



Adding Intellect to Inventor with Intelligent Modeling

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SPC Mechanical

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About the Speakers

Jason Hunt (Speaker)

- NPD Lead Designer for a global centrifugal compressor manufacturer, FS-Elliott Co., that is headquartered outside of Pittsburgh, Pa.
- Based out of the Williamsville, NY office.
- Over 25 years of compressor design experience (Rotary and Centrifugal).
- Provides lead design services to current New Product Development (NPD) projects and helps drive current CAD standards and best practices in the NPD team.
- Third time presenting at AU and fourth time attending AU.
- Have been a member of AUGI® (NAAUG) since 2012.



About the Speakers

Kevin Smedley (Co-Speaker)

- Cad Manager for SPC Mechanical headquartered in Wilson, NC.
- Over 28 years of CAD and Management experience with multiple Autodesk products in the manufacturing and AEC environments.
- Specialties include:
 - CAD management
 - Inventor 3D parametric modeling application
 - Vault Professional software data management
 - Revit & BIM



Your Instructor's Schedule



Jason Hunt

Time	Event
Wednesday 3:45 pm	Adding Intellect to Inventor with Intelligent Modeling



Kevin Smedley

Time	Event
Wednesday 9:15 am	3D Standards – A Continuing Journey of Best Practices
Wednesday 3:45 pm	Adding Intellect to Inventor with Intelligent Modeling

Key Learning Objectives

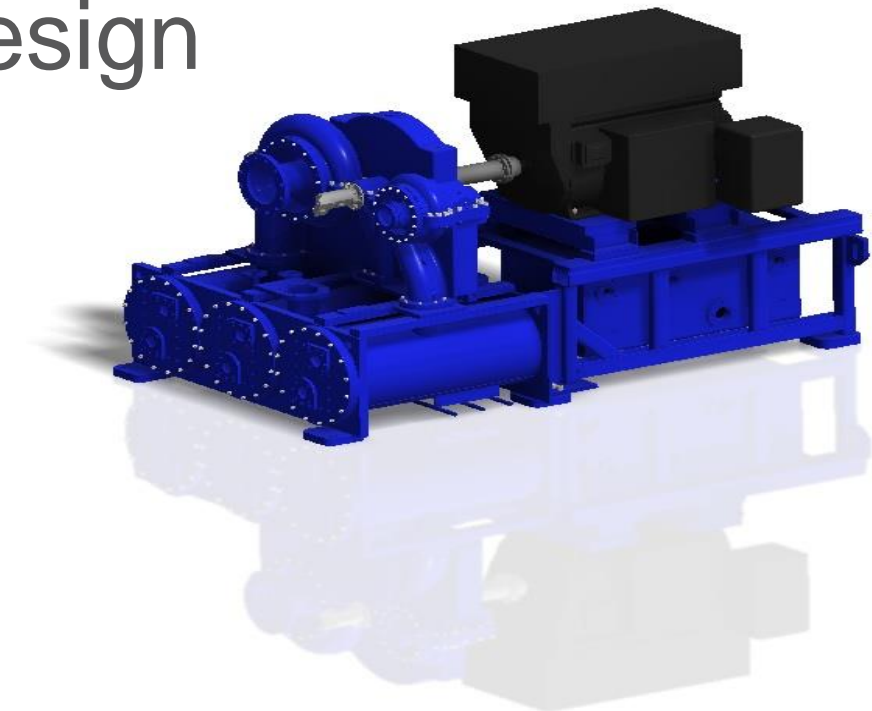
- Explore using parameters and the available functions in Inventor to build intelligent models.
- Learn how to incorporate iLogic in your intelligent-modeling workflows.
- Discover the power of using Adaptivity in your designs.
- Learn how to use simplification to drive modular design.



Class summary

Today, we are going to learn about four techniques to do the following:

- Use parameters Drive a simple stool Design.
- Use iLogic and parameters together to generate new stool design variations.
- See how adaptivity can be used for conceptual stool design options.
- Simplification in the design process.





