

CAD 2 Imagine 3200 HT

When budgeting for a new workstation, processing speed, memory and graphics typically take precedence over hard drive performance. But a new workstation from CAD 2, which features a more cost effective and fast hard drive subsystem, could make you think again.

Greg Corke

Such is the nature of the workstation market, it's not often that a piece of kit comes along that offers something brand new, something that immediately catches your eye. Increasingly the workstation manufacturer's role is becoming one of an assembler of standard components. Intel Pentium 4s are everywhere, as are graphics cards from Nvidia and ATI, and DDR RAM is becoming a workstation standard in memory.

But what about hard drives? While SCSI has led the workstation market for as long as I can remember, IDE/ATA has, in recent years, taken a large proportion of the hard disk market. In fact one of the UK's leading workstation manufacturers recently told me that IDE/ATA drives now account for over 90% of their workstation sales. With the mainstream PC industry driving the IDE/ATA standard, increased platter speeds and performance coupled with an extremely low cost per Mb ratio have help make IDE/ATA an extremely attractive solution for CAD users. Indeed, SCSI, despite its superior drive access times and sustained data transfer rates, is becoming a high-end workstation solution and, of course, one that costs a premium.

But hold on - here you've got two options that have been around in some form or another for a number of years. What's all this talk of something new, something that catches your eye?

Serial ATA

What I've been alluding to is a relatively new hard drive technology called Serial ATA, the natural evolution from Parallel ATA (better known as IDE/ATA). Serial ATA came to

us this month through the latest machine from CAD hardware specialist CAD 2, the 3.2GHz Pentium 4-based Imagine 3200 HT workstation. What's more, CAD 2 has knitted together the hard drive sub system using RAID 0, which shares data across two hard drives, significantly increasing data access speeds. What this boils down to is that CAD 2 is able to offer a real alternative to SCSI in terms of performance, but with a much lower cost/Mb ratio, which makes it a particularly attractive solution for those who regularly work with large CAD models.

To facilitate this, the company has based its Imagine 3200 HT Workstation around Intel's D875PBZ Motherboard, which features on-board support for serial ATA drives and RAID 0. Two 10,000RPM Western Digital Raptor 36Gb SATA hard drives (which give you a usable capacity of 72Gb) plug straight into the motherboard. With the Intel D875PBZ motherboard you can only use the RAID 0 set up, which makes this particular machine ideally suited to a modelling type environment where it would be typically connected via a network to a back-up server. However, should you require a hard drive subsystem that places a greater emphasis on security (as opposed to speed) CAD 2 also offers a wide range of RAID options.

In addition to providing an impressive hard drive system, CAD 2's implementation of the D875PBZ enables dual channel DDR RAM in a Pentium 4-based machine, which has until recently been the reserve of Xeon workstations. What this means is increased bandwidth for the machine's 2Gb of DDR400 RAM, which has often caused bottlenecks in single channel architectures.

The particular workstation we had in for test shipped with a PNY Quadro FX 500, which provides solid entry-level 3D performance. However, CAD 2 also offers a number of additional graphics cards including the full range of PNY's Quadro FX accelerators. For a full report of how these performed in the Imagine 3200 HT, plus the new range of professional graphics cards from ATI, turn to page 30.

To house all this cutting edge technology, CAD 2 has opted for a CoolerMaster 710 case, cabling and cooling fans. For those not familiar with the name, the company has been developing and manufacturing cooling systems for computers for over ten years, and despite the sometimes elevated price tag of its kit, continues to produce top quality components, making its products particularly suitable for power hungry, and as a result heat generating CAD workstations. The 710 is no exception to this rule and its sturdy case is insulated for both sound and heat, and CAD 2 maintains this attention to detail by tucking and clipping all its internal cables away extremely neatly.



Tech Specs

CAD2 Imagine 3200 HT workstation

- n Intel Pentium 4 3.2GHz
- n Intel D875PBZ Motherboard
- n 2Gb DDR400 dual-band memory
- n 2x Western Digital Raptor 36GB SATA Hard Disk (72Gb Usable/ RAID 0 Configuration)
- n PNY Quadro FX500 128Mb
- n LG 52 x DVD Rom Drive
- n LG 52 x 24 x 52 IDE CD RW
- n Cooler Master 710 chassis
- n Microsoft Windows 2000 or XP Professional
- n £2,125

Two Western Digital Raptor 36Gb Serial ATA hard drives in a RAID 0 configuration give CAD 2's Imagine 3200 HT workstation data access speeds to rival more expensive SCSI-based subsystems.



SiSoftware's Sandra 2003 MAX3! - file system benchmark

Hard drive subsystem	Drive Index (Kb/sec)
CAD 2 Imagine 3200 HT with two 10,000RPM Western Digital Raptor SATA RAID 0 configuration	67,629
Typical 7,200RPM ATA-100 drive	29,900
Typical 15,000RPM SCSI Ultra 320 drive	52,610
Two typical 15,000RPM SCSI Ultra 320 drives in RAID 0 configuration	93,376



On test

When using the workstation under a wide range of CAD applications it was clear that the machine excelled in a number of areas. The most noticeable was when loading up huge models where the RAID 0 / serial ATA hard disk sub system came into full effect, and brought up massive CAD models in a fraction of the time that it would typically take a standard single ATA drive. In order to provide some sort of reference point for this we tested the Imagine 3200 HT using SiSoftware's Sandra 2003 MAX3! Benchmark.

