

# **CATbench**

# **Update**

## **Summer 2004**

**Workstation  
Benchmark**

# Intel's New Extended Memory 64 Technology Processors to Fight AMD, and Our First Mobile Contender

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 Summer 2004 update column, reviewer Phil Harrison tests CATIA V5 on four newly released systems for Dell, HP, and IBM.

Intel has made some missteps in the last year, allowing AMD's Opteron processor to make inroads into high-end machines. In brief, AMD's Opteron provided a stepping stone between 32 bit processor technology and 64 bit systems (Intel Itanium.) Intel has now launched its own Extended Memory 64 Technology (EM64T) processors, which allow applications to address up to 256 TB of real memory. Other advantages include the PCI express (x16) graphics bus and PCI express I/O.

In this summer update column, we test three systems using Intel's new 3.6 GHz EM64T processors in Xeon and Pentium variants, nVIDIA's new FX-1300 and FX-3400 graphics cards rushed to us by workstation vendors Dell and HP, as well as IBM's lightweight T42p mobile workstation.

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:

- CATbench 2004S measures the performance of the CPU, Bus and I/O subsystems,
- CATbench 2004G measures the graphics performance of each system,
- CATbench 2004 is the combination of CATbench 2004G and CATbench 2004S, giving each equal weighting to both system and graphics performance.
- CATbench 2004DMU: 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.

While 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 (See Appendix A) gives prices and detailed system specifications for each of the systems submitted for this CATBench 2004 update. A summary of the results for the four workstation systems tested can be found in Table 2 (See Appendix B). These results also are displayed in Graphs 1, 2, 3, and 4, for overall (CATBench 2004), graphics (CATBench 2004G) system (CATBench 2004S) and Digital Mock-Up (CATBench 2004DMU) performance respectively (See Appendix B, D, and E).

This CATBench 2004 update (CATBench 2004M) differs significantly from CATBench 2004; there are a number of differences:

- We use the Dell M60 with nVIDIA FX Go 1000 as the datum with a score of 100 in all tests;
- 10% of the total weighting is given to system weight;
- 10% of the total weighting is given to battery life; and
- Graphics are tested using the system's native resolution.

Table 3 (See Appendix C) shows the results of the two mobile machines we have tested to date.

## System Features And Results



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### Dell Precision 470

Dell's 400 series machines are small chassis versions of the 600 series machines, still using Xeon processors and allowing storage to be upgraded. The systems can be used horizontally on the desktop, or vertically as desk-side systems. The particular machine submitted by Dell was equipped with two 3.6 GHz Xeon processors, an inexpensive 74 GB hard disk and SATA controller, and the new nVIDIA FX-1300 graphics card.

System performance was excellent with a CATBench 2004S score of 97.2 — not substantially improved over previous pure 32 bit processor systems. Performance was particularly good in our piston and engine assembly scenarios. The graphics performance of the nVIDIA card was stunning and received a CATBench2004G score of 49.2, twice as good as that of the average of our systems in the main benchmark. We attribute this to the new PCI Express bus and the second processor, which speeds graphics by culling.

This outstanding system achieved a CATBench 2004 score of 73.2 and a CATBench 2004DMU score of 72.0, the best scores we have seen. At \$4,386, the Dell Precision 470 workstation offers world-class performance in all areas of CATIA with no bottlenecks. The Dell 470 with dual 3.6 GHz Xeon processors gains a 5-star performance rating.

Price/Performance 4 stars \*\*\*\*\*  
 Performance 5 stars \*\*\*\*\*



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## HP Workstation xw4200 with nVIDIA Quadro FX1300 graphics

The HP xw4100 has been a firm price/performance favorite of ours for quite some time. HP has freshened the range with Intel's new processors and nVidia's new Quadro FX1300 graphics card (which will replace the FX1100 and FX1000.)

The xw4200 workstation line uses Intel Pentium 4 processors; our test unit came with a 3.6 GHz processor, 1 GB of 533 MHz DDR memory and a 74 GB Serial ATA disk drive. Serial ATA drives have become the standard hard drives in end-user workstations due to their low cost and near SCSI performance. The system board uses Intel's 925X Express chipset with 800 MHz FSB and a PCI Express x16 graphics bus for the graphics card. The xw4200 comes with an integrated 4 channel SATA controller offering RAID 0 and RAID 1 capability.

