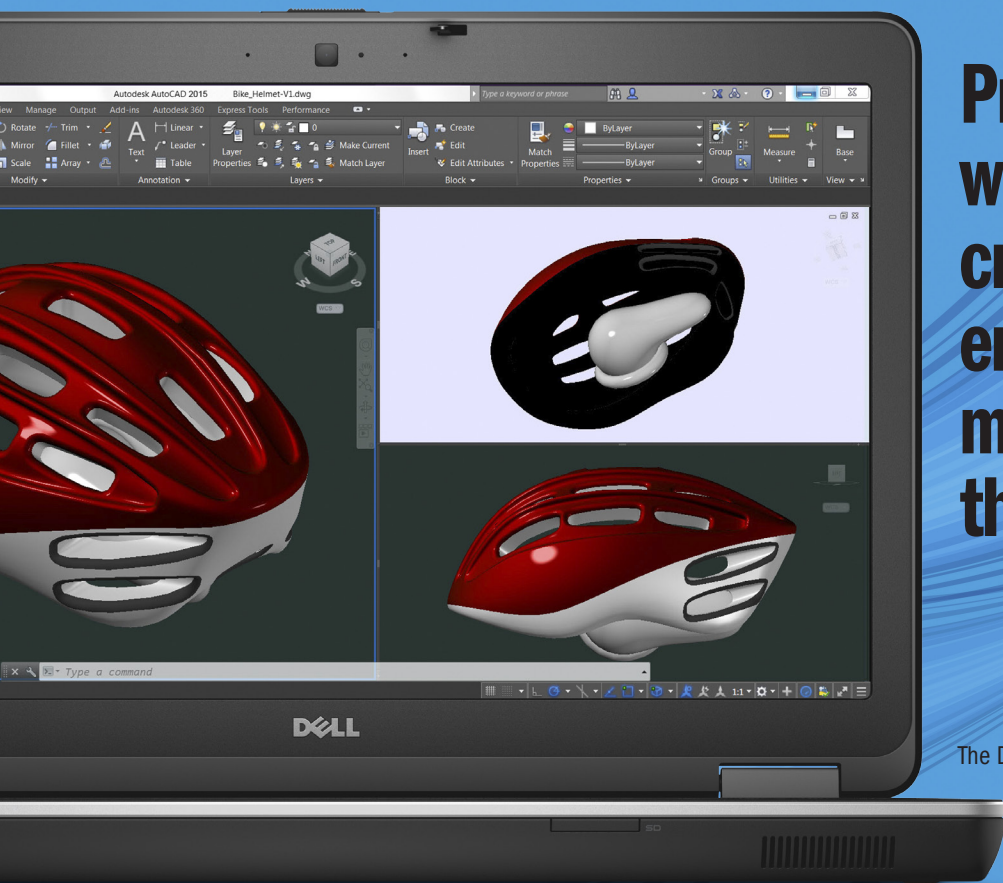


DE

Desktop Engineering®

MAKING THE CASE

FOR PROFESSIONAL ENGINEERING WORKSTATIONS



Professional workstations are crucial to design engineering, and more affordable than you think.

The Dell Precision M2800 mobile workstation

A SPECIAL SUPPLEMENT IN PARTNERSHIP WITH DELL AND INTEL



GO PRO

Make the case for professional workstations with benchmarks, ROI calculations and real-world examples.

“A SURGEON doesn’t wake up in the morning and pick up a kitchen knife and go to work to perform brain surgery,” said Andy Rhodes, executive director of Dell Precision workstations when introducing the new Dell Precision M2800 mobile workstation. “They use a scalpel. The two things are both knives, but one is a professional tool for a professional job.”



That’s the same thing happening on the workstation side. They are professional engineers, but they don’t have the professional tools to do their jobs,” Rhodes continued.

All professional workstations are computers, but not all computers are professional workstations. It’s a simple truth that should guide purchasing decisions, but it’s too often lost as homogeny and perceived costs overshadow the incredible benefits of providing professional engineers with the right tool for the job.