Utilizing Parameters to Create Intelligent Designs

Why Use Parameters?

Questions to Ask:

- Is the work repetitive?
- Is there a need or desire to improve consistency?
- Do you want to improve efficiency?
- Do you need to create many models in a short amount of time?

If you answered yes to any of the questions above, then using parameters to create intelligent designs should be an important facet of your design process.



Parameters Overview

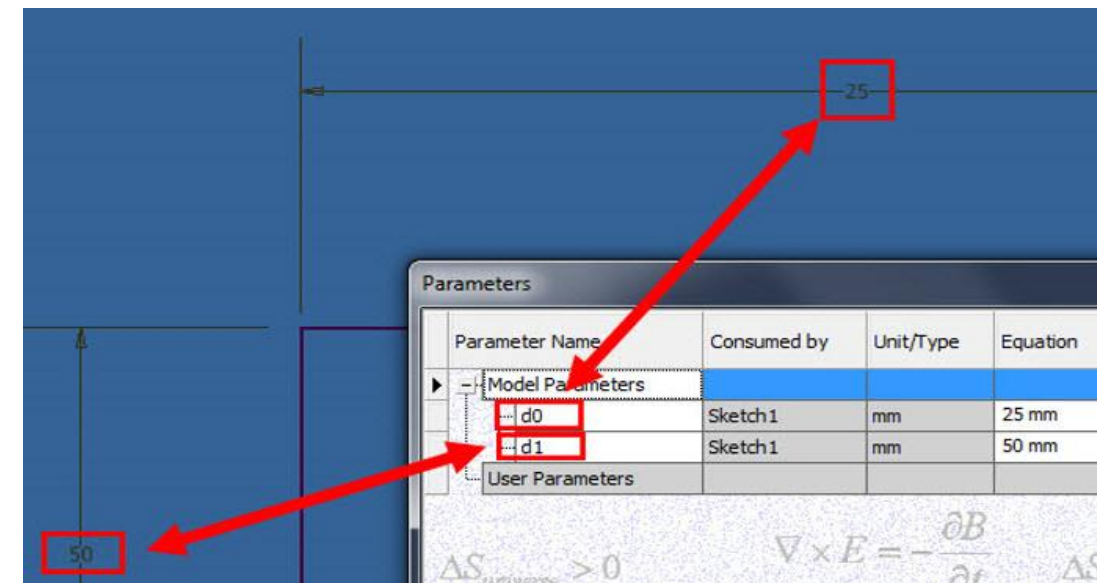
Parameters are your “everyday” tool to drive intelligence in your designs.

- To access
 - “*fx*” button on the Quick Access Toolbar
 - “*fx*” button on the Manage Ribbon.



