



**UGS**

*Transforming the  
process of innovation*



# Managing Large Assemblies

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Product Manager – Solid Edge

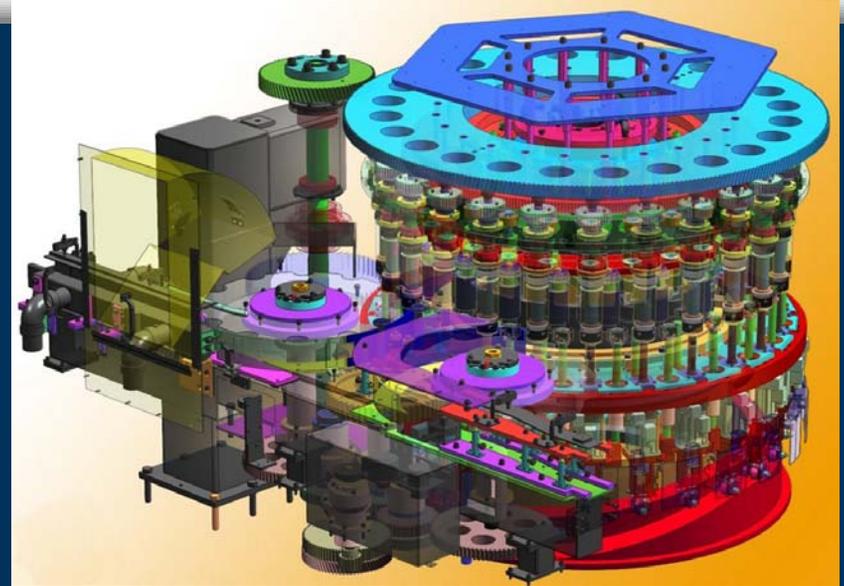




# Topics

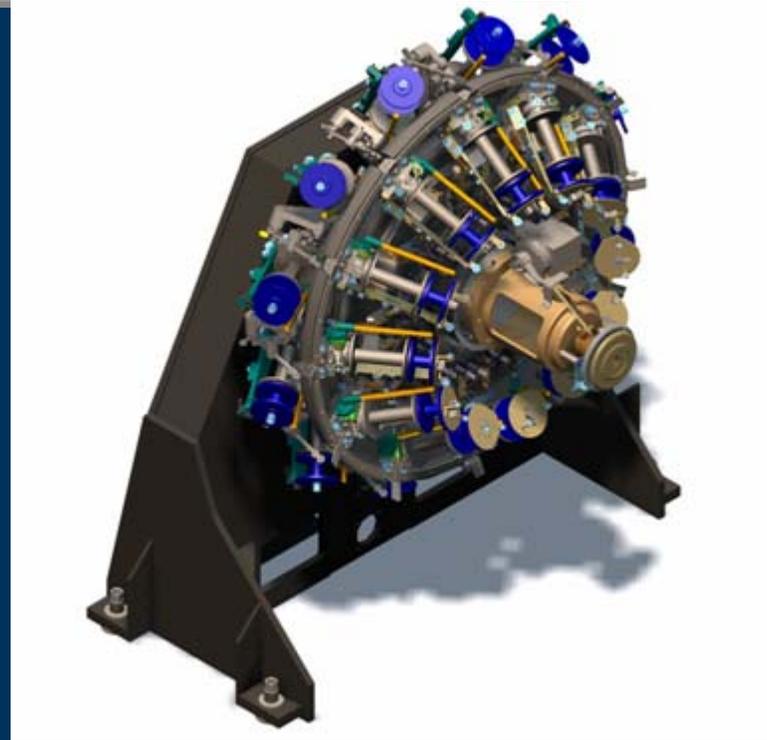


- ▶ Large Assembly Examples
- ▶ Definitions
- ▶ Solid Edge Settings
- ▶ Latest Enhancements
  - ▶ Hide All Components
  - ▶ Pathfinder Interaction
  - ▶ Simplified Assemblies
  - ▶ Pre-Defined Components
- ▶ Miscellaneous
- ▶ Conclusions



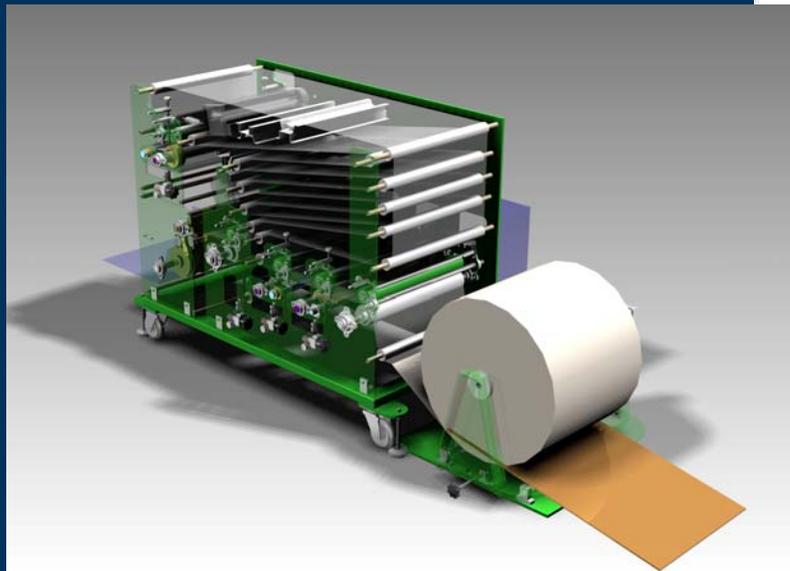
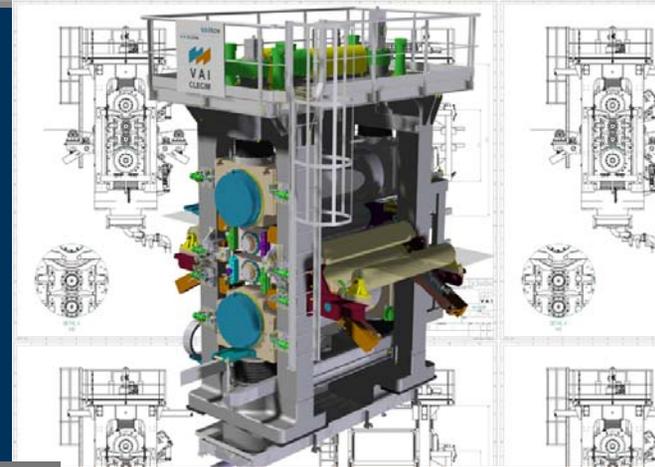
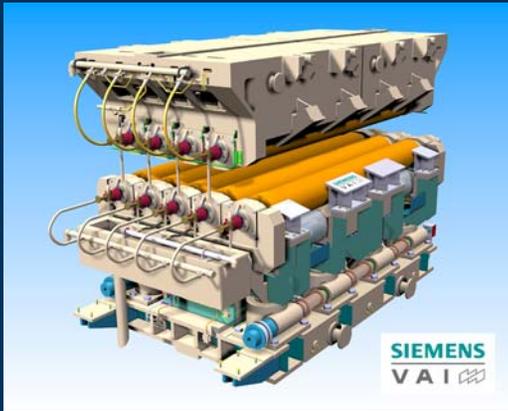