GET TO
KNOW THE
DELL PRECISION
M2800 MOBILE
WORKSTATION
PAGE 7



GET TO
KNOW THE
DELL PRECISION
T1700 TOWER
WORKSTATION
PAGE 7

BY THE NUMBERS

10x

The size increase in STL files that KEE Action Sports was able to effectively use after upgrading to Dell Precision workstations with Intel processors.

ALMOST **30**

Estimated days of design productivity gained annually by using a Dell Precision M2800 mobile workstation instead of a standard commercial laptop running professional engineering applications.

48%

The amount of time saved on a drawing test comparing AutoCAD 2010 on older hardware vs. AutoCAD 2015 on a professional Dell workstation.

4-8

The number of weeks it typically takes for an entry-level, professional engineering workstation investment to pay for itself via design productivity savings.

121%

The performance boost of PTC Creo made possible by the Dell Precision Optimizer on the Tower 5810 running SPECapc.

UP TO **1210%**

The design software performance increase realized with a Dell Precision T1700 workstation equipped with an NVIDIA Quadro K2000 vs. a Dell OptiPlex 9020 standard desktop.

DESIGN ENGINEERS + PROFESSIONAL WORKSTATIONS

ESSENTIAL TO INNOVATION

EVERY JOB IS IMPORTANT TO A COMPANY'S SUCCESS, but the engineering department is the company's innovation engine. The research, development and product design work performed by engineers form the basis of the company's intellectual property. Professional workstations allow engineers to explore new ideas, quickly improve existing designs and discover new product breakthroughs.

Without professional workstations, a company's innovation engine is stalled. It is slowed by delays large and small. Design engineers — one of the company's most valuable resources — could be wasting time as they wait for models to rotate and redraw. They reduce the pace of their work to match the sluggish speed of outdated or inadequate hardware. They save

early and often while working in constant fear that a long load time or stuttering visualization will prove too much for their underpowered machines and result in a complete system crash. Engineers are pulled away from the important job of designing new products and forced to become load management experts, limiting their work to that which won't crash their systems.

Using the wrong hardware has even more significant consequences as product designs become increasingly complex to combine the mechanical, electronic and software components that markets are demanding. With advanced engineering software and professional workstations, engineers have the tools to keep up with those demands. They can work with larger assemblies, perform multiple iterations quickly and simulate complete systems even as design cycles shrink.

To quantify those time-to-market boosts, *Desktop Engineering* Contributing Editor David Cohn worked with Autodesk and Dell to test the productivity gains a typical user would experience when upgrading to Autodesk AutoCAD 2015 software. Using older systems and a newer Dell Precision T1700 workstation, Cohn timed the repeated creation of common drawings, using both AutoCAD 2010 and AutoCAD 2015.

"It took more than 10 hours to complete the five drawings using AutoCAD 2010 compared to 6.5 hours to complete the same five drawings using AutoCAD 2015, representing time savings of 36%, without any change to the computer on which the software was run," according to the report, "Getting the most

from AutoCAD 2015 with Dell Precision workstations." "When the workstation was upgraded to the more modern Dell Precision T1700, the time required to complete the five drawings using AutoCAD 2015 was further reduced to 5.3 hours, a total time saving of 48% compared to using AutoCAD 2010 on an older workstation."

Powering software

Design engineers working on professional workstations can trust their systems to power the latest advanced design software because they have passed a rigorous independent software vendor (ISV) certification process. Dell provides ISV partners such as Autodesk, PTC and Dassault Systèmes with workstations to test. The ISV then runs its software, such as AutoCAD, Creo or SolidWorks, through various test scenarios, looking for any issues. When an issue is discovered, the ISV works with Dell to resolve them, before the workstation is sold to engineers. Dell's ISV certifications can cover 90% of the market on some models.

