



Get Spec'd In

How building product manufacturers can create
BIM objects to win more business.

Introduction

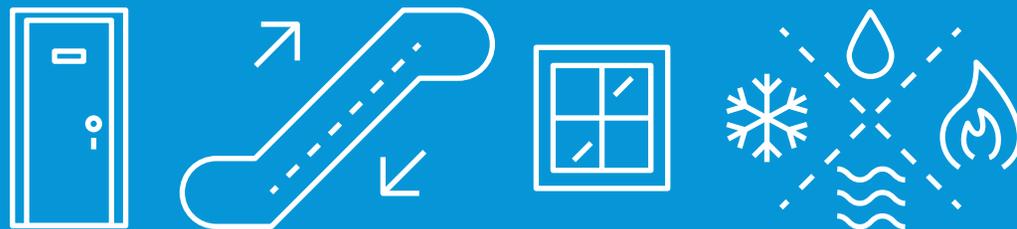
Manufacturers that design products and equipment that go into buildings have long used digital models to develop new offerings on shorter schedules. Now, their customers on the building and construction side—including architects, contractors, and building owner/operators—are adopting sophisticated digital approaches en masse. And while both groups understand the benefits of digital workflow, they each have very different needs.

Manufacturers of everything from HVAC systems to windows to elevators typically use 3D mechanical CAD software to create high-fidelity models needed to ensure proper manufacturing and assembly. Architecture, engineering, and construction (AEC) firms use a different standard, Building Information Modeling (BIM), to plan, design, construct, and manage building projects. Each of these models is fundamentally different and they can't be used interchangeably.

Here we'll explore how BIM is used and show how building product manufacturers can (and should) create BIM objects of their products with the appropriate level of detail, making it easier for architects and contractors to spec their products into new projects and help manufacturers win more business.



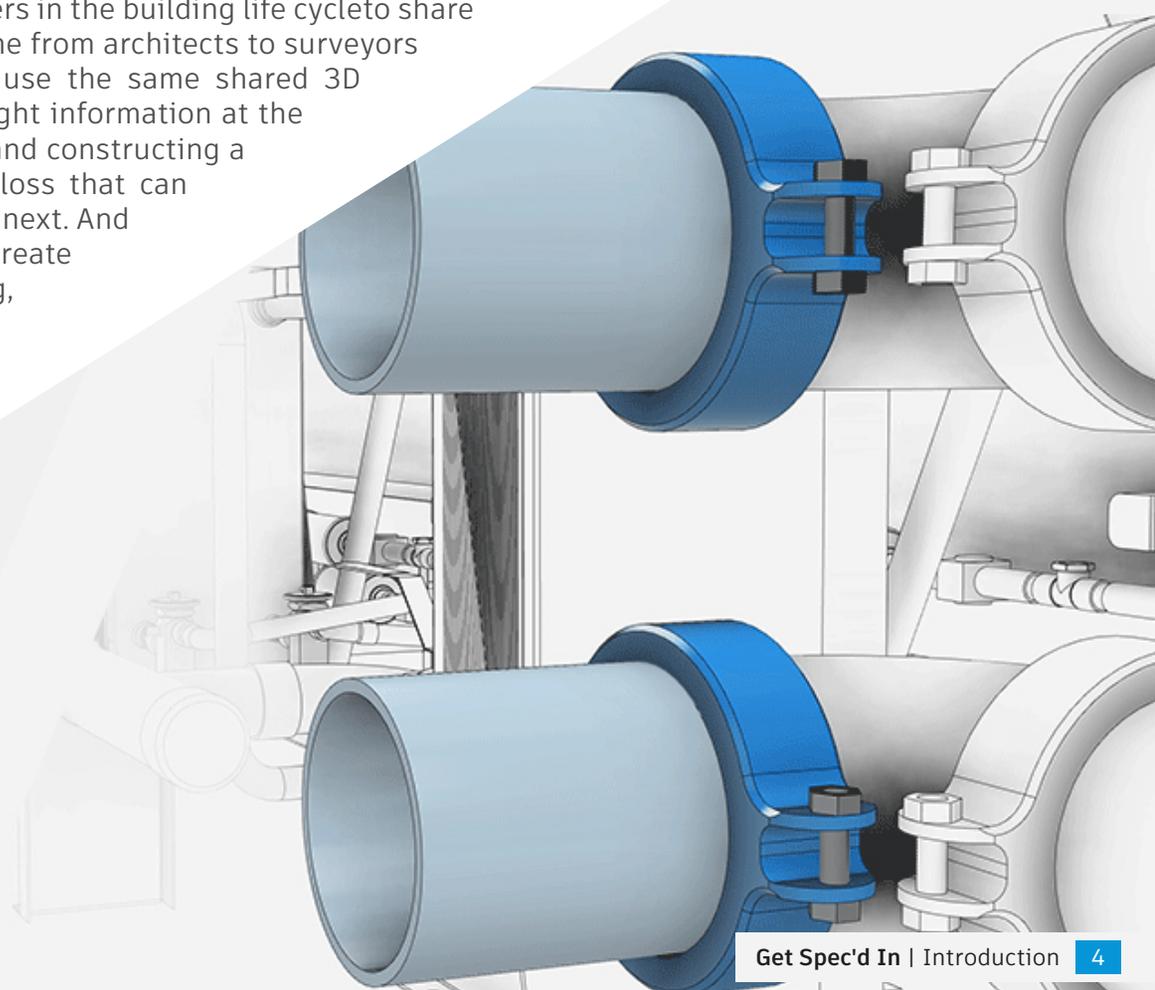
According to the 2018 NBS BIM Report, 75% of designers agreed that manufacturers need to provide BIM objects. Read on to learn what BIM objects are and how to create them from your engineering design data.



