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HP's Z200 Workstation

Making high-performance computing available to mainstream CAD users on a budget

By Robert Green, *Cadalyst* Contributing Expert

Despite what the CAD software companies would have you believe, not every CAD user analyzes airplanes, performs photorealistic renderings, or creates walk-through animations. In fact, many CAD users still perform a lot of 2D work with only occasional forays into 3D visualization or rendering. These users don't need a high-end workstation, and their bosses wouldn't approve the cost of one anyway. Yet these users still require optimized multicore processing, 64-bit operating systems, and more RAM and graphics firepower than budget computers typically provide.

What these users need is an entry-level workstation at a great price. HP is addressing exactly this need with its latest Z series Workstation: the Z200. The Z200 price starts at a budget-friendly $769.

The Z Workstation Family

The Z Workstation family now includes five models with progressively more impressive specifications. The Z200 (see figure below) and Z200 SFF join the Z400, Z600, and Z800 Workstations to offer a comprehensive range of machines that support anything from mainstream 2D CAD (the Z200) to no-holds-barred, high-end power for analysts and animators (the Z800).

NEW! HP Designjet T1200 Printer series

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The Z200 (at left) maintains the traditional vertical pipe styling of the HP's other Z Workstations (at right) with front-accessible FireWire and USB ports.

The Z200 SFF (small-form factor) is an even lower-cost version of the Z200 that achieves its smaller size by supporting small-form factor graphics cards such as the NVIDIA Quadro FX 380 LP and ATI FirePro V3800 Low Profile graphics cards. So unless you need full profile or multiple graphics cards -- and most 2D CAD users don't -- you may not even notice a difference.

The Z200 Small Form Factor is 65% smaller than the Z200 Workstation and provides compact workstation-level performance by supporting only low-profile graphics boards

Beefy Specs

Because the Z200 is the entry-level Z Workstation, you might think that it would be lacking in features, options, or expandability. But you would be wrong. In fact, the only inherent limitations of the Z200 are its single-processor architecture (the Z600 and Z800 support dual processors) and a 16-GB RAM restriction (the Z800 tops out at 192 GB by comparison), but neither of these limitations presents a problem for conventional CAD users.

In fact, the specifications for the Z200 are quite robust.

Processor, RAM, and operating systems. The Z200's single-processor architecture is based on the Intel 3450 chip set with Intel Core i3/i5 dual-core processors or Intel Xeon quad-core processors that provide as much as 16 GB of 1,333-MHz RAM in four memory DIMM slots. These multicore processors and RAM specifications provide an ideal platform for Windows 7 or XP Pro 64-bit operating systems or, if using 2 or 4 GB of RAM, Windows 7 or Windows XP Pro 32-bit operating systems. (XP operating

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***Cadalyst's* Highly Recommended rating:**

Cadalyst is the leader in delivering timely, thorough, unbiased reviews of software and hardware for CAD professionals. *Cadalyst's* Highly Recommended rating is an indication that a product meets *Cadalyst's* highest standards and is an excellent choice for CAD professionals.

No matter how you look at it, this workstation is impressive. It is compact, quiet, speedy, and highly configurable. It has innovative design and superb engineering and is forward looking in terms of expansion. The attention to detail in this system is remarkable, as is the design philosophy. It isn't often that I would consider an A+ grade for a workstation, but the HP Z600 deserves it.

Ron LaFon, "HP Z600 Workstation," Cadalyst.com, March 30, 2009.

systems are available via downgrade from the default Windows 7).

- Intel Core i3 processors max out at a 3.06-GHz clock speed with 4 MB of Intel Smart Cache spread over four processing threads and two-channel DDR memory architecture.
- Intel Core i5 processors max out at a 3.20-GHz clock speed with 8 MB of Intel Smart Cache and Intel Turbo Boost Technology spread over four processing threads and two-channel DDR memory architecture.
- Intel Xeon quad-core processors max out at a 2.93 GHz clock speed with 8 MB of Intel Smart Cache and Intel Turbo Boost Technology spread over eight processing threads and two-channel DDR memory architecture.

The Intel Core i5 processor offers Intel Turbo Boost Technology in an affordable dual-core package.

Drives and chassis. The Z200 is built in a mid-tower size, tool-free chassis that features three internal 3.5-inch drive bays and three external 5.25-inch drive bays to accommodate a variety of hard drives from 160 GB to 1.5 TB in capacity and 4.5 TB total storage. An integrated SATA 3-GB/second drive controller supporting RAID 0, 1, 5, and 10 protocols handles hard drives as well as DVD or optional Blu-ray writable optical drives.

