

PERFORMANCE COMPARISON: DELL LATITUDE E6430 VS. HP ELITEBOOK 8470P

Dell™ Latitude™ E6430 notebook



*Faster to boot and
more durable*
on PT's lab tests

*Faster business
application performance*
on SYSmark® 2012

Faster media handling and 3D
on HDXPRT 2012 and 3DMark® 11

Longer battery life
on MobileMark® 2012

versus HP EliteBook 8470p

When it comes to your employees' notebook computers, every second counts. A sluggish system not only affects productivity, but is a source of annoyance as well. Battery life also matters—the longer the better—as does durability. That's why it's essential to select a model with fast performance, long battery life, and the ability to keep running and keep your data safe even if it takes the occasional tumble.

Principled Technologies tested two notebook systems in our labs, the Dell Latitude E6430 and the HP EliteBook 8470p. We found that the Latitude outperformed the EliteBook in five areas: business application performance, media handling and 3D graphics performance, boot time, battery life, and durability. These advantages can save your workers time, making the Dell Latitude E6430 an excellent choice.



TIME IS OF THE ESSENCE

Battery life, performance, and durability are all extremely important to today's users of notebook systems. Running out of juice when you're on the go, having to wait for your system to perform everyday tasks, and risking downtime and data loss should your notebook accidentally fall—none of these is acceptable. We performed a range of tests to compare the Dell Latitude E6430 and the HP EliteBook 8470p in these areas. We conducted every test three times and present the results for the median run of each test.

Durability

When workers are on the go, accidents sometimes happen. Not all notebooks do an equally good job of protecting data during a fall. To see how our two test systems compared, we attempted to drop each three times from a height of 29 inches (73.7 cm), or about desk-high. After each drop, we used using HD Tune Pro 5.00 and HDDScan 3.3, tests that assess hard drive damage, to measure how well the system had protected its data. Once a system failed to boot, we conducted no further testing on that system. For these drop tests, we used regular spindle drives in both systems. For all other tests, we used a hybrid drive in the Dell Latitude E6430 and a regular spindle drive in the HP EliteBook 8470p. See [Appendix A](#) for detailed hardware information.

After the first drop, the HP EliteBook 8470p's top center bezel broke at the center/camera and we were unable to pop it back into place. After the second and third drops, the separation of the top bezel worsened. According to our hard drive testing, the HP EliteBook 8470p protected its data throughout the first and second drops. After the third drop, however, tests reveals that 81.8 percent of the blocks had suffered damage and there were 2,559 bad blocks.

The Dell Latitude E6430 stood up to our tests, however, working fine after three drops with no discernible damage to its hard drive. During the second and third drops, the right wrist rest lifted slightly, but we were able to pop it back in position. Figure 1 summarizes the results of our hard drive scans.

Drop testing – physical data protection		
	Dell Latitude E6430	HP EliteBook 8470p
Drop 1		
HD Tune Pro 5.00 damaged blocks percentage	0%	0%
HDDScan 3.3 bad blocks	0	0
Drop 2		
HD Tune Pro 5.00 damaged blocks percentage	0%	0%
HDDScan 3.3 bad blocks	0	0
Drop 3		
HD Tune Pro 5.00 damaged blocks percentage	0%	81.8%
HDDScan 3.3 bad blocks	0	2,559

Figure 1: The results of our physical data protection drop test for the notebooks.

Boot times

The less time users spend waiting for their notebooks to boot up, the more time they have to be productive. Figure 2 shows the median results for our boot time tests. In our tests, the Dell Latitude E6430 took 4.8 percent less time to boot than the HP EliteBook 8470p.

Boot times			
	Dell Latitude E6430	HP EliteBook 8470p	Percentage Dell win
Boot	26.00	27.03	4.8%

Figure 2: Median boot times, in seconds, for the two systems.

Performance

Because performance is so important to today's worker, we used three benchmarks to rate the performance of the notebooks, and found that the Dell Latitude E6430 was up to completing the tasks workers require.

We tested the gaming performance of the systems using Futuremark® 3DMark®11, which tests the graphics capabilities of the notebooks, and found that the Dell Latitude E6430 outperformed the HP EliteBook 8470p by 12.7 percent on the 3DMark11 benchmark. Figure 3 shows the median results of our 3DMark11 tests.

Futuremark 3DMark11		
	Dell Latitude E6430	HP EliteBook 8470p
3D Mark score	1,101	953
Graphics score	973	834
Physics score	4,745	4,768
Combined score	947	840

Figure 3: Median scores for the Futuremark 3DMark11 benchmark. Higher numbers are better.

BAPCo SYSmark® 2012 measures system performance for a number of common tasks including office productivity and media creation. Figure 4 shows the median results of our SYSmark 2012 tests. The Dell Latitude E6430 achieved a higher SYSmark2012 Overall Performance Rating than the HP EliteBook 8470p.

