

# BIM guide for members of the Institution of Mechanical Engineers



Institution of  
**MECHANICAL  
ENGINEERS**

IMechE Services Ltd

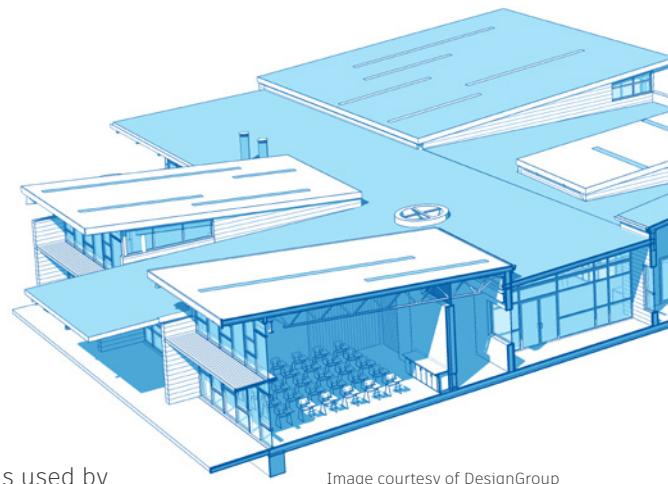


Image courtesy of DesignGroup

## Background

Autodesk® has prepared this guide for members of the Institution of Mechanical Engineers to:

- Explain what Building Information Modelling (BIM) is and how it is used by your customers
- Clarify how BIM impacts the way you design, make and sell your products
- Outline some practical steps you can take to realise its benefits

## What is BIM?

Building Information Modelling (BIM) is used in the Architecture, Engineering and Construction (AEC) industries to build better buildings, on time and on budget. BIM promotes the use of digital tools and data to collaboratively design, construct and delivery of an entire facility. This approach reduces the risks associated with traditional methods by ensuring the right people have access to the right information throughout the process. As a BIM project progresses an information model of the entire building is created and updated in real time, with all assets linked to the key data required to operate and maintain it effectively, including the products designed and manufactured by typical manufacturing businesses. Working in this way improves their ability to deliver to clients the building they want.

## What's driving BIM?

The UK government has mandated that all centrally procured public sector construction projects require the implementation of BIM. From October 2016, all centrally funded departments need to “have the capacity to electronically validate BIM information delivered from their supply chain”. In addition, they need to be making “progressively more use of supply chain data for key business activities”.

## How does BIM impact your design or manufacturing business?

It is easy to regard BIM as a public sector issue, but the benefits of BIM are being seen more widely in the private sector, where building owners are seeking to reduce the overall lifecycle costs from design, specification, construction and maintenance. This is creating increased pressure for building product manufacturers to provide their clients with product information digitally. Designers and manufacturers of building products, fixtures and fittings have an opportunity to add significant value to their clients' processes by providing simplified geometry and digital product information. Manufacturers can differentiate themselves by adding digital installation instructions, operational guidance, digital warranty and service data to their offering. Adopting this approach adds value to the project, and increases the chance of your products and services being used in BIM projects within the public, commercial, and residential sectors.

## What type of data does BIM require?

Building designers and contractors delivering BIM projects don't need "heavy" 3D models of a product. Instead they want lightweight geometry enriched with critical product data to complement the size, weight and part number information. An air handling unit, for example, has key performance characteristics such as air flow capacity and service schedules based on the building system it was engineered for. Enriching the product information with details of features such as connection points allows the design team to better understand how that product will fit, and perform, within the overall system. These are just some of differences between providing CAD models and the information-rich objects now required for BIM used by your clients.

Your clients may also provide you with guidance as to:

- The Level of model Detail, (LOD), relating to graphical detail
- The Level of Information, (LOI), which relates to non-graphical data

In addition, clients and industry bodies are now developing product data templates (PDT) that provide clarity on the practical information required for your product type.

A manufacturer can react to different information and product data requirements by handling data in a structured manner, and by linking the right information to their mechanical and BIM outputs.

