AUTODESK. UNIVERSITY

Reliable Techniques for complex Assembly design in Autodesk Inventor

Paul Munford

Autodesk Technical Marketing | @PaulCADmunford

Paul Munford

@PaulCADmunford

Carpenter

Drafter (AutoCAD & Inventor)

CAD/CAM Manager

Trainer & Consultant

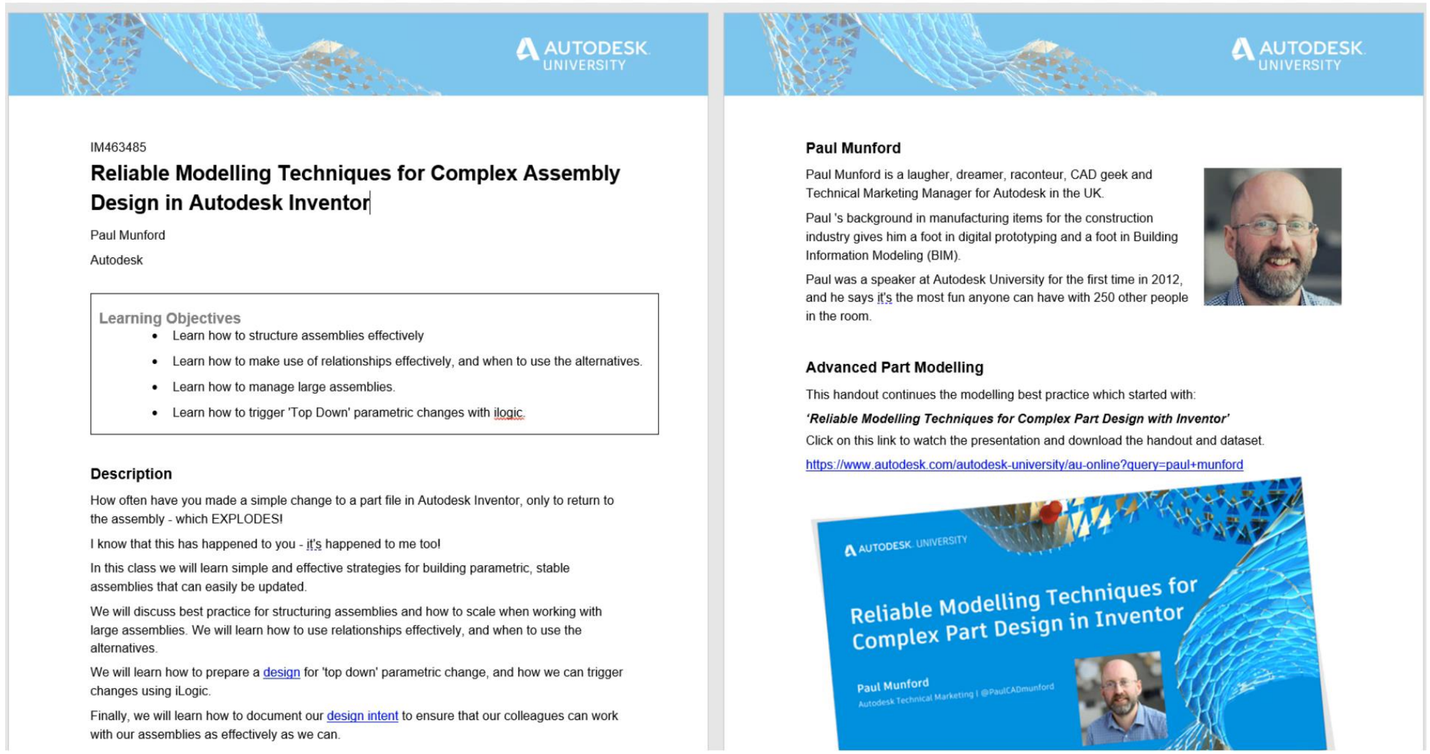
Technical Marketing Manager for Autodesk

Reliable Modelling Techniques for Complex Assembly Design in Inventor

Learning objectives

- Learn how to structure assemblies effectively
- Learn how to make use of relationships effectively, and when to use the alternatives.
- Learn how to manage large assemblies.
- Learn how to trigger 'Top Down' parametric changes with iLogic.

Downloads



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IM463485

Reliable Modelling Techniques for Complex Assembly Design in Autodesk Inventor

Paul Munford

Autodesk

Learning Objectives

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- Learn how to make use of relationships effectively, and when to use the alternatives.
- Learn how to manage large assemblies.
- Learn how to trigger 'Top Down' parametric changes with ilogic.

Description

How often have you made a simple change to a part file in Autodesk Inventor, only to return to the assembly - which EXPLODES!

I know that this has happened to you - it's happened to me too!

In this class we will learn simple and effective strategies for building parametric, stable assemblies that can easily be updated.

We will discuss best practice for structuring assemblies and how to scale when working with large assemblies. We will learn how to use relationships effectively, and when to use the alternatives.

We will learn how to prepare a design for 'top down' parametric change, and how we can trigger changes using iLogic.

Finally, we will learn how to document our design intent to ensure that our colleagues can work with our assemblies as effectively as we can.

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Paul Munford

Paul Munford is a laugher, dreamer, raconteur, CAD geek and Technical Marketing Manager for Autodesk in the UK.

Paul 's background in manufacturing items for the construction industry gives him a foot in digital prototyping and a foot in Building Information Modeling (BIM).

Paul was a speaker at Autodesk University for the first time in 2012, and he says it's the most fun anyone can have with 250 other people in the room.

Advanced Part Modelling

This handout continues the modelling best practice which started with:

'Reliable Modelling Techniques for Complex Part Design with Inventor'

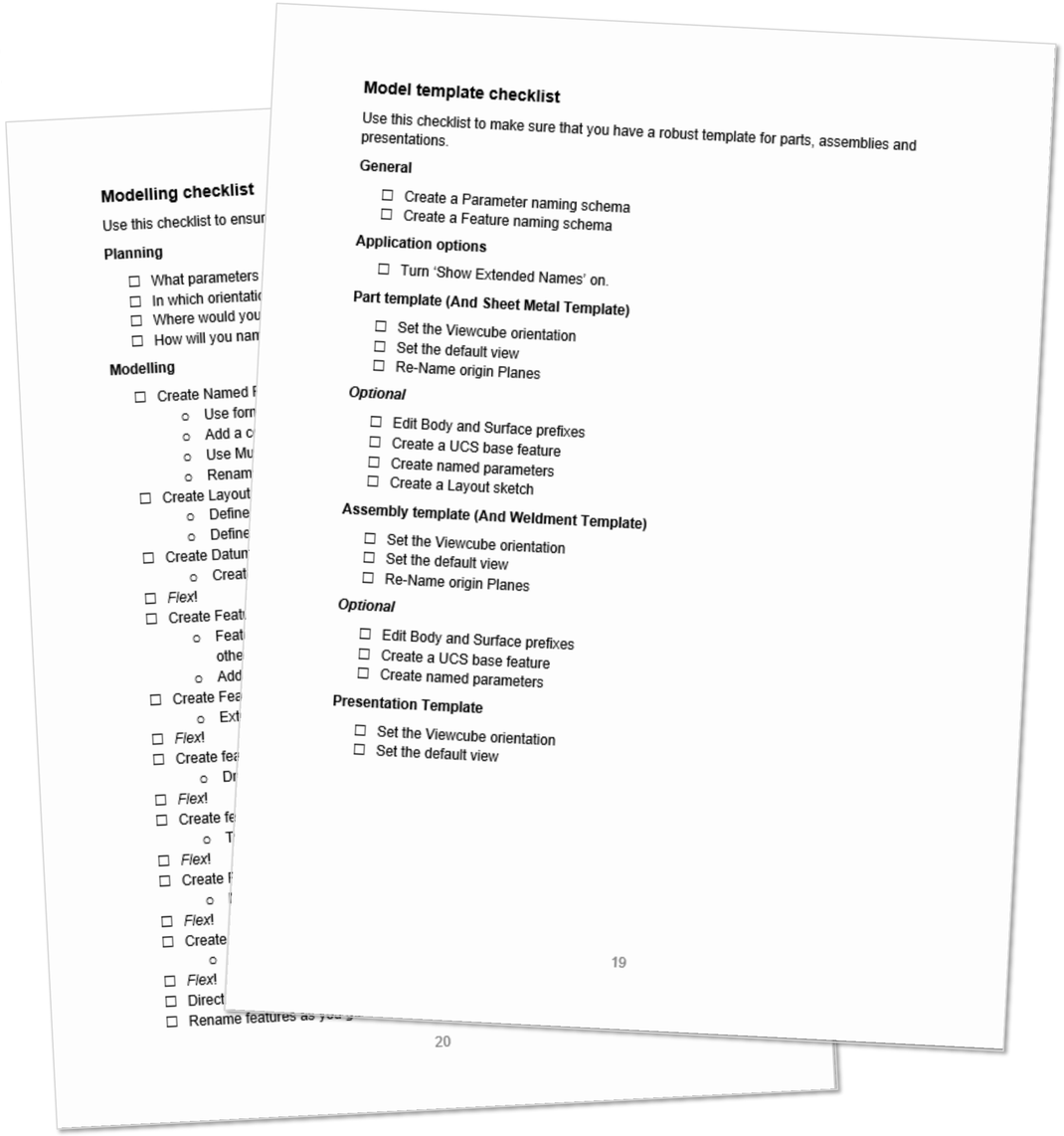
Click on this link to watch the presentation and download the handout and dataset.

https://www.autodesk.com/autodesk-university/au-online?query=paul+munford

- Download the handout and dataset from the class page:
- Or use this link: **https://cadso.co/IM463485_DOWNLOAD**

Checklists

- Template/Application options checklist
- Modelling Checklist



Model template checklist

Use this checklist to make sure that you have a robust template for parts, assemblies and presentations.

General

- ☐ Create a Parameter naming schema
- ☐ Create a Feature naming schema

Application options

- ☐ Turn 'Show Extended Names' on.

Part template (And Sheet Metal Template)

- ☐ Set the Viewcube orientation
- ☐ Set the default view
- ☐ Re-Name origin Planes

Optional

- ☐ Edit Body and Surface prefixes
- ☐ Create a UCS base feature
- ☐ Create named parameters
- ☐ Create a Layout sketch

Assembly template (And Weldment Template)

- ☐ Set the Viewcube orientation
- ☐ Set the default view
- ☐ Re-Name origin Planes

Optional

- ☐ Edit Body and Surface prefixes
- ☐ Create a UCS base feature
- ☐ Create named parameters

Presentation Template

- ☐ Set the Viewcube orientation
- ☐ Set the default view

19

Modelling checklist

Use this checklist to ensur

Planning

- ☐ What parameters
- ☐ In which orientatio
- ☐ Where would you
- ☐ How will you nam

Modelling

- ☐ Create Named F
  - ○ Use form
  - ○ Add a c
  - ○ Use Mu
  - ○ Renam
- ☐ Create Layout
  - ○ Define
  - ○ Define
- ☐ Create Datun
  - ○ Creat
- ☐ *Flex!*
- ☐ Create Featu
  - ○ Feat
    othe
  - ○ Add
- ☐ Create Fea
  - ○ Ext
- ☐ *Flex!*
- ☐ Create fea
  - ○ Dr
- ☐ *Flex!*
- ☐ Create fe
  - ○ T
- ☐ *Flex!*
- ☐ Create F
  - ○ I
- ☐ *Flex!*
- ☐ Create
  - ○
- ☐ *Flex!*
- ☐ Direct
- ☐ Rename features as you

20

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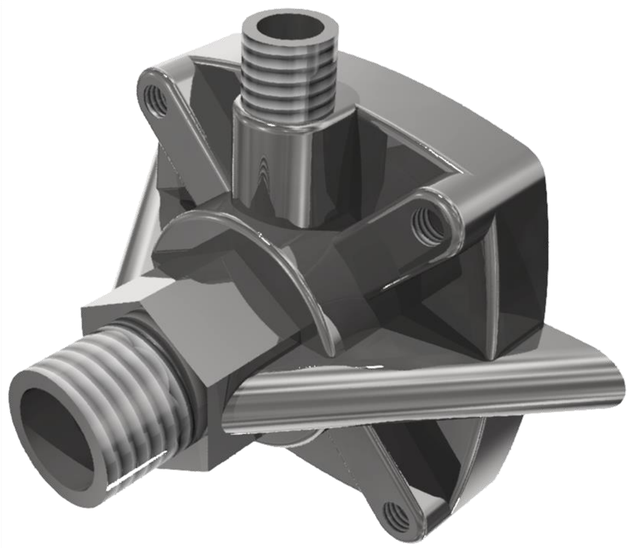
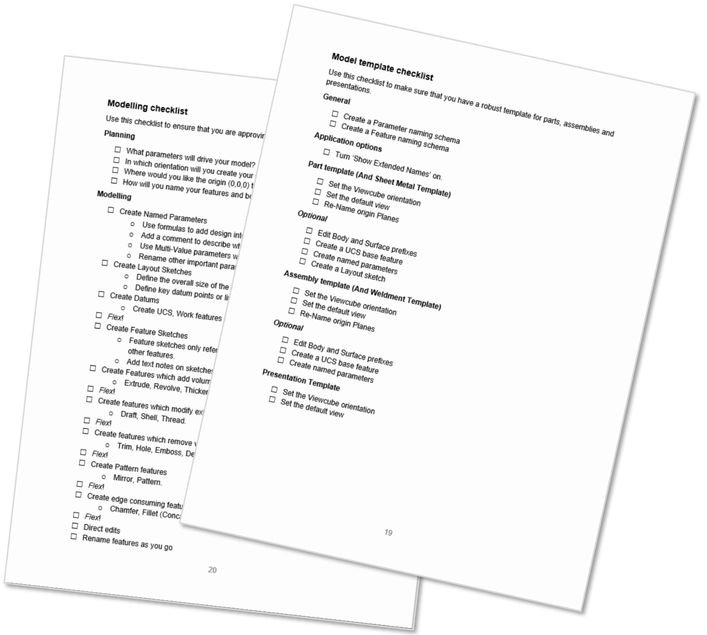
Reliable Modelling Techniques for Complex Part Design in Inventor

