Companies Trade PCs for Professional Workstations to Take Designs — and Business — to the Next Level

by Heather Livingston

Engineering and design push computing technology to the limits. How do users get the most for their time, money, and software? For these three manufacturing firms, professional workstations are the answer.

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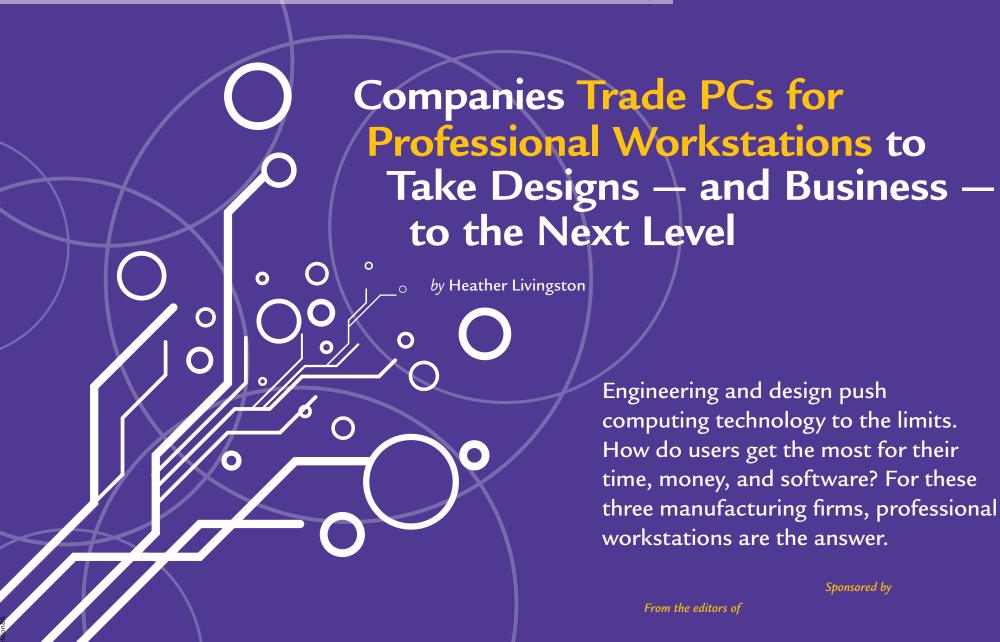
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Staggering feats of engineering and design are realized every day thanks to the rapidly evolving capabilities of digital imaging. As Moore's Law continues to hold true in its prediction that computer processing power will effectively double approximately every two years, it's not a stretch to say that your operating system can become obsolete in the same short time span. Whether you are manufacturing 3D-printed products in your own garage, designing a fuel-efficient car for on-demand production, or using fluid dynamics to help a skydiver achieve a world-record jump, you need to stay up to date with software and hardware to be competitive in the marketplace.

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> Automation·Gears·Machinery

Time and time again, companies learn that skimping on their computer hardware investment — whether trying to scrape by with consumer-grade PCs or pushing systems well beyond the intended three- to four-year life-cycle — is a losing proposition. When computers slip into obsolescence, companies can lose valuable time and money that, in the long run, equates to missed deadlines, subpar designs, missed opportunities for innovation, lower productivity and profitability, and dissatisfied customers. In addition, persistently tight budgets mean that companies still are trying to do more jobs with fewer employees. As such, the staff downtime that results from inadequate processors continues to cost you precious payroll hours. Savvy design firms are realizing that to address these shortcomings, they must upgrade standard PCs to professional-grade workstations that can handle complex computational processes in a minimum of time.

In this article, three manufacturing companies that have made the transition from conventional PCs to professional workstations share insights on the benefits of the investments, including speedier project delivery and higher profitability. Their stories illustrate how investing in a professional-grade workstation can improve your bottom line by way of increased computing power, user productivity, and hardware reliability. Not to mention, users will be able to spend more time getting the design details just right because iterations can be completed faster, giving you that all-important competitive edge.