ISV certification ensures that professional workstations are optimized to run professional software. For example, the new Dell Precision M2800 mobile workstation — which is lauded for the affordability of its workstation-class performance — was shown to perform significantly better than a Dell Latitude business class laptop equipped with the same processor and RAM in all verticals tracked by the SPECwpc benchmarks, including manufacturing and engineering.

Better performance

There is no mystery surrounding why workstations offer better performance; they are purposefully designed with engineers and the demanding software applications in mind. Professional workstations are built with professional-grade Intel® Core™ or Xeon® processors, a choice of professional graphics processing units (GPU), higher-quality, faster memory, and redundant storage to

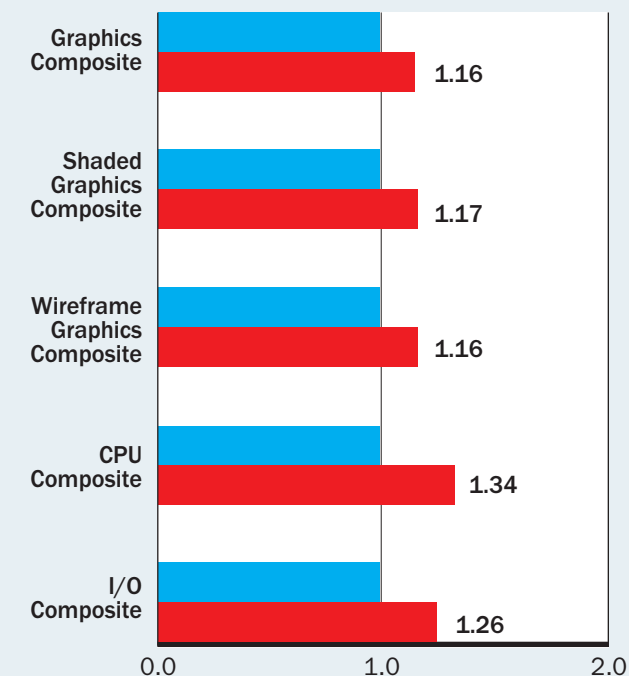
DESIGN
ENGINEERS +
PROFESSIONAL WORKSTATIONS

WHY
BUY?

"I need to produce more iterations of more complicated product designs faster."

M2800 MOBILE WORKSTATION VS. E6540 LAPTOP

E6540 M2800



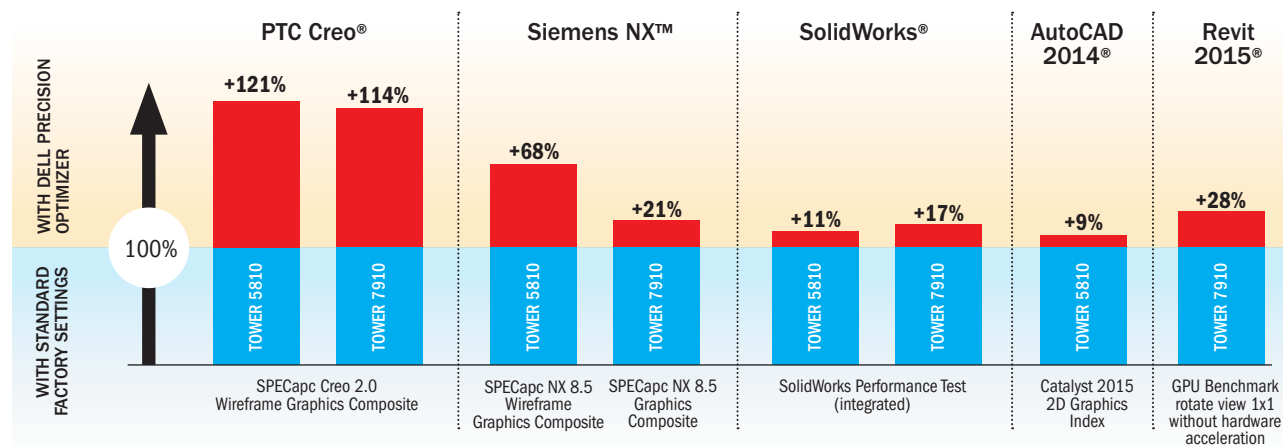
The Dell Precision M2800's performance in PTC Creo 2.0 vs. a Dell Latitude E6540 laptop with matched CPU and memory. Higher numbers are better.