There are "levels" associated with the nature of the BIM collaboration, and you can read about these standards here: [\[You can read about the standard here\]](#)

## Popular Strategies to avoid

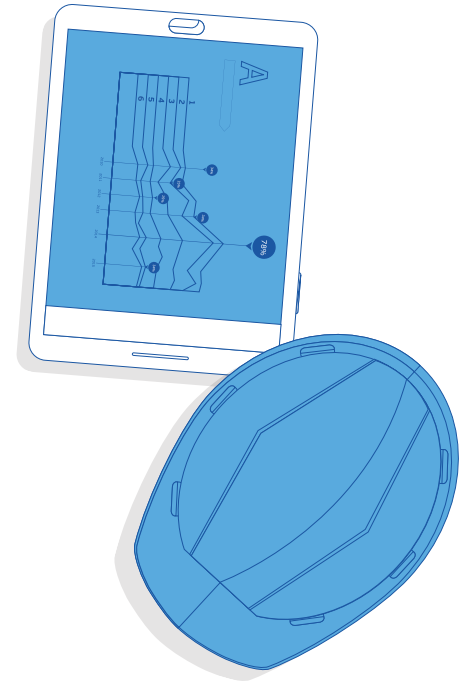
### Sharing detailed mechanical CAD models

Aside from inherent concerns around intellectual property, 3D mechanical CAD models contain far too much non-relevant data within them to be really useful to design and construction clients. They can also be very large files. Of course, sharing 3D models can be useful if clients have exactly the same CAD system, but manufacturers tend to use different design and fabrication software from that used by architects and construction companies. The key is the information contained within the model, not the model itself.

**"Our 21st Century Tools project team are working closely with Autodesk and our suppliers to streamline our project delivery and handover processes to truly incorporate BIM methodology."**

John Robison

Computer Aided Engineering, Design Capability Leader, Sellafield Ltd.



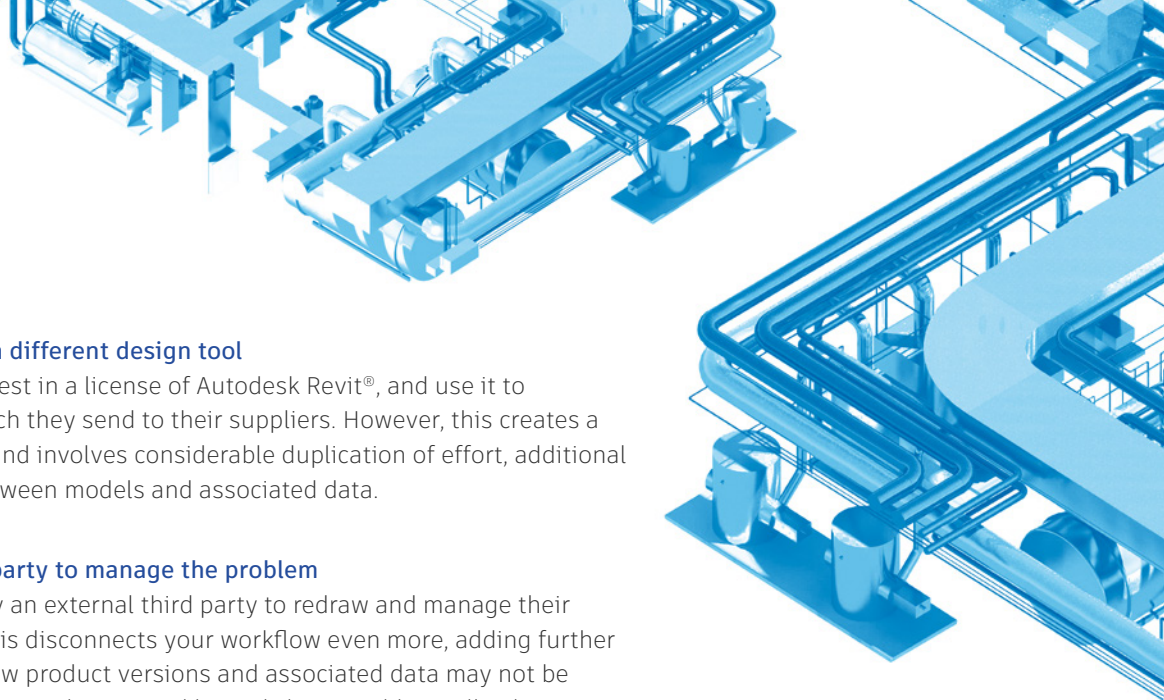


Image courtesy of Dunham Associates

### Redrawing products in a different design tool

Some manufacturers invest in a license of Autodesk Revit®, and use it to redraw their models which they send to their suppliers. However, this creates a disconnected workflow and involves considerable duplication of effort, additional cost and risk of error between models and associated data.