BAPCo SYSmark 2012		
	Dell Latitude E6430	HP EliteBook 8470p
SYSmark 2012 Overall Performance Rating	144	141
SYSmark 2012 – Office Productivity	136	132
SYSmark 2012 – Media Creation	146	145
SYSmark 2012 – Web Development	133	127
SYSmark 2012 – Data/Financial Analysis	164	161
SYSmark 2012 – 3D Modeling	134	138
SYSmark 2012 – System Management	155	144

Figure 4: Median scores for the BAPCo SYSmark 2012 benchmark. Higher numbers are better.

HDXPRT 2012 measures the performance of systems on common media usages. Figure 5 shows the median results of our HDXPRT 2012 tests. The Dell Latitude E6430 had a 25.7 percent higher Overall Create HD Score than the HP EliteBook 8470p.

HDXPRT 2012		
	Dell Latitude E6430	HP EliteBook 8470p
Create HD Score (Higher is better)	210	167
Media Organizer - minutes (lower is better)	4.91	5.07
Media Creator - minutes (lower is better)	10.29	12.14
Photo Blogger - minutes (lower is better)	7.24	7.39
Video Producer - minutes (lower is better)	1.86	5.38
Music Maker - minutes (lower is better)	2.66	2.31

Figure 5: Median scores for the HDXPRT 2012 benchmark.

Battery life

As Figure 6 shows, the Dell Latitude E6430 had longer battery life than the HP EliteBook 8470p, lasting for 330 minutes, a 42.2 percent increase in battery life.

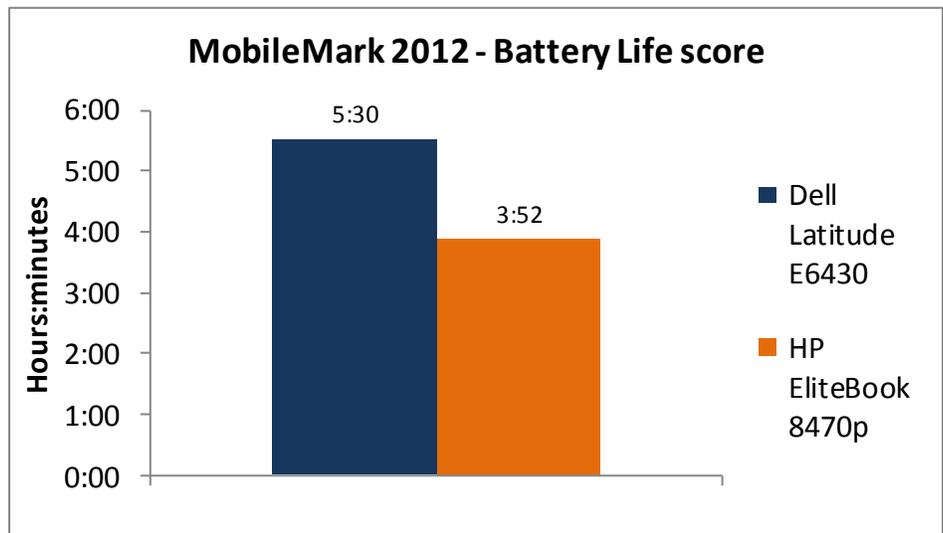


Figure 6: The battery of the Dell Latitude E6430 lasted 42.2 percent longer than that of the HP EliteBook 8470p.

Figure 7 shows the median results for our battery life testing using the BAPCo® MobileMark® 2012 benchmark.

BAPCo MobileMark 2012		
	Dell Latitude E6430	HP EliteBook 8470p
Screen brightness	154 nits	156 nits
MobileMark 2012 - Battery Life score (minutes)	330	232
MobileMark 2012 - Battery Life score (hours: minutes)	5:30	3:52

Figure 7: Median scores for the BAPCo Mobile Mark 2012 benchmark. Higher numbers are better.

WHAT WE TESTED

In this section, we present a brief overview of what we tested. For detailed system configuration information, see [Appendix A](#). For step-by-step details on how we tested, see [Appendix B](#).

Futuremark 3DMark11

Futuremark's 3DMark11 1.0.3 benchmark suite tests system GPU DirectX® 11 performance and CPU workload processing performance, primarily to report a system's 3D gaming capability. Tests include HDR rendering, shadow mapping, and pixel shading. For more information on this benchmark, see <http://www.3dmark.com/3dmark11>.

BAPCo SYSmark 2012

BAPCo SYSmark 2012 is an application-based benchmark that tests performance in the following office workload scenarios: office productivity, media creation, Web development, data/financial analysis, 3D modeling, and system management. SYSmark 2012 records the time the system takes to complete each individual operation in each scenario. For more information on this benchmark, see <http://www.bapco.com/products/sysmark2012/>.

HDXPRT 2012

The High Definition eXperience & Performance Ratings Test (HDXPRT) 2012, is a benchmark that evaluates the capabilities of PCs in consumer digital media uses, including

- Media Organizer
- Media Creator
- Photo Blogger
- Video Producer
- Music Maker

For more information on HDXPRT 2012, see www.hdxprt.com.