6 weeks

The average time it takes for a Dell Precision M2800 mobile workstation to pay for itself via productivity gains.

TOWER 5810 AND TOWER 7910 WITH DELL PRECISION OPTIMIZER

Application performance increases over factory default settings



* Test results are weighted geometric mean of optimized configuration samples, compared to factory-installed default settings.
* Benchmarks are industry standard applications using SPEC committee and other industry standard benchmarks.

improve their reliability and performance.

Dell workstations also include the Dell Precision Optimizer, which isn't offered on commercial PCs. It ensures ISV applications are running at their maximum potential by fine-tuning Dell Precision workstations beyond standard factory settings. This yields significant performance gains. For example, SPECapc benchmarks show that Dell Precision Optimizer can boost the performance of PTC's Creo by 121% or Siemens NX by 68% on a Dell Precision Tower 5810 system.¹ That's like giving engineers an extra hour and 40 minutes of design productivity each day.

Altogether, the combination of professional hardware, ISV certifications and application optimization available on Dell Precision workstations allow design engineers to achieve greater productivity and faster time to market.

1. Validated using benchmark SPECapc Creo 2.0 running PTC Creo 2.0 on Windows 7 64-bit Professional SP1, comparing Wireframe Graphics Composite results between a Tower 5810 system with E5-1620 v3 4C 3.5GHz, 4x4GB 1600, Quadro K4200 340.52, 500GB 7200, A00 BIOS with the Dell Precision Optimizer PTC Creo Performance Profile and the same system with factory default settings. Actual performance will vary based on configuration, usage and manufacturing variability.

FAST CARS, FAST WORKSTATIONS

Anyone who knows cars knows the name Shelby. Founded in 1962 by LeMans winner Carroll Shelby, Shelby American makes high-performance automobiles like the original Shelby Cobra roadster and the Shelby GT350. The company has grown to \$50 million in annual sales of about 2,000 cars built by hand at its Las Vegas headquarters.

But the company, known for its fast cars, realized its computers were not keeping pace. Shelby American IT Director Rich Sparkman solved that problem with a complete refresh of the company's IT infrastructure, including Dell Precision T7600 and T3600 workstations.

"For my CAD programs and graphics applications, the Dell Precision T7600 workstation gives me all the horsepower I need," he says, "plus I can quickly prototype design changes, which cuts our design cycles from months to weeks."

For more, read the full case study here.



Image courtesy: Shelby American, Inc.

GET TO KNOW THE DELL PRECISION M2800 MOBILE WORKSTATION

THE 15-INCH DELL PRECISION M2800 mobile workstation is being called a breakthrough product because it offers optimized performance and design application certifications at a breakthrough price. By offering an affordable independent software vendor (ISV) certified system with professional graphics and processors, engineers, designers, and IT don't have to settle for sub-par performance just because of price.

"Many designers and engineers are not realizing the full potential of their professional software because they are using a business or consumer-class PC instead of a workstation," said Andy Rhodes, executive director of Dell Precision workstations. "We are filling that gap by introducing a new mobile workstation at a price that lets more professionals and students maximize their software while on the go. This is the right tool to help more people design and deliver innovations faster, no matter where they are."

