DS SOLIDWORKS

MAKE GREAT DESIGN HAPPEN

SOLIDWORKS Hardware Guide

2018

SOLIDSOLUTIONS
SUPPORTING EXCELLENCE

HARDWARE

3S SOLID**WORKS**

KEYWORDS: HARDWARE, CORE, PROCESSOR, GRAPHICS, DRIVER, RAM, STORAGE

SOLIDWORKS HARDWARE RECOMMENDATIONS

Below is a summary of key components of an ideal SOLIDWORKS PC, all of this document is important but if you only read one page make it this one!, if you are unsure about more complex requirements such as Simulation and Visualisation products see appendix from page 12 onwards.

PROCESSOR (CPU)

This carries out the majority of calculations within SOLIDWORKS; the most common limiting factor is the speed in GHz of the CPU, the faster (GHz) the better.Look for the maximum "Turbo Boost" speed as the best guide of performance for most SOLIDWORKS tasks. For SOLIDWORKS parts and assemblies typically 2 cores are used, not all tasks are multi-threaded however drawings with many views, simulation, rendering tasks can benefit significantly from CPUs with more cores.

 i5/ i7 VS Xeon- The main advantage of Xeon CPU's is they support error correcting code (ECC) ram which can correct for random hardware errors and in some 6core + CPU's contain more cache which may benefit simulation tasks which product huge amounts of data while solving. Intel Core i5/i7 and Xeon still have a significant lead in SOLIDWORKS performance over AMD Processors as of August 2018

We recommend- High GHz Intel 8th Generation i5/ i7 Quad or Six Core or Xeon Equivalent

MEMORY (RAM)

When a document is opened in SOLIDWORKS it is loaded into RAM, you need enough so that Windows does not resort to using the hard disc (virtual memory). RAM is rated in MHz for speed; each increase tends to yield marginal gains so cost is a key factor, often the prices for the latest faster RAM is much higher. When buying new go for at least 8-16GB as this is the current sweet point for cost. ECC ram is recommended for users who run long simulation runs / renders frequently.

We recommend a minimum of 8GB of DDR4 RAM

GRAPHICS CARD

The graphics card is fundamental to your productivity. It assists the processor accelerating operations such as zooming and rotating. On-board Intel HD graphics, consumer cards such as GeForce and Radeon (non Pro) <u>are consumer level cards which are not supported.</u> often giving poor performance and stability. This is your productivity so you should not underestimate the potential hidden costs of having an unsupported setup

Workstation class graphics cards from the NVIDIA Quadro (Not NVS) range are the only graphics cards we recommend for use with SOLIDWORKS. NVIDIA Quadros' proven history of strong driver stability and performance means we only supply and recommend these. NVIDA are also the only graphics cards to accelerate SOLIDWORKS Visualize rendering and those with 4GB or more memory support the new [AI Denoiser](#) meaning you get your results back many times faster. Visualize Standard is included with all SOLIDWORKS Professional and Premium subscriptions.

You can check for supported Cards & drivers on the SOLIDWORKS website at https://www.solidworks.com/sw/support/videocardtesting.html

We recommend- NVIDIA Quadro P1000 or above Graphics Card

STORAGE (HARD DRIVE)

Solid State Drives (SSD) offer a significant performance upgrade and are recommended to at least be used for your operating system and programs if budget allows. Try to allow for 25-50% free for best performance.

We recommend- Fast solid state drives (256GB +)

OPERATING SYSTEM (OS)

From SOLIDWORKS 2015 SOLIDWORKS is <u>64Bit Only</u>, We now recommend Windows 10 Pro, Pro for Workstations or Enterprise 64bit. Pro for Workstations is required for new PC's with Xeon CPUs. SOLIDWORKS have announced that SOLIDWORKS 2020 SP5 will be the last release which will install and support Windows 7 64bit. SOLIDWORKS 2021 will not install on Windows 7,

Windows 8/8.1 are not supported for versions 2018 or newer

We recommend- Windows 10 Pro, Pro for Workstations or Enterprise 64bit

MONITOR

If buying a new monitor we recommend resolution of 1920x1080 at a minimum size of 1.5.6 inches for laptops or 21.5 inches for desktops. Please note that while resolutions above 1920x1200 such as 4K screens are better supported by SOLIDWORKS 2018 onwards we do not recommended on screens below 27inches in size and certainly do not currently recommend these in laptops.

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HARDWARE

RECOMMENDED DELL HARDWARE FOR SOLIDWORKS

We have partnered with Dell for many years for both our own internal use and to provide systems to our customers so that they can benefit from the discounts we receive and the reassurance that it will be ideally specified for SOLIDWORKS.

Dell ProSupport

All systems come with 3 years Dell ProSupport with highly trained technicians based in Ireland. In the event an issue cannot be solved over the phone they will typically dispatch an engineer to fix the system the following working day. We can also work with the Dell team to diagnose if it is a Hardware or Software issue if needed.

Below is a guide of what we recommend for most users. These are only guidelines for the majority of users, if you have a question please contact your account manager or hardware@solidsolutions.co.uk for advice. Specifications are correct as of August 2018 although our website always has the most up to date specifications, see https://www.solidsolutions.co.uk/solidworks/Hardware/

With such a range of products we have added a new performance guideline for then most commonly used products provided by Solid Solutions

Key

	SOLIDWORKS		SOLIDWORKS Composer
	SOLIDWORKS Simulation		SOLIDWORKS Electrical
	SOLIDWORKS Flow Simulation		Cam
	SOLIDWORKS Plastics		SOLIDWORKS Visualize

With the vast range of SOLIDWORKS solutions now available what is required to improve performance varies. For instance adding more fast cores may benefit Simulation products whereas SOLIDWORKS Visualize would benefit from a higher spec Quadro graphics card. You can start to see why it may not be as simple as just spending more, what you invest in is key and we aim to help you get the most for your money.