BAPCo MobileMark 2012

MobileMark 2012 is an industry-standard benchmark that provides a battery life rating and a performance rating based on common office scenarios. In our tests, we focus solely on the battery life rating. MobileMark 2012 applications and workloads specific to mobile systems. These include office activities like file and document management, data processing, and rich content creation. This module provides a score for battery life of the tested applications.

MobileMark 2012 includes the following applications with their corresponding tasks:

- ABBYY® FineReader Pro 11

- Adobe® Acrobat® Pro X
- Adobe Flash® Player 11
- Adobe Photoshop® CS5 Extended 12.04
- Adobe Photoshop Elements 10
- Adobe Premiere® Pro CS 5.5
- CyberLink PowerDVD Ultra 11
- Microsoft® Excel® 2010 SP1
- Microsoft Internet Explorer® 9
- Microsoft Outlook® 2010 SP1
- Microsoft PowerPoint® 2010 SP1
- Microsoft Windows Media Player
- Microsoft Word 2010 SP1
- Mozilla® Firefox® 10.0.2
- WinZip® Pro 16

MobileMark 2012 measures system battery life in minutes. It records system battery life at the start of the benchmark and repeats the workload until the system battery life is depleted, or until the system powers down due to low battery life.

MobileMark 2012 records a timestamp once per minute. At the end of the benchmark, it compares the beginning timestamp to the final (last recorded) timestamp. MobileMark 2012 derives its system battery life rating as the number of minutes between the start and end timestamps.

For more information on this benchmark, see

<http://www.bapco.com/products/mobilemark2012/index.php>.

IN CONCLUSION

Today's workers do not want their computers to keep them waiting. They want their notebooks to run as long as possible when unplugged and they certainly don't want to worry about having to replace a notebook that accidentally slips to the floor. Selecting notebooks that perform everyday tasks quickly, have long battery life, and are extremely durable makes good business sense. In our tests, the Dell Latitude E6430 delivered better performance, battery life, and durability than the HP EliteBook 8470p did. This makes it an excellent choice for your employees.

APPENDIX A – SYSTEM CONFIGURATION INFORMATION

Figure 8 provides detailed configuration information for the test systems.

System	Dell Latitude E6430	HP EliteBook 8470p
General		
Number of processor packages	1	1
Number of cores per processor	2	2
Number of hardware threads per core	2	2
System power management policy	Dell	HP Optimized
Processor power-saving option	Enhanced Intel® SpeedStep® Technology	Enhanced Intel SpeedStep Technology
System dimensions (length x width x height)	14-7/8" x 9-1/2" x 1-3/8" (37.8 cm x 24.1 cm x 3.5 cm)	13-1/4" x 9-1/16" x 1-3/8" (33.7 cm x 23.0 cm x 3.5 cm)
System weight	5 lbs. 4 oz. (2.38 kg)	5 lbs. 6 oz. (2.44 kg)
CPU		
Vendor	Intel	Intel
Name	Core™ i7	Core i7
Model number	3520M	3520M
Stepping	E1	E1
Socket type and number of pins	Socket 988B rPGA	Socket 988B rPGA
Core frequency (GHz)	2.90	2.90
L1 cache	32 KB + 32 KB (per core)	32 KB + 32 KB (per core)
L2 cache	512 KB (256 KB per core)	512 KB (256 KB per core)
L3 cache	4 MB	4 MB
Platform		
Vendor	Dell	Hewlett-Packard
Motherboard model number	0H3MT5	179B
Motherboard chipset	Intel QM77	Intel QM77
BIOS name and version	Dell A02 (04/24/2012)	Hewlett-Packard 68ICF Ver. F.04 (06/12/2012)
Memory module(s)		
Vendor and model number	Hyundai HMT351S6CFR8C-PB	Micron MT16KTF51264HZ-1G6M1
Type	PC3-12800	PC3-12800
Speed (MHz)	1,600	1,600
Speed running in the system (MHz)	1,600	1,600
Timing/Latency (tCL-tRCD-tRP-tRASmin)	11-11-11-28	11-11-11-28
Size (MB)	4,096	4,096
Number of memory module(s)	2	2
Amount of RAM in system (GB)	8	8
Chip organization (single-sided/double-sided)	Double-sided	Double-sided
Channel (single/dual)	Dual	Dual