Paul Munford

Autodesk Technical Marketing | @PaulCADmunford

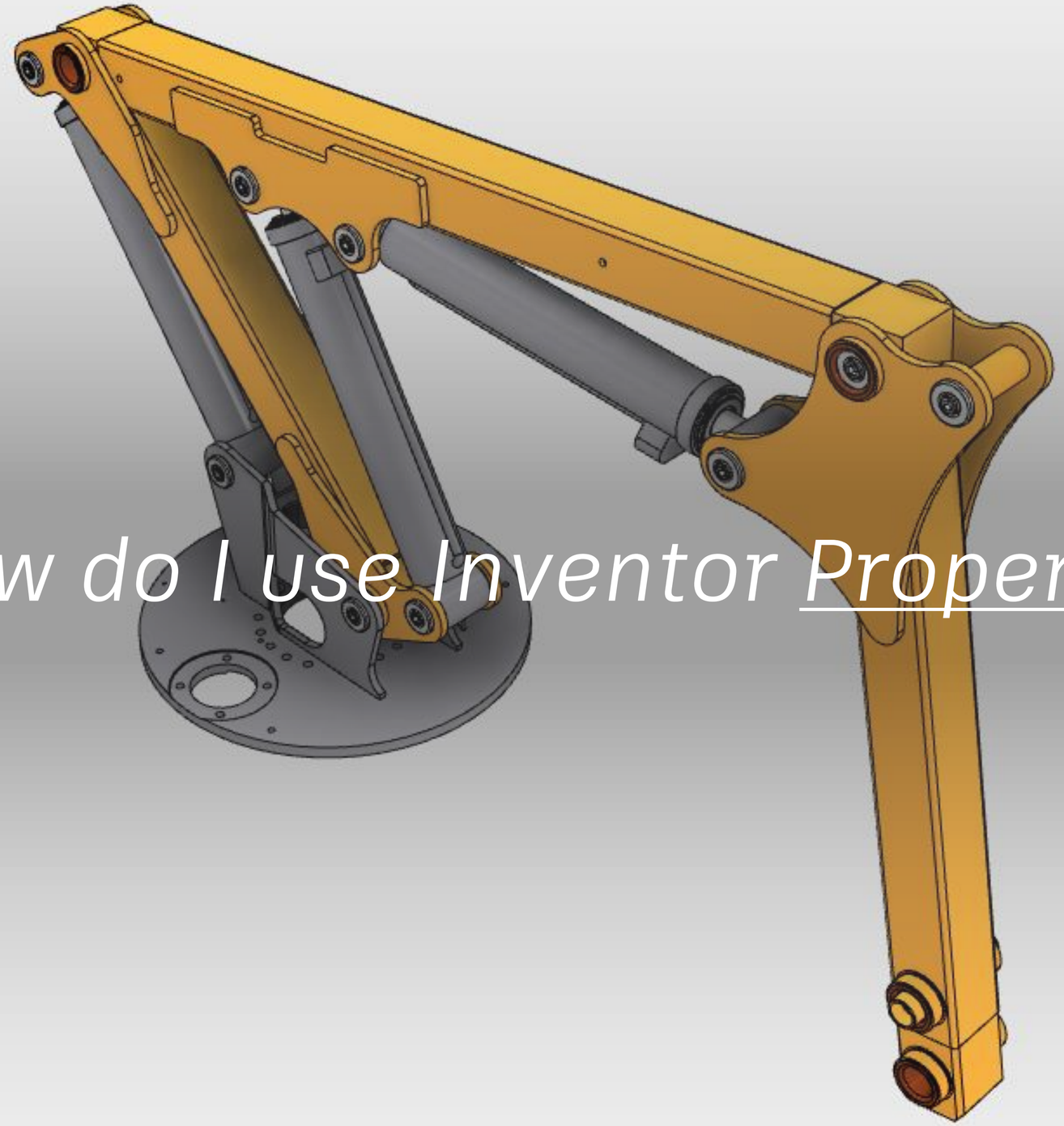




http://cadso.co/PaulCADMunford-AU-online

Q&A

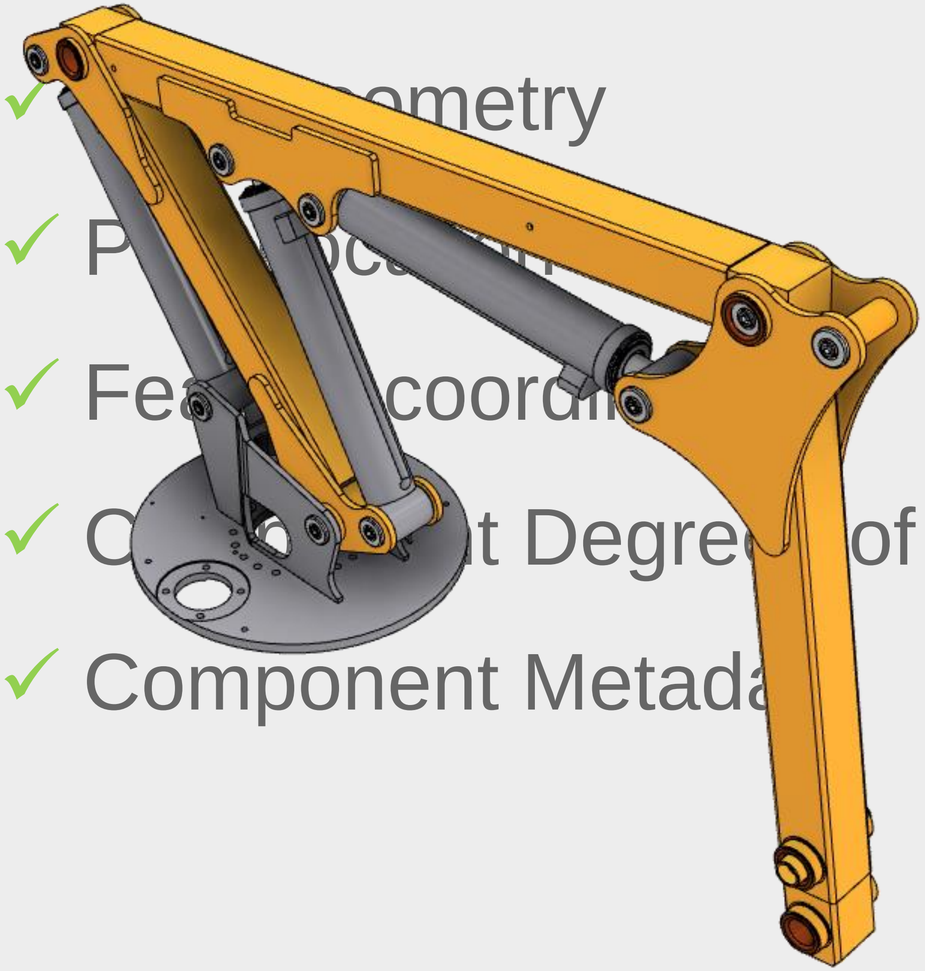

Comment (1)
Comments
PM
Please feel free to post your questions in the comments!
We have a be nice policy
Please be positive and constructive
POST



How do I use Inventor Properly?

✓ Correct Data

✓ Easy to update



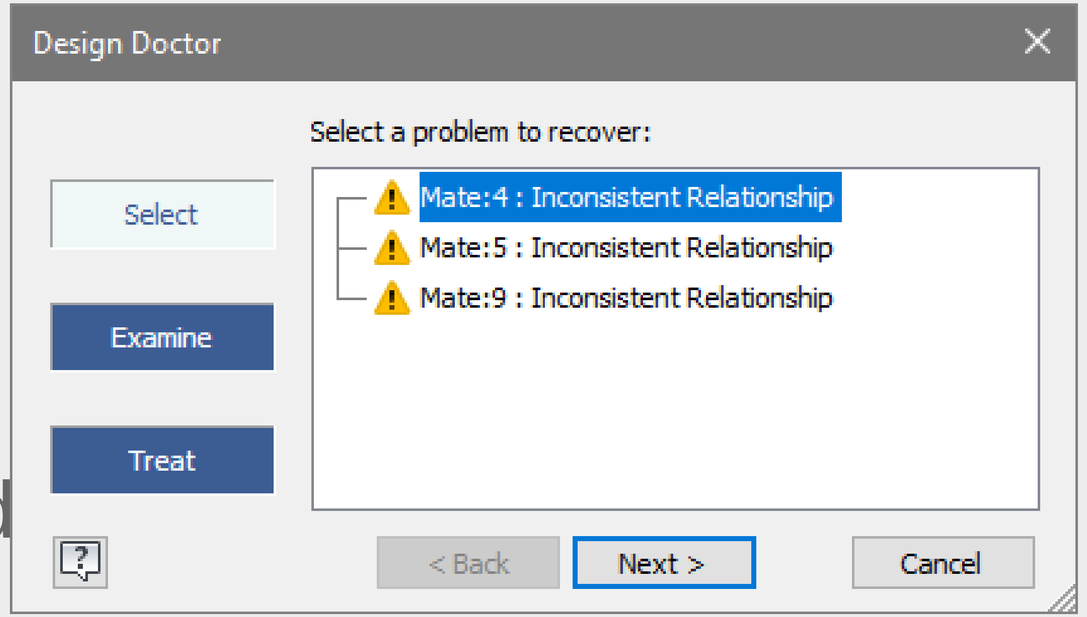
✓ ometry

✓ P oc

✓ Fea coordi

✓ C t Degre of Freed

✓ Component Metada



iLOGIC WHEEL CONFIGURATOR

WHEEL OPTIONS

WHEEL SIZE	22
WHEEL FINISH	Chrome - Polished
NO OF SPOKES	6
WHEEL PRICE	***$310***

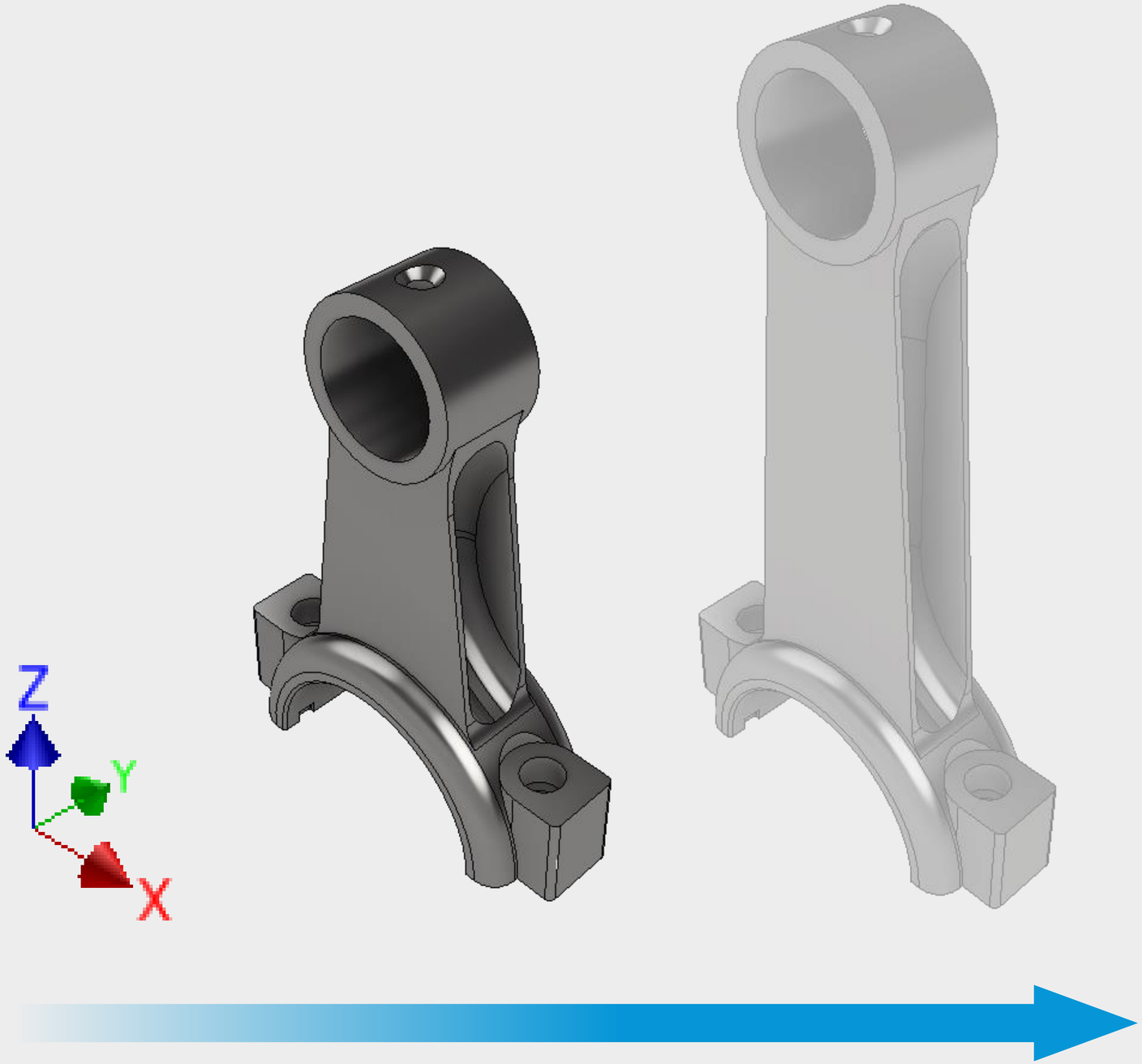
BRAKE OPTIONS

BRAKE MATERIAL	Cast Iron
CALIPER FINISH	Smooth - Light Orange
BRAKE PRICE	***$700***

TOTAL

TOTAL PRICE	***$1010***

Done


Z
Y
X

Unintentional relationships + Feature **Regeneration**

↳ **Unpredictable** Updates

↳ Design intent **lost**

↳ Time lost '**fixing**' designs

↳ Re-build rather than **Re-use**

Editable models	Design intent is captured
Obvious Models	Design Intent is documented
Reusable Models	Re-use rather than Re-Build

Component **File type**

Component **Complexity**

Component **Quantity**

Component **Relationships**

Component **Adaptivity**

Derived **Components**

Linked **Parameters**

*Multiple **Updates***

*By Multiple **People***

1. No **unintended** Relationships
2. Relationships are kept to a **minimum**
3. All relationships are **planned** and **purposeful**
4. All relationships are **obvious** & **easily understood**

SET UP

Model template checklist

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Assembly template (And Weldment Template)

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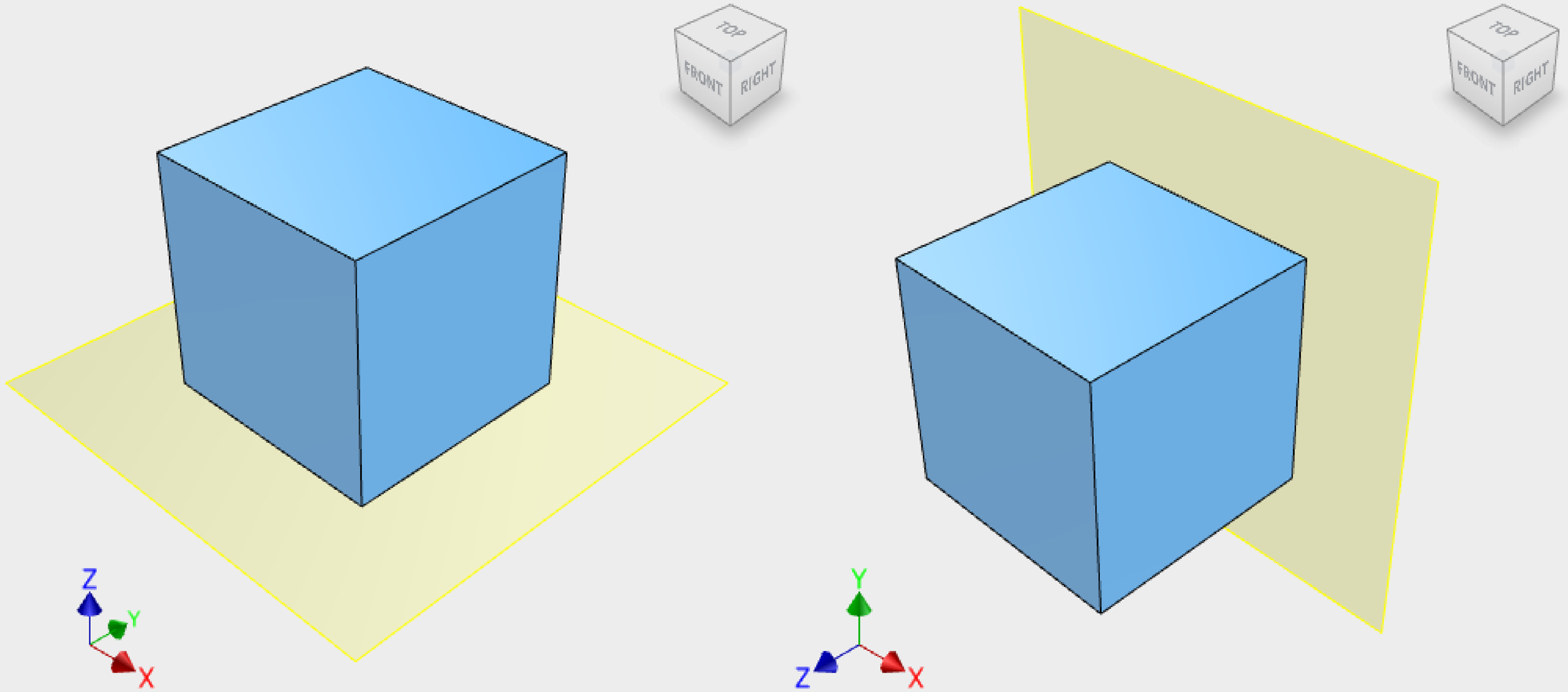
- ☐ Set the default view
- ☐ Re-Name origin Planes

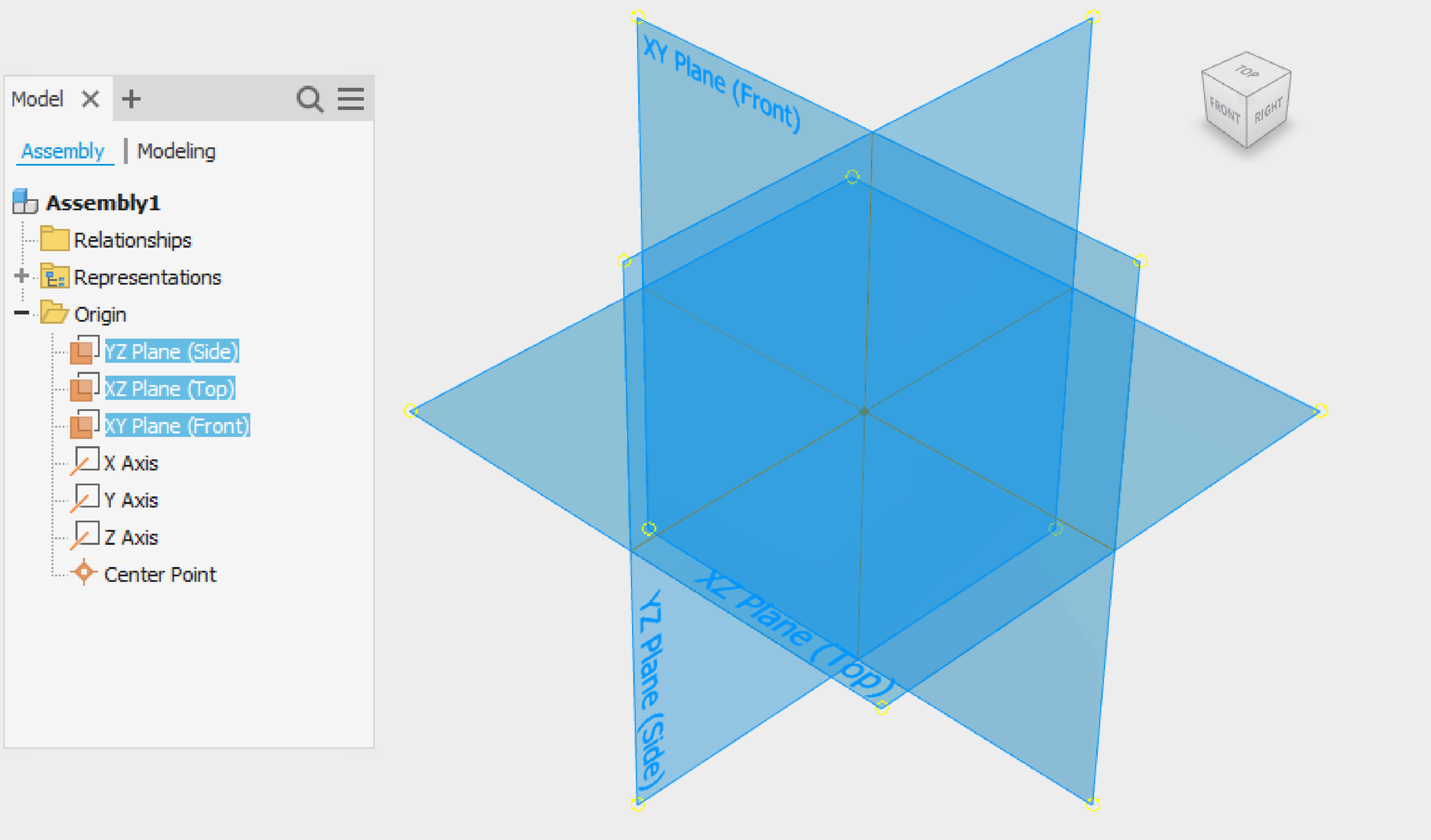
Optional

- ☐ Edit Body and Surface prefixes
- ☐ Create a UCS base feature
- ☐ Create named parameters

Presentation Template

- ☐ Set the Viewcube orientation
- ☐ Set the default view


TOP
FRONT
RIGHT
Z
Y
X
TOP
FRONT
RIGHT
Y
Z
X


Model
Assembly
Modeling
Assembly1
Relationships
Representations
Origin
YZ Plane (Side)
XZ Plane (Top)
XY Plane (Front)
X Axis
Y Axis
Z Axis
Center Point
XY Plane (Front)
XZ Plane (Top)
YZ Plane (Side)
TOP
FRONT
RIGHT

