

# SEAGATE MOMENTUS XT SOLID STATE HYBRID DRIVE VS. TRADITIONAL HARD DISK DRIVE IN A MACBOOK PRO

## Seagate® Momentus® XT solid state hybrid drive



than the standard notebook HDD

The speed of your drive has a direct bearing on how quickly your system can perform a variety of tasks. While solid state drives (SSDs) outperform traditional hard disk drives (HDDs), they can't match the capacity of HDDs. Solid state hybrid drives (SSHDs) merge high capacity with top performance, so you no longer have to choose. In Principled Technologies' tests in our labs, replacing a traditional HDD with the Seagate Momentus XT SSHD boosted performance considerably.

Using a range of custom tests, we compared performance of an Apple® MacBook® Pro notebook system with a 7,200 RPM HDD and with the Seagate Momentus XT SSHD. The hybrid drive consistently outperformed the HDD, with performance increases as high as 44.9 percent.

This performance boost, along with the Seagate Momentus XT SSHD's 750GB capacity, gives you the best of both worlds—the capacity of an HDD and speed approaching that of an SSD.



We tested an Apple MacBook Pro with a Hitachi® Travelstar™ 7K320 HDD and the same system with a Seagate Momentus XT SSHD. For each configuration, we conducted a number of hand-timed tests to measure how quickly the system performed everyday tasks such as booting and opening different kinds of files. We ran every test three times and report the median results.

See [Appendix A](#) for details on the test system configuration and [Appendix B](#) for detailed test procedures.

## FASTER IS BETTER

Figure 1 shows the time to perform three everyday tasks with the two drives. The Seagate Momentus XT SSHD system booted 15.6 percent faster, went to sleep 17.8 percent faster, and resumed from sleep 35.5 percent faster.

Figure 1. The system with the Seagate Momentus XT SSHD performed everyday tasks faster than did the system with the 7,200 RPM HDD. Lower numbers are better.

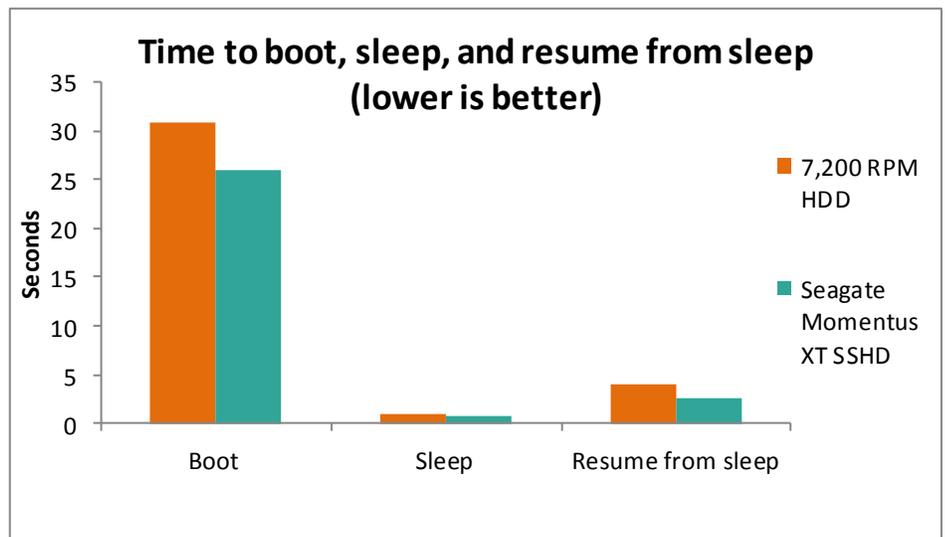


Figure 2 shows the time to open a variety of file types with the two drives. The Seagate Momentus XT SSHD system opened files as much as 44.9 percent faster.

Figure 2. The system with the Seagate Momentus XT SSHD opened files faster than did the system with the 7,200 RPM HDD. Lower numbers are better.

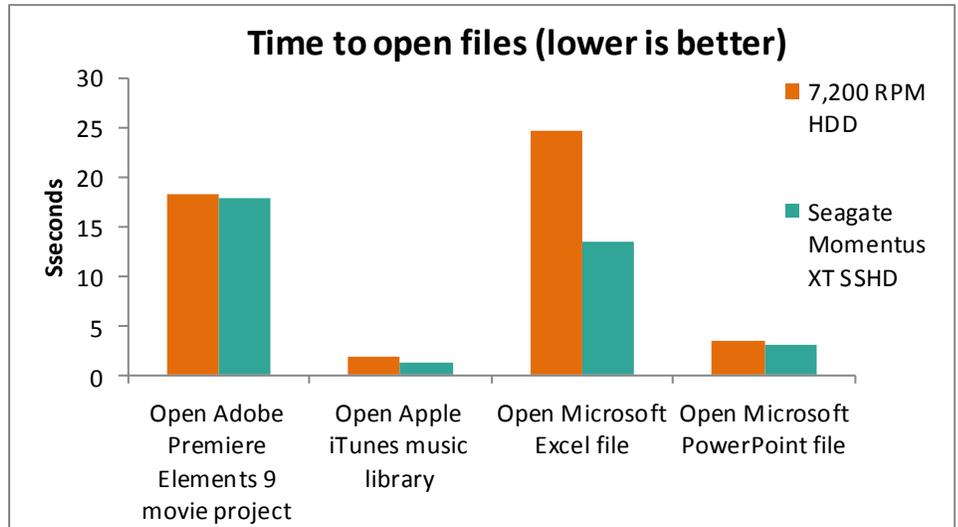


Figure 3 presents the time it took the system to perform everyday tasks and to open files with the two drives. We conducted three runs and present the scores from the median run.