System	Dell Latitude E6430	HP EliteBook 8470p
Hard disk (for performance tests)		
Vendor and model number	Seagate ST500LX003-1AC15G	Toshiba MK5061GSYN
Number of disks in system	1	1
Size (GB)	500	500
Buffer size (MB)	32	16
RPM	7,200	7,200
Type	SATA 6.0 Gb/s	SATA 3.0 Gb/s
Controller	Intel Mobile Express Chipset SATA RAID Controller	Intel 7 Series Chipset Family SATA AHCI Controller
Driver	Intel 11.0.0.1032 (11/29/2011)	Intel 11.1.0.1006 (11/29/2011)
Hard disk (for drop testing only)		
Vendor and model number	Hitachi HTS727550A9E364	Toshiba MK5061GSYN
Number of disks in system	1	1
Size (GB)	500	500
Buffer size (MB)	16	16
RPM	7,200	7,200
Type	SATA 3.0 Gb/s	SATA 3.0 Gb/s
Controller	Intel Mobile Express Chipset SATA RAID Controller	Intel 7 Series Chipset Family SATA AHCI Controller
Driver	Intel 11.0.0.1032 (11/29/2011)	Intel 11.1.0.1006 (11/29/2011)
Operating system		
Name	Windows 7 Professional x64	Windows 7 Professional x64
Build number	7601	7601
Service Pack	1	1
File system	NTFS	NTFS
Kernel	ACPI x64-based PC	ACPI x64-based PC
Language	English	English
Microsoft DirectX version	DirectX 11	DirectX 11
Graphics card 1		
Vendor and model number	NVIDIA® NVS 5200M	AMD Radeon HD 7570M
Type	Discrete	Discrete
Chipset	NVS 5200M	HD 7570M
BIOS version	70.8.a8.0.13	BR 42926.001
Total available graphics memory (MB)	4,095	4,830
Dedicated video memory (MB)	1,024	1,024
System video memory (MB)	0	0
Shared system memory (MB)	3,071	3,806
Resolution	1,366 x 768 x 32-bit	1,366 x 768 x 32-bit
Driver	NVIDIA 8.17.12.9679 (05/10/2012)	AMD 8.951.6.0 (03/29/2012)
Sound card/subsystem		
Vendor and model number	IDT High Definition Audio	IDT High Definition Audio
Driver	IDT 6.10.0.6324 (01/25/2011)	IDT 6.10.6392.0 (03/05/2012)

System	Dell Latitude E6430	HP EliteBook 8470p
Ethernet		
Vendor and model number	Intel 82579LM Gigabit	Intel 82579LM Gigabit
Driver	Intel 11.15.12.0 (11/30/2011)	Intel 11.15.16.2001 (02/22/2012)
Wireless		
Vendor and model number	Intel Centrino® Ultimate-N 6300	Intel Centrino Ultimate-N 6300
Driver	Intel 15.1.1.1 (03/12/2012)	Intel 15.1.0.18 (02/20/2012)
Optical drive(s)		
Vendor and model number	Matshita UJ8B2	HP GT50N
Type	DVD-RW	DVD RW
USB ports		
Number	4	4
Type	2 x USB 2.0, 2 x USB 3.0	2 x USB 2.0, 2 x USB 3.0
Other	Media card reader, HDMI, eSATA	Media card reader, eSATA
IEEE 1394 ports		
Number	0	1
Monitor		
LCD type	HD LED WXGA	HD LED WXGA
Screen size	14" (35.6 cm)	14" (35.6 cm)
Refresh rate	60 Hz	60 Hz
Battery		
Type	Dell T54FJ	HP CC06
Size (length x width x height)	8-1/4" x 2" x 13/16" (21.0 cm x 5.1 cm x 2.1 cm)	8-1/16" x 1-7/8" x 3/4" (20.5 cm x 4.8 cm x 1.9 cm)
Rated capacity	5400mAh / 11.1V (60Wh)	5600mAh / 11.1V (62Wh)
Weight	11 oz. (312 g)	11 oz. (312 g)

Figure 8: Configuration information for the systems we tested.

APPENDIX B - HOW WE TESTED

Measuring durability

This test measures the damage that the impact from a drop of 29 inches (73.7 cm) inflicts upon an open notebook running MAXON® CINEBENCH 11.5.

Setting up CINEBENCH R11.5

1. Download CINEBENCH 11.5 from <http://www.maxon.net/downloads/cinebench.html>.
2. Install CINEBENCH:
 - a. Right-click the CINEBENCH ZIP file, and choose Extract All.
 - b. In the Select a Destination and Extract Files window, click Browse, click Desktop, and click OK.
 - c. Click Extract.

Running CINEBENCH 11.5

1. Launch CINEBENCH 11.5 by double-clicking the CINEBENCH 11.5.exe file in the CINEBENCH 11.5 folder.
2. Enter the MHz frequency of the processor in the MHz (real freq.) field.
3. Click Start all tests.

Conducting the drop test

We used a Lansmont PDT56ED Precision Drop Tester, with a landing area covered by commercial carpet. We opened the notebook so that the screen and keyboard formed a 120-degree angle, and then placed the notebook flat on the platen. Orienting the notebook in this way resulted in a flat drop. (Figure 9 shows our test setup.)