# Large Assembly Examples



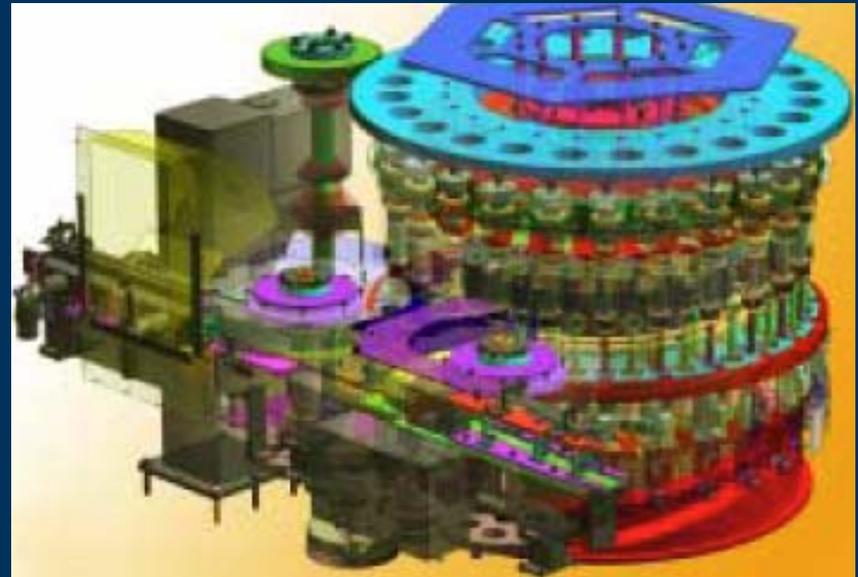
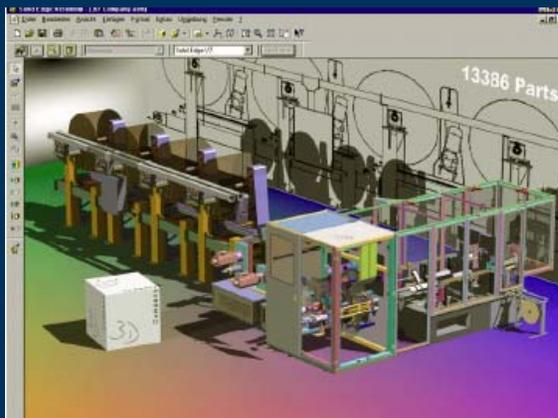


# Large Assembly Examples





# Large Assembly Examples





# Comments



- ▶ There are various settings/options that affect handling of massive assemblies
- ▶ Each setting can affect different aspects of handling large assemblies
- ▶ Areas classifying massive assemblies include:
  - ▶ File Open
  - ▶ View Manipulation
  - ▶ Drawing View Creation
  - ▶ Other (locate, recompute, etc)



# Display Modes



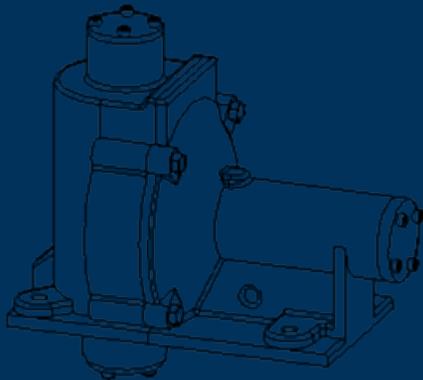
Visible Edges

Visible and Hidden Edges

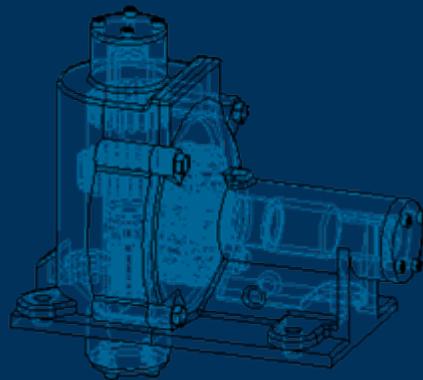
Shaded

Shaded with Visible Edges

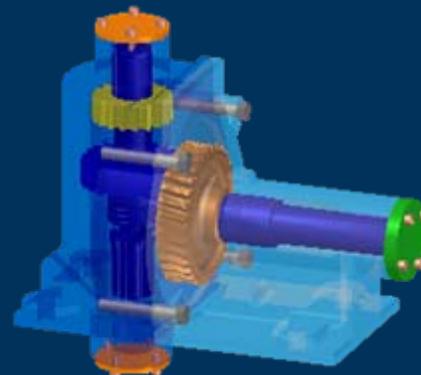
Slower



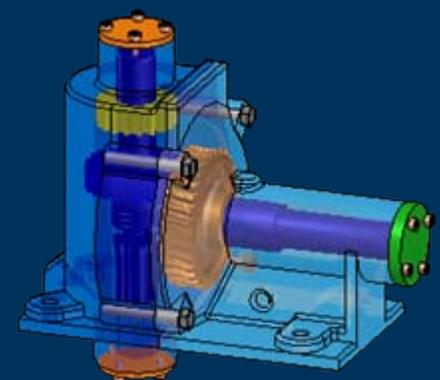
Slower



Fastest



Slower

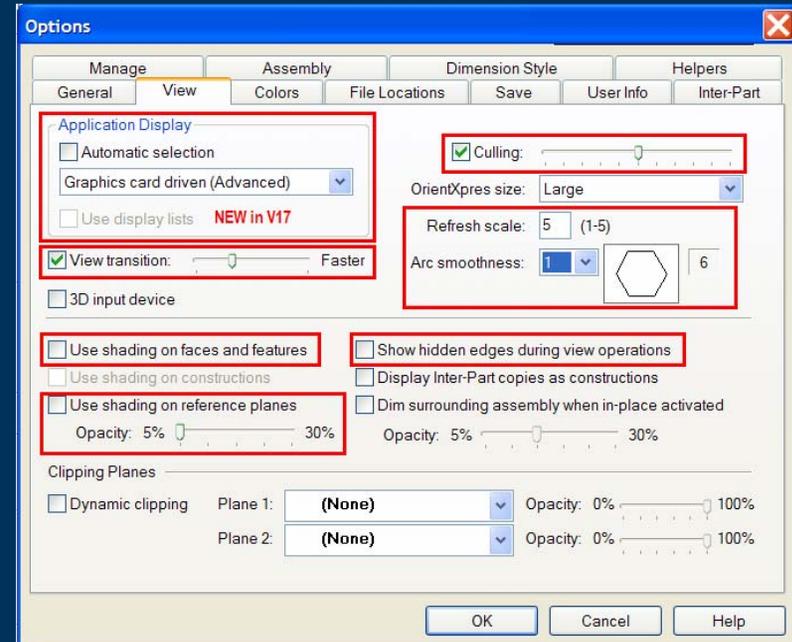




# Solid Edge View Settings



- ▶ Specific View settings can affect display performance
- ▶ Application Display
  - ▶ Graphics Card Driven (Advanced) BEST, but not always
  - ▶ Graphics Card Driven (Basic) GOOD
  - ▶ Backing Store OK
  - ▶ Software driven WORST
- ▶ Use Display List – NEW in V17
  - ▶ Only certain cards (Advanced) support this
  - ▶ Significant performance improvements

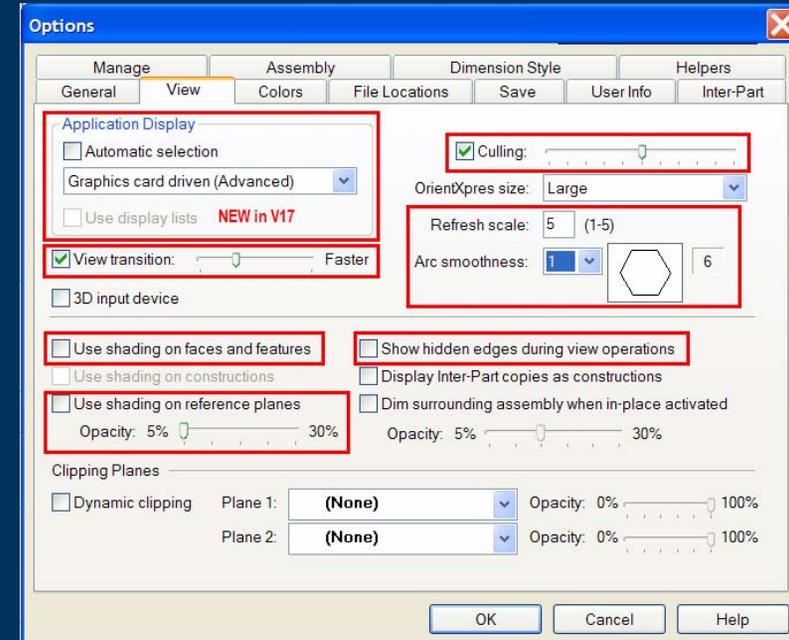




# Solid Edge View Settings (Cont)



- ▶ Culling
  - ▶ Affects dynamic view manipulations only
  - ▶ Drops from the display geometry based on size of objects relative to view volume
- ▶ Refresh Scale
  - ▶ Affects wireframe/outline display modes only
  - ▶ Affects zoom in/out and Pan commands only
- ▶ Arc Smoothness
  - ▶ Minimum # of lines to represent an arc
  - ▶ Lower values coarser but faster



- Show Hidden edges during view manipulations
- Use shading on reference planes
- Use shaded on faces and features