The M2800 can be configured with fourth-generation dual-core Intel® Core™ i5 or quad-core Intel® Core™ i7 processors. It uses AMD FirePro

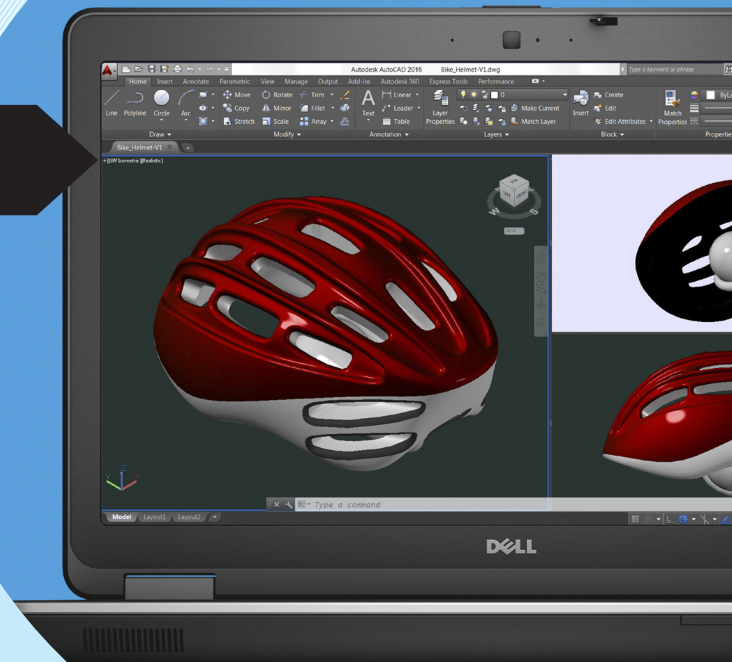
W4170M graphics with 2GB of dedicated GDDR5 video memory, and supports up to 16GB of system memory and 1TB of storage to run graphics- and data-intensive workloads. It comes with a 15.6-inch Dell UltraSharp display with HD or Full HD (1920 x 1080) resolutions, external multi-monitor support and docking compatibility.

The Dell Precision M2800's starting price is just \$1,079 at presstime. To maximize performance of CAD solutions, the M2800 is ISV-certified for Autodesk AutoCAD, Inventor and Revit, Dassault Systèmes SolidWorks and PTC Creo, among others. In addition, the M2800 comes with Dell Precision Optimizer technology, which increases application performance beyond standard factory settings.

"Prior to the Dell Precision M2800,

many AutoCAD users were running their software on a non-professional workstation due to budgetary constraints," said Amy Bunszel, vice president of AutoCAD products, Autodesk. "Now our customers will be able to upgrade to a workstation-class system that has been tested, optimized and certified for AutoCAD, increasing performance for minimal cost."

See why Fahrenheit Design was impressed with the M2800 here.



GET TO KNOW THE DELL PRECISION T1700 TOWER WORKSTATION

THE DELL PRECISION T1700 workstation is available in two compact sizes — a mini tower and small form factor — that are available with Intel® Xeon® processor E3-1200 v3 family or 4th Gen Intel® Core™ i3, i5 and i7 processors.

Graphics options include AMD FirePro™ or NVIDIA® Quadro® professional-grade discrete graphics. Integrated Intel® graphics are standard. The Dell Precision Optimizer on a Dell Precision workstation helps professional design engineering software run at its

peak performance automatically.

The Dell Precision T1700 is compatible with leading independent software vendor (ISV)-certified applications, including AutoCAD, SolidWorks and Creo for maximum uptime and productivity.

Triple monitor support comes standard, and optional quad monitor support can enable even greater productivity. Even with its professional features, the T1700 starts at about the price of a standard PC.

For more information, visit Dell.com/precision.



IT SPECIALISTS + PROFESSIONAL WORKSTATIONS

CHAMPIONING THE POWER USER

THE INFORMATION TECHNOLOGY DEPARTMENT is a key ally in securing the professional level workstations that design engineers need. They know engineers are power users who have different computing needs than other departments. What they might not know is how much time, resources and costs professional workstations can actually save the IT department.

If up-front cost is the only thing deterring IT from recommending professional workstations, they should know that workstations are available for many price points. For example, Dell's M2800 mobile workstation and T1700 tower start at about the same price as their standard commercial counterparts. But it's the long-term savings in deployment and maintenance that really add up for IT professionals.