To allow us to scan the notebooks identically, we booted to a Hiren's BootCD and installed the hard disk scanning software to the Microsoft® Windows® 7 virtual machine's RAM disk. Running the scanning software from RAM, we scanned the hard disk with HD Tune Pro 5.00 and HDDScan for Windows 3.3, and recorded the number of bad sectors and blocks before and after the drop test. We also recorded any other physical defects, such as cracks or breaks in the display, as well as separated hinges or displaced screws, which the impact of the drop caused. We took still photographs of the notebooks before and after each drop. We dropped each notebook once, using this process:

1. Install MAXON CINEBENCH 11.5 onto the test notebook, as outlined above.
2. Run EFD Software's HD Tune Pro 5.00 and HDDScan 3.3 to get baseline data on the state of the hard disk. Boot the system using a Hiren's BootCD.
 - a. Install HD Tune Pro 5.00:

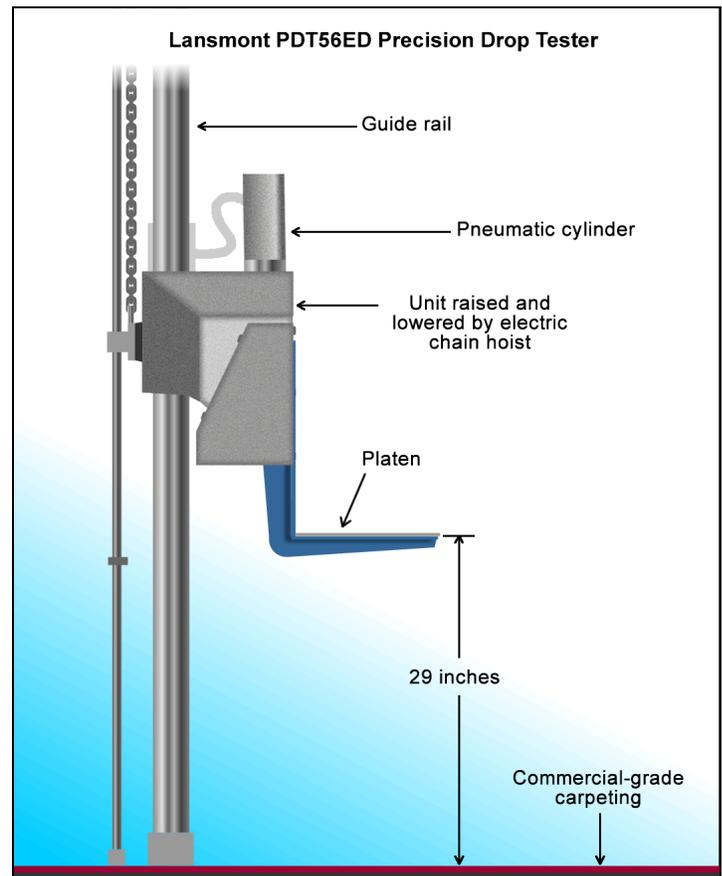


Figure 9: Our physical data protection test setup.

- i. Insert a USB flash drive containing the HD Tune Pro installation executable, and click once on My Computer.
 - ii. Navigate to the USB drive, and double-click the hdtunepro_500_trial.exe installation file to install the application.
 - iii. At the welcome screen, click Next.
 - iv. Click the I accept the agreement radio button, and click Next.
 - v. In the Select Destination Location window, click Browse.
 - vi. Click the RAMDisk drive once to select it, and click OK.
 - vii. Click Next in the next two windows.
 - viii. Leave check box empty for Create a desktop icon, and click Next.
 - ix. Click Install.
 - x. Leave the check box checked for Launch HD Tune Pro, and click Finish.
- b. Run the HD Tune Pro 5.00 Error Scan:
- i. Select the Error Scan tab.
 - ii. Click Start in the right hand pane.
- Note:** The Error Scan is complete when the Start button changes from grey to black.
- c. Save the Error Scan Results.
- d. Click the Copy information to clipboard button on the upper right hand menu bar (it is the first button on the left):
- i. Open a new text file by clicking Start→Run, typing notepad, and clicking OK.
 - ii. In the Notepad window, click Edit→Paste.
 - iii. Click File→Save As, enter an appropriate filename using a .txt extension, and choose the location to save the file (we saved ours to a USB flash drive). Click Save.
- e. Close the HD Tune Pro 5.00 Hard Disk Utility.
- f. Scan the notebook's hard drive with HDDScan for Windows version 3.3:
- i. Open the HDDScan folder, and double-click the HDDScan.exe executable file to run the application.
 - ii. Click Tasks→Surface Tests to open the Test Selection window.
 - iii. Select Verify from the list of tests, and click Add Test.
 - iv. At the conclusion of the run, double-click the VR-Verify test id in the Test Manager window to open up the results.
 - v. Select the Report tab, and copy and paste the test results into Notepad.
 - vi. Save the results as a text file.
3. Set the height of the platen on the Lansmont Precision Drop Tester to 29 inches (73.7 cm) above the surface of the 28-ounce commercial carpeting.
 4. Place the fully charged notebook onto the platen of the drop tester, with the notebook's base flat on the platen and the screen facing forward, open at a 120-degree angle.
 5. Launch CINEBENCH.
 6. Unplug the notebook, and drop the notebook onto the commercial carpeting.
 7. Wait until the notebook is completely still.
 8. If the battery or any other components come off the system, inspect them for damage, and reinstall them if possible.
 9. Take digital pictures of the notebook from all angles after completing the checklist.
 10. Stop CINEBENCH.
 11. Reconnect the notebook's AC adapter.
 12. Run HD Tune Pro 4.06 and HDD Scan 3.3 using the process in Step 2, and record the results as the notebook's post-test disk status.