System performance was good, with a CATBench 2004S score of 100.4. The graphics performance of the new nVidia Quadro FX1300 was extremely good, with a CATBench 2004G score of 72.7. Overall the HP system scores 86.5 for CATBench 2004 and 85.4 for CATBench 2004DMU. At \$3,362 this system offers outstanding value and is suitable for use in design, analysis and digital mockup domains. The xw4200 continues where the xw4100 left off.

Price/Performance 4 stars \*\*\*\*  
Performance 4 stars \*\*\*\*



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## HP Workstation xw6200 with nVIDIA Quadro FX3400 graphics

The HP xw6200 is HP's mid-range workstation line, utilizing Intel's Xeon processors in a chassis similar to that of the xw4200 range. This particular workstation was equipped with dual Xeon 3.6 GHz EM64T processors, a RAID 0 configuration using two 74 GB disk drives and nVidia's high end FX-3400 graphics card. The xw6200 comes with an integrated four-channel SATA/150 controller offering RAID 0 and RAID 1 capability.

System performance was actually 7 points below that of the xw4200 system, with a CATBench 2004S score of 107.4 with particularly poor performance in our engine assembly scenario. The graphics performance of the new nVidia Quadro FX-3400 was extremely good, with a CATBench 2004G score of 66.2, some 6.5 points better than the xw4200 system, but 16 points behind the FX-1300 in the Dell 470 with dual processors and FX-1300 graphics card, an anomaly we are unable to explain. Whatever Dell did to optimize the 470's graphics performance works better than the upgrade to nVidia's high-end graphics card. Overall the HP system scores 86.8 for CATBench 2004 and 99.9 for CATBench 2004DMU. At \$6,961 this system is relatively expensive, while inferior in performance to the xw4200.

Price/Performance 2 stars \*\*  
Performance 4 stars \*\*\*\*



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## IBM T42p Laptop

Unwrapping IBM's new laptop from the box I was immediately struck on how light the system was. Reading the literature, we find the T42p uses a magnesium chassis to reduce the weight of the system. The T42p comes with a 15.1 in. display with 1600 x 1200 resolution. When compared with office systems, while light in weight, the system is not light on performance, scoring 109.3 on our system tests. Graphics performance of the ATI graphics card is a little disappointing with a score of 157.6, equivalent to the older nVIDIA FX Go 700 card rather than the current FX Go 1000 card.

As the second mobile system we have received for CATBench 2004, we were able to do a direct comparison with the Dell M60. As you can see in Table 3, the IBM system was some 28.6 % slower than the Dell in graphics performance and 14% in systems performance. However the IBM T42p is nearly 20% lighter and has 30% better battery life, so we'd heartily recommend it for truly mobile users.

Price/Performance 3 stars \*\*\*

Performance 3 stars \*\*\*

## Conclusion

The release of Intel's new EM64T processors is a good architectural move, bridging 32 bit and 64 bit systems; however, as we have seen there are few

advantages to be gained by the end user in application system performance. In fact it would be fair to say that system performance has plateaued.

However in graphics performance we have seen a dramatic improvement with nVIDIA's FX-1300/3400 cards over previous cards. This is no doubt due to no small extent to the PCI Express graphics bus.

Both Dell and HP workstations showed significant gains in system and graphics performance compared to similar models submitted just 4 months ago.

The IBM T42p demonstrated near desktop performance in an extremely compact and light (7 Lb) package. ■

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](mailto:pph@lionheartsolutions.com).

