

HP recommends Windows.



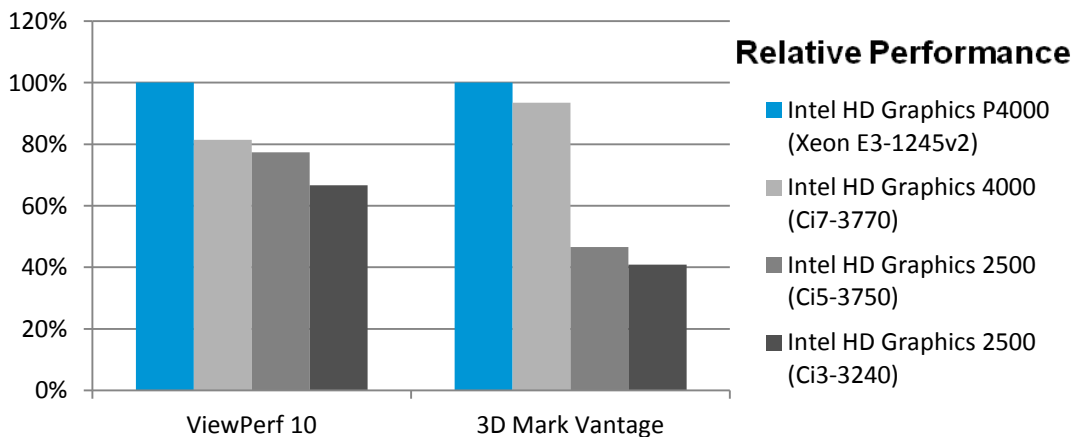
Intel® HD Graphics Family Performance on HP Z220

Introduction

Intel's 2nd and 3rd generation HD graphics are available on HP Z220(CMT&SFF) workstations, and there are four options of integrated Intel HD graphics solutions; Intel HD Graphics 2000, 2500, 4000 and P4000. There are specific benefits to choose Intel integrated graphics, besides the cost, such as QuickSync capabilities and the Intel HD Graphics P4000 integrated graphics certified for selected ISV certifications.

	Intel HD Graphics 2000	Intel HD Graphics 2500	Intel HD Graphics 4000	Intel HD Graphics P4000
Graphics	2 nd generation	3 rd generation	3 rd generation	3 rd generation
Processor	Ci3-2xxx	Ci3/5-3xxx	Ci7-3770	Xeon E3-12x5 v2
DX/OGL	10.1/ 3.0	11/ 3.3	11/ 3.3	11/ 3.3
Graphics EUs	6	6	16	16
Max Frequency	850MHz	1100MHz	1150MHz	1250MHz

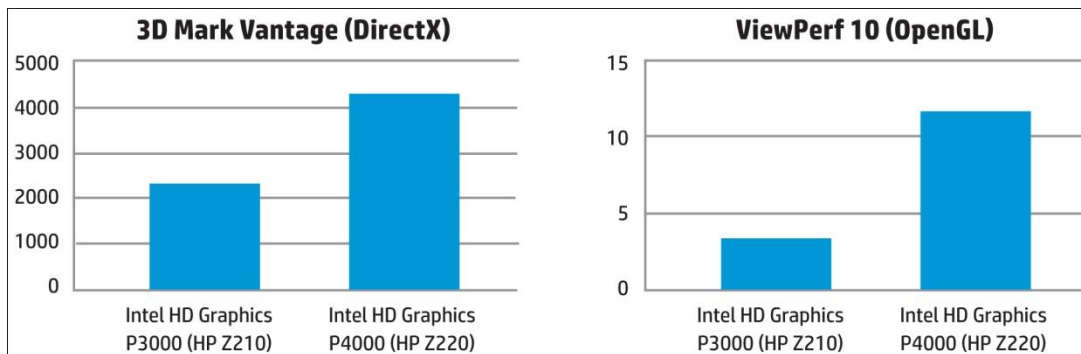
The chart provides the benchmarking on Windows 64-bit using Futuremark's 3DMark Vantage and SPEC ViewPerf 10 to show the relative performance for Intel HD Graphics 2000, 2500, 4000 and P4000 with the different processes.



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P4000 on HP Z220 vs. P3000 on HP Z210 (generation to generation improvement)

For DirectX performance improvement, the benchmark scores with Intel HD Graphics P4000 on HP Z220 are almost twice that of Intel HD Graphics P3000 on HP Z210. For OpenGL portion, the performance of Intel HD Graphics P4000 on HP Z220 is more than double that of Intel HD Graphics P3000 on HP Z210. Both DirectX and OpenGL performance show a considerable improvement in performance over previous generation.

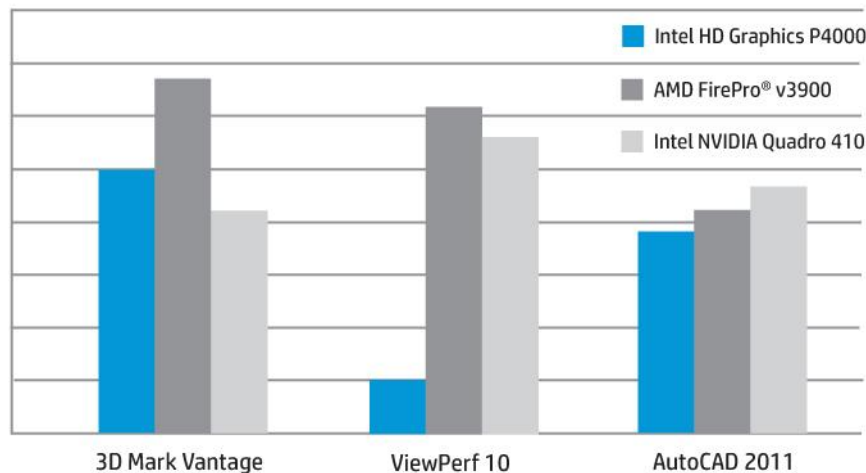


Intel P4000 vs. current Workstation entry-graphics cards

Using 3DMark Vantage to compare DirectX performance with Intel P4000 and current entry-graphics cards (NVIDIA Quadro 410 and AMD FirePro® v3900) on HP Z220 Windows 7 Professional 64-bit, shows that Intel P4000 is competitive with discrete graphics cards in these benchmarks.

