

PC Pro Labs

**Technical Report: Athlon FX51 PCs
Issue 112 – February 2004**



Author: Alyn Sparkes



Introducing the technical report

There's an awful lot we do in PC Pro Labs that doesn't actually make it onto the page. Sometimes it's just because of a restriction in the number of pages we're allowed or because the time to write up the information would push us over the deadline.

For this reason, we're starting to produce a technical report each month. Initially this will only cover the PC Labs, as this has the most 'missing' information when it gets to press. We are looking at how to extend it to the peripherals Labs as well, so once we've got a successful formula we'll increase the scope.

For the first report we have got graphs of each and every benchmark run on the PCs. These give the results of each of the applications used in our Real World Benchmarks. If you are a particularly heavy Adobe Photoshop user, it's easy to see which of the PCs performed well in this test, while it might not have done so well at Corel Draw.

As well as the Real World Benchmarks, we have also provided the frames-per-second scores for each test in 3DMark2001 SE. Although a synthetic benchmark, it's still useful to see how the different graphics cards cope with different DirectX versions. The frames-per-second scores are also shown for both Unreal Tournament 2003 tests. As we're using the game to test the overall system's performance, we don't quote the Flyby score in the magazine, as the AI engine increases in complexity if there's spare processing power available. This means it gives an indication of the in-game performance of the system as a whole. The Flyby score is simply how many frames of a pre-defined path can be pushed through the graphics card's buffers and so is the score we ignore in the magazine. We've included it in the report for comparison with the Botmatch score.

We've put the interior shots of each PC back into an HTML file as before. If there's anything else you feel would add to the report, please email us at Labs@pcpro.co.uk and include 'Technical Report' in the subject line



In this month's Labs...

For most people, the latest CPU is overkill. There's no point in spending a fortune on the back of AMD or Intel's latest marketing campaign when all you need to do is browse the Internet, send some emails, write a letter or manage your finances.

But, AMD makes no attempt to hide the fact that its new 64-bit FX51 processor is aimed squarely at gamers. The adverts boldly claim that the Athlon 64 FX51 is 'the best PC processor' and offers 'full throttle technology for immersive gaming and amazing digital media'. While we can't endorse either statement, we can agree that the FX51 is a stunning performer. And with this in mind, we asked eight system integrators to build the fastest gaming system they could with the chip, with a maximum budget of £2,000.

Being a 64-bit device, the FX51 offers several advantages over its 32-bit counterparts, like being able to address 256TB of memory with a 64-bit OS. Unfortunately, unless you're a Linux user, you'll have to wait until Microsoft releases the 64-bit version of Windows XP to take advantage. Thankfully, the FX51 is capable of running 32-bit applications in 32-bit Windows at breakneck speeds; one of the PCs here was almost three times faster than the reference 2GHz Pentium 4 in the 2D benchmarks.

As you'd expect, all eight systems are also highly proficient in 3D. ATi provides the 3D firepower in the form of the new Radeon 9800XT which is used in almost every machine. Surround sound is also well-catered for. Creative is flavour of the month, supplying sound cards and speakers principally in the form of the new Audigy 2 ZS sound card and Inspire T7700 7.1 speakers.

With one eye on the future, we've also run our 32-bit benchmarks on a beta version of Windows XP 64-bit edition to find out whether you can expect a big performance increase by upgrading. For the results, look at page 29. But, to find out which of these monster machines is top dog with today's software, read on.

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4 – 2D results

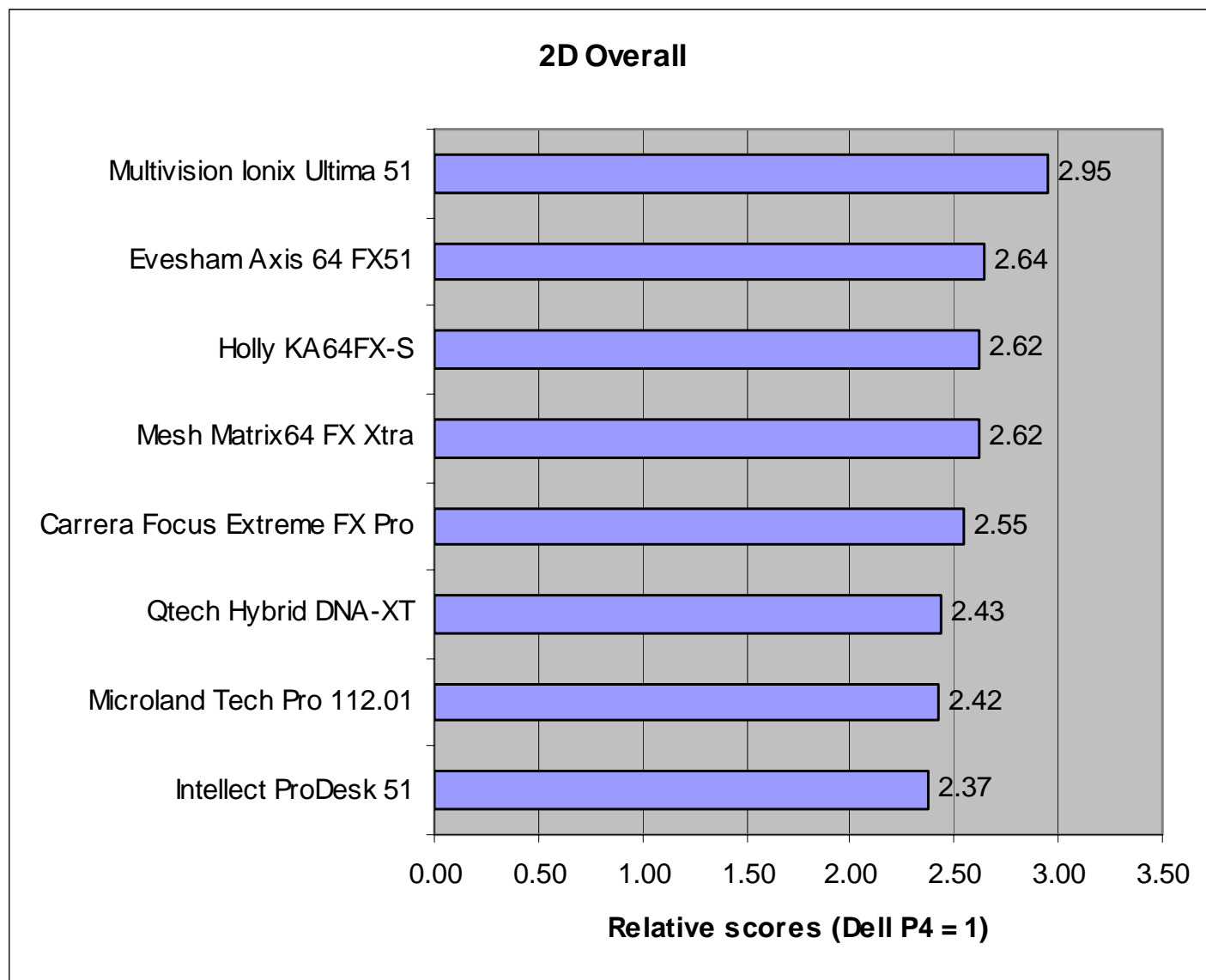
14 – 3D results

29 – 32-bit performance on 64-bit and 32-bit operating systems

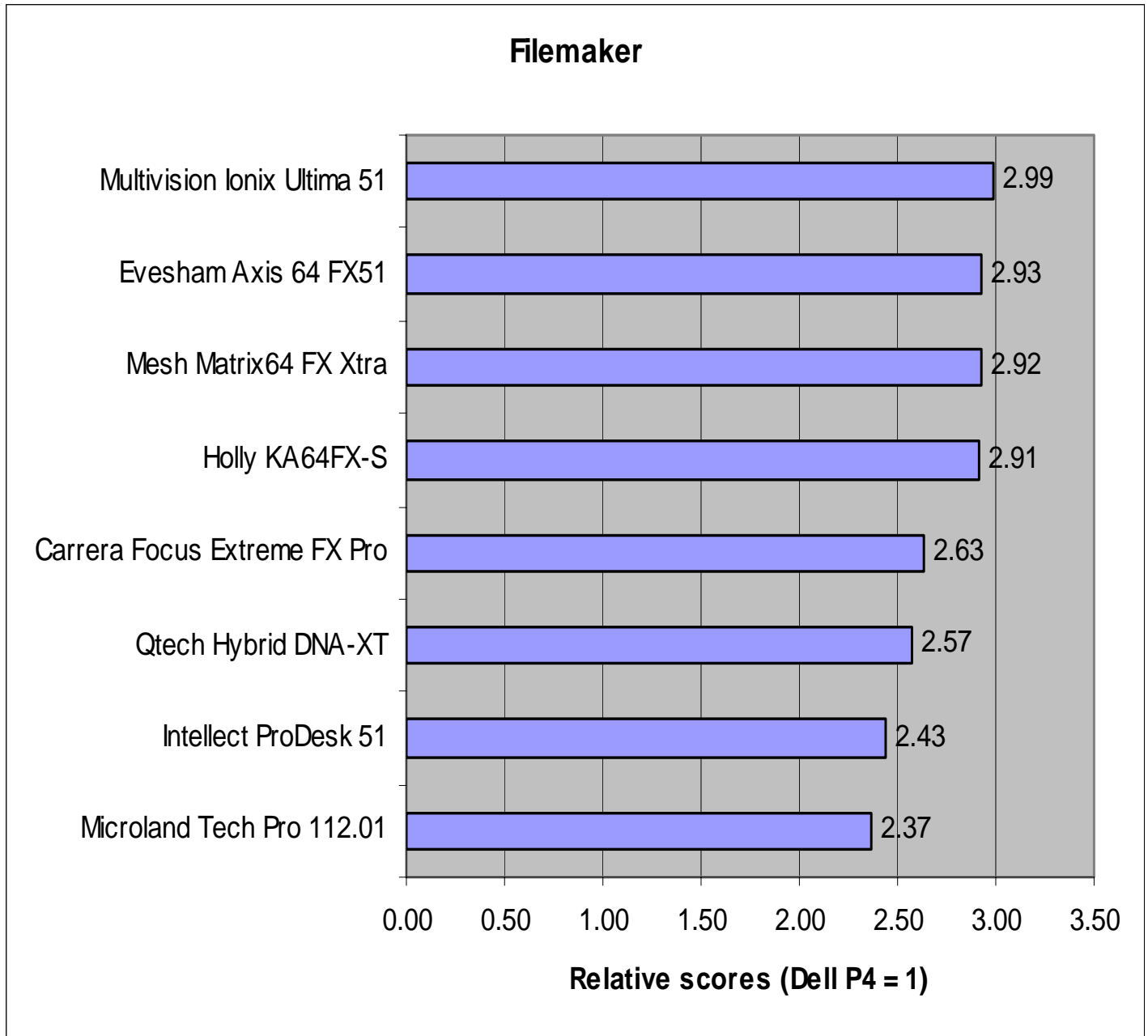
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2D tests

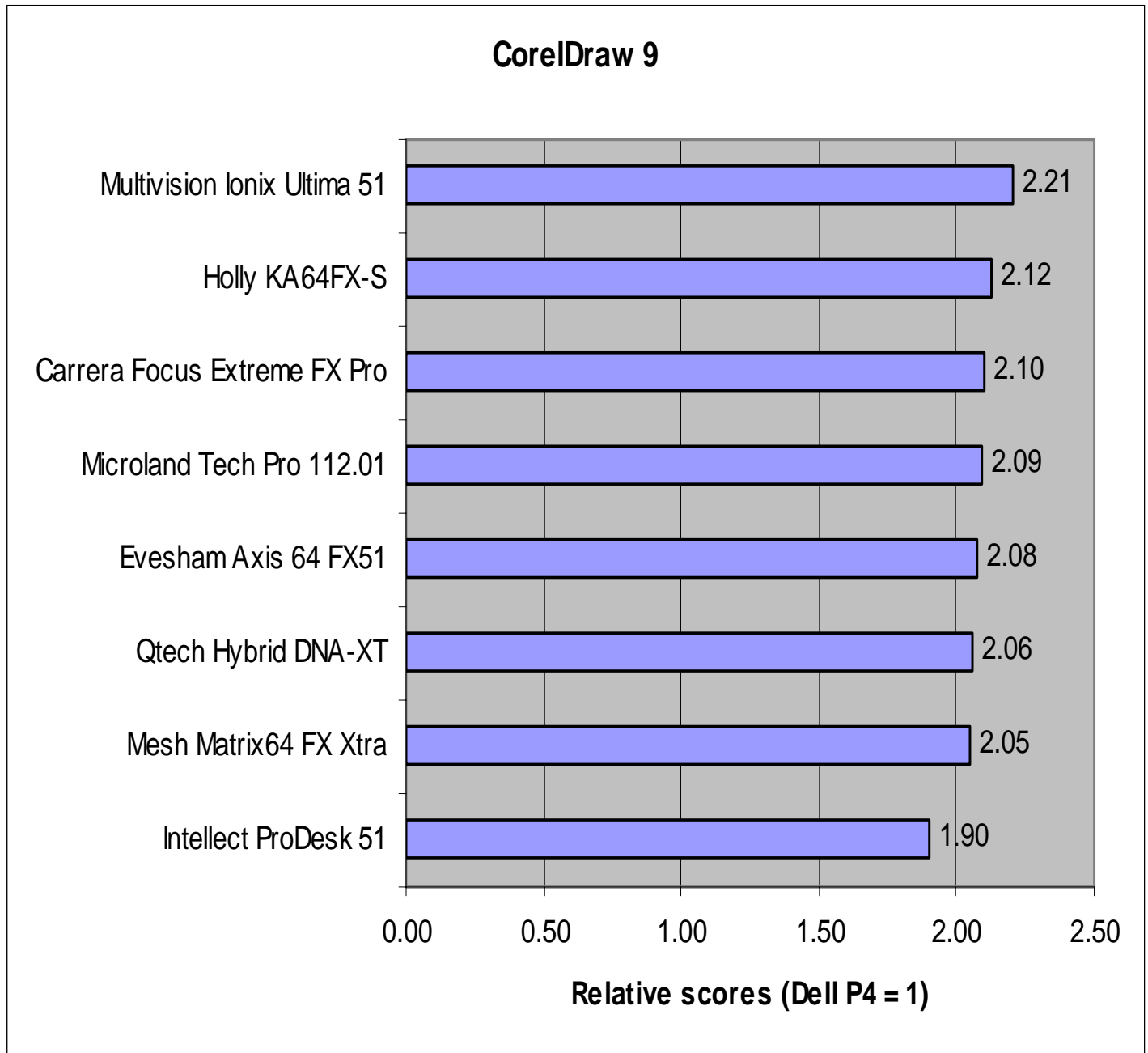
We use our own suite of real-world benchmarks to test each notebook's 2D speed. These are based on applications such as Microsoft Word XP, Excel XP, Adobe Photoshop 6.01, CorelDRAW 9 Essentials and Cleaner 5.01. Each score is relative to a 2GHz Pentium 4 Dell desktop PC with 256MB of PC800 RDRAM – so if a machine scores 1.35, that means it was 35 per cent faster than the Dell reference PC overall. For full details on the benchmarks, see appendix a.