## Appendix A

**Table 1: System Specifications**

| 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                          | <a href="http://www.dell.com">www.dell.com</a>      | <a href="http://www.hp.com">www.hp.com</a>             | <a href="http://www.hp.com">www.hp.com</a>                       | <a href="http://www.ibm.com/pc/us/intellistation">www.ibm.com/pc/us/intellistation</a> |
| 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                     | Quadro FX1300                                       | Quadro FX1300  | Quadro FX3400  | ATI Mobility FireGL T2   |
| Graphics driver                   | BIOS 4.35.2045.14<br>Driver 6.14.10.6127            | BIOS 4.35.2045.14<br>Driver 6.14.10.6171               | BIOS 5.40.02.10.18<br>Driver 6.14.10.6171                        | BIOS BK-ATI Ver 8.0110004.010, Driver 6.14.10.6451                                     |
| Chips set                         |   |  |  |  |
| 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<br>400 MHz ECC DDR2<br>SDRAM    | Dual channel<br>533 MHz ECC<br>DDR2 SDRAM              | PC3200 Dual channel<br>400 MHz ECC DDR2<br>SDRAM                 | 333 MHz PC2700 SDRAM   |
| Virtual memory                    | 2046 MB   | 1536 MB  | 1536 MB  | 3 GB   |
| Disk size/type                    | Western Digital<br>WD740GD-50FLA0<br>74 GB 10k SATA | Western Digital<br>WD740GD-50FLA1<br>74 GB 10k<br>SATA | RAID 0<br>Western Digital<br>WD740GD-50FLA1<br>2x 74 GB 10k SATA | HTS 7260M9AT00<br>60 GB 7200 RPM   |
| Bus type                          | IntegratedSerial ATA                                | IntegratedSerial ATA                                   | Integrated Serial ATA inc.<br>RAID                               | ATA 100  |
| Controller                        | Integrated Intel<br>82801EB Ultra ATA               | Integrated Intel<br>82801FB Ultra<br>ATA               | Integrated Intel 82801EB<br>Ultra ATA                            | Adaptec 7901 + Intel 82801EB   |
| File system type                  | NTFS  | NTFS   | NTFS   | NTFS   |
| Free Storage Bays                 | 1 x 3.5"  | 2x5.25", 1 x<br>3.5"                                   | 1x5.25"  |  |
| Network card ethernet             | Intel Pro/1000 MTW<br>Integrated                    | Broadcom<br>NetXtreme<br>Gigabit<br>Ethernet           | Broadcom NetXtreme<br>Gigabit Ethernet                           | Intel Pro/1000 + 802.11 a/b/g Wireless<br>LAN Integrated                               |
| Ports<br>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                                      |
| <b>Unique Features</b>                          | Intel Extended Memory 64 Technology<br>PCI Express Graphics (x16) + IO<br>4 Channel SATA controller<br>Smartcard Reader | Intel Extended Memory 64 Technology<br>PCI Express Graphics (x16) + IO<br>4 Channel SATA controller | Intel Extended Memory 64 Technology<br>PCI Express Graphics (x16) + IO<br>RAID Integrated | Light Weight 7.0 Lbs inc Power supply  |
| <b>As configured</b>                            | NEC CD/RW + DVD<br>Samsung CD-ROM   | Lite-on Combo<br>SOHC-4832K<br>CD/RW inc DVD  | HL-DT-STDVD-ROM<br>GDR8162B CD/R inc DVD  | CD/RW inc DVD                          |
| <b>Dimensions</b><br>Height x Width x Depth(mm) | 455x448x168   | 450 x 168 x 456   | 441x 165 x 450  | 329 x 268 x 36                         |
| <b>Software packaged with the machine</b>       |   | HP Hyperthreading Toolbox<br>Intel Application Accelerator  | HP Hyperthreading Toolbox<br>Intel Application Accelerator                                | MS IE                                  |
| <b>Technical support</b>                        | 24-7/365 Dedicated Phone Support  | 24x7 Standard   | 24x7 Standard   | (800) IBM-SERV                         |
| <b>Warranty</b>                                 | 3Yr Parts + Onsite Labor (Next Business Day)  | 3Yr Parts + Onsite Labor  | 3Yr Parts + Onsite Labor  | 3 Yr Parts and Labor Onsite Repair     |
| <b>OS/software</b>                              | <b>Windows XP Pro SPK1</b>  | <b>Windows XP Pro SPK1</b>  | <b>Windows XP Pro SPK1</b>  | <b>Windows XP Pro Version 2002 SP1</b> |
| <b>Dassault Certification</b>                   | <b>In Process</b>   | <b>In Process</b>   | <b>In Process</b>   | <b>Complete</b>                        |
| <b>Street price w/19" monitor as of 6/16</b>    | <b>\$4,386</b>  | <b>\$3,362</b>  | <b>\$6,961</b>  | <b>\$3,849</b>                         |