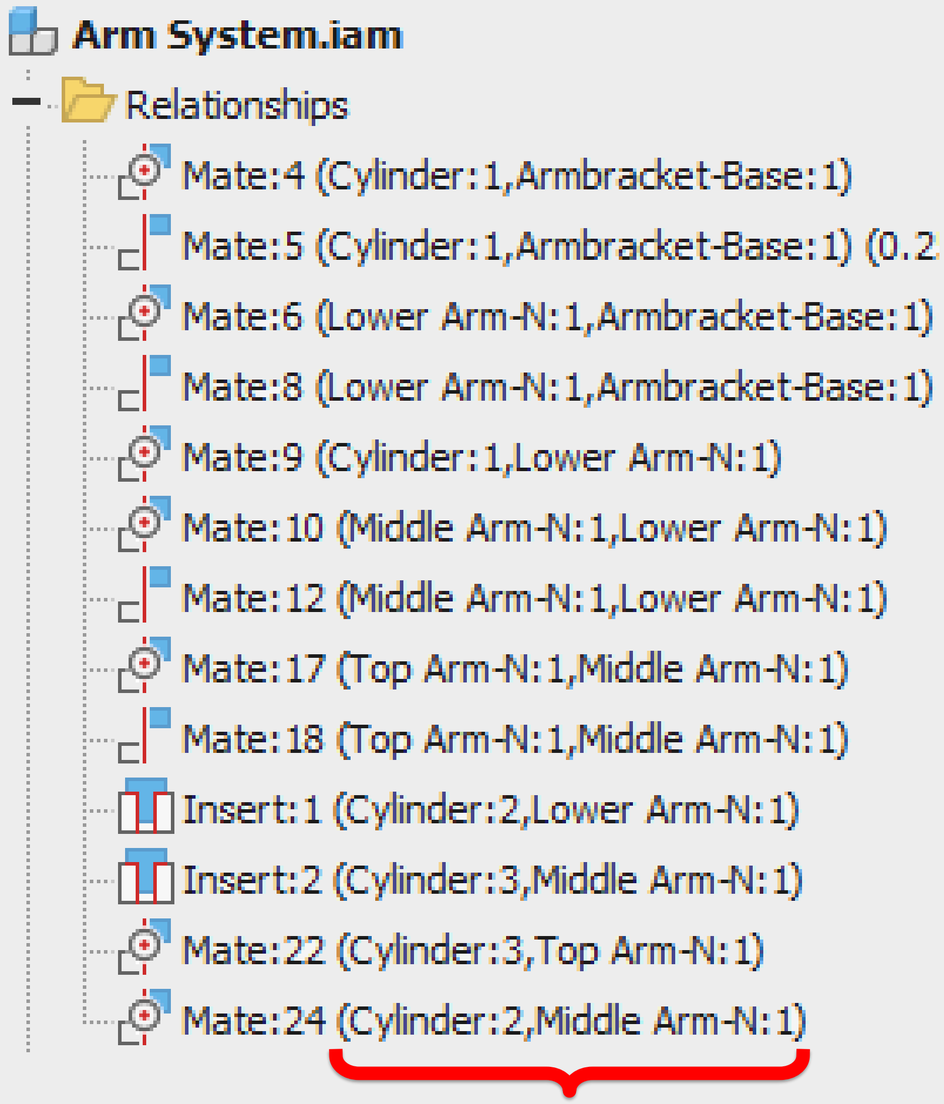
Bill of Materials [Arm System.iam]

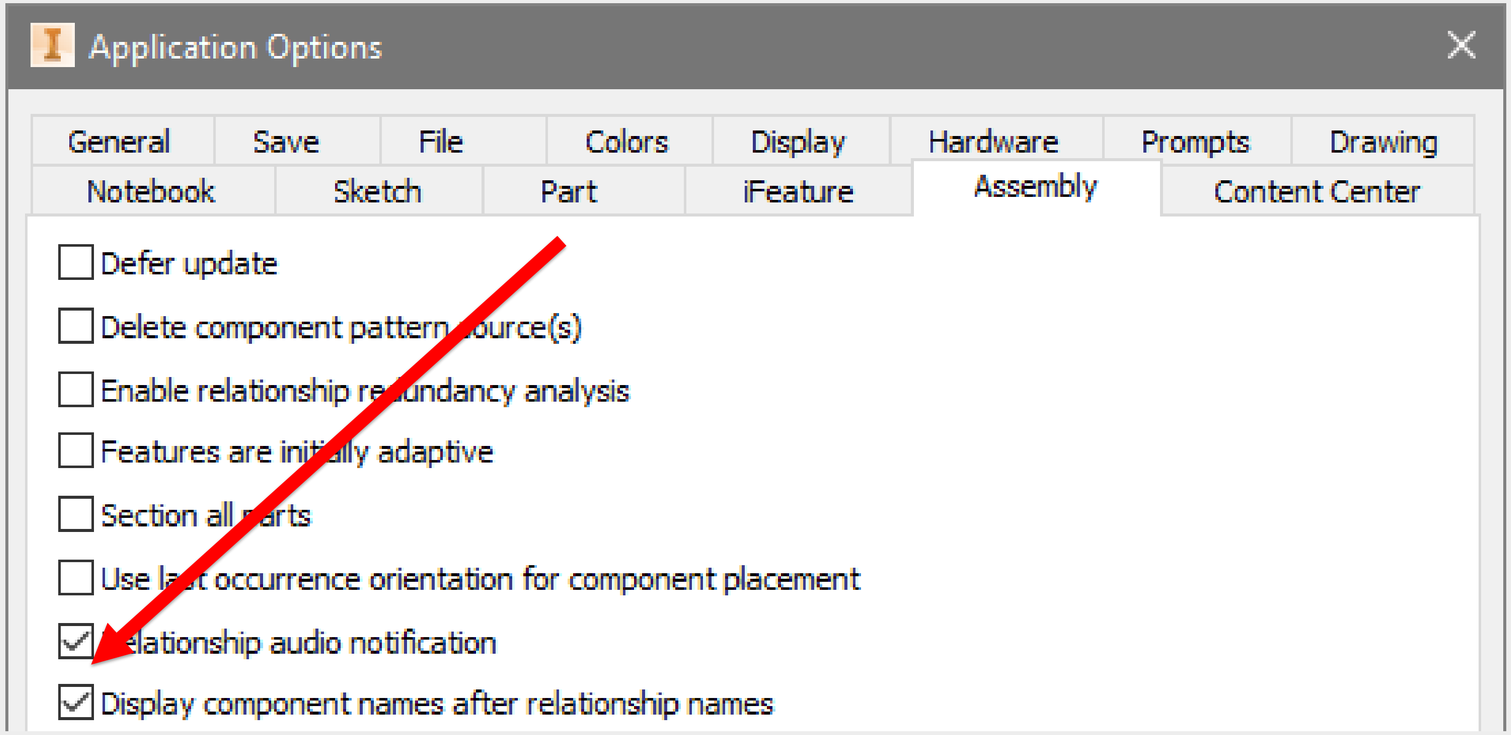
Show Clear

Model Data | Structured | Parts Only

Item	BOM Structure	Part Number	Material	Appearance	Mass	Item QTY	Description
1	Normal	3136 1149 26	Steel, Mild	Metal-Steel(Polish)	19.714 kg	1	
2	Normal	3136 1149 28	Steel, Mild	Metal-Steel(Polish)	3.595 kg	1	
3	Normal	3136 1149 27	Steel, Mild	Metal-Steel(Polish)	3.595 kg	1	
4	Normal	3136 1149 29	Steel, Mild	Metal-Steel(Polish)	1.388 kg	1	Plate
5	Normal	3136 7044 74	Steel, Mild	Brokk-Gul	0.586 kg	8	Shaft
6	Normal	3136 7044 91	Steel, Mild	Brokk-Gul	0.932 kg	2	Shaft
7	Normal	3136 7044 79	Steel, Mild	Semi-Polished	0.085 kg	18	Washer
8	Normal	0301 2344 00	Steel, Mild	Semi-Polished	0.005 kg	1	Washer
9	Normal	3136 7057 14	Steel, Mild	Semi-Polished	0.050 kg	18	Screw
10	Normal	0147 1323 03	Steel, Mild	Semi-Polished	0.014 kg	2	Screw
11	Normal	3136 1094 43	Steel, Mild	Brokk-Gul	7.562 kg	1	
12	Normal	3136 1133 81	Steel, Mild	Brokk-Gul	1.631 kg	4	
13	Normal	3136 1094 58	Steel, Mild	Brokk-Gul	0.116 kg	3	
14	Normal	3136 1144 21	Steel, Mild	Brokk-Gul	1.487 kg	5	
15	Normal	0500 4500 24	Copper	Metal-Copper(Polish)	0.103 kg	10	Flanged bearing

Import... Export... Done


Arm System.iam
Relationships
Mate:4 (Cylinder:1,Armbracket-Base:1)
Mate:5 (Cylinder:1,Armbracket-Base:1) (0.2
Mate:6 (Lower Arm-N:1,Armbracket-Base:1)
Mate:8 (Lower Arm-N:1,Armbracket-Base:1)
Mate:9 (Cylinder:1,Lower Arm-N:1)
Mate:10 (Middle Arm-N:1,Lower Arm-N:1)
Mate:12 (Middle Arm-N:1,Lower Arm-N:1)
Mate:17 (Top Arm-N:1,Middle Arm-N:1)
Mate:18 (Top Arm-N:1,Middle Arm-N:1)
Insert:1 (Cylinder:2,Lower Arm-N:1)
Insert:2 (Cylinder:3,Middle Arm-N:1)
Mate:22 (Cylinder:3,Top Arm-N:1)
Mate:24 (Cylinder:2,Middle Arm-N:1)


Application Options
General
Save
File
Colors
Display
Hardware
Prompts
Drawing
Notebook
Sketch
Part
iFeature
Assembly
Content Center
Defer update
Delete component pattern source(s)
Enable relationship redundancy analysis
Features are initially adaptive
Section all parts
Use last occurrence orientation for component placement
Relationship audio notification
Display component names after relationship names

C:\Reliable Assemblies\Workspace\Components\Armbracket-Base.iam	Armbracket-Base.iam	Armbracket-Base	Joe M	Arminfästning	Armbracket
C:\Reliable Assemblies\Workspace\Components\3136 1149 25.iam	3136 1149 25.iam	3136 1149 25	Joe M	Arminfästning svängmotor	Armbracket
C:\Reliable Assemblies\Workspace\Components\3136 1149 26.ipt	3136 1149 26.ipt	3136 1149 26	Joe M	Bottenplåt	
C:\Reliable Assemblies\Workspace\Components\3136 1149 28.ipt	3136 1149 28.ipt	3136 1149 28	Joe M	Sidoplåt vänster	
C:\Reliable Assemblies\Workspace\Components\3136 1149 27.ipt	3136 1149 27.ipt	3136 1149 27	Joe M	Sidoplåt höger	
C:\Reliable Assemblies\Workspace\Components\3136 1149 29.ipt	3136 1149 29.ipt	3136 1149 29	Joe M	Förstyvning	Plate
C:\Reliable Assemblies\Workspace\Components\3136 7044 74.ipt	3136 7044 74.ipt	3136 7044 74	Joe M	Axel	Shaft
C:\Reliable Assemblies\Workspace\Components\3136 7044 91.ipt	3136 7044 91.ipt	3136 7044 91	Joe M	Axel	Shaft
C:\Reliable Assemblies\Workspace\Components\3136 7044 79.ipt	3136 7044 79.ipt	3136 7044 79	Joe M	Kona	Washer
C:\Reliable Assemblies\Workspace\Components\0301 2344 00.ipt	0301 2344 00.ipt	0301 2344 00	Joe M	Bricka	Washer
C:\Reliable Assemblies\Workspace\Components\3136 7057 14.ipt	3136 7057 14.ipt	3136 7057 14	Joe M	Skruv	Screw
C:\Reliable Assemblies\Workspace\Components\Lower Arm-N.iam	Lower Arm-N.iam	Lower Arm-N	Uffe Bak		
C:\Reliable Assemblies\Workspace\Components\3136 7044 74.ipt	3136 7044 74.ipt	3136 7044 74	Joe M	Axel	Shaft
C:\Reliable Assemblies\Workspace\Components\3136 7044 79.ipt	3136 7044 79.ipt	3136 7044 79	Joe M	Kona	Washer
C:\Reliable Assemblies\Workspace\Components\3136 7057 14.ipt	3136 7057 14.ipt	3136 7057 14	Joe M	Skruv	Screw
C:\Reliable Assemblies\Workspace\Components\0147 1323 03.ipt	0147 1323 03.ipt	0147 1323 03	Joe M	Skruv	Screw
C:\Reliable Assemblies\Workspace\Components\3136 1144 16-N.iam	3136 1144 16-N.iam	3136 1144 16-N	Uffe Bak		
C:\Reliable Assemblies\Workspace\Components\3136 1133 80.iam	3136 1133 80.iam	3136 1133 80	Uffe Bak		
C:\Reliable Assemblies\Workspace\Components\3136 1094 43.ipt	3136 1094 43.ipt	3136 1094 43	Uffe Bak		
C:\Reliable Assemblies\Workspace\Components\3136 1133 81.ipt	3136 1133 81.ipt	3136 1133 81	Uffe Bak		
C:\Reliable Assemblies\Workspace\Components\3136 1094 58.ipt	3136 1094 58.ipt	3136 1094 58	Uffe Bak		
C:\Reliable Assemblies\Workspace\Components\3136 1144 21.ipt	3136 1144 21.ipt	3136 1144 21	Joe M	Kuts	
C:\Reliable Assemblies\Workspace\Components\0500 4500 24.ipt	0500 4500 24.ipt	0500 4500 24	Joe M	Flänslager	Flanged bearing
C:\Reliable Assemblies\Workspace\Components\Middle Arm-N.iam	Middle Arm-N.iam	Middle Arm-N	Uffe Bak		
C:\Reliable Assemblies\Workspace\Components\3136 1133 82.iam	3136 1133 82.iam	3136 1133 82	Uffe Bak		
C:\Reliable Assemblies\Workspace\Components\3136 1094 48.ipt	3136 1094 48.ipt	3136 1094 48	Uffe Bak		
C:\Reliable Assemblies\Workspace\Components\3136 1094 44.ipt	3136 1094 44.ipt	3136 1094 44	Uffe Bak		

File Naming

Consider

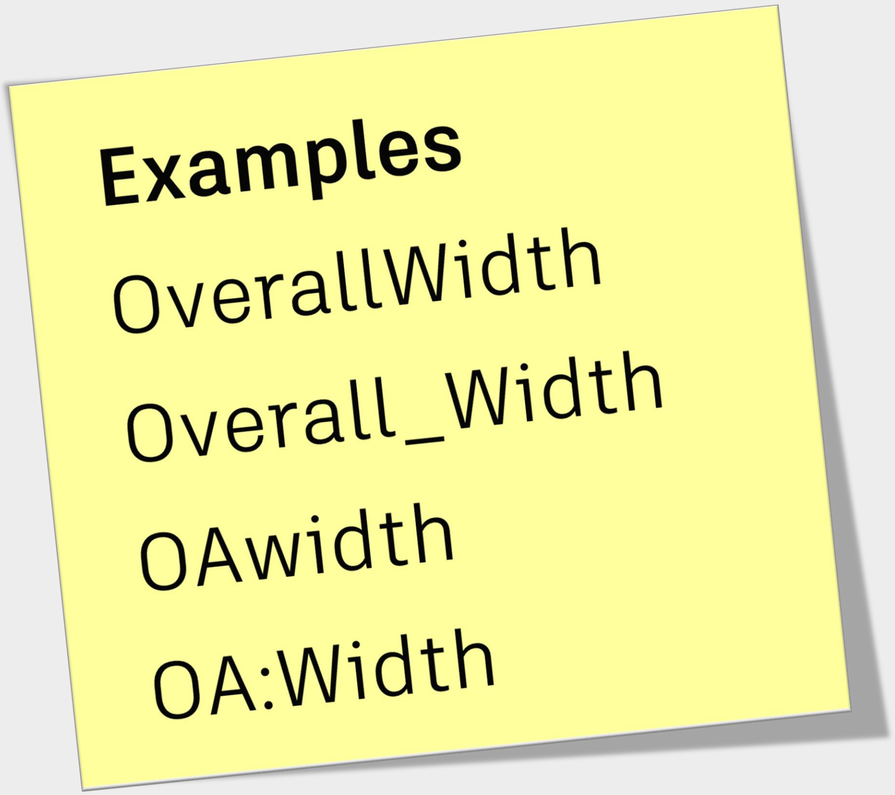
- ✓ Drawings and Assemblies
  Project/Product based
- ✓ Parts Project/Product based
- ✓ Parts ‘Standard’
- ✓ Parts Supplier
- ✓ ‘Output’ files .pdf .dwf .dwg

Avoid

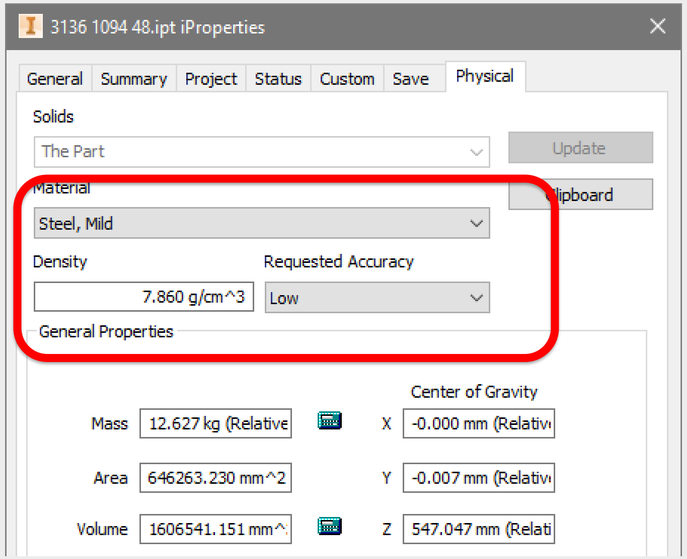
- ✘ 252 Character Limit
- ✘ State (WIP, Review, Released)
- ✘ Revision
- ✘ Date
- ✘ Calculated values
- ✘ Metadata