E.g. on the left is the lowest performance for SOLIDWORKS and on the right denotes best performance

If you aren't sure what is most suitable please get in contact with your account manager or hardware@solidsolutions.co.uk

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3S **SOLID**WORKS

Desktop Entry Level- Dell Precision™ 3420 SFF- Small Form Factor PC, aimed at SOLIDWORKS who create less complex assemblies/parts.

Processor: Intel Core i5-8500 6 core/6 threads 3.0GHz (Turbo Boost up to 4.0 GHz)

Memory: 16GB (2 x 8GB) 2666MHz DDR4 Non ECC Ram

OS/Boot Drive: *256GB M.2 PCIe NVMe Solid State Drive.*

Additional Hard Drive: 500GB 3.5 Inch 7200 RPM Hard Drive

Chassis: 260W with 8x DVD+/-RW and SD Card Reader

Graphics Card: 4 GB NVIDIA Quadro P1000

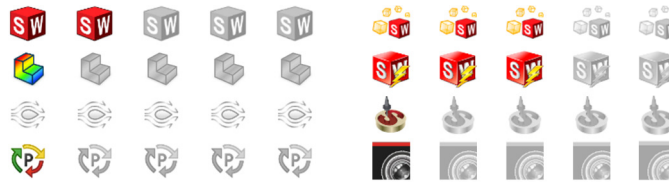*Mouse:* Dell Optical (Not Wireless) Scroll USB (3 Button Scroll) Black Mouse

Keyboard: QuietKey USB Keyboard Black

Operating System: Windows 10 Professional 64bit

Support: 3 Year Dell ProSupport and Next Business Day On-Site Service

Performance guidelines

Desktop All Rounder- Dell Precision™ 3620MT- The Best balance for price and performance for general SOLIDWORKS as well as occasional simulation/rendering

Processor: Intel Core i5-8600 6 core/6 threads 3.1GHz (Turbo Boost up to 4.3 GHz)

Memory: 16GB (2 x 8GB) 2666MHz DDR4 Non ECC RAM

Hard Drive: *512GB M.2 PCIe NVMe Solid State Drive.*

Additional Hard Drive: 1TB 2.5 Inch 7200 RPM Hard Drive.

Chassis: 460W with 8x DVD+/-RW , SD Card Reader & Dust Filter

Graphics Card: 5GB NVIDIA Quadro P2000

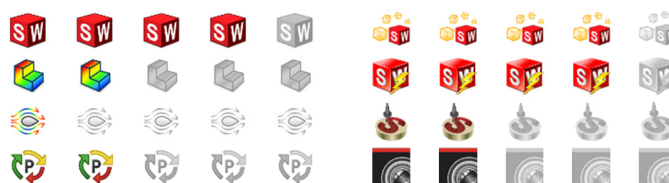*Mouse:* Dell Optical (Not Wireless) Scroll USB (3 Button Scroll) Black Mouse

Keyboard: QuietKey USB Keyboard Black

Operating System: Windows 10 Professional 64bit

Support: 3 Year Dell ProSupport and Next Business Day On-Site Service

Performance guidelines

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HARDWARE

Desktop High End - Dell Precision™ 3620MT - Aimed at users with large datasets with the fastest CPU available, high end 8GB Quadro P4000 graphics card and 32GB of Ram this is great for users with large datasets, as well as being strong for more occasional Simulation and Rendering.

Processor: Intel Core i7-8700K 6 cores/12 threads 3.7GHz (Turbo Boost up to 4.7 GHz)

Memory: 32GB (2x16GB) 2666MHz DDR4 ECC RAM

Hard Drive: 512GB *M.2 PCIe NVMe Solid State Drive.*

Additional Hard Drive: 1TB 3.5" Serial ATA (7,200Rpm) Hard Drive

Chassis: 460W with 8x DVD+/-RW , SD Card Reader & Dust Filter

Graphics Card: 8 GB NVIDIA Quadro P4000

Mouse: Dell Optical (Not Wireless) Scroll USB (3 Button Scroll) Black Mouse

Keyboard: QuietKey USB Keyboard Black

Operating System: Windows 10 Professional 64bit

Support: 3 Year Dell ProSupport and Next Business Day On-Site Service

Performance guidelines

MORE CORES?

Although a 4-6 core machine is the best balance between cost and performance for most SOLIDWORKS only users if you use Simulation or CPU based rendering tools such as Photoview 360 extensively you may see a benefit from a system with more cores. Also note that 2D Drawings with many views benefit from an increase in cores, but most tasks in SOLIDWORKS prefer fewer faster cores rather so adding more than 6 cores is typically only beneficial for Simulation and CPU best rendering tools (not Visualize with is graphics card (GPU) accelerated.

EXPECTED IMPROVEMENT

This will vary between different aspects of the software for instance with Photoview 360 if you double the amount of cores the render time can be as much as halved. With Simulation and Flow Simulation it is not so clear cut but is often still very beneficial. Please see appendix page 11-X15 for more information on types of simulation and how benefits vary between different tasks.

Also note that our Simulation specs include ECC RAM. This can correct for random calculation errors which all PC's experience. This is one reason why servers that have to run 24/7 365 days a year also use Xeon CPU's and ECC ram.