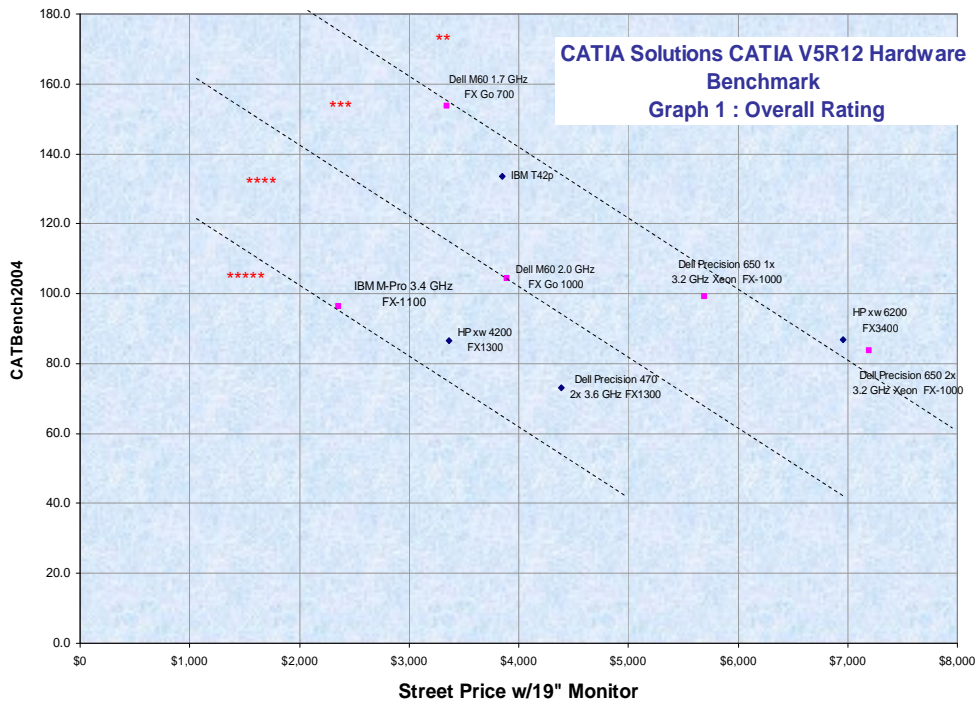
(CATbench Update Summer 2004 continues on following pages)



# Appendix B

Table 2 - Results Summary

|                        | Dell<br>470<br>2x3.6<br>GHz<br>Xeon<br>FX1300 | HP XW4200<br>FX1300 | HP xw6200<br>FX3400 | IBM T42p       |
|------------------------|---|---------------------|---------------------|----------------|
| <b>Graphics</b>        |   |                     |                     |                |
| Shaded+Edge            | 52.7  | 72.2                | 67.1                | 149.1          |
| Shaded                 | 47.8  | 78.0                | 71.0                | 196.8          |
| Edges                  | 47.2  | 67.9                | 60.4                | 127.0          |
| <b>CATBench2004G</b>   | <b>49.2</b>                                   | <b>72.7</b>         | <b>66.2</b>         | <b>157.6</b>   |
| <b>System</b>          |   |                     |                     |                |
| 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          |
| <b>CATBench2004S</b>   | <b>97.2</b>                                   | <b>100.4</b>        | <b>107.4</b>        | <b>109.3</b>   |
| <b>CATBench2004</b>    | <b>73.2</b>                                   | <b>86.5</b>         | <b>86.8</b>         | <b>133.5</b>   |
| <b>DMU</b>             | <b>94.7</b>                                   | <b>98.1</b>         | <b>133.6</b>        | <b>107.3</b>   |
| <b>CATBench2004DMU</b> | <b>72.0</b>                                   | <b>85.4</b>         | <b>99.9</b>         | <b>132.4</b>   |
| <b>Cost</b>            | <b>\$4,386</b>                                | <b>\$3,362</b>      | <b>\$6,961</b>      | <b>\$3,849</b> |