AUTOMATION·GEARS·MACHINERY

Automation·Gears·Machinery (AGM) is an engineering and design consulting firm in Delanson, New York. AGM creates special-purpose manufacturing systems, custom gears and gear boxes, and one-of-a-kind machine parts. Its projects have run the gamut from creating a robotic system to wrap insulation on conductor bars for electric generators to making new gears for the gearbox of a 1940s wooden boat. At the helm of AGM is Robert B. Price, Certified Manufacturing Engineer.

Of his previous modeling capabilities, Price explained that he used a Canadian 2D stress analysis program called Beam 2D and that he used AutoCAD since release 10 with AutoSolids, an add-on program that created editable 3D gears.

Even though his system allowed him to do photorealistic 3D modeling, Price realized that his off-the-shelf PC wasn't able to manage the more complex modeling and FEA analysis that

he required. In short, the PC didn't cut it any longer.

Price had been hoping for better stress analysis capabilities for some time. He explains, "I am not a professional engineer, but when I am designing something that has the potential to fail and cause injury, it is nice to be more certain that what is on the drawings is not going to do that."

Being a small company, AGM always keeps a sharp eye on costs. Serendipitously, in 2012, Price entered and won a contest sponsored by Autodesk and Lenovo that provided a professional workstation and new software to five small companies that were using outdated tools to do design work.

AGM soon after was using Lenovo's S-30 with a 27" LCD monitor; Intel® Xeon™ E5-1620, 3.6-GHz processor; NVIDIA Quadro 2000 1-GB memory; 8-GB ECC memory; dual 1-TB hard drives in a RAID 1 configuration; and Autodesk's Product Design Suite Premium. For AGM, the greatest benefit of the upgraded system has been "speed, speed, speed," Price proclaims. Because the new Autodesk/ Lenovo system was a prize, AGM didn't have to be concerned about return on investment (ROI); nonetheless, the gain in AGM's productivity — once past the early stages of the learning curve — has been significant.

"People carry around some very sophisticated smart phones that significantly enhance their ability to communicate," says Price. "It seems to me that in this day and age, anyone that is doing design engineering work beyond the most simple tasks needs to take advantage of the capabilities of a workstation.... Working with a 2009 desktop computer to do engineering work [today] is not a good thing."

SGEDESIGNS

Based in Wilmington, Delaware, SGEDESIGNS is a firm that primarily focuses on designing control room furniture for the broadcasting industry and working with a large woodworking company to solve manufacturing problems. SGEDESIGNS also performs product design and development, including products that help integrate electronics into cabinetry. As such, it needs to be able to deliver 3D models, presentation drawings, construction and assembly prints, parts drawings for CNC production, and installation diagrams and instructions.

"We changed to Dell Precision [desktop workstations] in about 2001," says Steve Goldberg, president. "Up until that point, we used consumer models optioned with SCSI drives or custom-built versions no longer in existence. We were always seeking the price/performance sweet

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spot, and Dell nailed it. Having a large and reliable company behind the computers was comforting, and Dell's products were robust, fast, and reasonably priced."

Goldberg refers to himself as a "one-man band" in that he — with front office support from his wife — handles sales, oversees marketing and design, manages production, makes the executive decisions, and sometimes even works in the shop. Given that he is pulled in so many directions, it was critically important that he have a fast and efficient computer. "I wanted the best equipment the company could afford," he says.

For SGEDESIGNS, the most valuable function of the professional-grade workstation has been rendering speed, both for visualization during design and rendering to file. Average rendering time has dropped from six minutes to two, Goldberg reports — a 50%

Sage Cheshire

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Sage Cheshire Aerospace

decrease when he acquired the Dell Precision T3400 and T3500 desktops and another 30% with the acquisition of the Dell Precision M6700 mobile workstation. The latter is outfitted with an Intel® Core™ i5-3340M processor with 2.7 GHz, 8-GB RAM; and an AMD FirePro M6000 graphics card.