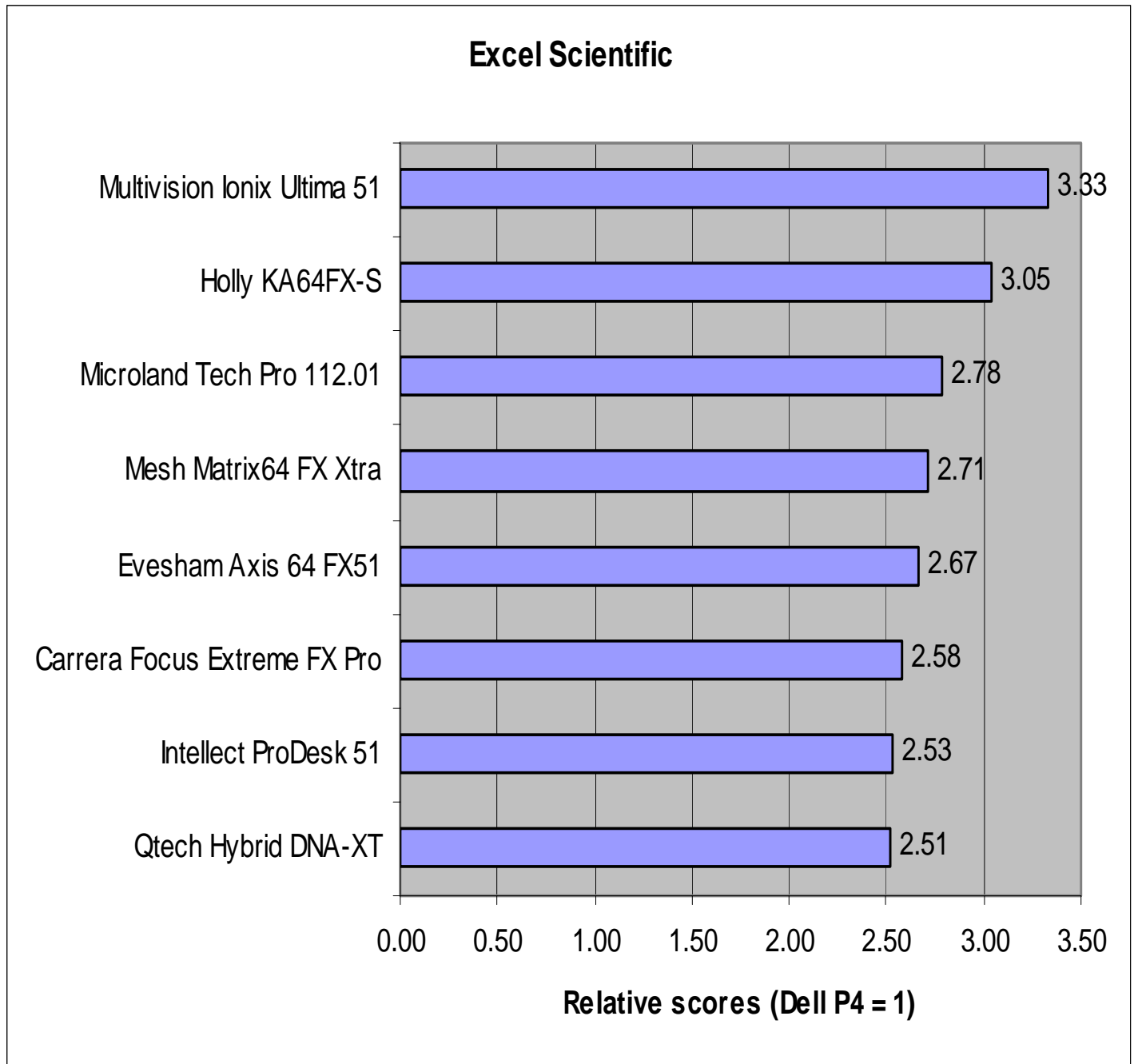
2D tests



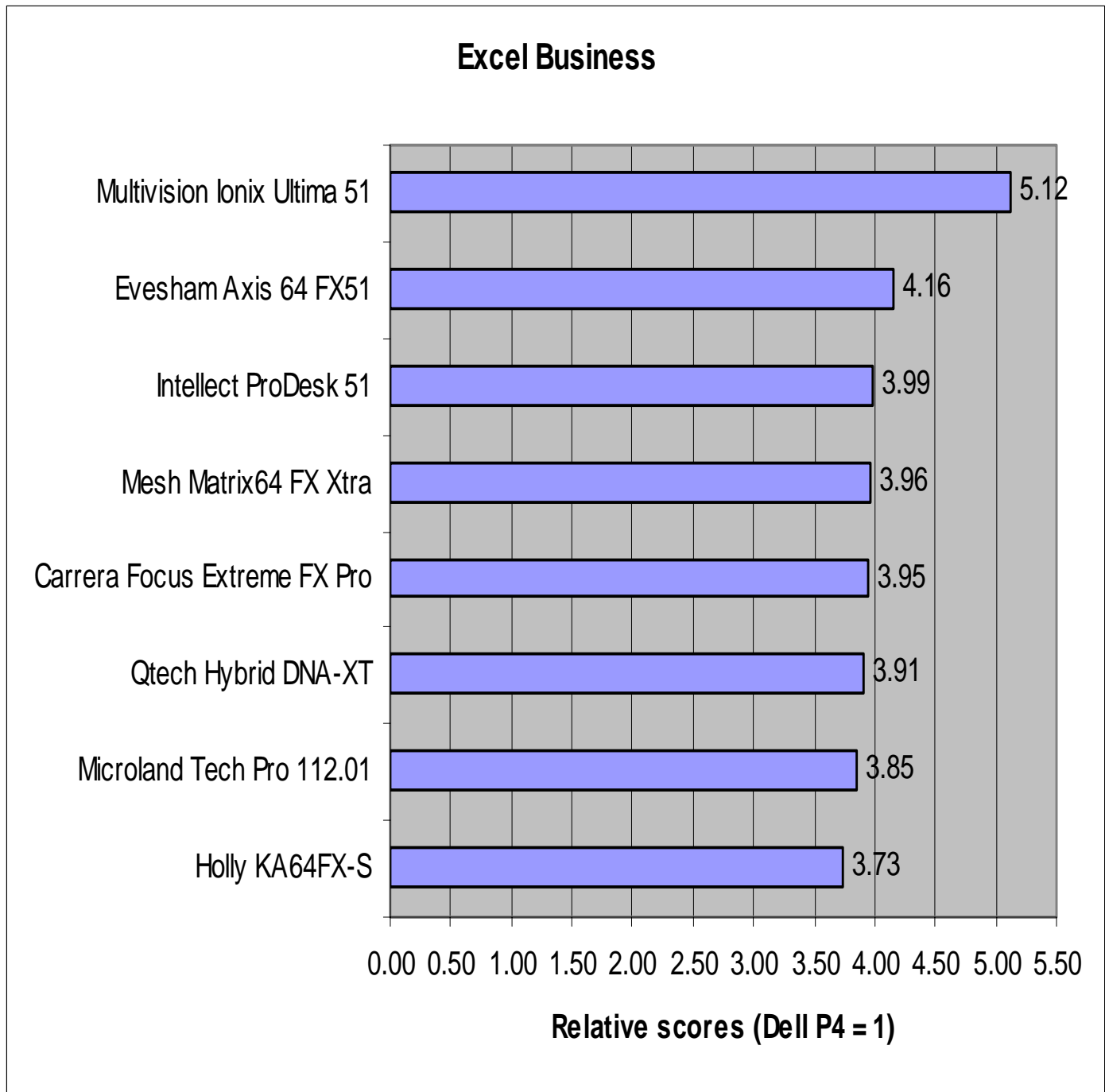
2D tests



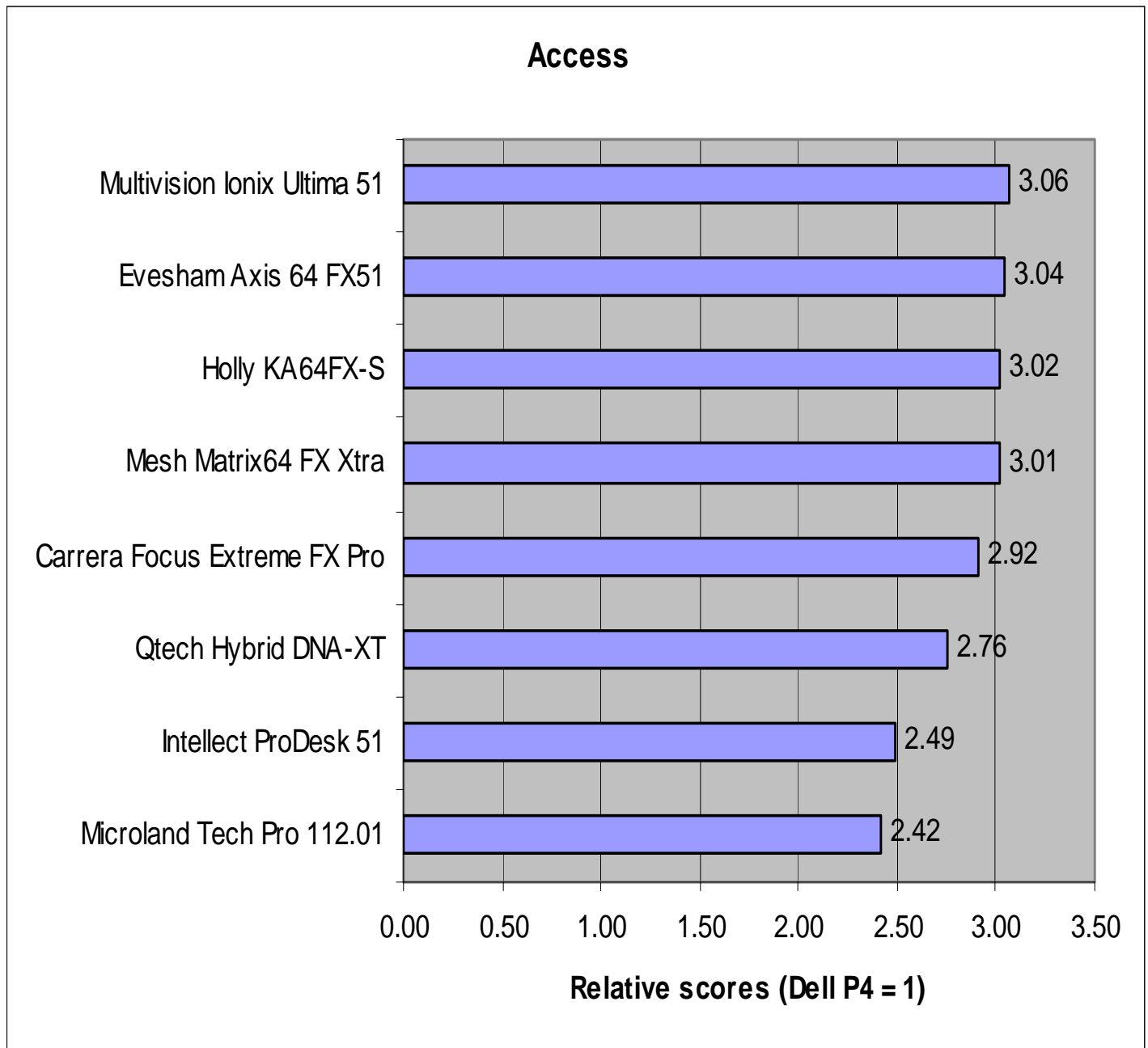
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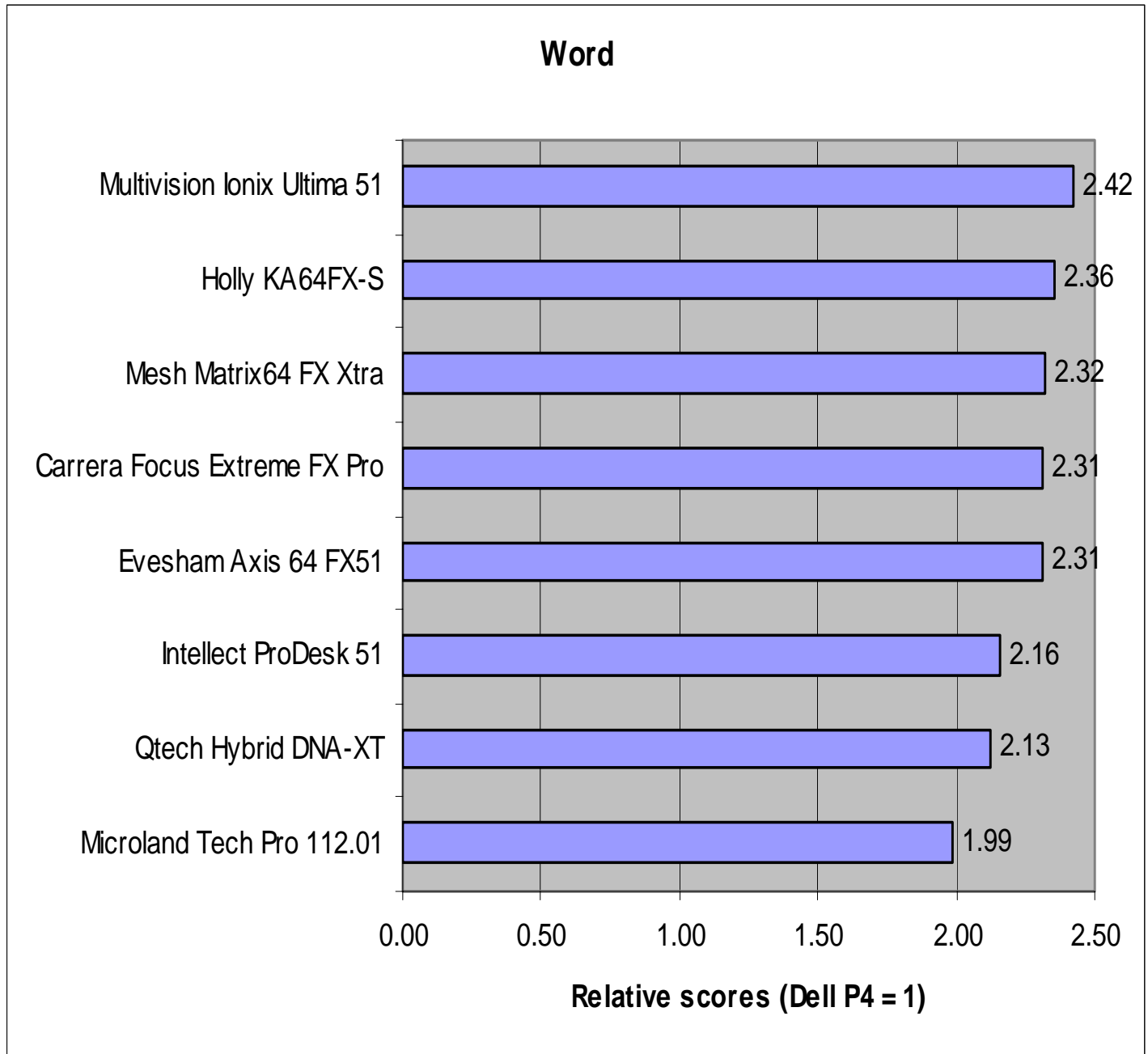
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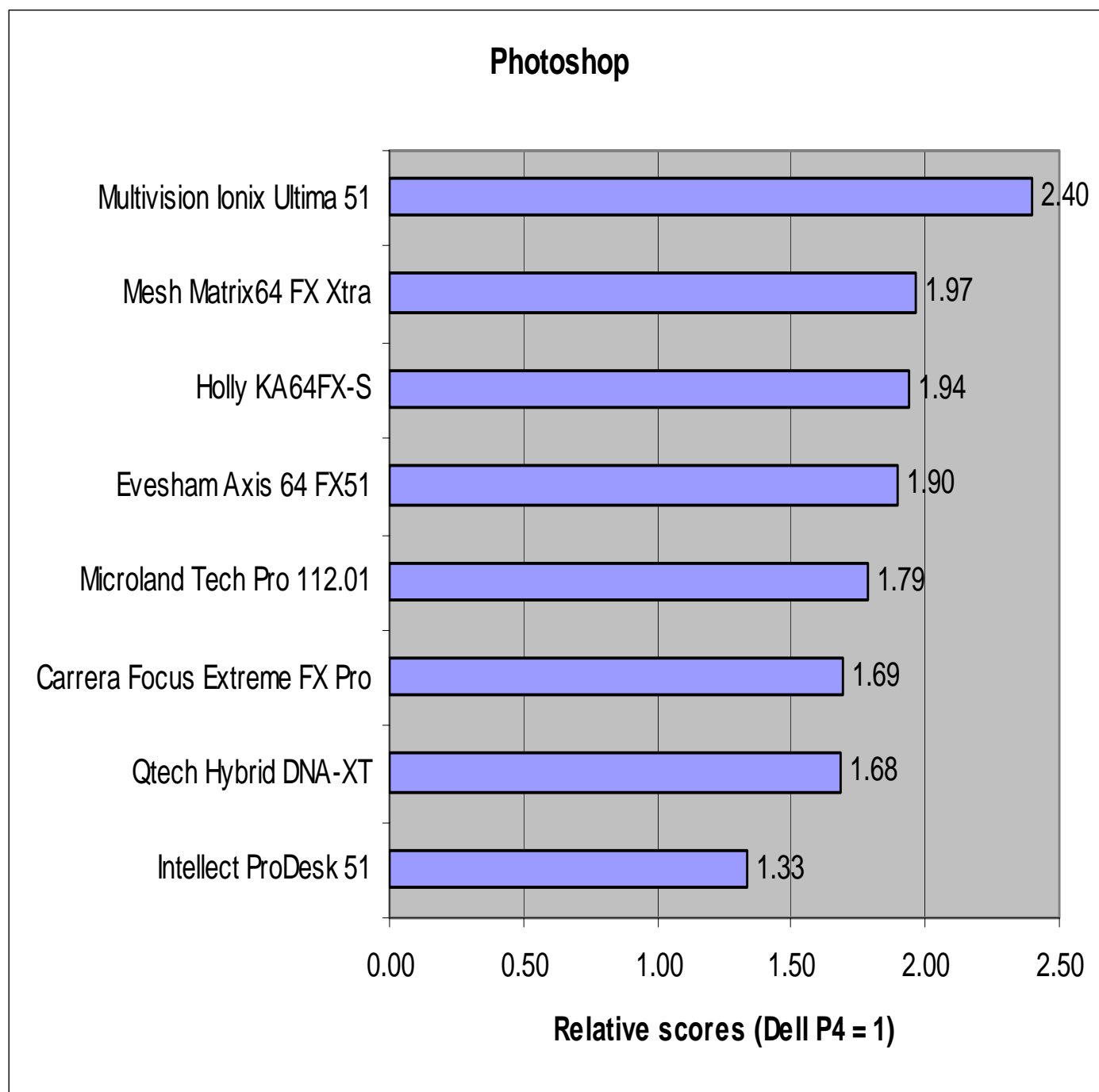
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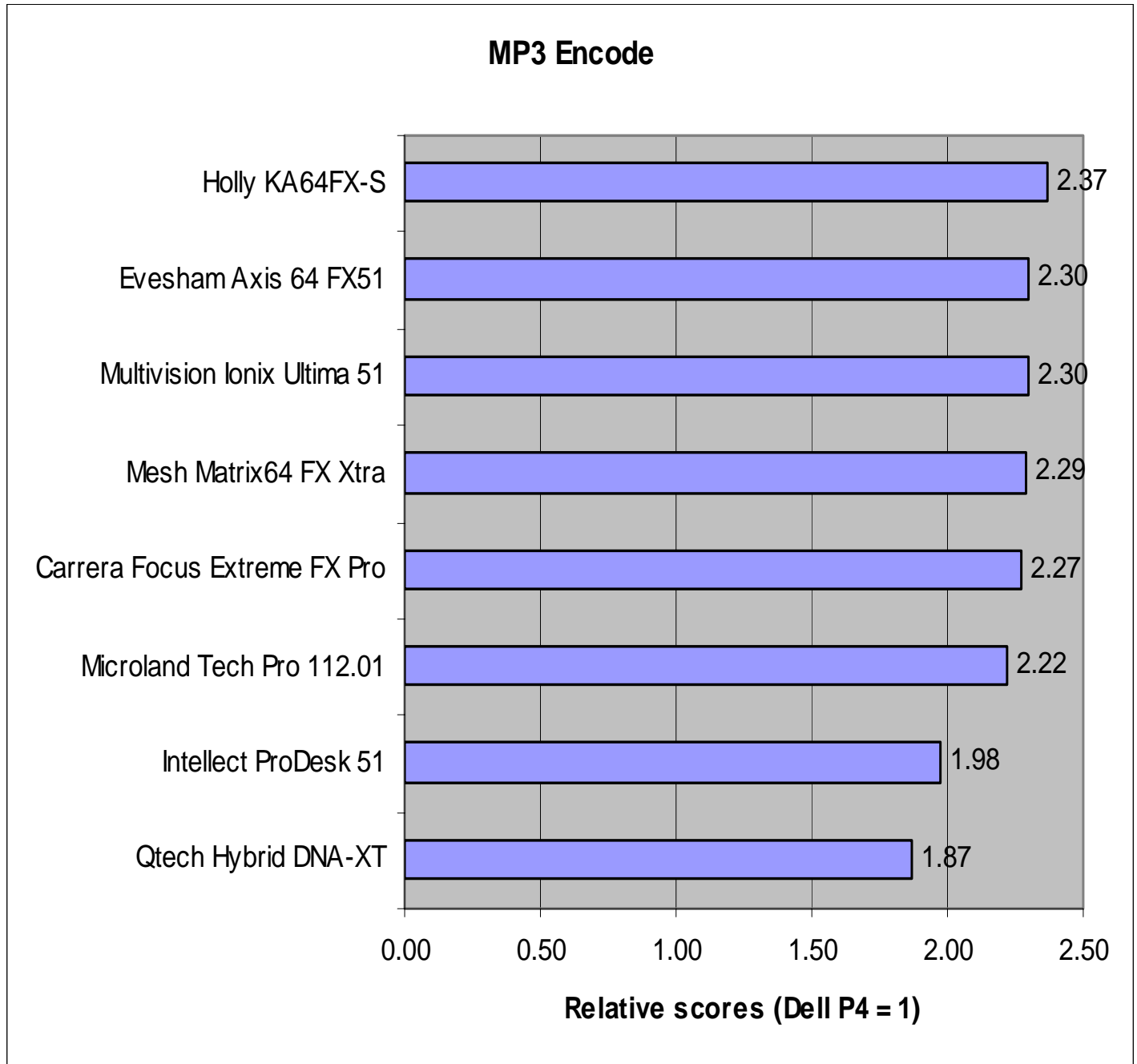
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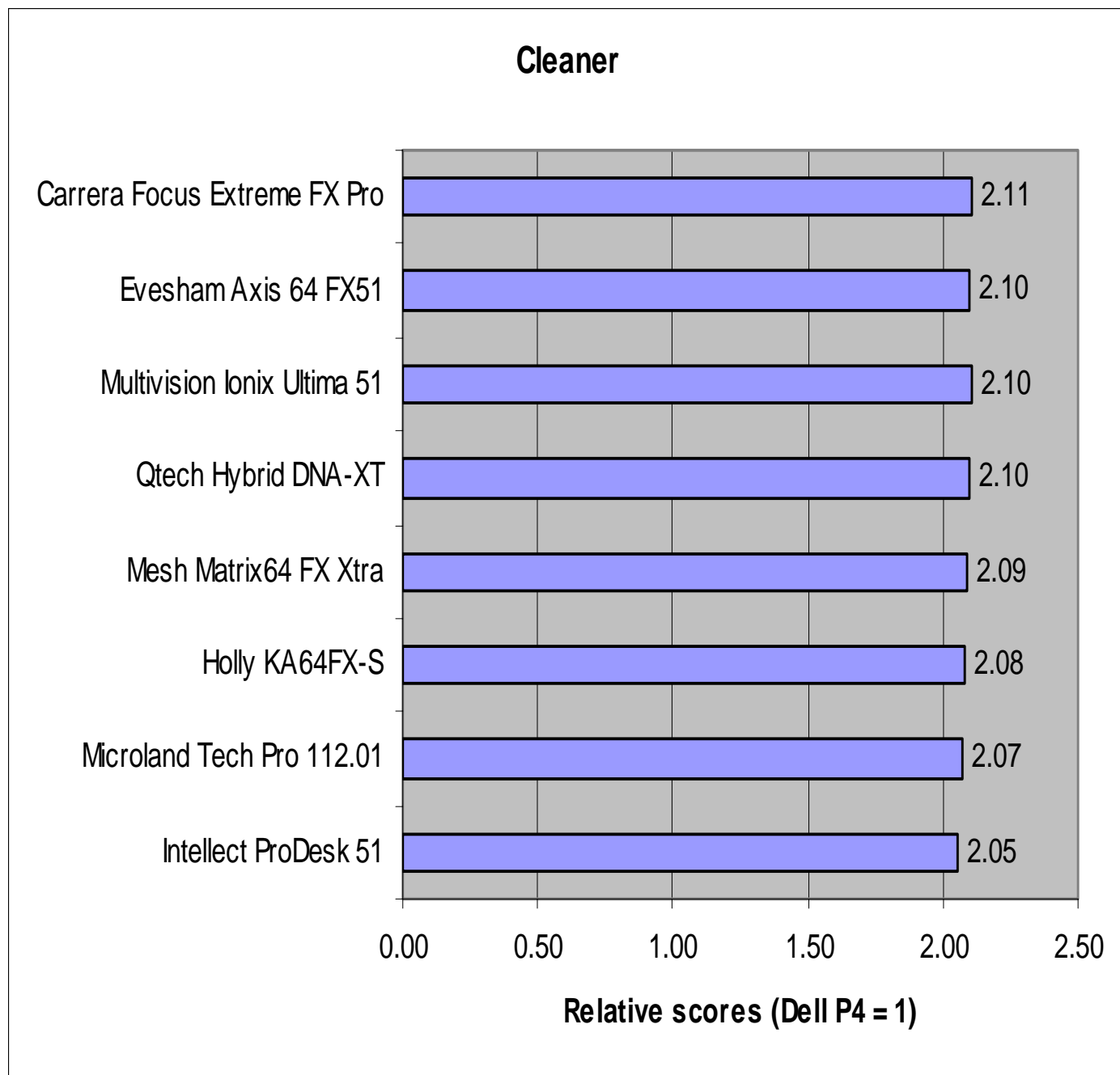
2D tests



2D tests



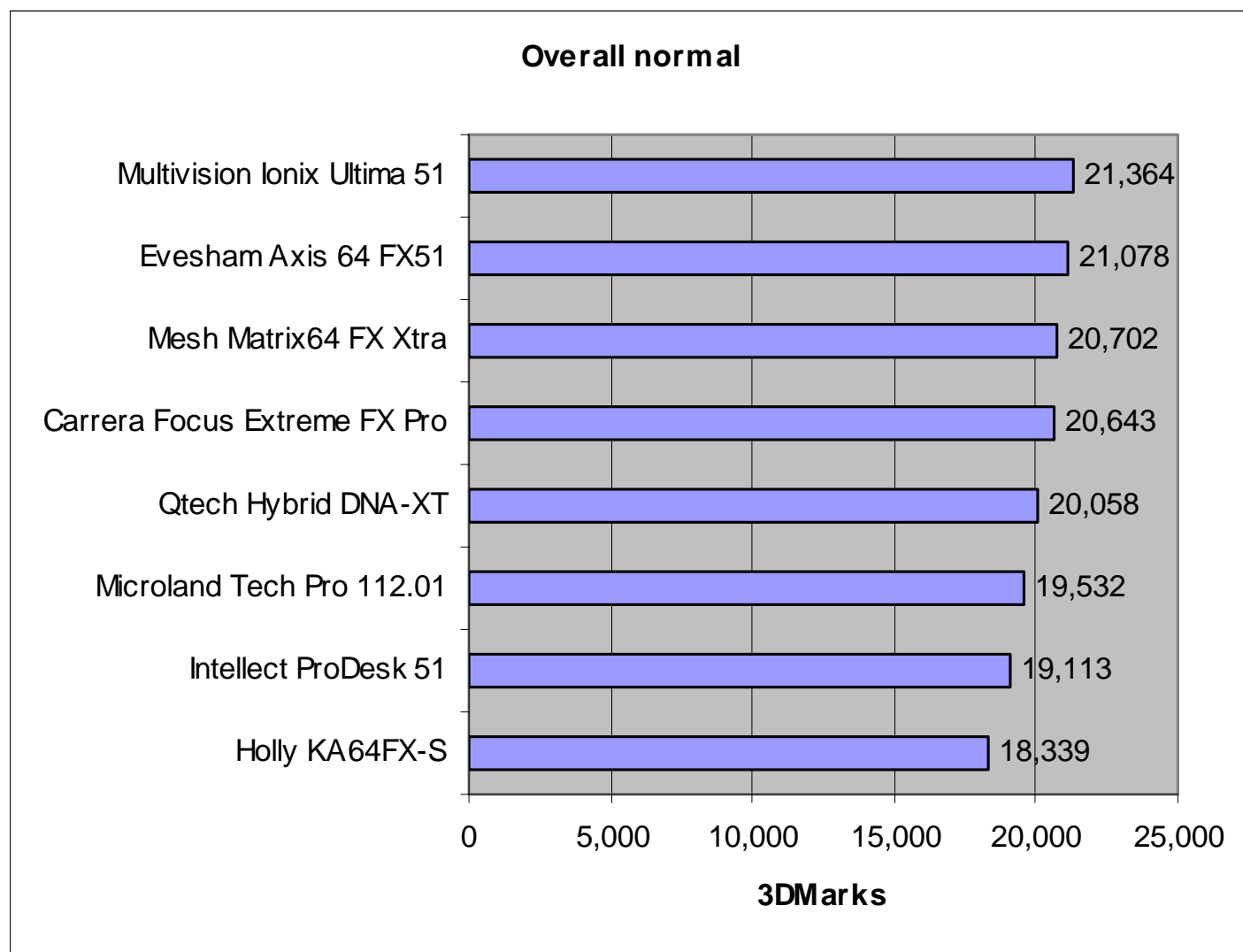
2D tests



3D tests

We test each machine's 3D performance using 3DMark2001 SE. We use the standard settings at 1,024 x 768 resolution in 32-bit colour, with compressed textures and double buffering. We run the test five times to get as accurate a score as possible. We've also run the controversial 3DMark03, as its Mother Nature test allows DirectX 9 performance to be evaluated. The results have to be taken with a pinch of salt, but are mostly useful. We also run Unreal Tournament 2003's benchmarking application at 1,024 x 768 in 32-bit colour and record both the Flyby and Botmatch scores. However, because the Botmatch gives a better indication of the overall performance of the PC it's the one used in the final score.

