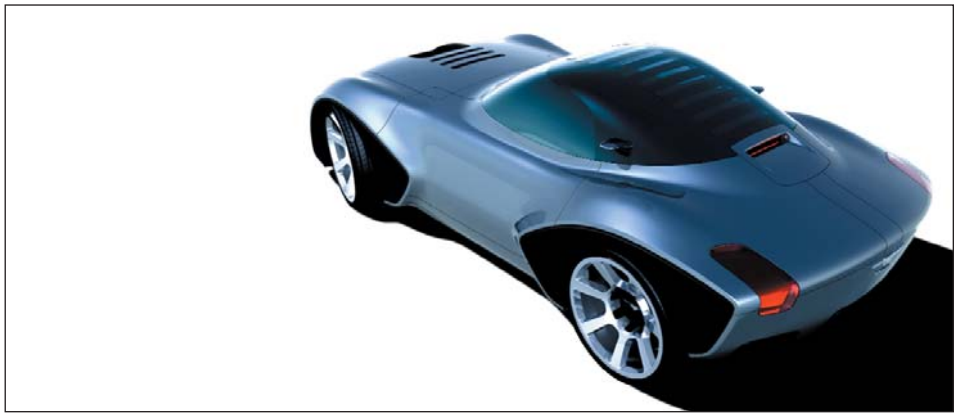
Solutions Brief

# Enabling Better Design Decisions



Conceptual sportscar rendered using Opticore Opus RTRT with SGI. Image courtesy of Paulin Motors.

## SGI®/Opticore Desktop Real Time Ray Tracing Solution

### Unleash Product Design Creativity with Turnkey, Interactive, Physics-based Desktop Visualization

### SGI and Opticore Bring Real Time Ray Tracing to the Desktop

SGI and Opticore are pleased to offer a complete desktop visualization and communication software solution for major manufacturing companies and design organizations. This feature-rich, turnkey solution allows designers to interact with photo realistic renditions of their products using Opticore's real time ray tracing module by taking advantage of the compute horsepower of SGI® Visual Solutions VSS workstations. VSS can include up to eight Intel® Xeon® processor cores and one or two professional grade NVIDIA® Quadro® FX GPUs. This solution bundle includes the VSS system and Opticore Opus R12 software with the RTRT real time ray tracing module. Factory preloading and tuning of the software and hardware ensure that designers can visualize their designs from the moment the system is unboxed and powered on. Best of all, this solution is supported by world class support from SGI and Opticore – your visualization partners.

### Opticore Opus Real Time Ray Tracing Module

The Opticore Opus Real Time Ray Tracing module provides a unique integration of Opticore's proprietary Real Time Ray Tracing technology with traditional OpenGL® real time rendering support available in the Opticore visualization products. Using Real Time Ray Tracing, physics-based simulation of advanced visual effects such as light reflection and refraction can be achieved, providing a better base for decision within interactive design reviews.

Opticore Opus Real Time Ray Tracing provides support for:

- Realistic visualization of complex shapes such as car headlights and taillights
- Correct visualization of self-reflections
- Interactive evaluation of driver visibility, including rear mirror visibility and glare conditions (e.g., reflections in the instrumentation cluster and windshield).

The included Opticore Opus Real Time Ray Tracing solution is an add-on module to Opus Realizer and Opus Studio R12. This module provides:

**Fully Integrated Opticore Real Time Ray Tracing Support**

The Opticore Opus Real Time Ray Tracing module is fully integrated within Opticore Opus Realizer and Opus Studio products, providing easy and efficient setup and reusability of visual properties for both traditional real time rendering

and Opus Real Time Ray Tracing. The integrated solution facilitates support for easy switching between traditional OpenGL rendering and Real Time Ray Tracing for a simulation.

**Real Time Ray Tracing for Your Desktop**
Using cutting-edge technology for optimized ray tracing, together with a unique Opticore adaptive solution, Opus Real Time Ray Tracing can be brought to your desktop without need for expensive and dedicated ray tracing cluster hardware. For high-resolution presentation environments, the Opus Real Time Ray Tracing solution will incorporate a license mechanism to provide fully scalable hardware support for improved performance and resolution.

**High Definition Image and Movie Generation**
The Opticore Opus Real Time Ray Tracing solution provides support for generation of high-resolution images and movie output. As the setup for ray traced image generation can be done in real time, the feedback on final image quality is immediate, thus ensuring time-efficient image preparation. With this solution, what you see is what you get!

## Opus Real Time Ray Tracing Features

**Full Scene True Real Time Ray Tracing**
Opticore's ray tracing solution features true ray tracing rendering for the entire scene in real time. Even in ray tracing mode you can still fully interact with your presentation (for example, trigger animations and variants, use environments and turntables, adjust shaders, textures and lighting, etc.) without switching to OpenGL rendering mode. Working directly in ray tracing mode allows the user to get instant feedback for real time evaluation


and also enables a highly efficient setup for generation of high quality still images and movies.

**Physically Correct Reflections and Refractions**
Opticore's ray tracing solution can simulate both reflection and refraction in a physically correct way–and do it with interactive performance.

The reflection functionality uses a Fresnel effect to correctly simulate the reflected amount of light which is normally lower when looking straight at a surface (for example, the body of a car). With ray tracing even local reflections are correctly simulated, something that is not possible with normal OpenGL rendering.

With the refraction functionality it is possible to visualize both thin surfaces with an optional thickness and solid transparent objects. This means that we can simulate parts of a car such as the windscreen and headlights with a great amount of realism.