Graphics. The Z200 features an on-board Intel HD graphics controller for high-performance 2D CAD graphics on a single display. To enable accelerated 2D or 3D performance, the Z200 supports a variety of NVIDIA and ATI controllers that range from 256 MB RAM to 768 MB RAM as well as dual-monitor and digital outputs.

The Z200 SFF features the same on-board Intel HD graphics with support for low-profile graphics cards from NVIDIA and ATI.

For specific graphics controllers specifications, read the full Z200 specifications.

Abundant connections. If you've ever crawled under a desk to find a FireWire port or found you had one too few USB ports, you'll appreciate the front-mounted USB, FireWire, microphone, and headphone connections along with six more USB ports, audio inputs and outputs, and DVI-D digital video outputs. No more struggling to find the connector you need.

Cheaper and Easier to Maintain

The Z200's processor capabilities, memory capacity, and graphics capabilities at a great price are what makes headlines, but the machine has several other features that

make maintaining and working with the machine less costly over time.

Energy consumption. The ENERGY STAR-certified Z200 has an 89% efficient, 320-W power supply that drives a full complement of disks and graphics boards. As with all Z Workstations, the Z200 uses HP WattSaver technology allows for less than 1-W power consumption in standby mode for substantial energy cost savings throughout the life of the workstation.

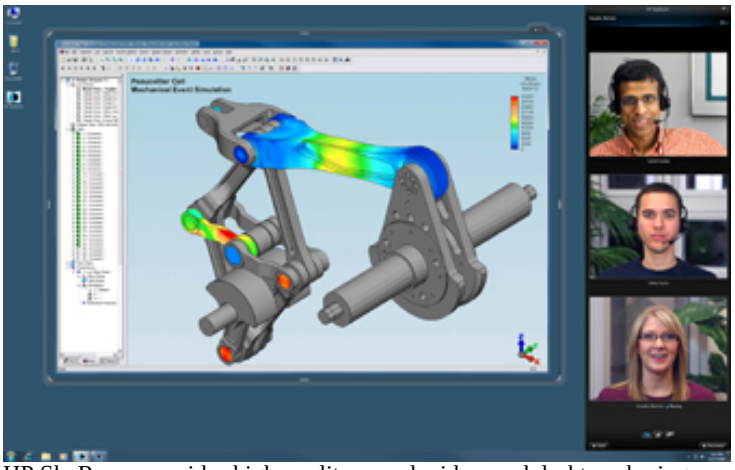
Configuration and driver management. Z series Workstations are equipped with HP Performance Advisor, a configuration-management software tool that tracks CAD application drivers and installs them when greater performance may be obtained. In addition to driver management, HP Performance Advisor gives users the ability to customize functions such as processor prioritization for specific applications to yield greater performance for the applications used most often.

If you've ever wished you could tune up your machine and have it stay optimally configured without searching for updates, patches, and drivers, then Performance Advisor is the application you've wanted. In fact during a three-year life span (the warranty period for the Z200), being able to avoid spending several hours per year keeping track of hardware and software drivers can substantially lower the cost of owning a Z200.

HP Performance Advisor keeps track of device and driver configurations so you don't have to.

Tool-free chassis. The Z200 and Z200 SFF, like the other Z series Workstations, have a tool-free chassis design that lets IT staff swap interior components faster than other machines, which makes it easily serviceable and lowers the cost of maintenance over time as well. Although it's hard to place a dollar value on a well-engineered chassis, it certainly is more enjoyable to work on them.

SkyRoom. All HP Z Workstations ship with HP SkyRoom audio/video collaboration software preinstalled. HP SkyRoom uses remote graphics technology to achieve smooth, jerk-free video; better-than-telephone quality audio; and desktop sharing at user selectable resolutions as high as 2,560 x 1,920 with up to 24-frame per second video performance for as many as four concurrent users -- all without any monthly fees!



HP SkyRoom provides high-quality sound, video, and desktop sharing tools for as many as four users without any subscription fees.

Workstations not PCs

Given the low cost of the Z200 Workstations, the line between workstations and PCs is becoming blurred. In fact, many clients I talk to believe that workstations are too expensive and wind up buying bargain PCs as a result. They overlook that workstations are designed specifically to run CAD applications at their best and are tested with these complex applications before shipping so that the problems are resolved ahead of time. This added performance improvement means that users can do more and do it faster. And with the low cost of the Z200, price differences are evaporating.