What is BIM?

The U.S. National Building Information Model Standard Project Committee defines BIM in this way: "Building Information Modeling (BIM) is a digital representation of physical and functional characteristics of a facility. A BIM is a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life cycle; defined as existing from earliest conception to demolition."

Essentially, BIM makes it easier for all stakeholders in the building life cycle to share information about the building. It allows everyone from architects to surveyors to structural engineers to building owners to use the same shared 3D model. This helps everyone gain access to the right information at the right time throughout the process of designing and constructing a building. It reduces the gaps and information loss that can occur when one team hands the project off to the next. And at the end of the build, BIM objects combine to create a reliable information model of the entire building, with all assets linked to key data required to operate and maintain it effectively.



Challenges creating BIM-ready content

BIM is increasingly recommended or mandated in product specifications for building projects. This is because it solves a lot of familiar problems in construction management, namely budget constraints, accelerated timelines, high demand for skilled labor, and plans that contain conflicting information.

1. Design and construction

BIM helps detect collisions between installed systems and equipment, or mismatches between specified systems and existing MEP connections. With the BIM methodology, subcontractors from all trades can provide information before construction starts, which minimizes waste and creates opportunities for off-site pre-assembly and fabrication.

2. Operation

BIM provides a great deal of value during the majority of the building's life cycle: operation. Any time there is a problem in the building, the owner/operator can use the digital model to quickly find the location of affected components and have instant access to their dimensions, manufacturers, part numbers, and other critical data.

When RFPs recommend or require BIM objects, building product manufacturers typically create BIM content from scratch, either in-house or through a third-party provider. As a result, creating and maintaining BIM content can be expensive. Often there is a lack of association between the BIM object and the manufacturing model. Manufacturers that outsource the process lose a degree of control over data authoring, raising the risk of out-of-date objects.

On top of all of this, configurable products add a high degree of complexity. One configuration of an air handler, for example, might cause a collision while another configuration of the same air handler will not. When these configuration decisions get made, it affects the efficiency of the whole process.

