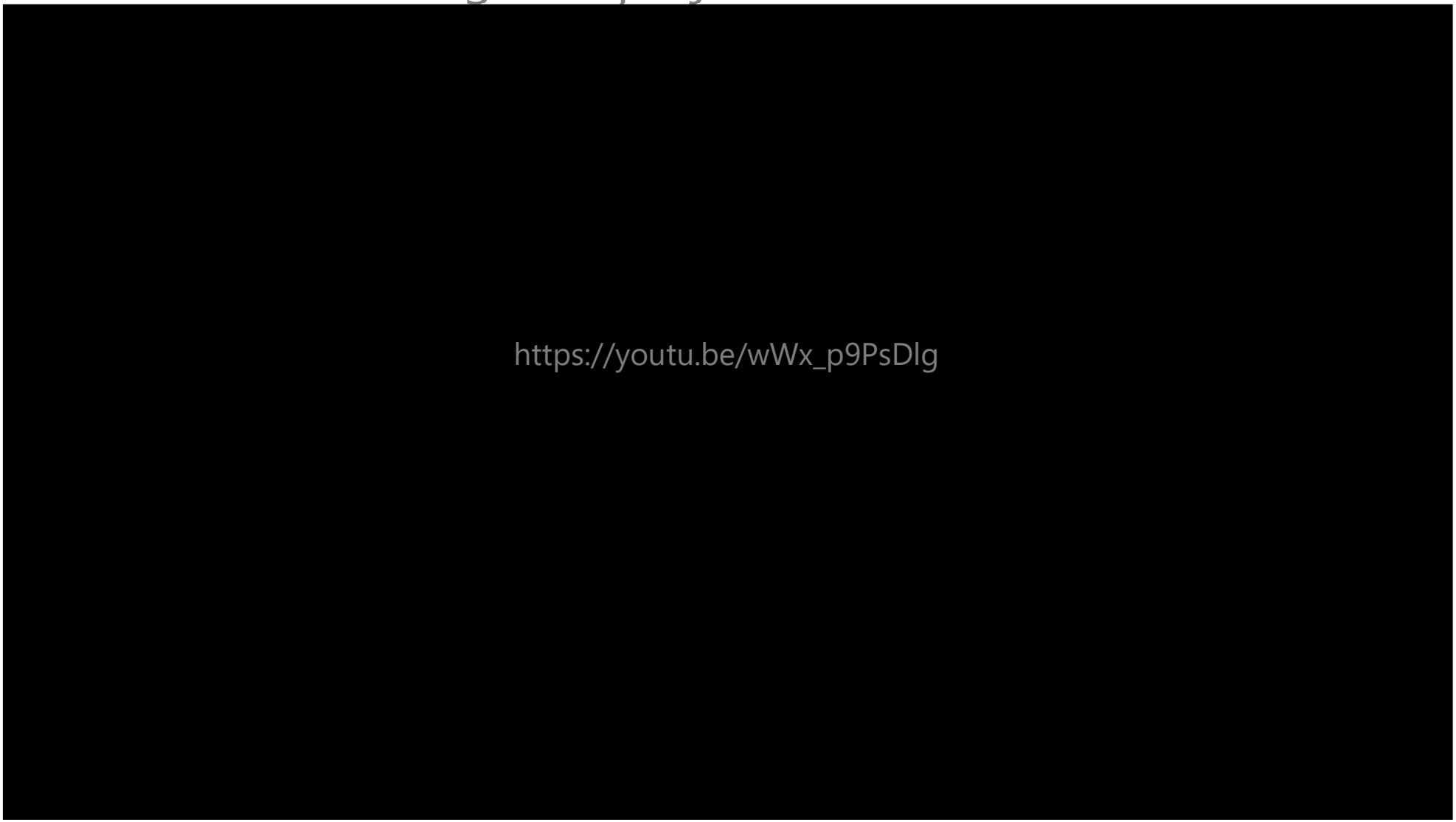
KI Production Tracking



Question - Have you found the use of Fabrication in Revit complimentary to the use of Fabrication suite of products?



Question - Would a design feature for Fabrication parts in Revit hinder or assist in the initial stages of projects?



Question - Have you seen any improvement in Processing time since adopting MAJ from Revit??

The Perfect world?

