



## FEATURES BENEFITS

<b>5th-Generation Workstation Graphics Architecture</b>	Parallel vertex engines, eight programmable pixel pipelines, and workstation specific features result in the industry's highest professional OpenGL and DirectX application performance and quality.
<b>3rd-Generation Vertex and Pixel Programmability</b>	Enables real-time shaders to simulate a wide range of physical effects (such as fresnel effects, chromatic dispersion, reflection, refraction, etc.) and surface properties (such as casting effects, molded surfaces etc.).
<b>Full 128-bit Precision Graphics Pipeline</b>	Enables mathematical computations to maintain high accuracy, resulting in unmatched visual quality. Full 128-bit IEEE floating-point color precision delivers millions of color variations with the broadest dynamic range.
<b>12-bit Subpixel Precision</b>	12-bit subpixel precision delivers high geometric accuracy, eliminating speckles, cracks, and other rasterization anomalies.
<b>16x Full-Scene Antialiasing (FSAA)</b>	Up to 16x FSAA dramatically reduces visual aliasing artifacts or "jaggies" at resolutions up to 3840x2400, resulting in highly realistic scenes.
<b>Powerwall<sup>2</sup></b>	The NVIDIA single-system powerwall technology allows any application to be projected on a dual-channel powerwall, with sophisticated edge-blending to achieve uniform luminosity. Powerwall works transparently with any application.
<b>Genlock/Frame lock<sup>3</sup></b>	The NVIDIA Quadro FX 3000G allows applications to sync video refresh and buffer swaps across multiple systems to create scalable multi-system reality centers for collaborative engineering and design reviews. The NVIDIA Quadro FX 3000G can also sync to standard video formats and house-sync signals for video postprocessing and editing solutions.

### NVIDIA QUADRO FX WORKSTATION GPU

- Full 128-bit floating-point precision pipeline
- 12-bit subpixel precision
- 8 pixels per clock rendering engine
- Hardware accelerated antialiased points & lines
- Hardware OpenGL overlay planes
- Hardware accelerated two-sided lighting
- Hardware accelerated clipping planes
- 3rd-generation occlusion culling
- 16 textures per pixel
- OpenGL quad-buffered stereo (3-pin sync connector)
- AGP 8x with Fast Writes and sideband addressing

### MEMORY

- High-speed memory (up to 256MB)
- Advanced lossless compression algorithms (color and Z data)

### CINEFX SHADING ARCHITECTURE

- Fully programmable GPU (OpenGL 1.5/DirectX 9.0 class)
- Long fragment programs (up to 2048 instructions)
- Long vertex programs (up to 65,536 instructions)
- Looping and subroutines (up to 256 loops per vertex program)
- Dynamic flow control
- Conditional execution

### HIGH-LEVEL SHADER LANGUAGES

- Optimized compilers for Cg, OpenGL shading language, and Microsoft HLSL
- OpenGL 1.5 and DirectX 9.0 support
- Open source compiler

### HIGH-RESOLUTION ANTIALIASING

- Up to 16x full-scene antialiasing (FSAA) up to 2048x1536 per display or 3840x2400 for single digital display
- 12-bit subpixel sampling precision enhances AA quality

### APPLICATION COMPATIBILITY

- Optimized and certified for all leading workstation applications
- Fully compliant with OpenGL 1.5 and DirectX 9.0

### UNIFIED DRIVER ARCHITECTURE

- Single driver supports all products

### OPERATING SYSTEMS

- Windows® XP
- Windows 2000
- Windows NT®
- Windows 98, Windows 95
- Linux—Full OpenGL implementation, complete with NVIDIA and ARB extensions (complete XFree 86 drivers)

### VIEW ARCHITECTURE

- Advanced multi-display desktop and application management seamlessly integrated into Microsoft Windows.
- Dual DVI output—drives two independent digital displays at 1600x1200, or one at 3840x2400<sup>4</sup>
- Dual-link TMDS—drive one digital display up to 2048x1536 and another at 1600x1200 simultaneously<sup>5</sup>

- 400 MHz DACs—two analog displays up to 2048x1536 @ 85Hz each<sup>6</sup>
- OpenGL stereo support for resolutions up to 3840x2400

### PROFESSIONAL CERTIFICATIONS: CAD

- Ansys®
- Autodesk AutoCAD
- Autodesk Inventor
- Bentley Microstation®
- Co|Create™ SolidDesigner
- Dassault CATIA®
- ESRI ArcInfo
- Helix
- ICEmsurf
- MSC Nastran/Patran
- Plant Designer/Imagineer
- PTC® Pro/ENGINEER™
- PTC 3Dpaint™
- SDRC I-DEAS® Master Series
- SolidWorks®
- UGS Solid Edge™
- Unigraphics®
- and many more...

