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Design, Develop, Deploy: Create Revit Content from Inventor Designs

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Learning Objectives

- Examine simplification and intellectual property protection methods.
- Discover the available connectors and data that can be passed into AEC products.
- Learn best practices for creating content for AEC product consumers.
- Learn about managing content and sharing effectively with trusted stakeholders.

Description

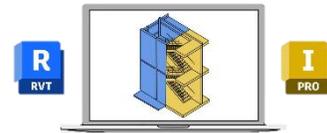
Inventor software has the functionality to export assemblies and parts for mechanical, electrical, and plumbing connections directly into Revit software. This class will focus on the dynamics and logistics between the two programs. You'll learn best practices for creating Inventor architecture, engineering, and construction (AEC) equipment and exporting it effectively to Revit programs, and how to best maximize their design intent.

Speaker(s)

Mark has been using Autodesk® products since the late ninties in many different manufacturing environments. He has implemented Autodesk products for many diverse industries. Autodesk® Inventor® has profoundly augmented Mark's abilities, allowing him to bring 3D digital prototyping to the forefront of the industries with which he has interacted. Mark has extensive experience and a comprehensive understanding of the technical and practical business and human dimensions of implementation and collaboration. His expertise has helped his clients to maximize their project's effectiveness and return on investment. He is an effective and skillful communicator, consulting with his clients to help them achieve their business objectives.

Introduction:

Current trends in the building product manufacturing segment—including HVAC, lighting, plumbing, doors/windows, and furniture systems—require that building product manufacturers deliver very specific content to the AEC community. The process that drives the need for this type of content is known as Building Information Modeling (BIM) and is rapidly becoming the standard around the globe. This presents a significant challenge (but also new opportunities) for all building product manufacturers and system designers, and drives an immediate need for companies to develop strategies and workflows to deliver BIM-ready consumable content for use by customers, distribution channels, and building owners.

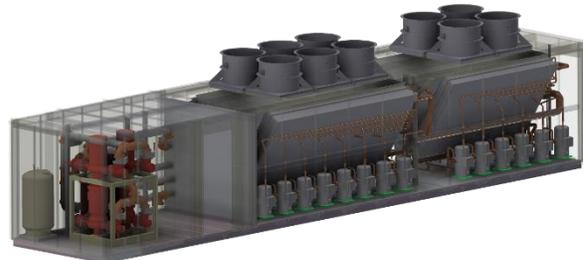


Building Information Modeling

Building Information Modeling (BIM) is the holistic process of creating and managing information for a built asset. Based on an intelligent model and enabled by a cloud platform, BIM integrates structured, multi-disciplinary data to produce a digital representation of an asset across its lifecycle, from planning and design to construction and operations.

3D CAD Modeling

We all know what 3D CAD Modeling is. Whether you call it Digital Prototyping on the Inventor side or the Revit platform's geometric enablement of the BIM model, 3D CAD programs contain the visual representations needed to facilitate the BIM process.



The Path to Digital Twin



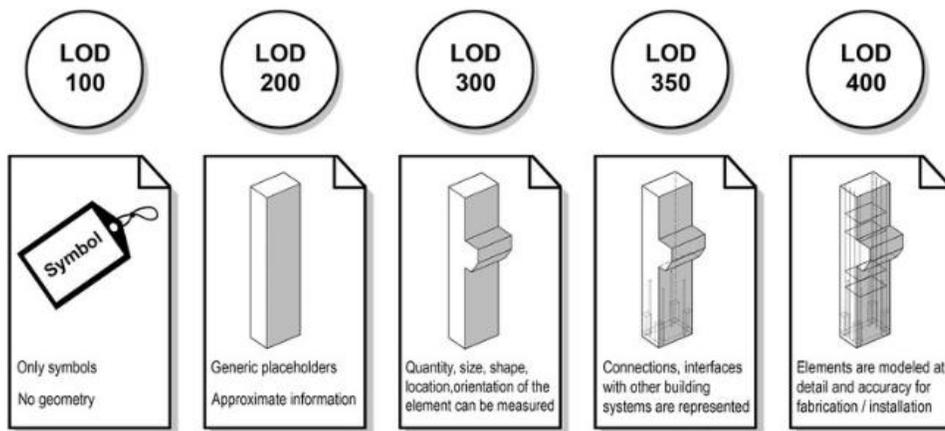
A digital twin is a dynamic, up-to-date replica of a physical asset that brings together design, construction and operational data. With the addition of real-time data, digital twins acquire the behavioral awareness necessary to simulate, predict and inform decisions based on real-world conditions. The cohesion of BIM and 3D CAD Modeling and operational data are pivotal to the path to a Digital Twin.

A Matter of Perspective:

There is a lot to the saying of “Before you judge me, walk a mile in my shoes” to the overall topic of Revit and Inventor user knowledge. Often times the obvious thought to one persona is not the same to the other due to how different industries operate and view their 3D modeling software. Here we will make some high level assertions about our two main personas of Revit and Inventor operators.

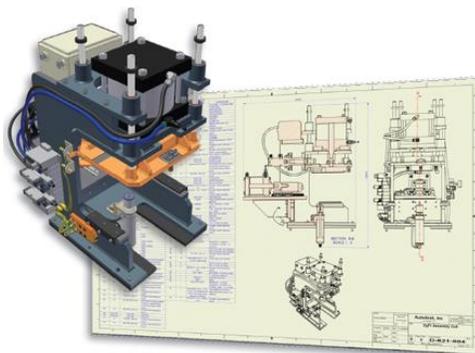
To the Siloed Revit User

Revit users are big picture and coordination operators that thrive on data and space claims. They often need different Levels of Development (LODs) during the project to lay out and develop the overall project. Operational parameters such as the physical rudimentary geometry and metadata are key to the project from start to finish. Tolerances here are usually 1/8 to 1/16 of an inch as building construction can tend to be really plus or minus a hammer swing.



To the Siloed Inventor User

Inventor users create models and documents that are entirely focused on fabrication which typically involved machining, intricate assembly, and the minutia that goes with it. Tolerances here are defined by tenths and hundredths and cost goes up the more refined that tolerance goes. Project considerations that are typically foreign to the Inventor users are those of BIM parameters, Omni class specifications, or any idea to create different variations for models for Levels of Development because it is extra work or doesn't appear to provide value to fabrication and manufacturing.



BIM Execution Plans:

The intent of a BIM Execution Plan (BEP) is to define a foundational framework to ensure successful deployment of advanced design technologies on your BIM enabled project. The BEP is about optimizing work and model flow across the project, as contrasted with optimizing siloed interests.



What makes a good BEP?

A strong BEP is typically created to lay out clearly defined roles and responsibilities of each team and contractor. It often involves strategic vision, scope definitions and deliverables key to the success of the project. Critical to a BEP is also the model quality control procedures and the working procedures inside of the technology stack. Examples of this include...which version of the software is to be utilized, file naming, iteration and data transfer management, and whether sharing is live or static.



Revit and Inventor Mutual Requirements

Both the Revit and Inventor user have responsibility in most BEPs for communication of changes and accountability for not meeting the BEP requirements.

For accountability, BEPs must provide detailed contract language on deliverables and expectations and to properly define the scope and space claim for the project. This includes which Levels of Development are required at different phases of the project and what is included in them (metadata, geometry claims, Go-NoGo areas, connectors and clear space)

Benefits of Following a BEP

In a properly executed BEP, there are immense benefits to project timetables and overall objectives. Strong communication and collaboration will lead to more accurate project milestones and fewer scheduling delays on installations and field service. Successful projects will lead to more robust and plentiful data for the Digital Twin (metadata, space claims, specifications, etc). For the fabricator, performing inside of a BEP will increase your companies professionalism around BIM and lead to repeat business against competitive bids.

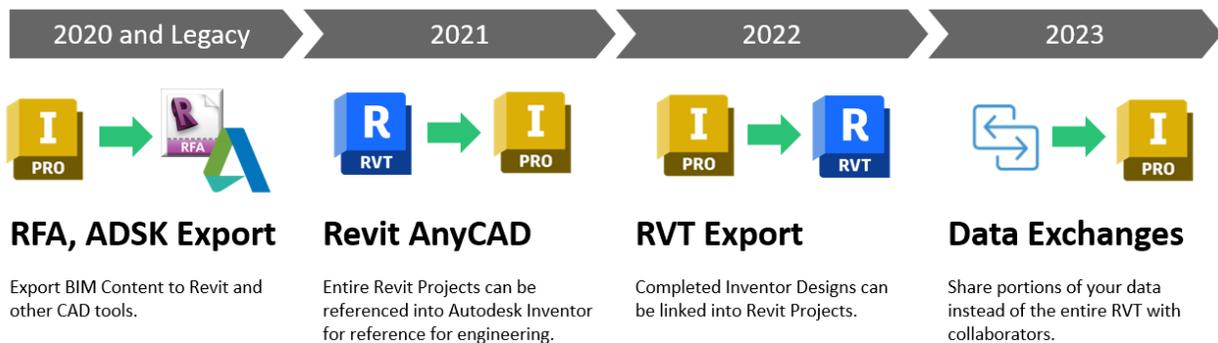


Inventor and Revit: Where are We Today?

