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Select Your Next Workstation

Overwhelmed? Use this guide to discover the workstation that best fits your needs.

Editor's note: Through a sponsorship by Dell and Intel, Cadalyst editors bring you this feature, part of a special series of articles designed to educate CAD users and managers about the benefits and realities of professional workstations. Find even more information at the [CADspeed blog](#).

By Alex Herrera

You've made the decision to step up to a workstation. You place high demands on application-specific performance and reliability, and you know you need every tool you can muster to maximize your productivity, win clients, and grow your business.

Choosing the right workstation to speed your mechanical and AEC CAD workflow doesn't have to be painful. Sure, it might feel like there are simply too many features and options to hope to navigate and find the right machine. Dell and its partners are constantly developing and deploying new technologies in an effort to keep increasing mechanical and AEC users' productivity. Fortunately, there are also plenty of useful guidelines and rules of thumb that can help you filter the thousands of possible configurations down to that one or so that make the most sense for your use, your applications, and most importantly, your budget.

Be Fast and Reliable

Because you're looking for reliability and the best application-specific performance you can get for your dollar, two fundamental workstation features are going to be high value, no matter what your budget: ISV certification and ECC. The former's free and the latter's a modestly priced option, available on all Precision workstations. A baseline feature of all Dell Precision workstations, independent software vendors (ISV) certification ensures that your workstation is optimized to run reliably and as fast as your hardware and content allows. Exhaustive testing and tuning with the world's top ISVs, including Autodesk, Siemens, and Dassault Systèmes, means no-question compatibility and stability while running your application.

ECC (Error Correction Code) memory technology can detect and correct single-bit errors in system DRAM. How often will you see such errors on your system? Well, they're certainly not common, but would you really like to experience even one if it meant a overnight simulation failed, wasting a valuable day of your already-tight schedule? As a modestly priced add-on to any model in the Dell Precision line-up, ECC at the very least buys you piece of mind, and at best, can mean the difference between delivering on time, as promised ... or not.

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The next criterion up for you to whittle down your buying options is capacity, and with capacity we have to look at price range and form factor. With four primary starting points, Dell's Precision line can give you the capacity you need in a package to fit your workspace and a price to fit your wallet. Go up the Precision line — from the most economical T1600 up to the no-compromise performance T7500 — and get more drive bays, more expansion slots, a higher power budget, and even a second CPU socket.

Dell's Workstation Lineup

	T1600	T3500	T5500	T7500
Form factor	Convertible mini-tower	Convertible mini-tower	Convertible mini-tower	Standard tower
Max # CPUs	1	1	2	2
Max # graphics cards	One mid-range or two entry cards	One high-end or two mid-range cards	One high-end or two mid-range cards	Two high-end cards
Max memory	32 GB (16 GB w/ECC)	24 GB (w/ ECC)	72 GB (w/ ECC)	192 GB (w/ ECC)
Max drive bays (max capacity)	4 (2 TB)	4 (8 TB)	4 (8 TB)	6 (10 TB)
Base price*	\$629	\$779	\$1,369	\$1,469

* As of November 1, 2011. Check www.dell.com/us/soho/p/precision-desktops for the latest pricing.

Dell's expertise in mass-customization means with each model, you'll have a chance to dial up or down components from any base (which we'll get to). But a scan of the form factor and maximum configurations in the table above gives you a good idea where to start shopping in Dell's Precision portfolio.

Top Choices for CAD: T1600 and T3500

If you're on a tighter budget, and your work doesn't involve overly demanding visual performance or huge data files, you can start and stop with the T1600. Offering solid price/performance for mechanical and AEC CAD applications, the T1600 is more than capable. But if your workflow is one that typically produces more data-intensive computation, elaborate 3D visuals or bigger storage-choking datasets, you're going to want to move on up and set your sights on the T3500.

The T3500 gets you twice the storage capacity and a 50% higher ceiling on memory than the T1600. What might be equally compelling is its ability to drive two mid-range graphics cards. Why would you want more than one graphics card? In a word, space. Once you go multi-monitor, you'll never go back. The more windows and applications you can have up at one time, the better you can juggle them. And, with deadlines getting shorter and competition getting hotter, managing more tasks in parallel is vital to the health of a business.

Where the T1600 can support two high-resolution monitors, a T3500 outfitted with two mid-range cards, such as the NVIDIA Quadro 2000, can drive up to four HD displays. Or go with one mid-range AMD FirePro V7900 and get high-definition on three monitors. What might seem like visual over-indulgence is now too cost-effective an option to ignore. Dell's (HD 1920 x 1080 or higher) LED-backlit monitors are slim, power-misers, and ever less expensive, making the step to a third or even fourth monitor an easy one. Draw with AutoCAD on one screen, render an elevation on another, and keep your office apps available on a third. It's one of those things where you don't truly appreciate how effective more monitors can be, until you try it.

Double Up with T5500 and the T7500

The T1600 and T3500 end up being the tools of choice for the majority of professionals in the CAD and AEC spaces. But, because the demands on CAD professionals continue to evolve, we are being asked to manage more complex workflows in less time. That means multi-processing, both for you and your workstation. Jumping to the T5500 and T7500 not only lets you double up on your CPU processing (with dual CPU sockets), they scale up the bandwidth and capacity of memory as well.