### PROFESSIONAL CERTIFICATIONS: DCC

- Alias Maya®
- Alias StudioTools®
- Discreet 3ds max
- Newtek Lightwave 3D™
- Side Effects Houdini™
- SOFTIMAGE | 3D
- SOFTIMAGE | XSI
- and many more...

1 Bidirectional reflectance distribution function  
 2 Available on NVIDIA Quadro FX 3000G/3000/2000/1100/1000  
 3 NVIDIA Quadro FX 3000G only  
 4 NVIDIA Quadro FX 500 includes one DVI and one analog output, Go700 includes one digital/analog and one TV output  
 5 Dual-link digital display available on NVIDIA Quadro FX 3000G/3000/2000  
 6 NVIDIA Quadro FX 500 includes dual 350MHz DACs

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# The Definition of Performance The Standard for Quality

The NVIDIA Quadro® FX series of professional solutions delivers the fastest application performance and the highest quality workstation graphics. Raw performance and quality are only the beginning—NVIDIA Quadro FX takes the leading computer aided design (CAD), digital content creation (DCC) and scientific applications to a new level of interactivity by enabling unprecedented capabilities in programmability and precision.

For the first time, styling and production rendering become integral functions of the design workflow, shortening the production process and enabling faster time to market.



NVIDIA Quadro FX  
 Product overview  
 November 2003 v07





## The Definition of Performance The Standard for Quality

### NVIDIA QUADRO FX ARCHITECTURE ACHIEVES UNPRECEDENTED PERFORMANCE

The NVIDIA Quadro FX architecture takes application performance to new levels by featuring an array of parallel vertex engines, a radically new line engine, the industry's first on-chip vertex cache, and fully programmable pixel pipelines coupled to a high-speed graphics DRAM bus. Graphics pipeline efficiency is magnified by NVIDIA's next-generation crossbar memory architecture, enabling occlusion-culling, lossless depth Z-buffer, and color compression.

These elements combine to achieve unprecedented 3D primitive performance: 100 million lit and textured triangles per second, five times faster line performance than the NVIDIA Quadro4 professional graphics solutions, and massive fill rate powered by eight pixel pipelines. But the true measure of power is application performance—and the NVIDIA Quadro FX architecture delivers more than double the performance vs. the previous generation.

In addition, all NVIDIA products utilize the NVIDIA Unified Driver Architecture (UDA), which is continually optimized for performance, quality, and support throughout the life of every NVIDIA Quadro product.

### ADVANCED PROGRAMMABILITY EMPOWERS A NEW CLASS OF APPLICATIONS

The design cycle is a long, iterative process from concept, to modeling, to final production. This final production can require hours of offline CPU rendering. The programmability of the NVIDIA Quadro FX architecture empowers the industry's leading OpenGL® and Microsoft® DirectX® workstation applications to now make the production rendering process an integral part of real-time design. This reduces design cycles, increases productivity, and accelerates time to market.

Leading this change in functionality are the major CAD and DCC application vendors, including: SolidWorks®, Alias®, Discreet®, Softimage®, and more. End users can take full advantage of the programmable NVIDIA Quadro FX architecture by enabling sophisticated shaders to simulate a virtually unlimited range of physical characteristics, such as lighting effects (fresnel effects, chromatic dispersion, reflection, refraction, BRDF<sup>1</sup> models, etc.) and even physical surface properties (such as casting effects, porosity, molded surfaces, etc.).

### The Benefits of High-Level Shading Languages

NVIDIA Quadro FX programmable graphics pipelines leverage high-level shading languages to enable the creation and integration of real-time photorealistic effects into 3D models, scenes and designs. This represents a major leap forward in ease and speed for the creation of real-time, realistic graphics within MCAD, DCC, and scientific applications.

1 Robust Skeletal Animation  
`worldNormal = worldNormal + a2v.  
 boneWeight0_3.z *  
 vecMul(model[a2v.boneIndex0_3.z],  
 objectNormal.xyz);`

2 Colored Translucence  
`fixed3 diffTerm = diffTerm + 0.3 *  
 bgImg *  
 tex2D(translucenceMap2, diffCol.xy);`

3 Skin Oil Variations  
`fixed3 sheen = oilSpec * tex2D  
 (oilMap, diffFuseCoord.xy).xyz;`



Image courtesy of SolidWorks.

