

CATbench Update

Autumn 2004

Workstation Benchmark

New Graphics Cards from 3Dlabs and IBM's New Intellistation Z-Pro

By Phil Harrison

Editor's note: CATIA Community's sixth annual workstation benchmark, CATbench 2004, reported how workstations performed when tested with CATIA Version 5 Release 12. In this CATbench 2004 update column, reviewer Phil Harrison tests new graphics cards, a generic system, and one of IBM's updated Z-Pros.

In this Autumn Update column, we test an IBM Z-Pro system using Intel's new Xeon 3.4 GHz EM64T processors and 3Dlabs' new Wildcat Realizm 100 and 200 graphics cards in generic system manufacturer Colfax International's chassis.

To ensure that the results of this update are comparable with those from the main benchmark, all systems were loaded with CATIA Version 5 Release 12 SP4, and tests were performed in an identical manner. When it came to results analysis, we used the same test weightings as in the main benchmark effort and did not re-compute the average system scores.

CATIA Community's CATbench 2004 benchmark issues four ratings:

- CATbench2004S measures the performance of the CPU, Bus and I/O subsystems;

- CATbench2004G measures the graphics performance of each system;
- CATbench2004 is the combination of CATbench2004G and CATbench2004S, giving each equal weighting to both system and graphics performance; and
- CATbench2004DMU: The Digital Mock-Up (DMU) results are not included in the System performance measurement, but are used to create a separate measurement specific to DMU. We apply the same relative graphics/DMU weight factors as applied to our overall results to create our DMU performance measure.

With no financial restrictions, any vendor can put a system together that is fast. CATIA Community feels that price/performance also should be taken into account. For this reason, all systems will be compared on two variables, one rating systems on a pure performance basis and the other taking prices into consideration. Our rating system is as follows:

- ***** = Excellent
- **** = Good
- *** = Average
- ** = Below Average
- * = Poor

Table 1 gives prices and detailed system specifications for each of the systems submitted for this CATbench 2004 update. A summary of the results for the three workstation systems tested can be found in Table 2. These results also are displayed in Graphs 1, 2, 3 and 4 for overall (CATbench2004), graphics (CATbench2004G), system (CATbench2004S), and Digital Mock-Up (DMU) (CATbench2004DMU) performance respectively. We have left the original machine results in CATbench2004 graphs for comparison.

System Features And Results

3Dlabs has been asking us to review their newer graphics cards for some time. As we can only test complete systems, they provided two of their new graphics cards and a test chassis from Colfax International. We will discuss the Colfax system and 3Dlabs graphics cards separately.

3Dlabs Wildcat Realizm 100



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3Dlabs' new Realizm 100 graphics card is the entry-level card in their new Wildcat Realizm range. They describe the target market segment for the graphics card as "High end." This AGP 8x card comes with 256 MB of Graphics DDR3 memory and is dual monitor capable while supporting resolutions of up to 1920 x 1200 pixels at 100 Hz. The graphics card and driver is not certified in any system yet, but 3Dlabs tells us they are working with a major hardware vendor and expect the card

to be certified by Dassault Systèmes in the near future.

Given the card's list price of \$825 (you can expect to pay \$550 on the street), we were a little disappointed with the CATbench2004G score of 94.2 in a dual Xeon configuration. The card did well in edge mode, but poorly in shaded mode. Given that the Colfax chassis was equipped with dual Xeon CPUs, we would have expected significantly better graphics performance as we have seen from other graphics cards. Perhaps the Card and/or graphics driver does not allow the second CPU to cull while the first is shading as with other vendors cards?

Price/Performance 4 stars ****

Performance 3 stars ***

3Dlabs Wildcat Realizm 200



Copyright 3Dlabs, 2004.

3Dlabs also supplied us with a Wildcat Realizm 200 graphics card. We were pleased to see that it used the same driver as the Realizm 100 card, so the swap took less than 10 minutes. In comparison to the Realizm 100 graphics card, the 200 is the middle card in the product range and is described as "Ultra high-end." The 200 uses the same basic package as the Realizm 100, but has 512 MB of Graphics DDR3 memory. The additional memory raises the list price to \$1,199 while the card can be purchased for about \$850 on the street. Again, 3Dlabs expects to certify the Realizm 200 graphics card with a major hardware vendor at Dassault Systèmes.