Workstations are designed for easy deployment, maintenance and expansion. Details like sturdy handles, easy-access front hard drives and tool-less features on some desktop models save deployment and expansion frustrations. Likewise, professional workstations are also designed to require less maintenance. For example, the M4800 and M6800 mobile workstations are equipped with dual fans and an advanced cooling design for better reliability. With better quality components, workstations can work 24x7, improving efficiencies by speeding up design work during the day and running complex analyses at night with less risk of failure.

Reducing downtime

Professional workstations also offer options to further decrease downtime. Dell's Reliable Memory Technology (RMT), for one, will quarantine the memory errors discovered by Error Code Correcting memory. After a reboot, RMT prevents the workstation from writing to areas of bad memory. That reduces system crashes, lost data and IT service calls, and it improves productivity and

extends memory life. But it doesn't try to be smarter than your IT department. If a memory error occurs seven times in the same memory module, the system notifies you that the module may need replaced, saving IT the trouble of finding the problem DIMM.

Another time saver is included with the Intel® Xeon® E3-1200 v3 product family. Intel® vPro™ technology embeds a set of security-, manageability- and productivity-enhancing capabilities into the processors. For IT, vPro helps make the workstation as secure and manageable as any PC in an organization's fleet.

Intel® Cache Acceleration Software for workstations (CAS-W) is another feature found only in professional workstations. CAS-W provides increased hard drive storage performance — near solid-state drive speeds — without the cost of SSDs and without the need for IT to spend its time configuring applications to use it.

In addition to improving application performance, the Dell Precision Optimizer is also a boon to the IT department. It can save IT administrators time by categorizing updates, enabling automatic updates of Dell-certified drivers and allowing administrators to filter updates by type and urgency. It can also aid IT administrators with system performance analytics, which can be used to justify upgrades, help plan system configuration, and ultimately keep all parties more productive.

Professional workstations not only improve the productivity of the design engineers using them, but of the IT administrators tasked with deploying, upgrading and maintaining them.

IT
SPECIALISTS +
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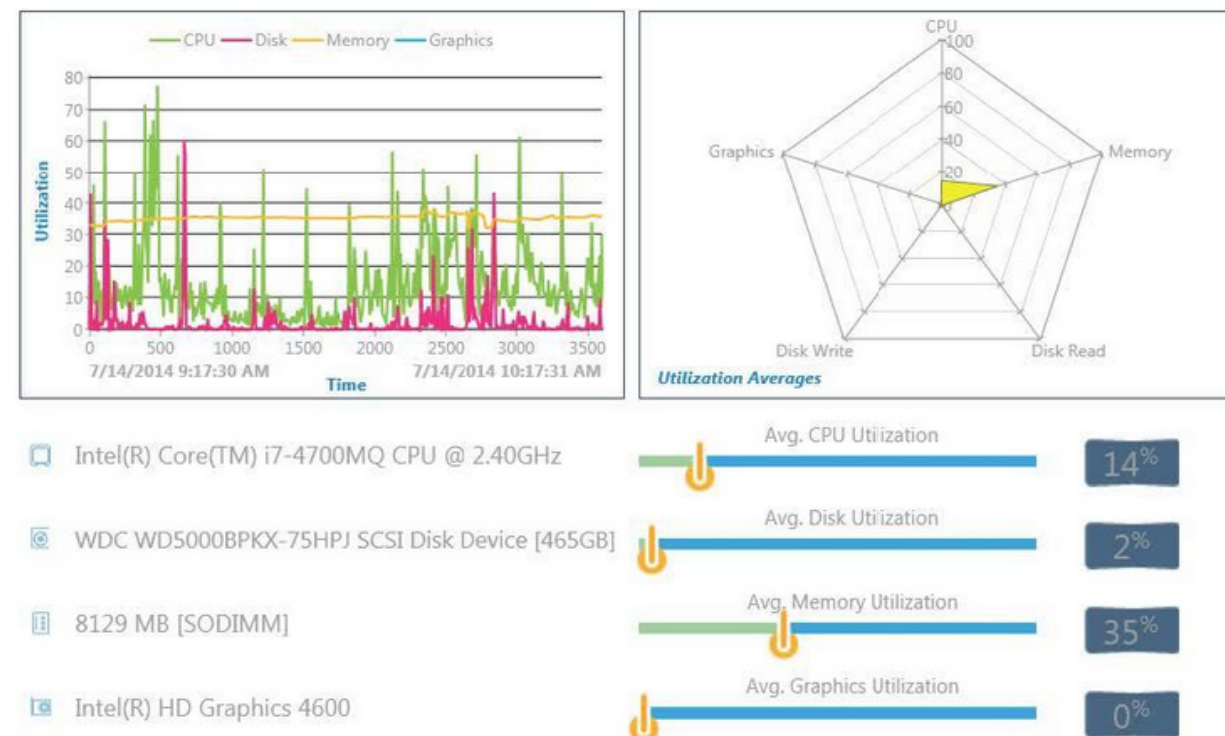
WHY
BUY?

