

A GUIDE TO IMPROVING YOUR WORKSTATION EXPERIENCE

SPECIAL
PTC CREO
PARAMETRIC
2.0
EDITION



Produced by
DEVELOP3D
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ILLUSTRATION: ROB BIDDULPH

OPTIMIS

Tune your workstation for free

Just like a kettle, workstations get furred up over time. Regular maintenance can help them perform to their true potential. Here are ten simple steps you can take to improve performance for free. Here's the disclaimer - proceed with caution and make sure all of your data is backed up before you start!

1 UNINSTALL UNNECESSARY APPLICATIONS

The simplest, most effective way to improve performance is to uninstall unnecessary applications as these take up memory and clog up startup sequences. Make sure you do this in the correct way, through Start > Settings > Control Panel > Add/Remove Programs.

2 TURN OFF UNWANTED STARTUP APPS

Some applications can't be uninstalled in the traditional way. To overcome this, click Start > Run and type MSCONFIG. Click the STARTUP tab and you will see all the

processes that run at startup before the operating system is ready to be used. Here's the WARNING! Be very careful what you turn off. For example, if you take out ATI.dll, on restart your screen will not display! Search the web for details of what each process does. In Figure 1 the Adobe PDF update utility has been switched off, which will save resources every time the machine boots up.

3 REBOOT REGULARLY

When applications and datasets load they can take up valuable memory resources. Over time this memory can become full, as resources are not always freed up when things are

closed. This can slow down your workstation, as new applications will then push some of their data to a swap file on the hard disk, which is a lot slower. Restarting your workstation periodically can clear up these minor memory leaks, helping ensure you have all of your memory available.

4 DEFRAG YOUR HARD DRIVE

Defragmentation can be a good way of increasing the performance of mechanical SATA hard drives. Hard disks are spinning platters with heads that read/write the data. The disks spin at a constant rate so the outside edge has more data read from / written to per revolution than the inside. This difference can be as much as 20%.

If you use your workstation a lot the files get spread over the disk with one part in the middle and one part at the end and this gets worse the more you delete and add files. This decreases performance because the head needs to physically move from one part of the disc to another and over a period of time your system starts to feel slower.

Defragmenting your hard drive on a regular basis can help with this as it moves all the files back together. N.B. defragmentation will not improve performance on modern Solid State Drives (SSDs) as there are no moving parts so they don't suffer from the same problems. Defragmenting a SSD could even damage the drive.

5 KEEP SPACE FREE ON YOUR HARD DISK

Keeping your hard disks half full can improve

performance. There are many things you can do to achieve this. First of all archive old projects, remove large files or duplicates and delete temporary internet and CAD files. Many software applications also install temp files in the root of the C drive. Once the application is installed it won't need them. A good way to check you've deleted the right folder is not to empty the recycle bin straight away. Run the application and if it all works OK you know it's safe to permanently delete.

6 INSTALL THE LATEST GRAPHICS DRIVER

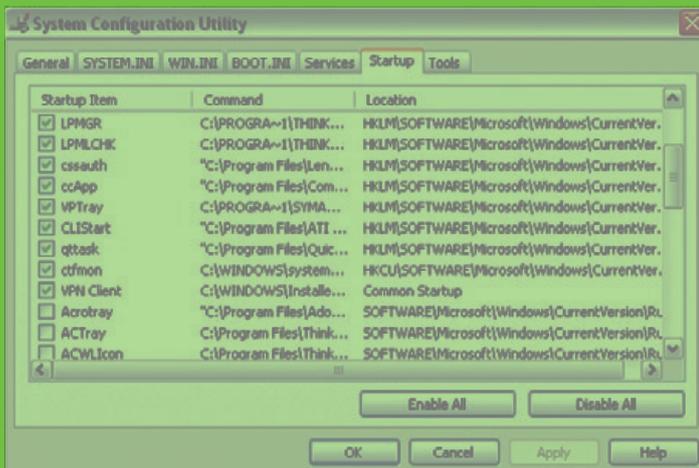
Hardware drivers are always important. Windows operating systems come with a base set of drivers but you can still benefit from ones that are more up to date. For 3D applications, graphics drivers, then chipset drivers are the most important. For information on Creo Parametric 2.0 certified drivers see PTC's support web page (www.ptc.com/partners/hardware/current/support.htm). This is updated periodically but the actual drivers are directly available from the workstation manufacturer.

