

CS197329

Tag and Track Building Components Through the Utilization of BIM 360 Field

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Learning Objectives

Learning Objective 1

Learn how to utilize BIM 360 products for tracking equipment

Learning Objective 2

Learn the process of getting information from Revit into the BIM 360 products

Learning Objective 3

Learn how to get information out of BIM 360 Field and put it back into Revit and Navisworks

Learning Objective 4

Learn about reporting out the status of equipment in construction

Description

Do you know where your components are during the construction phase of your project? Will your components be delivered late to the site, posing a risk of late delivery? What do you do if a component has an issue when delivered to the site? Excitech have been working with many of the UK Main Contractors to develop a workflow so the building materials can be tracked during the fabrication, manufacturing, delivery, installation, and commission process. Using Revit design elements, a workflow has been established that firstly goes through BIM 360 Glue software, so the coordination and layout of the element can be verified during the preconstruction process. Then the information is linked into BIM 360 Field software where the manufacturing elements can be tracked from procurement through to commissioning. The data can finally round-trip through to the Navisworks platform for a visual representation of the component status.

Speaker

Steve Rudge

Steve is coming to his tenth year working for the largest Autodesk Platinum Partner in the UK (Excitech) and during this time has been able to capitalize on years of industry experience in pioneering integrated modelling processes on major UK construction projects. This has given him great insight into the specific benefits that the BIM process can bring to all stages of construction, and furthermore enables him to provide sound guidance on how this can be successfully applied to the operations of a contracting organisation.

This experience has led to recent successes where Steve has helped several major contractors develop their BIM capability and he has been heavily involved in supporting the project bid process managing BIM execution plans, protocol and ensuring the clients requirements to BIM are fully achieved. BIM needs to cover all phases Design, build and manage, Steve has experience in all three from COBie drops and extending the use of BIM to support on-site activities through handover to the operations phase.

Steve has a unique insight and technical understanding of the primary design and construction applications that are utilized within a BIM environment. This understanding enables him to work across the extended project team to ensure that information can be effectively coordinated during the design stages, prior to the data being harnessed to best effect during the construction stages. In addition to his extensive knowledge of the solutions that apply to key construction activities, such as estimation, planning and field data capture – Steve also has specific skills in providing detailed assessments and developing accurate process workflows to inform each organization's BIM strategy.

Tag and Track

Tag and Track is nothing new outside of the construction industry. Manufacturing and the automotive industry have been using these methods for years and we now see this even coming to our doors via the likes of Amazon online shopping deliveries.












But in construction we just couldn't implement a platform or system just focused on tracking components or manufactured assets, we had to wait for something that brought other benefits all in a single platform and this is where BIM 360 became a platform that we could utilize and embrace the power of barcoding for tracking our construction elements.

The following Handout is a quick guide to the steps we need to take to get Tag and Track functioning on or projects today.

If you need any guidance please contact me at steve.rudge@excitech.co.uk and I will guide you into more detail.

Please remember that the BIM 360 Field platform being utilized is based on the classic version until we get Equipment and Barcodes in the Next Generation release of the software, but the principals will remain the same once released.

The process uses several software platforms, these are defined below (these are suggestions and other technology could be utilized):

Stage by Stage Approach

It is best to break down the process into small steps to gain understanding and why each one is so important to the overall success of implementing Tag and Track.

Stage 1 – The Process (Status)

The process and stages that we want to track components is important and these should be structured at the inset, but these may change depending on the asset type, the manufacturing process, the route to site, installation procedure and sign off on completion.

We will have many stages that each asset will pass through, but we need to select the key ones that we want to monitor, this is key as we do not want the stages and status codes to be too complex.



Below is an example of the statuses that have been simplified and that we are going to use in the presentation:

- Order
- Manufacturing
- Shipping
- Delivered
- Installed
- Sign off
- Hand over

Take note of these as they will be utilised later in BIM 360 Field against each asset, so we know which stage the asset is at during the manufacturing and construction process.

Stage 2 – Timing

Before we can track anything, we need to be able to track it against something, and that something should be time.