Time to perform everyday tasks and to open files (lower times are better)	7,200 RPM HDD	Seagate Momentus XT SSHD	Percentage time saved with Seagate Momentus XT SSHD
<b>Perform everyday tasks</b>			
Boot	30.92	26.1	15.6%
Sleep	0.90	0.74	17.8%
Resume from sleep	4.09	2.64	35.5%
<b>Open files</b>			
Open Adobe® Premiere® Elements 9 movie project	18.20	17.97	1.3%
Open Apple® iTunes® music library	1.94	1.39	28.4%
Open Microsoft® Excel® file	24.65	13.58	44.9%
Open Microsoft PowerPoint® file	3.46	3.05	11.8%

Figure 3. Time, in seconds, to perform everyday tasks and to open files with the two drives. Lower times are better and higher percentage time saved is better.

## CONCLUSION

As our test results show, replacing a traditional hard disk drive with the Seagate Momentus XT solid state hybrid drive reduced the time to perform everyday tasks and to open files. Upgrading your existing notebook system's drive, or selecting the Momentus XT for the next system you purchase, will give you this boost and the productivity gains that accompany it, while retaining the large capacity of an HDD.

## APPENDIX A – SYSTEM CONFIGURATION INFORMATION

Figure 4 provides detailed configuration information about the test system.

System	15" Apple MacBook Pro
	
Number of processors packages	1
Number of cores per processor	2
Number of hardware threads per core	4
System power management policy	Apple default
Processor power-saving option	Enhanced Intel® Speedstep® Technology
System dimensions (length x width x height)	14-5/16" x 9-13/16" x 7/8"
System weight	5 lbs. 9.5 oz.
<b>CPU</b>	
Vendor	Intel
Name	Core™ i7
Model number	620 M
Stepping	C2
Socket type and number of pins	Socket 1156 LGA
Core frequency (GHz)	2.66
Front-side bus frequency	2.5 GT/s DMI
L1 Cache	32 KB + 32 KB
L2 Cache	256 KB + 256 KB
L3 Cache	4 MB
<b>Platform</b>	
Vendor	Apple Inc.
Motherboard model number	Mac-F22586C8
Motherboard chipset	Intel ID0044
BIOS name and version	Apple Inc. MBP61.88Z.0057.B07.1004071225 (04/07/2010)
BIOS settings	Default
<b>Memory module(s)</b>	
Vendor and model number	Micron® 16JSF25664HZ-1G1F1
Type	PC3-8500F
Speed (MHz)	1,067
Speed running in the system (MHz)	1,067
Timing/Latency (tCL-tRCD-tRP-tRASmin)	7-7-7-20
Size (MB)	4,096
Number of memory module(s)	2 x 2,048
Chip organization (Single-sided, Double-sided)	Double-Sided
Channel (Single/Dual)	Dual

System	15" Apple MacBook Pro
<b>Hard drive</b>	
<b>Traditional hard disk drive</b>	
Vendor and model number	Hitachi Travelstar 7K320 HTS723216L9A362
Size (GB)	160
Buffer size (MB)	16
RPM	7,200
Type	SATA
Controller	Intel ICH9M-E/M
Driver	Intel 8.9.0.1023 (6/4/2009)
<b>Solid state hybrid drive</b>	
Vendor and model number	Seagate Momentus XT Solid State Hybrid Drive ST750LX003
Size (GB)	750
Buffer size (MB)	32 MB with 4GB solid state SLC NAND flash storage
RPM	7,200
Type	SATA
Controller	Intel ICH9M-E/M
Driver	Intel 8.9.0.1023 (6/4/2009)
<b>Operating system</b>	
Name	OS X 10.6.3
Build number	10D2084
File system	Journaled HFS+
Kernel	Darwin 10.3.1
Language	English
<b>Graphics 1</b>	
Vendor and model number	Intel HD Graphics
Type	Integrated
Chipset	Intel
Total available graphics memory (MB)	288
Resolution	1,440 x 900 x 32-bit
<b>Graphics 2</b>	
Vendor and model number	NVIDIA® GeForce™ GT 330M
Type	Discrete
Chipset	NVIDIA
Total available graphics memory (MB)	512
Resolution	1,440 x 900 x 32-bit
<b>Sound card/subsystem</b>	
Vendor and model number	Intel High Definition Audio
<b>Ethernet</b>	
Vendor and model number	Broadcom® NetXtreme® I (5764)
<b>Wireless</b>	
Vendor and model number	AirPort Extreme

<b>System</b>	<b>15" Apple MacBook Pro</b>
<b>Optical drive</b>	
Vendor and model number	Matshita® UJ-898
Type	DVD-R
Interface	SATA
Dual/Single layer	Dual
<b>USB ports</b>	
Number	2
Type	2.0
Other	SD Reader
<b>IEEE 1394 ports</b>	
Number	0
<b>Monitor</b>	
LCD type	LED-backlit glossy widescreen
Screen size (inches)	15.4
Refresh rate (Hz)	60
<b>Battery</b>	
Type	Lithium-polymer
Rated capacity	7100 mAh x 10.95V (77.5 Wh)

Figure 4. Detailed configuration information about the test system.