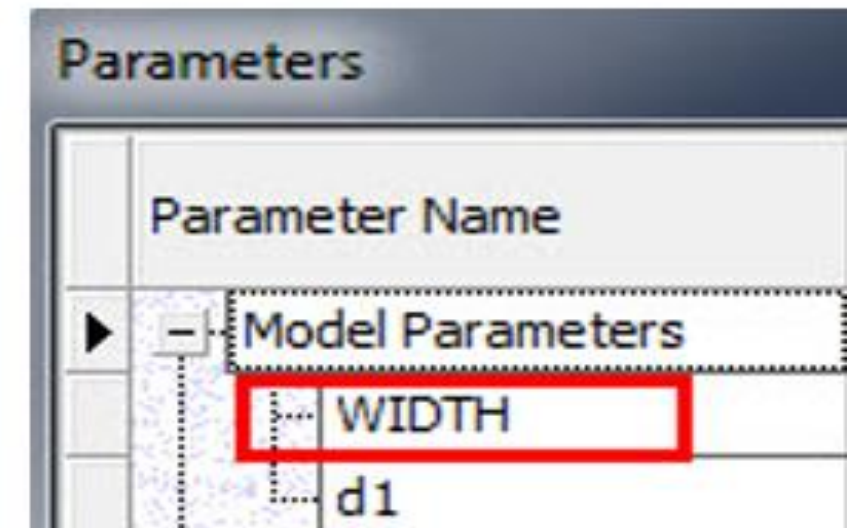
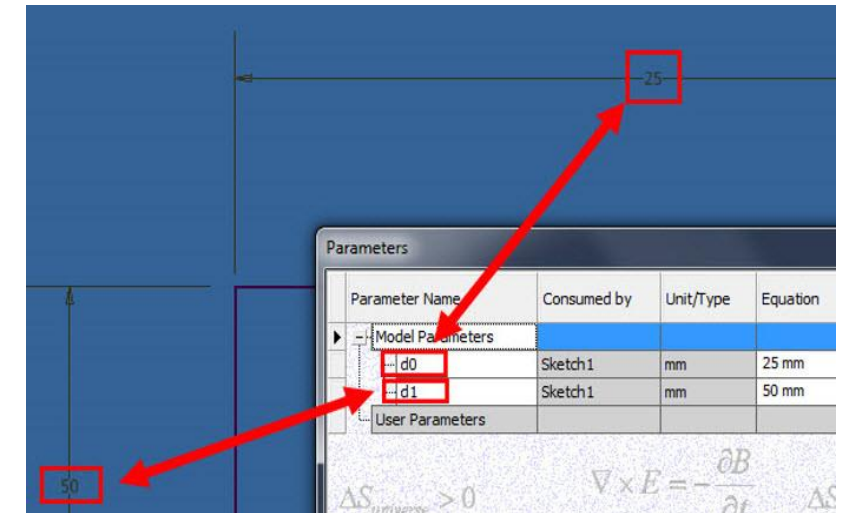
Two Types of Parameters

- Model Parameters
- User Parameters



Model Parameters Overview

- Model parameters are automatically created.
- Model parameters have an ID as a name.
 - ID name starts at d0, then d1, d2, etc....
 - Ability to change the name of the parameter.
- Disadvantage in using model parameters is that they can be accidentally deleted.
 - Formulas and Intelligence can be lost.



