

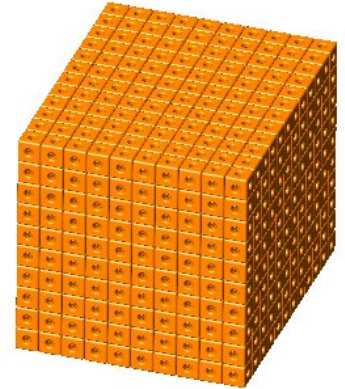
THE CUBE ASSEMBLY CHALLENGE

Cubes? Who builds cubes?

The cubes used in this test are good general representations of typical parts found in many machine design assemblies. They contain fillets, intersecting holes and blends. They are built the same to guarantee a controlled, reproducible and fair test. This is the only industry test with the dataset freely distributed and made available to all. Download the files and test for yourself.

www.solidworksales.com/images/sw_900_cubes.zip (83MB)

www.solidworksales.com/images/iv_900_cubes.zip (150MB)



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LARGE ASSY PERFORMANCE

- True time cost comparison of various CAD systems.
- Shows each CAD system's ability work with real world designs
- Gives users a good comparison of a CAD system's relative productivity.

Determining a given CAD system's large assembly capabilities can be difficult. Every CAD vendor claims to be efficient at large assembly design. For instance many CAD vendors spend a lot of time focusing on their underlying technology rather than their real measured performance.

Even the most advanced 3D modeling system can be brought to it's knees by simply adding enough parts to the assembly to overwhelm the software and hardware.

A surprising fact is that accurate side by side large assembly comparisons are rarely done. This is mainly due to the prohibitive resources required to accurately build the large assembly databases and test them. So most comparisons offered from CAD vendors are done using shortcuts such as importing data previously built other CAD systems. This problem is this is not how the system is likely to be used in production.

Some CAD vendors offer comparisons using different databases altogether. This introduces many unknown variables and is not a accurate measurement.

CAD vendors such as Autodesk have even offered comparisons using rigged data, purposely weighting the end results in their favor.

This test uses identical native data, modeled from scratch in each system. This dataset is freely distributed for those wishing to verify the results for themselves.

This dataset offers one of the most accurate large assembly comparisons available. It's also one of the toughest tests due to the number of unique parts. No patterns were used.

Due to the robust nature of this test many systems such as Inventor are not able to complete the suite of large assembly tasks required.

Test Hardware

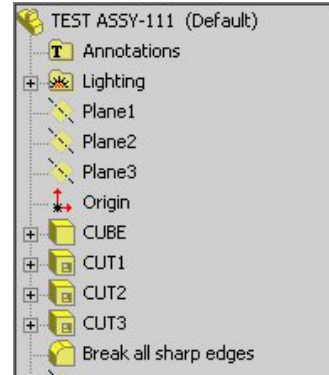
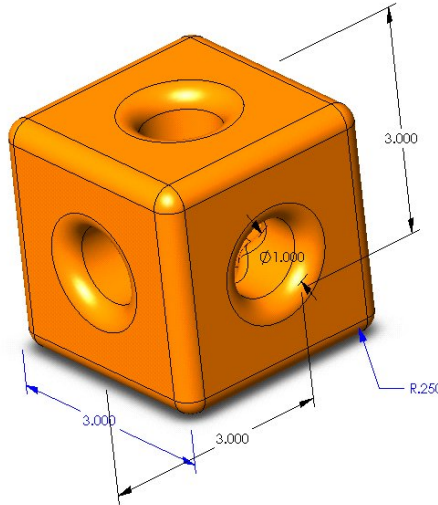


- Dell 420 Precision Workstation
- 2 dual processor, 950 MHz Pentium Xeon processor.
- 1 GB of RAM
- Total of 2GB virtual memory
- 5110 Wildcat Graphics Card

THE PARTS

The overall assembly contains 900 unique (not patterned) components. Each part was built parametrically, natively, in the given CAD system as shown:

- 3x3x3 cube.
- 1 inch diameter holes through each face.
- All sharp edges were broken using the system's filleting capability R.25 inches.