For years Autodesk has been working toward the interoperability of Autodesk Revit and Autodesk Inventor. These two hero class products have always stood out on their own and even Autodesk for years siloed them and regulated their interoperability with neutral format transfers with .SAT files. To be where we are at now with two products that carried different development schedules and core programming is pretty amazing. Over the last 4 years alone, many strides have been made to increase the collaboration between these two products.

Inventor and Revit Interoperability: At a Glance

For well over a decade Autodesk Inventor has been able to create RFA (Revit Families) directly from the software, however the methods of making the RFA and the nuances around it tend to be completely lost on the Inventor user (we will get into this later). More recently there have been strides to bring in Revit data to the Inventor user directly through the use of the AnyCAD technology in 2021. The next obvious step was to be able to produce the opposite which came with the ability in Inventor to create RVT (Revit Projects) in 2022. Finally, based on user feedback and collaborative empowerment came Data Exchanges in 2023. We will investigate all three of these in this class.



Inventor and Revit Compatibility

In all of this technology wonder and excitement, it is important to stay grounded in the reality of the interchange of data and why the BEP is an important guideline. With all these advancements, the version of the sending and receiving systems has become a topic all of its own. We will touch on these in each sub section.

Can I modify the geometry once I receive it?

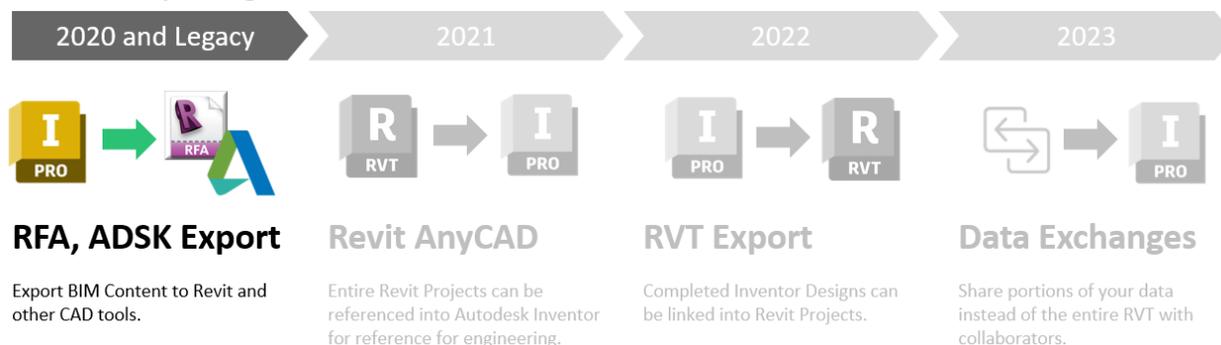
When working in these interchanges of data it is critical to pay attention to the version of the software and to also remember the Autodesk rule of interoperability...

He who hath authored shall be thine who ought modify!

This is largely due to the control of data and ownership of modifications. We would not want a Revit user changing the space claim or go-nogo zones and not have that properly communicated to the project. Sometimes the restrictions of data modifications are designed to protect you from yourself and your company from liability.

BIM Content Creation (RFA)

RFA, ADSK (Autodesk Exchange), and IFC (Industry Foundation Class) exports have been available to the Inventor user for a number of years but as I mentioned earlier, the nuance of creation is usually lost in the ether of communication. First off, compatibility is the first guideline here. If you create an RFA in Inventor 2022 you can use it in Revit 2022 and 2023 but not in Revit 2021. So having Inventor at the highest current subscription level allows the most consumability of a generated RFA or ADSK file.



What is an RFA?

The simple definition for families in Revit is that it is a group of components used to build a model, for example, walls, windows, stairs, doors, bathrooms, fixtures, showers, etc., with a common set of properties, or parameters, and a related graphical representation. If you are an Inventor user, think of this as an iPart, iLogic part, or spreadsheet driven part. All Revit projects (RVTs) are made up of Revit families and are loaded in the RVT file adding to its size.

Inventor RFA vs. Revit RFA

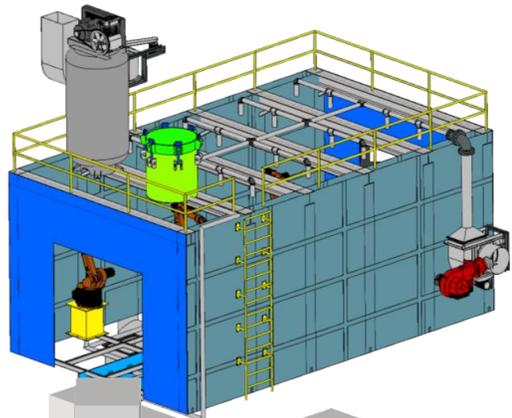
Since Inventor is not Revit and vice versa, there stands to reason there are differences in a RFA generated piece of content. Understanding these differences is a very important concept as it actually determines whether you should create a RFA from an Inventor model or change authoring tools and actually create a Revit native RFA.

Inventor Export	Revit Native Authoring
Single Variation (static)	Multiple Variations (parametric)
Encapsulate Connector Data	Encapsulate Connector Data
Metadata & Omni-Class Spec	Metadata & Omni-Class Spec
3D Model shows everywhere, even in plan views	3D is only shown in 3D, plan views are just linework
Cannot create multiple levels of Development (Course, Medium, and Fine)	Can create minimum Levels of Development (Course, Medium, and Fine)
All Static geometry in Revit (not editable)	All Data is fully constrained and modifiable in Revit Authoring

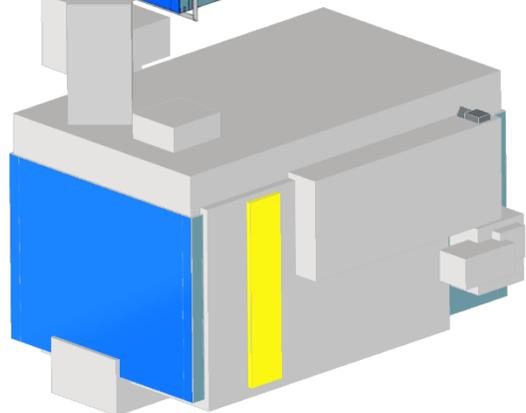
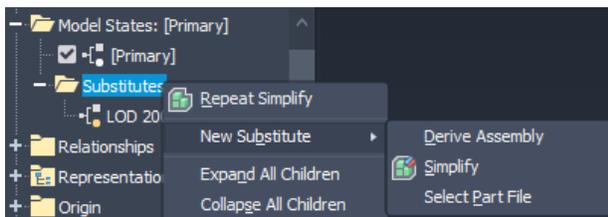
Lets examine those two authoring options further. If you create a Inventor RFA and you are required to provide different Levels of Development, it is not uncommon to create multiple RFAs from Inventor with those exports in mind. Depending on the type of model that is created in Inventor, this can be extremely easy or could be labor intensive if not approached in a methodical manner. In this example a chair is simplified using the Simplification tools inside of the Part environment of Inventor. Each one is saved as a different Model State (Inventor 2022 and 2023) and then exported as an RFA.



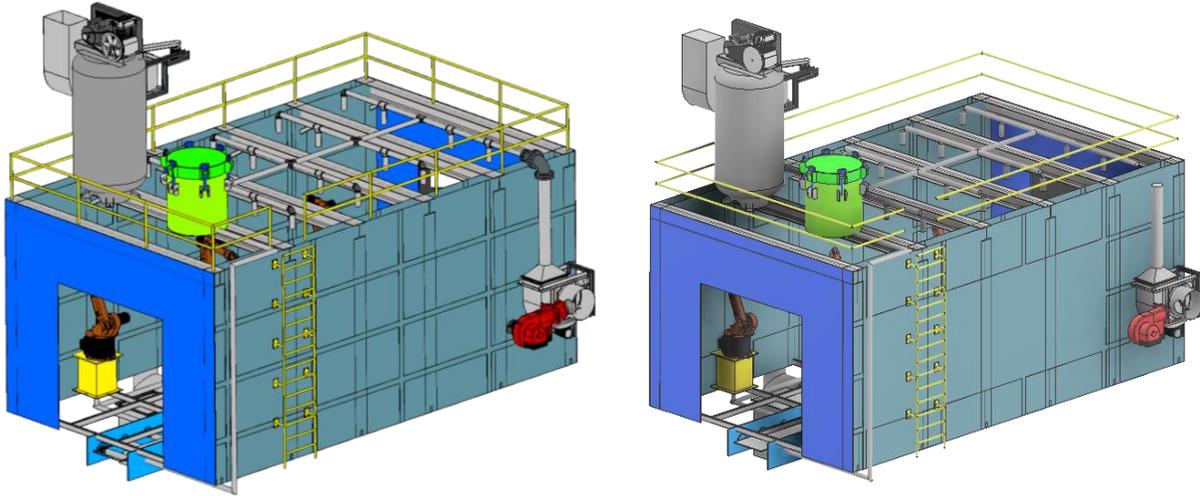
In a more complex model such as an assembly of a large piece of equipment, it is necessary to be more aware of the outcome you are to provide. This is where proper model structure and practices will assist in the creation of a valid asset. Lets take this paint booth as an example. This is a fabricated piece of equipment that needs to be used as an RFA in a Revit design but the amount of data noise and complexity in this model makes it unusable to the Revit user (more on that later). There are some quick methods in Inventor to get a usable output such as Assembly Substitutes with the Simplify option.