Working closely with the project planners we should be able to establish key dates that our building assets will need to meet to ensure we keep deliverables on time and aligned to the critical path for the project.

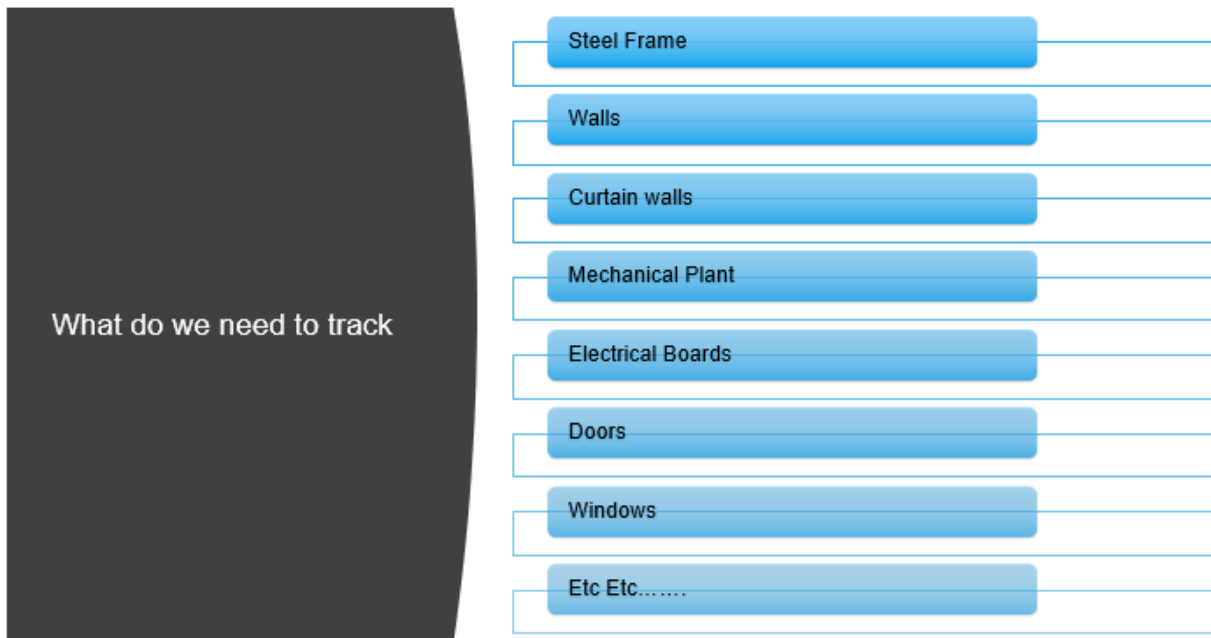
Regardless the planning application utilised some key dates should be able to be exported in an XLS file format that can be utilised later in our process.

These should be exported and stored.

Stage 3 – The Assets

The assets are the components that we will bring into the BIM 360 platform and capture data against. We can not monitor all assets as some elements are built over time and do not have structured staged status that we can report against.

As you can see below here is a suggested list, but this will change for each project and the stage of the project you are working on. Depending on the project stage you may want to capture things such as ground works, foundations and piling as a test and then progress to the cores and build frame etc.



Stage 4 – The Asset Data

Now we have the assets defined we need to start looking at the data we will be capturing against each of these assets. Knowledge of BIM 360 Field really helps here as we know what data can be captured by signatures or dates etc.

Below is a list suggested key data but again this could change depending on the asset and process defined in the earlier stages.

What data is key?

- Asset Number
- Complete Manufacturing
- Delivery to site
- Ready for Contractor sign off
- Ready for Client sign off
- Asset Handed over
- Etc Etc.....

Once defined this list needs to be added to the Revit model file via project parameters or if you will use the list over several projects then a shared parameter file should be generated and utilised.