# Solid Edge Settings



- ▶ Unloading Hidden Parts from Memory
- ▶ Active/Inactive Part Settings
- ▶ Simplified Parts
- ▶ Configurations
- ▶ Link Resolution
- ▶ Other Items



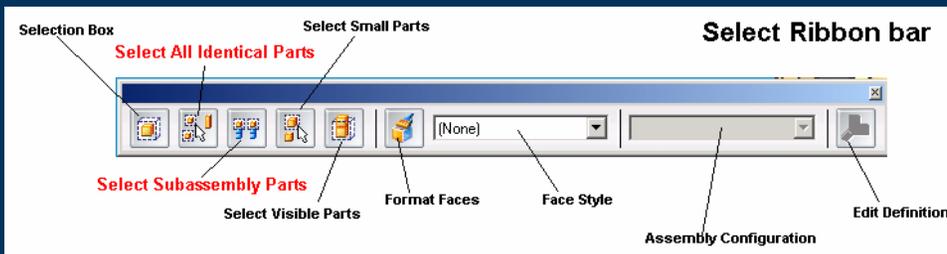
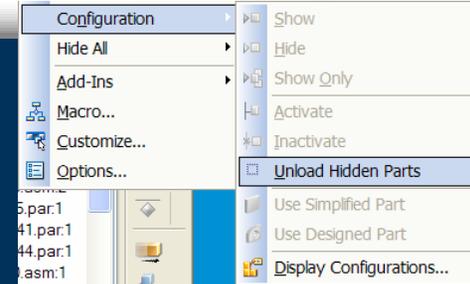


# Unloading Hidden Parts



## ▶ Hiding/Unloading Parts

- ▶ Working with large assemblies, you often work in limited areas for a period of time
- ▶ Hide parts that are not part of area during the session
- ▶ Use Select Tools to locate parts you want hidden
- ▶ Use Tools-Configurations - Unload Hidden Parts to free up memory
- ▶ Examples:
  - ▶ Small parts
  - ▶ Subassembly Parts
  - ▶ Identical Parts



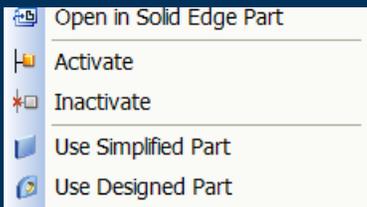


# Part Active/Inactive Setting

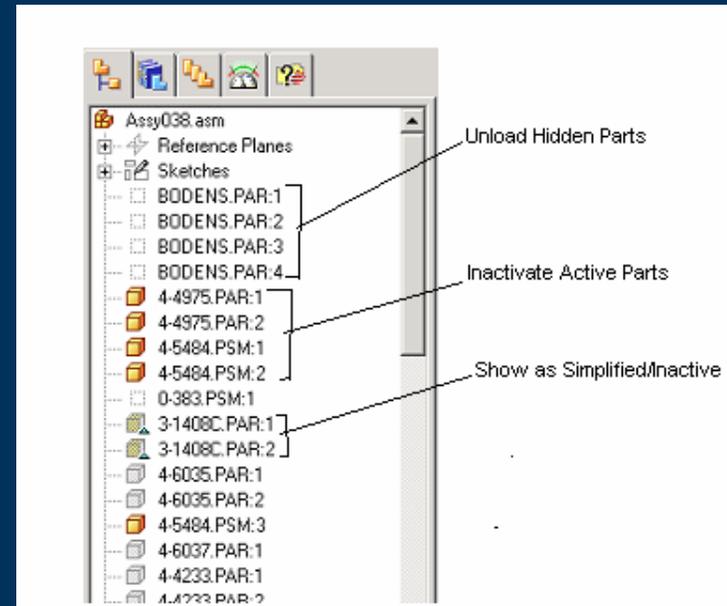
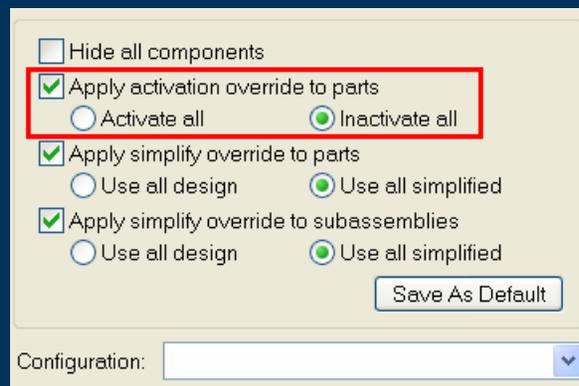


- ▶ Inactive Parts save memory by loading a lighter representation of the part
  - ▶ Use Inactive setting as much as possible
    - ▶ File Open
    - ▶ From Shortcut
    - ▶ From applied configurations

## File Open



## Shortcut

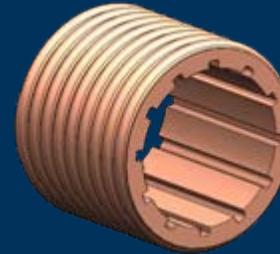




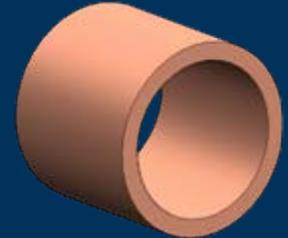
# Simplified Part Representation



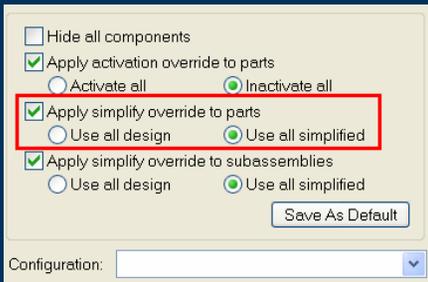
- ▶ Design as many parts as possible with simplified representation
- ▶ Show them as simplified in the assembly
  - ▶ From File Open Dialog
  - ▶ From Shortcut menu



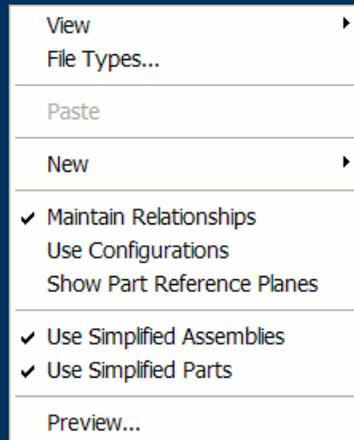
As Designed



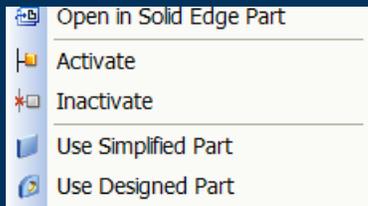
Simplified



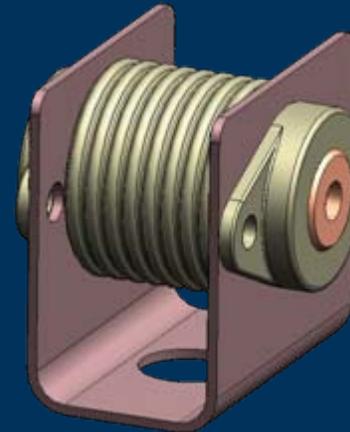
File Open



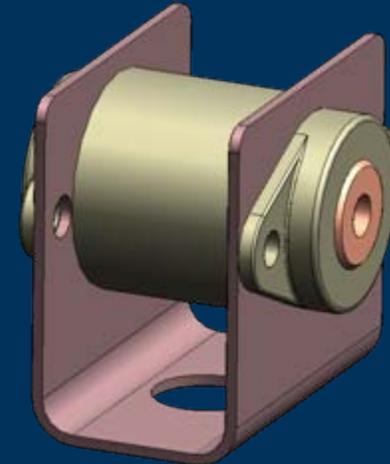
Parts Lib Shortcut



Shortcut



As Designed



Simplified



# Configurations



- ▶ Assembly Configurations store information about occurrences
  - ▶ Show/Hide State
  - ▶ Active/Inactive State
  - ▶ Simplified/Designed State
- ▶ Save configurations for commonly used grouping of components
- ▶ Apply configurations to quickly change assembly display settings

## File Open Options

Hide all components

Apply activation override to parts

Activate all  Inactivate all

Apply simplify override to parts

Use all design  Use all simplified

Apply simplify override to subassemblies

Use all design  Use all simplified

Save As Default

Configuration:

- default,rtconer1
- Electrical System
- EntireAssembly
- Hydraulics
- Mechanical System

Display Configurations

Configuration name:  Apply

- default,rtconer1
- Electrical System
- EntireAssembly
- Hydraulics
- Mechanical System

Save

Delete

Close

Help

Apply activation override

Activate all parts  Inactivate all parts

Apply simplify override

Use all simplified parts (when available)  Use all design parts

Configuration file:  Browse...