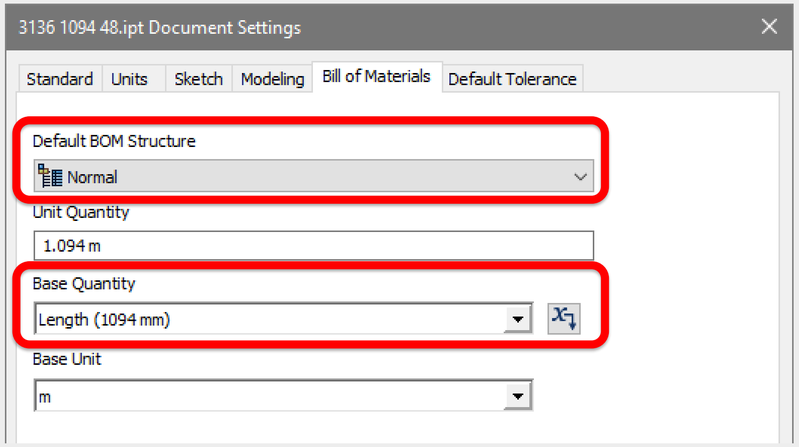
Parameter Naming

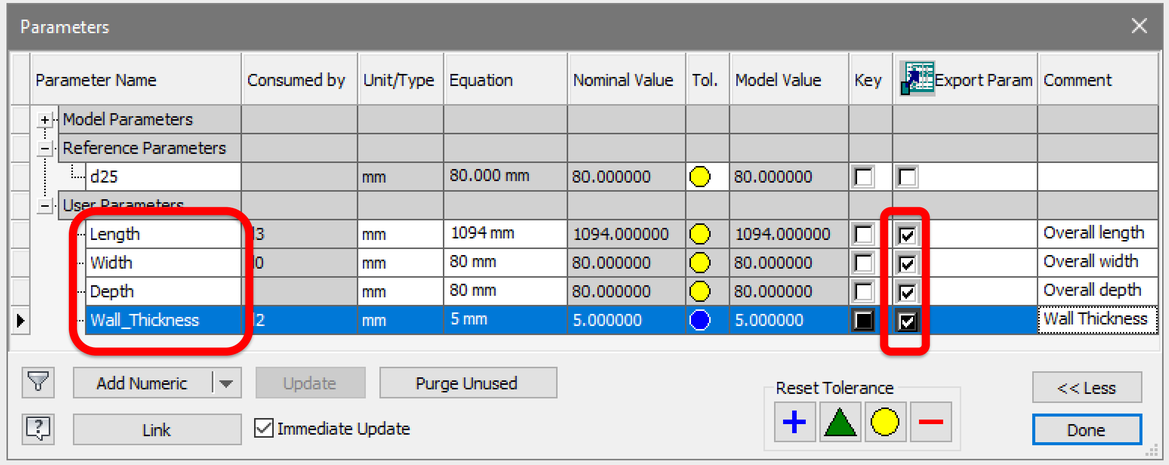
1. Case Sensitive
2. Start with a letter
3. Can Include Numbers
4. Cannot Contain spaces
5. Can contain ‘_’ and ‘:’

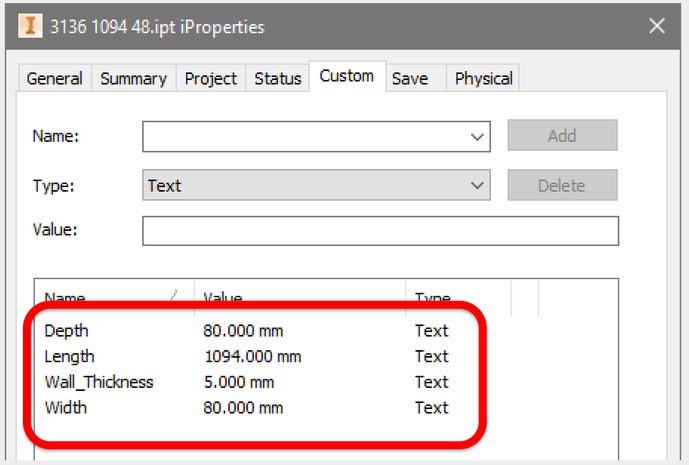



Material
Appearance


3136 1094 48.ipt iProperties
General
Summary
Project
Status
Custom
Save
Physical
Solids
The Part
Update
Material
Steel, Mild
Density
7.860 g/cm^3
Requested Accuracy
Low
General Properties
Center of Gravity
Mass
12.627 kg (Relative
X
-0.000 mm (Relativ
Area
646263.230 mm^2
Y
-0.007 mm (Relativ
Volume
1606541.151 mm^
Z
547.047 mm (Relati


3136 1094 48.ipt Document Settings
Standard
Units
Sketch
Modeling
Bill of Materials
Default Tolerance
Default BOM Structure
Normal
Unit Quantity
1.094 m
Base Quantity
Length (1094 mm)
Base Unit
m


Parameters
Parameter Name
Consumed by
Unit/Type
Equation
Nominal Value
Tol.
Model Value
Key
Export Param
Comment
Model Parameters
Reference Parameters
d25
mm
80.000 mm
80.000000
80.000000
User Parameters
Length
3
mm
1094 mm
1094.000000
1094.000000
Overall length
Width
0
mm
80 mm
80.000000
80.000000
Overall width
Depth
mm
80 mm
80.000000
80.000000
Overall depth
Wall_Thickness
2
mm
5 mm
5.000000
5.000000
Wall Thickness
Add Numeric
Update
Purge Unused
Link
Immediate Update
Reset Tolerance
<< Less
Done


3136 1094 48.ipt iProperties
General
Summary
Project
Status
Custom
Save
Physical
Name:
Add
Type:
Text
Delete
Value:
Name
Value
Type
Depth
80.000 mm
Text
Length
1094.000 mm
Text
Wall_Thickness
5.000 mm
Text
Width
80.000 mm
Text

Bill of Materials [Arm System.iam]

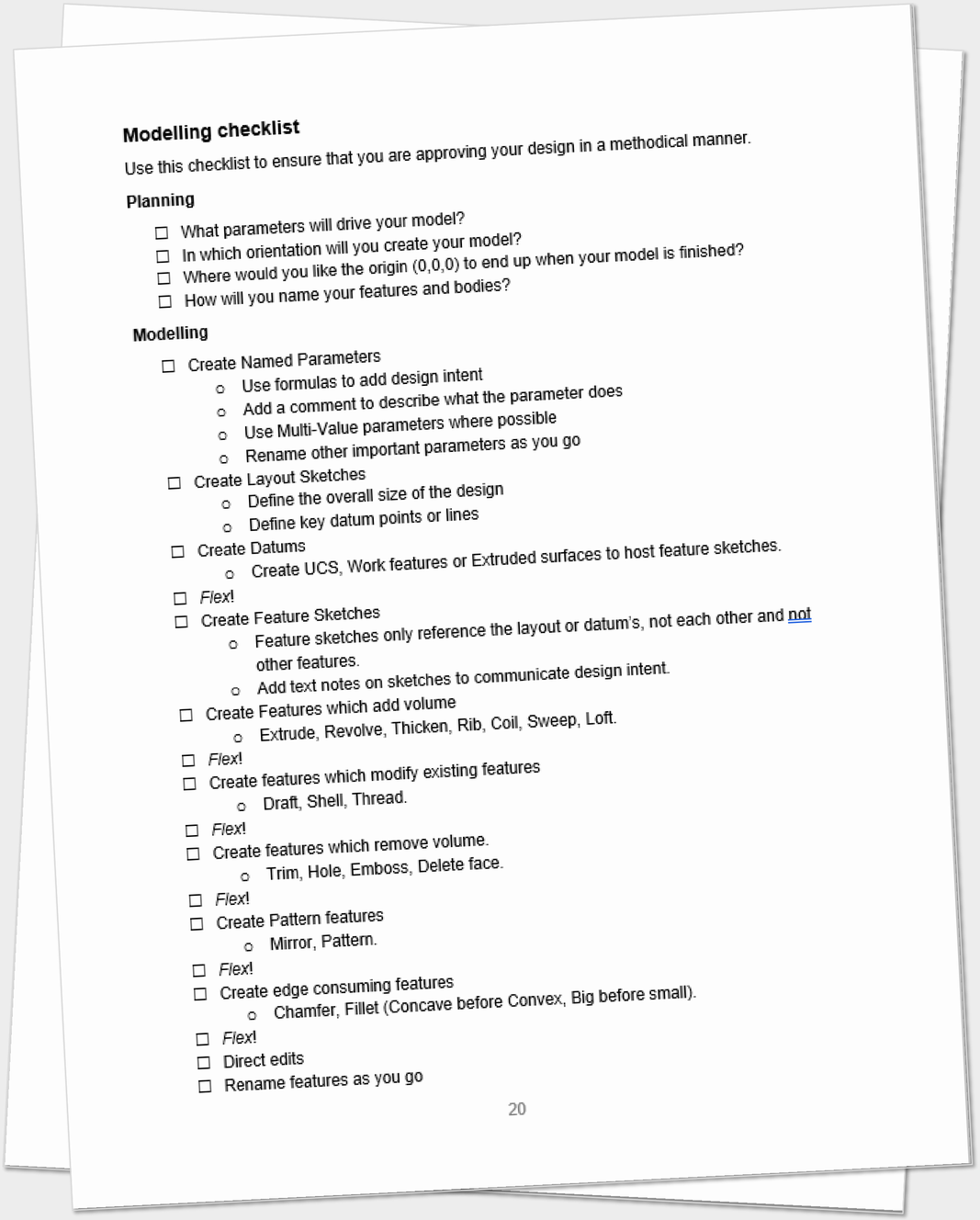
Show Clear

Model Data | Structured | Parts Only

Item	BOM Structure	Part Number	Material	Appearance	Length	Width	Depth	Mass	Base QTY	Item QTY	QTY	Description
01	Normal	0500 4500 24	Copper	Metal-Cop…				0.103 kg	Each	10	10	Flanged bearing
02	Normal	3136 7048 80	Copper	Metal-Cop…				0.069 kg	Each	12	12	Flanged bearing
03	Normal	3136 7009 59	Generic	Generic				0.002 kg	Each	3	3	Lock ring
04	Normal	3136 7009 52	Nylon 6/6	Nylon 6				0.037 kg	Each	3	3	Piston
05	Normal	3136 7009 55	Nylon 6/6	Nylon 6				0.002 kg	Each	3	3	Wiper
06	Normal	0147 1323 03	Steel, Mild	Semi-Polis…				0.014 kg	Each	2	2	Screw
07	Normal	0301 2344 00	Steel, Mild	Semi-Polis…				0.005 kg	Each	1	1	Washer
08	Normal	0544 1100 09	Steel, Mild	Semi-Polis…				0.006 kg	Each	6	6	Greasing nipple
09	Normal	3136 1074 64	Steel, Mild	Steel				0.850 kg	Each	3	3	Top nut
10	Normal	3136 1094 43	Steel, Mild	Brokk-Gul	655.000 mm	80.000 mm	80.000 mm	7.562 kg	655 mm	1	655.000 mm	
11	Normal	3136 1094 44	Steel, Mild	Brokk-Gul				3.057 kg	Each	2	2	
12	Normal	3136 1094 48	Steel, Mild	Brokk-Gul	1094.000 mm	80.000 mm	80.000 mm	12.627 kg	1094 mm	2	2188.000 mm	
13	Normal	3136 1094 55	Steel, Mild	Brokk-Gul	730.000 mm	80.000 mm	80.000 mm	8.234 kg	730 mm	3	2190.000 mm	
14	Normal	3136 1094 56	Steel, Mild	Brokk-Gul				3.311 kg	Each	1	1	
15	Normal	3136 1094 58	Steel, Mild	Brokk-Gul				0.116 kg	Each	3	3	
16	Normal	3136 1117 73	Steel, Mild	Steel				0.502 kg	Each	3	3	Piston
17	Normal	3136 1133 81	Steel, Mild	Brokk-Gul				1.631 kg	Each	4	4	
18	Normal	3136 1133 83	Steel, Mild	Brokk-Gul				2.680 kg	Each	2	2	

Import... Export... Done

WORK



Modelling checklist

Use this checklist to ensure that you are approving your design in a methodical manner.

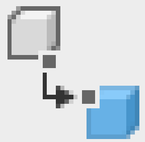
Planning

- ☐ What parameters will drive your model?
- ☐ In which orientation will you create your model?
- ☐ Where would you like the origin (0,0,0) to end up when your model is finished?
- ☐ How will you name your features and bodies?

Modelling

- ☐ Create Named Parameters
  - Use formulas to add design intent
  - Add a comment to describe what the parameter does
  - Use Multi-Value parameters where possible
  - Rename other important parameters as you go
- ☐ Create Layout Sketches
  - Define the overall size of the design
  - Define key datum points or lines
- ☐ Create Datums
  - Create UCS, Work features or Extruded surfaces to host feature sketches.
- ☐ *Flex*!
- ☐ Create Feature Sketches
  - Feature sketches only reference the layout or datum's, not each other and not other features.
  - Add text notes on sketches to communicate design intent.
- ☐ Create Features which add volume
  - Extrude, Revolve, Thicken, Rib, Coil, Sweep, Loft.
- ☐ *Flex*!
- ☐ Create features which modify existing features
  - Draft, Shell, Thread.
- ☐ *Flex*!
- ☐ Create features which remove volume.
  - Trim, Hole, Emboss, Delete face.
- ☐ *Flex*!
- ☐ Create Pattern features
  - Mirror, Pattern.
- ☐ *Flex*!
- ☐ Create edge consuming features
  - Chamfer, Fillet (Concave before Convex, Big before small).
- ☐ *Flex*!
- ☐ Direct edits
- ☐ Rename features as you go

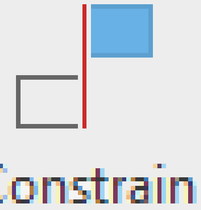
Joints V Constraints



Remove all DOF

Features

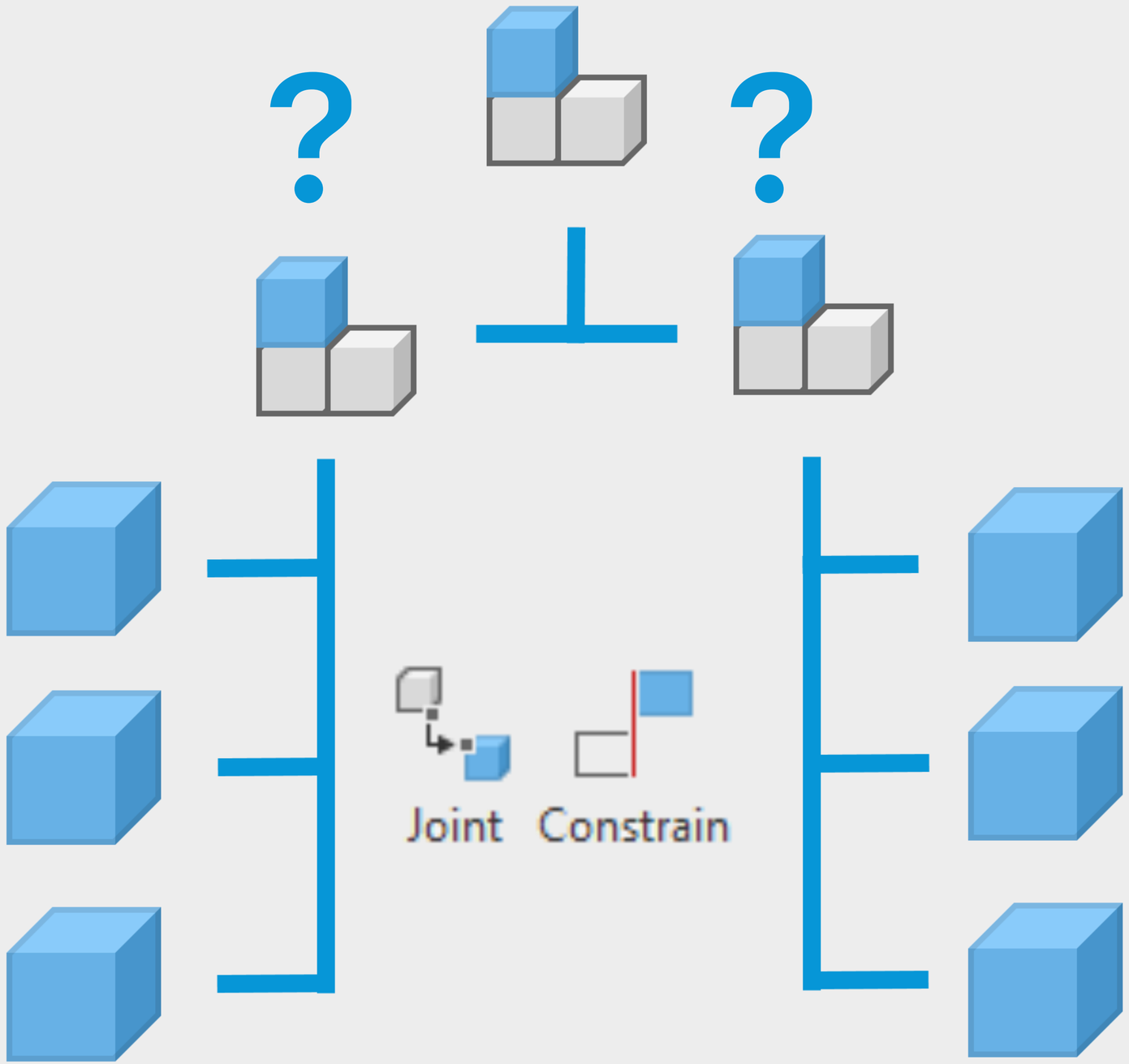
Great for assembly



Remove one DOF at a time

Faces (& Work Features)

Great for complex motion


Joint
Constrain

Joints V Constraints V ?