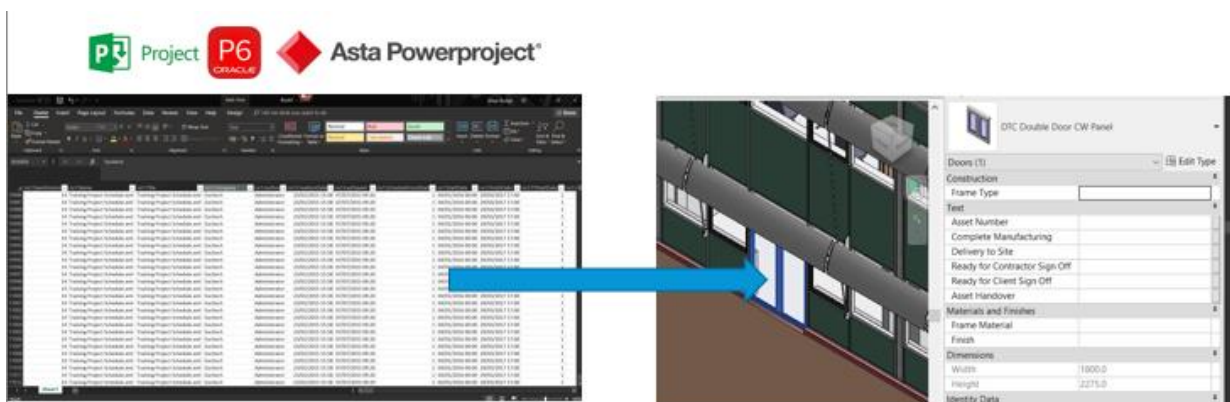
The parameters should be added to the categories of components defined in stage 3.

Stage 5 - Populate the Key Dates & Asset Numbers

This is where key dates defined from Stage 2 are added to the parameters generated in Stage 4.

The key here is to utilize an intelligent link between Revit and Excel, such as Ideate BIM link or BIM ONE Excel import/Export tool. Ideate BIM Link should be utilized if dates need to be added to a type/group of assets as BIM One will only work at an individual element level.

There are many options here from manually typing in the dates to Excel or looking at API's that may be able to be utilized from the planning tools.



Stage 6 - Prepare the model for BIM 360 Field

We now introduce the BIM 360 tools (Glue and Field), this is bringing the model and all the associated data we have added to the assets in the previous stages into the BIM 360 Field application that will be utilised out on site.



Once a 3D view has been generated and an NWC file has been exported out of the Revit file, this can be brought into the BIM 360 application. It is here that we will generate Equipment sets aligned to the lists of required assets in Stage 3.

There are some useful training guides on this process and for stage 7 below which can be found here:

<https://learnbim360.autodesk.com/series/classic-product-courses>

The last stage in this section is to share the model with BIM 360 Field

Stage 7 – Mapping in BIM 360 Field

The data we previously generated now needs to be mapped into BIM 360 Field.

Ensure the asset number of the elements are used to map each element in the system as the default GUID code could change as the model is amended during final development.

This process will generate all the elements from the Revit categories as individual Equipment assets in field, and map in the dates captured previously.

You will need to customise the status codes in the BIM 360 Field platform to reflect the agreed list established in Stage 1.

All the data will be then viewable out in the field via the iPad.

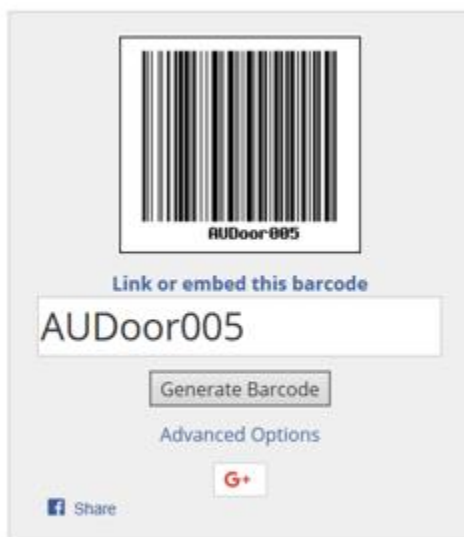
Note it is also this stage which defines which properties come back into Navisworks and Revit at the end of the process.

Stage 8 – Barcodes

Barcodes are the easiest way to Tag an element, so it can be used by each party during the different stages of the manufacturing, construction and sign off process.