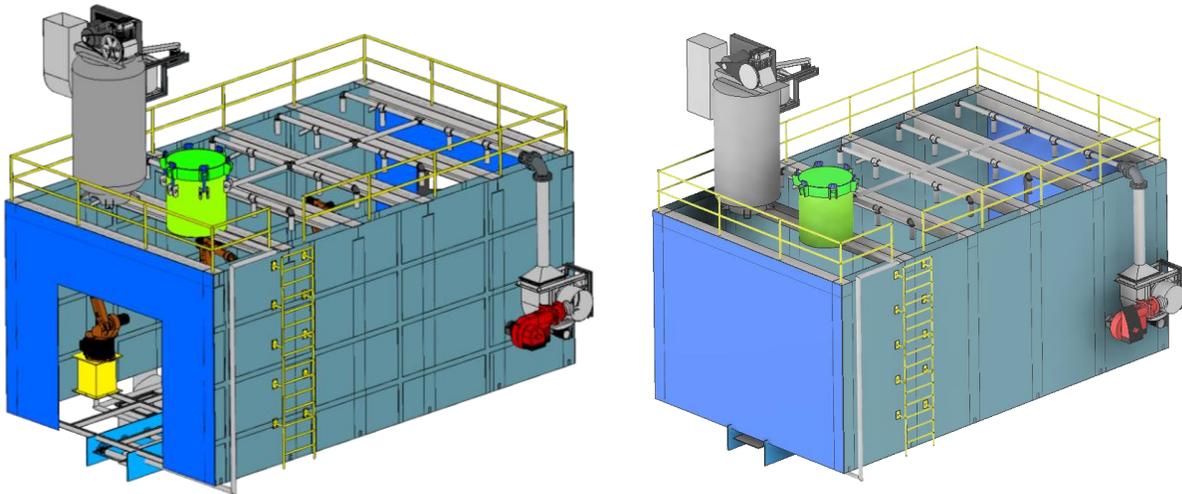
Creating one of these with the Envelope option can very quickly create a model suitable for LOD 200 or maybe even 300.



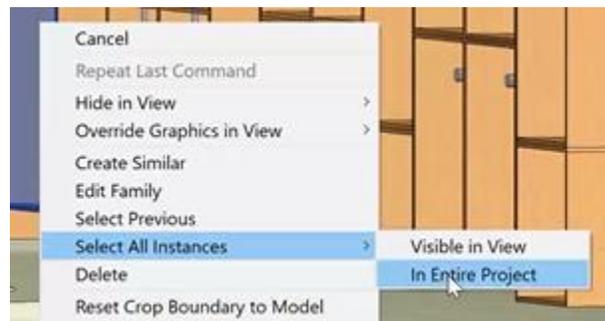
Other options like the Derive Assembly is extremely picky, time consuming and prone to high failure. Just don't use this option.



For LOD 300 and up, the Simplify command still gives great flexibility for selection and can create a decent balance of complexity versus model size.

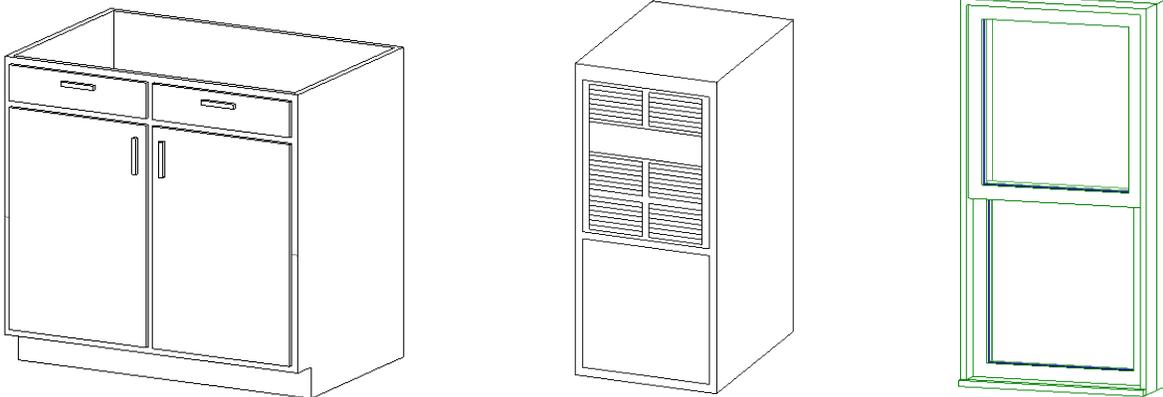


Since all of these RFAs are a single model from Inventor, in order to change them out during different phases of the Revit project development, all the different RFAs need to be loaded to the Revit project. From there instead of complexity changes native to Revit models, the Revit user would select all the instances of the RFA and then replace them from the loaded resources.



So the other option is full Revit native RFA creation. This makes a lot of sense in cases where the product that is created in Inventor is normally a series of product with varying options and stylings. Anything that is a series of product it just makes sense to model this in Revit. Yes, that means you will have an Inventor fabrication model and you will have a Revit design model for consumption that you will have to keep in sync as changes to your product line change. In the end if this requirement exists for the Revit family don't even bother trying to export an RFA from Inventor and go right to Revit and start making a solid RFA there.

If you are in the business of making Curtain Walls, Cabinetry, Windows, or other similar products then you will most likely have a configurable product that cannot be summed up in one Inventor model.



So I have to buy a seat of Revit if I want parametric configurable RFA families? – Yes

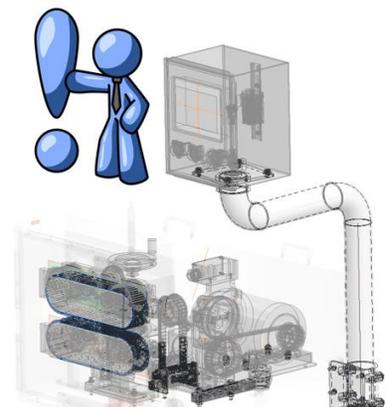
Yes, it's a necessary evil for a lot of businesses, but the payoff that architects know and use your product with all its categorical and costing information is quite beneficial to the adoption of your product in the market. Some architects will purposely NOT use a product because it adds time to their deadline to stop what they are doing and create a Revit family.

Special Considerations when Authoring RFAs in Inventor

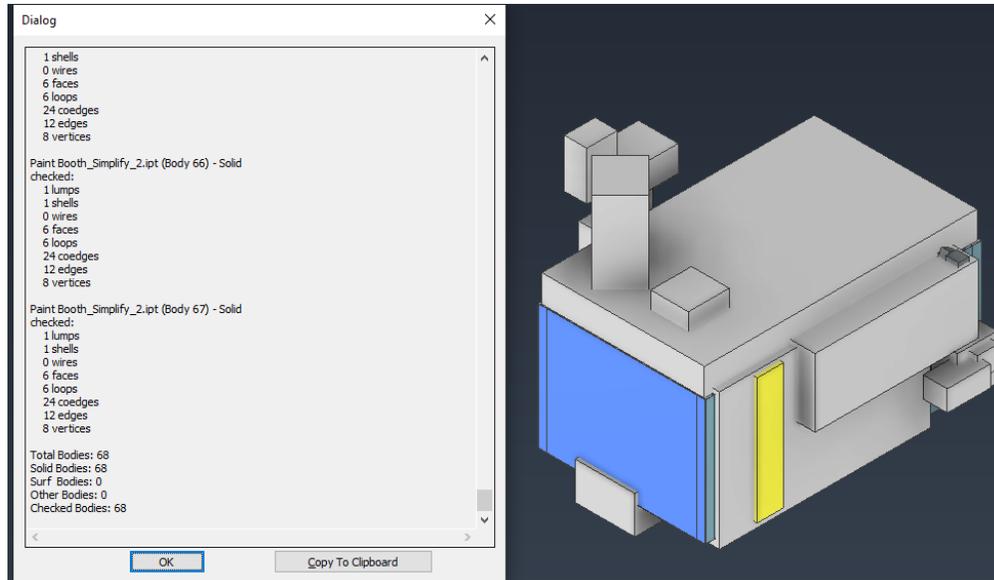
Before finalizing the export to Inventor you should also be aware of how the receiving system sees the data and what criteria ensures that the RFA is usable instead of simply discarded as a bad RFA.

