Solutions Brief

Advanced Visualization in Manufacturing Product Development: CATIA® V5/ENOVIA™ DMU V5 for Digital Mock-Up on SGI® Onyx® 350 InfinitePerformance™ Graphics System

The Problem

In order to bring a new product to market successfully, manufacturers need to consider and satisfy many requirements. Some of the considerations include:

- The appropriate product features to meet consumer tastes
- Maintaining high-quality products
- Delivering product differentiation as compared with the competition
- Meeting environmental and safety requirements
- Forecasting the cost of maintenance and service

Along with these requirements, manufacturers have been facing several fundamental changes within their industry. These include the change in cost-savings focus from the manufacturing process to the design process. They also include shorter product life cycles, which lead to an increase in design frequencies and shorter overall design cycles. So the question arises: how do manufacturers meet the challenges of reducing design costs while increasing the productivity of engineers in order to produce additional products faster?

Manufacturers have spent many years reducing the costs of the manufacturing process only to realize that these costs typically make up only 20% to 30% of the overall product costs. The remaining 70% to 80% of the costs lies in the product development process. This means that no matter how efficient the manufacturing process, the main focus of cost-savings efforts must be within the up-front product design stage. In order to reduce these costs, manufacturers must look at advanced design processes. Today, these processes focus on advanced visualization applications that allow engineers to design products in a digital format, thus saving costs on physical prototypes and the tooling required to make the prototypes. But these digital prototypes are becoming more complex, because the new products are generally more complex than their predecessors. This increase in product complexity leads to an increase in data complexity that must be handled by improved image generation hardware and advanced engineering software.

Manufacturers must also ensure that their design engineers have the appropriate tools to increase their productivity in order to meet the increased frequency of product designs. Products today often have a shorter life cycle than their predecessors did. Companies realize that the highest prices can be charged in the beginning of a product life cycle. As competitive forces drive faster obsolescence and lower prices for older products, companies are forced to design new products faster to take advantage of a narrowing profitability window. This means that companies are interested in increasing the frequency at which they design products. In order to meet the increase in frequency, it is imperative that manufacturing companies provide their design engineers with the latest and greatest tools for the purpose of keeping them productive. Often, engineers cannot view their models on existing desktop workstations, because the full assemblies are too large. SGI has an affordable solution that will enable engineers to be more productive by allowing them to view larger models at interactive speeds.

Solution Description

The solution to this problem is the combination of the SGI Onyx 350 system with InfinitePerformance graphics and CATIA V5/ENOVIA DMU V5 from Dassault Systemes. CATIA V5/ENOVIA DMU V5 software enables people involved in engineering and process decisions to perform collaborative and immersive visualization, navigation, review, analysis, and simulation of all the complexities of digital mock-ups and technical data. CATIA V5/ENOVIA DMU V5 offers design review capabilities that can be extended to technological, spatial, and motion synthesis. Designed for multi-CAD and product life-cycle management compatibility,

CATIA V5/ENOVIA DMU V5 facilitates digital mock-up processes required by manufacturers to sustain a productive global engineering environment. It also allows manufacturers to transform product information into business intelligence, providing support for fast and decisive decisions in the product development process.

Along with the SGI Onyx 350 InfinitePerformance system, which offers up to 141.5 million polygons per second and 3.85 billion pixels per second of sustained performance, this solution allows you to interactively visualize your toughest problems. Interactivity is key to manufacturers because the engineers need to modify their complex models in order to make appropriate design decisions. This remarkable performance is available in a cost-effective package that simplifies work for people requiring polygon-intensive applications such as ENOVIA DMU Navigator. The Fibre Channel disk subsystem of the SGI Onyx 350 visualization system provides loading of models in CATIA V5/ENOVIA DMU V5 that is several times faster than traditional SCSI disks.

SGI Onyx 350 InfinitePerformance provides multiuse graphics performance at unprecedented prices. The unique SGI® NUMAflex™ architecture eliminates the internal bandwidth constraints that cause data congestion in most computer systems. This enables polygon-intensive ENOVIA DMU Navigator to run quickly and effortlessly, so users can get to work immediately rather than wait minutes for data to load, thus enhancing the productivity of the engineer and the engineering team. The benefits will be recognized immediately.

With the SGI Onyx 350 InfinitePerformance system, it is possible to drive a multichannel SGI® Reality Center® room or wall facility with a dedicated graphics pipe per channel at a much lower price than the SGI® Onyx® 3000 system with InfinitePerformance, thus adding immersive visualization to the product design process. The SGI® shared-memory system architecture removes communication bottlenecks found in typical clustered visualization solutions, therefore guaranteeing the highest level of interactivity for large-model visualization. Along with optimized CATIA V5/ENOVIA DMU V5 software, this solution offers a new experience that provides engineers with an improved way to evaluate their data. Greater affordability allows you to make collaborative visualization available to many teams, empowering your users to make critical decisions in a timely manner.

SGI Onyx 350 InfinitePerformance is certified with all CATIA V5/ENOVIA DMU V5 solutions and has been heavily tuned and optimized for maximum performance and efficiency. It incorporates all high-quality rendering features that have been developed specifically for V5 on SGI systems (Phong shading, ClearCoat™, ClearCoat™ 360, OpenGL Shader™). These features allow realistic depictions of the final parts to be created and are paramount in reducing the number of physical prototypes required. When engineers have realistic models, they can make the right product decisions and get buy-in from their management without the hassle, cost, and time physical prototypes require.

SGI Onyx 350 InfinitePerformance offers flexible operating modes to keep it working around the clock. You can use it simultaneously as an interactive multiuser workstation, as a visual server, and to drive an SGI Reality Center facility. Put it to work at night and on weekends as a compute server to create data for analysis during the next business day. This flexibility provides engineers with several advanced engineering tools all in one system.

SGI Onyx 350 visualization systems offer the best scalability, flexibility, and reliability available today, offering unprecedented modularity and configurability that enable you to solve your most important graphics problems. SGI Onyx 350 InfinitePerformance enables you to scale graphics, CPU, memory, storage, and I/O components independently, allowing you to deploy, upgrade, service, expand, and redeploy your system in every possible dimension. Plus, it is binary compatible with existing applications and other SGI visualization systems, further protecting your investment.

SGI Onyx 350 InfinitePerformance will benefit from numerous CATIA V5/ENOVIA V5 functions that have been multithreaded for key application performance. Multithreaded functions include graphic database culling, clash-detection algorithms, model tessellation algorithms or file-model loading, and more that will be added over time. This multithreading speeds up operations and helps add to the interactivity engineers seek. The engineers will spend less time waiting for functions to finish and more time interacting with the data.

Great hardware and application software is only part of the solution. To ensure your success, SGI also delivers software tools and application programming interfaces. OpenGL Multipipe™ and OpenGL Multipipe™ Software Development Kit allow you to scale single-pipe CATIA V5/ENOVIA V5 across multiple InfinitePerformance graphics pipes with unprecedented flexibility and performance. These features, along with decomposition (which allows you to use multiple pipes to render frames that would normally be rendered by a single pipe), enhance the capabilities of the solution and help decrease the time it takes to develop a new product.

Today's market dynamics allow only a small window of opportunity and time to market is the key. Manufacturers today require the full integration of processes for digital mock-up within a global engineering environment and require extensive support for industry-best development practices. SGI Onyx 350 InfinitePerformance, in conjunction with CATIA V5/ENOVIA V5, offers the right solution to meet the productivity and cost-saving imperatives of today's manufacturing marketplace.

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