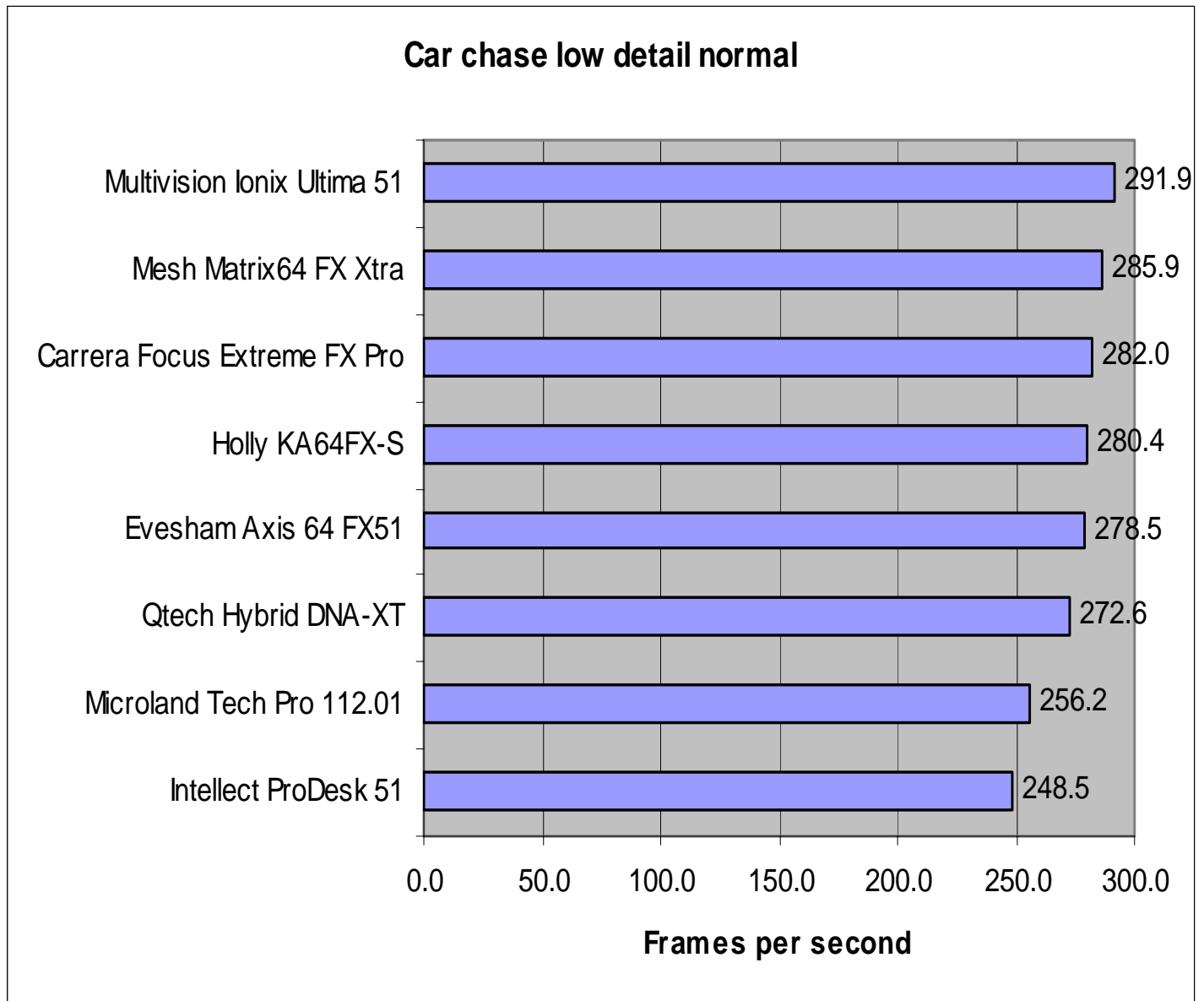
3DMark2001 SE





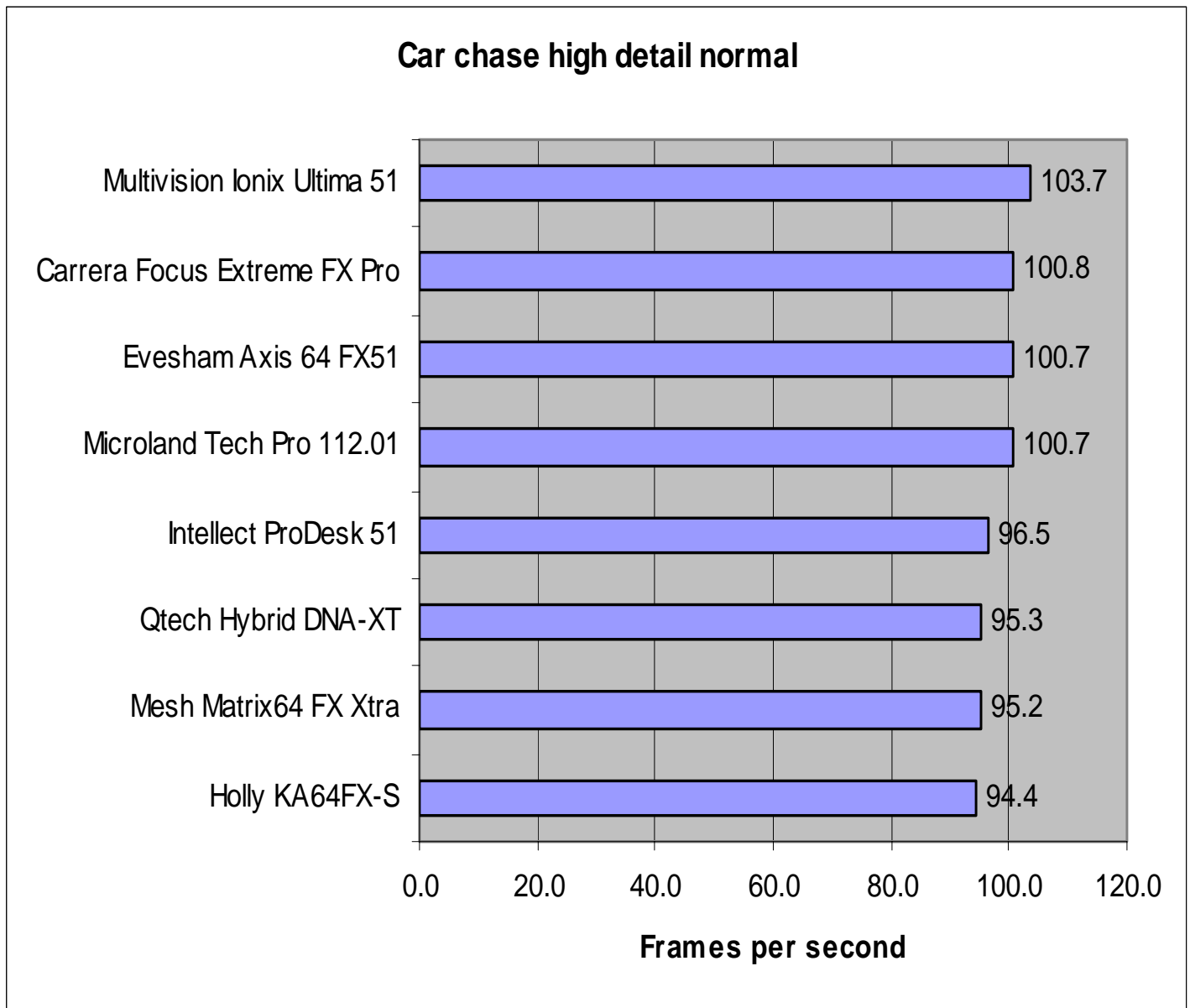
3D tests

3DMark2001 SE



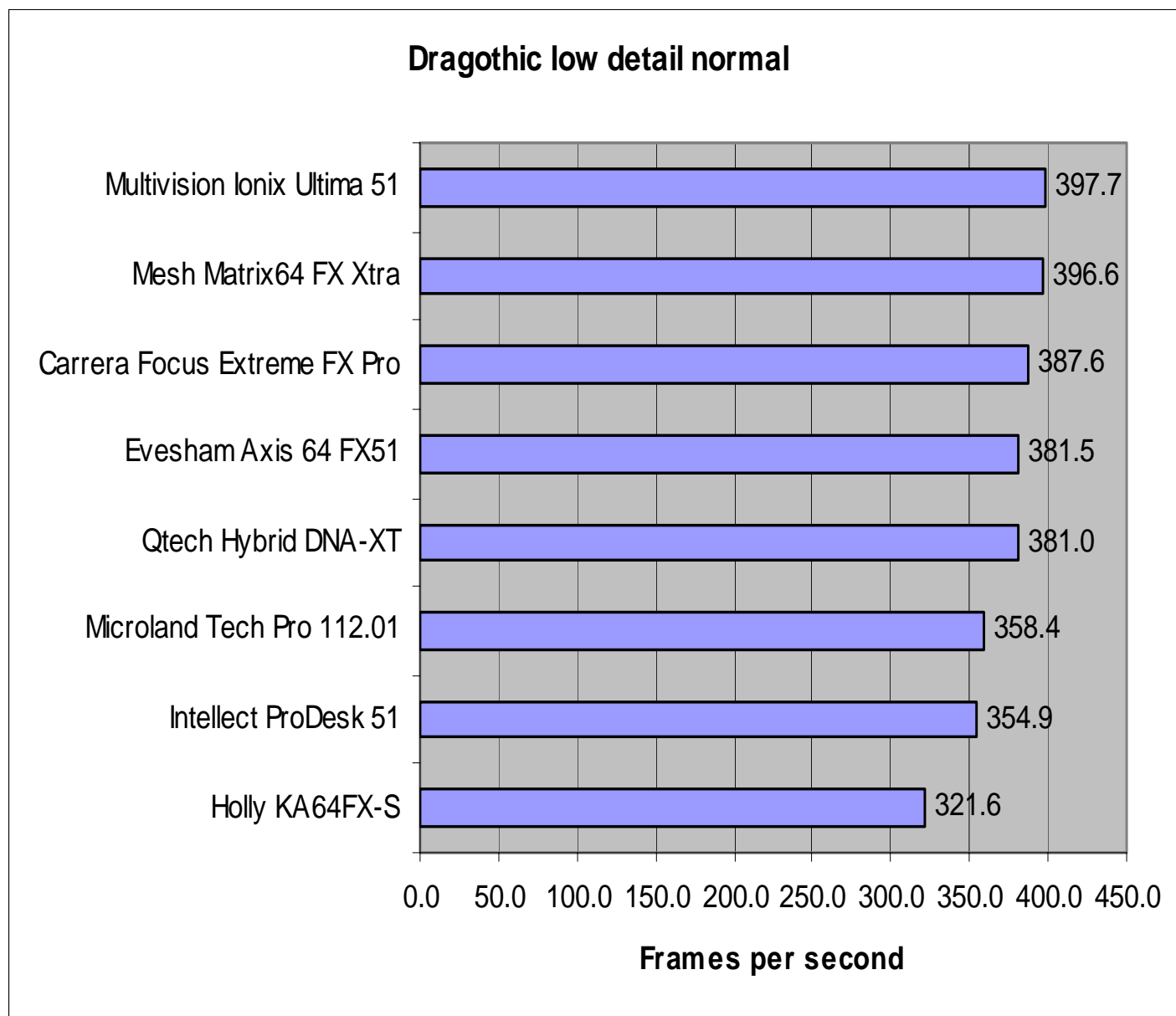
3D tests

3DMark2001 SE



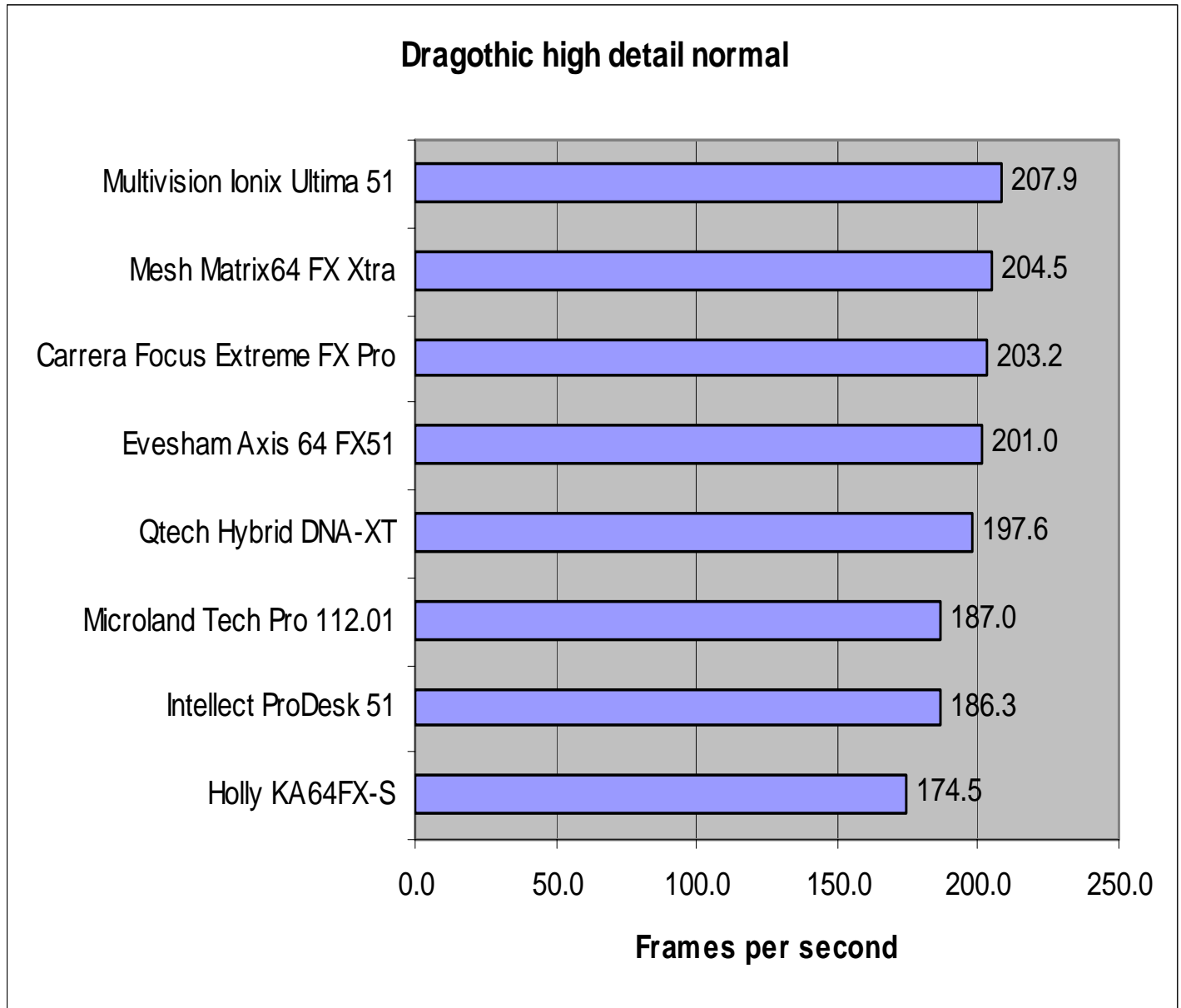
3D tests

3DMark 2001 SE



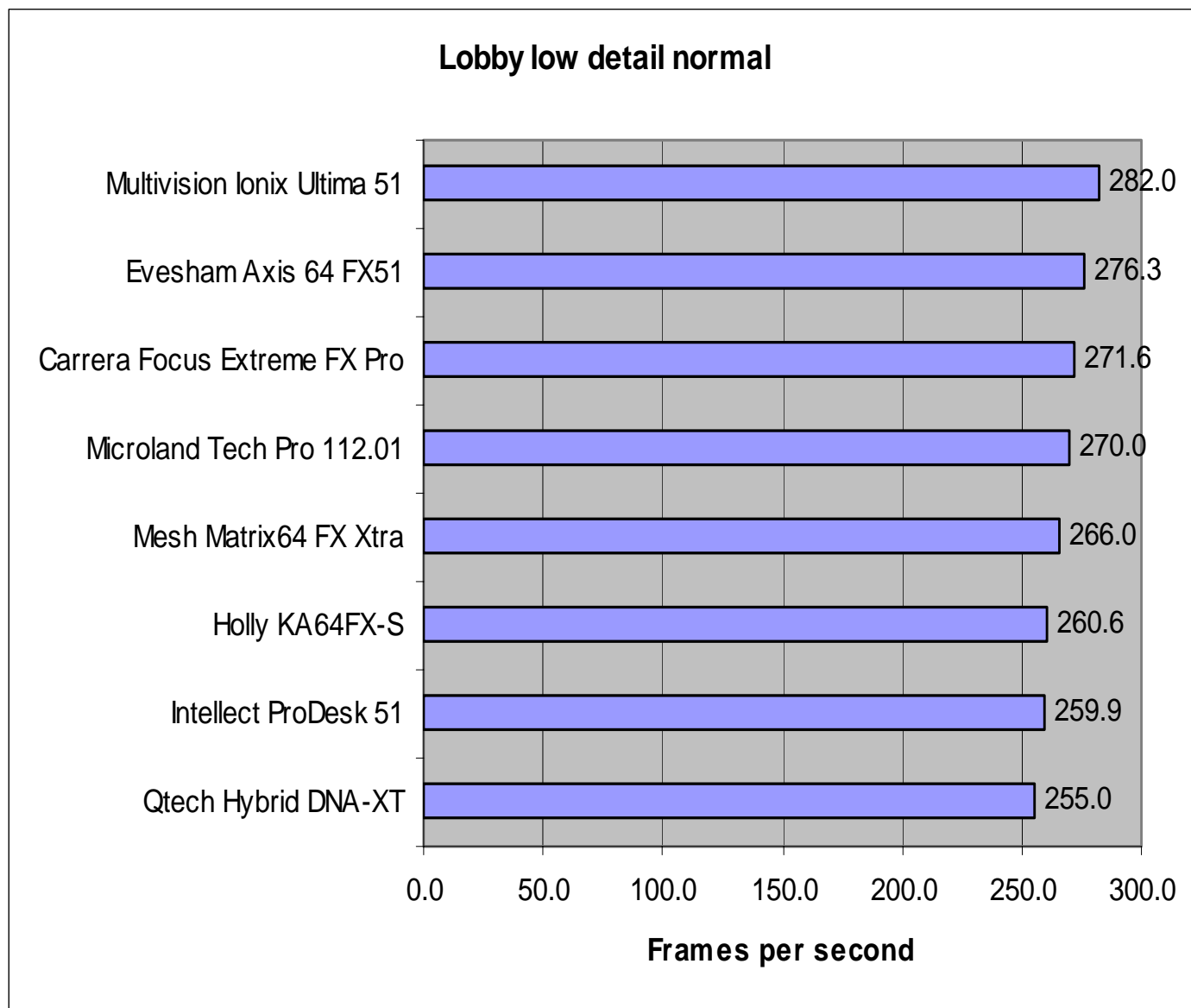
3D tests

3DMark2001 SE



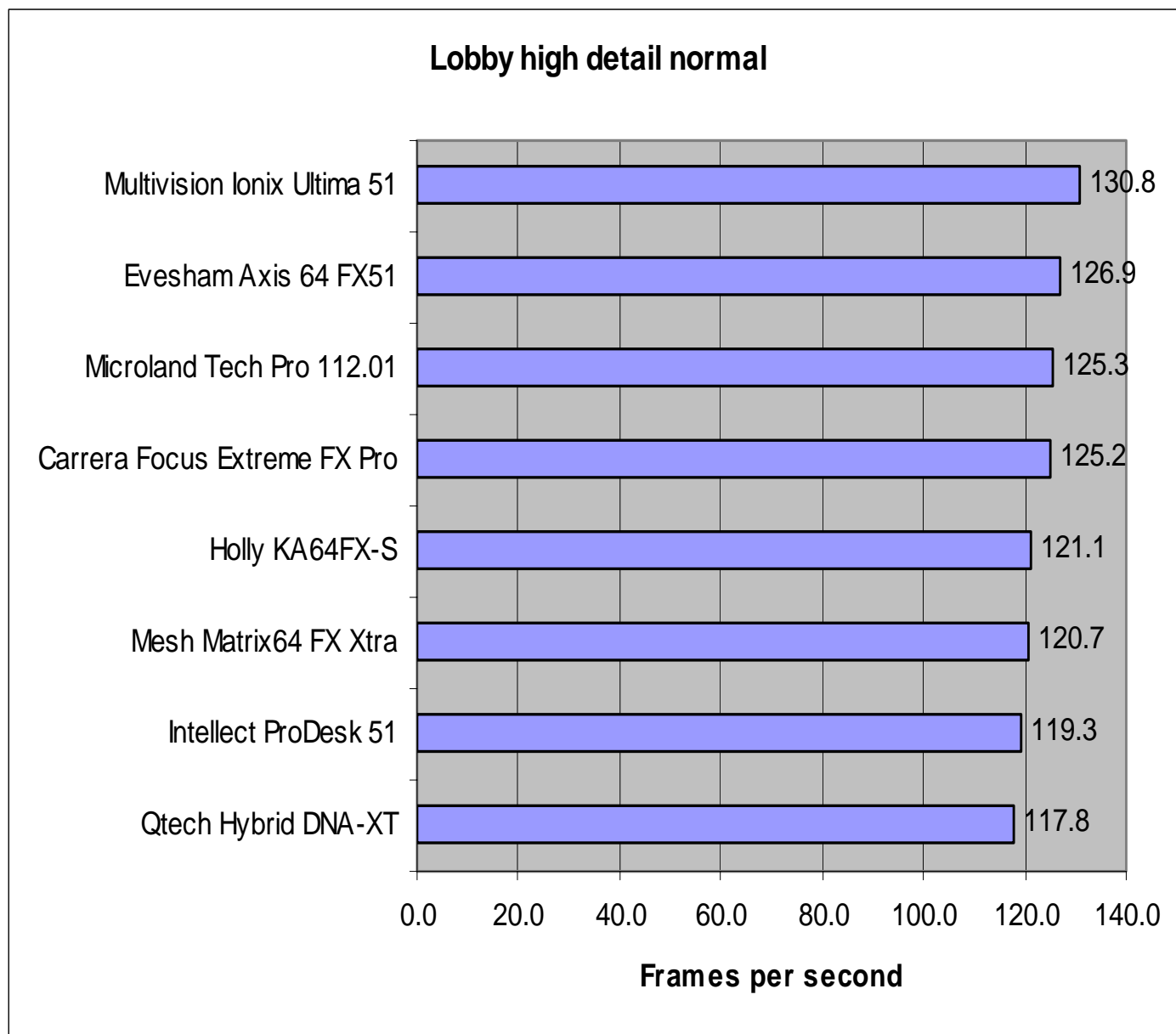
3D tests

3DMark2001 SE



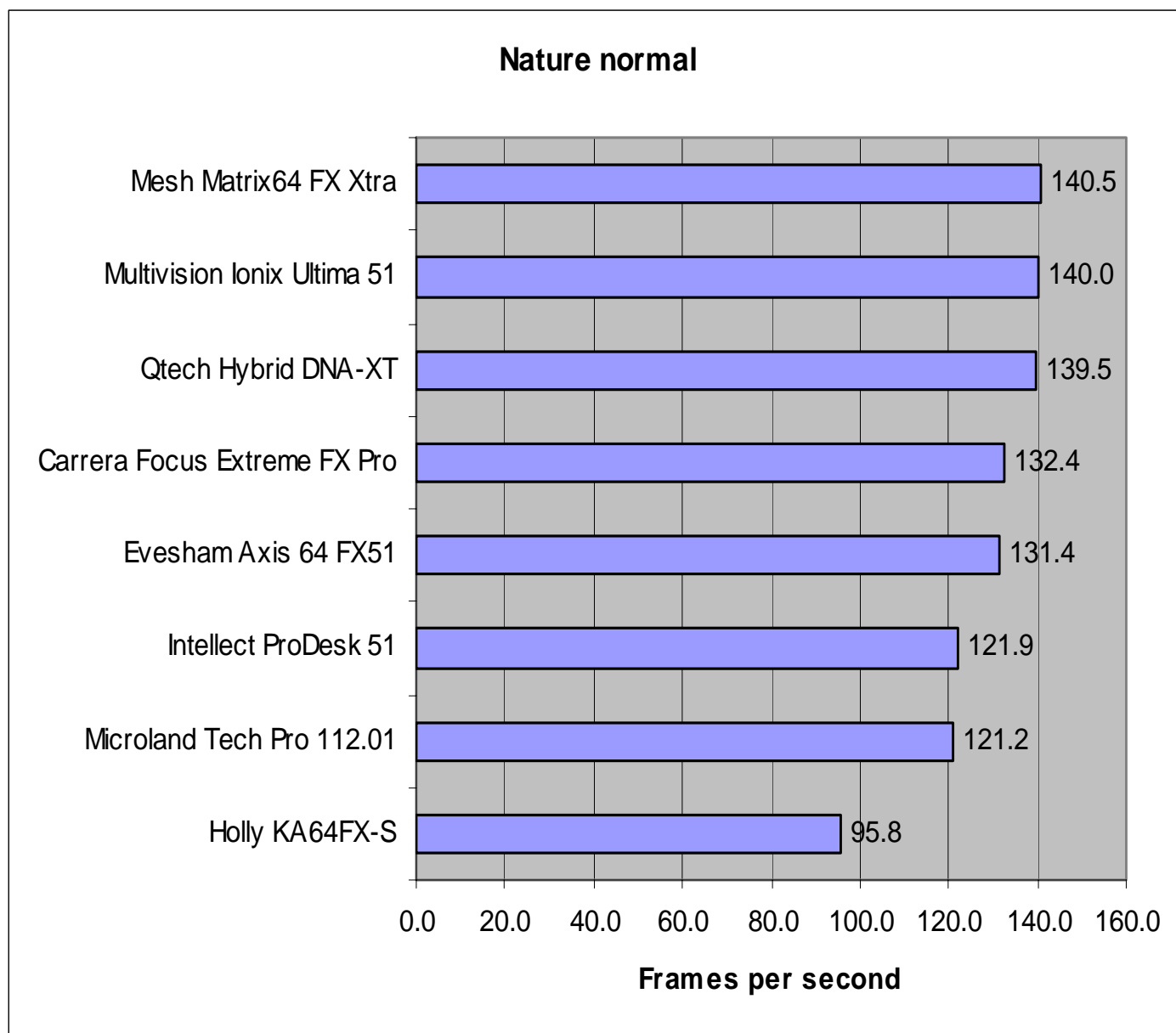
3D tests

3DMark 2001 SE



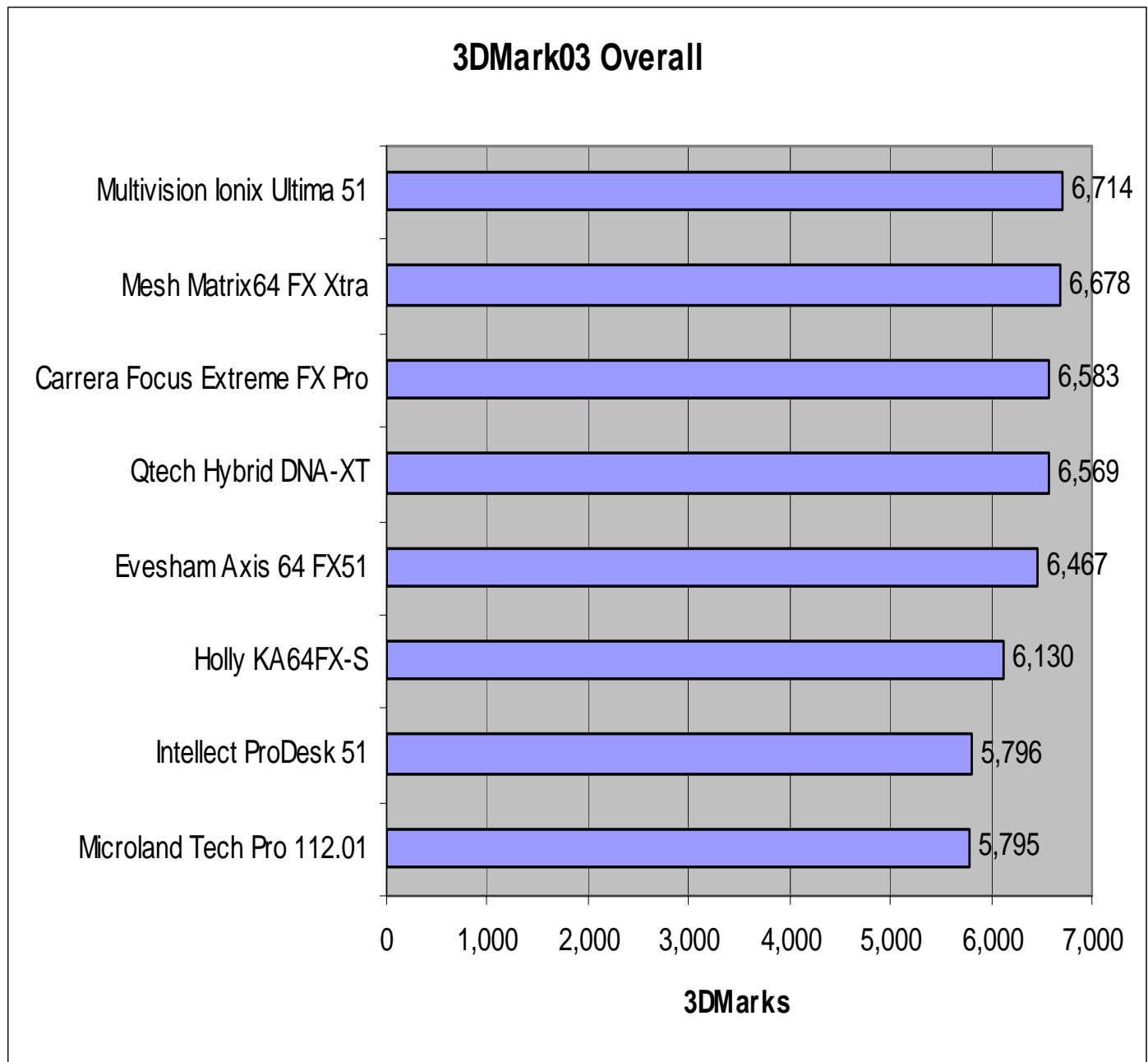
3D tests

3DMark 2001 SE



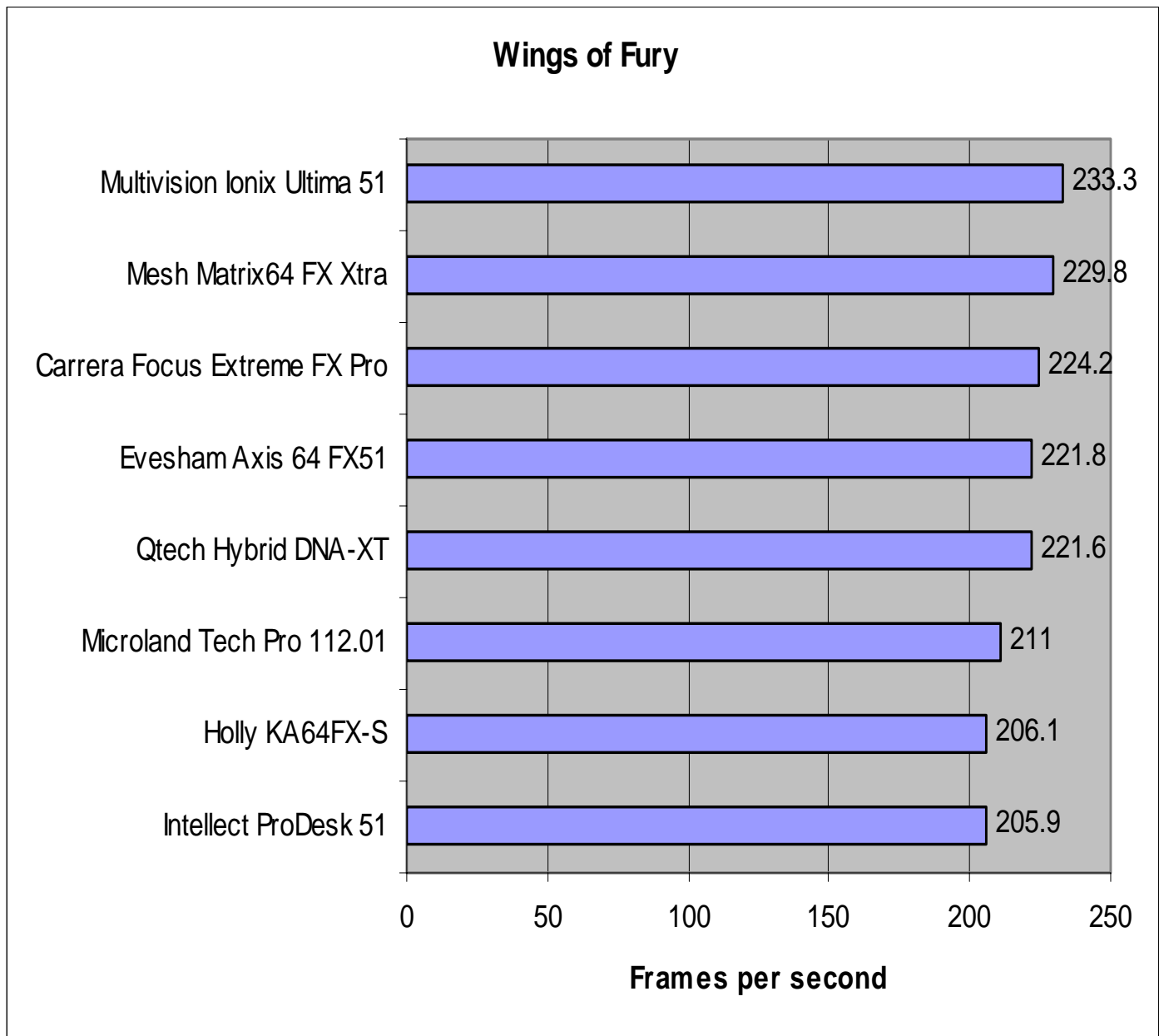
3D tests

3DMark03



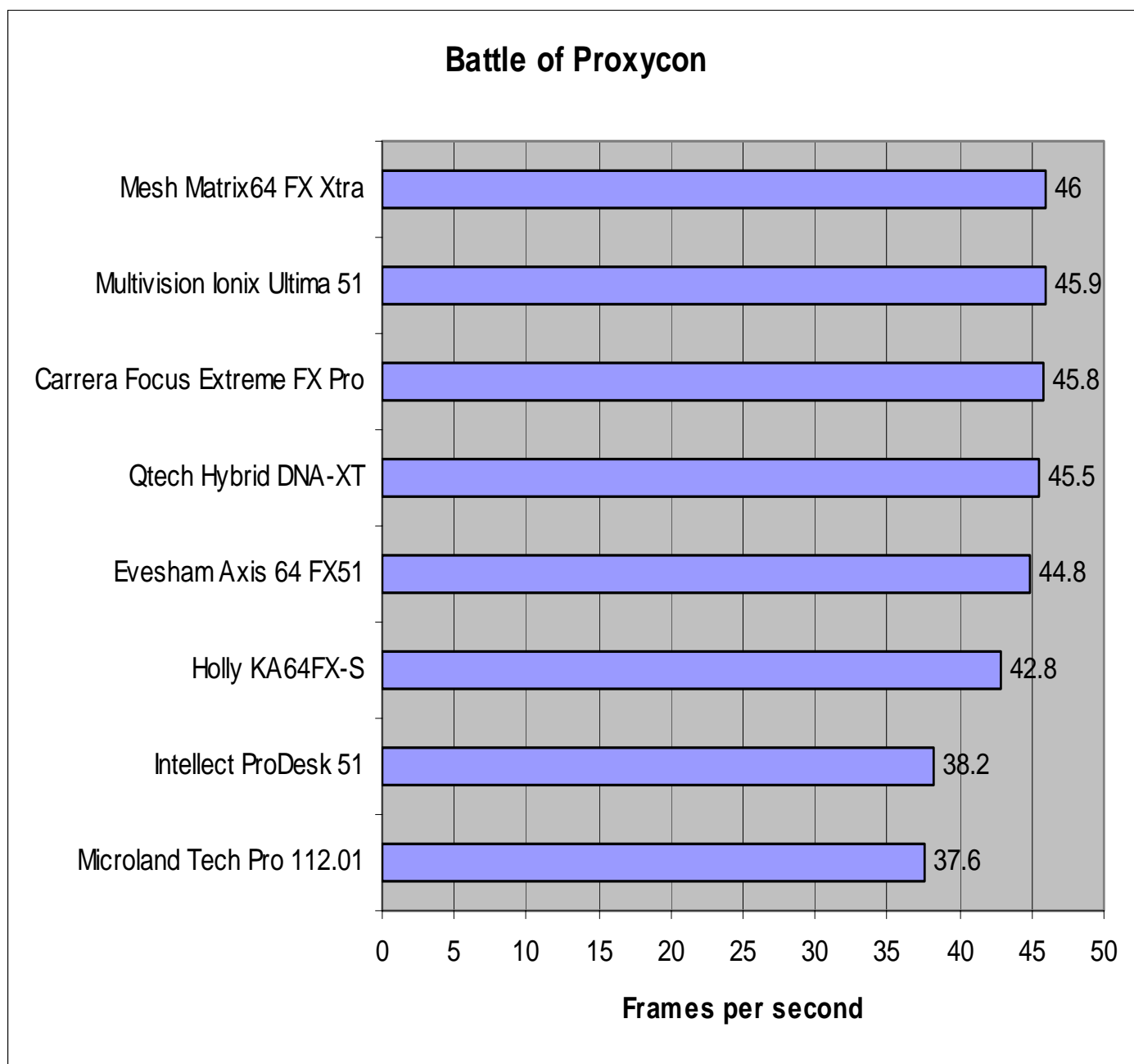
3D tests

3DMark03



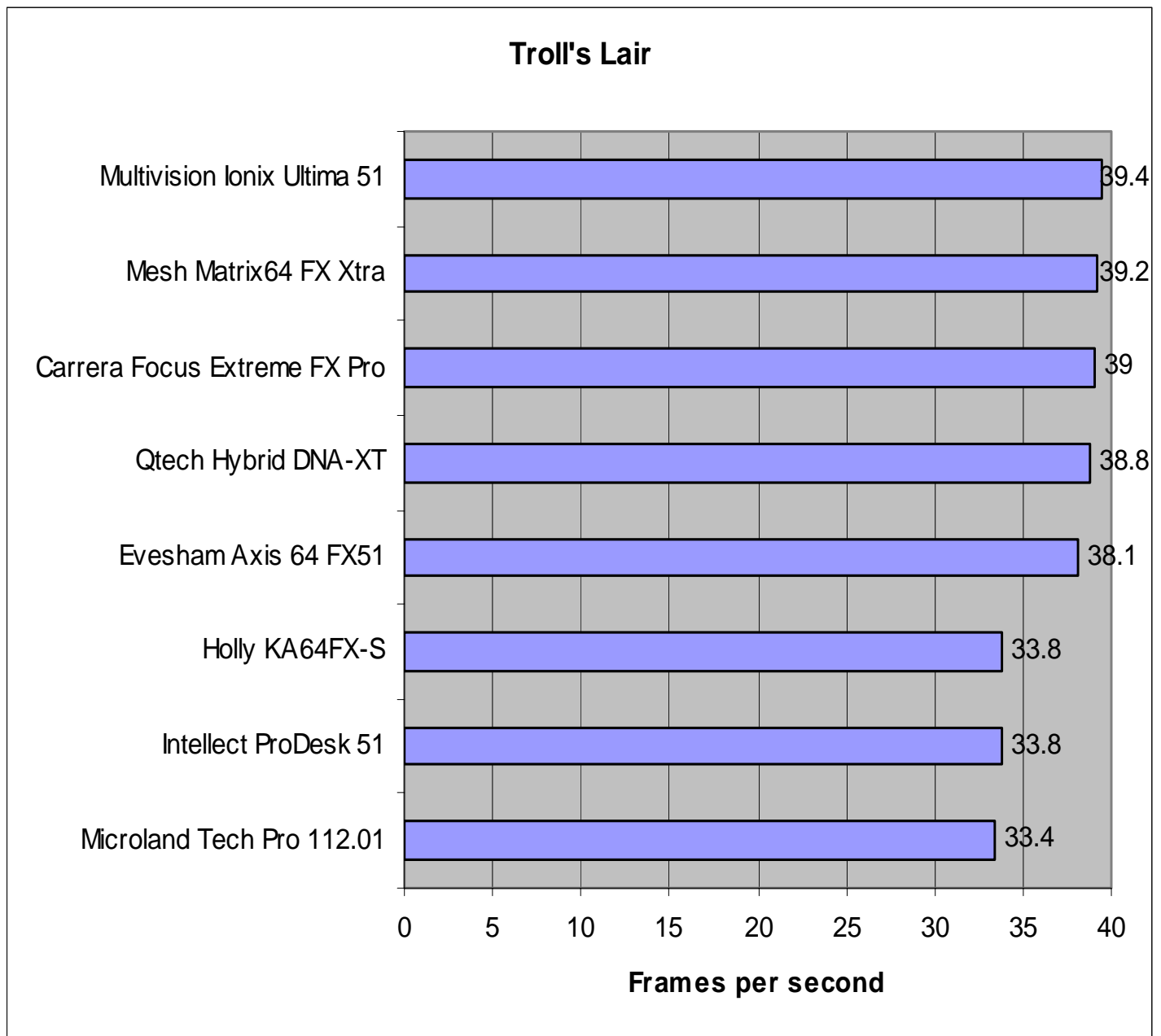
3D tests

3DMark03



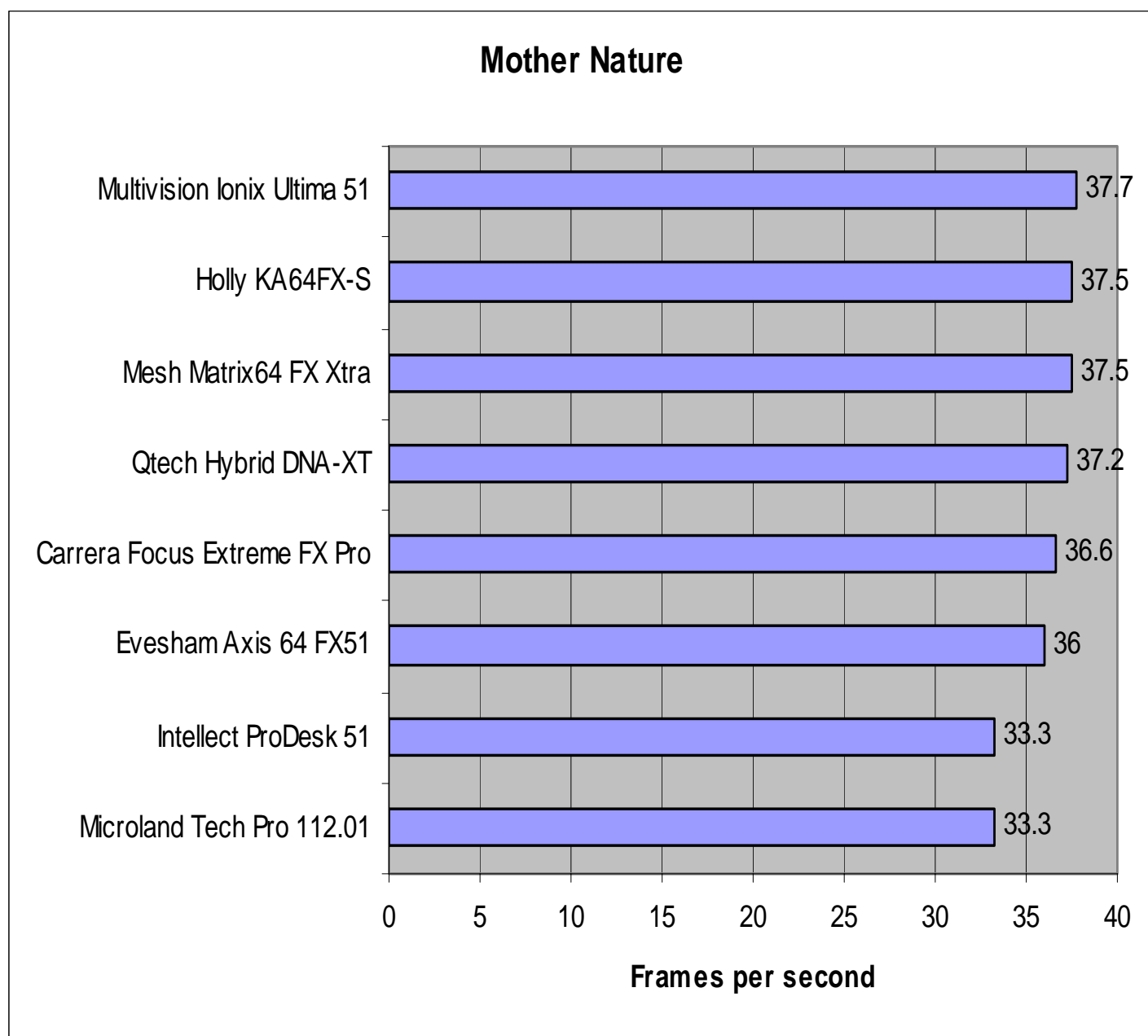
3D tests

3DMark03



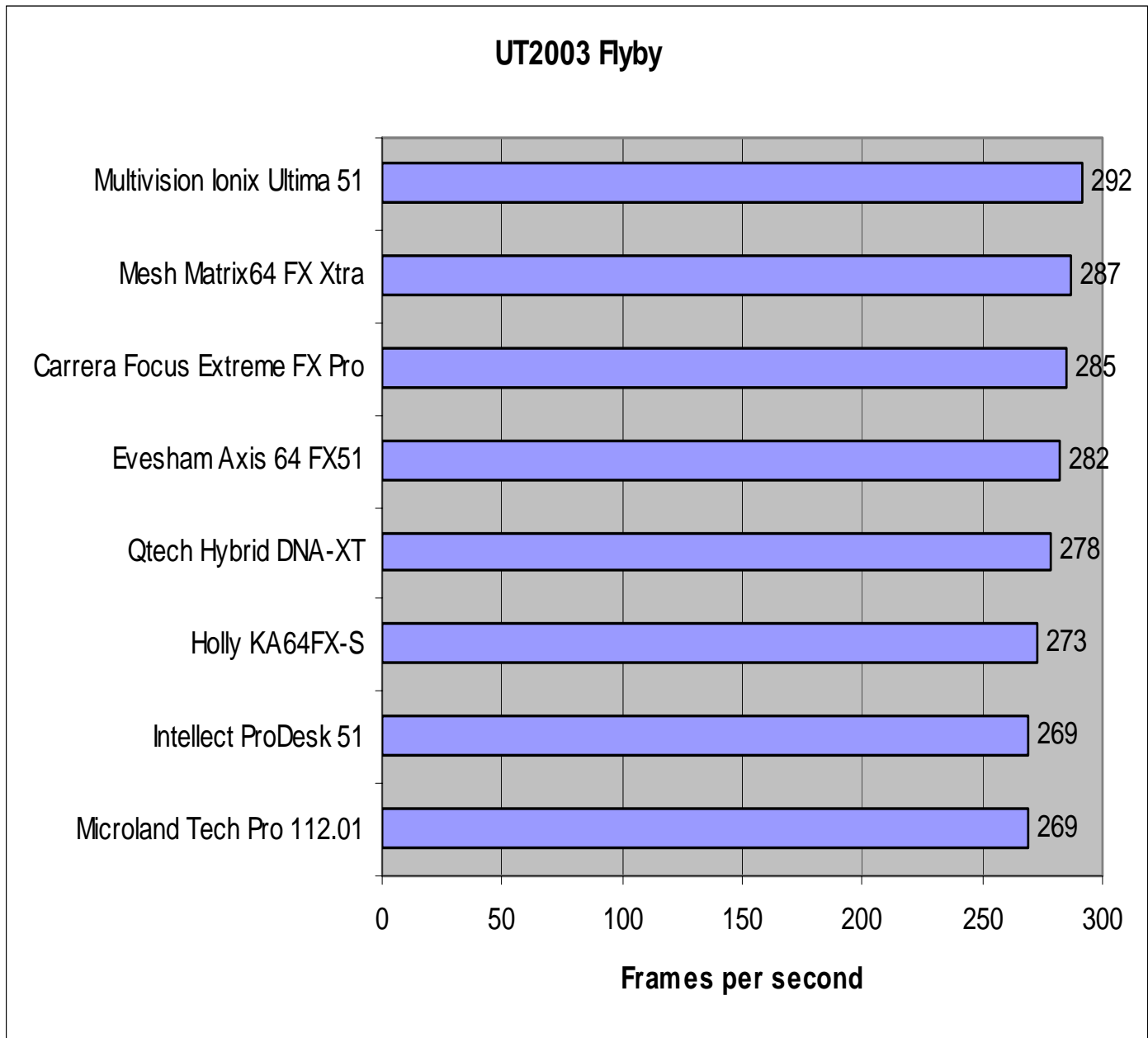
3D tests

3DMark03



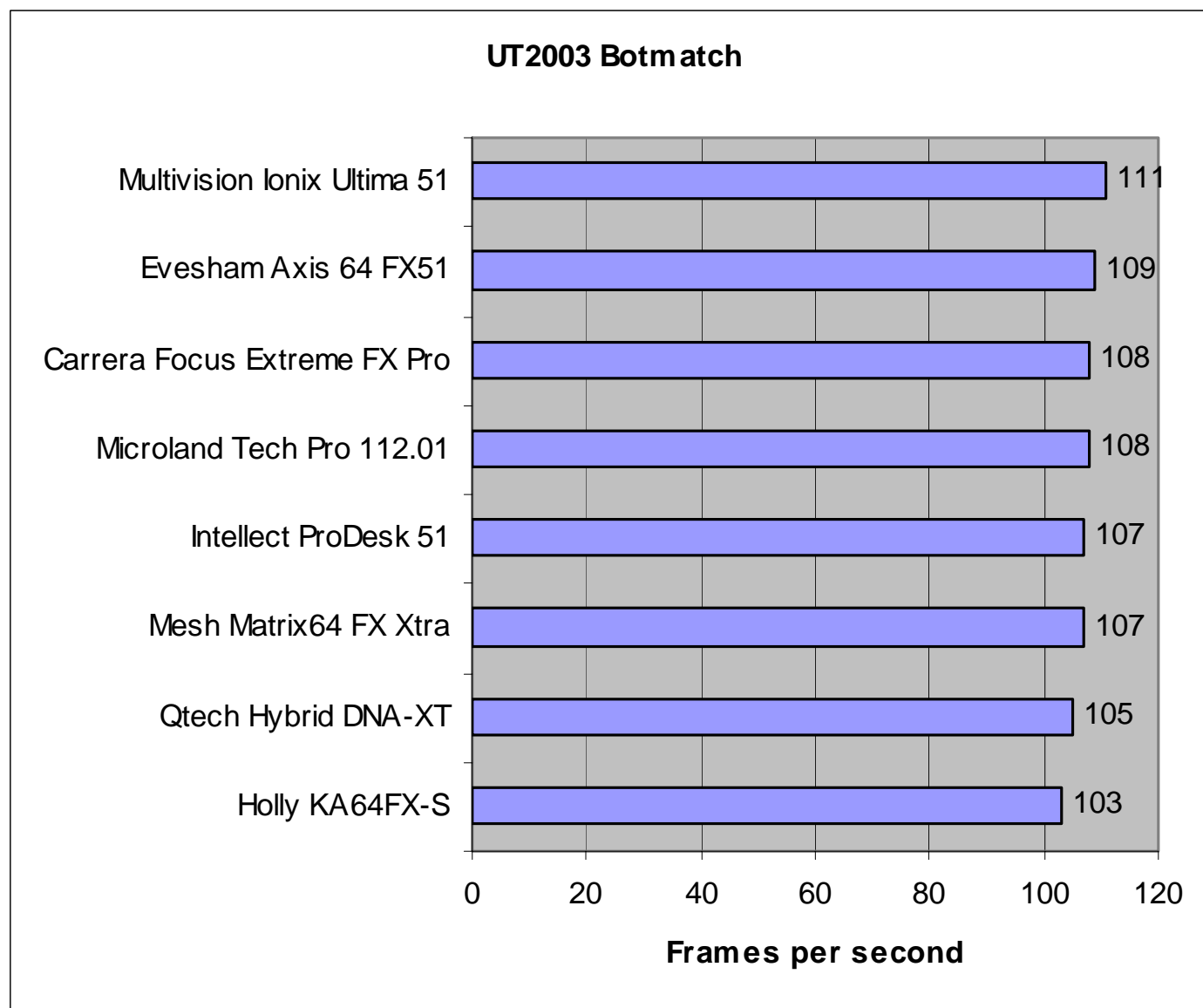
3D tests

Unreal Tournament 2003



3D tests

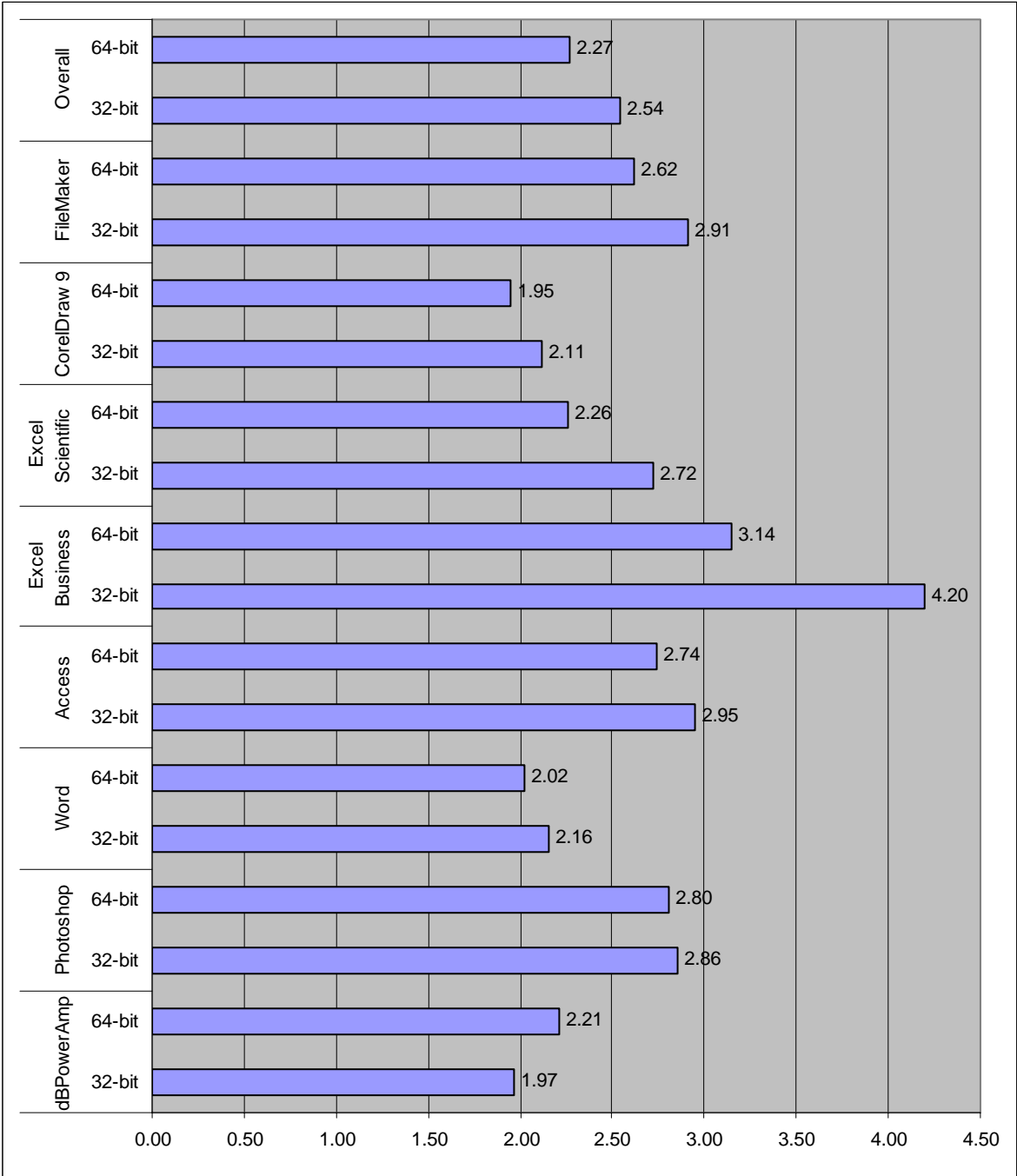
Unreal Tournament 2003





32-bit software on 32-bit and 64-bit operating systems

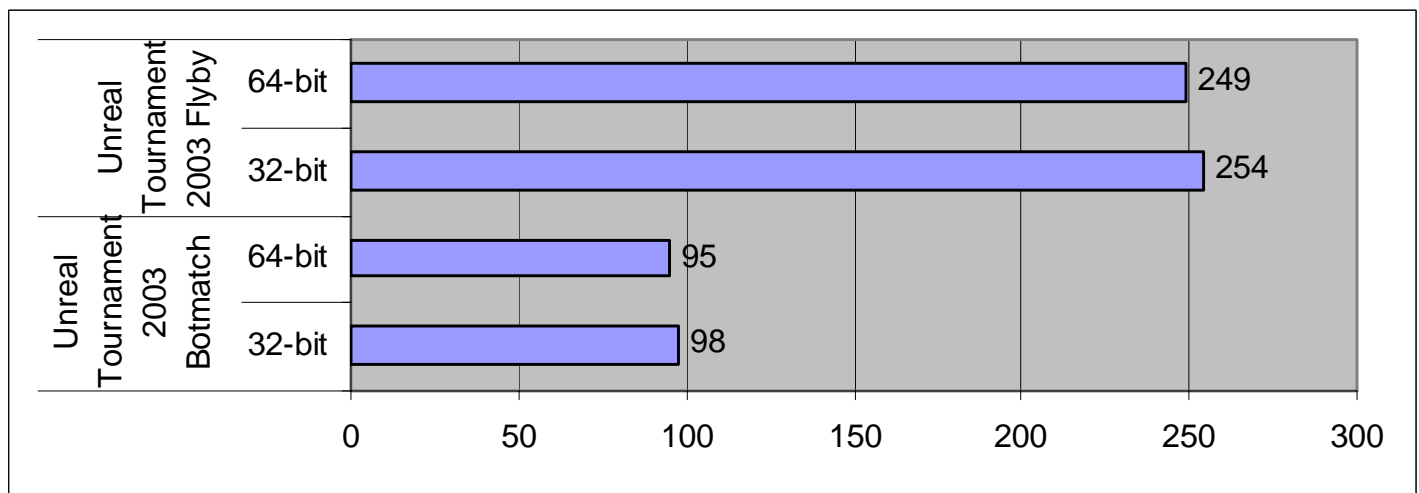
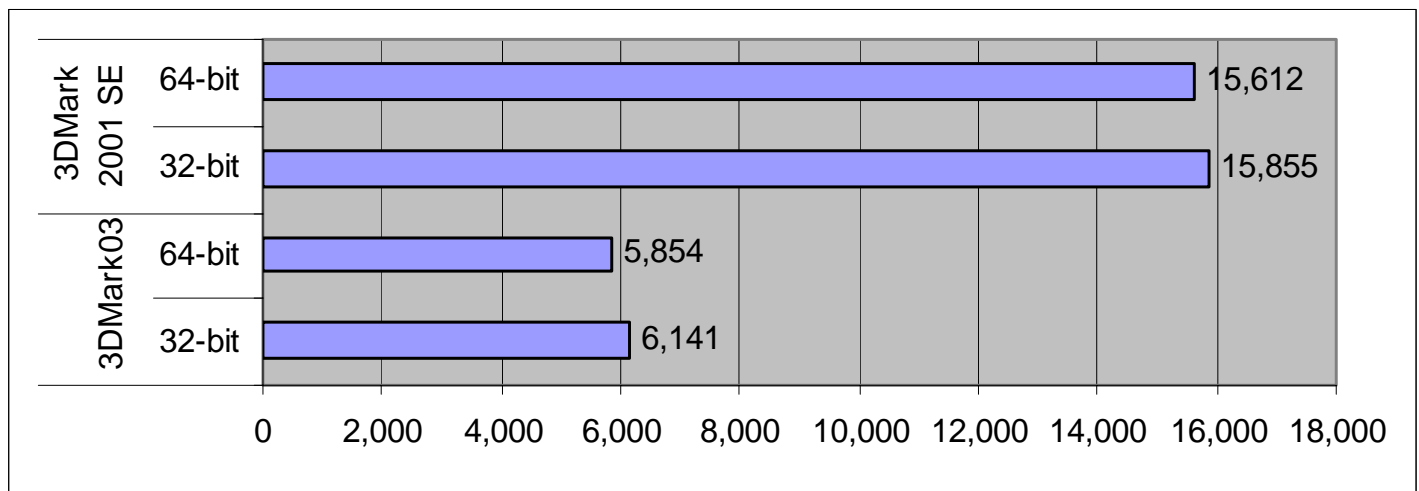
2D Performance





32-bit software on 32-bit and 64-bit operating systems

3D performance





Benchmarking in the real world



Derek Cohen introduces PC Pro's new benchmarks, which are now more demanding and more accurate than ever

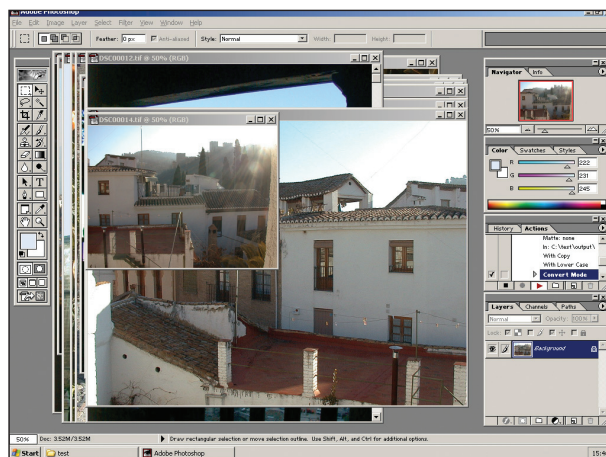
PC Pro has always believed that performance testing of PCs and notebooks has to reflect a reader's own experience. To satisfy this, we developed our own benchmark suite, which used standard business applications rather than low-level component tests to measure performance. It doesn't matter what the clock speed of a CPU is or how many platters a hard disk has; if the whole computer isn't configured with a well-matched set of components, drivers and settings, then your productivity will be throttled by the weakest link.