Measuring time to boot

1. Simultaneously start the timer and boot the system.
2. Stop the timer when the Windows taskbar appears.
3. Record the result as the Boot time.
4. Repeat steps 1 through 3 two more times, and report the median of the three runs.

Measuring graphics performance with 3DMark 11 1.0.3

Installing 3DMark 11

1. Purchase 3DMark 11 Professional Edition from <http://community.futuremark.com/store/>, and download the 3DMark_11_v103_installer.exe Windows package.
2. Install 3DMark 11 1.0.3 by double-clicking the 3DMark_11_v103.exe file; leave the default options set.
3. At the Choose Setup Language screen, choose English, and click Next.
4. At the Welcome screen, click Next.
5. At the License Agreement screen, click I accept the terms of the license agreement, and click Next.
6. At the Setup Type screen, click Complete, and click Next.
7. At the Ready to Install the Program screen, click Install.
8. When the 3DMark 11 Read Me page appears in your Web browser, review the document, and click Close when you are finished.
9. At the Setup Complete screen, click Finish to restart the computer.
10. Launch 3DMark 11 1.0.3 by double-clicking on the 3DMark 11 desktop icon. Enter the registration code, and click Register.
11. Exit 3DMark 11 1.0.3.

Running 3DMark11 1.0.3

1. Boot the system and open an administrative command prompt:
 - a. Select Windows Start orb.
 - b. Type `cmd` and right-click `cmd.exe`.
 - c. Select Run as administrator.
2. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`
3. Do not interact with the system until the command completes.
4. After the command completes, wait 5 minutes before running the test.
5. Double-click the 3DMark 11 desktop icon to launch the benchmark.
6. In the 3DMark 11 Main section, click the Performance option under Preset, and select Benchmark tests only.
7. Click Run 3DMark 11.
8. When the benchmark run completes, take a screenshot of the results, and record them as follows:
 - 3DMark Score
 - Graphics Score
 - Physics Score
 - Combined Score
9. Shut down the system.
10. Repeat steps 1 through 9 two more times, and report the median of the three runs.

Measuring performance with SYSmark 2012

Avoiding antivirus software conflicts

SYSmark 2012 is not compatible with any virus-scanning software, so we uninstalled any such software that was present on the notebook PCs before we installed the benchmark.

Avoiding pre-installed software conflicts

SYSmark 2012 installs the following applications, which its test scripts employ:

- ABBYY FineReader Pro 10.0
- Adobe Acrobat Pro 9
- Adobe After Effects CS5
- Adobe Dreamweaver CS5
- Adobe Photoshop CS5 Extended
- Adobe Premiere Pro CS5
- Adobe Flash Player 10.1
- Autodesk® 3DS Max® 2011
- Autodesk AutoCAD® 2011
- Google SketchUp™ Pro 8
- Microsoft Internet Explorer
- Microsoft Office 2010
- Mozilla Firefox Installer
- Mozilla Firefox 3.6.8
- Winzip Pro 14.5

If any of these applications are already on the system under test, they will cause problems with the benchmark due to software conflicts. To avoid any such issues, before we installed the benchmark, we uninstalled all conflicting pre-installed software applications, including different versions of any of the programs SYSmark 2012 uses.

Setting up the test

Using the SYSmark built-in Configuration Tool

This tool supports three levels of configuration:

1. Only makes changes that are REQUIRED in order for the benchmark to run.
2. Additionally, makes changes that are RECOMMENDED for repeatable results.
3. Additionally, makes OPTIONAL changes that help ensure best results.

The Configuration tool makes the following configuration changes at each of the three levels:

Level 1 - Required

- Disables User Account Control (UAC)
- Disables Windows Update
- Disables System Sleep and Hibernate
- Disables Low Battery Actions
- Disables Network Proxies

Level 2 - Recommended

- Creates BAPCo power scheme

- Sets Power Plan Type to High Performance
- Disables Windows Firewall
- Disables Windows Sidebar/Gadgets
- Disables Windows Pop-ups
- Disables Incoming Remote Desktop Connections
- Disables Windows Error Reporting
- Disables Screen Saver and Monitor Timeout
- Sets CPU Adaptive Mode
- Disables Desktop Slideshow
- Disables Disk Defrag

Level 3 - Optional

- Sets Hard Disk Timeout
- Disables Windows Defender
- Disables System Restore
- Ignores Laptop Lid Close
- Sets Maximum Display Brightness
- Disables Adaptive Brightness

Because we are testing how well each system does out of the box, we chose only the Required options in the Configuration tool.