Above everything else, one of the most important aspects of building component creation is file size. Its not uncommon to have a fully detailed Inventor model export without simplification as file size of over 10 MB. If you hand a 10 MB RFA to a Revit user, they will ask you to tell them another joke because that was quite funny. Revit RFAs need to be under 2 MB and preferably closer to 500 MB in size. Anything else, you might as well not create anything for them because above those metrics, its just not that usable to the Revit environment.

When you don't pay attention to adding this in the BEP or when you ignore the consumption user in your creation, you will create work for other users in the project and create delays.

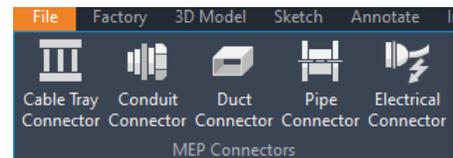


There are some built in tools to help you obtain simplicity before you export. Tools like the **Body Integrity Tool** (will show how many bodies, faces, etc. This tool is very well hidden but I use it ALL the time for imported files to check their integrity before I put them into my models.

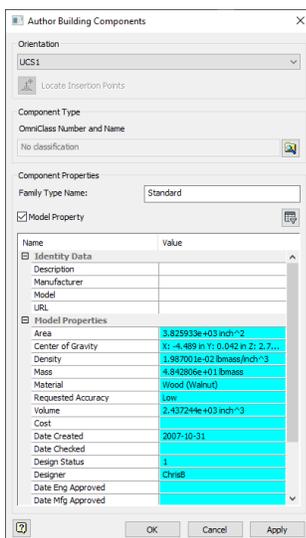
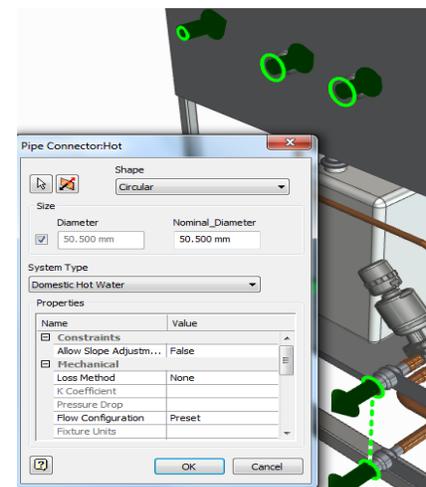


Body Integrity Tool (CTRL+F7) ([Click for Reference](#))

Other than file size the next important topic is metadata and connection information. This includes but is not limited to all the data you want to share with your client about where things hook up and what things are.



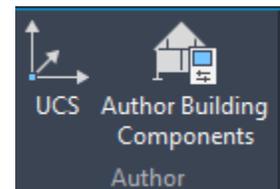
The BIM Connectors in the part level allow you to assign Cables, Conduit, Duct, Pipe, and Electrical connections complete with data about each connection such as Loss Factor and Input/Output direction.



Your modeling iProperties also play an important role. These can be exported with the file so the common data is shared in Revit.

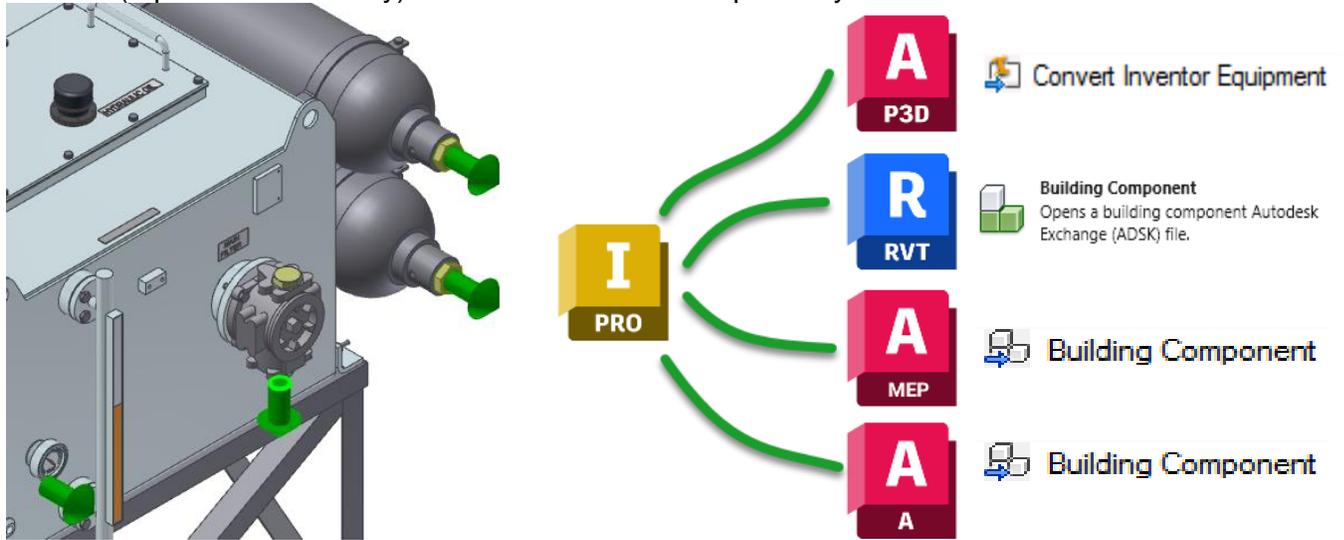
On the Author Building Components command, enter all the data you wish to send along with the RFA including OmniClass Specifications and COBie Requirements laid out in the BEP.

Lastly ensure that your Model UCS is in the correct orientation. Inventor "Up" is the Y Axis while the Revit "Up" is the Z Axis. Its painful for the Revit user to adjust this after the fact.



What about ADSK?

The ADKS format is primarily used for building components. If you are creating content for Revit, just stay in the RFA lane. If you are creating content for AutoCAD Architecture, MEP, or Plant 3D (Pipe Connector Only) then this is the format export for you.



Design Automation for Inventor and iLogic

The Autodesk Inventor API has been fairly open to automation around the BIM Content Environment. At first like most things, Autodesk kept it closed off like most new features but over time they opened and expanded it.

- BIMCableTrayConnectionTypeEnum
- BIMCableTrayConnectorDefinition
- BIMComponent
- BIMComponentDescription
- BIMComponentProperty
- BIMComponentPropertySet
- BIMComponentPropertySets
- BIMConduitConnectionTypeEnum
- BIMConduitConnectorDefinition
- BIMConnector
- BIMConnectorDefinition
- BIMConnectorDefinitionTypeEnum
- BIMConnectorLink
- BIMConnectorLinks
- BIMConnectors
- BIMConnectorShapeEnum
- BIMDuctConnectionTypeEnum
- BIMDuctConnectorDefinition
- BIMDuctFlowConfigurationEnum
- BIMDuctLossMethodEnum
- BIMDuctSystemTypeEnum
- BIMElectricalConnectorDefinition
- BIMElectricalPowerFactorStateEnum
- BIMElectricalSystemTypeEnum
- BIMExchangeServer
- BIMFlowDirectionEnum
- BIMPipeConnectionTypeEnum
- BIMPipeConnectorDefinition
- BIMPipeFlowConfigurationEnum
- BIMPipeLossMethodEnum
- BIMPipeSystemTypeEnum

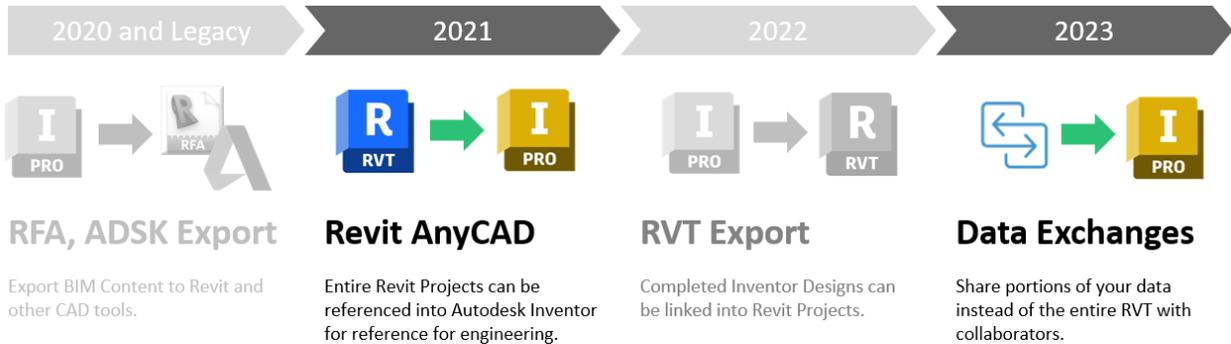
Now you can do a lot of iLogic and API Automation right inside of Inventor including having an RFA saved out everytime you perform a save in Inventor to keep things in sync with the Inventor model.

Autodesk has even added the Revit Core Engine to Autodesk Forge to allow Inventor Design Automation in Forge to use it to create native RFAs. This is really the best automated solution for users wanting to do full parametric models for Revit from their Inventor parametric models.