Graphics performance improved slightly to give a CATbench2004G score of 91.4, with the most improvement being in shaded mode. This reflects a

pretty small improvement in performance given the added price.

Price/Performance 3 stars ***
Performance 3 stars ***

Colfax International CX775 Workstation



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Colfax International is a California-based provider of what is described in the industry as “beige boxes”; that is, they assemble systems using generic components and put their own brand on the system.

The CX775 system provided by 3Dlabs to test their graphics cards is a little dated and was configured with dual non-EM64T 3.06 GHz Xeon processors. The chassis of the Colfax provided plenty of room for expansion and allows for up to four hot swappable disk drives. The motherboard (Supermicro’s X5D8A) has space for six memory chips, for a theoretical limit of 12 GB of memory.

What do you risk by buying a system such as this from Colfax? Well the systems are not certified by Dassault Systèmes and they are certainly not optimized to run for CATIA. In reality as long as you use the same graphics card and driver as a certified configuration, you are unlikely to face any issues, while saving up to 20% on the system price. The system performed flawlessly in all of our tests.

We did notice that the system warranty was limited to 30 days, which compares poorly against most certified hardware systems’ warranty of three years.

The CX775 workstation line uses Intel Xeon processors; our test unit came with dual 3.06 GHz processors with 512 KB cache, 2 GB of relatively slow 266 MHz memory, and a 40 GB Serial ATA disk drive.

System performance was behind systems that we have recently tested with a CATbench2004S score of 122.6. We attribute this to the slower Xeon processors and memory. A look of the Colfax-International’s superb configuration tool on their website (<http://www.colfax-intl.com>) confirmed that they do have systems with Intel’s newer EM64T processors and faster memory. We estimate the price of this system at \$4051 with the Wildcat Realizm 100 graphics card, given this system has twin Xeon processors, that is relatively inexpensive.

Price/Performance 3 stars ***
Performance 3 stars ***

IBM Intellistation Z-Pro 6223-21U with NVIDIA Quadro FX1300 graphics



Copyright IBM, 2004.

IBM was unable to supply us with a machine for our Summer update, but provided us with a freshened machine for our Autumn update.

The Intellistation Z-Pro model 6223-21U was equipped with dual Xeon 3.4 GHz EM64T processors, an 80 GB disk drive, and NVIDIA’s mid

range FX-1300 graphics card. The Z-Pro comes in a large chassis, which it shares with IBM's server range; the cover was the easiest we have seen to remove and provided quick access to all components. IBM, please take a look at Colfax's configurator, even IBM's "build your own system" did not let me configure a Z-Pro system with 3.4 or 3.6 GHZ Xeon processors.

System performance was actually six points worse than that of the M-Pro with a single 3.4 GHZ Pentium 4 processor that we tested in the Spring, with a CATbench2004S score of 111.4; we would still only recommend a dual-Xeon system where the user runs more than one intensive application concurrently, or if the user does a lot of high-end graphics work. The graphics performance of the new NVIDIA Quadro FX1300 was superb, with a CATbench2004G score of 61.4 — some 5.2 points behind a dual 3.6 GHZ system with the same graphics card that we tested in the Summer update. At \$5,353, this system is very capable and we would highly recommend it for someone doing a lot of Stress Analysis or Digital Mockup work.

Price/Performance 3 stars ***
Performance 3 stars ***

Conclusion

System performance of all the systems we have tested recently has reached a plateau, suggesting that application performance needs something more than raw chip speed. Indeed, Intel has recently announced that it will not develop its EM64T architecture chips beyond 4.0 GHz and concentrate on dual core chip technology. This will lead Software vendors such as Dassault Systèmes to multi-thread their applications as much as possible.

While both of 3Dlabs' Wildcat Realizm graphics cards performed competently, their performance

somewhat lags behind that of competitor's products, while being significantly more expensive. The Colfax International system performed flawlessly, showing that for budget conscious operations, they may be an option with caveats. ■

Phil Harrison is principal of LionHeart Solutions, Inc., a consulting firm specializing in CATIA and ENOVIA implementation and usage located in Cold Spring Harbor, NY. Harrison is president of the CATIA Operators Exchange (COE). He also is the author of CATIA Community's CATbench CATIA Version 5 Hardware Benchmark. Harrison has 15 years' experience installing and using CATIA on Unix, mainframe, and Windows systems. He can be reached via e-mail at pph@lionheartsolutions.com.