## APPENDIX B – TEST PROCEDURES

All tests are hand-timed and require a stopwatch.

### Measuring time to boot

1. Simultaneously start the timer and boot the system.
2. Stop the timer when the taskbar appears.
3. Record the result.
4. Wait 5 minutes before shutting the system down.
5. Repeat steps 1 through 4 two more times, and report the median of the three runs.

### Measuring time to sleep and resume from sleep

1. Boot the system.
2. Wait 5 minutes.
3. Simultaneously start the timer and put the system into sleep mode (Start→Sleep).
4. Stop the timer when the hard drive LED turns off.
5. Record the result.
6. Reset the timer.
7. Simultaneously start the timer and press the power button to resume from sleep mode.
8. Stop the timer when the system displays the desktop.
9. Record the result.
10. Shut down the system.
11. Repeat steps 1 through 10 two more times, and report the median of the three runs.

### Setting up the file-opening tests

1. Reset the system with the appropriate test image.
2. Copy the test 16MB Excel file to the desktop.
3. Copy the test 12MB PowerPoint file to the desktop.
4. Copy the test 1MB 3DCrafter file to the desktop.
5. Copy the test 35GB music library to C:\Music.
6. Copy the test 1.93GB of videos to C:\Videos.
7. Install Microsoft Office 2010.
8. Install Apple iTunes 10.
9. Install Adobe Premiere Elements 9.
10. Install Amabilis 3DCrafter 9.
11. Shut down the system.

### Measuring time to open Adobe Premiere Elements movie project

#### Setting up the test

1. Boot the system.
2. Double-click the Premiere Elements desktop icon to launch Premiere Elements 9.
3. Click New Project.
4. Enter a name for the test project and the save location.
5. Click the Get Media icon from Files and Folders, and browse to the test video files, and click open.
6. Drag each video to the bottom Sceneline.
7. Once all videos have been added to the Sceneline, click Save.
8. Exit Premiere Elements.
9. Copy the Premiere Elements Project file that was just created to the desktop.

10. Shut down the system.

### Running the test

1. Boot the system.
2. Wait 5 minutes.
3. Simultaneously start the timer and double-click the Premiere Elements Project file.
4. Stop the timer when the project is displayed.
5. Record the result.
6. Shut down the system.
7. Repeat steps 1 through 6 two more times, and report the median of the three runs.

## Measuring time to open Apple iTunes music library

### Setting up the test

1. Boot the system.
2. Double-click the iTunes desktop icon to launch iTunes (Do not maximize the iTunes window).
3. Select File→Add Folder to Library, and browse to the test music library.
4. In the upper right corner, select Show items in a grid, and move the slider all the way to the left.
5. Exit iTunes.
6. Shut down the system.

### Running the test

1. Boot the system.
2. Wait 5 minutes.
3. Simultaneously start the timer and double-click the iTunes desktop icon.
4. Stop the timer when the albums are displayed.
5. Record the result.
6. Shut down the system.
7. Repeat steps 1 through 6 two more times, and report the median of the three runs.

## Measuring time to open a Microsoft Office 2010 Excel file

### Setting up the test

1. Boot the system.
2. Double-click the test Excel file to launch Excel.
3. On the PC select the “Design” tab and verify “Chart Styles” are visible. On the MacBook Pro select the “Chart” tab and verify “Chart Styles” are visible.
4. Exit Excel.
5. Shut down the system.

### Running the test

1. Boot the system.
2. Wait 5 minutes.
3. Simultaneously start the timer and double-click the Excel test file.
4. Stop the timer when the file has loaded.
5. Record the result.
6. Shut down the system.
7. Repeat steps 1 through 6 two more times, and report the median of the three runs.

## Measuring time to open a Microsoft Office 2010 PowerPoint file

### Setting up the test

1. Boot the system.
2. Double-click the test PowerPoint file to launch PowerPoint.
3. Verify that PowerPoint opens in full screen.
4. Exit PowerPoint.
5. Shut down the system.

### Running the test

1. Boot the system.
2. Wait 5 minutes.
3. Simultaneously start the timer and double-click the PowerPoint test file.
4. Stop the timer when the file has loaded.
5. Record the result.
6. Shut down the system.
7. Repeat steps 1 through 6 two more times, and report the median of the three runs.

## ABOUT PRINCIPLED TECHNOLOGIES



Principled Technologies, Inc.  
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