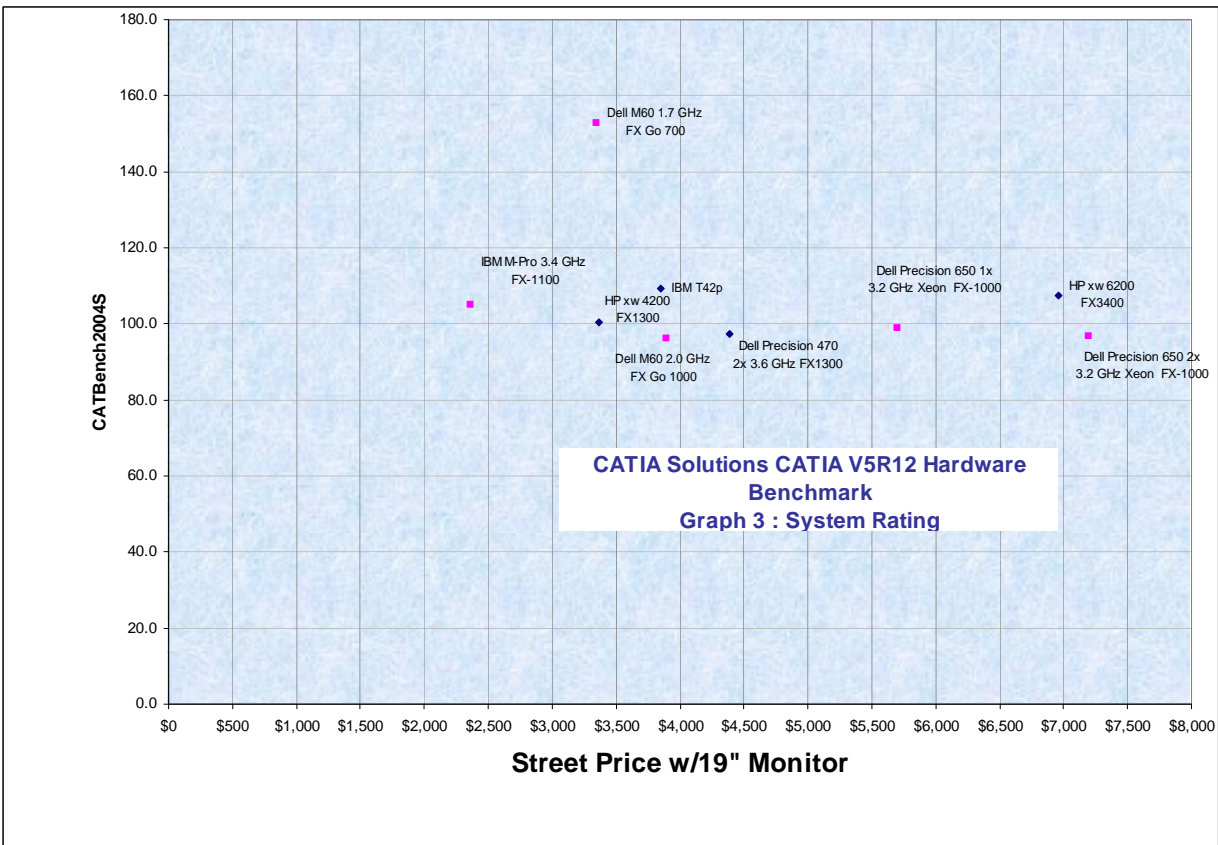
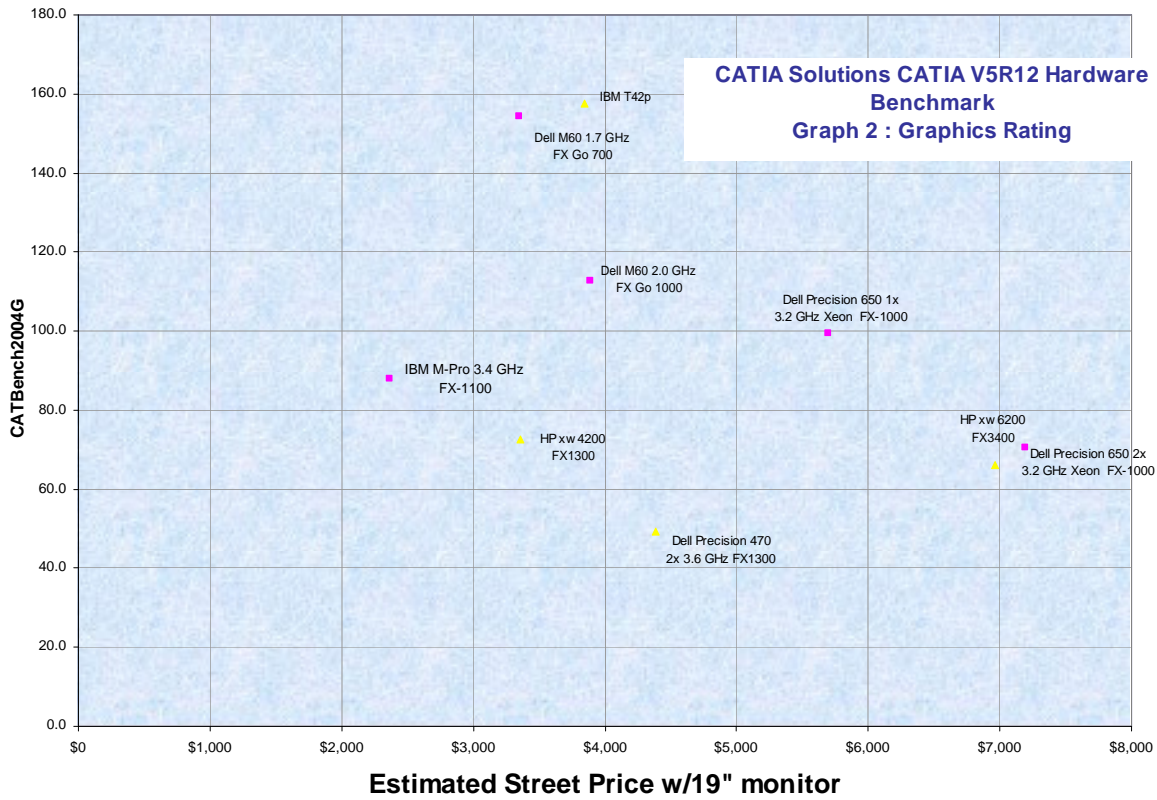