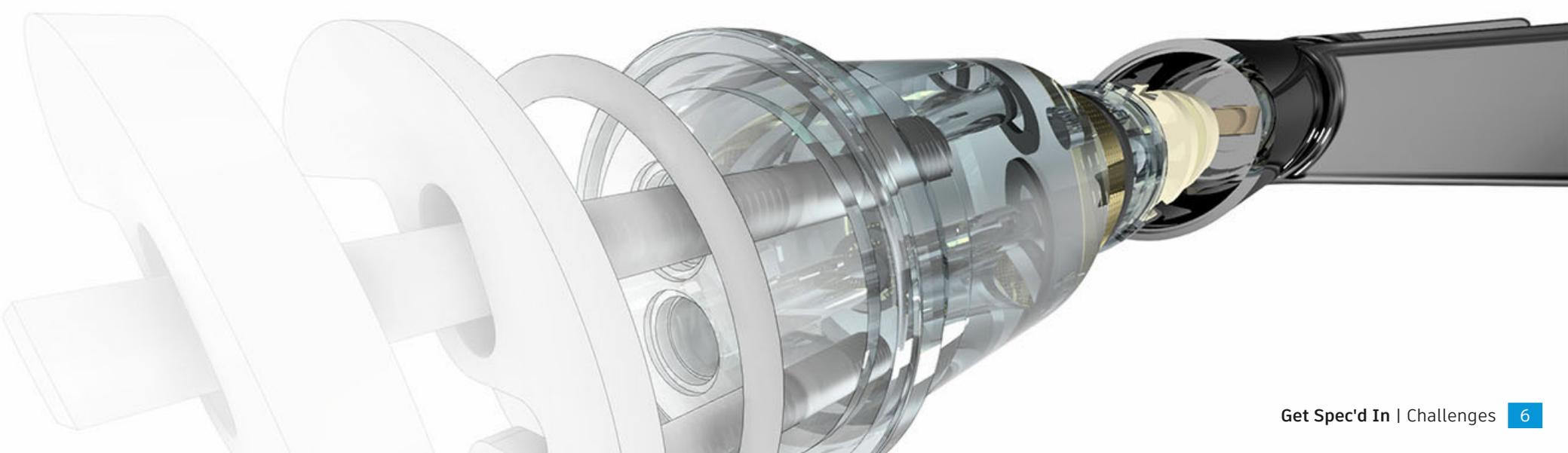
How BIM is used in design and construction

BIM models are used very differently during the design and construction phases of a large commercial or industrial project.

Architects often start with a generic model that is typically pulled from an internal BIM content library. This object is optimized for the design process with the appropriate parameters, properties, and scheduling. In other words, the object has just enough detail to support the design and bidding phase.

When the bid is won and construction starts, actual products are selected. At this point, the generic BIM model is replaced with a manufacturer-specific model. In the example shown, notice that the connectors for the real HVAC system are identified and properties assigned. In general, the construction-phase model provides more accurate information for collision detection, coordination among trades, installation, and maintenance.

Technically speaking, BIM content is differentiated by its level of detail (LOD). The preferred LOD changes depending on which stakeholders are using the BIM object.



Creating BIM objects

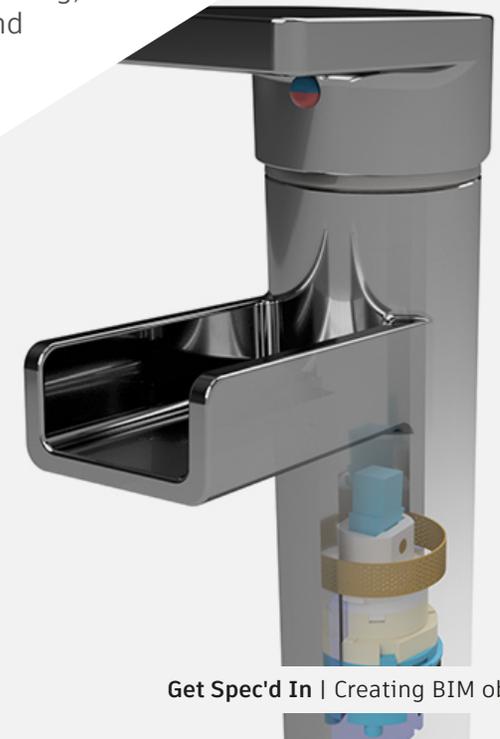
To deliver BIM objects with LOD 350, building product manufacturers can start by simplifying a full-fledged 3D CAD model, essentially stripping all the detail that would not be relevant to the AEC firm and then exporting a “BIM version” of the original model from this much smaller file.