Over the life of a professional graphics card, updating to the latest drivers can improve performance by up to 30%!

7 SET TO MAXIMUM PERFORMANCE

By default, the power profile in Windows is set to 'balanced', giving a combination of performance and reduced energy consumption. To set these to maximum performance click Start > Settings > Control Panel > Power Options. Then click 'show additional plans' and set to 'high performance'.

Fig. 1 AUTOMATIC PROGRAM UPDATES, SUCH AS ADOBE'S PDF UPDATE UTILITY, CAN BE REMOVED FROM STARTUP



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8 TURN OFF ENCRYPTION AND COMPRESSION

On NTFS disks you can save space and increase security by compressing and encrypting files. However, for maximum performance always turn these off.

9 SPECIALIST WINDOWS 7 TIPS

There are a number of specialist tips for boosting performance in Microsoft Windows 7. Here we provide the key concepts, but you'll need to do some research to find out exactly how to do them.

PREFETCHING is a Windows 7 performance feature that spots trends in disk usage and then the data that is accessed most frequently is automatically read into memory. The prefetcher can speed up booting, application launching, or both. It is configured by changing registry settings.

PROCESSOR SCHEDULING can tune Windows 7 so that it is optimised to run programs, as opposed to background operations.

THE LAST ACCESS TIMESTAMP tells you when a folder or file was last accessed. If you have folders that contain large numbers of files (such as 3D CAD parts) and you frequently access those files, writing the Last Access Time data can slow down disk access. You can turn this off in the registry.



10 SPRING CLEAN YOUR MACHINE

Over time, a build up of dust can clog up fans, which are used to cool CPUs and graphics cards. This makes them less effective, and in some cases causes processors to slow down to stop them overheating. Cleaning inside the machine can help this, but be very careful. Workstations are delicate and sensitive to static so this should be done by hand using an anti-static cloth or compressed air, not with a vacuum cleaner or cleaning products!

UPGRADE

Invest in new components

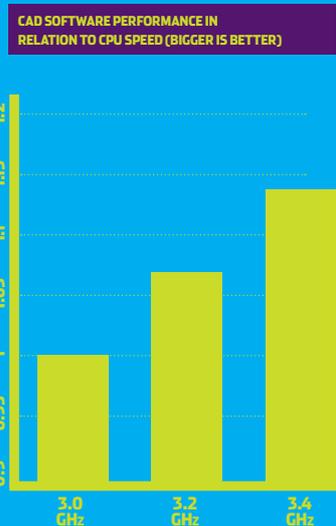
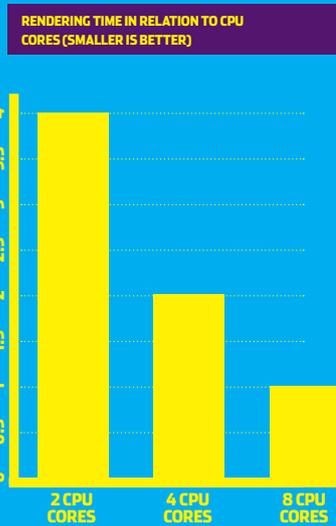
Your workstation can be improved further by upgrading key components. As machines get older, compatible components come down in price, and there are some great second hand bargains, so upgrading can be a very cost effective way of getting a lot out of a small budget.

1 PROFESSIONAL GRAPHICS
Upgrading to a new graphics card can help boost 3D performance when models increase in size and complexity. A replacement graphics card can also help maintain full support with new software. Older graphics cards can become out of date if they don't support the latest APIs, such as OpenGL 4.2 and DirectX 11, which are used by modern 3D applications. For Creo Parametric 2.0, for example, AMD recommends graphics cards that support at least OpenGL 4.0. Those that currently use a gaming card, such as AMD Radeon, may be missing out on features. For example, the new GPU-accelerated transparency mode in