Inventor and Revit RVT Interoperability

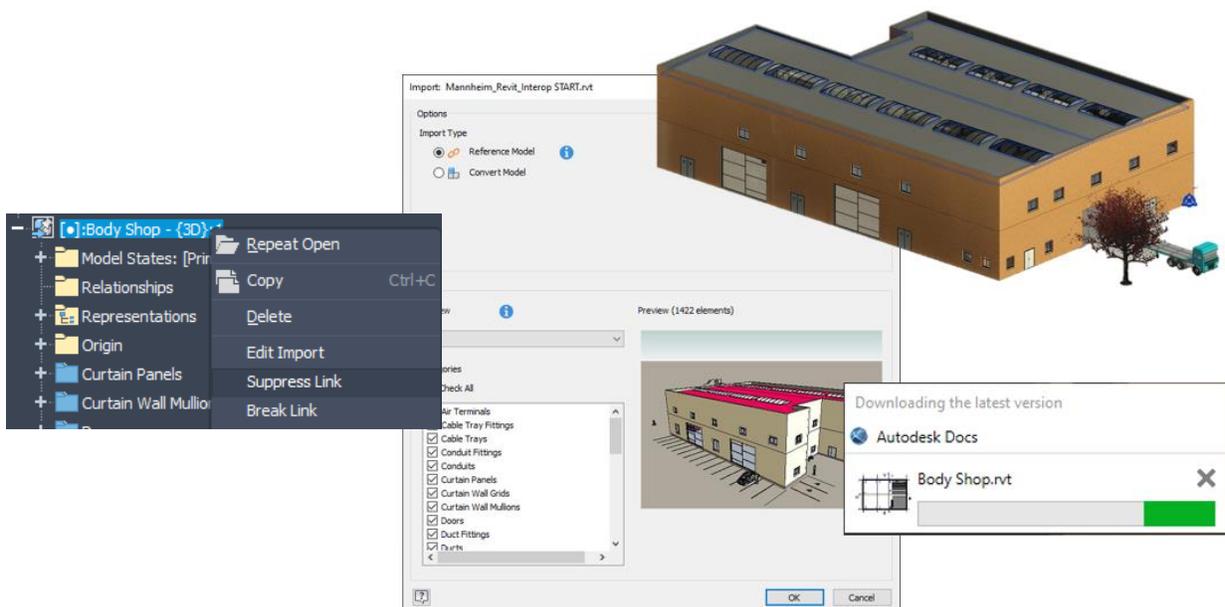
The ability for an Inventor user to actually see and reference modeling data from the Revit user was a monumental enhancement for the fabricator on large scale projects. Previously the Revit user would have to create a SAT file for the Inventor user to consume and was extremely unwieldy and prone to being out of date. This all changed with AnyCAD and Data Exchanges. As a reminder, versions play a role here as well. For the Inventor AnyCAD technology you can have a newer Inventor than the Revit RVT but not the other way around. So if you are using Inventor 2021, you cannot accept a Revit RVT that is 2022 or 2023. For Data Exchanges, both Inventor and Revit need to be on 2023.



Inventor AnyCAD

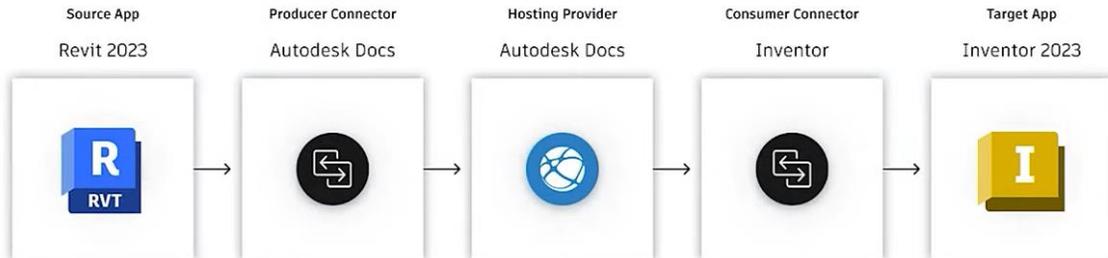
The enhancement of AnyCAD for Revit in Inventor 2021 allowed the entire Revit project to be loaded into Inventor. This enablement allows the Inventor user to see the project directly in their CAD authoring tool to located obstructions, layout space claims, and identify installation issues before they become a reality.

The Revit RVT can be downloaded and put in a traditional directory and referenced in or it can be consumed from Autodesk Docs. The latter provides real time updating from the Revit user on changes to the design while the former allows a metered updating required some file maintenance intervention from the project team.

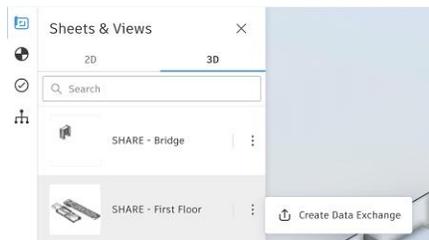


Autodesk Data Exchanges

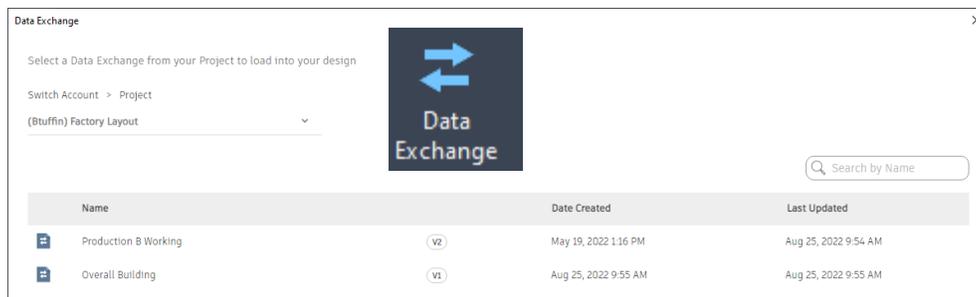
The newest player to the interchange gang was introduced in the 2023 product line and is not truly part of Inventor or Revit but instead it's a cloud based connector. This technology requires the Revit user to create a view in Revit and then synchronize their files to Autodesk Docs which is the document storage mechanism of the Autodesk Construction Cloud.



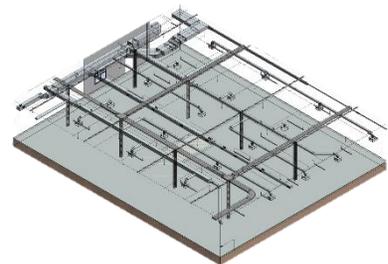
Once the file is in Autodesk Docs (which every AEC Collection comes with) they simply browse to the Revit project and under Sheets & Views the select to create a Data Exchange.



The Inventor user will need access to Autodesk Docs (which does not come with a Product Design and Manufacturing Collection) in order to use the Data Exchange command located on the Collaborate Tab.



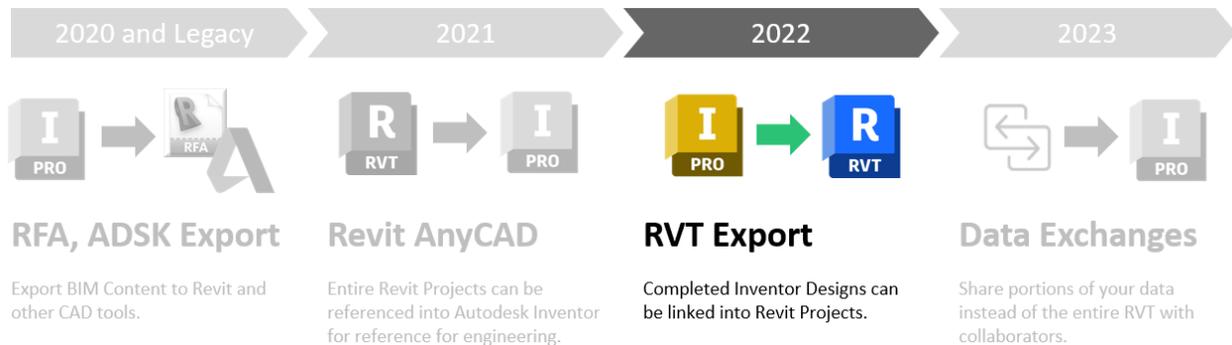
This technology allows the Revit user to only share a portion of the large Revit project with the Inventor user for their consumption. This throttling really reduces the data noise in the model to the Inventor user and allows them to focus on the area of concern for their part of the project.



But it also keeps the Inventor user up to date ALL the time! When the Revit model changes and the view content updates the Data Exchange also updates and that updates Inventor.

