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## HP's Midrange Workstations Meet CAD Users' Needs

HP Z220 CMT and Z220 SFF Workstations

By Robert Green, *Cadalyst* Contributing Expert



While the 3D CAD, simulation, and rendering applications that run on eight or sixteen core workstations grab all the headlines, the fact remains that the bulk of all CAD work is done with 2D optimized software with little rendering or simulation. For these "mortal CAD users," a high-end workstation isn't required, but a consumer PC doesn't have the RAM, storage, and graphics firepower required to make applications run well.

It is precisely these middle-ground users that HP is aggressively pursuing with its latest Z series workstations: the Z220 CMT (convertible mini-tower) and Z220 SFF (small-form factor). Coming fresh off the release of the HP Z420, Z620, and Z820 workstations, the HP Z220 CMT and Z220 SFF provide significantly upgraded features that consumer PC's lack.

### The Z Workstation Family

The Z Workstation family includes five models with progressively more impressive specifications. The HP Z220 CMT and Z220 SFF (see figure below) join the HP Z420, Z620, and Z820 workstations to offer a comprehensive range of machines that support anything from mainstream CAD (the HP Z220) to no-holds-barred, high-end power for analysts and animators (the HP Z820).

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The HP Z220 CMT and HP Z220 SFF (left) have front accessible drive and media reader bays along with a variety of USB 2.0/3.0 and FireWire ports in a tool-free chassis<sup>1</sup>.

## Beefy Specs

The HP Z220 workstation continues to bring the beef, albeit it small and smaller packaging, to the entry level of HP's Z workstation family. Sporting faster I/O, memory, and solid state disk (SSD) options<sup>8,9</sup>, the Z220 series is a robust CAD performer limited only by a single processor architecture and the physical size of the case which limits the number of drives and graphics cards that can be installed.

Let's break the Z220's specifications down section by section to get a better idea of what these machines are capable of.

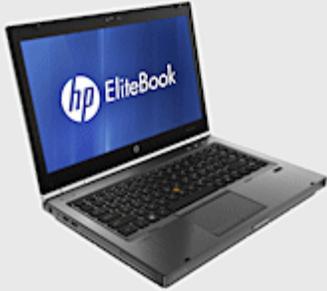
## Processor and RAM

The HP Z220's single-processor architecture is based on the Intel<sup>®</sup> C216 chipset supporting Intel<sup>®</sup> Core™ i7 or Intel<sup>®</sup> Xeon<sup>®</sup> E3 series quad-core processors<sup>2,3,4</sup> with 8 MB of cache, vPro and Turbo Boost Technology<sup>5</sup> running at clock rates from 3.20 to 3.70 GHz (Turbo Boost from 3.60 to 4.10 GHz, respectively). All processors address up to 32 GB of memory. Xeon processors support both ECC or non-ECC memory while Core i5 and Core i7 processors support only non-ECC memory. Memory speeds clock up to 1,600-MHz. RAM capacity is designed as four DIMM slots making memory configurations of 8, 16 or 32 GB easily achievable<sup>6</sup>.

## Fast Drives

Both HP Z220 machines offer an integrated 3 and 6 GB/sec SATA II or SATA III controllers, respectively, which support 7,200 rpm 3.5-inch drives up to 2 TB in size,

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10,000 rpm 2.5-inch drives up to 300 GB or SSD devices up to 300 GB in whatever combination you'd like, given the number of available drive bays<sup>8,9</sup>. Read on for more on this in the next section.

The HP Z220 CMT chassis contains three internal 3.5/2.5 combination drive bays for hard drives and SSD devices<sup>8,9</sup> while the smaller Z220 SFF supports two such bays. Even with the smaller HP Z220 SFF you can have a large 3.5-inch hard drive for data storage and a 300 GB SSD to support rapid processing. Given the available 32 GB of RAM that can be installed in tandem with the SSD<sup>8,9</sup>, you can see that even the HP Z220 SFF could bring some real firepower to CAD tasks.