The benefits of speedier rendering can include faster design assessment, more iterations, more detailed renderings with larger datasets, faster turnaround, and, according to Goldberg, a more relaxed designer.

"Waiting for screens to redraw or render is a necessary constraint of designing with computers," he explains. "By reducing the amount of screen lag time, fast workstations actually give me more productive

hours at work, and more time to enjoy life! It's a Murphy's Law of some sort, I'm sure, that the time spent waiting for a screen refresh — while agonizingly long — isn't long enough to do anything else!"

Finally, Goldberg cites one additional, but no less important, reason for moving to a workstation: dependability. "Workstations are designed and built with the intention of heavy-duty use, lots of hours, frequent disk access, computation-intensive programs that make processors run hot for long periods of time, weird peripherals, RAID setups, and multi-tasking. [Reliability] is transparent, yet extremely valuable," he concludes.

SAGE CHESHIRE AEROSPACE

Headquartered 30 miles outside Edwards Air Force Base in Lancaster, California, Sage Cheshire is a small aerospace company with some big bragging rights. On October 14, 2012, Sage Cheshire oversaw the culmination of years of work as the firm safely shepherded Felix Baumgartner through his record-breaking parachute jump from 24 miles above the surface of the Earth, during which he became the first human to break the sound barrier without the use of a vehicle.

The project left no room for error. Every detail would have to be painstakingly designed, tested, and

retested. Sage Cheshire CEO Art Thompson says, "We were taking Felix into a very hostile environment and had to make sure we brought him down safely. Not only did we have someone's life in our hands, we had an opportunity to advance scientific knowledge."

To safely parachute from the edge of space, Baumgartner needed Sage Cheshire to design a specialized capsule that would deliver him to the jump site, a modified spacesuit with life support systems, and a bevy of electronic sensors to capture scientific data and human physiological information for later analysis. Though the project was years in preparation, there clearly was much to be done.

To handle the intense computational, analytical, and graphical data that the project would require, Sage Cheshire insisted on professional-grade workstations for their reliability and speed. They called on HP Z230 and Z420 desktops and HP Zbook Mobile workstations with Intel® Core™ and Intel® Xeon® processors and NVIDIA Quadro K4000 graphics cards, each running SolidWorks for 3D modeling and computational fluid dynamics (CFD) analysis. The entry-level and midrange workstations helped Sage Cheshire stay under budget —yet still shorten the timeline for the development and testing

phases. The speed of the workstations allowed engineers to quickly go through multiple design iterations without getting bogged down waiting for rendering to complete, allowing them to create and evaluate more options. Explains Jonathan Wells, a Sage Cheshire mechanical engineer who served as capsule crew chief on the project, "The HP Z workstation allows us to quickly manipulate the models and understand what's going on with the 3D images, without breaking our thought process."

The dizzying number of simulations that Sage Cheshire conducted to prepare for the jump ultimately ensured a safe return from the heavens for Baumgartner. Once he was back on terra firma, the Sage Cheshire engineers compared the predictive data they had gathered prior to the jump with Baumgartner's actual jump data.

"We went from a computer theorizing what would happen to real life data and found very little deviation," Wells says. "With the new NVIDIA Kepler architecture, SolidWorks 2014 and our HP Z workstations, we can now simulate much faster and more accurate results for any of our projects."

CONCLUSION

That old adage "time is money" certainly rings true as you're sitting at your desk waiting for a simulation to run its course or a design to fully render. With a workstation, you can recapture that lost time and money thanks to greater processing speed, the power to run jobs simultaneously, and the reliability of professional-grade equipment. With a professional workstation, you can spend your time fine-tuning designs — and innovating — instead of worrying if your PC can manage the load.

"Having the right tools and technology unleashes creativity," believes Sage Cheshire's Wells. "You're not thinking about what you're lacking. You're thinking about what you want to build, what you want to do next." ◆