



Workstation Innovation News



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Introducing: HP's Z1 G2 Workstation

Powerful Intel® Xeon® processor performance in a compact package

Workstation-level Intel® Xeon® processors with high resolution graphics and a 27" diagonal screen can't be found in a single package, right? You might well think that until you have a detailed look at the latest generation of HP's Z1 Workstation, dubbed the Z1 G2. As the successor to 2012's HP Z1 all-in-one Workstation, the Z1 G2 delivers more options, more power, and greater peripheral flexibility than its predecessor while retaining the same desk friendly, cordless design that has proven so successful. I'm not used to thinking of workstations as being sleek or cool, but the HP Z1 G2 is both.

A Quick Tour of the Outside

If you glance at the HP Z1 G2 Workstation from a distance, it looks like a flat screen monitor mounted atop a highly adjustable stand. A close up look reveals the workstation's details. The super high-resolution 27" diagonal screen (a touch screen¹ upgrade is optional), cordless keyboard and mouse and bezel mounted Web cam and speakers complete the basic user interface elements while a variety of peripheral connectors hint at the HP Z1 G2's expansion capabilities.

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HP's Z1 G2 looks like a thick-bezel standalone monitor; closer examination reveals ports around the perimeter and rear of the unit. Screen image courtesy of Autodesk.

Of course the external look at the HP Z1 G2 yields no clue of the power that lurks within its chassis, but you are left with the impression that it is well-crafted and offers an exceptionally clean desk presentation due to the cordless (minus a single AC power cable) design. No more crawling under the desk to find network cables, plus no more tangle of chords on top your desk. When I first saw the HP Z1 two years ago, I postulated that it would find its way into a lot of executive suites and demo rooms due to its sleek look. The reality is that I've seen more HP Z1's at remote offices, job sites, and trade shows where their power combined with their non-corded infrastructure makes them as easy to deploy as laptops.

Take a Look Inside

A quick latch release and HP's Z1 G2 pops open like the hatchback of a car (complete with pneumatic dampening cylinder) to expose the toolfree interior². There's no wasted space inside the HP Z1 G2. While there are some limits to how much you can fit inside, it's easy to swap components in and out to expand this workstation. The lack of cabling makes it essentially impossible to incorrectly hookup components — something your IT department will appreciate as much as you will.



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All screen images
courtesy of Autodesk



As easy to open as the hatch of your car, the HP Z1 G2 reveals an easy to customize, tool free internal chassis with room for expansion drives, RAM, and graphics card.

Some investigation demonstrates that up to three drives/storage bay devices (typically one DVD RW device and two 2.5" drives), along with a PCIe form factor graphics processor (up to a 4 GB NVIDIA Quadro K4100M¹) can all fit neatly inside the HP Z1 G2. Another possible configuration would be to add a 128 or 256GB mSATA solid state storage card in a PCIe slot which would act as the system boot drive then using two hard drives (either independent or configured as a RAID 0/1 pair).

No matter which configuration you choose you simply swap out or add any components,

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close the lid and reboot — no screw drivers, jumpers, or cussing required. In fact, you may want to open the machine up just to admire the craftsmanship.

New Intel® Xeon® Processor Specs

Is the HP Z1 G2 really a workstation? A quick look at the processor specifications should answer that question.

The HP Z1 G2 has processor options ranging from a 3.4 GHz Intel® Core™ i3 processor (dual core) with 3 MB of onboard cache to the 3.6 GHz Intel® Xeon® processor E3 (quad core) with 8 MB of onboard cache and hyper-threading based on an Intel C226 chipset motherboard³. This range of processors is well suited for anything from 2D CAD on the low end to 3D CAD with occasional rendering on the high end as they stress high clock rates and ample memory capability.

The Intel® Xeon® processor E3 upgrade is where the HP Z1 G2 gets its big power boost for 2014 and is worth some discussion. The main technologies these processors bring are Intel® Smart Response Technology (SRT®) – which let you use a small/inexpensive solid state disk (SSD) as a smart cache to substantially decrease disk access times as well as Advanced Vector Extension (AVX®) which allows up to a 2X increase in data processing for photorealistic imaging. With the new generation of Intel® Xeon® processors the HP Z1 G2 becomes more of a high throughput server architecture which can substantially improve the throughput of high demand processes such as CAD.



In fact the HP Z420, Z620, and Z820 Workstations introduced last fall all have new Intel® Xeon® processors E5 processor technology with the Z820 supporting up to a staggering 12 cores and 512 GB of RAM.



HP's new family of workstations.

The Rest of the Specs

RAM: Memory is contained in up to four slots supporting up to 32 GB of fast DDR3 error-correcting code (ECC) RAM clocking at 1,866 MHz (a 16% increase from the first generation of Z1) across two memory channels. Compared to many consumer portables that top out at 8 GB of non-ECC memory, the HP Z1 G2 has the RAM to backup its Intel® Xeon® processor.^{4,5}

Display: The 27" diagonal backlit LED screen supports resolutions up to 2,560 x 1,440 at up to 16 million colors (surpassing HD level output resolutions and color depths) thus making even high end mechanical CAD and rendering users feel right at home. In-plane switching (IPS) screen technology yields a very wide (178-degree) viewing field without color shifting which makes the screen great for design reviews and presentation use. An option for conference or design review environments is a 10-finger capable touch screen for use with Windows 8.1.¹



An optional 10-point multi-touch screen can be added for Windows 8.1 users.¹ Screen image courtesy of Autodesk.