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Desktop High End Simulation - Dell Precision™ 3630 - Aimed at users who use Simulation tools extensively, with 6 core Xeon CPU and error correctly ECC RAM.

Processor: Intel Xeon Xeon E-2186G 6 Cores/ 12 threads 3.8GHz, Turbo boost up to 4.7 GHz)

Memory: 32GB (2x16GB) 2266MHz DDR4 ECC DIMM

Hard Drive: 1TB M.2 PCIe NVMe Solid State Drive.

Additional Hard Drive: 1TB 3.5" Serial ATA (7,200Rpm) Hard Drive

Chassis: 460W with 8x DVD+/-RW , SD Card Reader & Dust Filter
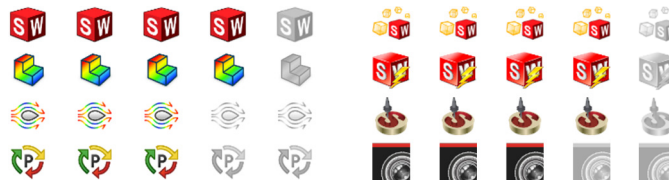
Graphics: 8GB NVIDIA Quadro P4000

Mouse: Dell Optical (Not Wireless) Scroll USB Black Mouse

Keyboard: QuietKey USB Keyboard Black

Operating System: Windows 10 Professional 64bit

Support: 3 Year Dell ProSupport and Next Business Day On-Site Service

Performance guidelines

Desktop High End Visualize - Dell Precision™ 3630 - Aimed at users who want the best balance for SOLIDWORKS Visualize with latest high end Pascal generation NVIDIA Quadro Graphics,

Processor: Intel Core i7-8700K 6 cores/12 threads 3.7GHz (Turbo Boost up to 4.7 GHz)

Memory: 32GB (2x16GB) 2666MHz DDR4 Non ECC DIMM

Hard Drive: 512GB M.2 PCIe NVMe Solid State Drive.

Additional Hard Drive: 1TB 2.5" Serial ATA (7,200Rpm) Hard Drive

Optical Drive: 16x DVD+/-RW Drive

Graphics: 2x 8GB NVIDIA Quadro P4000

Mouse: Dell Optical (Not Wireless) Scroll USB Black Mouse

Keyboard: QuietKey USB Keyboard Black

Operating System: Windows 10 Professional 64bit

Support: 3 Year Dell ProSupport and Next Business Day On-Site Service
Performance guidelines

*Also available with Single 16GB P5000 for very large datasets contact hardware@solidsolutions.co.uk if unsure.

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Desktop Ultimate Simulation- Dell Precision™ T5810- Aimed at users who carry out extremely large simulation tasks particularly users who want to run multiple tasks at once

Processor: 1 x Xeon W-2145 (3.7GHz, Turbo boost up to 4.5GHz, (8 cores)

Memory: 64GB (8x8GB) 2666MHz DDR4 ECC RDIMM

Hard Drive: 1TB M.2 PCIe NVMe Solid State Drive.

Additional Hard Drive: 1TB M.2 PCIe NVMe Solid State Drive.

Optical Drive: 8x DVD+/-RW Drive

Graphics: 8GB Quadro P4000

Mouse: Dell Optical (Not Wireless) USB Black Mouse

Keyboard: QuietKey USB Keyboard Black

Operating System: Windows 10 Professional 64bit

Support: 3 Year Dell ProSupport and Next Business Day On-Site Service

Performance guidelines

Desktop Ultimate Flow Simulation- **Dell Precision™ 7920**- Primarily aimed at Flow simulation users with large datasets users but also beneficial for CPU based rendering tools such as Photoview 360 and possibly for other simulation types where multiple studies are run at once.

Processor: 2 x Intel Xeon Gold 6136 (3.0GHz, Turbo boost up to 3.7GHz, (12 cores per CPU 24 Cores total)

Memory: 64GB (4x16GB) 2666MHz DDR4 ECC RDIMM

Hard Drive: 1TB M.2 PCIe NVMe Solid State Drive.

Additional Hard Drive: 1TB M.2 PCIe NVMe Solid State Drive.

Optical Drive: 8x DVD+/-RW Drive
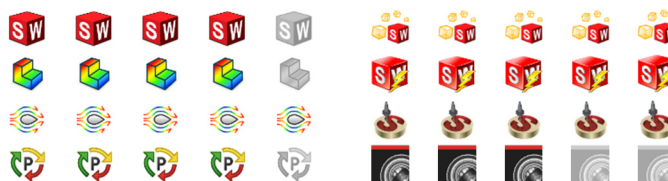
Graphics: 8GB Quadro P4000

Mouse: Dell Optical (Not Wireless) USB Black Mouse

Keyboard: QuietKey USB Keyboard Black

Operating System: Windows 10 Professional 64bit

Support: 3 Year Dell ProSupport and Next Business Day On-Site Service

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Laptop Entry Level - Dell Precision™ 7530 -15.6inch laptop, aimed at users who don't produce large assemblies or very complex parts but still a very capable machine for key functions of SOLIDWORKS parts, assemblies & drawings.

Processor: Intel Core i5-8300H Quad Core (2.30GHz Turbo Boost up to 4,0GHz)

Display: 15.6inch Ultra Sharp FHD 1920x1080 With Cam & Mic

Memory: 8GB (1x 8GB) 2666MHz DDR4 Dual Channel

OS/Boot Drive: 256GB M.2 PCIe Solid State Drive

Optical Drive: No internal optical drive available

Graphics Card: NVIDIA Quadro P1000 with 4GB GDDR5 dedicated memory

Operating System: Windows 10 Professional 64bit

Support: 3 Year Dell ProSupport with next business day on-Site Service

Performance guidelines

Laptop- All Rounder - Dell Precision™ 7530

15.6inch laptop giving the best balance between cost and performance. This system supports higher spec graphics card and more RAM has been added along with a Solid State Drive for improved performance. A very capable machine for key functions of SOLIDWORKS parts, assemblies & drawings and occasional renders/ simulation.