In Stage 7 the unique asset code should have been mapped in the system as the Barcode.

The Barcode can be generated by on-line applications or via technology such as a Zebra printer.



The on-line application I utilise is:

<https://www.barcodesinc.com/generator/index.php>

The Barcode should be attached to the asset at the start of our tracking process, so mostly in manufacturing. If the component has an existing barcode applied by the manufacturer we just need to update the system with the number to ensure we can utilise the same tagging throughout the remainder of the process.

Stage 9 – BIM 360 Field – In Action

The system is now setup and can be utilised through the iPad BIM 360 Field application.

Ensure all the equipment is synchronised to the Field iPad being utilised, and each party who need to have access to the environment and we are good to go.

Users will scan the barcodes on the elements and update dates, sign off stages and update the status

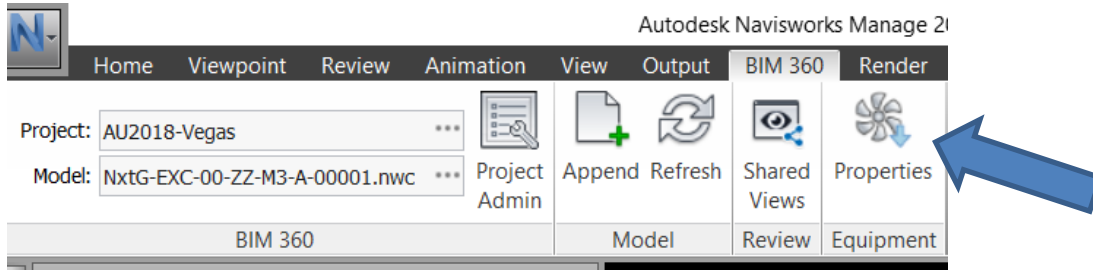


Stage 10 - Using the data – (Status from Stage 1)

The status will be changed as the asset journey through installation is captured, it is this value or other values that can be utilised in reports or graphically in other applications such as Navisworks.

Below you can see how the piles for the foundation of this project have changed status labels, and hence changed colour. To get this to work we need to bring in the BIM 360 Field properties into the Navisworks platform.

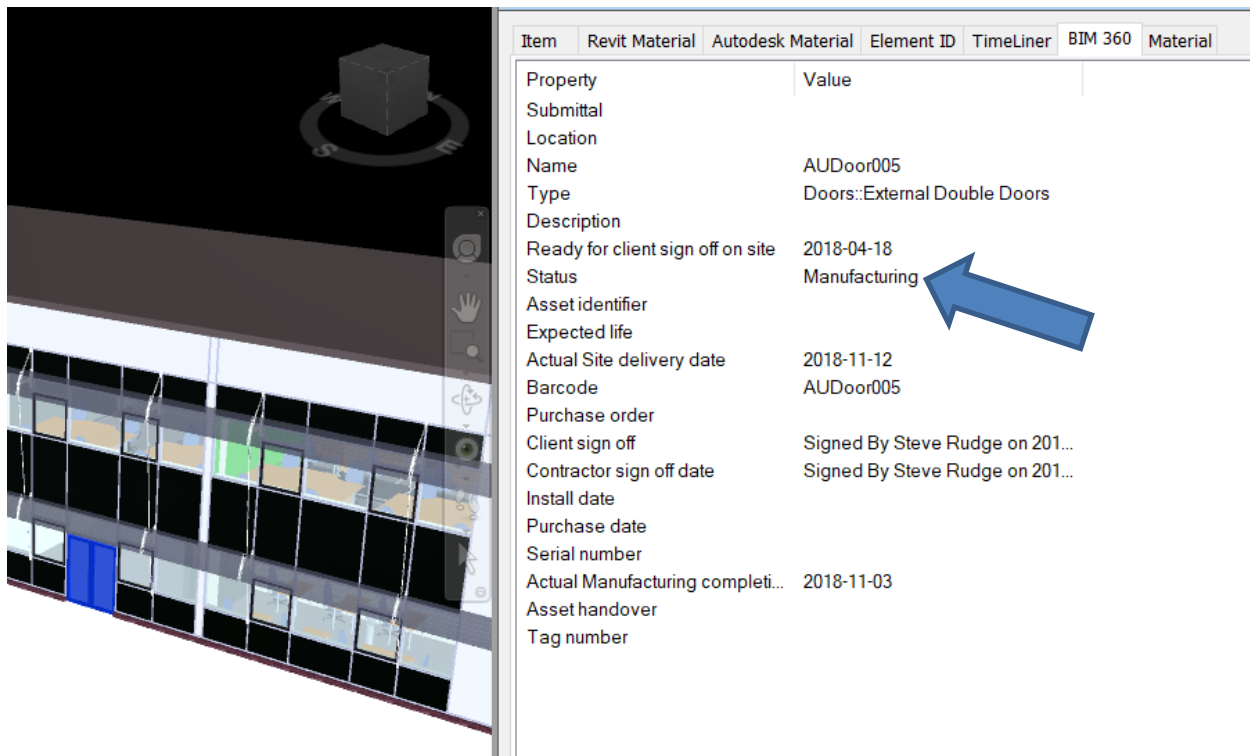
Due to BIM 360 Field and Glue being synchronised we can log into the BIM 360 environment from the Navisworks BIM 360 tab on the ribbon:



Once logged into the tab and the correct model is selected that wants to be viewed you select the Equipment Properties command as indicated above.

This will bring through the properties captured in BIM 360 Field to the model in Navisworks.

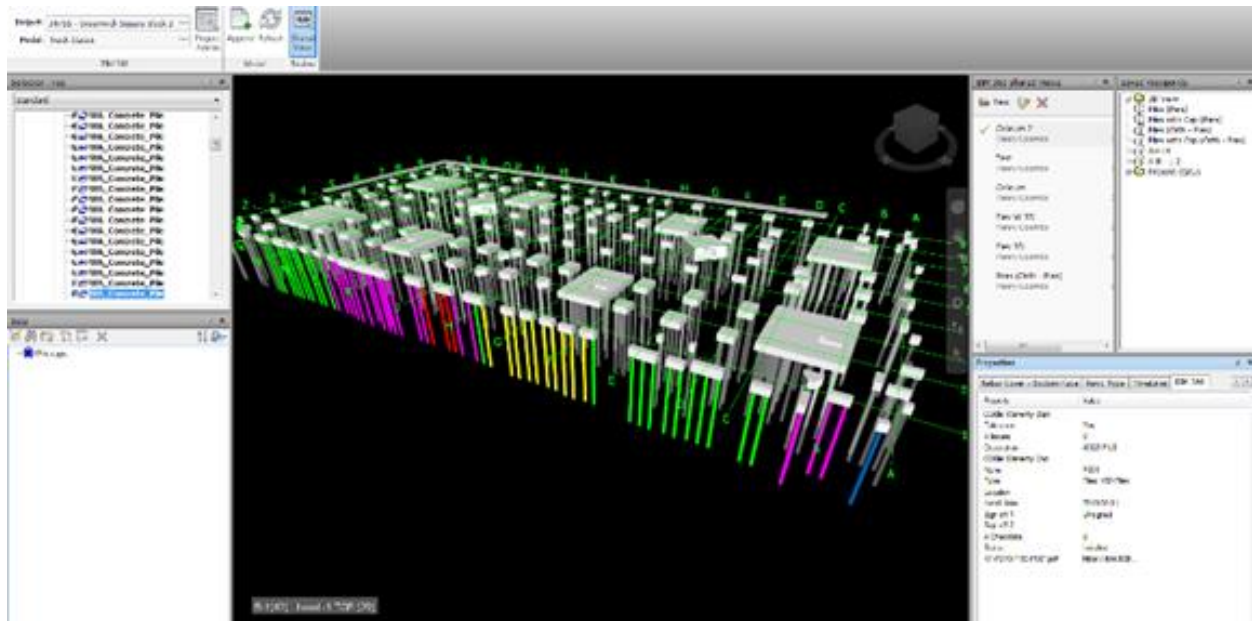
Now you can see the BIM 360 properties for the elements are available.