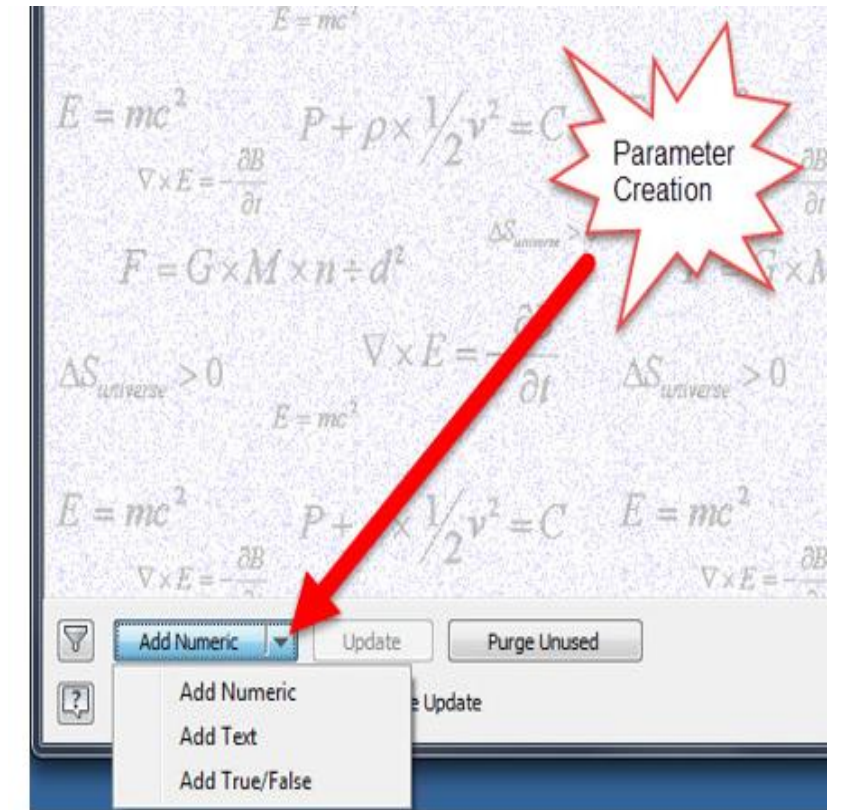
User Parameters Overview

Three Types of User Parameters

- 1. Numeric:** Used typically to drive geometry and in formulas / equations.
- 2. Text:** Some uses are to drive data on drawings or for assisting you in writing iLogic code.
- 3. True / False:** Typically used with iLogic

Advantages

- Flexible
- Stronger than model parameters.



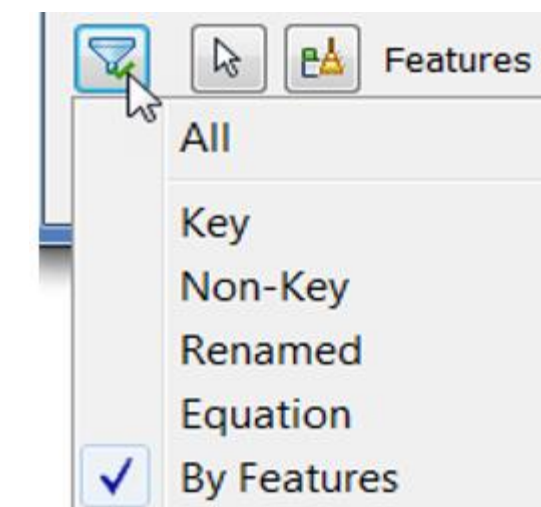
Parameter Name	Consumed by	Unit/Type	Equation	Nominal Value
Model Parameters				
User Parameters				
SeatDiameter	SupportRingDiam...	in	18 in	18.000000
SeatThickness	LegHeight	in	1.25 in	1.250000
StoolHeight	LegHeight	in	20 in	20.000000
LegHeight		in	StoolHeight - SeatThickness	18.750000
SupportRingDiameter		in	SeatDiameter - 2 in	16.000000

Parameters - What's new in 2018

- A Consumed by column has been added to the parameters table to make it easy to identify where a parameter is used.

Parameter Name	Consumed by
Sheet Metal Parameters:22 GA SST	
Thickness	d29, GapSize, Minimu...
BendRadius	d35, d33, JacobiRadi...
BendReliefWidth	d30
BendReliefDepth	d31
CornerReliefSize	d37
MinimumRemnant	d32
TransitionRadius	
JacobiRadiusSize	d39
GapSize	d38
Model Parameters	
d29	Corner Round1
d47	Corner Round1
Reference Parameters	
User Parameters	

- By Features has been added to the parameter filter options.



Demo Time Controlling a Stool with Parameters



Demonstration – Controlling a Stool with Parameters

The purpose of this demonstration is to show how you can apply parameters and functions to control the design of a stool.

We will do the following:

- Create User Parameters to control the stool height and seat diameter.
- Use a Trig Function to assist in the design.
- Push parameters to assembly members, from the assembly.
- Create a form to manipulate your design on the fly.





Incorporating iLogic into your Intelligent Modeling Workflows

Why use iLogic?

Questions to Ask:

- Is the work repetitive?
- Will automation save time, so a designer can focus on other tasks?
- Is there a need or desire to improve consistency?
- Do you want to improve efficiency?
- Does the data output need to be provided in a certain manner, every time?
- Do you need to create a lot of models in a short amount of time?

If you answered yes to any of the questions above, then using iLogic to automate your design should be an important facet of your design process.



iLogic Definition

What is iLogic?

- iLogic enables rule driven design that provides a simple way to capture and reuse your work. It allows the user to standardize and automate the design process.
- iLogic allows you to become a coding expert without having to learn much actual code.

iLogic Rules

What are iLogic Rules?

- A Visual Basic (VB.NET) program.
- Monitors and controls Inventor parameters, features, or components.