- Ground & Occurrence properties
- UCS constraints
- Derive (Skeletal or Multibody modelling)
- iLogic

Armbracket-Base:1 iProperties

General | Summary | Project | Status | Custom | Save | Occurrence | Physical

Name

Armbracket-Base:1

Properties

- [x] Visible
- [x] Enabled
- [ ] Degrees of Freedom
- [ ] iMate Glyph Visibility
- [ ] Assembly Dependencies
- [ ] Transparent
- [ ] Suppress
- [ ] Adaptive
- [ ] Flexible
- [x] Grounded
- [ ] Contact Set

BOM Structure

Default (Normal)

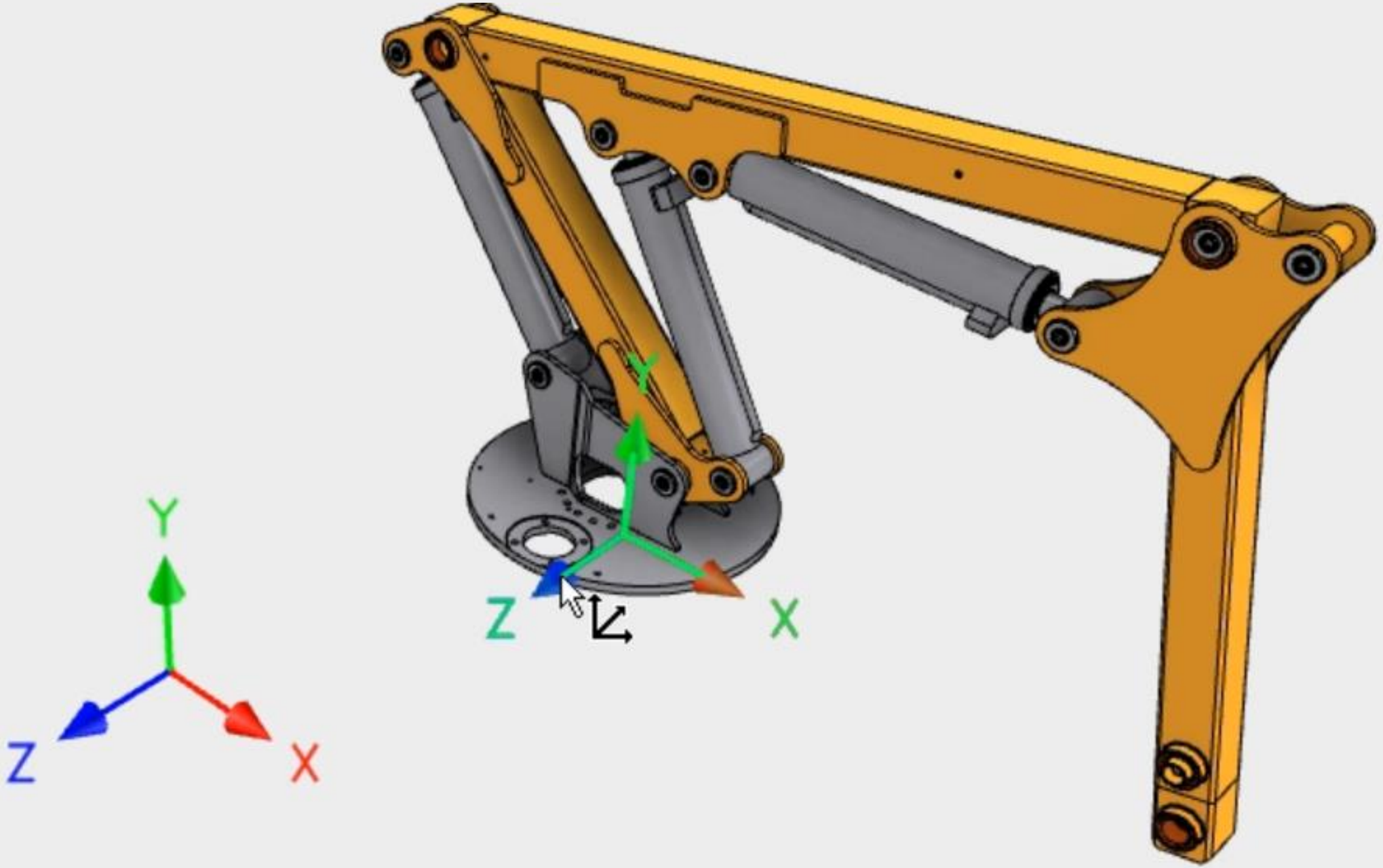
Appearance

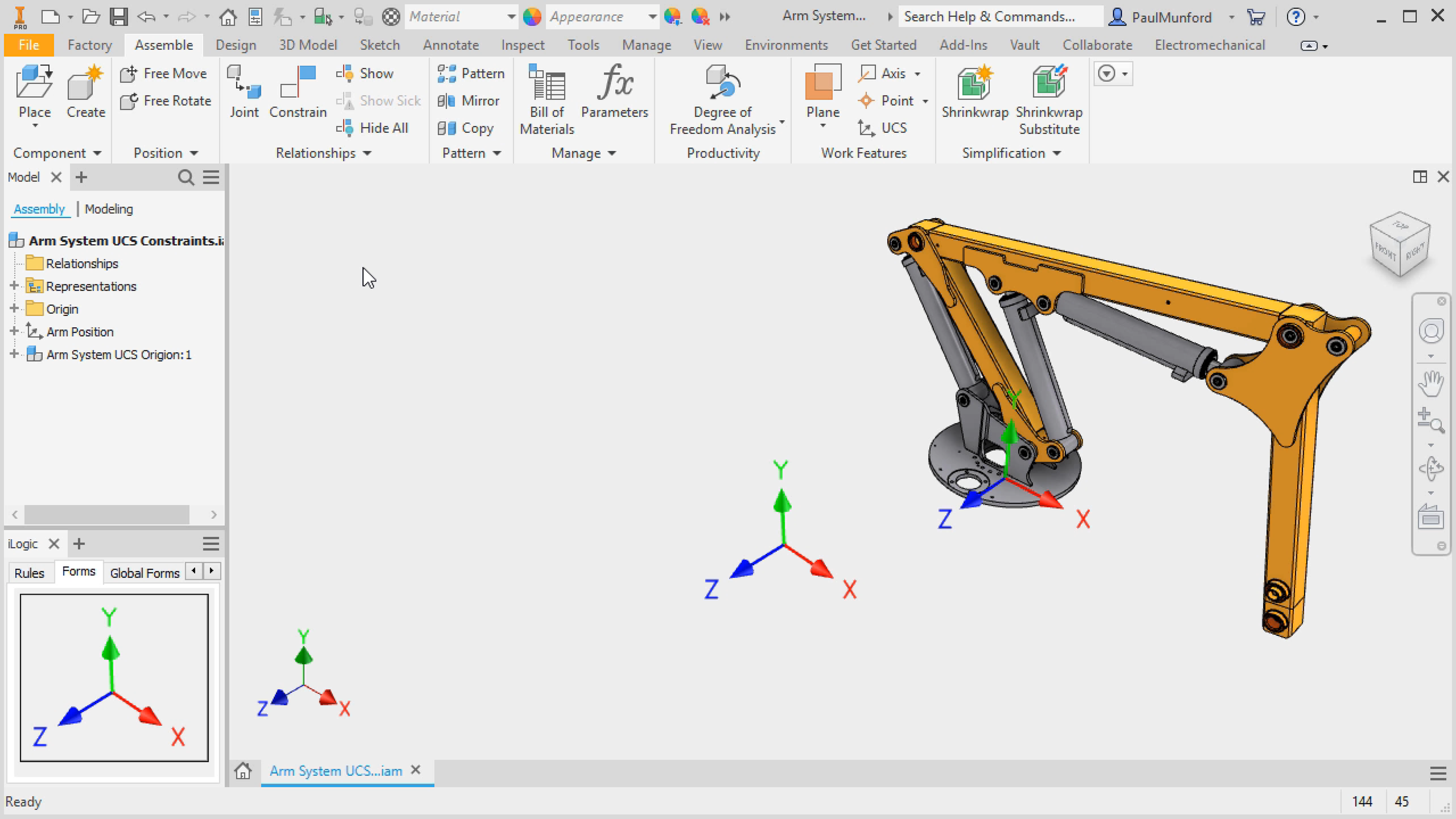
As Material

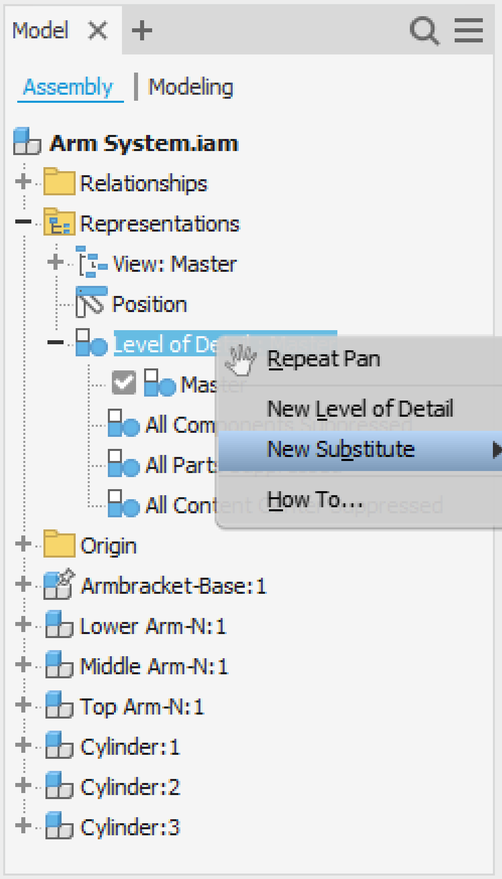
Current Offset from Parent Assembly Origin

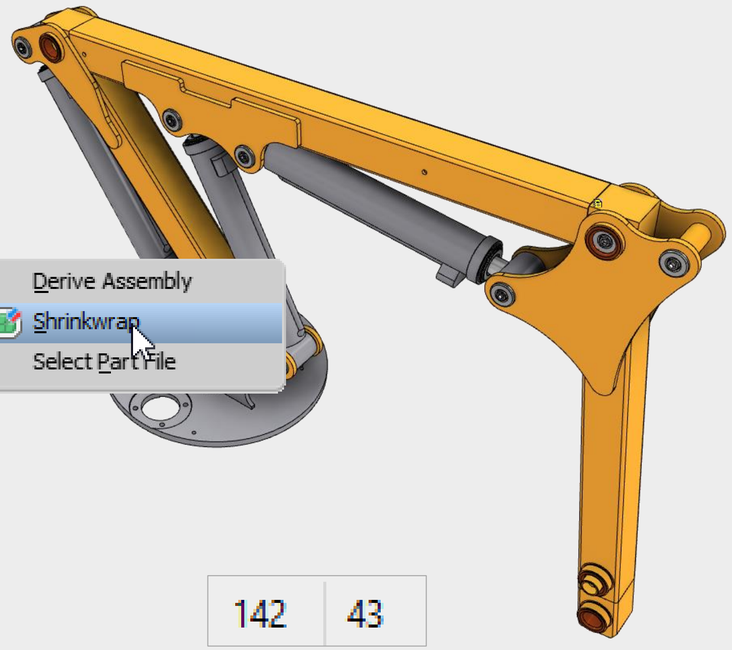
X Offset:	X Angle:
0.000 mm	89.9999813 deg
Y Offset:	Y Angle:
0.000 mm	0.00 deg
Z Offset:	Z Angle:
0.000 mm	0.00 deg

Close | Cancel | Apply

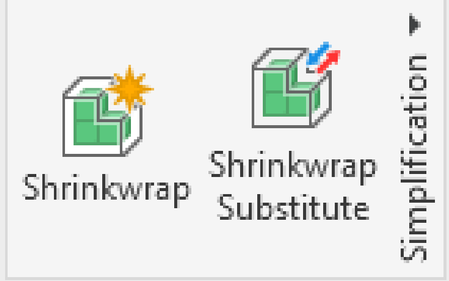

Y
Z
X
Y
Z
X

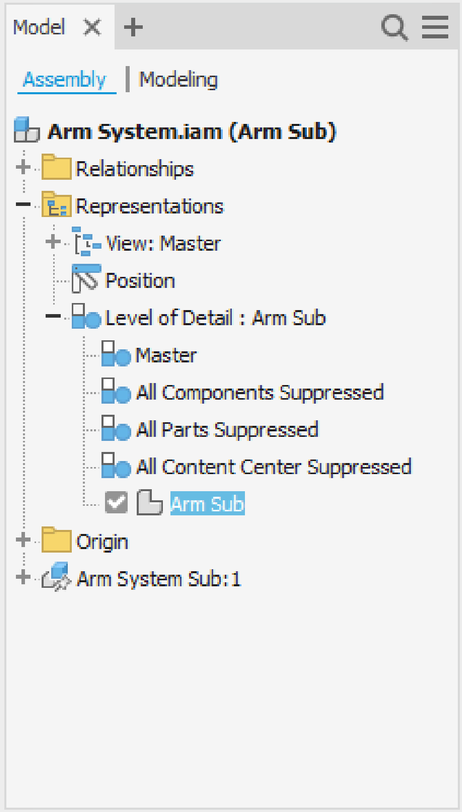

Material
Appearance
Arm System...
Search Help & Commands...
PaulMunford
File
Factory
Assemble
Design
3D Model
Sketch
Annotate
Inspect
Tools
Manage
View
Environments
Get Started
Add-Ins
Vault
Collaborate
Electromechanical
Place
Create
Free Move
Free Rotate
Joint
Constrain
Show
Show Sick
Hide All
Pattern
Mirror
Copy
Bill of Materials
Parameters
Degree of Freedom Analysis
Plane
Axis
Point
UCS
Shrinkwrap
Shrinkwrap Substitute
Component
Position
Relationships
Pattern
Manage
Productivity
Work Features
Simplification
Model
Assembly
Modeling
Arm System UCS Constraints.i
Relationships
Representations
Origin
Arm Position
Arm System UCS Origion:1
iLogic
Rules
Forms
Global Forms
Y
Z
X
Arm System UCS...iam
Ready
144
45


Model
Assembly
Modeling
Arm System.iam
Relationships
Representations
View: Master
Position
Repeat Pan
New Level of Detail
New Substitute
How To...
Derive Assembly
Shrinkwrap
Select Part File
Origin
Armbracket-Base:1
Lower Arm-N:1
Middle Arm-N:1
Top Arm-N:1
Cylinder:1
Cylinder:2
Cylinder:3