(Continue to pages 5 – 13 for Tables and Graphs).

Table 1: System Specifications

Vendor	Dell	Dell	Dell	Dell	IBM
Model Number	Dell Precision 650	Dell Precision 650	Dell Precision M60	Dell Precision M60	IntelliStation M Pro 6230-36U
Phone Number	1-(800)-www-DELL	1-(800)-www-DELL	1-(800)-WWW-DELL	1-(800)-WWW-DELL	1-(888)-SHOP-IBM
Web site	www.dell.com	www.dell.com	www.dell.com	www.dell.com	www.ibm.com/po/us/intellistation
CPU Type	Intel Xeon	Intel Xeon	Intel Pentium M (Centrino)	Intel Pentium M 755	Intel Pentium 4
CPU Speed	3.20 GHz 512 KB L2, 1MB L3	3.20 GHz 512 KB L2, 1MB L3	1.7 GHz / 600 MHz	2.0 GHz/600 MHz 2MB L2 Cache	3.40 GHz 512 KB L2
I/O Bus	533 MHz FSB	533 MHz FSB	400 MHz FSB	400 MHz FSB	800 MHz front side bus
# of CPU's (Max. #)	1 (2)	2 (2)	1 (1)	1 (1)	1 (1)
Chip Set	Intel E7505	Intel E7505	Intel 855 PM	Intel 855 PM	Intel 875P
Graphics Card	Nvidia Quadro FX 1000	Nvidia Quadro FX 1000	Nvidia FX Go 700	Nvidia FX Go 1000	NVIDIA Quadro FX1100
Graphics driver	BIOS 4.30.20.16.05 Driver 6.14.10.4521	BIOS 4.30.20.16.05 Driver 6.14.10.4521	BIOS 4.31.20.52 C2 Driver 6.14.10.4424	BIOS 4.36.20.30 C1 Driver 6.14.10.5382	BIOS 4.36.20.22.15, Driver 6.14.10.5656
Chips set	nVIDIA	nVIDIA	nVIDIA	nVIDIA	Nvidia
Bus type	AGP 8x	AGP 8x	AGP 4x	AGP 4x	PCI 8x
Video RAM	128 MB	128 MB	128 MB	128 MB	128 MB DDR-SDRAM
Graphics Output	2 x DVI	2 x DVI	VGA	VGA	2 x DVI
Resolution for test	1280x1024 75 Hz	1280x1024 75 Hz	1920x1200 60 Hz	1920x1200 60 Hz	1280x1024 75 Hz
Number of colors for test	32 bit	32 bit	32 bit	32 bit	32-bit
Monitor size	17" Flat Panel (1702FP)	17" Flat Panel (1702FP)	15.4" WUXGA Wide aspect screen	15.4" WUXGA Wide aspect screen	17" Flat Panel (1702FP)
Memory (maximum)	1 GB (4 GB)	1 GB (4 GB)	1 GB (2 GB)	1 GB (2 GB)	1 Gb (4Gb)
Slots Used (total)	4 (4)	4 (4)	2 (2)	2 (2)	2 (4)
Memory type	PC2100U 266 MHz ECC DDR SDRAM	PC2100U 266 MHz ECC DDR SDRAM	333 MHz DDR SDRAM	PC2700S 333 MHz DDR SDRAM	PC 2700 333MHz ECC CL2.5 DDR-SDRAM
Virtual memory	2046 MB	2046 MB	1536 MB	1536 MB	4600 MB
Disk size/type	PERC Array SCSI 3 x 36 GB Seagate Cheetah ST336753LW 15k RPM	PERC Array SCSI 3 x 36 GB Seagate Cheetah ST336753LW 15k RPM	60 GB UATA 7200 rpm HTS726060M9AT0 0	60 GB UATA 7200 rpm HTS726060M9AT0 0	Maxtor 6Y080M0 74 GB SATA
Bus type	RAID 0 SCSI	RAID 0 SCSI	Serial ATA	Serial ATA	SATA
Controller	PERC 320/DC Integrated Intel 82801 DB UATA	PERC 320/DC Integrated Intel 82801 DB UATA	Integrated Intel 82801DBM UATA	Integrated Intel 82801DBM UATA	Adaptec 7901 + Intel 82801EB
File system type	NTFS	NTFS	NTFS	NTFS	NTFS
Free Storage Bays	1 x 3.5" using optional bracket, 1 x 5.25"	1 x 3.5" using optional bracket, 1 x 5.25"	0	0	1 x3.5", 1x5.25" 2 x Hdisk
Network card ethernet	Intel Pro/1000 MTW Integrated	Intel Pro/1000 MTW Integrated	Intel Pro/Wireless lan 2100 mini PCI	Intel Pro/Wireless lan 1350 mini PCI	Intel Pro/1000 CT Integrated
Ports Serial + Parallel + 1394	2+1+2	2+1+2	1+1+1	1+1+1	2 + 1 +2
USB	2 on Front, 4 on rear	2 on Front, 4 on rear	2 on rear, 2 on side	2 on rear, 2 on side	2 on front , 4 on rear
Sound Inputs/Outputs	Headphone socket on front, Mic, sound in/out on rear	Headphone socket on front, Mic, sound in/out on rear	Headphone socket sound out on side	Headphone socket sound out on side	Sound in, sound out + microphone Front & Rear