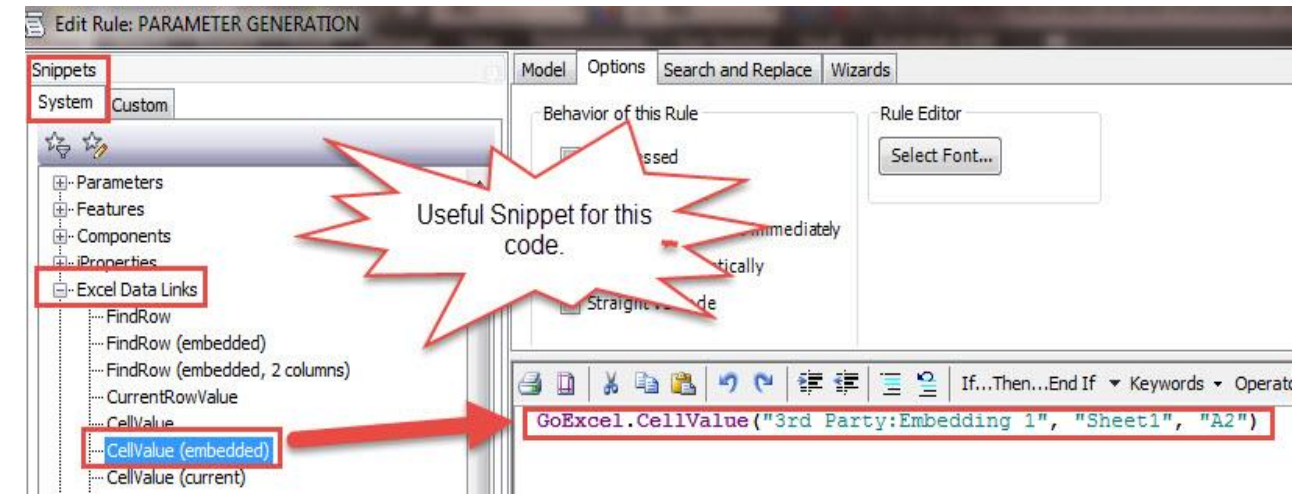
Rule Types

- **Internal Rules**: iLogic Rules saved within a document
 - Used on one part (local)
- **External Rules**: Saved on your local or network drive.
 - Used Globally

iLogic Code Snippets

What are Snippets?

- Shortcuts, for frequently used pieces of code.
 - Using snippets allows the user to insert them into your code that you would normally have to type in manually.
 - Using snippets also helps reduce the possibility of errors in your program, due to typographical errors.
- Snippets can be found in the area of the Edit Rule dialog box. This area features two tabs:
 - The **System tab** includes a set of predefined snippets, arranged by category.
 - The **Custom tab** allows you to add your own snippets, or create custom copies of System snippets.



Demo Time Controlling a Stool Design with iLogic



Demonstration – Controlling a Stool Design with iLogic

The purpose of this demonstration is to show how you can utilize iLogic and parameters together to create a master assembly to generate an unlimited number of stool variations.

We will do the following:

- Create iLogic rules in each component in the “Stool” assembly to generate new models, based on the user inputs in the form.
- Create an iLogic Form to drive the design, via parameters and iLogic.
- Generate an iLogic rule in the Stool assembly to make and save the new stool design into a new folder, with the new components.



The background features a complex, light gray wireframe mesh that forms a series of interconnected, flowing, and somewhat chaotic shapes. This mesh is set against a plain white background. A solid blue horizontal bar spans the bottom portion of the image, serving as a backdrop for the text.

Incorporating Adaptivity in your Designs

Why Use Adaptivity in Your Design?

- ❑ Adaptive Design is a conceptual process that enables the creator to produce ideas and objects with more ease.
- ❑ Adaptive Design is a method that lays the basis for the making of every object or system while adapting to the changes of the surrounding objects and/or systems.
- ❑ Adaptive design techniques can assist in producing quick ideas, objects and/or systems.