Chassis. Here the two workstations diverge in capability as the different chassis dictate storage volume.

The HP Z220 CMT is built in a convertible mid-tower size, tool-free chassis<sup>1</sup> that features three internal 3.5/2.5-inch drive bays and three external 5.25-inch drive bays to accommodate a variety of hard drives from 250 GB to 2 TB in capacity and 6 TB total storage. The integrated SATA drive controller supports RAID 0 and RAID 1. CMT (convertible mini-tower) units are very flexible in that they can be used laying flat on your desk, standing as a tower, or mounted in a rack.

The HP Z220 SFF is housed in a mini-tower tool-free chassis<sup>1</sup> that features one internal 3.5-inch drive bay, an internal/external shared 3.5-inch drive bay and one 5.25-inch drive bay to accommodate a variety of hard drives from 250 GB to 2 TB in capacity and 4 TB total storage. The integrated SATA controller has the same functional specs as the Z220 CMT, although drive bay limitations restrict possible RAID drive configurations.

Graphics. Depending on the processor selected, the Z220 workstations feature optional on-board Intel<sup>®</sup> HD 4000 graphics and a variety of NVIDIA NVS or AMD FirePro<sup>™</sup> graphics boards.

For users who don't perform much (or any) visualization, but simply stick to standard resolutions while doing principally 2D work, the on-board Intel<sup>®</sup> graphics may be perfectly fine.

To enable accelerated 2D or 3D performance beyond the included HD graphics, the HP Z220 CMT and Z220 SFF Workstations both support the following graphics cards:

- For professional 2D: NVIDIA NVS 300 or NVIDIA Quadro NVS 310
- For entry level 3D: AMD FirePro<sup>™</sup> V3900, NVIDIA Quadro 410, NVIDIA Quadro 600

Due to its larger chassis and power supply, the HP Z220 CMT also supports the following graphics cards:

- For entry level 3D: AMD FirePro<sup>™</sup> V4900, NVIDIA Quadro 410, NVIDIA Quadro 600
- For mid-range 3D: AMD FirePro<sup>™</sup> V5900, NVIDIA Quadro 2000
- For high-end 3D: AMD FirePro<sup>™</sup> V7900, NVIDIA Quadro 4000

*\* Note that NVIDIA NVS 310 and NVIDIA Quadro 410 should be shipping by the time you read this.*

So, while your options may be a bit limited in the smaller HP Z220 SFF, there are plenty of graphics options in the larger HP Z220 CMT chassis.



Intel solid state drives (SSDs)<sup>8,9</sup> are made entirely of memory which can function much faster than mechanical hard drives in CAD environments where large amounts of data must be processed.



HP Z220 CMT				
HIGH-END 3D	MID-RANGE 3D	ENTRY-LEVEL 3D	PROFESSIONAL 2D	INTEGRATED GRAPHICS
NVIDIA Quadro 4000 (AMO only) AMD FirePro™ V7900 (AMO only)	NVIDIA Quadro 2000 AMD FirePro™ V5900	NVIDIA Quadro 600 AMD FirePro™ V3900 AMD FirePro™ V4900	NVIDIA NVS 300 NVIDIA Quadro NVS 310	Intel® HD Graphics 4000/P4000

HP Z220 SFF		
ENTRY-LEVEL 3D	PROFESSIONAL 2D	INTEGRATED GRAPHICS
NVIDIA Quadro 600 AMD FirePro™ V3900	NVIDIA Quadro NVS 310	Intel® HD Graphics 4000/P4000

Use this table to search for the graphics cards available for the HP Z220 CMT and Z220 SFF.