PCI Slots Available	3	3	1	1	5
Unique Features	Tower Case Quiet Operation	Tower Case Quiet Operation	Infrared Port Integrated Wireless Networking	Infrared Port Integrated Wireless Networking	Frnt LEDs for Hard Disk, Power & Network activity
As configured	CD-R/RW	CD-R/RW	CD/RW DVD	CD/RW DVD	CD/RW inc DVD
Dimensions Height x Width x Depth(mm)	500x500x220	500x500x220	38.1 x 358 x 273	38.1 x 358 x 273	470 x 165 x 480
Software packaged with the machine	Dell Bundle incl. Internet Explorer	Dell Bundle incl. Internet Explorer	Dell Bundle incl. Internet Explorer	Dell Bundle incl. Internet Explorer	Lotus SmartSuite; Lotus Notes Client, MS IE, Adobe Acrobat Reader.
Technical support	24-7/365 Dedicated Phone Support	24-7/365 Dedicated Phone Support	24-7/365 Dedicated Phone Support	24-7/365 Dedicated Phone Support	(800) 772 2227 Standard: 24x7, Worldwide
Warranty	3Yr Parts + Onsite Labor (Next Business Day)	3Yr Parts + Onsite Labor (Next Business Day)	3Yr Parts + Onsite Labor (Next Business Day)	3Yr Parts + Onsite Labor (Next Business Day)	3 Yr Parts and Labor Onsite Repair
OS/software	Windows XP Pro Version 2002 SP1	Windows XP Pro Version 2002 SP1	Windows XP Pro SP1	Windows XP Pro Version 2002 SP1	Windows XP Pro Version 2002 SP1
Dassault Certification	Complete	Complete	Complete	Complete	Complete
Street price w/19" monitor as of 6/16	\$5,699	\$7,198	\$3,345	\$3,893	\$2,362

(Tables and graphs continued on following pages).

Table 1: System Specifications (continued)