1. Insert the SYSmark 2012 Install DVD into the notebook PC's DVD drive.
2. When the Autoplay menu appears, click Run SYSmark2012_setup.exe.
3. At the Welcome screen, click Next.
4. Enter the serial number, and click Next.
5. Accept the license agreement, and click Next.
6. At the Choose Components screen, select Full, and click Next.
7. At the Choose Install Location screen, accept the default location of C:\Program Files (x86)\BAPCo\SYSmark2012, and click Next.
8. At the Choose Start Menu Folder screen, click Install.
9. Insert Disc 2 when prompted.
10. At the InstallShield Wizard Complete screen, click Finish.
11. Download and install SYSmark 2012 Patch 2 <http://www.bapco.com/support/>.
12. Launch SYSmark 2012.
13. Click Configuration and choose only the Required options.
14. Click Apply, and restart the computer when prompted.

Running the test

1. Launch SYSmark 2012 by double-clicking the desktop icon.
2. Enter a Project name and choose 3 iterations.
3. Click Run Benchmark.

Getting the SYSmark 2012 results

When SYSmark 2012 has completed, the Test Results Viewer appears. To submit these results to BAPCo, we saved the test results by performing the following steps:

1. Click Save.
2. Enter a name, and select FDR to save the results as an FDR file.
3. Click Save again, and select PDF to save the results as a PDF file.
4. Browse to the Documents directory where the result FDR and PDF files were saved.

Measuring digital media capabilities with HDXPRT 2012

Setting up the test

1. Insert the HDXPRT DVD-ROM into your DVD drive.
2. At the HDXPRT Install screen, click Install HDXPRT.
3. Accept the HDXPRT end user license agreement.
4. After the setup is complete, select Yes, I want to restart my computer now, and click Finish.

Running HDXPRT

1. Click the HDXPRT 2012 shortcut on the desktop.
2. Click Run HDXPRT.
3. Enter a test name, choose 3 iterations, and click Run.
4. The Results Screen automatically appears at the end of a successful run. The test results files are found in the C:\ProgramFiles\HDXPRT\Reports\<TestName> directory.

Measuring battery life with MobileMark 2012

Avoiding antivirus software conflicts

MobileMark 2012 is not compatible with any virus-scanning software, so we uninstalled any such software present on the notebook PCs before we installed the benchmark.

Avoiding pre-installed software conflicts

MobileMark 2012 installs the following applications, which its test scripts employ:

- ABBYY FineReader Pro 11
- Adobe® Acrobat Pro X
- Adobe Flash Player 11
- Adobe Photoshop CS5 Extended 12.04
- Adobe Photoshop Elements 10
- Adobe Premiere® Pro CS 5.5
- CyberLink PowerDVD Ultra 11
- Microsoft Excel® 2010 SP1
- Microsoft Internet Explorer
- Microsoft Outlook 2010 SP1
- Microsoft PowerPoint 2010 SP1
- Microsoft Windows Media Player
- Microsoft Word 2010 SP1

- Mozilla Firefox 10.0.2
- WinZip Pro 16

If any of these applications are already on the system under test, they could cause problems with the benchmark due to software conflicts. To avoid any such issues, before we installed the benchmark, we uninstalled all conflicting pre-installed software applications, including different versions of any of the programs MobileMark 2012 uses.

Adjusting display brightness and power settings

The brightness of a notebook's display affects its battery life. Therefore, BAPCo requires that, before you test with MobileMark 2012, you do the following step: make sure the brightness of the notebook's monitor is greater than or equal to 150 nits on a completely white screen while the notebook is unplugged and running on battery power. The measurement follows the standards from the Video Electronics Standards Association (www.vesa.org).

We complied with this standard for all the tests we ran by setting the notebook PC's brightness as close to 150 nits as we could without going below that brightness level. We used the following procedure before we started each test. Note: This procedure assumes we began with the notebook plugged into the power supply.

1. To create a completely blank, white screen, open Microsoft Paint by clicking Start→All Programs→Accessories→Paint.
2. Press Ctrl+W to open the Resize and Skew dialog.
3. Under Horizontal and Vertical enter 200, and click OK.
4. Click the View tab.
5. Click Full screen to view a white screen.
6. Wait 45 minutes to allow the screen to warm.
7. Unplug the notebook from the power supply, and measure the display's brightness using a luminance meter in the center of the screen. (We used the Gossen Mavolux5032C.)
8. If the reading is below or significantly greater than 150 nits, use the notebook's keyboard screen-brightness-adjustment keys to bring the display as close to 150 nits as possible, then retest.
9. Allow the notebook to run on battery power for 10 minutes, re-measure the display, and adjust the brightness up or down as necessary.
10. Verify that the notebook saved the brightness setting by plugging in the system, unplugging it, and taking another reading.

Note: If the notebook did not save this setting, use its power management application(s) to set the brightness appropriately, and save that setting. If saving the settings is ineffective, use the keyboard brightness setting keys to adjust the screen to bring the display as close to 150 nits as possible. Next, note how many times you pressed the button to achieve the desired brightness. After unplugging the system under test, use the keyboard to set the desired brightness by pressing the brightness button as many times as you previously noted to return the screen to the correct brightness level.

Using the MobileMark built-in Configuration Tool

This tool supports three levels of configuration:

1. Only makes changes that are REQUIRED in order for the benchmark to run.
2. Additionally, makes changes that are RECOMMENDED for repeatable results.
3. Additionally, makes changes that help ensure best results.