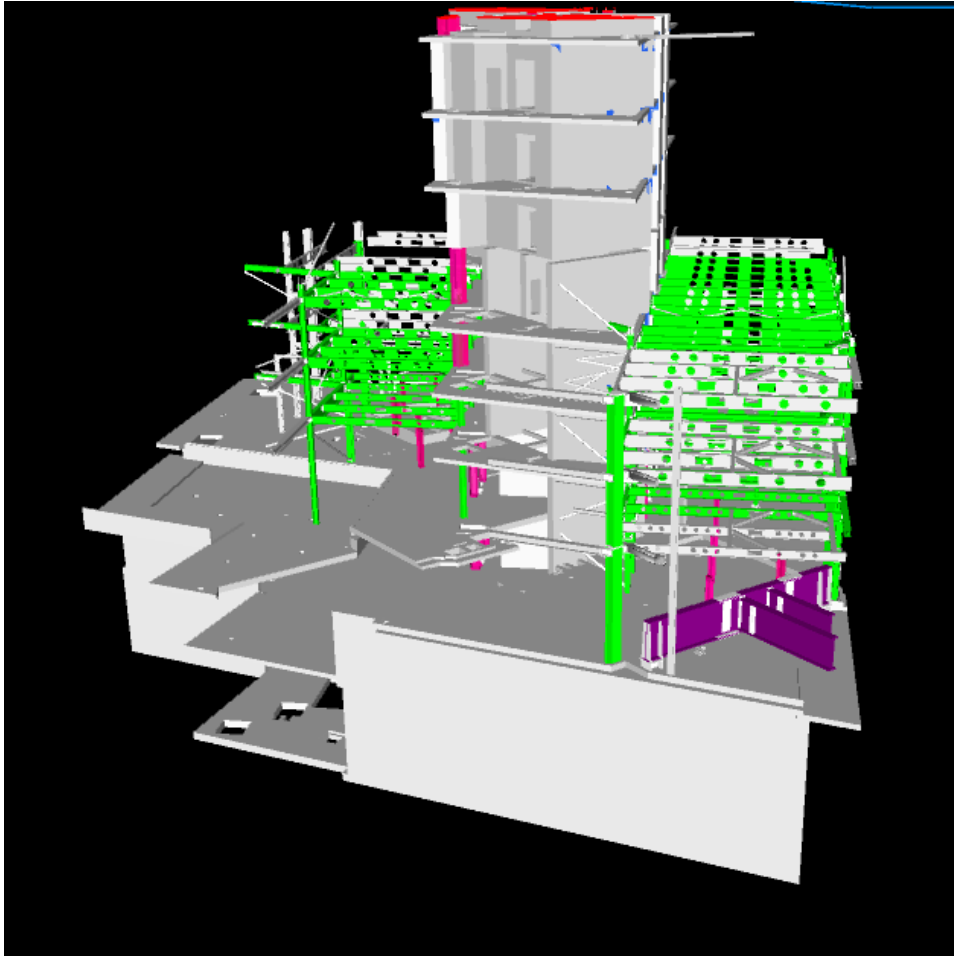
You will see in the screen shot that the status for this door is in manufacturing.

We can now configure the appearance profiler in Navisworks, so the elements are coloured to suit the status property.

Once setup results as that shown below can be obtained where we can clearly see the stage of each pile on the project.

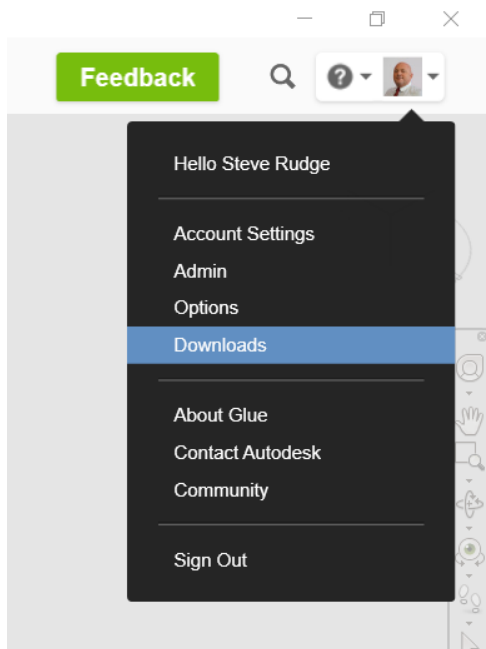


Also, by using the status codes and hiding elements through the use of search sets and then hiding none selected elements we can create live 4D tracking. So, the example below will show which elements have been constructed on the steel frame erection.