Vendor	Dell	Hewlett Packard	Hewlett Packard	IBM
Model Number	Dell Precision 470	HP Workstation xw4200	HP Workstation xw6200	T42p Mobile workstation
Phone Number	1-(800)-www-DELL	1-(800)-652-6672	1-(800)-652-6672	1-(888)-SHOP-IBM
Web site	www.dell.com	www.hp.com	www.hp.com	www.ibm.com/pc/us/intellistation
CPU Type	Intel Xeon	Intel Pentium 4	Intel Xeon	Intel Pentium M Processor 745
CPU Speed	3.6 GHz 1 MB L2	3.6 GHz 1 MB L2	3.6 GHz 1 MB L2	1.8 GHz / 800 MHz
I/O Bus	800 MHz FSB	800 MHz FSB	800 MHz FSB	400 MHz front side bus
# of CPU's (Max. #)	2 (2)	1 (1)	2 (2)	1 (1)
Chip Set		Intel 925X Express	Intel E7525	
Graphics Card	NVIDIA Quadro FX1300	NVIDIA Quadro FX1300	NVIDIA Quadro FX3400	ATI Mobility FireGL T2
Graphics driver	BIOS 4.35.2045.14 Driver 6.14.10.6127	BIOS 4.35.2045.14 Driver 6.14.10.6171	BIOS 5.40.02.10.18 Driver 6.14.10.6171	BIOS BK-ATI Ver 8.0110004.010, Driver 6.14.10.6451
Chips set	NVIDIA	NVIDIA	NVIDIA	
Bus type	PCI Express x16	PCI Express x16	PCI Express x16	AGP 4x
Video RAM	128 MB	128 MB	256 MB	128 MB DDR-SDRAM
Graphics Output	2 x DVI	2 x DVI	2 x DVI	
Resolution for test	1280x1024 60 Hz	1280x1024 60 Hz	1280x1024 60 Hz	1280x1024 60 Hz
Number of colors for test	32 bit	32 bit	32 bit	32-bit
Monitor size	17" Flat Panel (1702FP)	Dell 1701 FP (17"LCD Panel)	Dell 1701 FP (17"LCD Panel)	15" 1600x1200
Memory (maximum)	2 GB (6 GB)	1 GB (4 GB)	1 GB (4 GB)	1 Gb (2Gb)
Slots Used (total)	6 (6)	2 (4)	2 (4)	2 (2)
Memory type	PC3200 Dual channel 400 MHz ECC DDR2 SDRAM	Dual channel 533 MHz ECC DDR2 SDRAM	PC3200 Dual channel 400 MHz ECC DDR2 SDRAM	333 MHz PC2700 SDRAM
Virtual memory	2046 MB	1536 MB	1536 MB	3 GB
Disk size/type	Western Digital WD740GD-50FLA0 74 GB 10k SATA	Western Digital WD740GD- 50FLA1 74 GB 10k SATA	RAID 0 Western Digital WD740GD-50FLA1 2x 74 GB 10k SATA	HTS 72606M9AT00 60 GB 7200 RPM
Bus type	IntegratedSerial ATA	IntegratedSerial ATA	Integrated Serial ATA inc. RAID	ATA 100
Controller	Integrated Intel 82801EB Ultra ATA	Integrated Intel 82801FB Ultra ATA	Integrated Intel 82801EB Ultra ATA	Adaptec 7901 + Intel 82801EB
File system type	NTFS	NTFS	NTFS	NTFS
Free Storage Bays	1 x 3.5"	2x5.25", 1 x 3.5"	1x5.25"	
Network card ethernet	Intel Pro/1000 MTW Integrated	Broadcom NetXtreme Gigabit Ethernet	Broadcom NetXtreme Gigabit Ethernet	Intel Pro/1000 + 802.11 a/b/g Wireless LAN Integrated
Ports Serial + Parallel + 1394	2+1+0	1+1+1	1+1+1	1+1+0

USB	2 on Front, 6 on rear	2 on Front, 6 on rear	2 on Front, 6 on rear	2
Sound Inputs/Outputs	Headphone socket on front, Mic, sound in/out on rear	Front & Rear	Front & Rear	Sound in, sound out + microphone
PCI Slots Available	3	2 PCIx 1x, 4 PCI legacy	1 PCIx 1x, 4 PCI legacy	0
Unique Features	Intel Extended Memory 64 Technology PCI Express Graphics (x16) + IO 4 Channel SATA controller Smartcard Reader	Intel Extended Memory 64 Technology PCI Express Graphics (x16) + IO 4 Channel SATA controller	Intel Extended Memory 64 Technology PCI Express Graphics (x16) + IO RAID Integrated	Light Weight 7.0 Lbs inc Power supply
As configured	NEC CD/RW + DVD Samsung CD-ROM	Lite-on Combo SOHC-4832K CD/RW inc DVD	HL-DT-STDVD-ROM GDR8162B CD/R inc DVD	CD/RW inc DVD
Dimensions Height x Width x Depth(mm)	455x448x168	450 x 168 x 456	441x 165 x 450	329 x 268 x 36
Software packaged with the machine		HP Hyperthreading Toolbox Intel Application Accelerator	HP Hyperthreading Toolbox Intel Application Accelerator	MS IE
Technical support	24-7/365 Dedicated Phone Support	24x7 Standard	24x7 Standard	(800) IBM-SERV
Warranty	3Yr Parts + Onsite Labor (Next Business Day)	3Yr Parts + Onsite Labor	3Yr Parts + Onsite Labor	3 Yr Parts and Labor Onsite Repair
OS/software	Windows XP Pro SPK1	Windows XP Pro SPK1	Windows XP Pro SPK1	Windows XP Pro Version 2002 SP1
Dassault Certification	In Process	In Process	In Process	Complete
Street price w/19" monitor as of 6/16	\$4,386	\$3,362	\$6,961	\$3,849

(Tables and graphs continued on following pages).