Simplifying a manufacturing model in this way can work for products with only one size, but not as well for configurable products. With configurable products, manufacturers would have to pre-build each possible geometry, export them, and maintain them separately. This would be incredibly time-consuming and is generally not practical for building product manufacturers with a large number of configurable products.

What tends to be more effective is simplifying the manufacturing model natively, within the same application with which it was designed. This capability allows manufacturers to view the manufacturing detail for any product, configure it appropriately for the project in question, then download the scale geometry version as an LOD 350 BIM object with much less manual work.

Once the model is simplified, connection points can be defined for electrical, plumbing, ducts, conduit, or cable trays along with relevant properties such as size, voltage, and flow direction. In addition, OmniClass numbering and naming can be applied to the object for correct categorization within the BIM project where specific manufacturer and model number details can also be added.

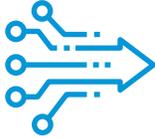
Because you are converting detailed mechanical designs into lightweight BIM objects with the correct amount of metadata, these natively simplified BIM objects are very easy for customers to integrate in their 3D models. There are no extra steps and no back-and-forth required. In addition, native simplification gives you more control over your intellectual property, because there is no need to share your complete product designs with a third-party provider or with the customer.



BIM object workflow for configurable products

With configurable products, creating a BIM object can be done internally as well as externally. Autodesk, for example, offers an online product configurator that can be deployed online to sales teams and customers. The online configurator speeds up the selection of custom products using rules-based design to control the allowable customization options without complex programming. The workflow for this configurator usually runs as follows:

1. 
Start with the fully detailed, configurable engineering model

2. 
Simplify the master model

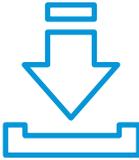
3. 
Author MEP connections

4. 
Author BIM metadata

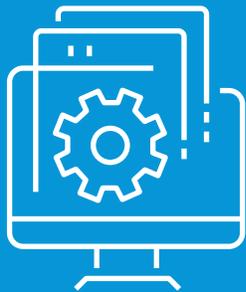
5. 
Upload to the configurator and embed in website

6. 
Customer visits the website to choose options and see a dynamic, high-detail 3D rendering

7. 
Behind the scenes, the BIM design view of the configuration is exported to a requested format

8. 
Customer downloads the BIM object and inserts into project

There are three general approaches you can take, depending on the complexity of your product's configurations:



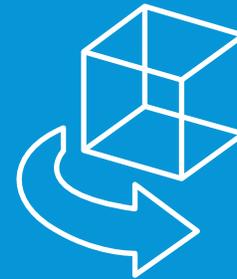
1.

For single-size or fully custom products, it's best to export Revit families or IFC files directly from your engineering design data.



2.

For configurable products, it is recommended to use an online configurator where Revit families and IFC files can be downloaded.

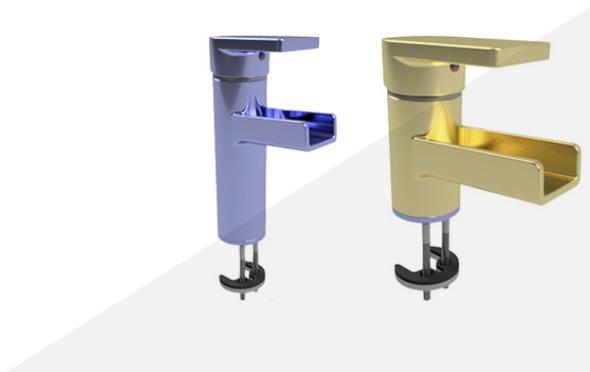


3.

For products with complex Revit behavior, such as doors, windows, and lights, consider creating a multi-size family natively in Revit.