Creo Parametric 2.0 (OIT - Order Independent Transparency) is only supported by AMD FirePro professional graphics (see page 8). The amount of Graphics Processing Unit (GPU) memory is also an important factor when considering an upgrade. 128MB or 256MB is common in some older generation cards, but modern 3D applications need more GPU memory to run to their full potential. This is particularly true of applications that feature advanced under-the-hood graphics performance optimisations, such as Vertex Buffer Object (VBO), which PTC has implemented in Creo Parametric 2.0 (see page 8). A graphics card upgrade is not always the most cost-effective way

to improve 3D performance. Some workflows will respond better to a balanced investment in CPU and GPU, rather than throwing your entire budget at a high-end GPU. With some 3D CAD applications the CPU acts as the bottleneck, so no amount of additional graphics power will boost 3D performance. In these instances the upgrade budget is best spent on a faster CPU. **PRACTICAL TIP #1** Make sure your new graphics card is fully compatible with your workstation. The latest PCI Express 2.1 graphics cards will not work to their true potential in PCI Express 1.0 workstations. **PRACTICAL TIP #2** Make sure you have sufficient power (watts). High-end graphics card need an additional feed direct from the Power Supply Unit (PSU) and some PSUs simply don't output enough power for high-end cards.

MEMORY (RAM) REQUIREMENTS FOR TYPICAL CAD MODELS			MODEL TYPE	# OF COMPONENTS IN ASSEMBLY	TYPICAL RAM CONSUMED
ENGINE	CHASSIS	BODY			
					
655	706	6625			
7.5GB	10GB	23.5GB			



2 CPU (CENTRAL PROCESSING UNIT)
Those considering an upgrade to a new CPU should concentrate on two main areas – GHz and CPU cores. All applications will benefit from a CPU with a higher GHz so this is a good way to boost general performance. Increasing the amount of CPU cores will have a major benefit for multi-threaded processes such as final ray-traced rendering in Creo. On the other hand, multiple CPU cores will have little effect on overall CAD design tasks. Four CPU cores is a good amount for mainstream users of Creo Parametric. Investing in a faster CPU can also benefit 3D graphics. Increasing the GHz of the CPU will almost always improve 3D performance. **PRACTICAL TIP #1** Make sure the CPU is

compatible with the socket on your motherboard. **PRACTICAL TIP #2** Make sure you have the correct heat sink and use a good quality thermal paste to 'bond' the CPU to the motherboard. **3 MEMORY (RAM)**
Multi-application workflows and increasingly complex datasets mean workstations need more RAM than ever before. When a workstation runs out of memory, the system can slow down completely due to hard drive caching. Here, adding more memory can be a very cost effective way of improving performance, but make sure you have a 64-bit operating system if you have more than 3GB. **PRACTICAL TIP #1** To check how much memory you are using press CTRL, ALT, DELETE and click performance or, for a more detailed

DE

report, download a specialist memory viewing application.

PRACTICAL TIP #2 When you add more memory, make sure it is matched to existing RAM for best performance.



DISPLAYS

There are many benefits to upgrading a display.

Modern TFT displays feature higher resolutions, more vivid colors, a smaller footprint and can help reduce eye strain. Modern graphics cards can support multiple displays, which can either be used for individual applications or positioned side by side for an extended desktop.

PRACTICAL TIP #1 Don't throw out your current display. Use it for a complementary process, such as email or document management.

PRACTICAL TIP #2 All graphics cards support two displays, but AMD Eyefinity technology can support three or more.



OPERATING SYSTEM

One of the most compelling arguments for upgrading an operating system (OS) is to get access to more memory. A 32-bit OS, such as Windows XP Professional, can't use more than 3GB, whereas a 64-bit OS, such as Windows 7 Professional 64-bit can.

PTC will no longer offer technical support for "out of memory conditions" on 32-bit hardware for Creo Parametric 2.0 in cases where /3GB switch (a workaround for addressing more memory in a 32-bit system) is utilised.

Windows 7 can also improve performance in some applications, by enabling them to make better use of multiple CPU cores.



ILLUSTRATION: ROBE BIDDULPH

6 STORAGE

There are two main reasons to upgrade a hard drive. 1) to increase performance 2) to increase capacity.