Table 1: System Specifications (continued)

Vendor	Colfax		Colfax	IBM
Model Number	Workstation CX775 3Dlabs Wildcat Realizm 100		Workstation CX775 3Dlabs Wildcat Realizm 200	IntelliStation Z Pro 6223-21U
Phone Number	(408) 730 2275		(408) 730 2275	1-(888)-SHOP-IBM
Web site	http://colfaxinternational.com		http://colfaxinternational.com	www.ibm.com/pc/us/intellistation
CPU Type	Intel Xeon		Intel Xeon	Intel Xeon EM64T
CPU Speed	3.06 GHz 512 KB L2		3.06 GHz 512 KB L2	3.40 GHz
I/O Bus	800 MHz FSB		800 MHz FSB	800 MHz front side bus
# of CPU's (Max. #)	2(2)		2(2)	2(2)
Chip Set	Intel E7525		Intel E7525	Intel E7525
Graphics Card	3Dlabs Wildcat Realizm 100		3Dlabs Wildcat Realizm 200	NVIDIA Quadro FX1300
Graphics driver	Bios 3.15 Driver 4.03-0184		Bios 3.15 Driver 4.03-0184	BIOS 4.35.20.45.14 Driver 6.14.10.6176
Chips set	3Dlabs		3Dlabs	NVIDIA
Bus type	PCI Express 16x		PCI Express 16x	PCI Express 16x
Video RAM	256 MB DDR3-SDRAM		512MB DDR3-SDRAM	128 MB DDR-SDRAM
Graphics Output	2 x DVI		2 x DVI	2 x DVI
Resolution for test	1280x1024 75 Hz		1280x1024 75 Hz	1280x1024 75 Hz
Number of colors for test	32-bit		32-bit	32-bit
Monitor size	17" Flat Panel (1702FP)		17" Flat Panel (1702FP)	17" Flat Panel (1702FP)
Memory (maximum)	2 (12 Gb)		2 (12 Gb)	1 Gb (8Gb)
Slots Used (total)	2(6)		2(6)	2 (6)
Memory type	PC2100U 266 MHz ECC DDR SDRAM		PC2100U 266 MHz ECC DDR SDRAM	PC 3200 400MHz ECC DDR2-SDRAM
Virtual memory	2.35 GB		2.35 GB	1534 MB
Disk size/type	Western Digital WD400JB-00FSA0 40 GB SATA		Western Digital WD400JB-00FSA0 40 GB SATA	Maxtor 6Y080M0 80 GB SATA
Bus type	SATA		SATA	Serial ATA
Controller	Integrated Intel 82801DB Ultra ATA		Integrated Intel 82801DB Ultra ATA	Adaptec 7902B U320 SCSI + Intel 82801EB
File system type	NTFS		NTFS	NTFS
Free Storage Bays	1 x 5.25", 3 x Hdisk		1 x 5.25", 3 x Hdisk	1 x3.5", 1x5.25" 2 x Hdisk
Network card ethernet	Intel Pro/1000 MTW Integrated		Intel Pro/1000 MTW Integrated	Broadcom NetXtreme 5721 Gigabit Integrated
Ports Serial + Parallel + 1394	2 + 1 + 0		2 + 1 + 0	2 + 1 +2
USB	4 on rear		4 on rear	2 on front , 4 on rear
Sound Inputs/Outputs	Sound in, sound out + mic Rear		Sound in, sound out + mic Rear	Sound in, sound out Front & Rear
PCI Slots Available	3 PCI-X, 2 PCI		3 PCI-X, 2 PCI	2 PCI-X, 3 PCI