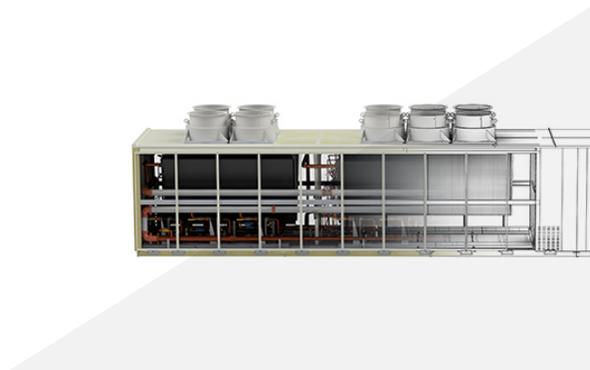
Best practices for BIM content

Regardless of the tools you use to produce BIM objects of your products, there are a handful of best practices manufacturers can follow to make the process more successful.



1. Rules-based design

For configurable building products, rules-based design enables you to publish 3D product models that customers or sales teams can configure as needed, on demand, that account for allowable specifications and fabrication constraints. Not only does this speed up the RFP process, but it frees up valuable engineering time that would normally be spent manually configuring products to order.



2. Model simplification

When creating BIM content, simplifying the geometry in the model is an essential first step. Much of the detail that is important to manufacturers is not only unnecessary in the building model context, but may represent intellectual property that should be protected. Simplification should easily and automatically remove any proprietary design details, small and/or internal components or features.

Model Property	
Name	Value
Identity Data	
Description	Roof Mounted HVAC
Manufacturer	Mammoth
Model	
URL	http://mammothwet
Model Properties	
Area	2.065502e+06 inch ²
Center of Gravity	X: -0.519 in Y: 37.48
Density	6.161817e-02 lbmas
Mass	5.787108e+04 lbmas

3. Metadata integration

Building designers and contractors want lightweight geometry enriched with critical product data, including digital installation instructions, operational guidance, digital warranty, and service data. Adding this information along with details of connection points allows the design team to better understand how the product will fit, and perform, within the overall system.

Type	Basin
Finish	Chrome - Polished Blue
Cost	£250.00
Weight	1.5 kg
LOD	Manufacturing

4. Deployment to online configurator or direct export

BIM objects should be exported as the industry standard IFC2x3 format (.ifc) or the native Revit Family (.rfa). Some tools, such as Autodesk Inventor, can read CAD files (in native 3D) from multiple software vendors, allowing manufacturers to output a lightweight Revit, ADSK, or IFC object, greatly simplifying the creation of BIM content without additional costs.

Vent-A-Hood accelerates custom range hood design

Vent-A-Hood® Limited is the market leader in premium residential ventilation. The company can make virtually any hood a customer asks for, but wanted to improve the customization process to keep lead times reasonable.

The resulting “Build-A-Hood” portal simplifies customization, guiding customers through the steps to design the ideal range hood while staying within the parameters established by the engineering models. The result is a 3D visual rendering that includes all physical specifications and pricing details. Nearly the entire Vent-A-Hood portfolio is available to customize through the portal.

Many of Vent-A-Hood’s models have now been made BIM compliant. According to Mike Sy, head of technology and purchasing, “We get at least a dozen calls a month from architects and designers asking for BIM data. By delivering BIM models directly from our online product configurator, we expect to win more business.”