Graphics: On board Intel® HD Graphics 4400 (on the i3 processor), Intel® HD Graphics 4600 (on the i5 and i7 processors) and Intel® HD Graphics P4600 (on the Intel® Xeon® processors) mean that an additional graphics card may not even be necessary for 2D and basic 3D CAD work.³ A variety of NVIDIA graphics cards ranging from the entry-level 1 GB K610M to the high-level 4 GB K4100M are available for users performing rendering or modeling that require a dedicated graphical processing unit (GPU). An external DVI monitor connection for driving a second monitor is also included.

Drive Controller: An integrated SATA III (6 Gbit/sec) controller yields twice the throughput of previous generation controllers to really take advantage of higher speed drives — particularly solid state drives (SSD).

Drives: In addition to the onboard DVD optical drive, storage may be installed in one of two internal 2.5" form factor drive bays using 500 GB to 1 TB at 10,000 RPM mechanical drives or 128- to 512 GB SSD. An alternate configuration supports a single 3.5" form factor mechanical drive of up to 3 TB at 7,200 RPM drive for maximum storage capacity. To extend the storage capacity further an mSATA solid state storage card can also be installed in an available PCIe slot. So, depending on the amount of data access required, the HP Z1 G2 could be configured as a single drive machine with maximum storage or as a hybrid dual mechanical, SSD drives machine yielding maximum disk throughput.

LAN connections: A wired 1 GB LAN connection and an 802.11 a/c wireless LAN/Bluetooth radio is included for easy connection to either fixed or wireless network topologies.

Peripheral connections: On the lower right hand side of the case of the Z1 G2, you'll find two USB 3.0 connectors (1 charging), an optional Thunderbolt 2 connector, a multi-format card reader, headphone, and microphone connectors. On the rear of the unit are four USB 2.0 connectors, an RJ-45 Gigabit-wired LAN port, audio line in/out, display port out, and additional audio outputs which we'll examine in the multimedia section shortly. If you want to plug in SD cards, memory sticks, external monitors/drives, or even just charge your iPad, you've got all the connectivity you'll need in the HP Z1 G2.

Multi-Media, Touch and Thunderbolt 2

In addition to being a solid platform for CAD use, the HP Z1 G2 can also function as a multimedia demo and touch based design review workstation. The Z1 G2's front, side, rear and optional touch panels hide several demo friendly features:

Integrated Web Cam: The screen bezel contains a full HD 1,080p web cam (much like you'd see on a laptop) to facilitate web conferencing software applications or video capture.

Sound: Integrated speakers provide good quality sound but analog audio line in/out, Sony/Philips Digital Interconnect Format (SPDIF) digital audio output, and a subwoofer output make the Z1 G2 easy to interface with from anything, such as a digital recorder, an analog mixing board, and external sound reinforcement speakers.

External Monitor: The ability to drive a secondary very large screen monitor with the included display port makes the HP Z1 G2 and audio an even more flexible video viewing machine especially for trade show or training applications.

Optional Touch Screen: While touch screens for CAD applications aren't mainstream yet, there are a few applications that show the promise of multi-touch technology. For example, SolidWorks has adopted a [multitouch gesturing system](#) to allow total control of 3D visualizations. I'm betting that as more companies perform 3D design reviews, shop floor viewing/zooming of CAD files, or BIM walkthrough visualizations that touch screens will provide an intuitive way to interact with software applications without special controllers or mousing actions. How quickly the market will adapt to touch screen applications is an unknown but, like tablets changed the way we work with mobile apps, Windows 8.1-based CAD stations with touch screens may change how we interact with CAD as well.



Using zoom to fit touch gestures in SolidWorks. Screen image courtesy of Sage Cheshire Aerospace.

Thunderbolt 2⁶: The capability to interface high speed peripherals such as 4K video cameras, high capacity portable drives, and even drive external graphics cards housed in Thunderbolt expansion bays allow for all manner of video editing possibilities.

For tasks from high power demos at trade shows or manipulating large data sets on the road, HP's Z1 G2's portability and media interface capabilities make it one of the most compact high performance media systems obtainable.

Wrapping Up

Starting at \$1,999, the HP Z1 G2 is admittedly a bit more expensive than an equivalent tower-based desktop and monitor. However, if you factor in the mobility, wireless ease of deployment, low power consumption, and great graphics the Z1 G2 can bring to remote or conference locations, the convenience is worth it.

For the CAD user or road demo warrior, the HP Z1 G2 Workstation is a unique blend of convenience, power, and flexible expandability with even more processing and throughput than its predecessor that fits in a carryon-compliant road case!

About the Author

Robert Green 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.

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1. Sold separately or as an optional feature.
2. The power supply, graphics card, hard drives, optical drive, system-cooling blower, and memory can be accessed, and removed without tools. Tools may be required for all other components.
3. Multi-Core is designed to improve performance of certain software products. 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 your hardware and software configurations. Intel's numbering is not a measurement of higher performance.
4. Each processor supports up to 2 channels of DDR3 memory. To realize full performance at least 1 DIMM must be inserted into each channel. Actual memory speeds dependent on processor capability.
5. Intel® Xeon® E3 and Intel® Core™ i3 processors can support either ECC or non-ECC memory. Intel® Core™ i5 and i7 processors only support non-ECC memory.
6. Thunderbolt™ 2 is planned to be available via an optional add-in card in early 2014 on the Z1 G2. Thunderbolt is new technology. Thunderbolt cable and Thunderbolt device (sold separately) must be compatible with Windows. To determine whether your device is Thunderbolt Certified for Windows, see thunderbolttechnology.net/products.