Under the file system benchmark the two 10,000RPM Western Digital Raptor 36Gb SATA drives achieved a drive index of 67,629Kb/sec. To put this into perspective a typical 7,200 ATA-100 drive would score 29,900Kb/sec, a 15,000RPM SCSI Ultra 320 drive would score 52,610Kb/sec, and the only subsystem which would beat this would be a SCSI Ultra 320 RAID 0 setup, which would give you a drive index of 93,376Kb/sec - but this

What is RAID 0?

The level of a RAID system (Redundant Array of Inexpensive Disks) relates to its operating mode and how the hard disks are combined to form a single logical drive. There are a number of different arrangements that can be combined for speed and data security.

RAID 0 distributes data across the available disks using a process called striping. This technique is used to build a common data area and to achieve higher speeds. Because the data is written and read in a quasi-parallel fashion, overall performance is boosted compared with just a single drive. However, if one drive fails, you lose the data on all drives.

Intel's D875PBZ motherboard gives CAD 2's Imagine 3200 HT workstation on-board support for Serial ATA, RAID 0, and dual channel DDR RAM.

would set you back an additional £1,000 or so!

In terms of Memory bandwidth, the Imagine 3200 HT dual channel DDR400 RAM subsystem delivered a rate of 4,816Mb/sec, which pretty much tops out anything on the PC workstation market at the moment. If you want to reference any of these figures against your existing workstation go to www.sisoftware.co.uk and download the Sandra 2003 MAX3! benchmark. N.B. This utility was recently superseded by the SiSoftware Sandra 2004 benchmark.

As usual, we also tested the Imagine 3200 HT Workstation extensively under a number of 3D graphics benchmarks. There were no surprises here and the combination of cutting edge graphics technology and core workstation components provided some of the fastest results we've yet seen at the MCAD and AEC magazine labs. Turn to page 30 for a full report.

Conclusions

When CAD 2 volunteered its workstation for review, we were promised, and I quote, a 'corking' machine, and I have to say we were not disappointed. The Imagine range is positioned as CAD 2's high-end workstation, and it's clear to see why - cutting edge performance in all areas and build quality unsurpassed by anything else on the market.

In addition to the core computational and 3D graphics speed, hard disk performance is something that doesn't often get the attention it deserves. If you're working on huge models on a day-to-day basis, having a hard drive system that can deliver and save data two or three times quicker than standard solutions, can provide a serious boost to your productivity.

Of course, it will come as no surprise that this level of performance and quality doesn't come cheap and prices

Serial ATA and Parallel ATA

The Serial ATA hard drive standard was created to overcome many of the design limitations of Parallel ATA and provide a path forward from the standard that had started to reach its upper limit in terms of burst transfer rates.

Without getting bogged down in too much technical detail, Serial ATA works just like other new generation serial technologies like Firewire and USB 2.0 - it transfers data in a single stream in comparison to Parallel ATA that transfers data in multiple streams. By sending 1 bit of data at a time, data can be sent at a much faster rate with serial ATA whereas parallel ATA sends many bits at a time, so they must be sent slowly enough to allow setup and setting time.

At present Serial ATA is still in its first 1.0 incarnation, and data transfer rates are not that much faster than high-end Parallel ATA drives. However, future generations of the technology will be able to achieve much higher burst transfer rates. For example, Serial ATA 2.0 is scheduled for release in 2004, and should double the burst transfer rates achievable with Serial ATA 1.0.

Of course, increased data transfer is not the only advantage that Serial ATA brings to the table. Its slimline cabling system can reach distances up to 1m, which makes it easy to fit drives anywhere in the system. Parallel ATA cables were restricted to 18" and its large data cables have been known to cause airflow problems, potentially leading to thermal issues.

Furthermore, Serial ATA uses a point-to-point interface, where each device is connected to the host via a dedicated link. Parallel ATA often uses a common cable in a master and slave relationship, and as a result shares bandwidth, and of course, makes installation more complex.

www.serialata.org

start at £2,125 for the machine featured in this article equipped with a PNY Quadro FX 500, going up to £3,460 for a top of the range Quadro FX 3000.

Compared to many of the entry-level machines on the market (and CAD 2 also offers entry-level machine through its Vision Workstation range), this may seem a little steep, but then 'entry-level' is the last term you'd use to describe CAD 2's Imagine 3200 HT Workstation. On top of the impressive hard drive system, don't forget the system is kitted out with a whopping 2Gb of dual channel DDR memory, the fastest Pentium 4 processor currently on the market, and a CD and CD/RW, and if you compare this to a similarly specified machine from any other workstation vendor I think you'll find that extremely hard to beat.

www.cad2.com

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