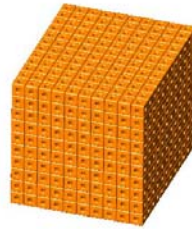


THE ASSEMBLY

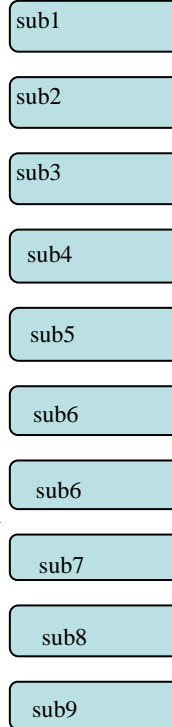
To assemble all 900 components, the assembly was broken down into 9 individual sub-assemblies. Each sub-assembly contained 100 unique components.

(Unique parts, not Patterned)

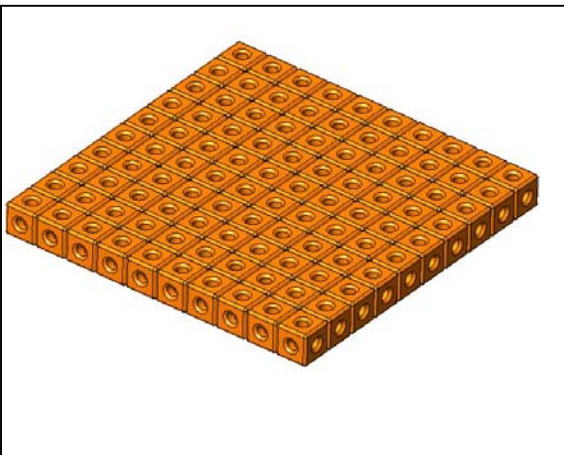
Each unique sub-assembly was placed into the upper master assembly for a total of 900 unique components.



900 unique

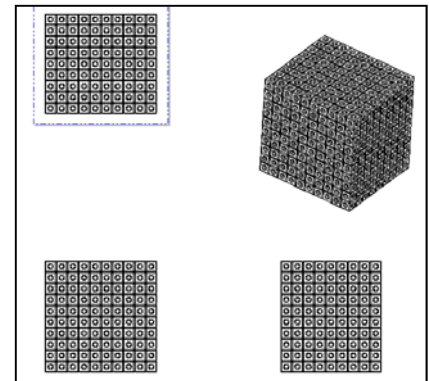
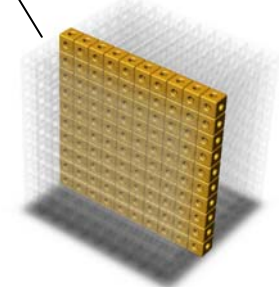
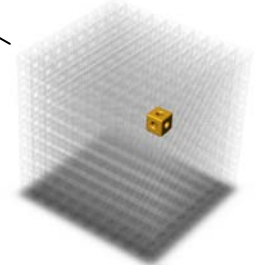
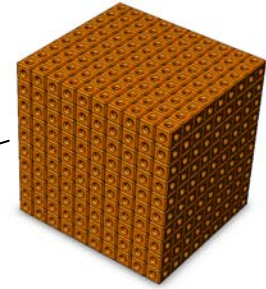


Data was built natively in each CAD system in exactly the same manner. The final assembly was composed of 900 unique parts, not patterned.