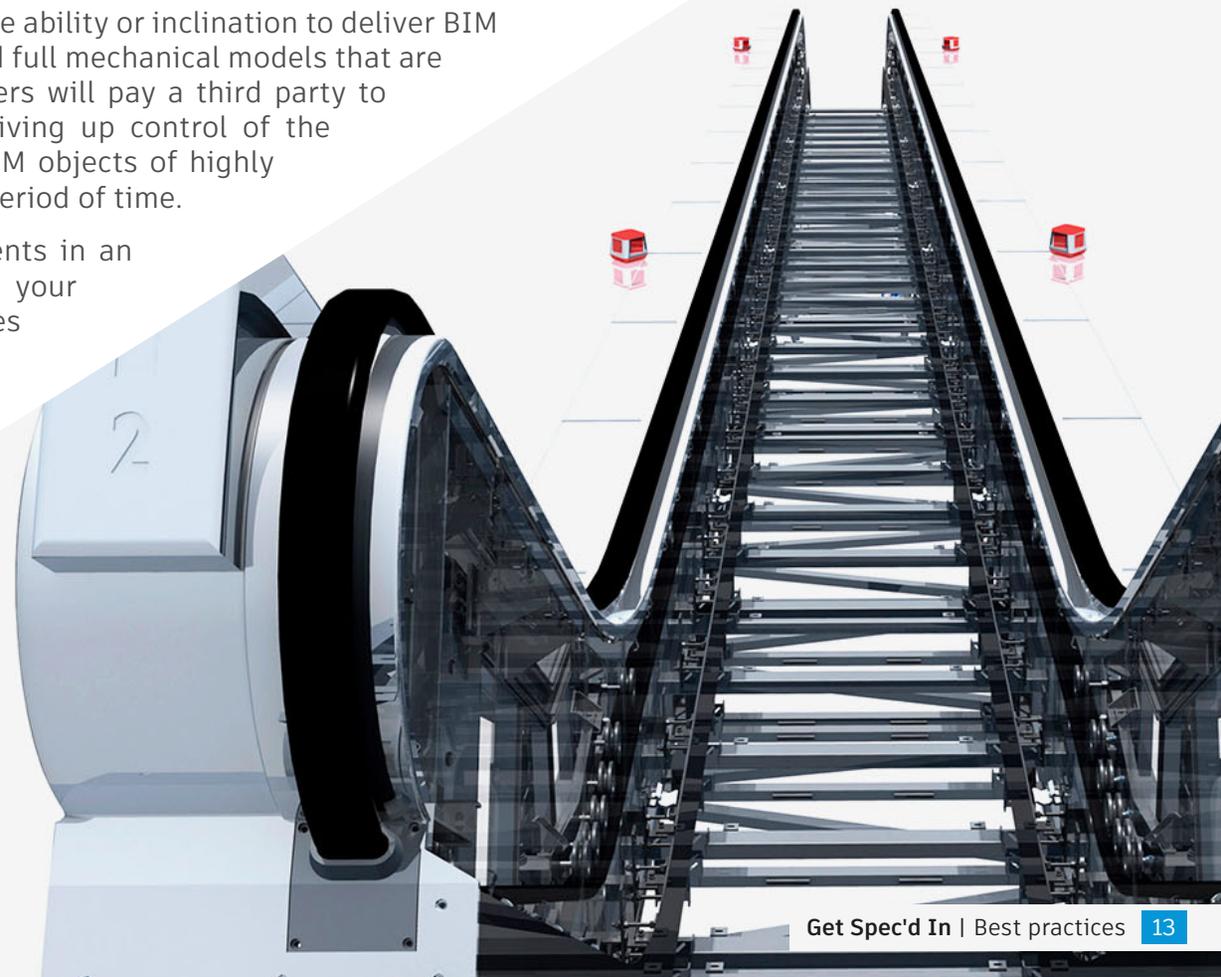


Make your products more attractive

Designers and manufacturers of building products, fixtures, and fittings have an important opportunity to add value by providing BIM objects with simplified geometry and digital product information.

Keep in mind, not every manufacturer has the ability or inclination to deliver BIM objects that are ready to use. Some will send full mechanical models that are too complex for AEC firms to manage. Others will pay a third party to create BIM objects of unknown quality, giving up control of the process. Many will be unable to provide BIM objects of highly configurable products within a reasonable period of time.

If you can comply with the BIM requirements in an RFP quickly and easily, it differentiates your products and your company. In short, it makes your products easier for your customer to spec in their design and increases the chance of your company winning more business.

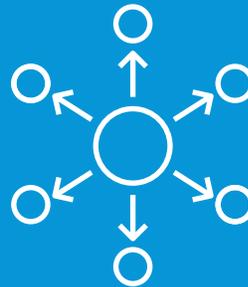


Get Started

Learn more about how Autodesk can help you get spec'd in by creating configurable, BIM-ready content.



Download a trial of
Inventor today



Contact our sales team to see
what options are right for you