The Configuration tool makes the following configuration changes at each of the three levels:

Level 1 - Required

- Disables User Account Control (UAC)
- Disables Windows Update
- Disables System Sleep and Hibernate
- Sets Screen Dimming Timeout (2 minutes)
- Disables Low Battery Actions
- Disables Network Proxies
- Disables Autorun for Optical Drive

Level 2 - Recommended

- Create BAPCo power scheme
- Set Power Plan Type to balanced
- Disables Windows Firewall
- Disables Windows Sidebar/Gadgets
- Disables Windows Pop-ups
- Disables Incoming Remote Desktop Connections
- Disables Windows Error Reporting
- Disables Screen Saver and Monitor Timeout
- Sets CPU Adaptive Mode
- Disables Desktop Slideshow
- Disables Disk Defrag

Level 3 - Optional

- Sets Hard Disk Timeout
- Disables Windows Defender
- Disables System Restore
- Ignores Laptop Lid Close
- Sets Maximum Display Brightness
- Disables Adaptive Brightness

Because we are testing how well each system does out-of-box, we chose only the Required options in the Configuration tool.

Installing MobileMark 2012 and configuring the system for testing

1. Verify that the wireless adapter is enabled and connected to a wireless router that is not connected to the Internet.
2. Insert the MobileMark 2012 Install DVD into the notebook PC's DVD drive.
3. When the Autoplay menu appears, click Run MobileMark2012_Setup.exe.
4. At the Welcome screen, click Next.
5. Enter the serial number, and click Next.
6. Accept the license agreement, and click Next.
7. At the Choose Components screen, select Full, and click Next.
8. At the Choose Install Location screen, accept the default location of C:\Program Files (x86)\BAPCo\MobileMark2012, and click Next.
9. At the Choose Start Menu Folder screen, click Install.

10. Insert Disc 2 when prompted.
11. At the InstallShield Wizard Complete screen, click Finish.
12. Launch MobileMark 2012.
13. Click Configuration and choose only the Required options.
14. Click Apply, and restart the computer when prompted.
15. Adjust the screen brightness to no less than 150 nits:
 - a. Click the Windows start button, and type `power options` in the Windows Start Search box.
 - b. Click Change plan settings.
 - c. Click Change advanced power settings.
 - d. Expand the Display option, and change the Display brightness on battery and plugged in to the correct percentage that produces no less than 150 nits.

Note: If you are unable to save these settings, please see the Displaying Brightness section above.

Conditioning the battery

1. Plug the AC power adapter into the notebook PC, and completely charge the battery.
2. Install MobileMark 2012, following the steps we outlined in the Installing MobileMark 2012 section earlier in this section.
3. Double-click the MobileMark 2012 icon on the desktop.
4. Click the Office Productivity icon.
5. Type `System Conditioning` as the name for this test in the Project Name, check the box next to conditioning, and click Continue.
6. If MobileMark 2012 lists no problems or warnings, click Continue. If it does list any problems or warnings, close MobileMark 2012, and correct the problem(s) before proceeding.
7. When prompted, unplug the AC power adapter. The Office Productivity test begins immediately.
8. The test is complete when the notebook PC has fully depleted its battery and is no longer operational when running on battery power.
9. Plug the AC power adapter into the notebook PC, and completely charge the battery.

Measuring battery life with MobileMark 2012

We performed the following steps to run the MobileMark 2012 Office Productivity benchmark:

1. Double-click the MobileMark 2012 icon on the desktop.
2. Select the Office Productivity test by clicking the Office Productivity icon.
3. Enter a name for this test in the Project Name field, and click Continue.
4. If MobileMark 2012 lists no problems or warnings, click Continue. If it does list any problems or warnings, close MobileMark 2012, and correct the problem(s) before proceeding.
5. When prompted, unplug the AC power adapter. The test begins immediately.
6. The Office Productivity test is complete when the notebook PC has fully depleted its battery and is no longer operational when running on battery power.

We executed the MobileMark 2012 Office Productivity test three times on the system and took the median battery life run as the representative score for that test.

Getting the MobileMark 2012 results

After each MobileMark Productivity 2012 test completed, we plugged the AC power adapter into the notebook PC and turned on the system. MobileMark 2012 started automatically after the system booted, then analyzed the test scores and opened the Test Results Viewer with the results from the last test.

To submit these results to BAPCo, we saved the test results by performing the following steps:

1. Click Save.
2. Enter a name and select FDR to save the results as an FDR file.
3. Click Save again, and select PDF to save the results as a PDF file.
4. Browse to the Documents directory where the result FDR and PDF files were saved.

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Note: This report was modified on April 2, 2013 to include specific information on the drives used for the drop tests. For drop tests, we used regular spindle drives in both systems. For all other tests, we used a hybrid drive in the Dell Latitude E6430 and a regular spindle drive in the HP EliteBook 8470p. See [Appendix A](#) for detailed hardware information.

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