Our real-world benchmarks are designed to reveal how well a computer runs the tasks common to our readers. More than this, their accuracy is well above any other benchmarks. To be statistically valid, a benchmark suite has to produce results with not just a known accuracy, but also a margin of error that is less than the difference between the products being tested.

In the highly competitive world of PC manufacturing, many manufacturers choose to use very similar components. The result is machines that are only 1 or 2 per cent apart in performance. If a benchmark figure is only accurate to plus or minus 5 per cent (and this is indeed the case with some benchmarks used by other magazines), the tests are of no use in deciding which machine is faster. PC Pro's benchmarks consistently deliver results that are accurate to within 0.5 per cent.

This month sees the launch of the latest release of our benchmarks. We've included some extra programs, updated the editions of others, enhanced the tasks performed and added a multitasking element as well.

Our reference PC (against which all other machines tested by PC Pro will now be compared for performance) is a Dell Dimension 8200, with full specifications as follows: 2GHz Intel Pentium 4, 256Mb of PC800 RDRAM, 64Mb Nvidia GeForce3 graphics card, 100Gb Western Digital



WD1000BB hard disk and Windows XP Professional.

All tests are run using the programs' own scripting languages. The tests are run in sequence and the whole run repeated six times. To ensure consistent results and counter both the applications' and Windows XP's inclination to optimise the scripts by reorganising memory and data, the PC is rebooted between each run of each test. On the Dell Dimension 8200, the entire suite takes six hours to complete, and on the longest individual test there is only two seconds difference between the shortest and longest time for that test.

We also ran the tests on an Evesham PC based on an Athlon XP 2000+, but with an otherwise similar specification to the Dell reference PC. Comparing

The Photoshop test is one of the toughest, with 25 high-resolution photos opened and worked upon simultaneously.

the times for the two machines, the Athlon PC was 35 per cent faster overall. But before everyone rushes out to buy an Athlon, note that a Pentium 4 comes top for 2D speed in our ultimate PCs Labs this month.