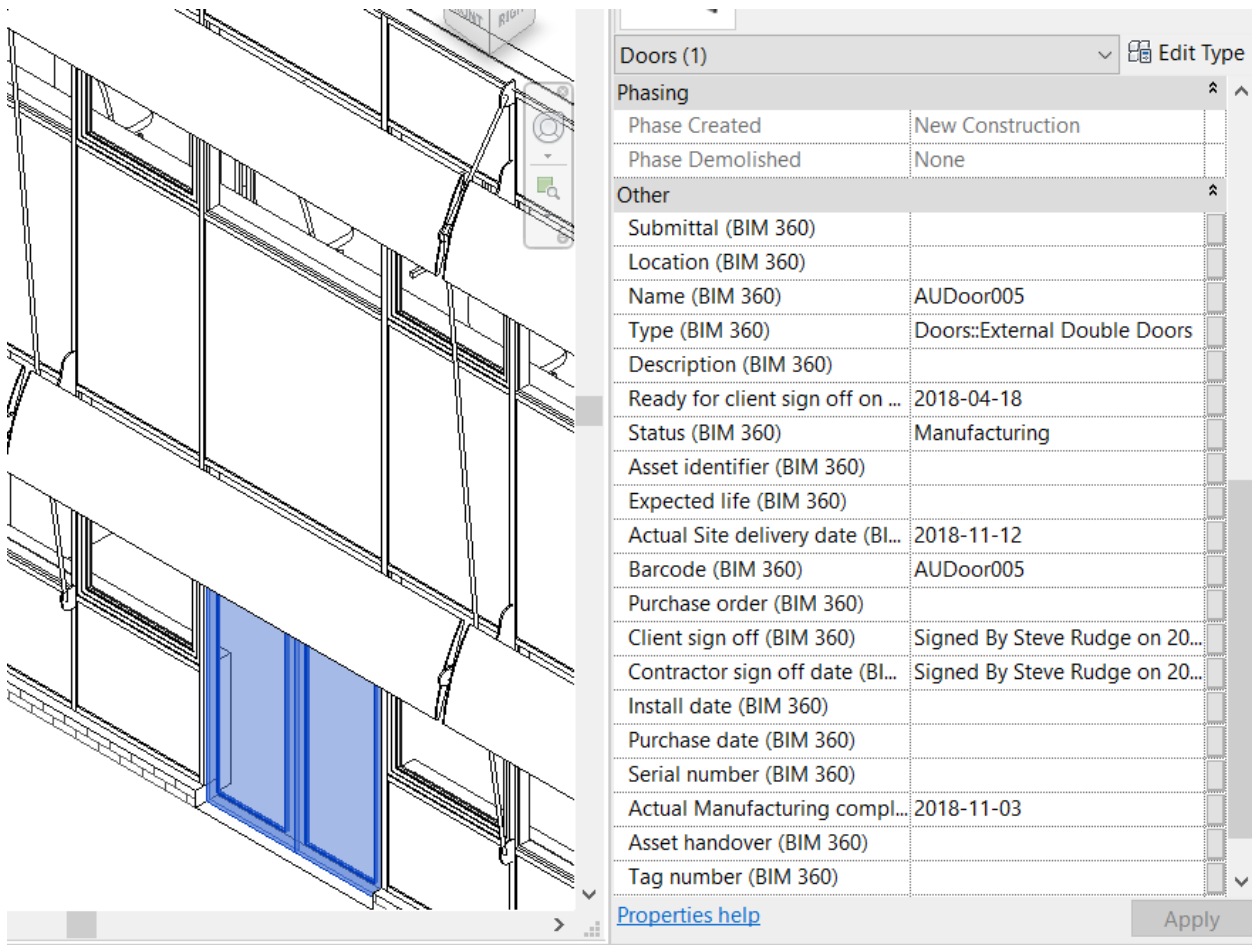
Stage 11 – Using the data – Revit

Similar to the workflow shown above we need to install the BIM 360 add-in for Revit which can be obtained from the downloads command on the top left of BIM 360 Glue.