Abundant connections. The small chassis on the HP Z220 workstation doesn't mean it's short on connection ports. The front and back of both models contain a variety of USB 2.0/3.0 connections to make attaching portable hard drives, memory sticks, or keyboards flexible and easy. In addition to USB, optional IEEE 1394b FireWire ports, and DVI and DisplayPort monitor outputs for Intel® HD graphics. Chances are, you'll be able to plug whatever you need to the Z220 workstation.

### Cheaper and Easier to Maintain

The Z220's processor capabilities, high memory capacity, available SSD support and a variety of graphics options combine to pack a lot into a small package. But does that mean the Z220's are hard to work on or cut corner in terms of power supplies or other internal components? Not at all.

Let's dig a little more to get a better idea of how the design of the Z220's make them easy to install, maintain, and use.

Energy consumption. The ENERGY STAR-certified HP Z220 CMT has a 90% efficient, 400-W power supply that drives a full complement of disks and graphics boards while the smaller HP Z220 SFF has a 90% efficient, 240-W unit. As with all Z workstations, the 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. The HP Z220 series workstations are equipped with HP Performance Advisor, a configuration-management software tool that tracks CAD application drivers and with a single click 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 and BIOS setup for specific applications to yield the optimal performance for the applications used most often. It allows users to monitor all the subsystems, so if there are

performance bottlenecks, they can easily be found and upgraded.

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 HP Z220), being able to avoid spending several hours per year keeping track of hardware and software drivers can substantially lower the cost of owning a HP Z220.

Tool-free chassis. The HP Z220's, like their bigger Z siblings, use a tool-free chassis<sup>1</sup> 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.

Space-saving design. With mounting options, such as the monitor adapter you see below, the HP Z220 SFF workstation can be deployed using wireless keyboard/mouse for a clean, uncluttered desktop work environment.



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



Space-saving design options for the HP Z220 SFF workstation allow it to be deployed in a variety of environments.

## Wrapping Up

With all the attention in the computer industry going to bigger boxes with high price tags, it is refreshing to see HP paying specific attention for general CAD use that is at once compact and affordable, with far more power and options than a consumer PC. While the HP Z220 series workstations may not be the right choice for high-end 3D rendering or huge digital modeling simulation, it is for a great solution for the general CAD user and offers some room to grow and expand.

If your budget's tight, but you still need solid CAD performance, the Z220 series workstations may be just the ticket.

## 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](http://www.cad-manager.com).

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Windows 7 systems may require upgraded and/or separately purchased hardware and/or a DVD drive to install the Windows 7 software and take full advantage of Windows 7 functionality. See <http://www.microsoft.com/windows/windows-7/> for details.

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1. The Power Supply, Graphics Card, Hard Drives, Optical Drive, System Cooling Blower and Memory can all be accessed, and removed without tools. Tools may be required for all other components.
2. Dual-, quad-, six-, and eight-core technologies are designed to improve performance of multithreaded software products and hardware-aware multitasking operating systems and may require appropriate operating system software for full benefits; Not all customers or software applications will necessarily benefit from use of these technologies.
3. 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 your hardware and software configurations. See <http://www.intel.com/info/em64t> for more information.
4. Intel's numbering is not a measurement of higher performance.
5. Turbo boost stepping occurs in 100MHz increments. Processors that do not have turbo functionality are denoted as N/A. 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. Please visit <http://www.intel.com/technology/turboboost> for more information.
6. Each processor supports up to 4 channels of DDR3 memory. To realize full performance at least 1 DIMM must be inserted into each channel.
7. Z620 systems configured with E5-1600 series processors may not add a 2nd processor. To support two processors, E5-2600 series processor must be chosen.
8. SATA hardware RAID is not supported on Linux systems. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. Please visit <http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00060684/c00060684.pdf> for RAID capabilities with Linux
9. For hard drives, 1 GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 8 GB of hard drive (or system disk) is reserved for the system recovery software for Windows® XP and XP Pro, up to 12 GB for Windows® Vista®, and up to 20 GB for Windows® 7.
10. NVIDIA Tesla C2075 requires the 1125W power supply.

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