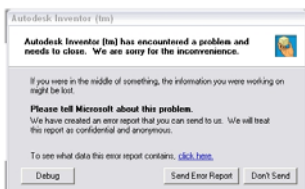


PROCEDURE

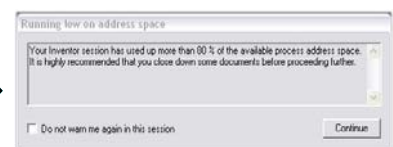
Task	Notes (each task was performed in the order listed).
1 Open 900 comp assy	Originally a 1000 piece assembly. We were forced to remove one 100 component sub assy due to Inventor bugs. In one sub assembly, Inventor treated the components as if there were interferences. However measuring each part showed zero interferences. We gave up and just removed this assy after several hours of debugging.
2 Edit part in context of assembly	Standard top down assembly editing operation.
3 Edit sub-assembly in context of assembly	Standard top down assembly editing operation.
4 Save 900 assy	This step should be done after editing a few parts.
5 Close 900 comp assy	In well written code, this step should be instantaneous.
6 Total time to build assembly	This test simulates the time it would take to build each part from scratch. IV single part rebuild 6.3 (sec) SW single part rebuild 1.6 (sec) Total time = single part x 900
7 Total time to add mates required for 900 components.	This test simulates the total time it would take to add each part to the assembly. In IV a single mate takes 19 (sec) to add. IN SW a single mate takes 5 (sec) to add. Total time = single part x 900 x 3
8 Create 4 view detail drawing	IV is successful creating the detail drawing only by inserting views one view at a time using hidden line removed (HLR). Even though IV promotes background HLR, background HLR in this case caused the user to wait for all views to complete precise calculations. Only precise views can be used on other applications like Volo view. Only precise views are production worthy.
9 Save new detail drawing	Unlike SolidWorks, IV stores most information in each individual part. So while the assembly files are smaller, the overall size of the assembly and parts are very large. If many parts have been modified IV will take much longer to save since each part must be saved and updated as well.
10 Change view scale	Close IV and reopen detail drawing.
11 Change isometric view to hidden line visible	After 1hr+ of waiting, IV crashed. The only successful 3 View drawing IV was able to create was using HLR. Using templates drawings crashed IV on this assy. Using hidden line shown crashed IV. Using hidden line grey crashed IV. Basically any combination other than step 10 crashed IV after wasting hrs of the users time. Inventor is unable to create the production level detail drawing.
12 Change front view to hidden line visible	IV crashed in step 11. So after reopening the detail drawing the front view was attempted to be set to hidden line dashed. IV again crashed.