5 REASONS WHY IT SHOULD GO PRO

1. CHASSIS DESIGNED FOR DEPLOYMENT, RELIABILITY, AND MANAGEMENT
2. RELIABLE MEMORY TECHNOLOGY (RMT)
3. INTEL® CACHE ACCELERATION SOFTWARE FOR WORKSTATIONS (CAS-W)
4. INTEL® VPRO™ TECHNOLOGY
5. DELL PRECISION OPTIMIZER

“I want to support the needs of my power users without spending all my time in the engineering department”

DELL PRECISION OPTIMIZER ANALYZE WORKLOAD REPORT



Understand system resource utilization of critical components with the Dell Precision Optimizer.

PAVING THE WAY TO PROFIT



“We need to get more innovative products to market faster by getting peak performance from our key employees.”



NOW THAT YOU HAVE YOUR REASONS FOR NEEDING A PROFESSIONAL WORKSTATION firmly established and have IT on your side, it's time to make the case to management. Engineers and executives both work in numbers. Design engineers just need to present the numbers that make it clear to management how fast an investment will pay off in accelerated time to market, competitive advantage, and better quality products.

Let's break it down. An engineer earning \$70,000 a year who spends about a third of the approximately 250 working days a year actually using design software would cost the company more than \$23,000 a year for that design work. That's 83 days of total design work at \$35 per hour for eight hours each day. If that engineer had a professional workstation that increased his/her design productivity by just 36%, the company would gain the equivalent of almost 30 more days of design productivity, which equates to \$8,366 a year.

\$8,366
Approximate annual benefit realized by increasing one design engineer's productivity via a professional workstation.

And a 36% design productivity boost is a conservative estimate. For hard numbers, Dell pitted two Dell Precision T1700 configurations against a standard Dell OptiPlex 9020 desktop on a SPECviewperf 11 benchmark using, PTC Pro|ENGINEER, Dassault Systèmes SolidWorks and Autodesk Maya datasets. The T1700 entry-level

workstation with an NVIDIA Quadro K600 performed up to 885% (9.9x) faster and the T1700 with the NVIDIA Quadro K2000 performed up to 1210% (13x) faster than the Dell OptiPlex 9020 standard desktop.

More than ROI

ROI is only part of the picture. Time-to-market and product quality are critical to a company's long-term growth. Moving simulation further up in the design process provides the dual benefits of saving time while improving quality. In fact, research from Aberdeen Group shows that the top 20% best-in-class companies (those pursuing a robust design approach that includes widespread use of simulation) were more likely to meet product launch dates, hit product revenue, cost, and quality targets, and reduce overall development cycle times.

But simulation-led design relies on professional engineering workstations to run professional engineering simulation and design software. Without the right technology infrastructure, management can't realize the design cycle gains inherent in an upfront simulation approach.