Are you among the few who need dual socket capabilities? If you're not sure, and you have the budget to consider the move, ask yourself where you're most limited in your

workflow. Do you spend the bulk of your time drawing, with relatively little time spent on engineering or construction analyses? If so, one CPU socket, and the quad or even hex-core Intel processors that fill that socket, should suffice.

But, if you're pushing the computing envelope, kicking off regular finite element analyses, computational fluid dynamic simulations or complex LEED simulations — each of which chews up a lot of compute time or involves big data sets — then you're definitely a candidate to leverage what the T5500 and T7500 can deliver. If you're more compute bound, the T5500 will likely be your best choice, but if you really need it all — heavy-duty computation operating on huge datasets that soak up both memory and storage — the T7500 can put the maximum possible workstation horsepower at your disposal.

Choosing CPU, GPU, and Memory

Whether you opt for one CPU or two, there's still must choose from among the many Intel Core and Xeon brand models. Let's address Core vs. Xeon first. If you're among the many who value ECC memory, or among those who demand dual-socket performance, your brand is decided; it's Xeon, as those two key workstation features are not available on Core brand CPUs.

What about Intel processor features such as number of cores, cache, and clock speed? Well, it all has to fit a budget, and unless you have a good reason otherwise, it's best to pick a processor SKU that is balanced with the rest of the system. The same goes for selecting your GPU and dialing the memory size. Start with a balance and then dial up or down, if necessary. If your budget pushes you to choose a mid-range GPU and mid-range memory size, then it makes sense to opt for that mid-range CPU.

There are exceptions, of course, and if you know your current workflow is constantly bumping into the same roadblock, then choosing your upgrades a la carte makes perfect sense. If you find your system snappy when it comes to drawing, but renderings take too long or are poor-quality, then consider spending more dollars on a more capable GPU.

If rendering isn't the problem, but modeling interactivity leaves something to be desired, then consider bumping up the CPU clock speed. If your visuals are fine, but analysis run time is killing your schedule, then where more CPU cores or a second processor might be in order. Or, if you find your ear is constantly picking up that click and hum of your disk drive every time you move around your building model, then those extra dollars might be best spent on over-sizing your memory.

Optimize Storage: Performance and Up-Time

No corner of the professional computing space is more dominated by sole proprietors and small business owners than mechanical CAD and AEC. If you're one of the many who must manage his or her own IT needs, you should seriously consider a RAID 1 configuration. RAID (Redundant Array of Independent Disks) mode 1 mirrors your data on two drives, protecting your data — and your business — should one drive fail. Your machine can still operate on one drive, meaning you can, at least temporarily keep working to deliver on tomorrow's deadline, even if one drive fails today. If your IT environment already has an effective means for data protection, opting for RAID can still offer benefits. RAID 0 doesn't provide the data security of RAID 1, but it can cut your AutoCAD or Revit retrieval times in half. RAID 0 and 1 are available across all Precision workstations, including the most affordable Precision T1600.

If you can't cut any corners in either storage performance or data security, then choose RAID 5 or RAID 1+0 (a.k.a."10") storage, which combines both redundancy and distributed data across drives to deliver the best of both worlds: a single drive failure tolerance and higher access bandwidth. RAID 5 and RAID 10 require three and four drives (respectively) and are supported in the Precision T3500, T5500, and T7500.

Your last significant option in customizing storage is whether to choose existing, traditional, spinning-platter SATA or SAS¹ hard drives or adopt new Solid State Drive (SSD) technology. Dell continues to pull down the price of SSDs, but they remain substantially more expensive than hard drives. The benefit? Much lower latency than mechanical drives, which translates into higher average bandwidth. If your throughput demands are paramount, and your budget allows, consider choosing an SSD as your

boot drive.

Help at Your Fingertips

Are you still unsure about how to fine-tune your workstation configuration? Let the Precision Advisor help. Dell's on-line tool can walk you through the configuration process step-by-step, and is tailored specifically to the needs of your application and your business. Find the link to the Precision Advisor at www.dell.com/precision.

There's a world of compelling workstation technology at your disposal, packaged in systems that can have a dramatic, positive impact on your mechanical and AEC CAD workflows. You find your competitive edge by innovating, delivering quality, and hitting promised milestones.

Dell has a Precision workstation designed for virtually any budget, built specifically to maximize your productivity without stifling your creativity. Now is the time to have a look.

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With more than 25 years of engineering, marketing, and management experience in the semiconductor industry, Alex Herrera is a consultant focusing on high-performance graphics and workstations. Author of frequent articles covering both the business and technology of graphics, he is also responsible for the Workstation Report series, published by Jon Peddie Research.

FOOTNOTES

¹ Serial Attached SCSI, providing somewhat higher bandwidth than standard SATA hard drives



What's New at Cadalyst.com

CADspeed Blog Post:

Sustainability and the CAD Workstation: Heat, Noise and Power Consumption

Price and performance generally increase as you climb the workstation ladder, and so do heat, noise and power consumption. These metrics, which were of low or no concern years ago, are top of mind today. [Read more »](#)

TurboViewer

First Look Review: Use this handy app to view 2D and 3D DWG files on your iPad or iPhone. [Read more »](#)

The Sky is Not the Limit

Advances in BIM and software interoperability are helping propel a boom in supertall building construction. [Read more »](#)

A-r-ray of Sunshine

Circles and Lines Tutorial: More visual, smarter, and easier to modify, these new associative arrays are a bright spot in AutoCAD 2012. [Read more »](#)

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