For performance, a popular upgrade is to a modern Solid State Drive (SSD). These boast faster read/write access than standard mechanical platter drives, which means operating system, applications and datasets will load quicker. For increased capacity the latest mechanical SATA drives can hold terabytes of data and prices are comparatively low.

PRACTICAL TIP #1 Make sure your motherboard supports the relevant SATA standard (PCI cards can be added in to support newer standards).

PRACTICAL TIP #2 Buy a SSD for operating system, applications and current datasets and use your existing SATA drive for storage.

INVEST

Buy a brand new workstation

Investing in a brand new workstation can deliver huge productivity benefits, enabling new workflows that are simply not possible with aging hardware. But where do you spend your money? We look at the key components and what they all mean.

1

GRAPHICS

Professional graphics cards, such as AMD FirePro, are a good choice for designers and engineers as they are tested, optimised and certified to work with all the leading CAD/CAM/CAE applications.

For Creo Parametric 2.0, a PTC-certified system with an entry-level or mid-range card with 2GB or more of memory is a good choice.

When buying a workstation it is important to find a good balance between CPU and graphics card. A high-end graphics card will not be able to harness its true performance if matched with an entry-level CPU.

Higher end graphics cards can also offer additional benefits. A

single AMD FirePro V7900, for example, can span Creo Parametric 2.0 models across four displays for 'beyond HD' visualisation. This is a unique feature, which is made possible by AMD Eyefinity multi-display technology. Professional graphics cards from other manufacturers require two graphics cards to do the same task.

AMD Eyefinity multi-display technology is also available in other graphics cards. The AMD FirePro V4900 and V5900, for example, support three displays, while the AMD FirePro V9800 supports six.

2

CENTRAL PROCESSING UNIT (CPU)

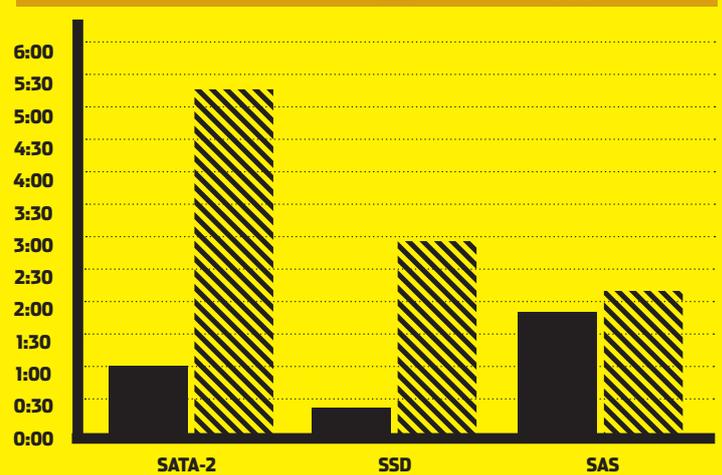
Modern CPUs comprise multiple processors (cores). When there was only one core per chip you had the choice of a single or dual processor workstation. Now things are measured in single or dual sockets and the number of cores per socket. On a single socket workstation four cores are common, but two, six or even eight core processors are also available. On a dual socket workstation the amount of cores is doubled.

In general the clock speed of the CPU is more important for performance in 3D software than the number of cores. This is measured in GHz.

For Creo Parametric 2.0 two CPU cores should be a minimum, with four a good amount for average users.

Today, in order to benefit from a

RELATIVE PERFORMANCE OF WORKSTATION HARD DRIVES (SMALLER IS BETTER)



larger number of cores, you will need to use multi-threaded software designed for rendering or simulation. While Creo Advanced Rendering works incredibly efficiently with eight or sixteen cores, the benefits for simulation software, including Creo Simulate, often diminish above two or four cores. However, multi core workstations can be put to good use when solving multiple simulations at the same time or multi-tasking between multiple applications.

Modern graphics card drivers can also use multiple CPU cores to help improve performance.

3

STORAGE

There are three main types of hard drives in workstations today. SATA (Serial ATA), SSD (Solid State Drive) and SAS (Serial Attached SCSI).

SATA drives are the most popular as they offer large capacities at a

low cost. They feature read/write heads that move across rotating platters. A common rotation speed is 7,200RPM.