Processor: Intel Core i5-8400H Quad Core (2.50GHz Turbo Boost up to 4,2GHz)

Display: 15.6inch Ultra Sharp FHD 1920x1080 With Cam & Mic

Memory: 16GB (2 x 8GB) 2400MHz DDR4 Non ECC Ram

OS/Boot Drive: 512GB M.2 PCIe Solid State Drive

Optical Drive: No internal optical drive available

Graphics Card: NVIDIA Quadro P2000 with 4GB GDDR5 dedicated memory

Operating System: Windows 10 Professional 64bit

Support: 3 Year Dell ProSupport and Next Business Day On-Site Service

Performance guidelines

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Laptop All Rounder-17 Inch Option-Dell Precision™ 7730

Larger 17.3 Inch mobile desktop replacement system with more powerful graphics than the 15inch version. A very capable machine for key functions of SOLIDWORKS parts, assemblies & drawings and occasional renders/ simulation.

Processor: Intel Core i5-8300H Quad Core (2.50GHz Turbo Boost up to 4,2GHz)

Display: 17.3inch Ultra Sharp FHD 1920x1080 With Cam & Mic

Memory: 16GB (2 x 18GB) 2666MHz DDR4 Non ECC Ram

OS/ Boot Drive: *512GB M.2 PCIe NVMe Solid State Drive.*

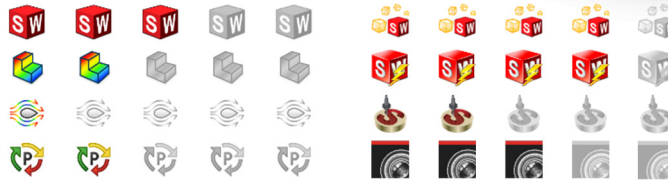*Optical Drive:* No internal optical drive available

Graphics Card: NVIDIA Quadro P3200 w/6GB GDDR5 dedicated memory

Operating System: Windows 10 Professional 64bit

Support: 3 Year Dell ProSupport and Next Business Day On-Site Service

Performance guidelines

NVIDIA VR READY

Laptop High End- Dell Precision™ 7530

15.6inch laptop giving the best balance between cost and performance. This system supports higher spec graphics card and more RAM has been added along with a Solid State Drive for improved performance. A very capable machine for key functions of SOLIDWORKS parts, assemblies & drawings and occasional renders/ simulation.

Processor: Intel Core i7-8850H Six Cores, 12 Threads 2.60GHz,(Turbo boost up to 4.3GHz)

Display: 15.6inch Ultra Sharp FHD 1920x1080 With Cam & Mic

Memory: 32GB (2 x 16GB) 2666MHz DDR4 Non ECC Ram

OS/Boot Drive: 1TB M.2 PCIe Solid State Drive

Optical Drive: No internal optical drive available

Graphics Card: NVIDIA Quadro P3200 with 6GB GDDR5 dedicated memory

Operating System: Windows 10 Professional 64bit

Support: 3 Year Dell ProSupport and Next Business Day On-Site Service

Performance guidelines

NVIDIA VR READY

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Laptop High End- 17 Inch Option- Dell Precision™ 7530

Processor: Intel Core i7-8850H Six Cores, 12 Threads 2.60GHz,(Turbo boost up to 4.3GHz)

Display: 17.3inch Ultra Sharp FHD 1920x1080 With Cam & Mic

Memory: 32GB (2 x 16GB) 2666MHz DDR4 Non ECC Ram

OS/Boot Drive: 1TB M.2 PCIe Solid State Drive

Optical Drive: No internal optical drive available

Graphics Card: NVIDIA Quadro P3200 with 6GB GDDR5 dedicated memory

Operating System: Windows 10 Professional 64bit

Support: 3 Year Dell ProSupport and Next Business Day On-Site Service

Performance guidelines

Laptop High End Simulation - Dell Precision™ 7730

Aimed at heavy Simulation use with the fastest mobile CPU available benefiting both SOLIDWORKS and Simulation in particular. As this is a Xeon CPU it also supports error correcting RAM ensuring increased reliability for long simulation runs

Processor: Intel Core Xeon E-2186M Six Cores, 2.9GHz, (Turbo boost up to 4.6GHz)

Display: 17.3inch Ultra Sharp FHD 1920x1080 With Cam & Mic

Memory: 32GB (2x 16GB) 2266MHz ECC DDR4 Dual Channel

OS/Boot Drive: 1TB M.2 PCIe NVMe Solid State Drive

Additional Hard Drive: 1TB M.2 PCIe NVMe Solid State Drive

Optical Drive: No internal optical drive available

Graphics Card: NVIDIA Quadro P3200 w/6GB GDDR5 dedicated memory

Operating System: Windows 10 Pro for Workstations 64bit (4 Cores plus)

Support: 3 Year Dell ProSupport and Next Business Day On-Site Service

Performance guidelines

Note this is really as high as you can go with regards to performance for Simulation in a workstation class laptop, it doesn't get 5 stars to indicate that you may wish to consider a Desktop with more cores if performance is your priority.