Peak efficiency

Management might think of it this way: “If you're an engineer and your system is rendering, you're not an engineer,” said Dell's Rhodes. An engineer who isn't doing any engineering is an expensive resource.

If design engineers' computers are not professional workstations, they're not hitting peak efficiency in simulation-led design workflows. A simple upgrade to a professional workstation with the latest design software is the right tool for the engineer's job. It will improve engineering and IT productivity, quickly pay for itself and allow your company to not only compete, but to innovate.

ROI CALCULATIONS

TIME SPENT DOING DESIGN WORK:

A third of 250 working days = about 83 days per year

ANNUAL COST OF AN ENGINEER'S DESIGN WORK:

\$35 per hour for 8 hours a day for 83 days = \$23,240

ADDITIONAL TIME SPENT DOING DESIGN WORK BY BEING 36% MORE PRODUCTIVE:

83 days x 36% = 29.88 days

ANNUAL BENEFIT FROM INCREASING DESIGN PRODUCTIVITY:

\$35 per hour for 8 hours a day for 29.88 days = \$8,366.40.

ROI OF AN M2800 MOBILE WORKSTATION THAT COSTS \$1,079 (Dell price at presstime):

About six weeks

CLOSING ARGUMENTS



Professional workstations are an effective, affordable way to empower design engineers to create better products faster, explore and discover product design solutions they might otherwise have missed and maximize their impact on the intellectual property that companies depend upon. In short, investing in affordable, reliable professional workstations is a smart move. It allows valuable employees to innovate quickly and efficiently.

For design engineers, a professional workstation means more time spent creating new products and improving existing ones, and less time spent waiting for large assemblies to load or simulations to run. The professional components of an engineering workstation that is ISV certified for the latest design engineering software combine to create a reliable system that can perform at the speed of thought.

For IT specialists, equipping power users like design engineers with professional workstations means less time spent diagnosing and fixing issues. Professional workstation features, such as Dell's Reliable Memory Technology, Error Code Correcting memory, Intel® vPro™ technology and Intel® Cache Acceleration Software for workstations (CAS-W) combine to help eliminate downtime. Dell Precision Optimizer ensures workstations run at peak performance and can categorize and automate updates to save time for IT specialists.

For executive management, investing in an affordable professional workstation can pay for itself in just six weeks, with breakthrough performance at breakthrough affordability. But what that investment really means to the company is immeasurable. It provides the ability to grow the business via huge leaps in product innovation and can allow them to gain a competitive advantage. In short, an investment in professional engineering workstations enables success.

RESOURCES



Learn more about the M2800 mobile workstation

- **Product details:** www.dell.com/us/business/p/precision-m2800-workstation/pd
- **Product video:** www.dell.com/learn/us/en/19/videos~en/documents~precision-m2800-video.aspx



Learn more about the T1700

- **Product details page:** www.dell.com/us/business/p/precision-t1700-workstation/pd
- **Product video:** www.dell.com/learn/us/en/04/videos~en/documents~precision-t1700-workstation-video.aspx



Learn more about what makes a workstation a workstation

- **Main page:** www.dell.com/precision
- **Dell Precision Optimizer:** www.dell.com/optimizer
- **CAS-W:** www.dell.com/learn/us/en/555/videos~en/documents~precision-workstation-intel-cas-w-video.aspx
- **ISV Certification:** www.dell.com/learn/us/en/555/workstations-partners



Customer Successes

- **OXO rapidly designs products on Dell Precision:** www.dell.com/learn/us/en/04/videos~en/documents~innovation-oxo-precision-video.aspx
- **Reel FX animates on Dell Precision:** www.dell.com/learn/us/en/uscorp1/videos~en/documents~2013-reelfx-rendering-10013142.aspx
- **Shelby cuts time to market:** www.dell.com/learn/us/en/uscorp1/videos~en/documents~2014-shelby-10013422-end-to-end-high-performance-design.aspx