Going "Green" with Diskeeper

I. Overview

The purpose of this paper is to evaluate benefits in performance, cost, time to complete, wattage consumed for each test and overall KWH consumption by using Diskeeper defragmentation software.

All testing, including methodology, format, and protocols were performed by 3D Professor, with a focus of determining the power/cost savings Diskeeper affords to users.

Full details on procedure, configuration, and raw data is available in the full white paper at www.3dprofessor.org.

II. Methodology & System Configuration

Benchmarking consisted of simple before and after wattage calculations monitored on the system without, and then with Diskeeper. This provides "before and after" statistics used to formulate the conclusions. To eliminate anomalies, all tests, renders, and benchmarks have been duplicated.

Hardware:

Measure Kilowatts per hour (KWH)

- Plug-in Mains Power & Energy Monitor (note: where wattage and kilowatts are measured, lower is better in all instances. (100 watts equals .1 kilowatt)
- Four thermal diodes used to ensure ambient room temperature of 22.5 °C (72.5 °F).

Intel Test Platform[1]

- Akasa Zen Chassis
- Akasa Power80+ 500W Power Supply Unit
- Akasa 965 Heatsink Fan
- Intel Q9300 (2.5GHz) Quad Core CPU
- Intel X38 Bonetrail Mainboard
- 4 X 1GB Crucial DDR3 Ballistix PC3-12800, Memory Modules
- AMD FireGL V5600 (Current Driver Release 8.453.1)
- Plextor SATA DVDRW+ PX-760A (Designated Drive D)
- Akasa 120mm Intake Fan
- Akasa 120mm Exhaust Fan
- Western Digital Caviar® GP 500GB IntelliPower Hard Disk, SATA 3 GB/s, 8MB Cache. (Boot Disc Designated Drive C)
- Western Digital Caviar® GP 1TB IntelliPower Hard Disk, SATA 3 GB/s, 16MB Cache. (Data Disc Designated Drive E)

Uninterrupted Power Supply (UPS)

- APC Back-UPS ES 700

Software:

Microsoft Windows XP Professional SP3 Platform (with all updates)

Application Software used to test power consumption:

- SPECviewperf 10®
- HD Tach Version 3.0.4.0
- SiSoftware Sandra XII SP1
- MAXON CINEBENCH 10
- Autodesk 3ds Max 9 SP2
- SPECapc for 3ds Max™ 9
- SPECapc for SolidWorks 2007™

[1] Estimated Street Cost = $2165 US Dollars, £1165 UKP, €1391 Euros

Defragmentation Software

- Diskeeper® 2008 Pro Premier Edition w/InvisiTasking (used to eliminate fragmentation for comparisons tests)
  - Light/mild file fragmentation was naturally created through installation and use of above listed software. Typically about 7000-8000 total excess file fragments.

III. Test Results

Note wattage results indicate peak usage monitored during the respective test.

A. SPECviewperf 10

Across various test, Diskeeper reduces the system's power requirements.

SPECviewperf 10	*Diskeeper Not Installed*	*Diskeeper Installed*
3dsmax-04	142 Watts	139 Watts
catia-02	155 Watts	144 Watts
ensight-03	148 Watts	143 Watts
maya-02	145 Watts	140 Watts
proe-04	155 Watts	146 Watts
sw-01	162 Watts	160 Watts
tcvis-01	149 Watts	146 Watts
ugux-01	156 Watts	141 Watts

SPECviewperf 10	*Diskeeper Not Installed*	*Diskeeper Installed*
Time to Complete Test (Hours:Minutes)	0:28	0:27
Total KHW	.06 KWH	.05 KWH

B. HD Tach Version 3.0.4.0

HD Tach Version 3.0.4.0	*Diskeeper Not Installed*		*Diskeeper Installed*	
	Drive C:	*Drive D:*	*Drive C:*	*Drive D:*
Short Test	98 Watts	101 Watts	96 Watts	98 Watts
Long Test	98 Watts	102 Watts	94 Watts	101 Watts
Full Test	100 Watts	100 Watts	99 Watts	97 Watts