## Appendix C

| Dell M60 Mobile<br>Workstation 2.0 GHz<br>FX Go 1000 |                |  | IBM T42p       |
|--|----------------|--|----------------|
| <b>Graphics</b>                                      |                |  |                |
| Shaded+Edge  | 110.8          |  | 149.1          |
| Shaded   | 108.9          |  | 196.8          |
| Edges  | 118.3          |  | 127.0          |
| <b>CATBench2004G</b>                                 | <b>112.7</b>   |  | <b>157.6</b>   |
| <b>System</b>  |                |  |                |
| Piston   | 105.5          |  | 119.1          |
| Crankshaft   | 95.0           |  | 102.4          |
| Engine Block   | 83.1           |  | 91.9           |
| Engine Assembly                                      | 109.5          |  | 121.7          |
| Migration  | 80.3           |  | 102.8          |
| Analysis   | 102.7          |  | 116.3          |
| <b>CATBench2004S</b>                                 | <b>96.3</b>    |  | <b>109.3</b>   |
| <b>Battery Life</b>                                  | <b>100.0</b>   |  | <b>70.2</b>    |
| <b>Weight</b>  | <b>100.0</b>   |  | <b>83.3</b>    |
| <b>CATBench2004</b>                                  | <b>104.5</b>   |  | <b>133.5</b>   |
| <b>DMU</b>   | <b>96.5</b>    |  | <b>107.3</b>   |
| <b>CATBench2004DMU</b>                               | <b>104.6</b>   |  | <b>132.4</b>   |
| <b>Cost</b>  | <b>\$3,893</b> |  | <b>\$3,849</b> |

| Dell M60<br>Mobile<br>Workstation<br>2.0 GHz FX Go<br>1000 |                |  | IBM T42p       |
|--|----------------|--|----------------|
| <b>Graphics</b>  |                |  |                |
| Shaded+Edge  | 100.0          |  | 124.4          |
| Shaded   | 100.0          |  | 159.9          |
| Edges  | 100.0          |  | 101.4          |
| <b>CATBench2004G</b>                                       | <b>100.0</b>   |  | <b>128.6</b>   |
| <b>System</b>  |                |  |                |
| Piston   | 100.0          |  | 112.9          |
| Crankshaft   | 100.0          |  | 107.8          |
| Engine Block   | 100.0          |  | 110.5          |
| Engine Assembly  | 100.0          |  | 111.2          |
| Migration  | 100.0          |  | 128.0          |
| Analysis   | 100.0          |  | 113.3          |
| <b>CATBench2004S</b>                                       | <b>100.0</b>   |  | <b>113.5</b>   |
| <b>Battery Life</b>  | <b>100.0</b>   |  | <b>70.2</b>    |
| <b>Weight</b>  | <b>100.0</b>   |  | <b>83.3</b>    |
| <b>CATBench2004</b>  | <b>100.0</b>   |  | <b>112.2</b>   |
| <b>DMU</b>   | <b>100.0</b>   |  | <b>111.2</b>   |
| <b>CATBench2004DMU</b>                                     | <b>100.0</b>   |  | <b>119.9</b>   |
| <b>Cost</b>  | <b>\$3,893</b> |  | <b>\$3,849</b> |

## Appendix D



# Appendix E