Our thanks go to the technical support teams at Adobe, Corel, FileMaker, Media 100 and Microsoft for helping us produce

● OPERATING SYSTEM SHOOT-OUT

In the course of developing these benchmarks, we were able to compare the performance of the same computer (a 1GHz Pentium III PC from Dell) using three versions of Microsoft Windows. The results shown below compare the speed of the PC running the various tests compared to its performance running Windows ME.

The conclusion is clear – Windows XP is faster than either on all tasks except the Microsoft Excel Business task. And if you do a lot of scientific floating point calculations, Windows 2000 would seem to be a better bet than XP. Finally, XP is clearly the winner if you do a lot of database or Photoshop work, both of which make heavy demands on hard disk access.

	Windows 2000	Windows XP Pro
Word XP	1.10	1.12
Excel XP: Business	1.10	0.85
Excel XP: Scientific	1.22	1.08
Access XP	1.20	1.27
FileMaker Pro 5	1.33	1.29
Photoshop 6.01 Pro	0.82	1.58
dBpowerAMP WAV to MP3	0.99	1.26
Cleaner AVI to MPEG-2	1.03	1.17
Overall (weighted score)	1.11	1.16

Windows ME score is 1 in every case



Bugs? What bugs?

Benchmark suites necessarily place some extra demands on a computer. For a start, the applications have to run through their tasks uninterrupted by virus checkers, activation reminders and power management. So it's not surprising that, in an attempt to tame these, we stumbled upon various documented and undocumented 'features'. Here are some of our favourites. We admit some are very obscure.

● If you play videos while your spreadsheet or database is churning away in the background, those

background tasks will complete 25 per cent faster if you use ATI's video player rather than the Windows Media Player.

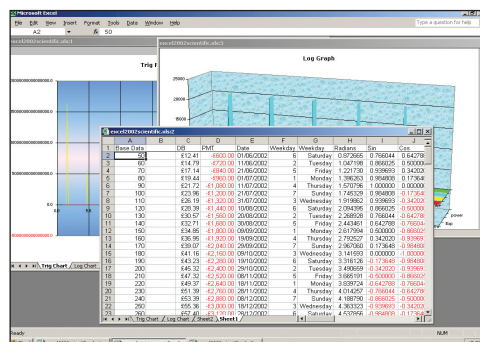
● Do all those fancy rounded dialogs on Windows XP make it run more slowly than if you use the Windows Classic look? Yes, they do. But 1 per cent faster is hardly the basis for choosing between the two themes.