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HARDWARE

Laptop High End Visualize - Dell Precision™ 7720

17.3 Inch mobile desktop replacement system with the best performance vs price ratio for SOLIDWORKS Visualize. This is also our first VR Ready certified specification in a laptop.

Processor: i7-8850H 6 Cores, 12 Threads 2.60GHz,(Turbo boost up to 4.3GHz

Display: 17.3inch Ultra Sharp FHD 1920x1080 With Cam & Mic

Memory: 32GB (2 x 16GB) 2666MHz DDR4 Non ECC Ram

OS/ Boot Drive: 1TB M.2 PCIe NVMe Solid State Drive.

Optical Drive: No internal optical drive available

Graphics Card: NVIDIA Quadro P4200 w/8GB GDDR5 dedicated memory

Operating System: Windows 10 Professional 64bit

Support: 3 Year Dell ProSupport and Next Business Day On-Site Service

Performance guidelines

Note that the Quadro P5200 is the highest specification mobile Quadro card available but this adds approx. £500 to the price for around 15% performance improvement we made some compromise, for large datasets the P5200s 16GB memory may also be worthwhile.

Laptop – Ultra Portable – Dedicated Use- Dell Precision™ 5520

The sleekest model in the range at just 17mm maximum thickness and starting at just 1.8kg this still packs in a quad core CPU and 4GB NVIDIA Quadro professional graphics and has been specified for a user who is dedicated to using SOLIDWORKs but for whom portability is key.

Processor: i7-8850H 6 Cores, 12 Threads 2.60GHz,(Turbo boost up to 4.3GHz

Display: 15.6" Ultra Sharp FHD IPS 1920x1080 Wide View Anti-Glare LED-backlit
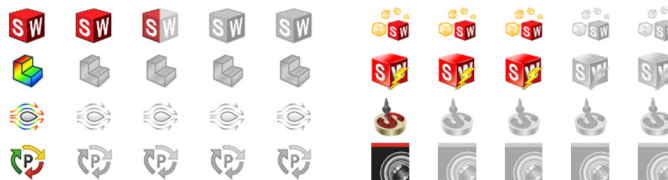
Memory: 16GB (1 x 16GB) 2666MHz DDR4 Non ECC Ram

Boot/OS Drive: 1TB M.2 PCIe NVMe Solid State Drive Boot Drive

Optical Drive: No internal optical drive available

Graphics Card: NVIDIA Quadro P2000 w/4GB GDDR5 dedicated memory

Operating System: Windows 10 Professional 64bit

Support: 3 Year Dell ProSupport and Next Business Day On-Site Service

If you are unsure of your requirements please contact hardware@solidsolutions.co.uk for help.

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Appendix- FAQ and Performance data

FAQ

IS SOLIDWORKS SUPPORTED ON MAC?

SOLIDWORKS will not install natively on Apple computers. However, some customers run successfully on Mac OSX based systems, using emulation (parallels) or Boot Camp (installing windows on mac to dual boot). Please note that SOLIDWORKS may suffer from the lack of graphics acceleration on Apple Mac based machines, as pro level graphics along with certified graphics drivers are not available this is particularly noticeable on more complex data sets such as assemblies with many components.

WHAT ABOUT VIRTUALISATION?

SOLIDWORKS have tested to confirm that the software will install on certain virtualisation platforms, however support in terms of performance and stability is down to the virtualisation provider and graphics card manufacturer. The latest NVIDIA GRID based setups support everything including accelerating SOLIDWORKS Visualize when using the new Pascal generation Tesla cards.

See http://www.solidworks.com/sw/support/11168_ENU_HTML.htm However note that supported does not mean that performance will be up to scratch, graphics acceleration is lacking in many solutions. SOLIDWORKS have tested drivers for certain NVIDIA GRID cards on Citrix Xen and VM Ware platforms.

RECOMMENDATIONS FOR DATA MANAGEMENT (PDM)

Ideally a dedicated Windows server/s should be used for either a SOLIDWORKS Workgroup PDM or SOLIDWORKS PDM Standard and Professional vaults. Besides giving maximum performance for the CAD users, using a dedicated server provides a location to store company standards and templates. For hardware specifications for a PDM system, please visit:

http://www.solidworks.com/sw/support/PDMSystemRequirements.html

DOES SOLIDWORKS USE MORE THAN ONE CORE?

This is common misconception in some operations SOLIDWORKS is multi-threaded. Many of the activities such as dialogue box interaction; drawings etc. take advantage of this technology. Even a cut extrude with many profiles is multi-threaded, however, the solving process (rebuilding) used for parametric modelling is by nature very linear i.e. one feature must be rebuilt before the next therefore SOLIDWORKS will not always use all the available cores the full use of 1-2 cores is more typical during a rebuild so less faster cores are better than more slower cores.

However, drawings with multiple views, most simulation and photoview 360 rendering tasks also benefit significantly from multiple cores to varying degrees more detail on this follows below.

SLOWDOWNS-SHOULD I ADD MORE RAM?

Adding more RAM will not solve performance issues unless you are running out, tools such as the windows performance monitor or even at a basic level the task manager. Run your normal tasks and see if you are running low (the SOLIDWORKS performance Monitor should also alert you) you only need enough so that you don't run out this would start using virtual memory on your hard disc which is many times slower. Often using best practices in the software can speed things up otherwise you have to identify where the bottlenecks are before upgrading hardware.

PHOTOVIEW 360- HOW CAN I SPEED UP MY RENDERS

Photoview 360 only uses CPU for rendering and the scaling for is this pretty much linear, i.e. if you go from 4 cores to 8 cores you would expect the render to take around half the time. However, some tasks such as lighting calculations are less multithreaded so this is only a rough guide. Despite not using the graphics card for rendering a certified card is still recommended.