HD Tach Version 3.0.4.0	*Diskeeper Not Installed*		*Diskeeper Installed*	
	Drive C:	*Drive D:*	*Drive C:*	*Drive D:*
Time to Complete Test (Hours:Minutes)	2:23	4:14	2:16	4:10
Total KHW	.23 KWH	.43 KWH	.22 KWH	.41 KWH

C. **SiSoftware Sandra XII SP1 Professional**

Power Consumption	SiSoftware Sandra XII SP1 Professional	Diskeeper Not Installed		Diskeeper Installed	
		Drive C:	Drive D:	Drive C:	Drive D:
	Processor Arithmetic Test	138 Watts	N.A.	136 Watts	N.A.
	Processor Multimedia Test	138 Watts	N.A.	135 Watts	N.A.
	File System Test	112 Watts	110 Watts	111 Watts	110 Watts
	Physical Disc Test	109 Watts	106 Watts	98 Watts	95 Watts

Performance	SiSoftware Sandra XII SP1 Professional	Diskeeper Not Installed		Diskeeper Installed	
		Drive C:	Drive D:	Drive C:	Drive D:
	Time to Complete Test (Hours:Minutes)	0:22	0:16	0:16	0:14
	Total KHW	.04 KWH	.02 KWH	.02 KWH	.02 KWH

D. MAXON CINEBENCH 10

MAXON CINEBENCH 10	Diskeeper Not Installed		Diskeeper Installed	
	Drive C:	Drive D:	Drive C:	Drive D:
OPEN GL Test	119 Watts	122 Watts	118 Watts	121 Watts
Single CPU Test	108 Watts	108 Watts	107 Watts	107 Watts
Multi CPU Test	135 Watts	135 Watts	133 Watts	134 Watts

MAXON CINEBENCH 10	Diskeeper Not Installed		Diskeeper Installed	
	Drive C:	Drive D:	Drive C:	Drive D:
Time to Complete Test (Hours:Minutes)	0:9	0:10	0:8	0:8
Total KHW	.02 KWH	.02 KWH	.01 KWH	.01 KWH

E. Autodesk - 3ds Max 9 SP2

All Wattage and KWH's of energy results.

Autodesk - 3ds Max 9 SP2	Diskeeper Not Installed Drive D:	Diskeeper Installed Drive D:
CBALLS 2 Video Post Render	135 Watts	132 Watts
Radiosity Render Full 101 Frames	138 Watts	135 Watts

Autodesk - 3ds Max 9	Diskeeper Not Installed Drive D:	Diskeeper Installed Drive D:

SP2		
Time to Complete Test (Hours:Minutes)	0:24	0:22
Total KHW	.05	.04

F. SPECapc for SolidWorks 2007™

SPECapc for SolidWorks 2007™	*Diskeeper not Installed*	*Diskeeper Installed*
Complete Test – 5 Runs IAW SPEC Fair Play Rules	131 Watts	129 Watts

SPECapc for SolidWorks 2007™	*Diskeeper not Installed*	*Diskeeper Installed*
Time to Complete Test (Hours:Minutes)	0:19	0:17
Total KHW	.03 KWH	.03 KWH

Diskeeper 2008 Pro Premier Edition with InvisiTasking

Diskeeper 2008 Pro Premier Edition	**Intel Platform**	
	Peak Wattage within the Test	
	Drive C	***Drive D***
Manual Analysis	100 Watts	101 Watts
Manual Defragmentation	99 Watts	99 Watts
Average Wattage throughout Manual Defragmentation	96 Watts	96 Watts

Test System – Both Drives took 14 minutes to complete the full range of tests, throughout this period 0.02 KWH's had been consumed

Test System; the average wattage consumption at idle was **97 Watts**. With Diskeeper 2008 Pro Premier Edition with InvisiTasking, the systems idle speed remained stable at **92 Watts**. Both tests were completed over a 1 hour period to gauge the average system wattage before and after the installation of Diskeeper.

System Volume Back-Up

A simple back up using the Windows File Back-Up Tool was performed on the C: volume. This volume (boot Disc) contained a total of 13.7GB of Data and System files.