SSDs are an increasingly popular choice for workstations. Read/write speeds are faster than SATA, which means datasets can be opened and saved much quicker. Operating systems and applications will also load quicker. The downside of SSDs is that the cost per GB is still high. As a result, a popular choice for workstations is to use an SSD for operating system, applications and current datasets and a SATA drive for storage.

SAS drives offer excellent read/write performance. Like SATA drives they feature read/write heads that move across rotating platters, but rotation speeds are typically from 10,000RPM to 15,000RPM. As the cost per GB is also high, a combination of SAS (for performance) and SATA (for storage) is also typical.

GRAPHICS PROCESSING UNIT (GPU) MEMORY REQUIREMENTS FOR TYPICAL CAD MODELS

MODEL TYPE	ENGINE	CHASSIS	BODY
# OF COMPONENTS IN ASSEMBLY	655	706	6625
TYPICAL GPU MEMORY CONSUMED	370MB	1GB	1.2GB

Disks can also be combined in multiple ways with a hardware solution called RAID. This comes in many forms but the differences in performance and reliability can have a big impact if you don't select the correct options.

RAID 0 is where you take two disks and stripe the data across both. You get better performance than a single drive, the full capacity of both drives, but if one drive fails you lose all your data.

RAID 1 is where the drives are mirrored. If one drive fails your data is backed up on the other, but you only get the capacity of one drive.

RAID 5 is a combination of 0 and 1 and data is spread over multiple drives. It's fast but expensive as it needs four physical drives, for only one third of the capacity of the drives added together.



OPERATING SYSTEM

Microsoft Windows 7 64-bit now comes as standard on all new CAD/CAM/CAE workstations. However firms that are on older operating systems, such as Windows XP, need to plan for the future.

Windows 7 is able to handle multi-tasking more efficiently, which better supports advanced engineering workflows. Reduced support for CAD/CAM/CAE software and workstation hardware on Windows XP make an even stronger case for standardising on a modern operating system. It is also important to note that some new hardware, including AMD Eyefinity multi-monitor graphics cards, is not supported on Windows XP.

5 MEMORY

Memory requirements are growing in CAD/CAM/CAE workstations and 8GB is now considered 'entry-level' with 16GB or more often needed to run multiple applications at the same time and load up complex datasets. Additional memory is required for compute intensive operations such as simulation, rendering, CAM and drawing production.

To address more than 3GB of memory a 64-bit operating system is mandatory. To improve system stability Error Code Checking (ECC) is often recommended and this is standard in high-end workstations. Non-ECC memory is more common in entry-level machines.

When buying a new workstation it is good practice to ensure there are spare DIMM slots reserved for future upgrades. However, don't break the bank doing this by having to buy expensive high capacity modules. The price of memory always comes down over time, so in the long run it could be more cost effective to replace the entire memory in the workstation.



ACCELERATING CREO WORKFLOWS

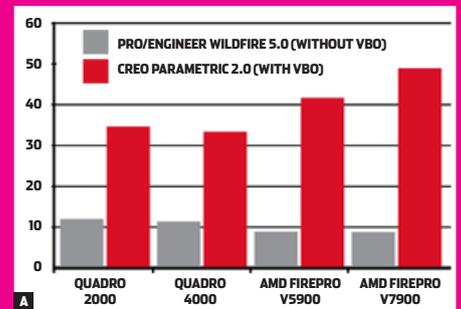
AMD FirePro graphics cards give Creo Parametric users access to unique GPU-accelerated features and new levels of performance

1 GPU MEMORY PERFORMANCE OPTIMISATIONS



The AMD FirePro professional graphics team worked closely with PTC to optimise the 3D graphics engine inside Creo Parametric 2.0. The advanced OpenGL optimisation (known as VBO – Vertex Buffer Object) increases the interactivity of large 3D models by loading and processing geometry on-board the graphics card.

Applications that do not feature VBO technology, such as Pro/Engineer Wildfire, have to continually move geometry between the CPU and GPU which can slow down performance. Creo designers running AMD FirePro experience up to 400%+ faster performance when working with complex datasets.