Network rendering is also supported so long as the machine running the render is on subscription. Other PC's can install the free network render client. A benefit is typically seen when a single render takes more than 5 minutes. More info can be seen on MySolidSolutions.

Note that the clients Pc's should be reasonably modern in order to be of benefit and have an Open GL capable graphics card we have seen issues with on board graphics e.g. servers. If unsure a low end Quadro or Fire Pro card would be the safest bet.

SOLIDWORKS VISUALISE- HOW CAN I SPEED UP MY RENDERS?

SOLIDWORKS Visualize Standard is a new standalone product for which a complimentary license is provided with each SOLIDWORKS Professional and Premium subscription. SOLIDWORKS Visualize Professional available at extra cost including animation and many other functions to leverage your 3d data. Both options and can be installed either on the SOLIDWORKS users system or on another users system.

Speed in Visualize is primarily down to using NVIDIA GPU (graphics card) CUDA cores to achieve massive speed ups vs traditional CPUs. AMD graphics cards will not accelerate this process however the software will still run in CPU only mode on such setups.

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Also note that the new Visualize AI denoiser included in versions 2018 SP3 and above is only supported on NVIDIA graphics cards with 4GB or more of dedicated video memory. This can be used to reduce the number of passes required to eliminate noose/artefacts in the render by up to 10 times. I.e. if you need 1000 passes in a traditional rendering tool you may be able to use as little as 100 using the denoiser.

When working in Visualize a mid-high end NVIDIA card (Quadro P2000+) will show significant acceleration with 4GB will be enough in most cases but large assemblies may demand more otherwise it will revert to CPU mode which is considerably slower. Adding a second card of the same specification will reduce render times by as much as half.

Below are some results taken from the [SOLIDWORKS Visualize Benchmarks](#), for a benchmark project to render at 1920x1080 for 500 passes the CPU mode is the performance you would get without a supported NVIDIA graphics card.

Model	1 x Quadro 5GB P2000 (Desktop) Approx £360	1 x Quadro P4000 8GB (Desktop) Approx £725	2x Quadro P4000 8GB (Desktop) Approx £1500
CUDA Cores	1024	1792	3584
Render Time	3 Mins 33 Secs	2 Mins 13 Secs	1 Min 10 Seconds

We can see performance scales pretty linearly with the number of CUDA cores. Cards with More CUDA cores are available but cost significantly more, the P5000 has 2560 cores and costs approx. £1500 and the P6000 has 3840 but costs over £4000 for the card alone. These cards are however useful if you need more video memory for very complex scenes as the scene must fit into the memory of the smallest card installed on the system, if you have dual cards with differing amounts of memory the smallest of the two is your limiting factor, memory is **not** additive.

WHICH SIMULATION TYPES BENEFIT MOST FROM MULTI CORE PROCESSORS?

Most simulation types see some benefit from multiple cores; simulations using the direct sparse solver see the most benefit.

Keep in mind that if you have capacity to spare in terms of available cores and RAM you should be able to continue working productively in SOLDIWORKS while carrying out simulations. In general if running a single study, performance improvements diminish with more than 4 cores available to the study. For that reason, 4-8 cores is currently the sweet point as you should then have resources to continue to work in SOLIDWORKS and other programs to a degree without affecting the solve time significantly.

Below you can find data based on some testing by SOLIDWORKS and Solid Solutions which is an indication only, there is no guarantee of how well a particular simulation study will take advantage of multiple cores.
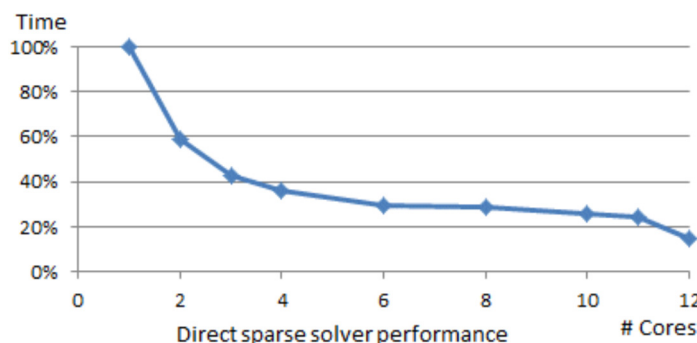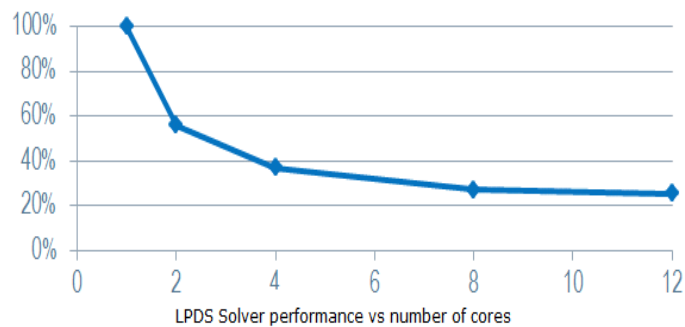
SOLIDWORKS SIMULATION

MESHING

From SOLIDWORKS 2011 the curvature based mesher can take advantage of multiple cores where as the standard mesher is mostly single threaded.

STATIC SIMULATION - ASSEMBLIES AND PARTS

A static simulation of an assembly with bolt connectors sees a 75% improvement in solve time using the direct sparse solver when going from 1 to 4 cores. Using the FFEPlus Solver this benefit may only be 15%

Below is a table produced by SOLIDWORKS showing the performance increase for static simulation of more cores on the various solvers; Direct Sparse, FFEPlus and Large Problem Direct Spare Solvers.