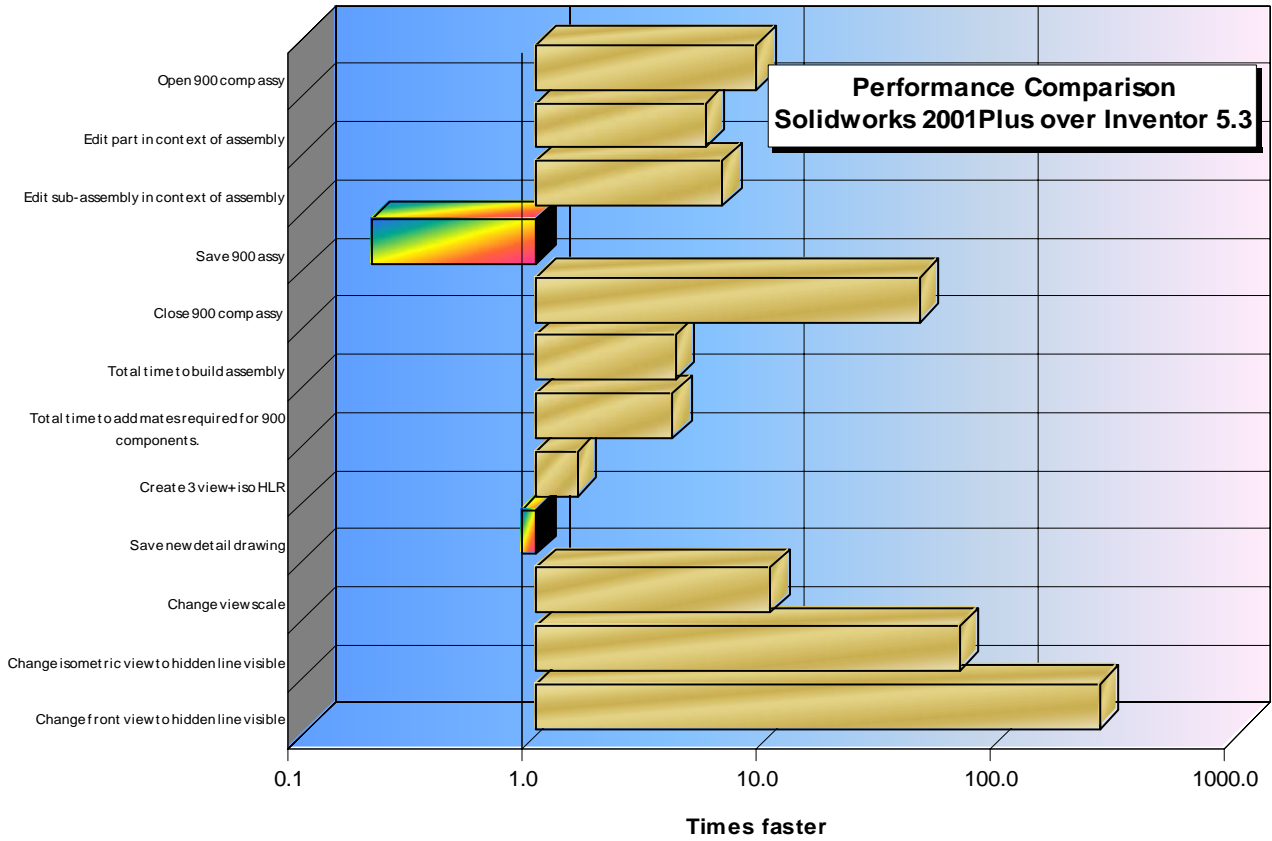
SolidWorks only, Inventor fails this task



Note,
Inventor failed steps number 11 and 12. 30 minutes was added to Inventors time for each of these steps. In actuality hrs were wasted.



RESULTS



Task		SW 2001Plus (sec)	IV 5.3(sec)
Standard open close	Open 900 comp assy	23	200
	Edit part in context of assembly	3	21
	Edit sub-assembly in context of assembly	4	25
	Save 900 assy	47	10
	Close 900 comp assy	2	87
Build as-sembly tests	Total time to build assembly	1440	5670
	Total time to add mates required for 900 components.	13500	51300
Create detail drawing tests	Create 3 view+ iso HLR	275	411
	Save new detail drawing	79	68
	Change view scale	4	40
	Change isometric view to hidden line visible	28	1800
	Change front view to hidden line visible	7	1800
Total time to complete (sec)		15408	61408

Results show SolidWorks is 4 times more productive than Inventor. Note Inventors failure to complete tasks 11 and 12.

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The results show the enormous difference between the two CAD systems. Inventor will cost you time and productivity compared to SolidWorks.

SUMMARY

As demonstrated in this report, **SolidWorks shows a 4 to one productivity advantage over Inventor**. This advantage is multiplied drastically when you consider Inventor's failure to complete a production level detail drawing. **Inventor fails steps 11 and 12**. The inability to fully complete these tasks shows the danger in using Inventor for large assembly design.

Make sure to try these tests for yourself. Or contact a SolidWorks representative for a demonstration.

SolidWorks Corporation, the leader in affordable solid modeling software, is a strong and growing company. SolidWorks software is the proven and established leader in production-level 3D CAD and has become the standard by which all other midrange (and some traditional high-end) modelers are measured. We invite you to join the growing community of users who benefit from SolidWorks by getting their products to market faster. For more information about SolidWorks Corporation and its products, please visit <http://www.solidworks.com>.

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