Adaptive Methodologies

With Autodesk Inventor 2018, there are two main methodologies or techniques for Adaptive Designs:

- Adaptive Cross-Part Sketch Geometry
- Adaptive Parts and Features

Benefits:

- The techniques that you will learn can assist tremendously in producing components directly in relation to other components within an assembly and immediately reflect changes.
- Referencing of existing models or sub-assemblies keep you focused on your current idea.

Demo Time Utilizing Adaptivity to Create Conceptual Stool Designs



Demonstration – Utilizing Adaptivity to Create Conceptual Stool Designs

The purpose of this demonstration is to show how you can utilize adaptivity to generate some conceptual features from furniture company “X” to design a new feature to be sold as an option.

We will do the following:

- Utilize adaptivity to generate two conceptual stool design options.
- See how the power of adaptivity can be used to generate conceptual options.





Simplification and Modular Design

Simplification and Modular Design

Why Create a Modular Design?

- Multiple Designers / Engineers Working on The same Project.
- Multiple design options.
- Handle Design Scope Creep.
- Speed to market is crucial to meeting your goals.

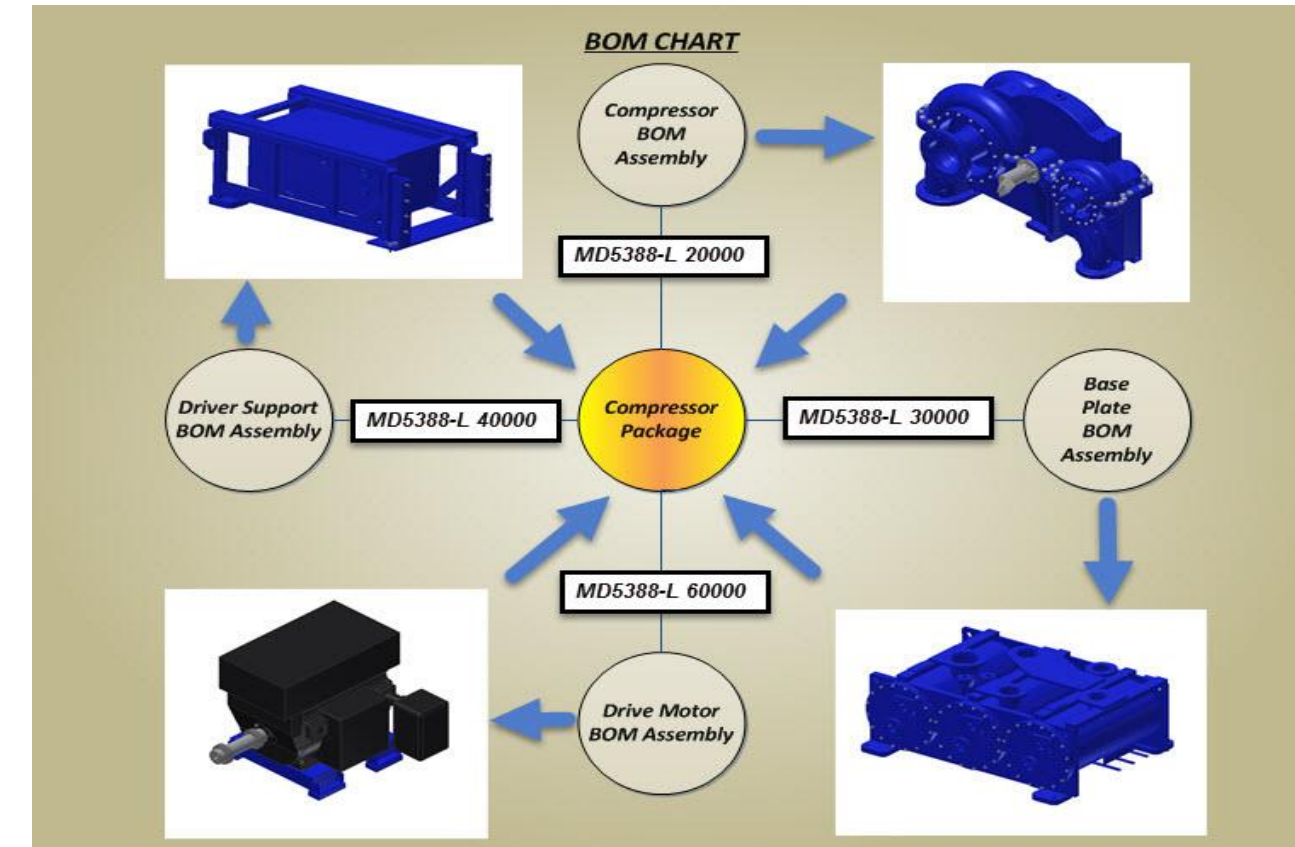


Planning Ahead

The design process just doesn't happen on its own, there must be a plan.

- Create a workflow diagram
 - Planning is the best use of an Engineer's or Designer's time.
 - Crucial to streamlining the design process.
 - A Work flow diagram is an excellent tool to help plan out the design.

The overall goal of this methodology is to make 3D CAD processes more efficient and better documented for consistency throughout the company.