142 43

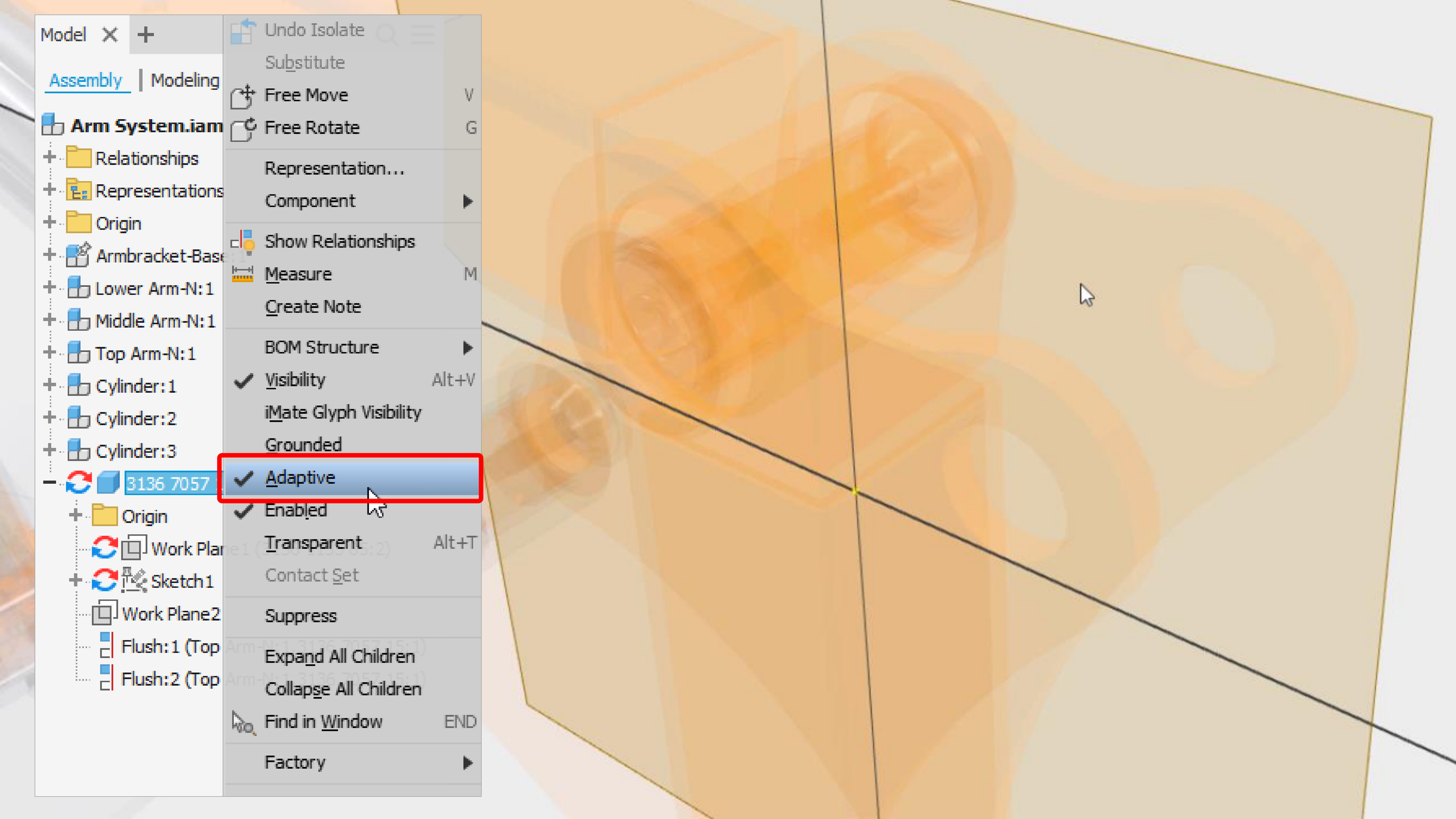

Shrinkwrap
Shrinkwrap Substitute
Simplification

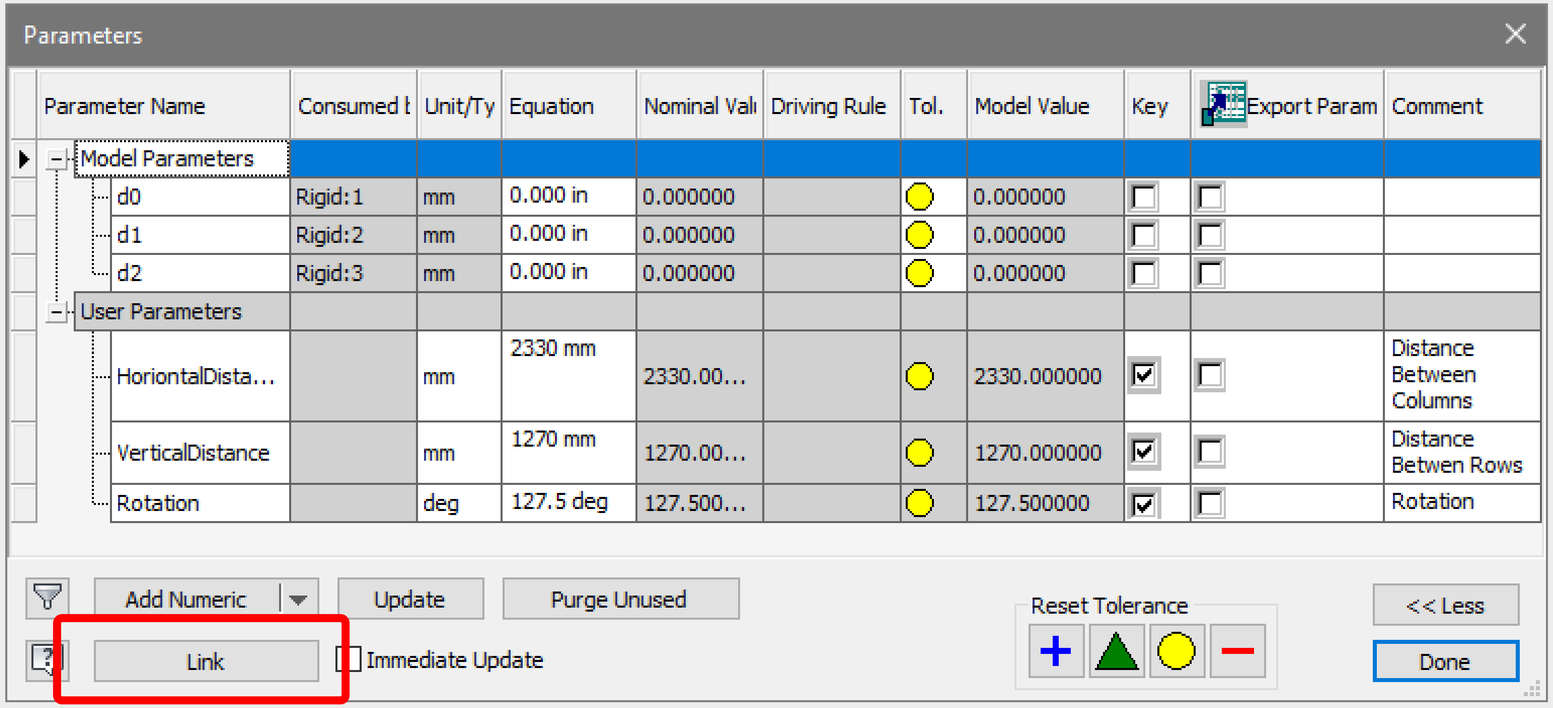

Model
Assembly
Modeling
Arm System.iam (Arm Sub)
Relationships
Representations
View: Master
Position
Level of Detail : Arm Sub
Master
All Components Suppressed
All Parts Suppressed
All Content Center Suppressed
Arm Sub
Origin
Arm System Sub:1

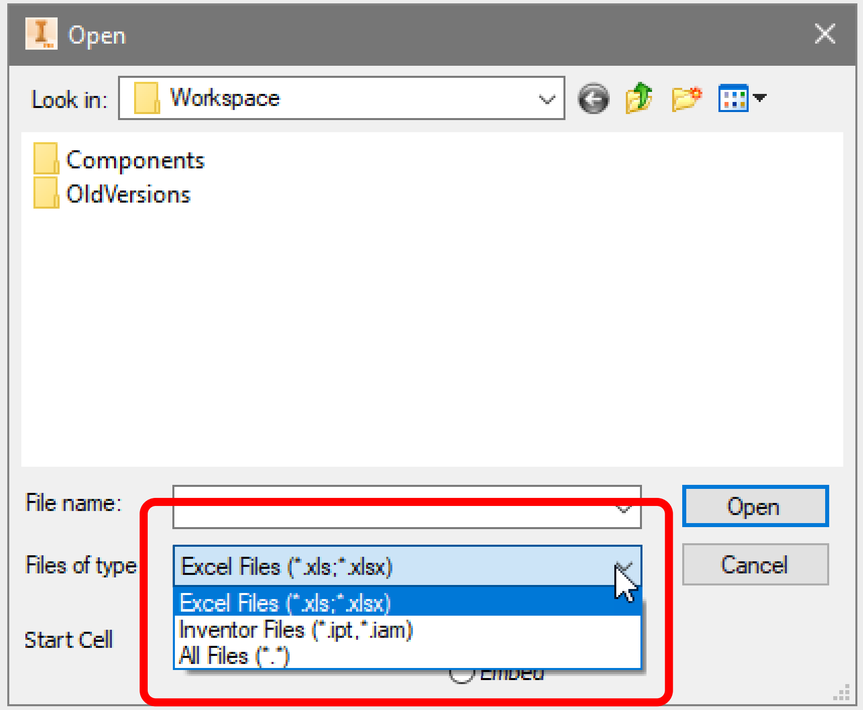
1 2

Feature Relationships

- Adaptivity
- Linking Parameters
- Derive (Skeletal or Multibody modelling)
- iLogic


Model
Assembly
Modeling
Arm System.iam
Relationships
Representations
Origin
Armbracket-Base
Lower Arm-N:1
Middle Arm-N:1
Top Arm-N:1
Cylinder:1
Cylinder:2
Cylinder:3
3136 7057
Origin
Work Plan
Sketch1
Work Plane2
Flush:1 (Top
Flush:2 (Top
Undo Isolate
Substitute
Free Move V
Free Rotate G
Representation...
Component
Show Relationships
Measure M
Create Note
BOM Structure
Visibility Alt+V
iMate Glyph Visibility
Grounded
Adaptive
Enabled
Transparent Alt+T
Contact Set
Suppress
Expand All Children
Collapse All Children
Find in Window END
Factory


Parameters
Parameter Name
Consumed t
Unit/Ty
Equation
Nominal Vali
Driving Rule
Tol.
Model Value
Key
Export Param
Comment
Model Parameters
d0
Rigid:1
mm
0.000 in
0.000000
0.000000
d1
Rigid:2
mm
0.000 in
0.000000
0.000000
d2
Rigid:3
mm
0.000 in
0.000000
0.000000
User Parameters
HoriontalDista...
mm
2330 mm
2330.00...
2330.000000
Distance Between Columns
VerticalDistance
mm
1270 mm
1270.00...
1270.000000
Distance Betwen Rows
Rotation
deg
127.5 deg
127.500...
127.500000
Rotation
Add Numeric
Update
Purge Unused
Link
Immediate Update
Reset Tolerance
<< Less
Done

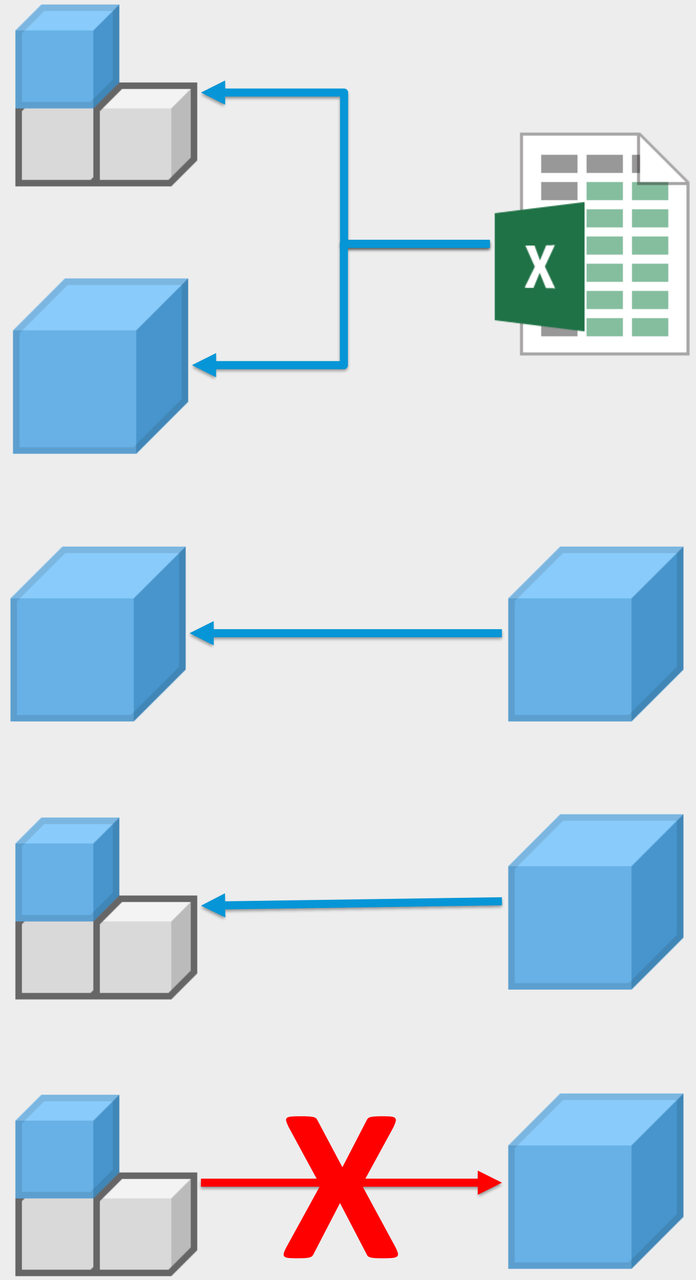

Open
Look in:
Workspace
Components
OldVersions
File name:
Files of type
Excel Files (*.xls;*.xlsx)
Excel Files (*.xls;*.xlsx)
Inventor Files (*.ipt,*.iam)
All Files (*.*)
Start Cell
Open
Cancel

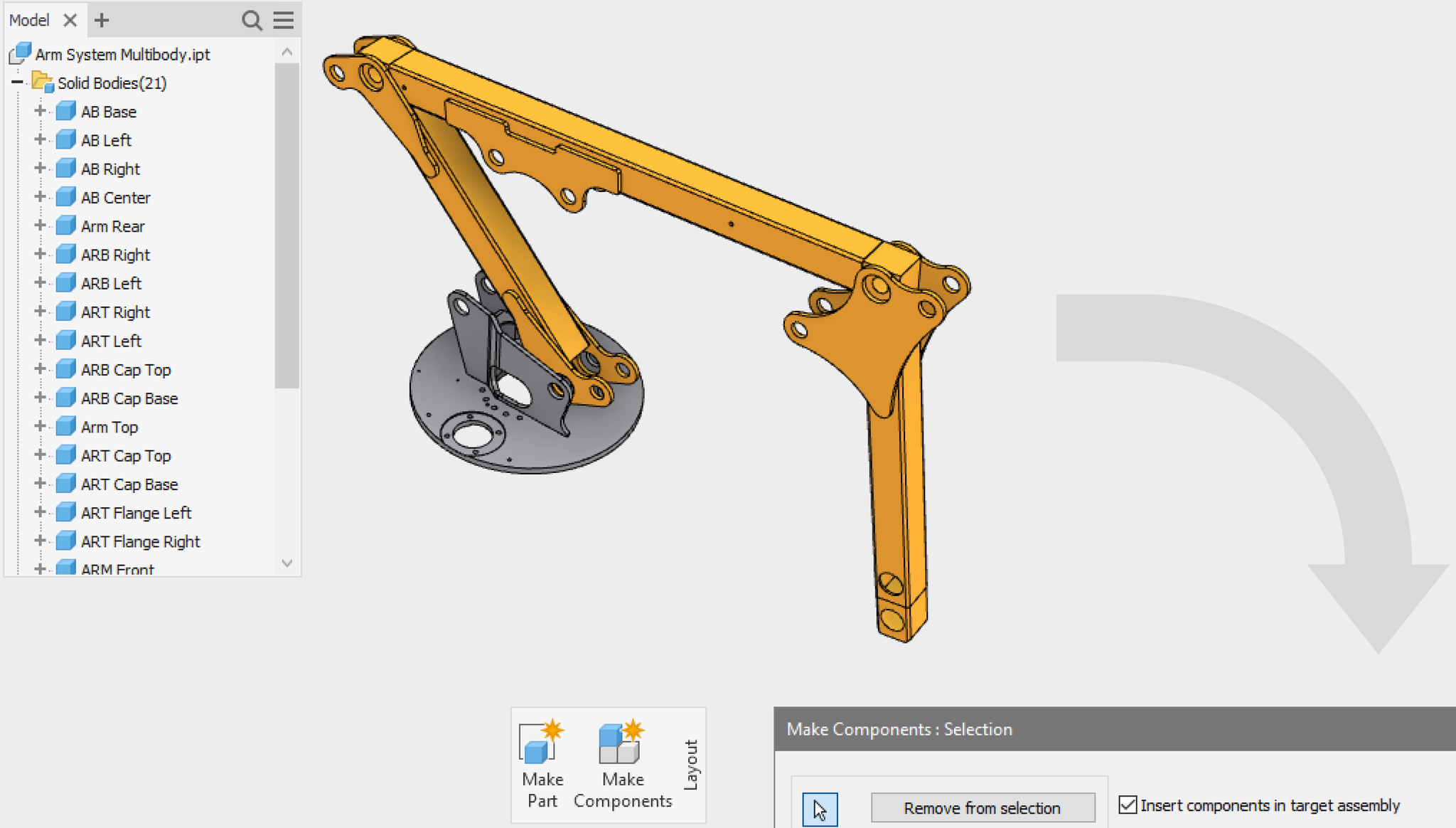
Excel to Part or Assembly

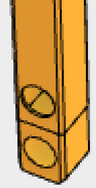
Part to Part

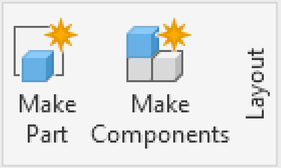
Part to Assembly

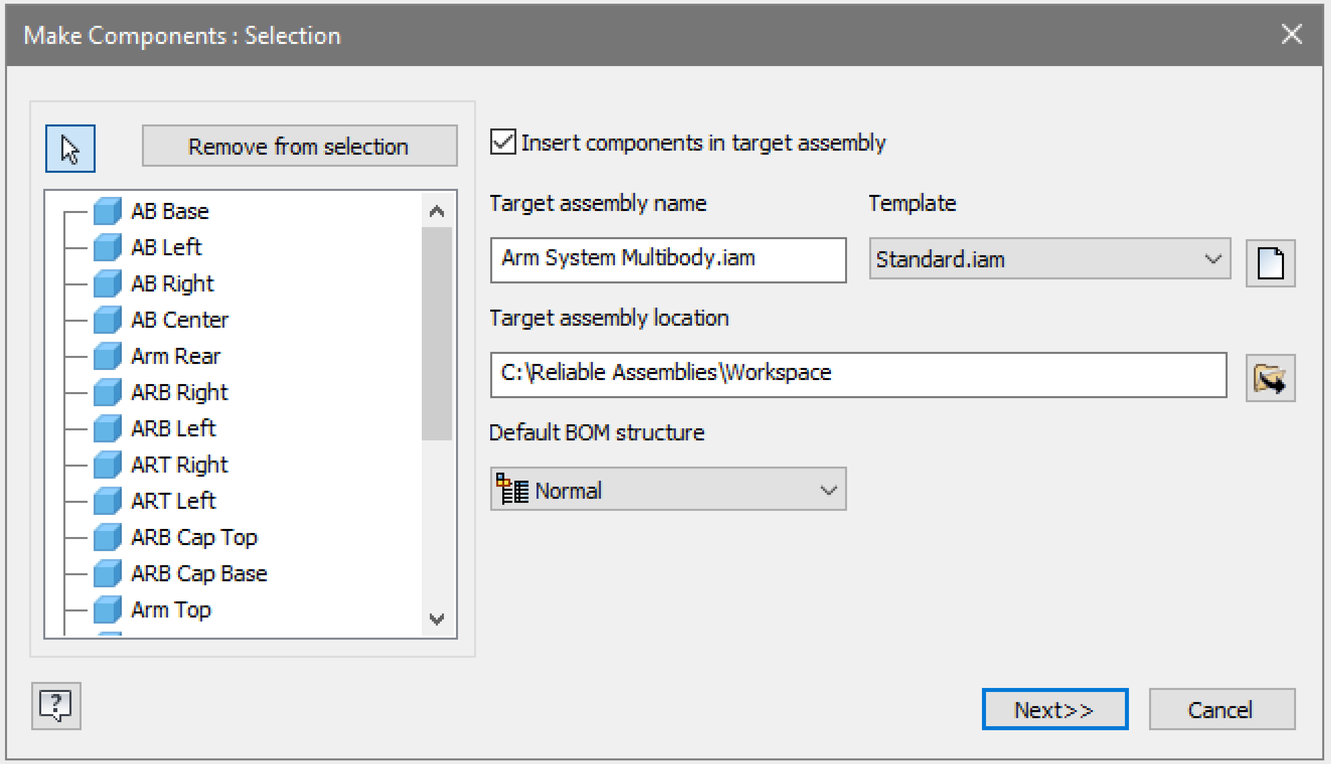
~~Assembly to Part~~

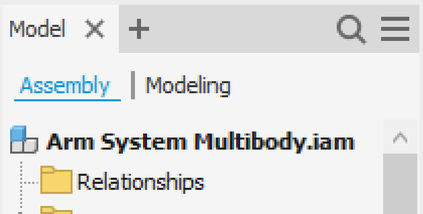


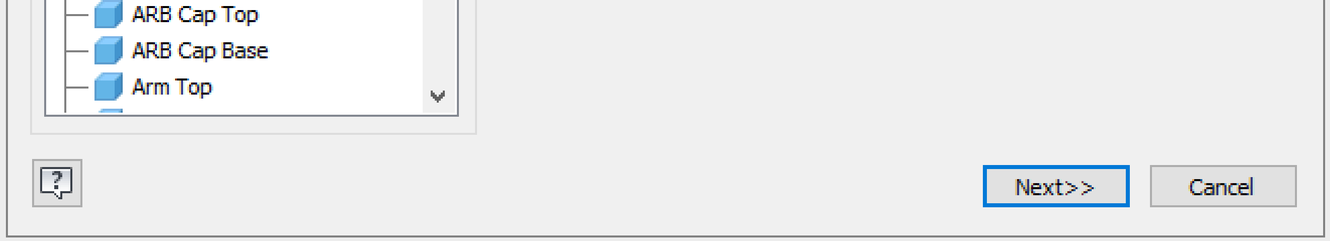

Model
Arm System Multibody.ipt
Solid Bodies(21)
AB Base
AB Left
AB Right
AB Center
Arm Rear
ARB Right
ARB Left
ART Right
ART Left
ARB Cap Top
ARB Cap Base
Arm Top
ART Cap Top
ART Cap Base
ART Flange Left
ART Flange Right
ARM Front
Make Part
Make Components
Layout
Make Components : Selection
Remove from selection
AB Base
AB Left
AB Right
AB Center
Arm Rear
ARB Right
Insert components in target assembly
Target assembly name
Template
Arm System Multibody.iam
Standard.iam
Target assembly location
C:\Reliable Assemblies\Workspace