### Paying an external 3rd party to manage the problem

Some manufacturers pay an external third party to redraw and manage their entire product library. This disconnects your workflow even more, adding further risk to the process, as new product versions and associated data may not be reflected in the library objects being used by end clients. Additionally, this approach leads to manufacturers losing the opportunity to directly communicate their brand value, whilst leaving them reliant on a third party for the life of their model, which can involve significant long term cost.

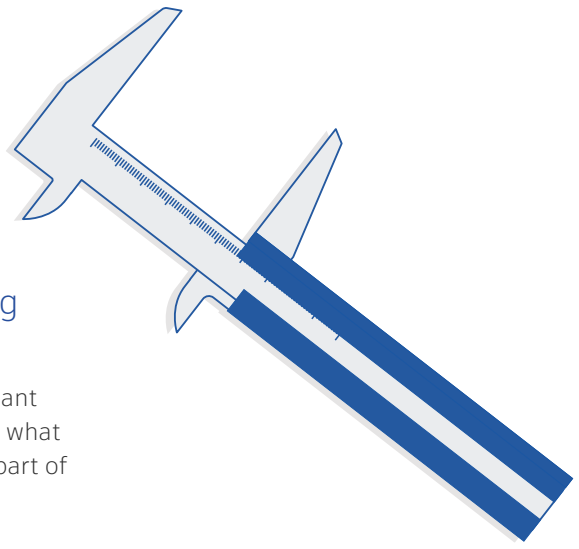
### A best practice approach to BIM content creation

The most agile solution is therefore one where you remain in full control of your data and process, in which you, or even your client, can define and generate the simplified BIM compliant data, either on request or on demand, converting your detailed mechanical designs into lightweight BIM objects for use in their construction projects. This approach reduces the effort associated with producing BIM objects by integrating BIM into your existing sales and design processes. You can focus on engineering great products rather than managing a compliance process.

For manufacturers, having an agile product development process is one of the critical factors that will differentiate them from their competitors.

**“We view BIM as a means of improving our productivity and collaborate closely with Autodesk to realise these goals. The capturing of data and assembling it in to collaborative, coordinated models will, in time, reduce many of our traditional workflows. Suppliers will play a vital role in this by providing us with, not only geometrically accurate models of their components, but smart data that allows us to efficiently record and share information with our customers in ways we have not done in the past.”**

**Mike Beckett**  
Director, Hill Partnerships

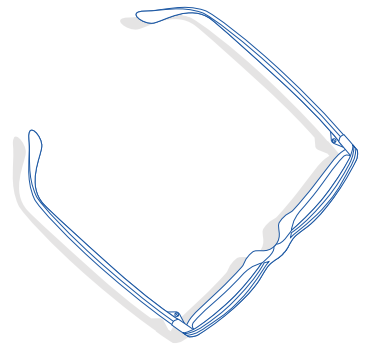


## How do manufacturers take advantage of BIM using their own engineering data?

Although perceived by some as a business challenge, providing BIM compliant product data is actually very straightforward. The key lies in understanding what information clients need, and implementing this best practice as a natural part of the design or sales process.

Here are some points to consider:

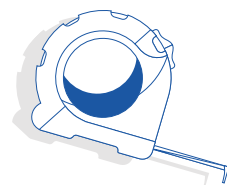
1. Work out what information about your products would add greatest value to the architects and contractors you have to work with. If you don't know – ask them! Think of it as defining some digital standards for intelligent collaboration and data exchange.
2. If your primary design tool is 2D-based, then it's likely you are using an AutoCAD® product. Whilst AutoCAD is a powerful design and drafting package, it does not provide the intelligent outputs required by BIM and you will need a 3D modelling package to share data and models effectively.



Subscribing to solutions like Autodesk Inventor® and Vault allows manufacturers to add and manage the key product information required by customers and follow the Inventor workflow path below.