# Occurrence Properties



- ▶ Setting occurrence properties can help improve performance
  - ▶ Uncheck Display in Drawings unimportant parts
  - ▶ Uncheck Display when assembly is attached as subassembly

Occurrence Properties

Placement name: Gear1.PAR:1

Linked to:

Selectable:  Yes  No

Quantity:  User defined:

Offset from assembly origin

X: 0.000 in x: 0.00 deg  
Y: 0.000 in y: 0.00 deg  
Z: 0.000 in z: 0.00 deg

Reference

Include in Bill of Materials and \*Parts Lists  
 Display in drawings and \*Draft Parts Lists  
\* unchecking either of the above settings will remove the Occurrence from Draft Parts Lists.

Display when assembly is attached as subassembly  
 Include in mass property calculations

OK Cancel Apply Help

New in V18!

Occurrence Properties

Translate/rotate about: Model Space

Placement Name	User...	Quantity	X	Y	Z	X°	Y°	Z°	Selectable	Higher Level	Reference	*Assembly Reports	*Drawing Views	Physical Properties	Interference An
Complete.asm															
Shaft.par:1	No		0.00 mm	0.00 mm	0.00 mm	0.00 deg	0.00 deg	0.00 deg	Yes	Yes	No	Yes	Yes	Yes	Yes
Glddisk.par:5	No		-2.13 mm	-30.0...	-29.2...	0.00 deg	0.00 deg	0.00 deg	Yes	Yes	No	Yes	Yes	Yes	Yes
Glddisk.par:4	No		-2.13 mm	-27.0...	-0.08 mm	0.00 deg	0.00 deg	0.00 deg	Yes	Yes	No	Yes	Yes	Yes	Yes
Glddisk.par:3	No		-2.13 mm	-18.0...	-0.08 mm	0.00 deg	0.00 deg	0.00 deg	Yes	Yes	No	Yes	Yes	Yes	Yes

\* Selecting "No" for Drawing Views or Assembly Reports will remove the occurrence from Draft Parts List.

Update Position OK Cancel Help



# Link Resolution



- ▶ Resolving links to parts and subassemblies is done at file open time
  - ▶ Container – looks in Assy/Draft folder location for occurrences
  - ▶ Relative – looks in relative path (.ie ..\..\..\Folder A\)
  - ▶ Absolute – absolute path of linked documents
- ▶ LinkMgmt.txt (Tools-Options-File Locations) specifies how links are resolved and order.
- ▶ You can reorder method to bypass methods of link resolution
- ▶ Example:
  - ▶ Make Absolute first if always resolving links on mapped network drive
- ▶ “File NOT Found” causes delays in File Open performance!!

```
CONTAINER  
RELATIVE  
ABSOLUTE|
```



# Other Items



- ▶ Here are a few more items that help with performance
- ▶ Number of SE Files Opened
  - ▶ Minimize the # of Solid Edge files open during session
  - ▶ We've seen beta customers who will have 10-15 files open all at one time
- ▶ Close and restart Solid Edge
  - ▶ Opening/closing files takes up memory and gets fragmented
  - ▶ Recommend shutting down Solid Edge and restarting
    - ▶ (ie. Lunch, end of day)



# V17/V18 Enhancements



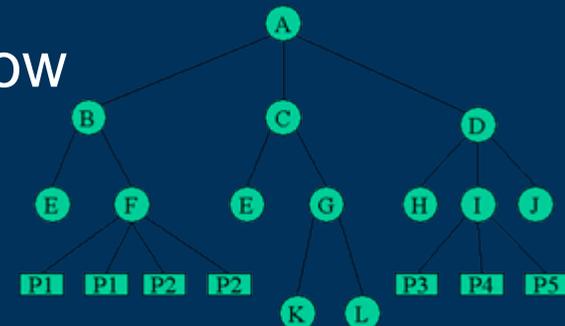
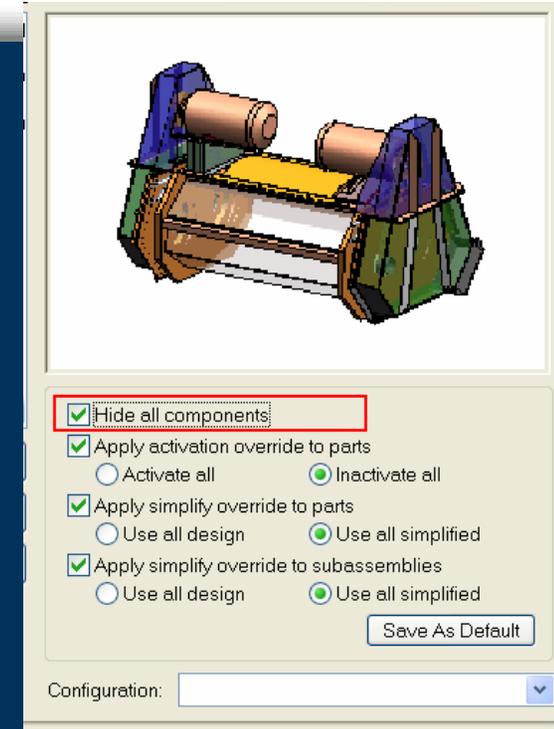
- ▶ File Open-Hide All Components
- ▶ Pathfinder Locate
- ▶ Fast Locate of parts/subassemblies
- ▶ Simplified Assemblies
- ▶ Virtual Real Components



# File Open – Hide All



- ▶ Very Fast File Open of Large Assemblies
- ▶ Think of a persisted Hide All Configuration
- ▶ Only immediate level components loaded in memory
- ▶ User can expand the branches they need to work on
- ▶ Good concurrent engineering workflow

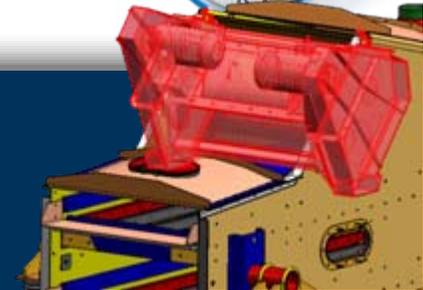




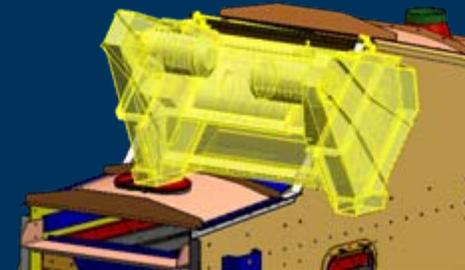
# Pathfinder Locate



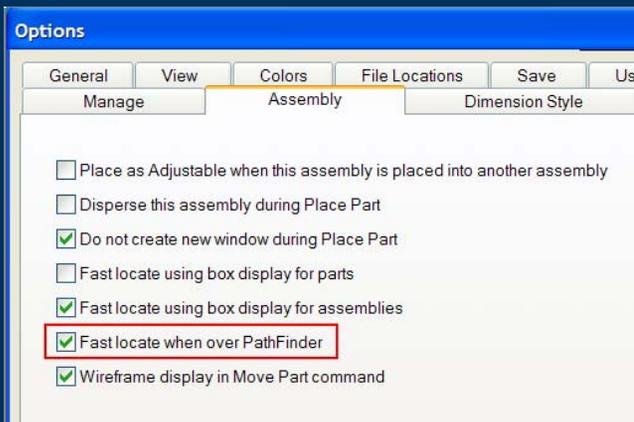
- ▶ For Top Level and Large subassemblies, it takes time to graphically show as located
- ▶ Tools-Option to prevent graphical locate display
- ▶ Option only for when locating in Pathfinder