System Volume Back-Up	*Diskeeper not Installed*	*Diskeeper Installed*
Drive C Volume to Drive D System Back-up Volume (Week 1)	104 Watts	102 Watts

Drive C Volume to Drive D System Back-up Volume (Week 2)	105 Watts	93 Watts[2]

System Volume Back-Up (Week 2 results)	***Diskeeper not Installed***	***Diskeeper Installed***
Time to Complete Test (Hours:Minutes)	0:25.37	0:23.46
Total KHW	.05 KWH	.04 KWH

IV. Conclusions

The positive impact Diskeeper has throughout the various test demonstrates its full potential for energy savings in precious KWH's, however slight they may seem on an individual high-end PC.

A brief summary of the results from the tests show;

Test Application/Procedure	**Diskeeper not Installed**	**Diskeeper Installed**
SPECviewperf 10® Complete run_all		Used Less Energy and Faster Results
HD Tach Version 3.0.4.0 Average Read Test		Used Less Energy and Faster Results
HD Tach Version 3.0.4.0 Burst Speed Test		Used Less Energy and Faster Results
Cinebench 10		Used Less Energy and Faster Results
SiSoftware Sandra XII Processor System Test		Used Less Energy and Faster Results
SiSoftware Sandra XII Multimedia System Test		Used Less Energy and Faster Results
SiSoftware Sandra XII File System Test		Used Less Energy and Faster Results
SiSoftware Sandra XII Physical Disc Test		Used Less Energy and Faster Results
Autodesk 3ds Max 9 SP2 Scenes		Used Less Energy and Faster Results
SPECapc for SolidWorks 2007™		Used Less Energy and Faster Results
System Volume Back-Up (Initial Test)		Used Less Energy and Faster Results
System Volume Back-Up (12 Day work cycle completed)		Used Less Energy and Faster Results

[2] To further investigate the efficiency of Diskeepers I-FAAST technology, after a period of 12 days the Windows System Volume Back-Up was rerun. Over this additional period, the systems had additional files and had accumulated fragmentation. The C: volume now contained a total of 18.7GB of Data and System files (or approximately 5GB more data).

While all the tests showed positive savings, perhaps the best power-friendly results were with the Radiosity tests, which are designed to stress the whole system (Hard Disc, Memory and CPU) to perform to their maximum.

One of the biggest known issues today is that of system back-up. IT professionals know just how long and frustrating a task this can be, especially when backing up many systems simultaneously. The simple testing presented demonstrates the effectiveness of Diskeeper and I-FAAST technology at its best. the implementation of Diskeeper with I-FAAST technology saw both Back-Up times reduced and subsequent energy savings.

The total aggregate time for all tests, renders, and benchmarks covered within this paper was 9 Hours and 21 minutes and required 0.97 KWH's of power when Diskeeper was not installed. Compare this to a far faster total of 7 Hours and 40 minutes to complete, with only 0.85 KWH's of power consumed when Diskeeper was implemented. That accounts for saving of 1 hours 41 minutes of time.

It also accounts for 0.12 KWH's of energy savings in a given day, or about 12.4% per computer. While this may appear minimal on a granular scale, it amounts to considerable energy savings when extended over the course of a full year. Assuming average cost of US Commercial KWH at $0.1108[3], that is a savings of $3.22 per PC. Calculating these power savings to a medium sized company with 250 workstations we see an approximate annual savings of $804.41[4]. This also takes in to consideration that the PCs are powered off/down during non-production hours (overnight/lunch).

While the average PC in business use may not be exercised so heavily, it is almost certain to have a higher degree of fragmentation than in these tests. With high powered computers easily reaching fragmentation levels 10 times higher we believe the power savings calculations will be quite accurate to extend across corporate computers.

About 3D Professor:

3D Professor is the "One Stop Choice" for prosumers and enterprise analysts regarding the High-End PC industry, by offering the most unbiased opinions through empirical and scientific analysis. 3D Professor has extensive experience catering to the High-End and professional PC community. Product and technology reviews are known for providing (even first time buyers) clear and precise opinions and results.

Other 3D Professor Reviews/Benchmarks include Western Digital, Intel, AMD, nVidia, Super Micro, Corsair and others. View the entire catalogue of published reviews at: www.3dprofessor.org.

---

[3] US Energy Information Administration: http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_a.html

[4] .12 KWH savings / day * $.1108 per/KWH * 242 working days in a given year (also accounting for 9 US holidays & 10 employee vacation days) * 'X' number of PC's (250 is the example used here) = $804.41 (or $3.22 per computer).