**Dynamic Scenes and Animations**
The Opticore Opus Real Time Ray Tracing solution provides support for dynamic scenes with animated objects, lights, and cameras. Everything is updated and ray traced in real time.

**Extensive Shader Support**
All shader effects, such as image-based lighting and HDRI, bump mapping, orange peel effects, post-processing effects, and others that are available in Opticore's OpenGL renderer are also supported in ray tracing mode out of the box.

**Physically Correct Soft Shadows**
Physically correct soft shadows are rendered with interactive frame rates even on a single desktop computer. Softness and quality can be adjusted in real time.

**High Quality Rendering Features**
Features usually found in offline batch renderers, like high quality anti-aliasing and depth of field, are now available at interactive frame rates.

**Performance and Scalability**
Opticore Opus Real Time Ray Tracing uses advanced acceleration methods to provide interactive performance of high quality renderings even on a single desktop computer. It is fully multithreaded to take maximum advantage of multi-core and multi-processor systems and will in addition provide support also on high-end clustered environments.

## Innovation Without Limits – SGI Visual Solutions Family

The SGI Visual Solutions family extends the SGI heritage of visual computing with a new line of high-performance, professional-grade workstations that provide world-class performance and exceptional value for a range of budgets and price points. The systems incorporate the latest Intel Xeon workstation processor technology from Intel and high end graphics technologies from NVIDIA.

# SGI®/Opticore Desktop Real Time Ray Tracing Solution

| VSS 40/80 Key Features and Key Benefits | |
|---|---|
| x86 workstation environment using industry standard components | Run all Opticore products as well as thousands of other off-the-shelf Windows® or Linux® applications to become productive immediately. |
| Based on dual-core and quad-core Intel® Xeon® processors | Provide ultimate performance for advanced real time visualization and ray tracing tasks all from a desktop workstation right at the designer's desk. |
| 64-bit global shared memory | Run one copy of the operating system and have up to 8 processor cores addressing up to 32 GB of RAM and computing real time ray tracing in parallel. |
| Scalable graphics | Connect up to two NVIDIA® professional grade GPUs, sync them together and drive up to four dual-link DVI displays simultaneously. |


**World Class Desktop Performance Enables Ray Tracing in Real Time**
Based upon 64-bit x86 computing technologies, the SGI Visual Solutions VSS system with Intel dual-core (VSS 40) and quad-core CPUs (VSS 80) brings real time ray tracing to the desktop using Opticore Opus Studio R12 with its RTRT ray tracing module.

In a VSS 80, eight separate 64-bit Intel Xeon CPU cores work in parallel, addressing up to 32 GB of RAM to generate interactive, photo-realistic ray traced scenes in real time.

**SGI Professional Services and Opticore**
SGI and Opticore understand your challenges and are dedicated to helping you achieve breakthrough performance. SGI and Opticore provide a complete pre-installed tuned visualization solution. We also provide world leading technical expertise in advanced visualization, high performance computing, and storage to make everything work together to achieve the results you expect.

**Complete Collaborative and Interactive Solutions**
SGI and Opticore bring complete real time visualization solutions to the desktop as well as large scale display systems for demanding tasks such as automotive styling and product design. It's a complete "one stop shop" solution that includes compute hardware, the display system, visualization software, peripheral components and project management.

**SGI Professional Services and Reality Centers**
Since SGI opened the world's first Reality Center facility in Reading, England in 1994, the SGI Reality Center concept has generated excitement in industry,


academia, and the media. As the industry's pioneer, SGI has created solutions to ease your transition to immersive visualization. The goal is to help you implement advanced visualization technologies as powerful business tools, complementing and dramatically improving your business processes.

# SGI®/Opticore Desktop Real Time Ray Tracing Solution

**Manufacturing**

Reality Center collaborative visualization facilities are indispensable tools for the manufacturing industry, providing rapid return on investment and improved product development processes. Engineers and designers can create digital models and implement design changes in a fraction of the time it takes to build expensive physical prototypes, saving money, reducing time to market, and improving quality and safety. With Reality Center facilities, engineering, procurement, and marketing teams are now able to participate in high-fidelity, 1:1 scale real time 3D walk-throughs to visualize and interact with every part of a complex design, achieving consensus and avoiding costly mistakes before beginning production.

**Pick Your Level of World-Class Support**

SGI provides a range of support options to best meet your enterprise's needs. For those with IT organizations who prefer to support their own systems, SGI provides phone support and next-business day advanced parts exchange. We also offer SGI's highly rated onsite hardware support at a range of response times to meet your exact requirements.


**SGI - Innovation for Results™**

SGI delivers a complete range of high-performance server and storage solutions along with industry-leading professional services and support that enable its customers to overcome the challenges of complex data-intensive workflows and accelerate breakthrough discoveries, innovation and information transformation. SGI helps customers solve their computing challenges whether it's enhancing the quality of life through drug research, designing and manufacturing safer and more efficient cars and airplanes, studying global climate, providing technologies for homeland security and defense, or helping enterprises manage large data. With offices worldwide, the company is headquartered in Mountain View, Calif., and can be found on the Web at www.sgi.com.

**Opticore – the Company**

Opticore is the world's leading provider of real time interactive photo-realistic visualization software. More than 200 companies world-wide are using Opticore OPUS, including AUDI, Bertone, BMW, Canon, Electrolux, Ford, Hyundai, ItalDesign–Giugiaro, Jaguar, Renault, Nokia Mobile Phones, Philips, Pininfarina, Scania Trucks, TATA Motors, Volvo, and eight Japanese automotive makers.



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