Locate Color



Select Color



New in V18

No highlight of Top Node in Assy

Checked

Unchecked

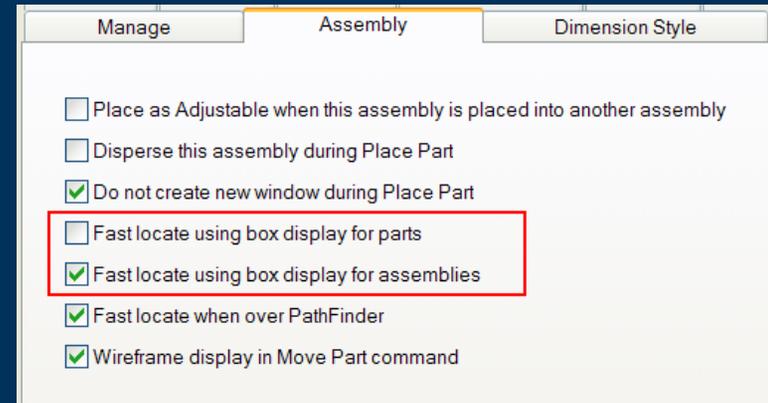




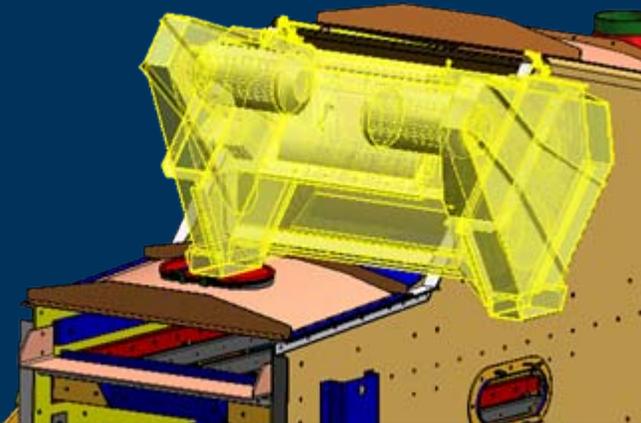
# Fast Locate



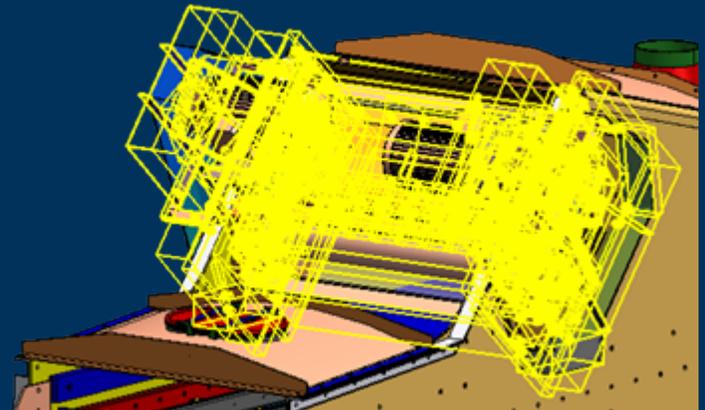
- ▶ Show parts/subassemblies as range box vs design in locate/select colors



Unchecked



Checked

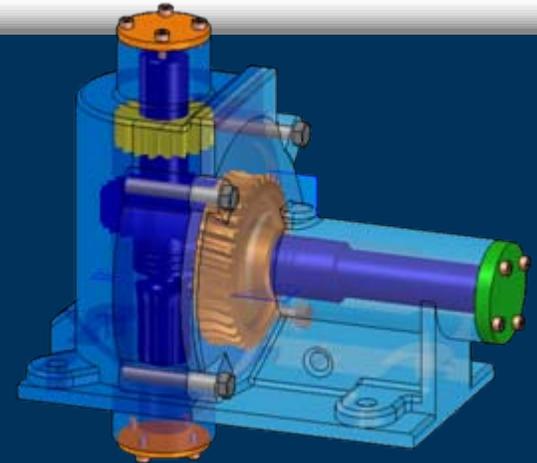




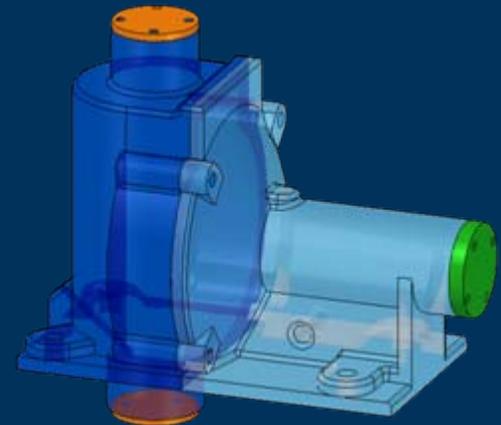
# Simplified Assemblies



- ▶ Automatic method of producing an “envelop” representation of the assembly
- ▶ User controls to refine/improve the solution
  - ▶ Exclude Parts (small or chosen)
  - ▶ Option to add additional faces
  - ▶ Uses simplified parts in the solution
- ▶ Results:
  - ▶ Associative collection of surfaces
  - ▶ Stored inside the assembly document



Designed



Simplified



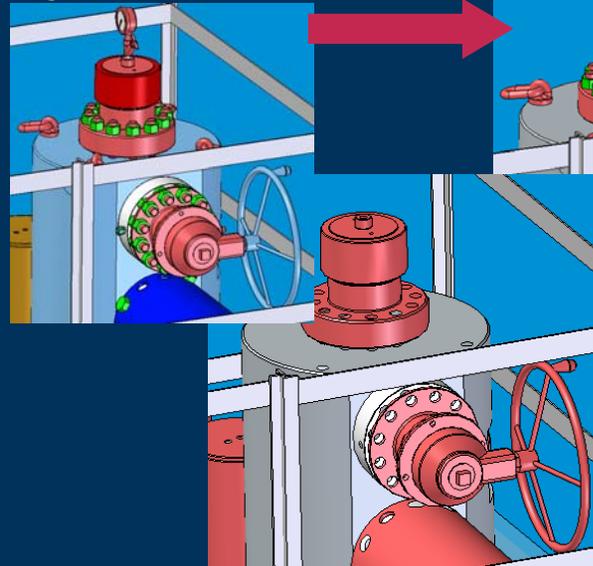
# Simplified Assemblies



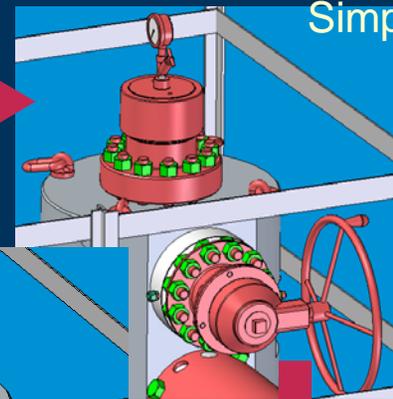
- ▶ Accurate, Simplified, Associative Assembly Representation
  - ▶ Eliminates all internal detail from the assembly display
  - ▶ Optionally removes small parts
  - ▶ Vast Improvement over traditional “Lightweight Assemblies”
  - ▶ Allows positioning of complex subassemblies within master assembly
  - ▶ Switch between Simplified and Detailed design at will

- ▶ Gives users a quick and easy method to create a simplified representation of assemblies for faster file opening, display and drawing production time
- ▶ Preserves intellectual property by sharing designs without proprietary detail

As Designed



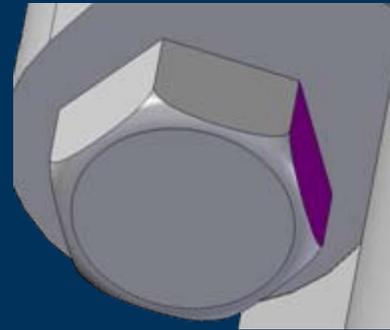
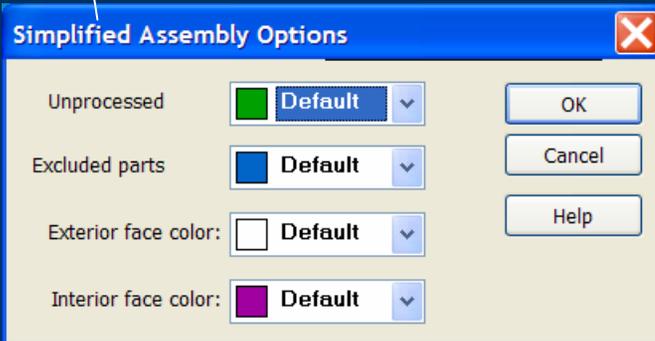
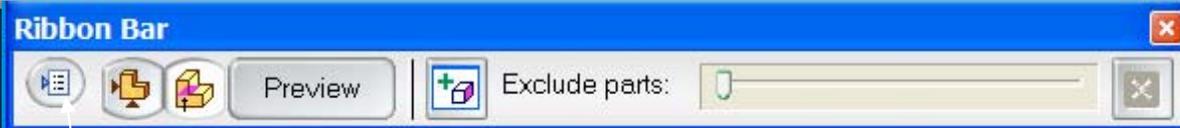
Simplified