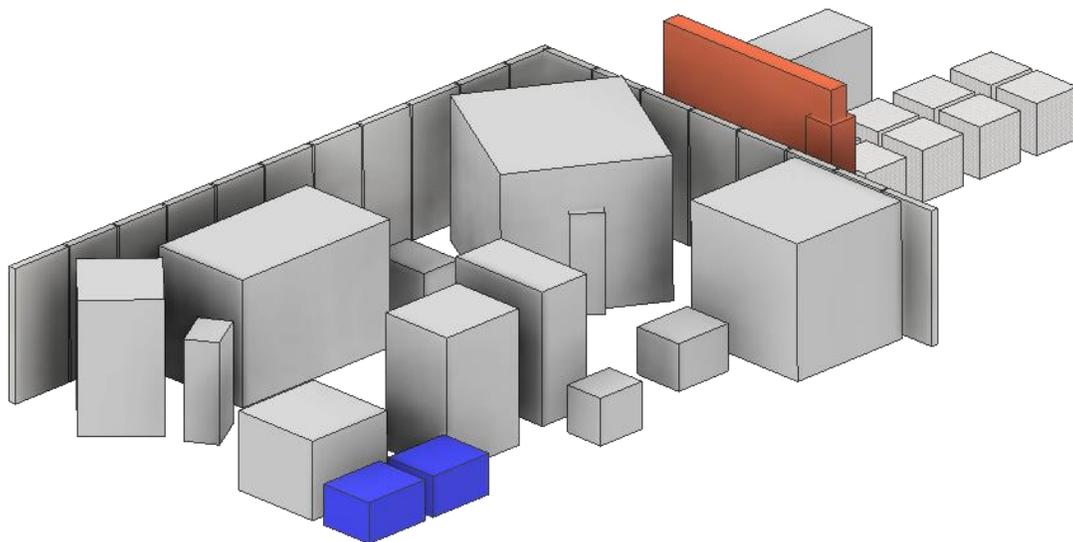
Creating Revit RVTs from Inventor: Simplification and Best Practices

The more recent advancements in Inventor are very different than RFA and BIM content creation. These enhancements have opened the door for larger scale collaborations with the products due to removal of the size restriction for Revit and the ability to see more of the architecture model in Inventor to aid in layout and space claims. For compatibility, Inventor RVTs are forward compatible so ones created in 2022 are compatible with Revit 2022 and 2023 but not 2021.



Pre-Engineering

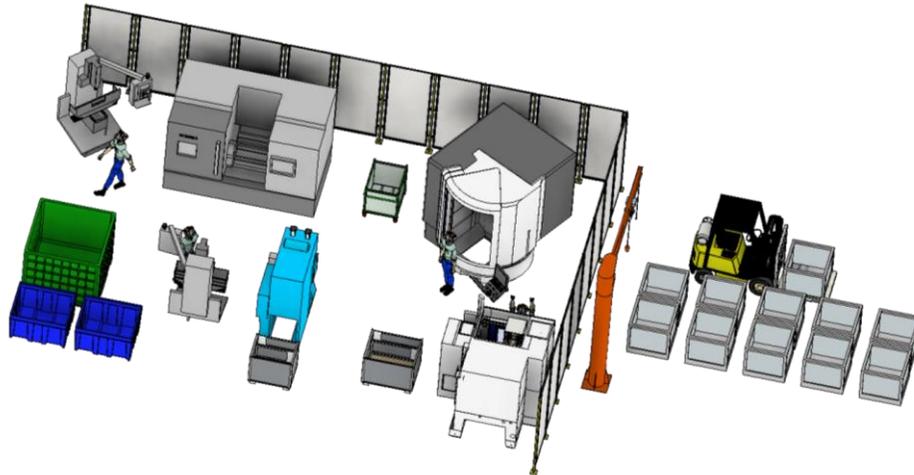
At the onset of the project when all you have to go on is preliminary space claims and no real fabrication models, that doesn't mean you can provide some insight into what will be commissioned in the field. Starting with a simple layout part for Level of Development 200 can give the Revit user something to work with. Use of the Factory Design Utilities and the Asset Library or just some boxes that represent the equipment goes a long way. These files can also double as Substitute part later on if maintained properly.



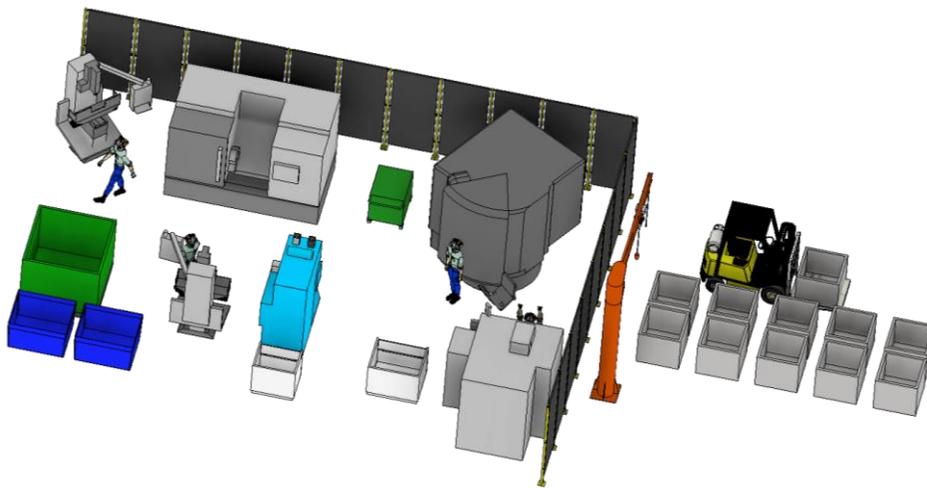
Its important to identify overall space but also provide insight into go-nogo zones such as minimum safe distances for equipment and arc flash areas.

Model States: The Thinking Man's Inventor Tool

In Inventor 2022, Level of Detail was replaced by Model States in Inventor. They do everything Level of Detail did and more. In fact Model States also exist in part files as well for configuration of parts. The focus on Models States for our conversation will be around Simplification and overall process approach.



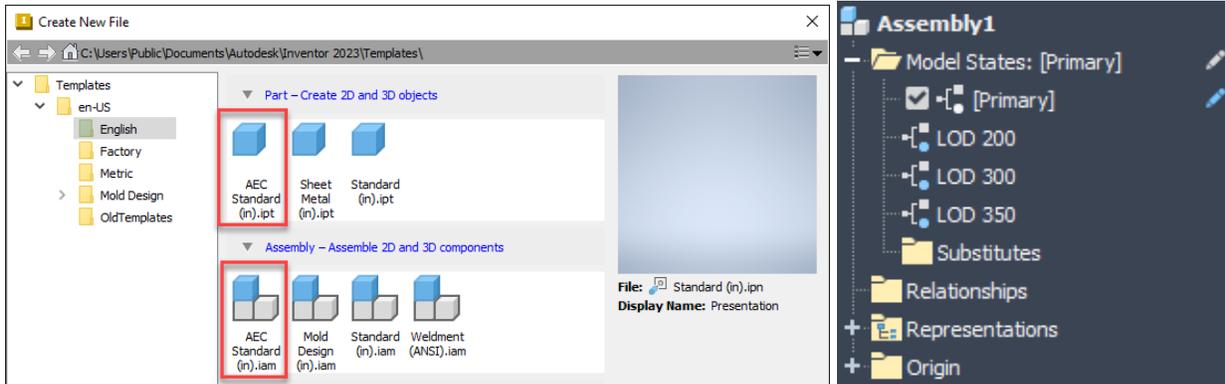
Master Model State



Simplified Model State

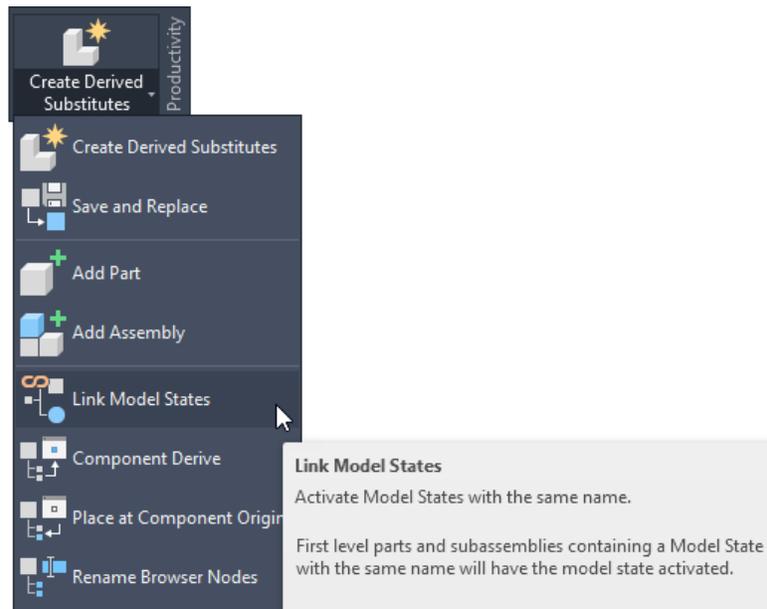
Now before you get too excited about these two images above, there is no magic wand that creates the Simplified Model State. Yes, there are tools that help but what you see here is a methodical approach to modeling with the two results in mind. One being the Fabrication of the Equipment and the other being the consumption of the data to the Revit user. Each of these assemblies and subassemblies and even some parts have their own Model States set for Levels of Development pertinent to the project BEP.