● Use VBA in Microsoft Excel 2000 to select the wall of a 3D chart so you can change its texture. The standard VBA call will fail if your system's default language is set to Spanish. We know this because PC

Pro's Spanish licensee fell foul of this.

● The setting in the Windows 2000 Registry that reports whether a screensaver is active gets stuck in the 'on' position once you enable a screensaver. So even though you have no screensaver enabled, the Registry will still tell you one is if you query it in the documented way.

● An action script in Adobe Photoshop can close down Photoshop when it has finished, but you can't create an 'autoexec' action to run whenever the application starts.



Our Excel Scientific test measures the floating point ability of the PCs.

torture-testing scripts for their applications, to Dell for supply of reference PCs and to *PC Pro* contributors Dave Mitchell, Simon Jones and Tom Arah for devising installation routines and test scripts.

THE TESTS

Word XP

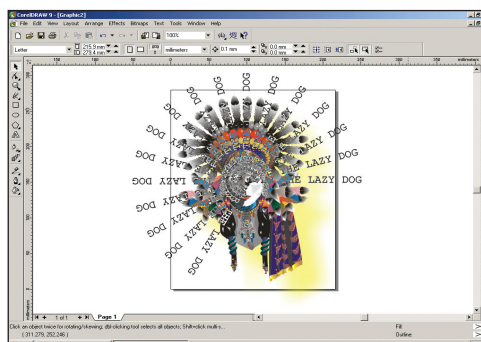
A 145-page document containing numerous tables and images is spell checked, reformatted, annotated, printed and generally worked on to simulate common Word operations. We then generate a product catalogue using a mail merge of over 800 product details.

Excel XP: Business

A multidocument spreadsheet is used, which models the end-of-year financial report of a typical business. The values in numerous key cells are changed, forcing extensive recalculations. The financial health of the business is represented in various summary reports and graphs, which are also reformatted.

Excel XP: Scientific

This test measures the ability of the computer to perform numerous floating point calculations. Trigonometric, financial and statistical transformations are applied to 200



The CorelDRAW script is so demanding that even Corel's technical staff went pale when they saw it running.

changing rows of data, with 3D graphs being drawn of the results. The format of the graphs themselves is cycled through a number of options.

Access XP