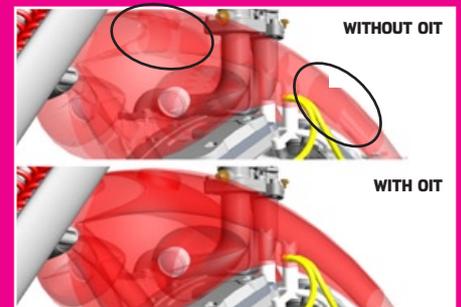


2 GPU-ACCELERATED TRANSPARENCY



Creo Parametric 2.0 features a new real-time GPU-accelerated transparency mode – Order Independent Transparency (OIT) – that is uniquely supported by AMD FirePro professional graphics. Compared to older methods for rendering transparency in the viewport, OIT renders the model a lot more accurately.

OIT fixes a problem that occurs with older “blended transparency” methods that can cause visual artifacts, making it harder to perceive depth. Transparency is particularly useful for revealing details inside complex models or rendering semi-transparent materials like glass or plastic.

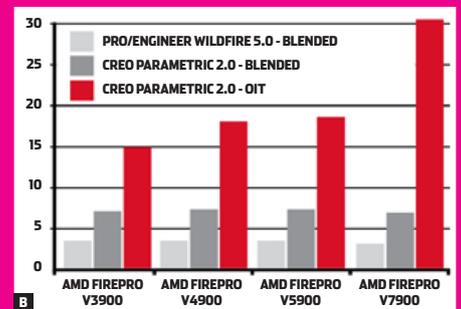


3 900% HIGHER TRANSPARENCY PERFORMANCE



The new Order Independent Transparency (OIT) mode in Creo 2.0 not only provides much improved transparency effects, but 3D performance is significantly faster than with earlier transparency modes in Creo or Pro/E Wildfire. With OIT the AMD FirePro GPU does the complex calculations, freeing up the CPU which is often busy

performing other tasks. Together with driver optimisations, performance in Creo Parametric 2.0 can be over 900% faster than blended transparency mode in Pro/E Wildfire 5.0. This opens up new workflow opportunities as Creo users can now leverage workflow efficiencies that were not previously available.



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A - VBO BENCHMARKS
 CREO® PARAMETRIC® 2.0 VS. PRO/ENGINEER WILDFIRE 5.0 (LARGE DATASET, SHADED MODE)
 MEASURED IN FRAMES PER SECOND - HIGHER SCORES = BETTER USER INTERACTIVITY
 BASED ON COMPARISON OF CREO 2.0 (WITH VBO) (47.3 FPS) VS. WILDFIRE 5 (WITHOUT VBO) (0.0 FPS) RUNNING AMD INTERNAL BENCHMARK, "AMD_FRAPS_BENCH," USING AMD'S MOTORCYCLE DATASET AND "SHADED" MODE. CONFIGURATION: DELL T3500, INTEL XEON W3690 3.47GHZ 6-CORE, 12GB, AMD FIREPRO V7900, WINDOWS 7 X64, 1920X1200, DRIVERS: AMD CATALYST PRO 8.911.3.3

B - OIT BENCHMARKS
 TRANSPARENCY PERFORMANCE (MEDIUM SIZED DATASET, SHADED MODE)
 MEASURED IN FRAMES PER SECOND - HIGHER SCORES = BETTER USER INTERACTIVITY
 BASED ON COMPARISON OF CREO 2.0 "OIT" MODE (30.9 FPS) VS. "BLENDED" TRANSPARENCY MODE IN WILDFIRE 5 (3.0 FPS) RUNNING INTERNAL BENCHMARK, "AMD_FRAPS_BENCH," USING AMD'S MOTORCYCLE DATASET, 3.47GHZ 6-CORE, 12GB, AMD FIREPRO V7900, WINDOWS 7 X 64, 1920X1200, DRIVER: AMD CATALYST PRO 8.911.3.3 AND "SHADED" MODE. CONFIGURATION: DELL T3500, INTEL XEON W3690 3.47GHZ 6-CORE, 12GB, AMD FIREPRO V7900, WINDOWS 7 X64, 1920X1200, DRIVER: AMD CATALYST PRO 8.911.3.3