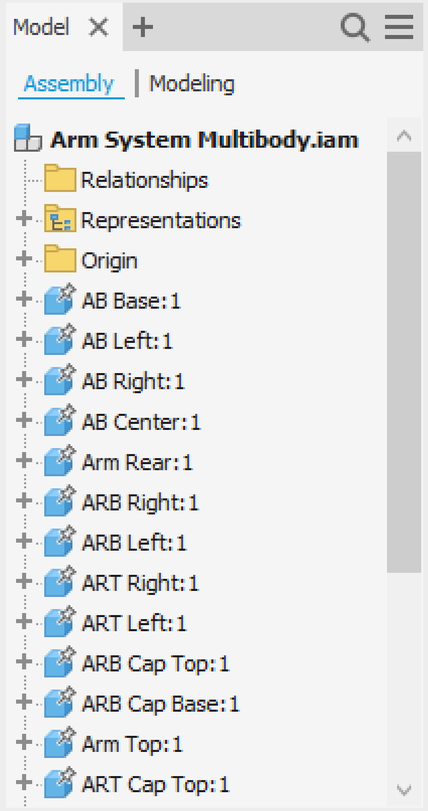


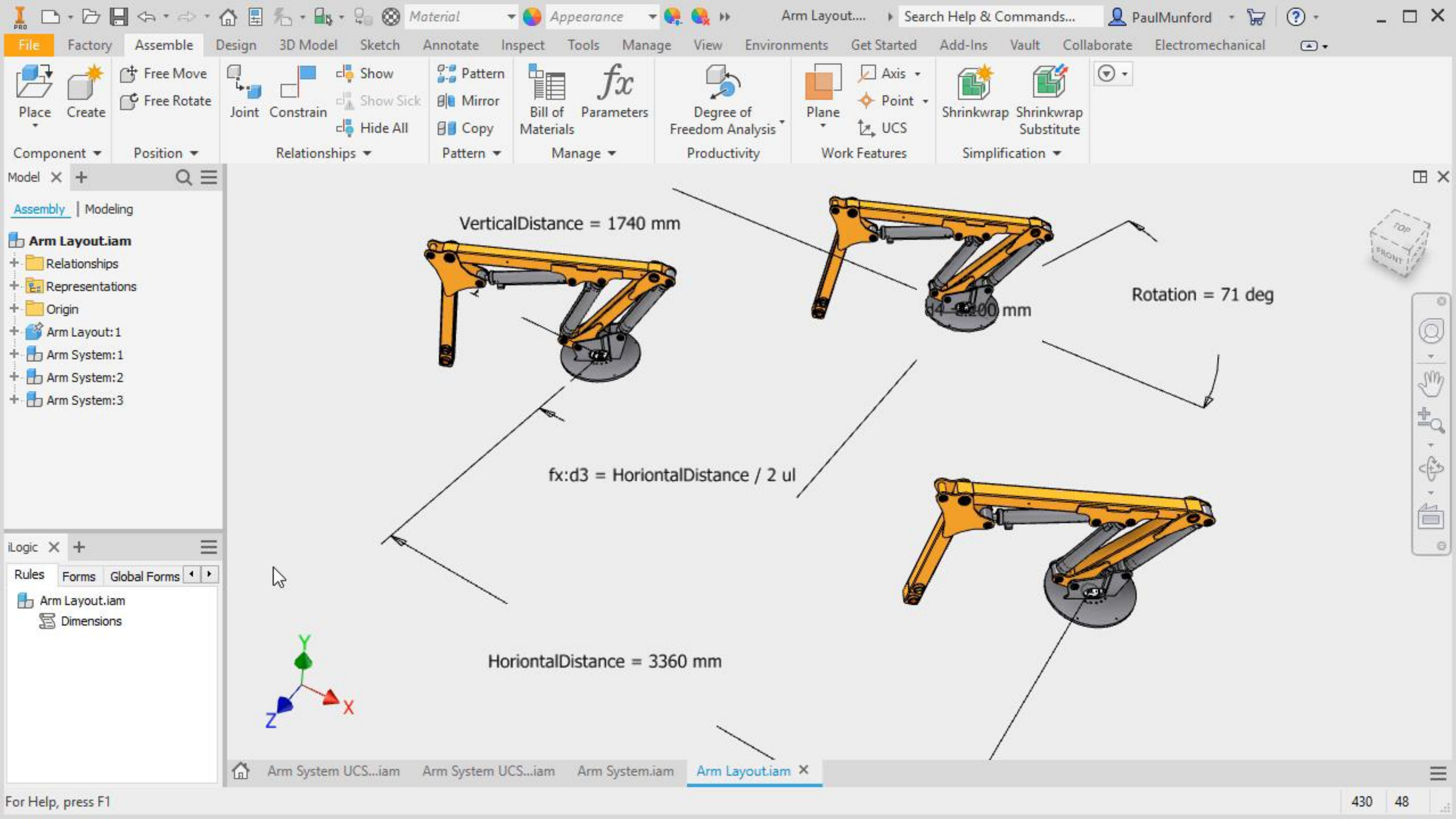

Make
Part
Make
Components
Layout

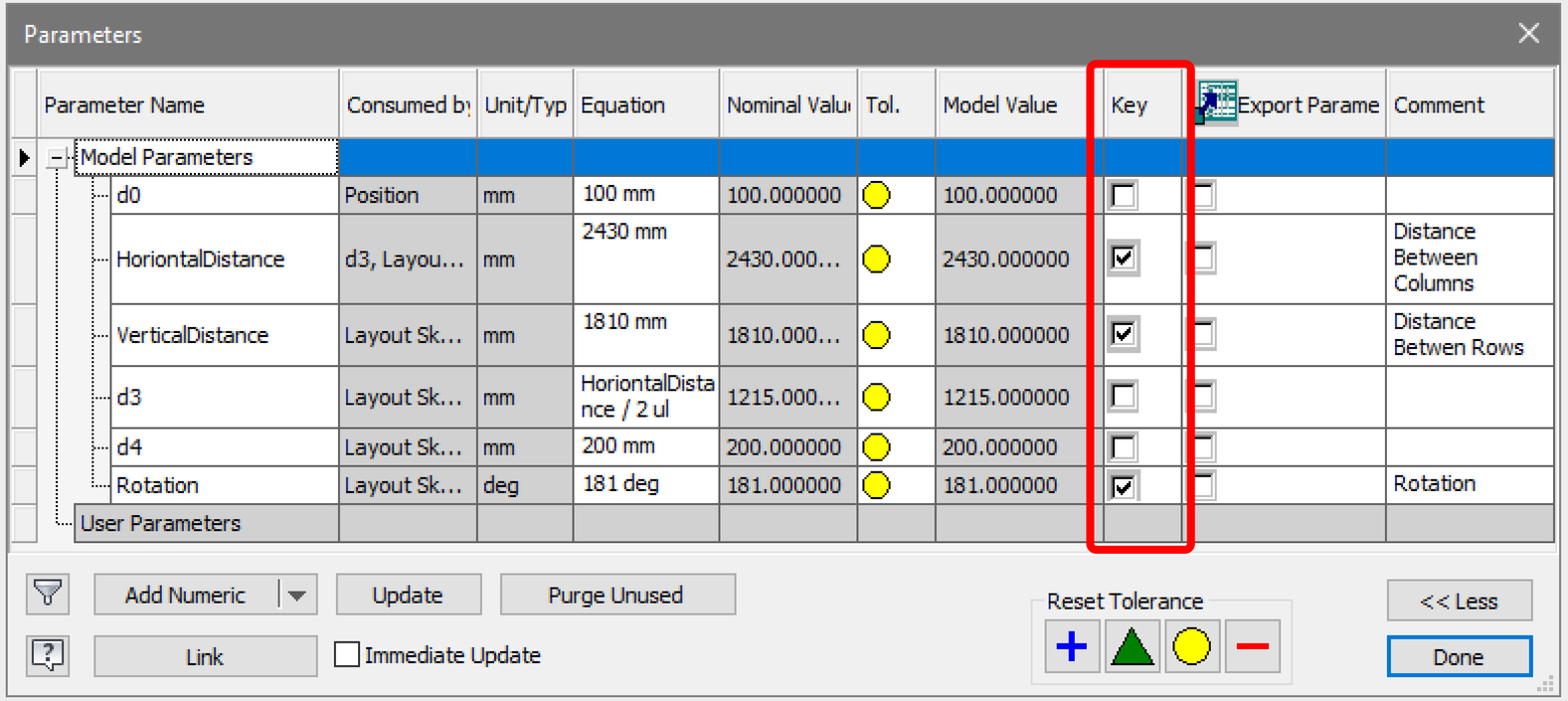

Make Components : Selection
Remove from selection
AB Base
AB Left
AB Right
AB Center
Arm Rear
ARB Right
ARB Left
ART Right
ART Left
ARB Cap Top
ARB Cap Base
Arm Top
Insert components in target assembly
Target assembly name
Template
Arm System Multibody.iam
Standard.iam
Target assembly location
C:\Reliable Assemblies\Workspace
Default BOM structure
Normal
Next>>
Cancel

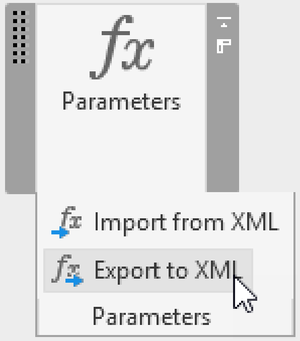

Model
Assembly
Modeling
Arm System Multibody.iam
Relationships

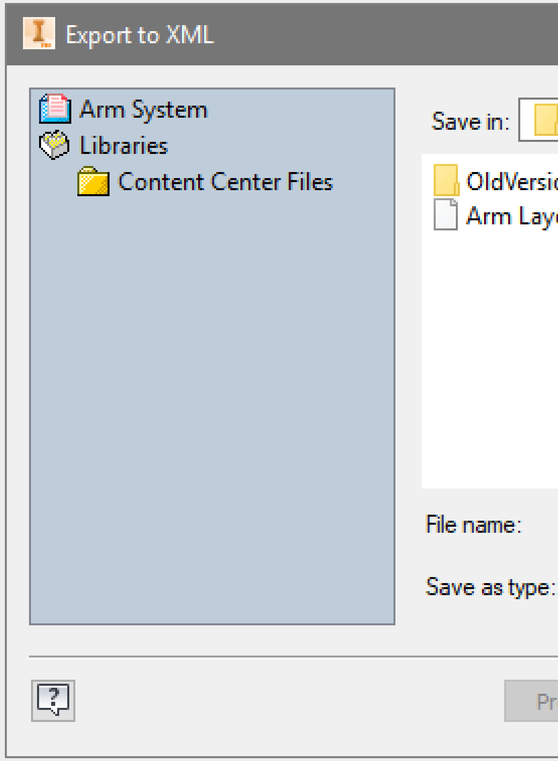

ARB Cap Top
ARB Cap Base
Arm Top
Next>>
Cancel

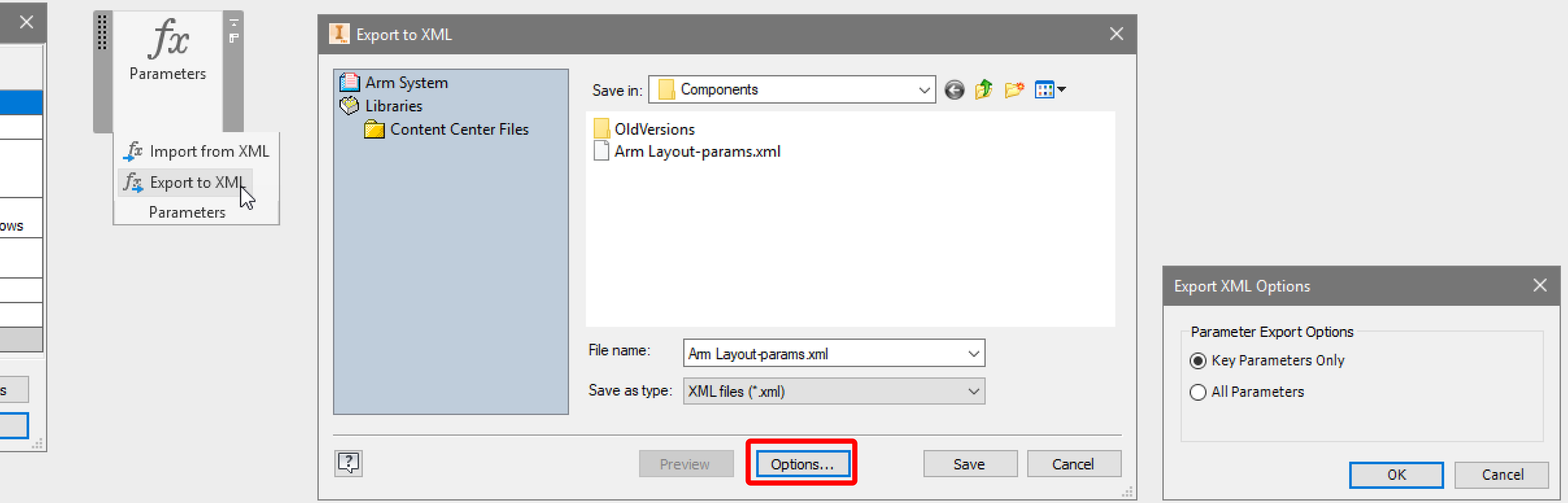

Model
Assembly
Modeling
Arm System Multibody.iam
Relationships
Representations
Origin
AB Base:1
AB Left:1
AB Right:1
AB Center:1
Arm Rear:1
ARB Right:1
ARB Left:1
ART Right:1
ART Left:1
ARB Cap Top:1
ARB Cap Base:1
Arm Top:1
ART Cap Top:1

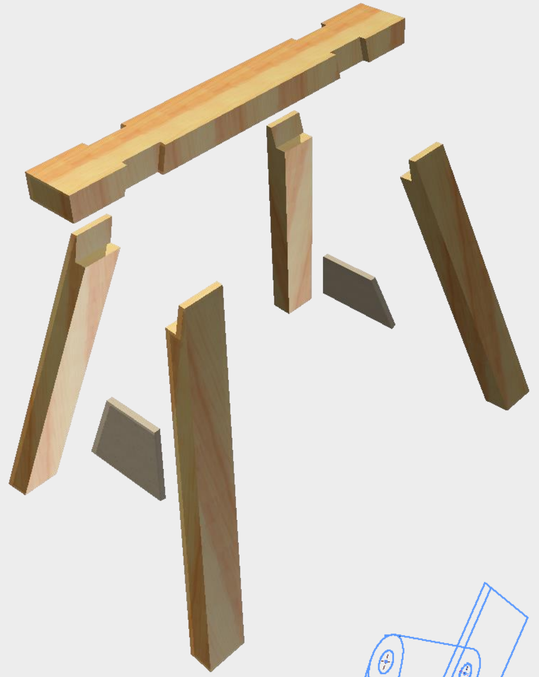

VerticalDistance = 1740 mm
Rotation = 71 deg
fx:d3 = HoriontalDistance / 2 ul
HoriontalDistance = 3360 mm

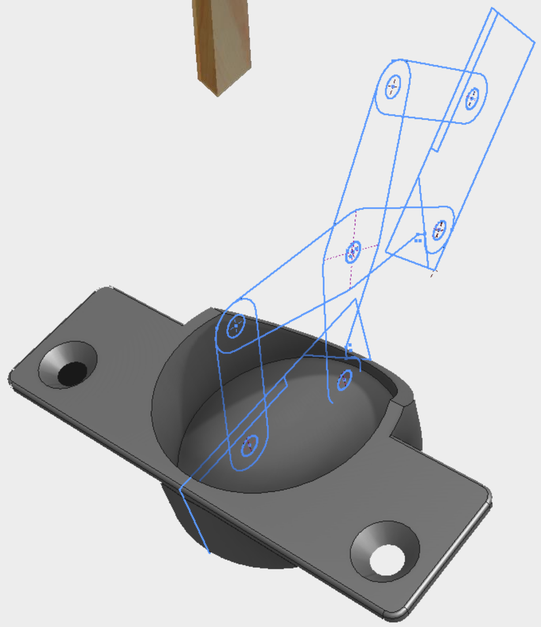

Parameters
Parameter Name
Consumed by
Unit/Typ
Equation
Nominal Valu
Tol.
Model Value
Key
Export Parame
Comment
Model Parameters
d0
Position
mm
100 mm
100.000000
100.000000
HoriontalDistance
d3, Layou...
mm
2430 mm
2430.000...
2430.000000
Distance Between Columns
VerticalDistance
Layout Sk...
mm
1810 mm
1810.000...
1810.000000
Distance Betwen Rows
d3
Layout Sk...
mm
HoriontalDistance / 2 ul
1215.000...
1215.000000
d4
Layout Sk...
mm
200 mm
200.000000
200.000000
Rotation
Layout Sk...
deg
181 deg
181.000000
181.000000
Rotation
User Parameters
Add Numeric
Update
Purge Unused
Reset Tolerance
<< Less
Link
Immediate Update
Done