Simplified +  
Exclude Small



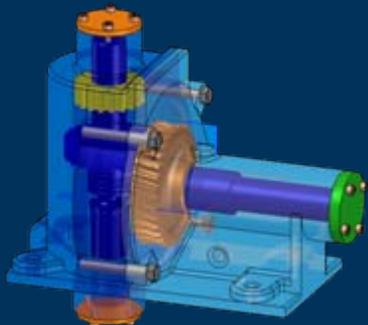
# Simplified Assemblies - Creation



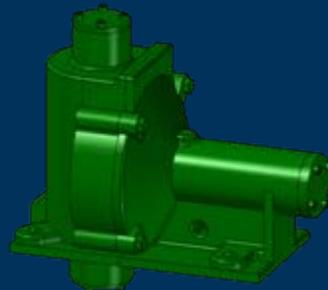
Faces identified as internal

New in V18

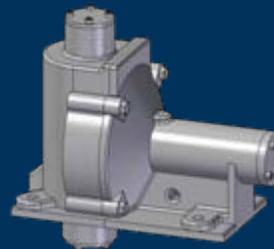
► Inactive Simplified Rep



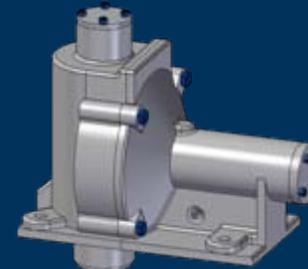
Design



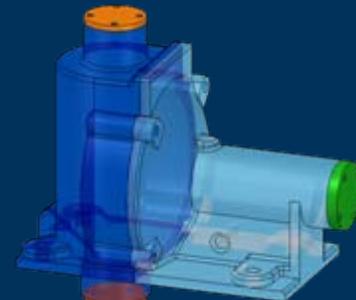
Unprocessed



Processed



Excluded  
Parts



Simplified



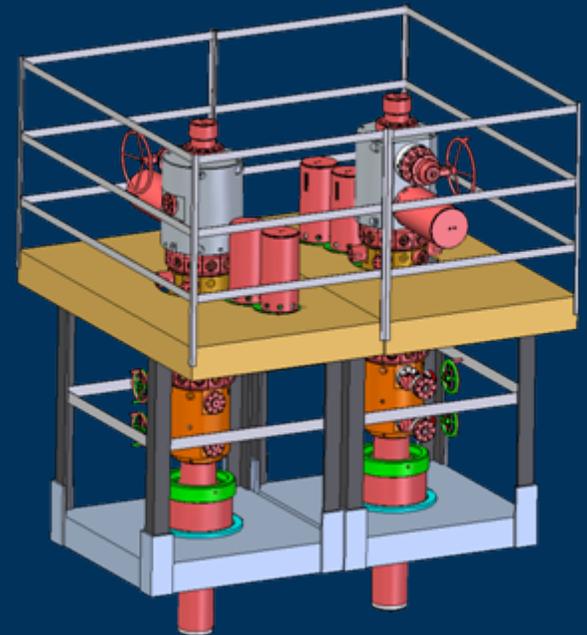
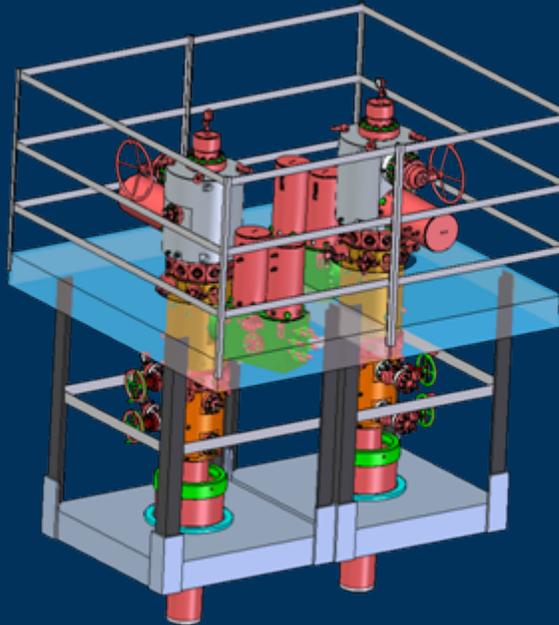
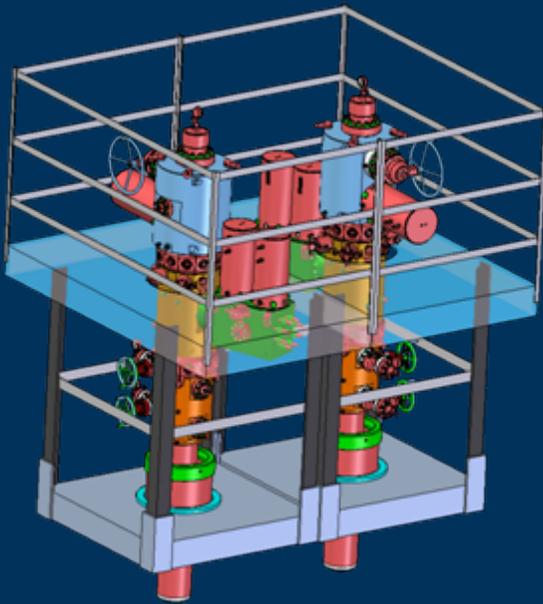
# Simplified Assemblies - the Numbers



As Designed

Simplified

Simplified + Exclude Small Parts

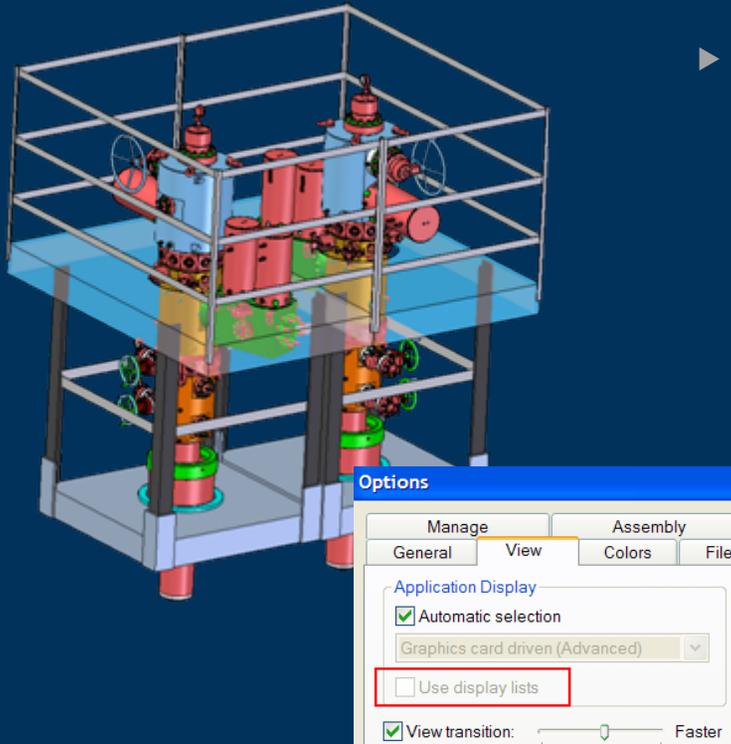


As Designed		Simplified	X Times Faster	Simplified + Exclude	X Times Faster
22	File Open(sec)	11	2	5	4.4
2	★ View Rotation (hz)	12.3	6.2	20	10
89	Drawing Creation (sec)	49	1.8	21	4.3

\*hz = # frames/sec → < 5 = choppy ; 10+ = smooth ; 20+ = very smooth



# Pure Display Improvements



- ▶ Significant display optimization independent of Simplified Assemblies
  - ▶ Most noticeable on cards w/64MB+
  - ▶ 2-4X on view rotation
  - ▶ Multiply this TIMES the Simplify benefits to get actual frame rate for V16 versus V17 Simplified
    - ▶ Example
      - ▶ V17 vs V16 = 2.5X
      - ▶ V17 Simplified vs V17 As Designed = 6X
      - ▶ V17 Simplified vs V16 As Designed = 15X