Designers can now interactively modify and view surface finishes on dashboards or hand tools by modifying the stipple and surface reflectance; the sheen of a character's skin can be adjusted through a dynamic range from oily to dry by interactively adjusting a few sliders; or objects can be programmed to dynamically self shadow. Real-time shaders allow these effects to be combined and modified interactively—impossible with simple 2D static texture maps.

### FULL 128-BIT FLOATING-POINT PRECISION DELIVERS THE INDUSTRY'S HIGHEST WORKSTATION QUALITY

Sophisticated real-time effects typically involve multiple mathematical operations that demand high precision to maintain image quality. The NVIDIA Quadro FX features 128-bit IEEE floating point precision, making available millions of colors in a broad dynamic range. This results in the highest level of accuracy and the ultimate in visual quality.

High subpixel precision is another major contributor to image quality, addressing visual anomalies that cause models to "speckle" or "crack." The NVIDIA Quadro FX virtually eliminates this problem by providing 12 bits of subpixel precision—four times higher precision than the nearest competitive product.

Precision continues to be a critical factor when rendering high quality antialiased images—for both line and full-scene antialiasing. The NVIDIA Quadro FX architecture accelerates antialiased points and lines in hardware, and supports up to 16x FSAA. And unlike other graphics hardware, NVIDIA Quadro FX products drive up to a phenomenal 3840x2400 resolution.

### CERTIFIED FOR THE HIGHEST QUALITY EXPERIENCE WITH THE MOST DEMANDING WORKSTATION APPLICATIONS

The performance and power of the NVIDIA Quadro FX are built on a solid foundation of quality engineering. This engineering excellence is exemplified by the NVIDIA Unified Driver Architecture (UDA), which is certified for quality by the entire spectrum of CAD and DCC applications.

The true power of UDA lies in the breadth of supported products and its long-term delivery of quality and performance. All NVIDIA Quadro products, including previous generations, are continually tested and certified. This rigorous testing process results in the industry's highest quality hardware and drivers, even with applications released long after an NVIDIA Quadro product may have shipped.

Productivity is increased by the award-winning NVIDIA® nView™ multi-display solution. nView is seamlessly integrated within the display environment, helping users

to maximize productivity through advanced desktop and application management. nView offers the perfect complement to the industry's highest quality workstation graphics product line.

### THE DEFINITION OF PERFORMANCE THE STANDARD FOR QUALITY

Productivity improvements can be achieved in two ways—through speed, or through efficiency. The right graphics hardware can enable both. Based on a foundation of quality engineering, NVIDIA Quadro FX delivers blistering application performance, unmatched features, and the industry's highest image quality. Coupled with professional CAD and DCC applications, the NVIDIA Quadro FX makes real-time rendering an integral part of the design workflow.



	POSITIONING	ARCHITECTURE	HIGH LEVEL SHADING LANGUAGES
NVIDIA Quadro FX 3000G	Revolutionary multi-system scalable advanced visualization power	<ul style="list-style-type: none"> <li>128-bit IEEE floating-point precision graphics pipeline</li> <li>128-bit color</li> </ul>	<ul style="list-style-type: none"> <li>High-level shader language compiler (Microsoft HLSL and Cg for the latest DirectX 9 and OpenGL 1.5 APIs)</li> <li>Open-source compiler</li> </ul>
NVIDIA Quadro FX 3000	Ultimate power for full-scale models and datasets	<ul style="list-style-type: none"> <li>12-bit subpixel precision</li> <li>Up to 256MB high-speed SDRAM</li> <li>Up to 27.2GB/s. memory bandwidth</li> </ul>	
NVIDIA Quadro FX 2000	High-end workstation features and performance	<ul style="list-style-type: none"> <li>Up to 16x FSAA</li> </ul>	
NVIDIA Quadro FX 1100	Revolutionary NVIDIA Quadro FX architecture delivers industry leading performance	<ul style="list-style-type: none"> <li>CineFX™ shading architecture               <ul style="list-style-type: none"> <li>2,048 fragment instruction</li> <li>65,536 vertex instruction</li> </ul> </li> </ul>	
NVIDIA Quadro FX 1000	Excellent combination of features, price and performance	<ul style="list-style-type: none"> <li>3D volumetric textures</li> <li>Single-system powerwall</li> <li>Multi-system frame lock</li> </ul>	
NVIDIA Quadro FX 500	Full NVIDIA Quadro FX features at an entry-level price	<ul style="list-style-type: none"> <li>Genlock</li> </ul>	
NVIDIA Quadro FX Go700	Uncompromised professional graphics to Go		



The new Dell Precision™ M60 mobile workstation featuring NVIDIA Quadro FX Go700 graphics