[\[Click here to learn more\]](#)

3. Some non-Autodesk 3D CAD tools offer an IFC export, which is a neutral file exchange format, but this does not necessarily give your customers all the rich information they need. We recommend leveraging the AnyCAD functionality of Autodesk Inventor, which can read, in native 3D, CAD files from multiple software vendors, allowing you to add the right data and output a lightweight Revit, ADSK or IFC object for use by your clients. The BIM Exchange functionality built into Inventor makes it a simple task to generate the right BIM content quickly and without additional cost.  
[\[Click here to learn more\]](#)
4. Autodesk Inventor delivers the flexibility to design components, configure them according to size variants, and simulate and analyse their performance rapidly. You can reduce the amount of materials used whilst increasing the strength and performance of your products with advanced generative and simulation tools. If, as part of this process, you start to define BIM information, then you've created an agile product innovation platform that puts you in control of your product data and engineering processes. Below are two workflows to make your BIM Content available on demand by building professionals.



Depending upon the nature of your product or service, you may want to “design in” your solution to the client digital model, rather than simply provide objects for client use. Mechanical design tools such as Inventor allow you to use the client Revit model as a reference for your design, ensuring compatibility with the project.

## Creating and sharing BIM content for single size products

Once the engineering design has been finalized, Autodesk Inventor BIM Exchange helps generate a simplified BIM model at the right Level of Detail for your clients to read directly in Autodesk Revit or other design tools.

## Creating and sharing BIM content for configurable products

Leveraging Autodesk Inventor rules-based design and engineering automation, manufacturers can publish 3D product models for customers to configure online, on demand, within their specifications and fabrication constraints. BIM libraries are hosted on the manufacturer's website directly within their product configurator.

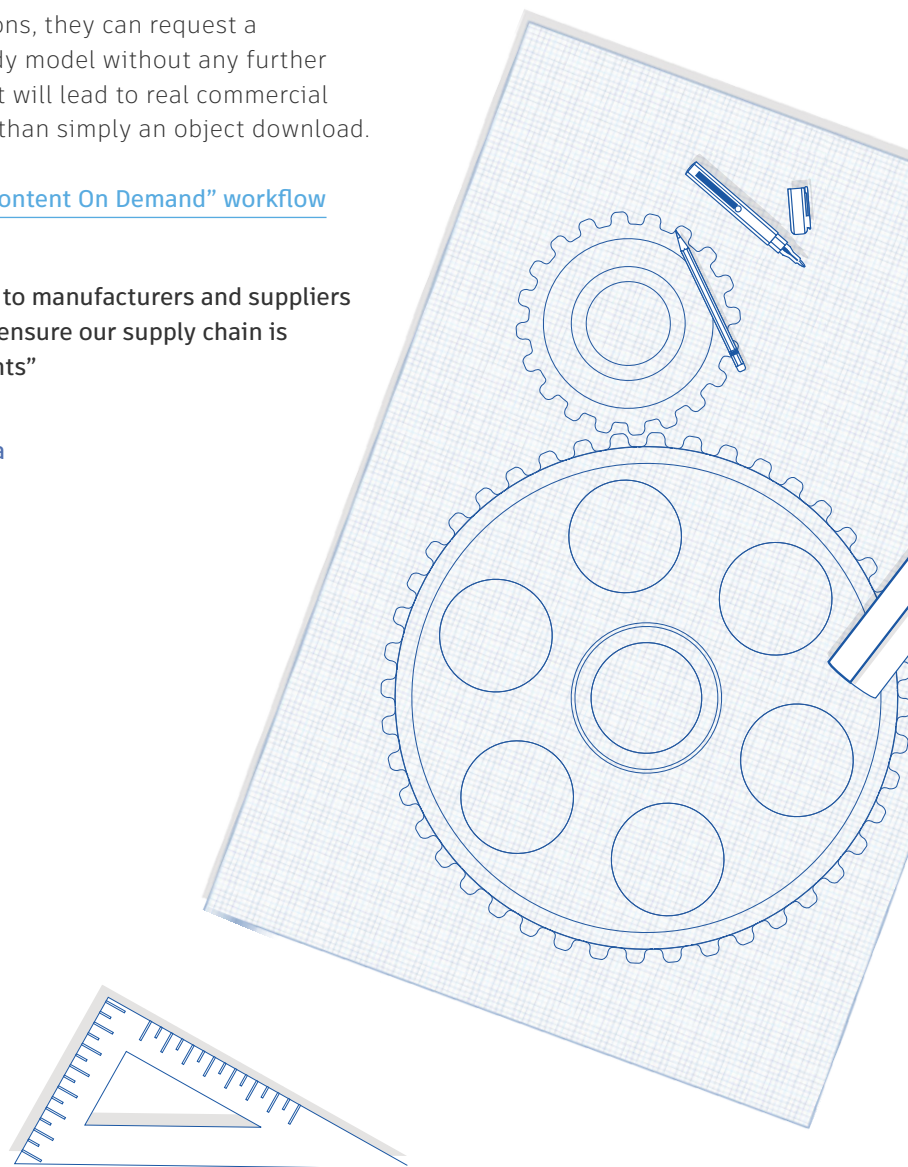
Once a client is happy with their product options, they can request a quote and download the lightweight BIM-ready model without any further effort. This greater level of client engagement will lead to real commercial opportunities, starting a sales process rather than simply an object download.