	V16 hz	V17 hz	times faster
FX 330 64 MB	2.5	6.0	2.4
FX 1300 128 MB	2.6	10.0	3.8

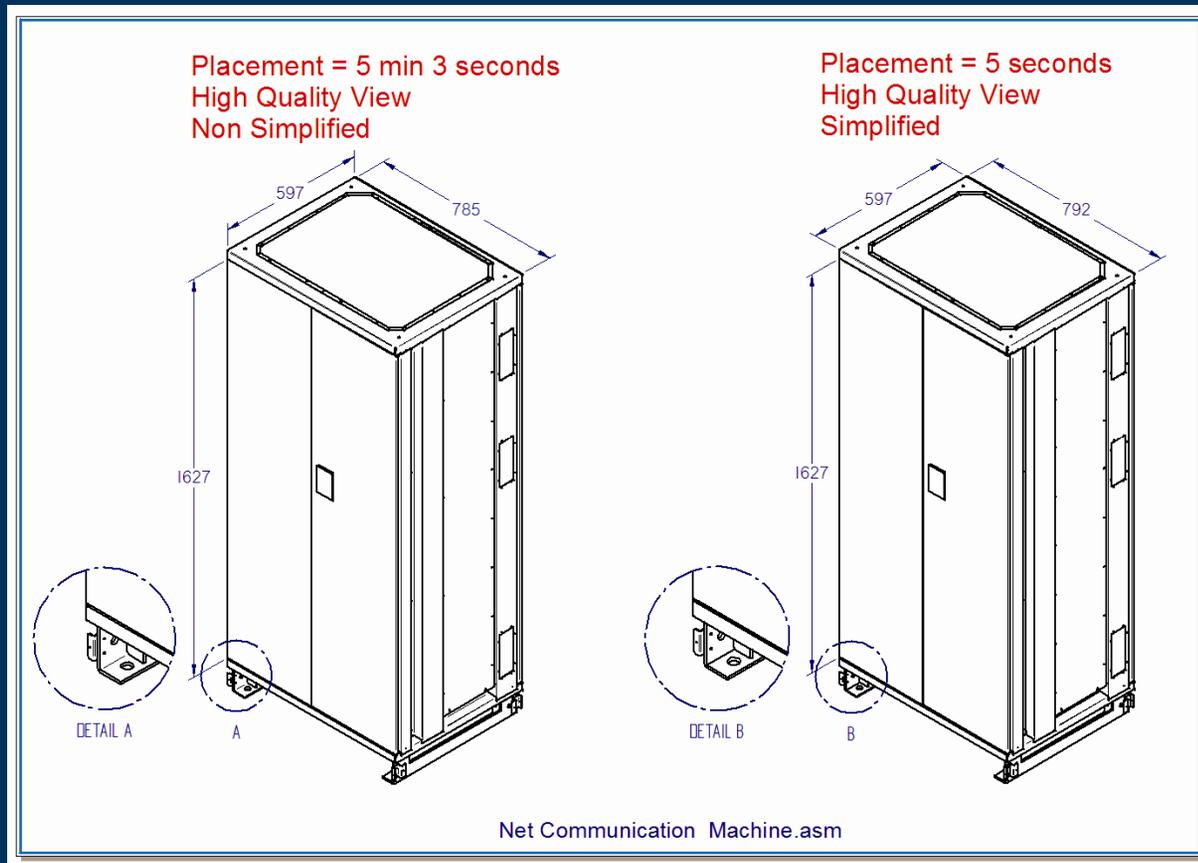
\*hz = # frames/sec → < 5 = choppy ; 10+ = smooth ; 20+ = very smooth



# Simplified Assemblies - Drawing Productivity



- ▶ Simplified Assemblies also allows rapid drawing layout

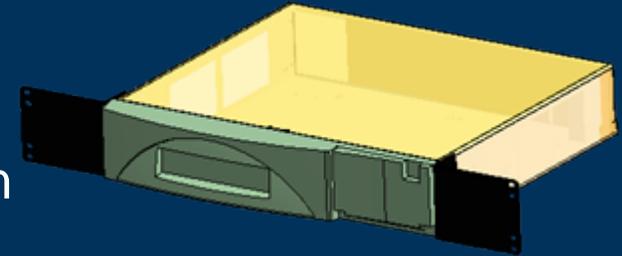




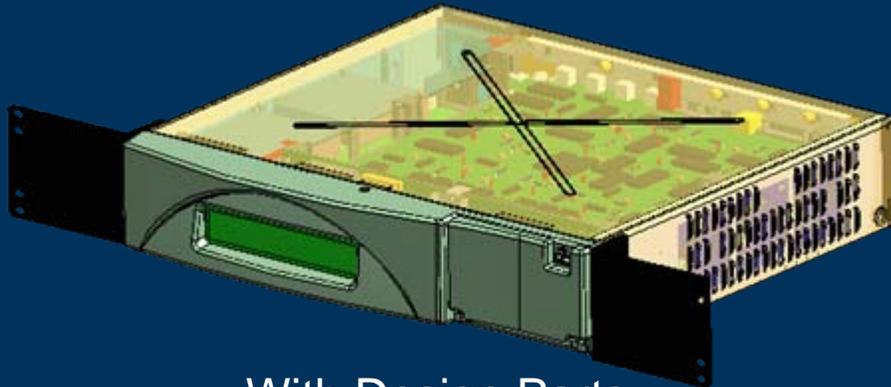
# Simplified Assemblies – Best Practices



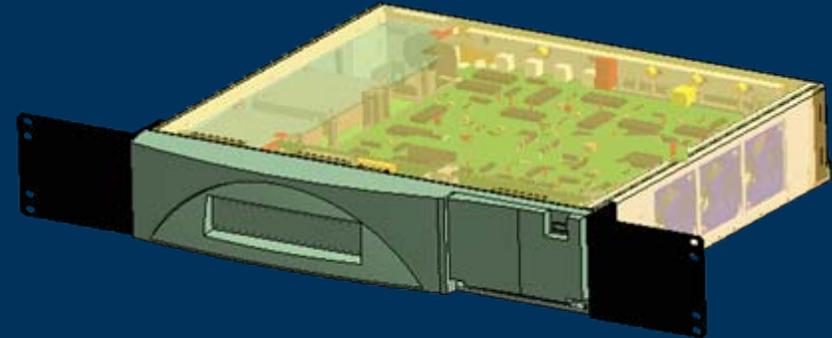
- ▶ Use Simplified Parts with Simplified Assemblies results in:
  - ▶ Faster Simplified Assembly Creation
  - ▶ Better Visibility Solution
  - ▶ Smaller Simplified Representation
  - ▶ Smaller Assembly File Size
  - ▶ Faster Performance



Maximum Benefit



With Design Parts



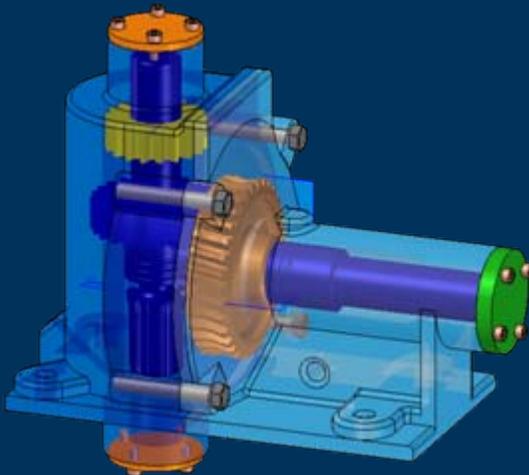
With Simplified Parts



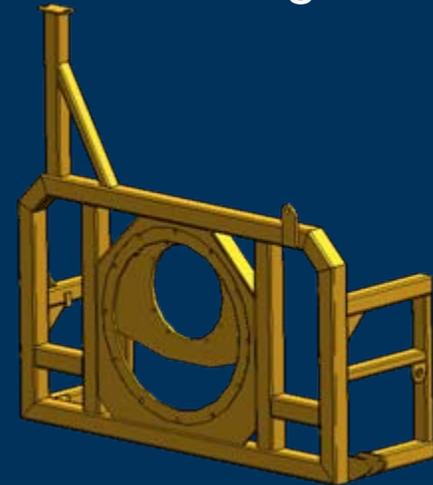
# Simplified Assemblies – Best Practices