Three linked data tables are opened. One contains 438,000 records, one 15,000 and one 400. A series of queries are executed and summary reports produced. Then numerous random queries are generated and values in the returned records changed.

FileMaker Pro 5

Three empty database tables are opened and filled with over 120,000 records, with some of the columns being calculated on the fly. The tables are joined and queried, and the results output to a number of reports.

CorelDRAW 9 Essentials

A complex drawing comprising over 4,000 vector objects is opened and some bitmap objects derived from them. This collection is then overlaid with different types of semi-transparent text that acts as a lens applying transformations to the base objects. After each script step, the program is forced to redraw the whole document. Even Corel's technical staff went pale when they saw this test running.

Adobe Photoshop 6.01

We open 25 high-resolution photographic images from a sunny photo shoot in Spain, then rotate, colour correct and apply filters as necessary. They're then saved in different graphic formats appropriate for further use. We then choose some of the better ones and turn them into a poster and a Web page with buttons and hotspots.

Cleaner 5.01

We use this to convert a 45-second AVI file into MPEG-2. It's notable that this is the most demanding test of the whole suite, lasting for nearly 11 minutes on the reference PC.

dBpowerAMP

This utility is used to convert a 25-minute WAV file into first MP3 and then Windows Media Player formats. Finally, it converts the MP3 file to Windows Media Player format.

Multitasking

To simulate an element of real-world multitasking, we play an AVI file in Windows Media Player simultaneously with the Access, Excel, FileMaker and dBpowerAMP tests.

● CAN I HAVE A COPY?

In order to produce the accurate results we do, our testers have to disable many of the security features that make a computer safe to use. We don't wish to be responsible for encouraging you to make these changes on your own computer, just in case you forgot to turn them on again and suffered a major data loss as a result. So the answer, we're afraid, is no.