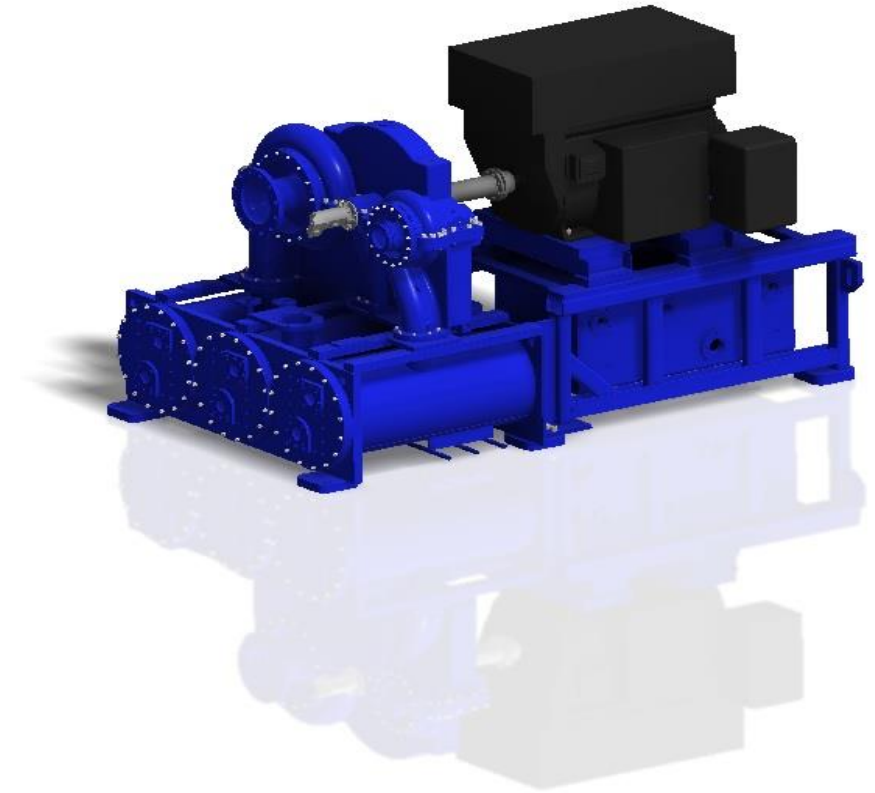


Demo Time Driving Modular Design with Simplification

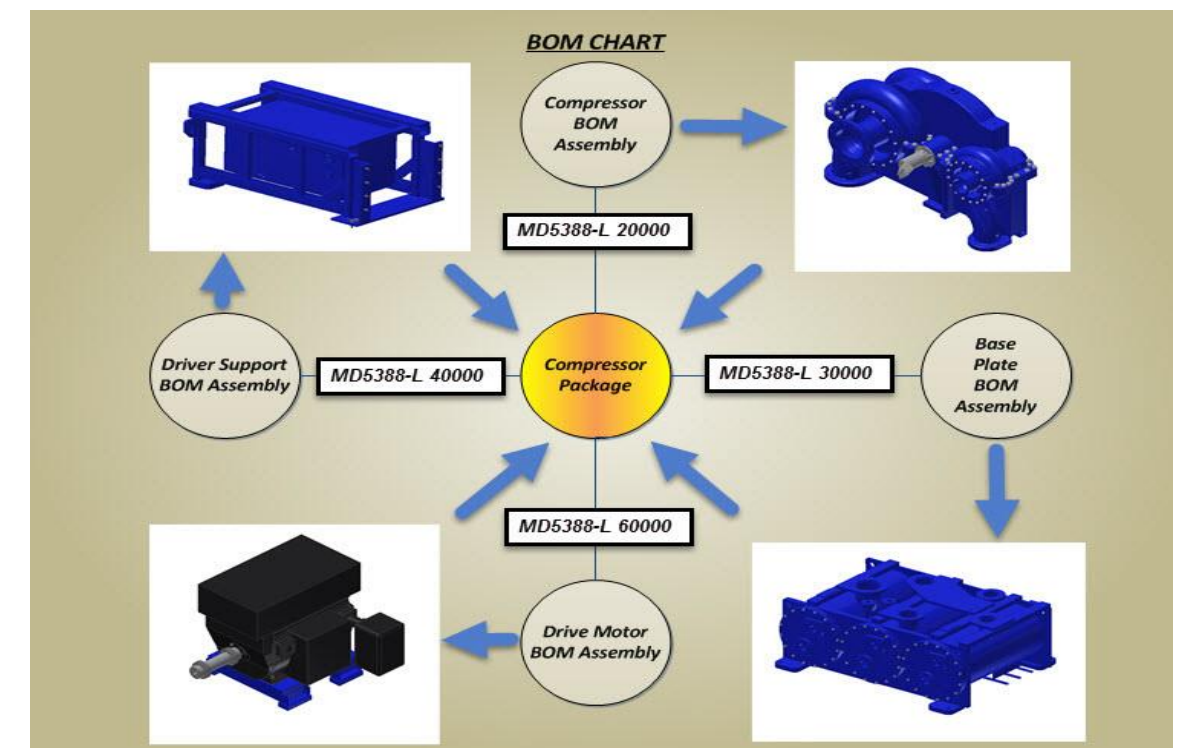


Demonstration – Driving Modular Design with Simplification

In this last demonstration, we are going to make a quick modular design using the simplification tool. We already have reviewed the design requirements and have created a workflow diagram showing our logical BOM assemblies.



- Compressor BOM Assembly
- Base Plate BOM Assembly
- Drive Motor BOM Assembly
- Driver Support BOM Assembly



Conclusion

There are a number of ways to create intelligent models within Inventor 2018. The key to deciding which method is best for your company is to understand your objectives.

I like to break it down as follows:

- **Day to Day Tasks** – Use simple parameters to drive your designs intelligently
- **Master models / templates** – Utilize iLogic & parameters to drive and create your designs
- **Conceptual work** – Use adaptivity to prove out conceptual designs or options
- **Simplification** – Modular design for Design Projects

I hope that these demonstrations has started to get the thought process churning to think of ways that you can add intelligence to your designs and workflows.



Conclusion (Con't)

Autodesk Websites / Forums:

Autodesk Community Forums: <https://forums.autodesk.com/>

Autodesk Exchange Apps: <https://apps.exchange.autodesk.com/en>

Inventor Blogs:

From the Trenches with Autodesk Inventor (Curtis Waguespack):

<http://inventortrenches.blogspot.com/>

CADSETTEROUT(Paul Munford):

<http://cadsetterout.com/>

Inventor Tales (Jonathan Landeros):

<http://www.inventortales.com/>



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Questions?





Make anything.