- ▶ Proper Selection of Assemblies for Simplification
- ▶ Some assemblies are more suited for simplification
  - ▶ Products with Enclosures have good results
  - ▶ Products not enclosed (ie. Frames) become large



Good



Bad



# Simplified Assemblies – Best Practices



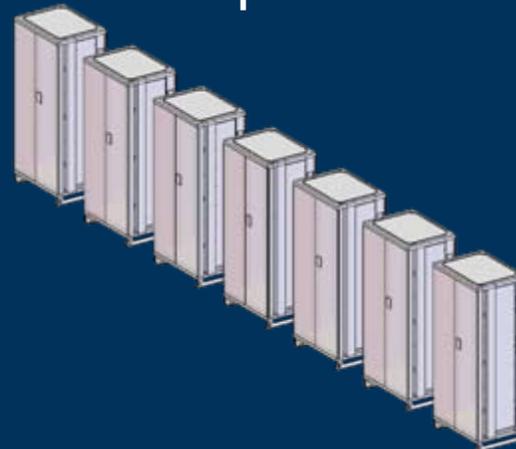
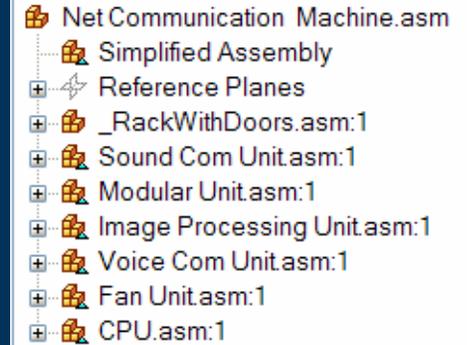
- ▶ Consider Depth of Assembly Structure
  - ▶ Assemblies with large depth structure
  - ▶ Assemblies with minimal depth structure
- ▶ Consider Subassy with 20 levels and 10,000 parts and compare with subassy with 3 levels and 1000 parts
- ▶ File Open performance using simplified assemblies is maximized with assemblies of larger depths
- ▶ This only affects file open performance, not graphical



# Simplified Assemblies – Best Practices



- ▶ Simplifying top level assembly requires additional memory/resources for open
- ▶ Top level is always opened as designed
- ▶ More common to simplify major subassemblies rather than top level

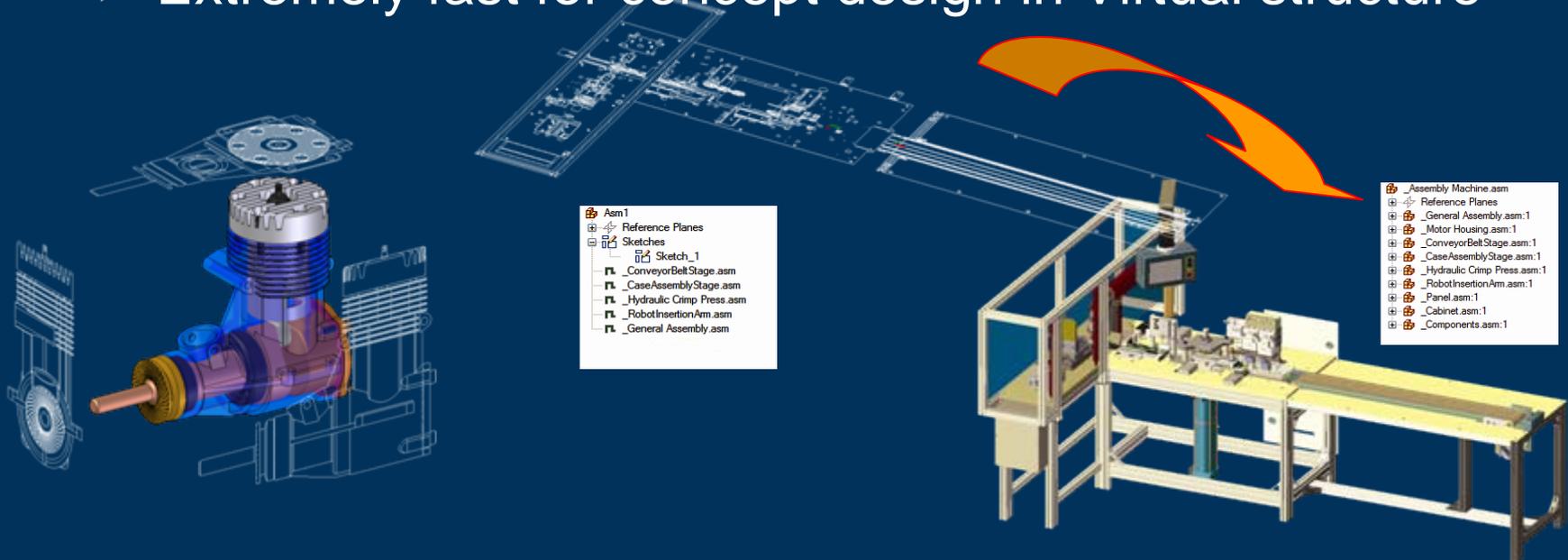




# Predefined Components



- ▶ For Conceptual Layouts, Predefined Components can be used to quickly layout assemblies in 2d mode
- ▶ Component Sketches in real 3d components is a lightweight 2d representation of 3d geometry
- ▶ Extremely fast for concept design in Virtual structure





# Drawing Productivity

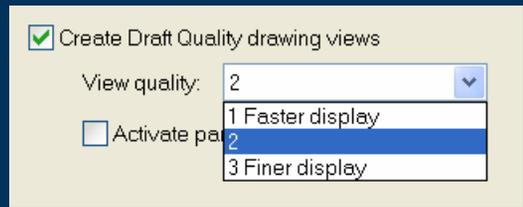
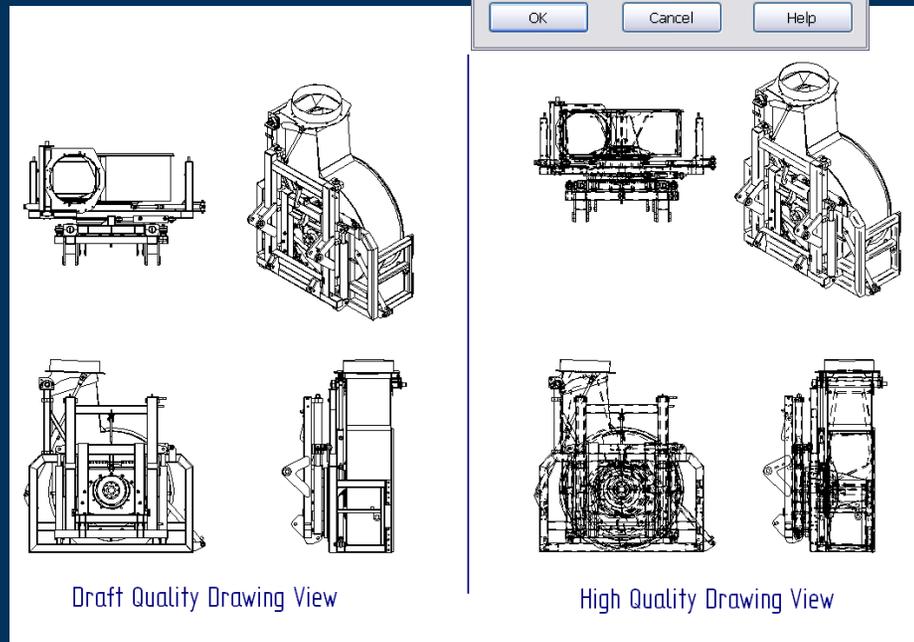


## ▶ Draft Quality Views

- ▶ Very fast computation of initial draft-quality views
- ▶ Draft-quality views can be dimensioned and annotated
- ▶ Quickly create draft level drawings for initial communication

## ▶ Convert to High Quality Views

- ▶ Upon Command
- ▶ Final detailing or release to printing in precise form





## Miscellaneous



- ▶ Under-Constrained assemblies take longer to recompute than fully constrained assemblies
- ▶ When opening Assemblies in View & Markup, options are available to open assemblies as Simplified or as Designed
- ▶ Adjustable assemblies promote assembly constraints up



# Conclusions



- ▶ There are a variety of options/workflows that improve performance managing large assemblies
- ▶ Each affect various aspects of performance
- ▶ Choosing the right combination can maximize working with large assemblies

