BIM – Automate the boring stuff with
AutoM8

The rate of development within building services over the past decade has been staggering, with recently-developed technologies allowing projects to be delivered in unprecedented timeframes. However, fast-track projects can put a squeeze on resources within an engineering firm. All too often the fine detail checks, like checking for adequate containment size, are pushed aside. This can lead to reduced quality and cost variations that very often only become visible at a later project stage.

In order to meet tight project deadlines, while also allowing adequate time for necessary document reviews and checks, it is paramount to leverage modern technology to work efficiently. Automation is key to meeting this challenge and AutoM8 developer


AutoM8 developer Paul Flanagan.

Paul Flanagan has been working to develop tools to leverage data which users may already have within a BIM model. AutoCT, the first add-in available in the AutoM8 suite, is designed to route circuits along containment runs. It can automatically check electrical cable tray and ladder sizes to ensure there are no under-sized, oversized or unused routes.

Traditionally, carrying out checks for containment size is a time-consuming, manual task. To do the calculation circuit routes need to be identified and assigned to each run of containment. Then the cable characteristics, including size, type, number of cores, supports and installation methods, all need to be accounted for. While a single calculation by itself is simple, large projects having thousands of cables and multiple containment routes can easily become very complex.

As a project progresses through detailed design stage, multiple recalculations can be required if the cable configuration or routes change. Very often the minor circuit routes are never accounted for due to the quantity of calculations required.

Automation in BIM

The transition from computer-aided design to information modelling has not been an easy one for most engineering firms. The concepts that BIM presents to engineers and
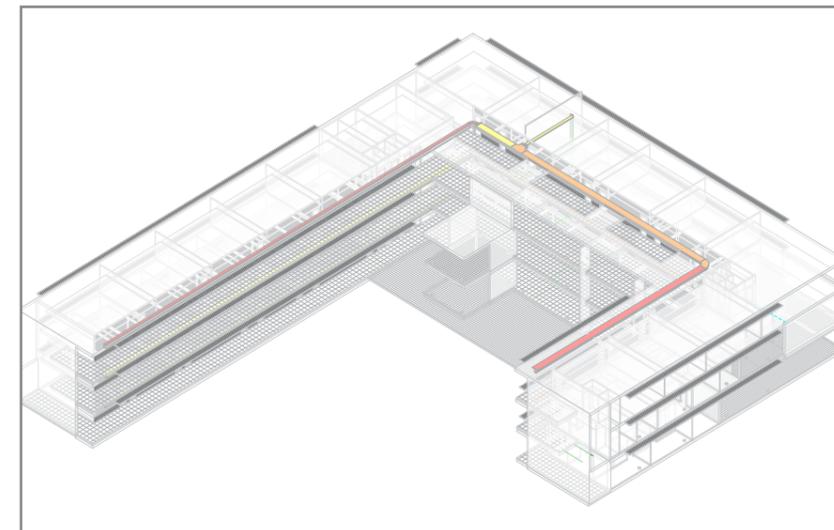
C3D isometric results from AutoCT containment sizing calculation.

designers can be abstract and convoluted when compared to the "what you see is what you get" nature of CAD.

While software packages like Autodesk's AutoCAD and Revit can both be used as drafting tools, at their core they are very different programs.

The Revit software package allows users to have many different windows into the data hosted in a model. For example, when viewing a 2D or 3D view of an electrical panel it clearly has a size, depth, height and width.

Schedules in Revit allow another window to the data – allowing a live link between the spatial data we can see in a view to be tabulated into equipment schedules or distribution board schedules.

Extending this further, scripting tools like Dynamo can expose even more of the underlying data – the electrical connection details, numeric X Y Z position in relation to the rest of the model, along with a host of other data not seen in 3D is all accessible. This can allow users to create templates to carry out repetitive actions on the model data.

However, if we want to carry out custom calculations in the Revit model like containment sizing, using scripting tools like Dynamo can have limitations as operations are carried out using
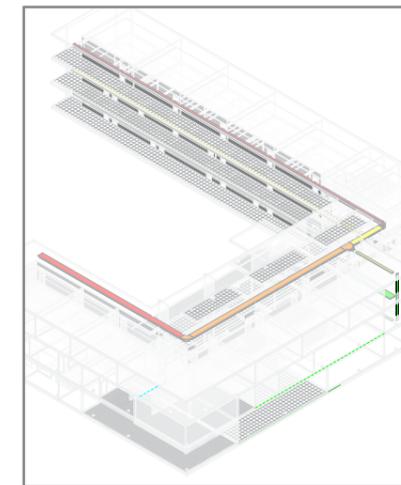
Rotated view of model calculation results. Risers and disconnected containment networks are easily calculated.

"nodes". Complex operations require numerous nodes which greatly reduce efficiency. Additionally, interacting with the Dynamo user interface is a daunting task for most users.

> *AutoCT, the first add-in available in the AutoM8 suite, can automatically check electrical cable tray and ladder sizes to ensure there are no undersized, oversized or unused routes.*

AutoCT solution

AutoCT has been designed as a custom add-in to overcome these limitations. It automates the routing of circuits and sizing of containment within a Revit BIM model. The focus of the software is to carry out the sizing calculations efficiently while presenting a logical, easy-to-use interface.

AutoCT contains a "shortest path" routing algorithm. It gives a numeric score to each piece of containment as it passes from the origin electrical panel towards its end goal. This scoring system, along with the spatial data available in the model, makes light work of the multiple calculations required for larger models.

To allow the user to easily interpret the results, the percentage fill is displayed in a colour-coded 3D isometric view. This allows users to easily identify congested or unused containment and take action to resize.

AutoCT allows users to work more efficiently within the BIM model. The time savings realised can then be dedicated to greater value-added tasks. For medium and large-sized projects the time required for containment calculation checks can typically be reduced from weeks to a matter of hours. The larger the model the greater the savings while using AutoCT.

Challenge

The transition for engineers from computer-aided drawing to information modelling has been quite a challenge. However, the benefits are being realised with the emergence of software and add-ins that leverage this information easily. Tools such as AutoCT allow BIM to become more than just a "drafting tool".

Some of the upcoming features for AutoCT will also allow for cable bending radius checks on containment as well as weight loading calculations for all the containment in the model.

See https://autom8bim.com for more information. ∎