Unique Features	Chassis allows up to 4 Hot Swappable disk drives	Chassis allows up to 4 Hot Swappable disk drives	Huge Chassis with plenty of expansion room. Easiest chassis to open we've seen.
As configured	Teac DV-516D CD-ROM + DVD	Teac DV-516D CD-ROM + DVD	CD/RW
Dimensions Height x Width x Depth(mm)	438 x 200 x 562	438 x 200 x 562	445 x 216 x 500
Software packaged with the machine	none	none	Lotus SmartSuite; Lotus Notes Client.
Technical support			(800) 772 2227 Standard: 24x7, Worldwide
Warranty	30 days	30 days	3 Yr Parts and Labor Onsite Repair
OS/software	Windows XP Pro Version 2002 SP2	Windows XP Pro Version 2002 SP2	Windows XP Pro Version 2002 SP1
Dassault Certification	No	No	Complete
Street price w/19" monitor as of 6/16	\$3,701	\$4,001	\$5,353

Table 2

	<i>Colfax w/ 3Dlabs Wildcat Realizm 100</i>	<i>Colfax w/ 3Dlabs Wildcat Realizm 200</i>	<i>IBM Zpro 6223-21U 2x3.4 GHz FX-1300</i>
Graphics			
Shaded+Edge	95.3	94.6	59.0
Shaded	108.7	101.9	71.7
Edges	78.4	77.6	53.6
CATbench2004G	94.2	91.4	61.4
System			
Piston	127.9	127.9	120.8
Crankshaft	124.8	124.8	112.2
Engine Block	129.9	129.9	113.1
Engine Assembly	123.9	123.9	104.7
Migration	127.5	127.5	122.2
Analysis	105.6	105.6	98.8
CATbench2004S	122.6	122.6	111.4
CATbench2004	108.4	107.0	86.4
DMU	133.04	133.00	100.2
CATbench2004DMU	113.6	112.2	80.8
Cost	\$3,701	\$4,001	\$5,353

Table 3

	<i>Dell 650 1x3.2 GHz Xeon FX1000</i>	<i>Dell 650 2x3.2 GHz Xeon FX1000</i>	<i>IBM Mpro 3.4 GHz FX- 1100</i>	<i>Dell M60 Mobile Workstation 1.7GHz FX Go 700</i>	<i>Dell M60 Mobile Workstation 2.0 GHz FX Go 1000</i>
Graphics					
Shaded+Edge	103.2	76.2	86.8	158.0	110.0
Shaded	110.3	80.3	82.9	142.8	106.8
Edges	95.7	62.8	87.1	162.5	117.2
CATbench2004G	103.1	73.1	85.6	154.4	111.3
System					
Piston	90.1	80.7	104.4	154.7	105.5
Crankshaft	94.0	92.1	111.0	147.1	95.0
Engine Block	107.3	107.1	109.5	120.3	83.1
Engine Assembly	85.7	85.9	104.9	224.1	109.5
Migration	111.9	111.8	107.8	136.5	80.3
Analysis	102.6	101.6	94.7	137.5	102.7
CATbench2004S	98.8	96.7	105.0	152.7	96.3
CATbench2004	100.9	84.9	95.3	153.6	103.8
DMU	104.8	106.6	98.7	159.3	96.5
CATbench2004DMU	103.9	89.9	92.1	156.9	103.9
Cost	\$5,699	\$7,198	\$2,362	\$3,345	\$3,893

	<i>Dell 470 2x3.6 GHz Xeon FX1300</i>	<i>HP XW4200 NVIDIA FX1300</i>	<i>HP xw6200 NVIDIA FX3400</i>	<i>IBM T42p</i>
Graphics				
Shaded+Edge	57.0	73.8	68.5	152.3
Shaded	58.2	82.1	74.8	207.1
Edges	53.5	70.0	62.3	131.0
CATbench2004G	56.2	75.3	68.5	163.4
System				
Piston	90.0	95.5	96.4	119.1
Crankshaft	95.2	95.7	100.9	102.4
Engine Block	104.9	103.7	106.9	91.9
Engine Assembly	89.9	97.4	135.7	121.7
Migration	109.6	118.8	113.9	102.8
Analysis	94.4	93.1	94.1	116.3
CATbench2004S	97.2	100.4	107.4	109.3
CATbench2004	76.7	87.8	88.0	136.4
DMU	94.7	98.1	133.6	107.3
CATbench2004DMU	75.5	86.7	101.1	135.4
Cost	\$4,386	\$3,362	\$6,961	\$3,849