When you approach modeling in this way, you don't have to think too hard about the Revit user, you just need to be smart enough to plan for it. For instance, one of the easiest things to do is create default Model States in all of your part and assembly templates. Whats it going to hurt if its there and you don't use it?



Consider adding these Model States to your existing Library components as well to make them more flexible for this work as well.

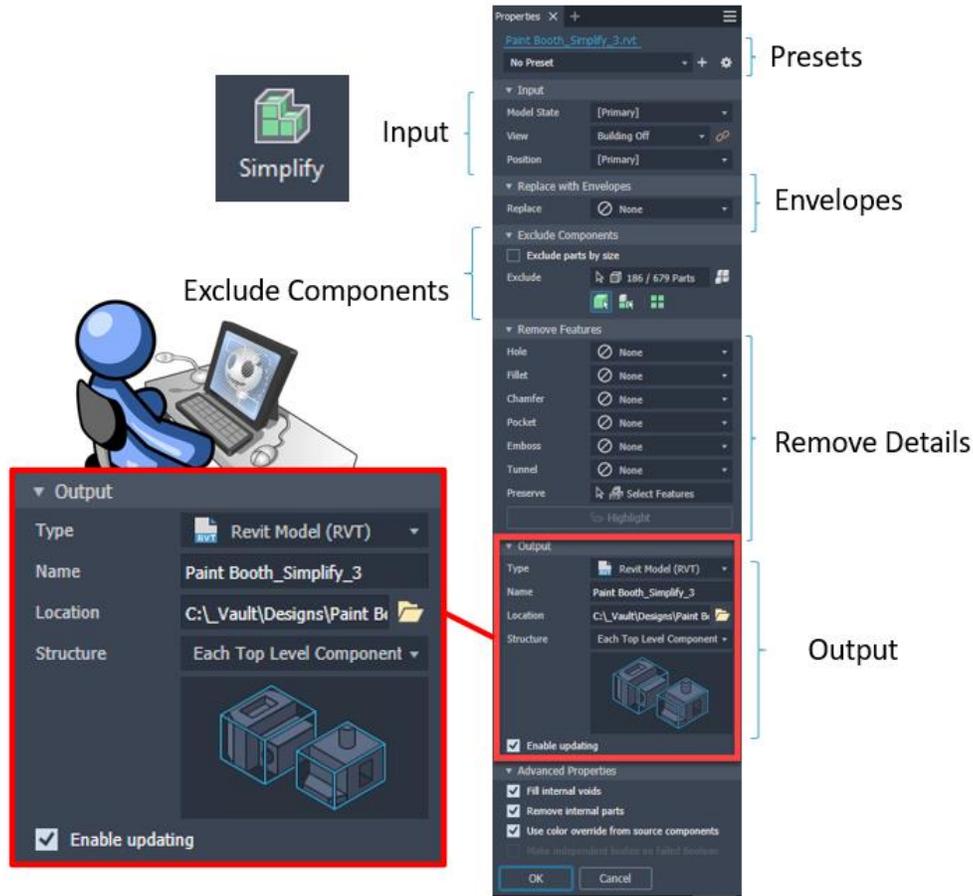
With these Model States in place there is a command that has been around for some time that can assist with bringing all of the Model States together. By default, when you enable a Model State at the top level of an assembly it does not know to connect anything in lower assemblies or part files to that same Model State. The silver bullet here is found in the Productivity Panel of the Inventor Assemble Tab. Link Model States will take any Model State and activate all the Model States with the same name down the model tree!



This tools saves immense amounts of manual linking time to enable this robust workflow.

Creating the RVT

The process of actually creating the RVT is a bit hidden but also clever as it forces the user to really think about simplification before they export out the file. In the Simplify command you can select your Presets, Model States and Representations, Envelopes (great for LOD 200), Component Exclusions (like people stand-ins or the Revit model), and detail reduction.



When ready for the RVT Export, choosing where the file goes is an important step. If you are in a Autodesk Docs enabled project you are likely going to want to save it to that location to ensure the Revit consumer always has an updated version of your Inventor export. If you are not in an Autodesk Docs enabled project, then a local share is more likely for project collaboration.

Obviously the aforementioned Docs environment is extremely preferable. Enable updating is turned on by default so as you make changes in your assembly you can force Inventor to update the RVT with a right click in your browser.



Revit User Consumption

When a Revit user is ready to work with the exported RVT, they don't simply add it to already existing RVT. Instead they link it in to their RVT. This allows your file size of Inventor RVT export to be quite large and not adversely affect the source Revit project. Just try to keep it under 400 MB.

Upon linking the models will share an intrinsic shared origin point so it is very easy to locate.

Managing Content and Effective Collaboration

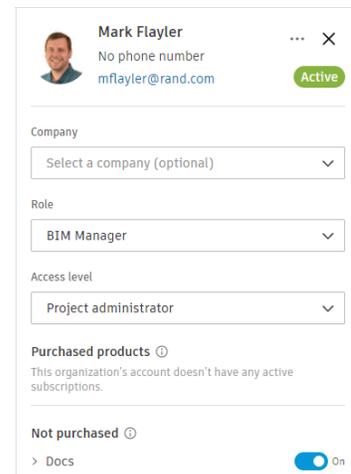
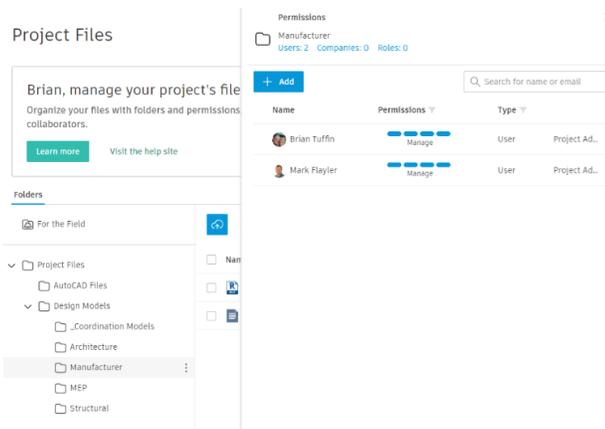
Perhaps one of the most important aspects of any project without question is the collaboration and communication around the content that is created. Autodesk has a platform widely accepted by the Revit userbase to accomplish a positive outcome. The Autodesk Construction Cloud with Autodesk Docs as the basis for Document Management is a pivotal component in these endeavors.



	AUTODESK BIM COLLABORATE		AUTODESK TAKEOFF	★ AUTODESK BUILD				
Capabilities	Design Collaboration	Coordination	Quantification	Project Management	Cost Management ★	Quality	Safety	Project Closeout
Workflows	<ul style="list-style-type: none"> Constructability Review Change Visualization Revit Cloud Worksharing Collaboration for Civil 3D / Plant3D 	<ul style="list-style-type: none"> Model Coordination Constructability Review 	<ul style="list-style-type: none"> Scope Analysis 2D/3D Takeoff 	<ul style="list-style-type: none"> RFIs Submittals Meeting Minutes Daily Reports 	<ul style="list-style-type: none"> Contract Creation / Administration Change Orders Payment Applications Forecasting 	<ul style="list-style-type: none"> Quality Planning Quality Checking Punchlists Issue Management 	<ul style="list-style-type: none"> Safety Planning Safety Training Safety Observations Safety Inspections 	<ul style="list-style-type: none"> Commissioning Turnover Documentation Final Completion As-Built Survey
	★ Document Management		Document Control · Document Versioning · Document Approvals					
Unified Data	Models · Drawings · Documents · Cost Items · Assets · As-Built · Photos · Videos							
Insight	Dashboards · Reports · Construction IQ · Data Connector							
Admin	Admin Console · Permissions · Project Setup · Templates · Notifications							

Project Inception

At the onset of a project whether it is a Greenfield (new build) or a Brownfield (retrofit or existing modification) the first step begins with being invited to the project in the Construction Cloud. Here the Revit user or building owner will setup the folder structure in line with the BEP and setup up users and permissions.



Autodesk Docs vs Autodesk Vault Professional

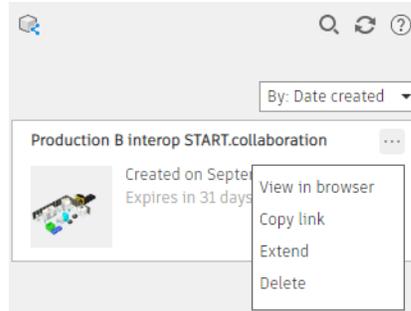
Before we get to far lets take a quick reminder that Autodesk Docs is not Autodesk Vault Professional, its not even really Vault Basic in a lot of ways. Think of Docs as a place to work with the project and upload new versions (not revisions) of files. This is also not the place for any Inventor assemblies with a loads of parts. This is a place for the RVTs, RFAs and other singular type files for the project.