[Click here to learn more about Autodesk "BIM Content On Demand" workflow](#)

**"We are working with Autodesk to communicate to manufacturers and suppliers what information and format is needed, and to ensure our supply chain is aligned to share their data with us and our clients"**

**Gary Scott**

**BIM and Digital Engineering Specialist, Skanska**



## What are the benefits for design and manufacturing companies?

Providing customers with simplified objects and product data in a format that makes their job easier aligns you directly to their objective of driving efficiency, and improving the lifetime performance and management of their buildings. It makes products easier to specify and design in to projects much earlier, increasing your competitive advantage while helping you win more business, by making your company easier to do business with.

The value of BIM for building operators, housebuilders, contractors, retailers and designers is significant, and these organisations want to support their supply chains in delivering this capability. Making BIM a part of your process is now simple, low cost, and can provide a foundation for developing new revenue streams linked to lifetime use and operation.

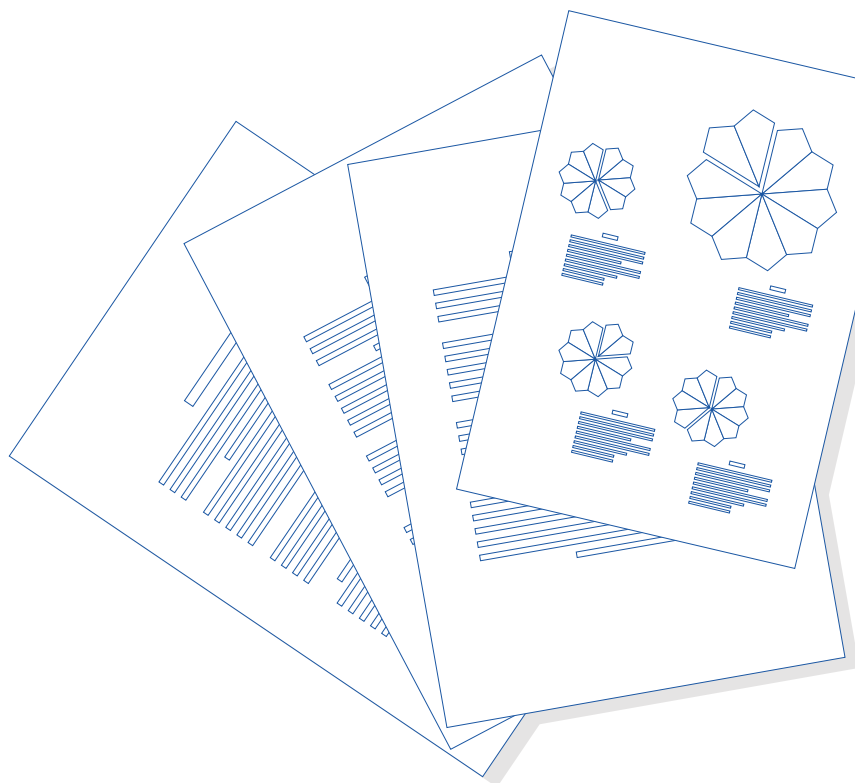
Autodesk is working with numerous retail, housebuilding, public sector, and contractor clients to make it easier for manufacturers to engage with them. Increasingly, BIM will be a requirement for market access, and adopting best practice now will ensure you benefit.

[For further information and to contact Autodesk click here](#)

**“We see BIM as an enabler, driving certainty into our design process which reduces programme risk as we design and develop our space. The quality and accuracy of information received from our suppliers is critical to this process. John Lewis is working with Autodesk to improve the understanding and capability throughout the supply chain.**

**The biggest challenge to the industry still remains delivery on time and on budget and the use of Autodesk’s technology supports achieving this.”**

**Andy Smith**  
GM Future Planning,  
Property Services, John Lewis Partnership



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