Design using **Fabrication Parts** (Consultants)

Estimate using **Fabrication Parts** (Contractors)

Construction using **Fabrication Parts** (Contractors)

Procurement using **Fabrication Parts** (Fabricators)

The Perfect world?

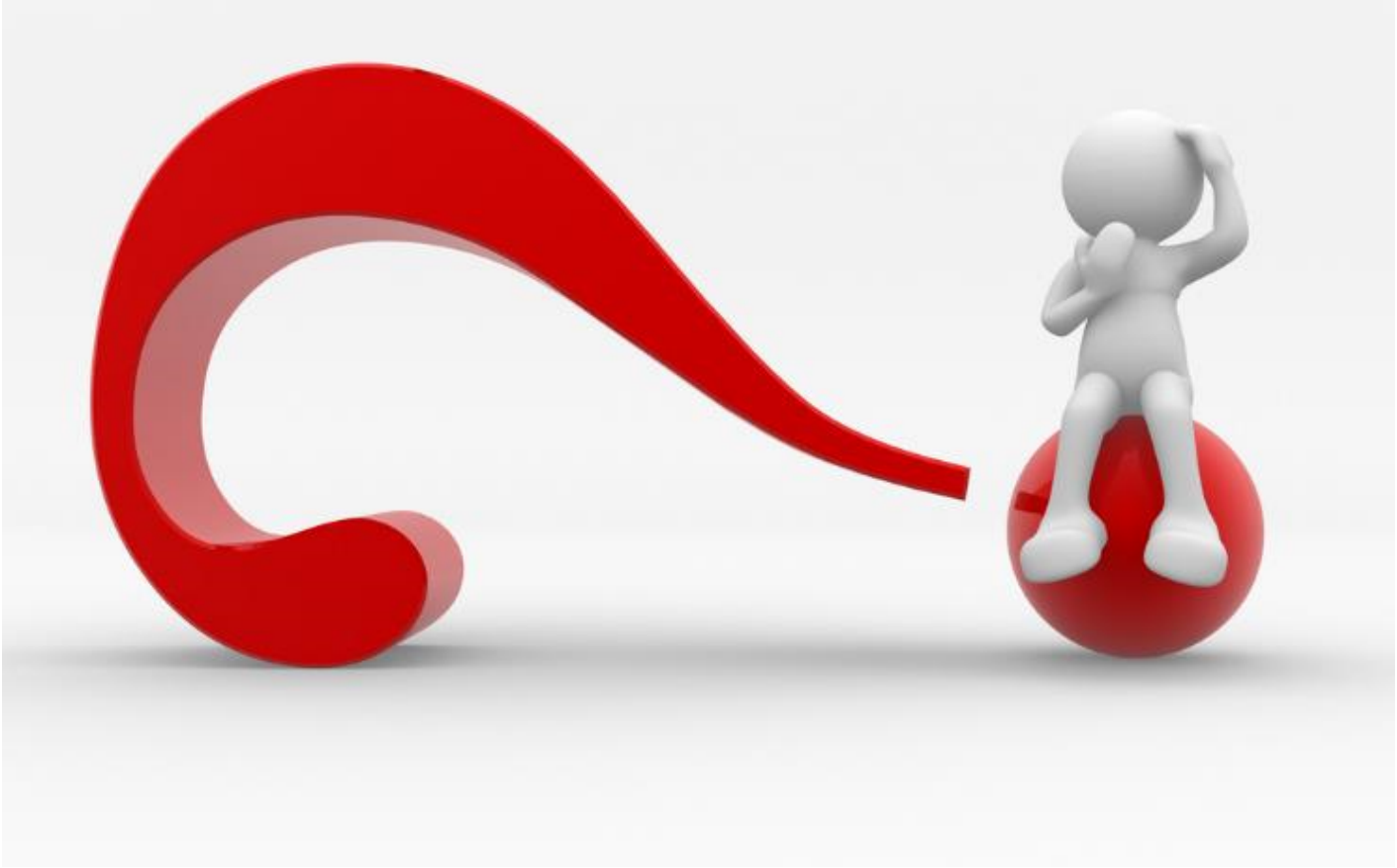
= Seamless Collaboration between ALL stakeholders

AUTODESK® REVIT®

AUTODESK® FABRICATION ESTMEP™

AUTODESK® FABRICATION CAMDUCT™

Questions?



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Make anything™