So if you’re looking at new computers for your company, make sure to consider these additional areas in which workstations typically outperform PCs:

- **Memory architecture.** Be sure any machine you purchase can support the high amount of memory that CAD applications require -- I suggest 16 GB as the minimum, even if you don’t install all the RAM right away. Make sure the memory is error-correcting code (ECC) compatible with dual memory channels to achieve maximum RAM to processor transfer rates.
- **Graphics.** Be sure to look for a machine that has the available slots to support the professional graphics cards you’ll need for 3D acceleration. Even AutoCAD gets a boost from these capabilities.
- **Drives.** Consider whether the disk drive controllers have support for data redundancy protocols such as redundant array of inexpensive disks (RAID).
- **Power supply.** Be sure the power supply has enough capacity to support the added graphics cards and drives you may want to add later.

Justifying the Cost

Nobody's management team is going to just buy a new workstation simply because a user wants one. To justify the purchase of a Z200, you'll need to make a financial case, which isn't hard to do given the Z200's low price. Here's how:

1. Find the cost of the workstation in your specific configuration
2. Compute the user-time savings due to faster processing
3. Compute the IT configuration-time savings due to HP Performance Advisor

For the purposes of these calculations, I'll assume that all labor time is valued at $50/

hour and that the lifetime of the Z200 Workstation is three years. You can use the following calculations as examples to compute your own numbers.

Machine cost. Obviously machine cost depends on how the machine is configured. You can go to HP's Configurable HP Z200 Workstation SATA/SAS page to find an exact cost, but for the purposes of this discussion I'll use $1,600 for a workstation with a 3-GHz i5 series processor, a 250-GB hard drive, and 8 GB of RAM.

Savings due to faster processing. What would it mean if you could save an engineer one-half hour per week by giving him or her a faster workstation? What would the savings be over the three-year life of your workstation? Using a labor rate of $50/hour and assuming a 48-week year, the calculation would look something like this:

0.5 hour/week x $50/hour x 48 weeks/year x 3 years =

0.5 x $50 x 48 x 3 = $3,600

Savings due to HP Performance Advisor. What would it mean if you could cut 4 hours of IT support time each year by keeping your workstation optimally configured using HP Performance Advisor? Using a labor rate of $50/hour over a three-year machine lifetime, the calculation would look like this:

4 hours/year x $50/hour x 3 years =

4 x $50 x 3 = $600

Final justification. The examples above show that even modest time savings compounded over a few years can far exceed machine cost. In fact, our examples resulted in a $4,200 time savings in three years, given a $1,600 cost. Therefore, the machine could pay for itself shortly after the first year you own it. Or simply divide your $4,200 savings by the $1,600 cost of the workstation to compute a 260% three-year return on investment (ROI) for the workstation.

Wrapping Up

Given the tendency for computer makers to always push for bigger, faster, and more expensive hardware, HP's Z200 Workstation is a refreshing change. By providing performance features that are more than adequate for high-end 2D and mid-level 3D in an affordable, expandable 64-bit-capable machine, HP has made it affordable to own the latest Intel technology.

If you work with big 2D models, medium-sized 3D models, or even perform occasional rendering or analysis work, the Z200 Workstation may provide exactly the right price-to-performance ratio for you.

About the Author

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Robert provides CAD implementation, consulting, and programming services for a variety of companies throughout the United States and Canada. He holds a degree in mechanical engineering from the Georgia Institute of Technology and is the author of *Expert CAD Management: The Complete Guide*. Reach him via his web site at www.cad-manager.com.

DISCLAIMERS

(1) Quad Core is designed to improve performance of multithreaded software products and hardware-aware multitasking operating systems and may require appropriate operating system software for full benefit. Not all customers or software applications will necessarily benefit from use of this technology. 64-bit computing on Intel architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers, and applications enabled for Intel 64 architecture. Processors will not operate (including 32-bit operation) without an Intel 64 architecture-enabled BIOS. Performance will vary depending on hardware and software configurations. More information is available at www.intel.com/info/em64t. Intel's numbering is not a measurement of higher performance.

(2) Intel Turbo Boost technology requires a PC with a processor with Intel Turbo Boost capability. Intel Turbo Boost performance varies depending on hardware, software, and overall system configuration. More information is available at www.intel.com/technology/turboboost.

(3) Maximum memory capacities assume Windows 64-bit operating systems or Linux. With Windows 32-bit operating systems, memory above 3 GB may not all be available due to system resource requirements

(4) SkyRoom sub 100ms latency is limited to the latency within the visual code itself, and does not include network latency.

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