Direct sparse solver performance

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FFEPlus solver performance — # Cores

LPDS Solver performance vs number of cores
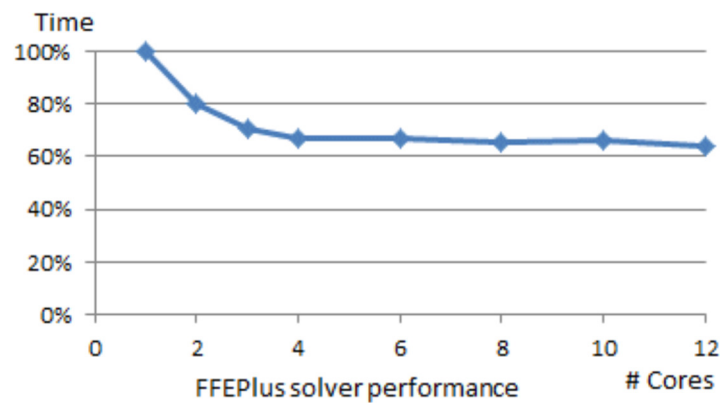
The most computationally intensive stages of the analysis using a sparse solver are generally decomposition of stiffness matrix and solving contact constraints. These are the stages which support multi-core, hence making them less time consuming.

OTHER SOLIDWORKS SIMULATION TYPES

NON LINEAR SIMULATION

A similar setup as a non-linear simulation on a single part yields a 58% improvement using the direct spare solver but no improvement when using the FFEplus.

THERMAL SIMULATION

Thermal simulation sees an 82% improvement using the direct sparse solver, again no improvement when using FFEPlus.

OTHER SIMULATION TYPES

Simulation types which are mostly single threaded are:

FATIGUE

The fatigue solver itself uses only one core in testing but preparing to run a fatigue study involves running one or more static studies which do benefit from multiple cores, overall there is an improvement.

FREQUENCY

Frequency saw less improvement in testing than most simulation types, contrary to the other simulation types direct sparse solver saw 0% improvement whereas the FFEPlus Solver saw a 25% improvement.

OPTIMIZATION

Most of the time spent solving an optimization analysis is taken up by running loops of design iterations of the studies defined for constraints. The benefit would depend on the type of study optimised.

LINEAR DYNAMIC

The actual post dynamic analysis and stress calculations use special solvers which used only one core in testing. However, performing a linear dynamic analysis involves first finding resonant frequencies, which did show usage of more than one core when using the FFEPlus solver.

PRESSURE VESSEL DESIGN

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The majority of the time taken to complete a pressure vessel analysis is running static studies that you wish to combine. The actual calculations for combination of results used only one core during testing but as this made up a small percentage of the total time to perform the analysis there was a significant performance improvement.

Drop Test
Only one solver type available, the test model used only one core.
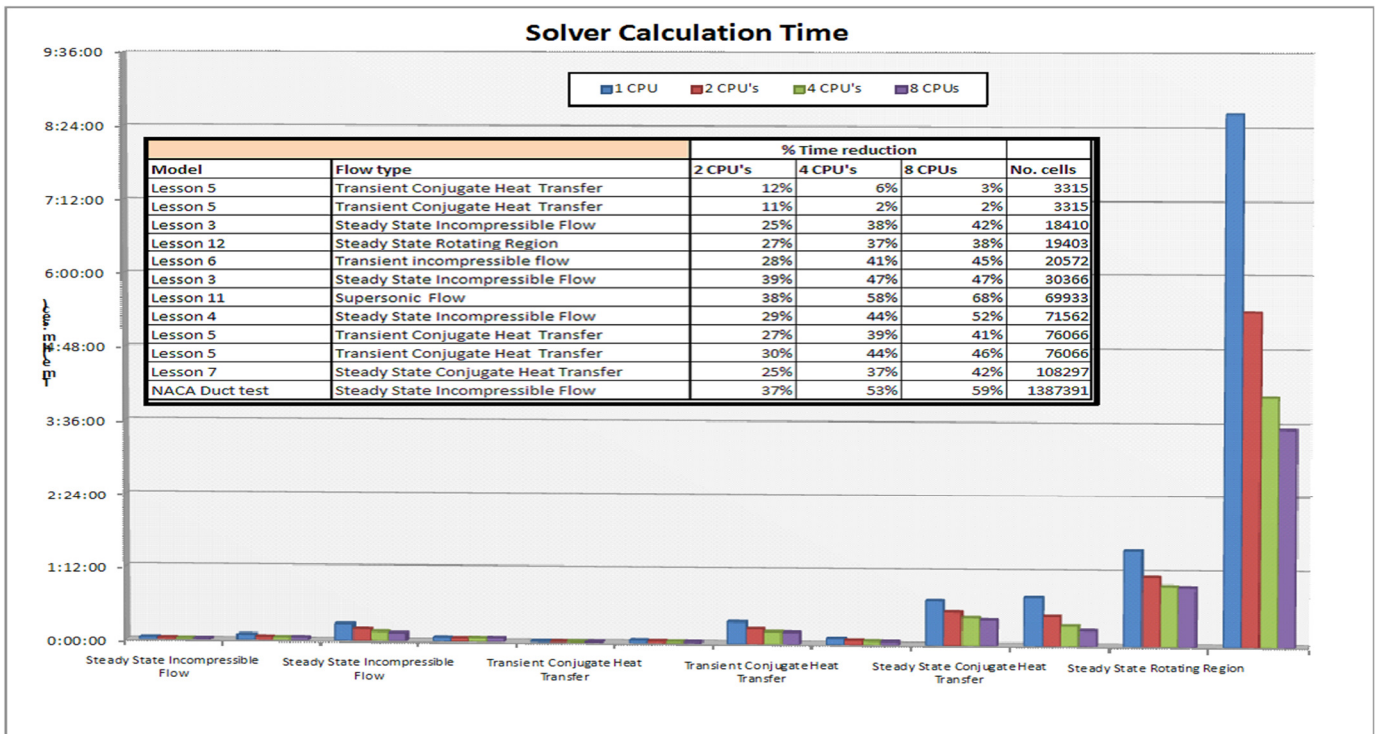
SOLIDWORKS PLASTICS