However, for OpenGL, Intel integrated graphics has only enabled select portions of the OpenGL API; this limits the capability and the performance of Intel integrated graphics to address OpenGL-based applications on Windows and Linux.

Relative Performance



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ISV-certified applications

Unlike Intel's other integrated graphics offerings, the Intel HD Graphics P4000 – is certified on the following applications:

- Professional OpenGL: Adobe Photoshop, Adobe Premiere Elements, SolidWorks, SolidEdge, Maya, SoftImage, AfterEffect
- Professional DirectX: Autodesk AutoCAD, Inventor, Revit, 3ds Max, Microstation v8i, Showcase

Intel HD Graphics P4000 in Intel Xeon is not to be confused with the Intel HD graphics 4000 on Intel Core i7. The P4000 is only available on Intel Xeon E3 v2-based workstations and it delivers ISV application certifications and Workstation-only performance and features with Intel C216 chipset.

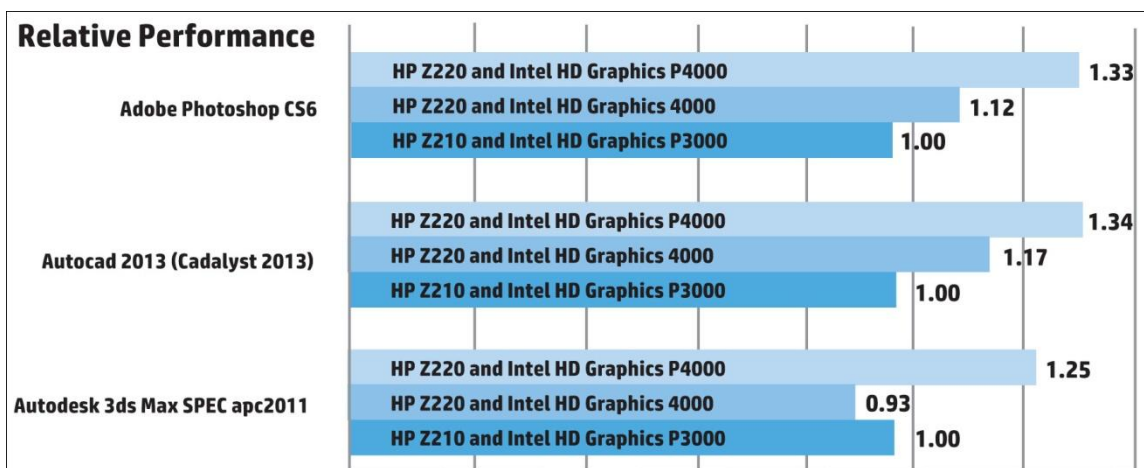
Driver version, 15.26.2712 and after, supports optimizing performance of the certified applications.

Application Performance

Application performance is of key importance to users. The Intel HD Graphics P4000 also includes application specific tuning unavailable on any other Intel graphics solution.

This chart compares an HP Z220 Workstation having an Intel Xeon E3-1245v2 processor (Intel HD Graphics P4000) with the same workstation having an Intel Core-i7 3770 (Intel HD Graphics 4000) and also with an HP Z210 Workstation running an Intel Xeon E3-1245 processor (Intel HD Graphics P3000). All systems are running the Windows 7 Professional 64-bit operating system. Testing is based on Autodesk AutoCAD 2013(Cadalyst 2013), Adobe PhotoShop CS6 and Autodesk 3ds Max 2011 SPECapc.

This testing shows up to 30% more Photoshop and AutoCAD performance and up to 20% more 3ds Max performance when comparing the HP Z220 P4000 with the HP Z210 P3000. Also, adding the Intel Core i7 with Intel HD Graphics 4000 into the comparison shows the reduced performance without driver optimization for ISV applications.



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Intel® QuickSync video overview

Intel Quick Sync, which is offered on all Intel integrated graphics SKUs, uses dedicated media processing to accelerate video encoding H.264 and MPEG2 for faster conversion time while also enabling the processes to complete other tasks and improving overall PC responsiveness.

The main applications that support QuickSync are:

- ArcSoft MediaConverter 7
- Corel VideoStudio Pro X4
- CyberLink MediaEspresso v6.5
- Badaboom 2.0

Recommendations and Conclusion

Intel HD Graphics are recommended for office productivity applications. The Intel HD Graphics P4000 is certified for selected professional applications, and offers a cost-effective alternative to discrete professional 2D/entry 3D graphics cards from NVIDIA and AMD in certain cases. However, customers should first verify that the system with Intel HD Graphics P4000 performs adequately for their need and workloads. Linux users should limit themselves to basic desktop applications.

Additional resources

hp.com/go/whitepapers

hp.com/support/Z220SFF_manuals

hp.com/support/Z220CMT_manuals

¹ Requires an 2nd gen Intel® Core™ processor, enabled chipset, Intel Rapid Storage technology software, and a properly configured hybrid drive (HDD + small SSD). Intel Smart Response Technology is sold as an optional feature and is only available on HP's 2012 Workstations, HP EliteBooks and HP Ultr Depending on system configuration, your results may vary.

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