Inventor Project Ownership

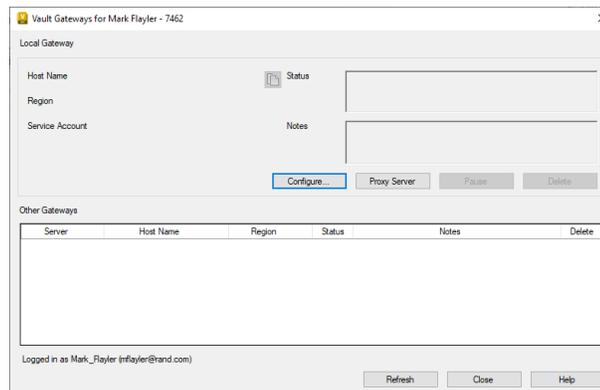
When the Inventor users are actively working on design files and collaborating with the other users in the project, that doesn't mean there still isn't a place for Vault Professional though. Normal Inventor data management should continue as normal throughout the project for the internal Inventor team, it's a bit more unlikely for the need to arise for anyone else to see directly into the Vault Professional environment but it is possible with a few tools already available.



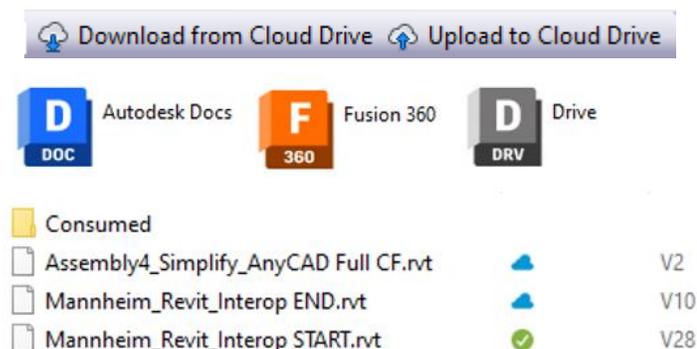
1. Autodesk Inventor or Vault Professional Shared Views



2. Autodesk Vault Gateway in Vault Professional 2023 for VPN Passthrough



3. Project Sync in Vault Professional to Push to Docs on Lifecycle Events or on demand. Just do not push any Inventor assemblies, Docs really just can't handle it. Send PDFs, RVTs, RFAs, PDFs, or other supporting documents or lightweight files.



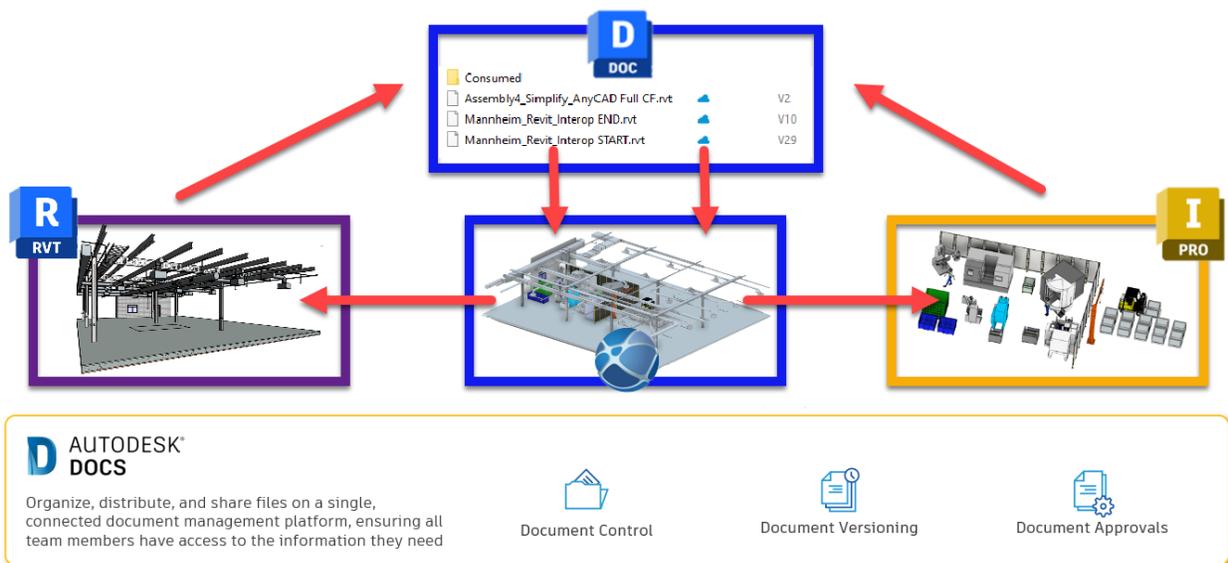
Markup and Issue Tracking

Markups help all members across a project communicate updates, changes, and critical information. The markups toolset offers various options for members to manage and fine-tune an extra layer of information on top of construction records.

You can create and edit markups on PDF, PNG, JPG, and JPEG files, and any 2D elements contained in DWG and RVT files. Communicate installation instructions, add measurement markups that ask about incorrect room dimensions, and link important information such as other sheets and files directly to the floor plans.

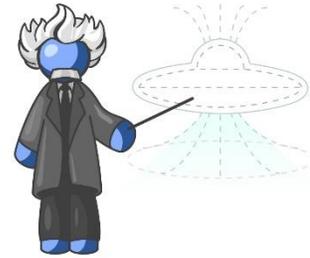


This environment creates a solid place to track issues, markups, and comments for a project since all the Revit data synchronizes to Inventor and Inventor data synchronizes to Revit in the Autodesk Construction Cloud.



Class Summary

In the class we have examined many dynamics and practices that are available to the Autodesk user. From the general tools examined and when data is provided, create a more accurate depiction of project as built and planned outcomes. Currently a large hurdle in this space is the availability of data or the trust centers around it. If no Revit model is available or simply does not want to be shared, it creates a detrimental effect on the project to all parties involved in the process. This is what makes a BEP and contract language pivotal in the overall conversation.



Path to Digital Twin

A digital twin gives a multi-dimensional view of how a facility is designed, built, and is performing throughout its lifecycle. Whether you're an architectural practice, engineering consultant, building contractor, facilities manager or the owner of the built asset, digital twin technology will transform the built asset lifecycle—from improving operational efficiency and providing a better occupant experience, to informing future design and construction decisions.



The Autodesk solution to Digital Twin has been developing for a number of years. The tools we have learned in this course speak directly to the convergence of data and harmonization of teams. Creating a digital twin is often a manual, expensive, and highly bespoke process. Autodesk Tandem was designed to make the process of creating a digital twin highly repeatable, resulting in a digital twin accessible to everyone. With Autodesk Tandem, the journey has begun that is focused on delivering workflows to curate a descriptive digital twin and harnessing the BIM process and data. As Autodesk continues to develop Autodesk Tandem, customers will move up the maturity model step-by-step, enabling them to take advantage of their operational benefits.

95.5%

The proportion of data that goes unused in engineering and construction.

Source: FMI Report

82%

The proportion of BIM users that reported a positive return-on-investment.

Source: Dodge Data and Analytics

58%

The percentage of owners favoring a more collaborative approach.

Source: FMI Report

Where to Learn More...

There are many resources available to further your education on these topics. Be sure you check out some of the classes and links below for more information on the class topic.



Related Autodesk University Classes

- IM500008 – Inventor to Revit: Revit Project Export from Inventor for BIM Collaboration
 - Another look at the Inventor to RVT Interoperability from 2022
- FAB466294 – Anybody Can Do It! Easily Build Revit Content in Inventor
 - In Depth Look at BIM Content Creation and Inventor Techniques
- FAB323474 – Best Practices for Inventor and Revit Workflows
 - Overview of many challenges facing Revit and Inventor Users
- MFG501653 - Web-Based Product Configuration Using Autodesk Forge Design Automation for Inventor
- SD502830 - Unleash the Power of Design Data with Autodesk Forge API
- MFG502453 - Elevating Sales with Autodesk Forge and Inventor iLogic
- BLD501296 - Implementing a Facilities Data Spec with Autodesk Tandem
- BLD681789 - Have You Started Your Digital Twin Journey? How and Why (or Why Not)?
- BES501899 - Bridging Revit and Inventor Using Autodesk Data Exchange to Make Configurator
- CS501002 – Getting Started with Autodesk Construction Cloud

Sample BIM Execution Plans

There are sample BEPs all over the internet with a simple search but here are few to get started.

- US General Services Administration – [Sample BEP](#)
- Penn State – [BIM Project Execution Guide](#)
- US Army Corp of Engineers – [CAD/BIM Tech Center](#)

Autodesk Platinum Partners

Find a local partner that understands your unique business and industry needs. Use the Autodesk Partner Locator to find resellers, partner-developed solutions, implementation or support services, and more. Multi-Disciplined partners are unique to address the Revit and Inventor integration and project collaboration. Platinum partners meet the highest requirements from Autodesk for customer service and project satisfaction.

[Autodesk Partner Locator](#)

Autodesk Developer Network

The Autodesk Developer Network was created for desktop software developers seeking proven tools and technologies to extend Autodesk products and technologies. The ADN program helps developers use Autodesk's large investments and expertise in design, engineering, and media and entertainment platform technologies.

[Autodesk Developer Network \(ADN\)](#)