SOLIDIWORKS Plastics shows good gains for all parts of the process. Note the jump here this is thought to be as when using 12 cores in our testing we were using all 10 cores from 1 CPU and 2 from the second, the data communication between the two likely being the cause of the anomalous results.
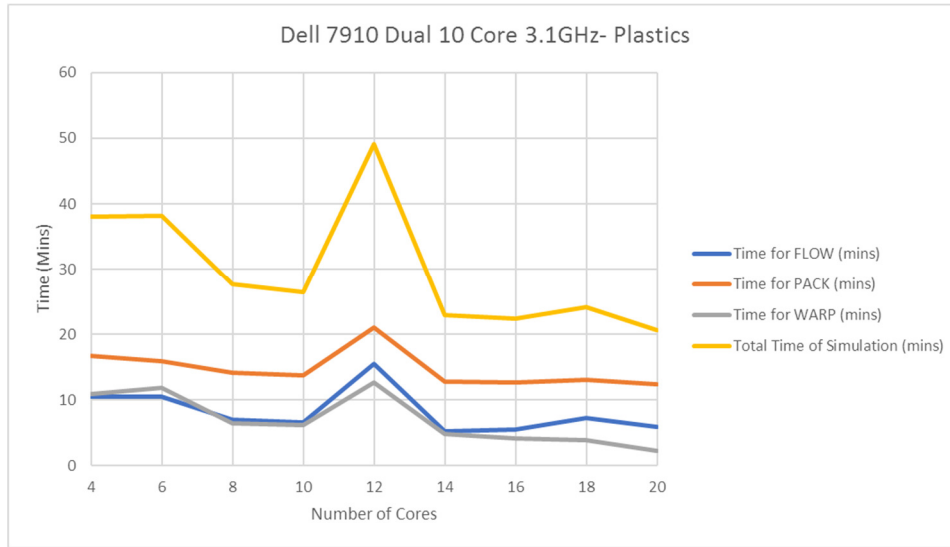
Flow Simulation

In SOLIDWORKS Flow Simulation, great improvements were made in SOLIDWORKS 2012 and above to take advantage of more than 4 cores, larger cell count models see the most benefit.

FLOW SIMULATION SPEED VS NUMBER OF CORES

Model	Flow type	2 CPU's	4 CPU's	8 CPUs	No. cells
Lesson 5	Transient Conjugate Heat Transfer	12%	6%	3%	3315
Lesson 5	Transient Conjugate Heat Transfer	11%	2%	2%	3315
Lesson 3	Steady State Incompressible Flow	25%	38%	42%	18410
Lesson 12	Steady State Rotating Region	27%	37%	38%	19403
Lesson 6	Transient incompressible flow	28%	41%	45%	20572
Lesson 3	Steady State Incompressible Flow	39%	47%	47%	30366
Lesson 11	Supersonic Flow	38%	58%	68%	69933
Lesson 4	Steady State Incompressible Flow	29%	44%	52%	71562
Lesson 5	Transient Conjugate Heat Transfer	27%	39%	41%	76066
Lesson 5	Transient Conjugate Heat Transfer	30%	44%	46%	76066
Lesson 7	Steady State Conjugate Heat Transfer	25%	37%	42%	108297
NACA Duct test	Steady State Incompressible Flow	37%	53%	59%	1387391

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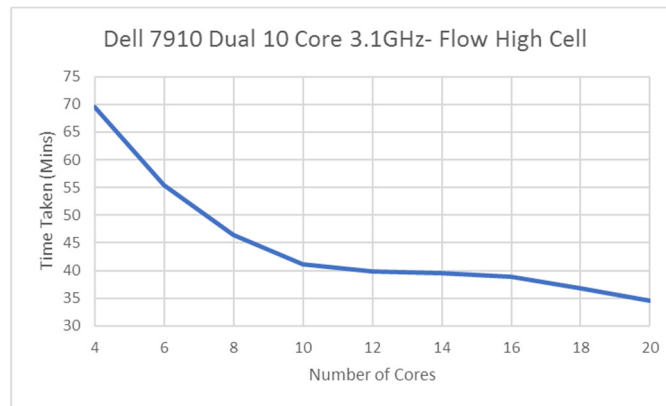
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DS SOLIDWORKS

. FROM SOLIDWORKS 2014 ONWARDS MESHING IS MULTITHREADED, WITH THE LARGEST GAINS BEING FOR LARGE MESHES

► Larger meshes see the highest gain

► For a single core, meshing is 30% faster on average compared to 2013

Complex Flow Simulation problems with a <u>large cell count</u> also typically show more benefit from core counts over 8 cores than smaller problems

If you require a quote or if you are unsure about your requirements please contact your account manager or hardware@solidsolutions.co.uk

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