Parameters
Import from XML
Export to XML
Parameters


Export to XML
Arm System
Libraries
Content Center Files
Save in:
OldVersio
Arm Layo
File name:
Save as type:


Parameters
Import from XML
Export to XML
Parameters
Export to XML
Arm System
Libraries
Content Center Files
Save in:
Components
OldVersions
Arm Layout-params.xml
File name:
Arm Layout-params.xml
Save as type:
XML files (*.xml)
Preview
Options...
Save
Cancel
Export XML Options
Parameter Export Options
Key Parameters Only
All Parameters
OK
Cancel



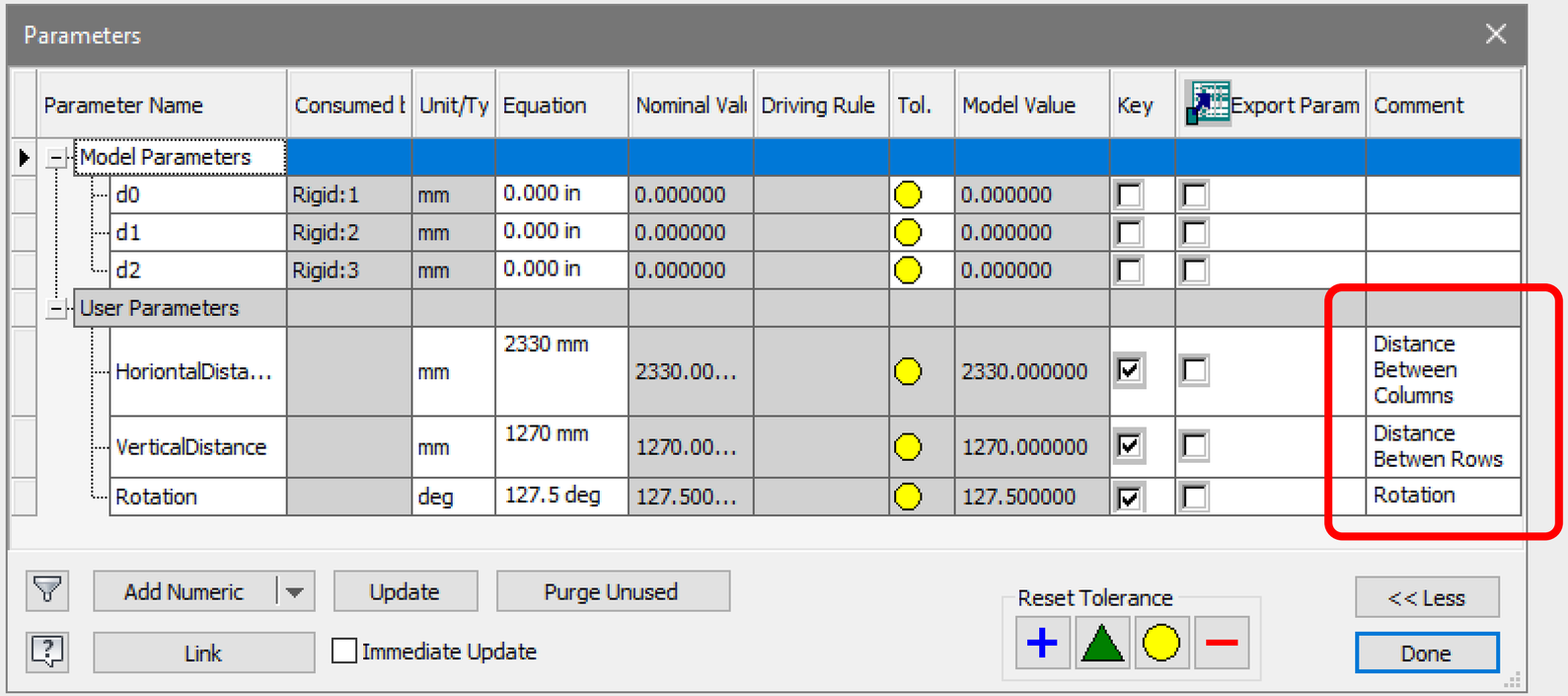


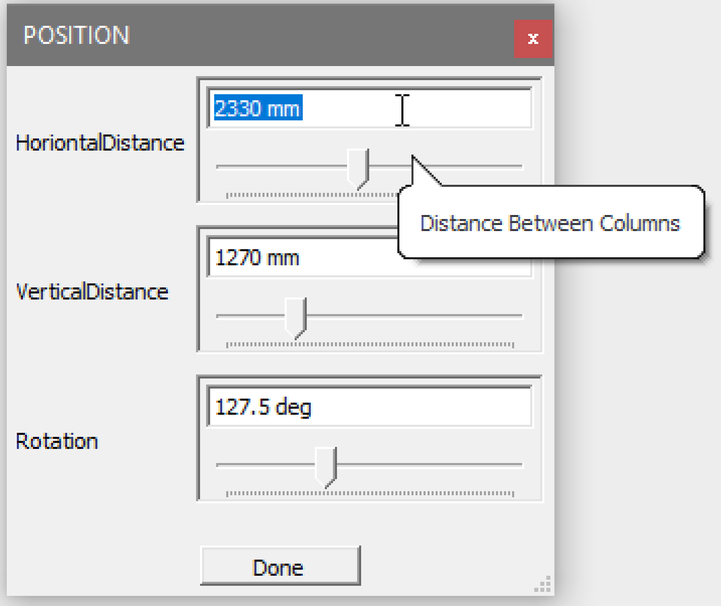
https://www.autodesk.com/autodesk-university/class/How-Drive-AutodeskR-InventorR-Top-Down-Alternative-Assembly-Modeling-Master-Class-2012

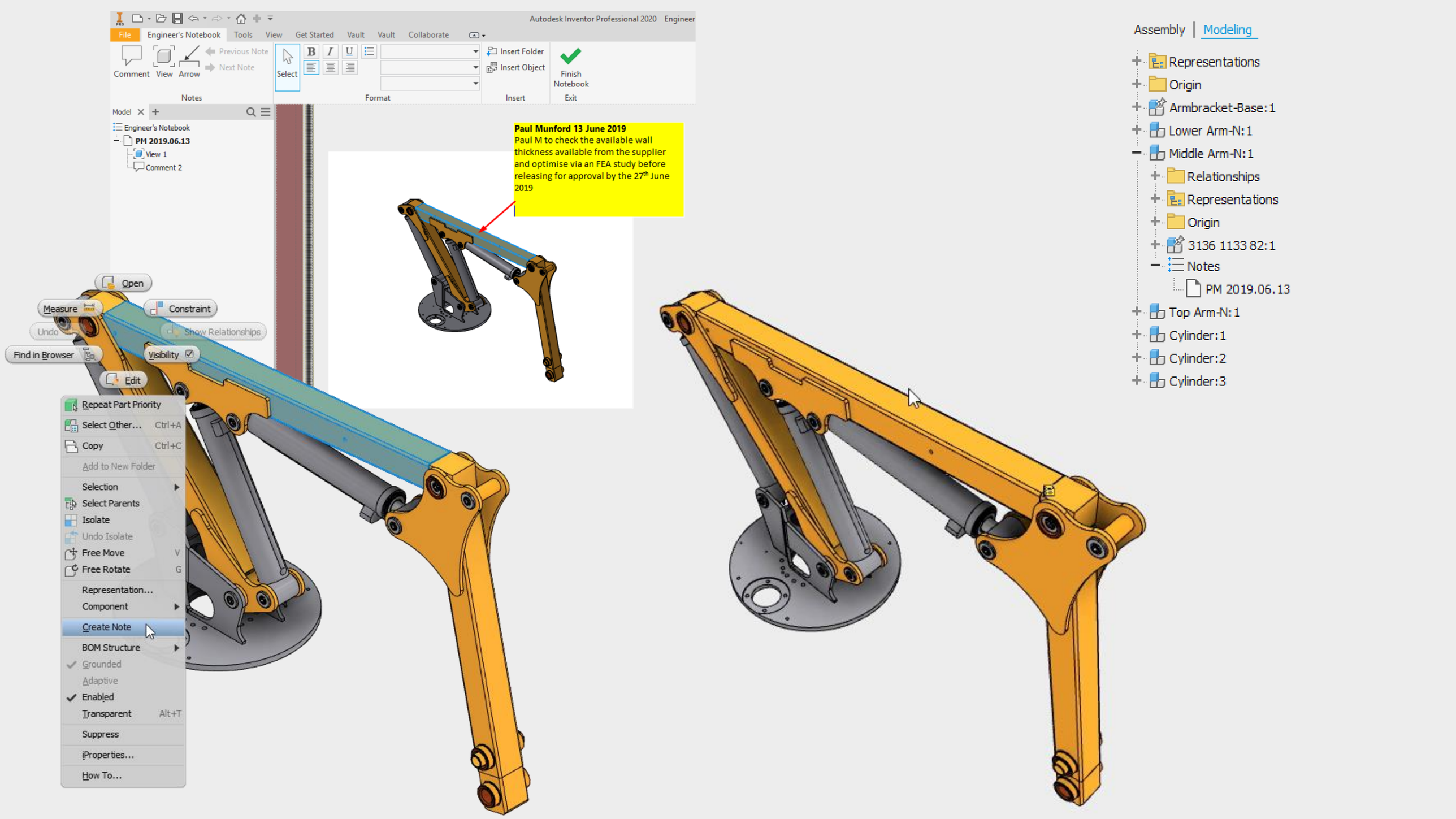
Before you start – *STOP*! Planning is key

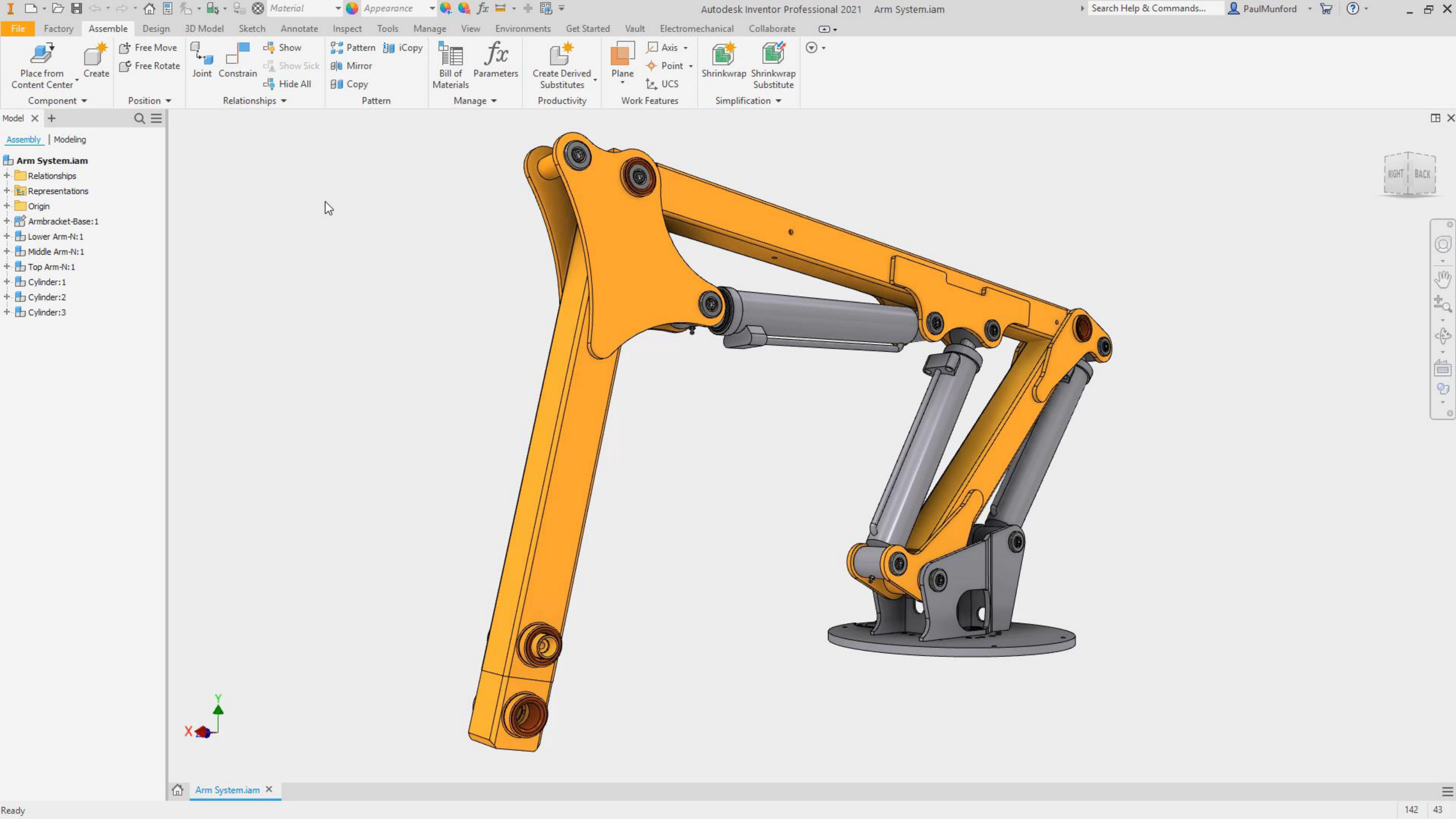
- ❑ File names
- ❑ Parameter names
- ❑ Data
- ❑ Origin
- ❑ Base component
- ❑ Relationship strategy
- ❑ Change – Design Intent
- ❑ Document

DOCUMENT


Parameters
Parameter Name
Consumed I
Unit/Ty
Equation
Nominal Vali
Driving Rule
Tol.
Model Value
Key
Export Param
Comment
Model Parameters
d0
Rigid:1
mm
0.000 in
0.000000
0.000000
d1
Rigid:2
mm
0.000 in
0.000000
0.000000
d2
Rigid:3
mm
0.000 in
0.000000
0.000000
User Parameters
HoriontalDista...
mm
2330 mm
2330.00...
2330.000000
Distance Between Columns
VerticalDistance
mm
1270 mm
1270.00...
1270.000000
Distance Betwen Rows
Rotation
deg
127.5 deg
127.500...
127.500000
Rotation
Add Numeric
Update
Purge Unused
Link
Immediate Update
Reset Tolerance
<< Less
Done


POSITION
HoriontalDistance
2330 mm
Distance Between Columns
VerticalDistance
1270 mm
Rotation
127.5 deg
Done


Autodesk Inventor Professional 2020 Engineer
File
Engineer's Notebook
Tools
View
Get Started
Vault
Vault
Collaborate
Comment
View
Arrow
Previous Note
Next Note
Notes
Select
Format
Insert Folder
Insert Object
Insert
Finish Notebook
Exit
Model
Engineer's Notebook
PM 2019.06.13
View 1
Comment 2
Paul Munford 13 June 2019
Paul M to check the available wall thickness available from the supplier and optimise via an FEA study before releasing for approval by the 27th June 2019
Open
Measure
Constraint
Undo
Show Relationships
Find in Browser
Visibility
Edit
Repeat Part Priority
Select Other... Ctrl+A
Copy Ctrl+C
Add to New Folder
Selection
Select Parents
Isolate
Undo Isolate
Free Move V
Free Rotate G
Representation...
Component
Create Note
BOM Structure
Grounded
Adaptive
Enabled
Transparent Alt+T
Suppress
iProperties...
How To...
Assembly
Modeling
Representations
Origin
Armbracket-Base:1
Lower Arm-N:1
Middle Arm-N:1
Relationships
Representations
Origin
3136 1133 82:1
Notes
PM 2019.06.13
Top Arm-N:1
Cylinder:1
Cylinder:2
Cylinder:3


Material
Appearance
Autodesk Inventor Professional 2021
Arm System.iam
Search Help & Commands...
PaulMunford
File
Factory
Assemble
Design
3D Model
Sketch
Annotate
Inspect
Tools
Manage
View
Environments
Get Started
Vault
Electromechanical
Collaborate
Place from Content Center
Create
Free Move
Free Rotate
Joint
Constrain
Show
Show Sick
Hide All
Pattern
iCopy
Mirror
Copy
Bill of Materials
Parameters
Create Derived Substitutes
Plane
Axis
Point
UCS
Shrinkwrap
Shrinkwrap Substitute
Component
Position
Relationships
Pattern
Manage
Productivity
Work Features
Simplification
Model
Assembly
Modeling
Arm System.iam
Relationships
Representations
Origin
Armbracket-Base:1
Lower Arm-N:1
Middle Arm-N:1
Top Arm-N:1
Cylinder:1
Cylinder:2
Cylinder:3
RIGHT
BACK
Y
X
Arm System.iam
Ready
142
43

Reliable Modelling Techniques for Complex Assembly Design in Autodesk Inventor

Summary

- Before you start – *Stop*! Make a plan (use the checklist from the handout).
- Standardize the Application settings and Templates.
- Take charge of your Relationships.
- *Flex*. Don’t leave booby traps behind.
- Document your design intent.
- Look for ways to improve for next time.

Q&A (My Turn!)

Q: Name Paul's two criteria for a well modelled Assembly?
A: Correct Data and Easy to update.

Q: Name four places that Data can be added to a component?
A: Materials & Appearances, Parameters, Bill of materials and iProperties.

Q: List Paul's four relationship rules?
A: Minimum, Intended, Planed, Obvious.

Q: List four ways to document design intent?
A: Parameter comments, Engineer's Notebook, 3DA, iLogic form.

Please help me by recommending this class!

@PaulCADMunford

Q&A