The Revit plugin will allow you to bring the BIM 360 Field parameters back to the original assets defined at the beginning of our process (Stage 5&7).

Once the properties are back into Revit you will see that when we pick an element like the door that we have been using and the existing properties and the BIM 360 properties are present against the asset.



Now in Revit we can start to generate schedules of this data against the planned data migrated earlier, which brings us on to Analytics.

Stage 12 – Analytics

The two main ways of looking at this collated data is via Excel or links into Power BI.

When you export a schedule out of Revit the dates captured from signatures can be compared to the values captured from the initial planning tools and then with basic Excel skills using conditional formatting you can colour the fields to highlight if a date is in front or behind the schedule date, this can be seen below.

Schedule Properties

Fields Filter Sorting/Grouping Formatting Appearance

Select available fields from: Doors

Available fields:

- Assembly Code
- Assembly Description
- Assembly Name
- Asset Handover
- Asset Number
- Comments
- Construction Type
- Cost
- Count
- Description
- Description (BIM 360)
- Door Panel Height
- Door Panel Thickness
- Door Panel Width
- Expected Life (BIM 360)

Scheduled fields (in order):

Family Barcode Status (Deliver) Complete Actual Asset ID Asset Name Install Client Ready Ready for Delivery

<Door Schedule 5>

Family and Type	Barcode (BIM 360)	Status (BIM 360)	Delivery to Site	Actual Site delivery	Complete Manufact	Actual Manufact	Client sign off (BIM)	Ready for Client Sig	Ready for cl
DTC Double Door C /AUDoor01		Shipping	11/04/2018 00:00:00	2018-11-04	10/25/2018 00:00:00	2018-10-25	Unsigned	10/10/2018 00:00:00	2018-10-10
DTC Double Door C /AUDoor02		Delivery	11/06/2018 00:00:00	2018-11-06	10/27/2018 00:00:00	2018-10-27	Unsigned	10/12/2018 00:00:00	2018-10-12
DTC Double Door C /AUDoor03		Installed	11/08/2018 00:00:00	2018-11-08	10/29/2018 00:00:00	2018-10-29	Unsigned	10/14/2018 00:00:00	2018-08-14
DTC Double Door C /AUDoor04		Installed	11/10/2018 00:00:00	2018-11-10	10/31/2018 00:00:00	2018-10-31	Unsigned	10/16/2018 00:00:00	2018-05-16
DTC Double Door C /AUDoor05		Manufacturing	11/12/2018 00:00:00	2018-11-12	11/02/2018 00:00:00	2018-11-03	Signed By Steve Ru	04/18/2018 00:00:00	2018-04-18
DTC Double Door C /AUDoor06		Sign off	11/14/2018 00:00:00	2018-11-14	11/04/2018 00:00:00	2018-11-04	Unsigned	02/18/2018 00:00:00	2018-02-18
DTC One & Half Do /AUDoor09		HandOver	11/20/2018 00:00:00	2018-11-20	11/10/2018 00:00:00	2018-11-10	Unsigned	08/25/2017 00:00:00	2017-08-25

ID	Description	Start Date	End Date	Quantity	Status	Location	U	V	W	X
6	DTC Double Door001	03.02.2017 00:00:00	04.02.2017 00:00:00	1	Delivered	External Double Doors	0	0	0	0
7	DTC One & Door009	06.02.2017 00:00:00	07.02.2017 00:00:00	1	Installed	External Double Doors	0	0	0	0
8	DTC Double Door003	09.02.2017 00:00:00	07.02.2017 00:00:00	1	Delivered	External Double Doors	0	0	0	0

Or if you people can access and have knowledge of the BIM 360 Field API can utilise this data in platforms such as the Power BI application and displayed in many ways.

