Good news from the manufacturing sector. According to the influential forecast issued by the Institute for Supply Management (ISM), manufacturing in the United States is expected to continue its economic growth throughout the remainder of 2015. ISM bases its optimistic pronouncements on its annual survey of a panel of manufacturing supply management executives. Some 55% of the respondents, representing 18 industries within manufacturing, predicted that their revenues will be 9% greater in 2015 compared with 2014.

One of the drivers of this sustained growth in manufacturing is the widespread adoption of computer-aided engineering (CAE) and virtual prototyping to validate a design before committing to making a physical prototype.

CAE integrates design and manufacturing into systems directly controlled by computers characterized by high-end workstations and high performance computers (HPC). Virtual product design allows products to be validated early in the manufacturing process through modeling and simulation, rather than testing many, sometimes very expensive, physical prototypes. This dramatically reduces the time and costs needed to develop and bring new products to market.

The use of CAE applications for virtual prototyping helps engineering teams better manage risk and evaluate the implications of their designs quickly. The flexibility of these systems allows them to optimize production flow and scheduling, increase productivity, and provides manufacturers with a competitive advantage in the global marketplace.
SGI and Virtual Product Design

SGI is in the forefront of the efforts to speed up the virtual product design process. The company delivers to its customers a unified compute and storage solution that reduces overall system management requirements and costs as well as simplifies simulation data management and archival needs.

In particular, the SGI® ICE™ X for HPC cluster computing, comprised of the Intel® Xeon® processor E5-2500 v3 series, is ideal for handling advanced CAE applications and workflows. The SGI team of engineers, scientists and consultants are experts in the major CAE applications including: Altair® RADIOSS® and Altair FEKO; ANSYS® Fluent™, ANSYS Mechanical and ANSYS HFSS™; MSC Nastran; CD-adapco™ STAR-CCM+®; LSTC LS-DYNA®; OpenFOAM® and SIMULIA® Abaqus FEA® to name just a few.
Challenges Facing Manufacturing Companies

CAE-based manufacturing companies looking to streamline their design and simulations operations face a number of challenges.

Just a few examples:

- The need to increase engineering productivity
- Speed up product development time
- Reduce physical prototyping to save time and costs
- Enhance safety margins on designs and quotations
- Need to maintain multiple geographically distributed engineering facilities
- Streamlining workflows to transfer result data back to remote workstations for analysis
- Distributed workstations cannot interact with computer resources and data in the corporate data centers
- Need to replace workstations with low cost, remote clients

SGI products like the SGI ICE X and SGI VizServer® solution directly address these and other challenges common to manufacturing companies – both large and small – that rely on CAE and virtual product design as a fundamental part of their operations.

Courtesy of ANSYS, Inc.
SGI Products

SGI ICE X

In the world of HPC, one size does not fit all. And this is particularly applicable to CAE, a discipline that is undergoing constant change as the leading independent software vendors (ISVs) add new capabilities and refine old ones to take advantage of advances in HPC hardware, storage and networking.

The SGI ICE X platform is one of the HPC systems leading the way. It is SGI’s flagship scale-out system – the most powerful distributed memory supercomputer in the world. This is a petascale class system with a clear roadmap to exascale, offering seamless scalability from tens of teraflops to hundreds of petaflops, all within a system based on industry-standard components.
SGI ICE X key features include:

- Leading commercial CAE applications as well as in-house developed codes take full advantage of its state-of-the-art x86, Linux® and integrated InfiniBand® technologies
- Optimum flexibility in processor and accelerator mix, blade and storage configurations, and network topology to meet stringent CAE workflow requirements
- Reduced operational costs through superior power and cooling efficiency coupled with advanced SGI software for system, health and power management
- No implementation science projects – SGI systems are up and running in hours or days, not weeks or months
- Grow existing SGI ICE X clusters by adding next generation nodes without user interruption

SGI ICE X was designed from the ground up to accommodate a wide range of computing requirements both now and in the future. This flexibility makes the platform particularly suited to handle demanding CAE workflows in widely distributed geographic environments.

In addition to the many capabilities of SGI ICE X, SGI provides another leading edge technology that supports the trend toward collaboration among an increasingly distributed workforce. That technology is the SGI VizServer remote visualization solution.

**SGI VizServer**

The SGI VizServer system with NICE Desktop Cloud Visualization (DCV) provides users with remote 3D modeling tools through a web-based portal, supporting GPU and resource sharing and secure data storage.

The solution delivers efficient and optimized remote access to graphic intensive 3D applications including all the major CAE pre- and post-processing software.

Its key features include:

- Hardware and software solutions for optimized remote 3D visualization
- Full GPU acceleration for off-the-shelf OpenGL® applications
- GPU sharing across multiple users
- Collaborative session sharing of remote 3D data

SGI VizServer systems can provide visualization capabilities through a
software-as-a-service (SaaS) built into the company’s private network.

Key benefits of the SGI VizServer include:
• Enhanced application performance by provisioning resources based on actual user needs
• Enabling mobile access by using a web interface and optimizing visual performance based on available bandwidth
• Reducing infrastructure upgrade costs by removing the need to upgrade workstations or peripherals
• Providing guided workflow and parameter checking prior to workload submission
• Assisting with prevention of data theft and security breaches

For CAE users, SGI VizServer enables collaboration with geographically remote colleagues, each with instantaneous access to the most recent simulation model and its representation in real time.

Like all other SGI products, SGI ICE X and SGI VizServer are fully supported by a full range of professional services – from installation, maintenance and support programs to customer education.
SGI Professional Services

SGI provides a full range of professional services that match customer needs depending on where they are in their technical computing lifecycle. Every client is unique, and those running CAE applications are no exception. It’s one thing to be an analyst running a CAE app on a new product in an R&D environment; it’s very different if the app is running on the factory floor at a manufacturing facility halfway across the world.

SGI Professional Services delivers a spectrum of services to meet manufacturing CAE requirements – from entry-level services like application tuning to more integrated advisory service offerings such as project management, on-site consulting, technical account management and solution architecture consulting.

The approach SGI takes is to address IT and business objectives as a single, interrelated domain. SGI Professional Services works closely with customer IT organizations to develop and drive process efficiencies throughout the enterprise. The results include transformational business changes that boost competitiveness, lower Total Cost of Ownership (TCO) and increase Return on Investment (ROI).

SGI Global Services Lifecycle

An End-to-End Approach

SGI provides a full range of professional services that match CAE customer needs depending on where they are in their technical computing lifecycle.
Among the SGI Professional Services are:

- Assessment of IT performance
- Development of IT strategies that align with technical and business objectives
- Alignment and integration of people, process and technology
- Creation of architectural leading practices
- Recommendation of new and existing technologies to meet business and IT challenges
- Management of IT transformation
- Customer education

A recent SGI engagement illustrating these principles was assisting a major aerospace parts manufacturer to deal with a merger that doubled their size and turned the company from a North American-centric organization to a truly global enterprise.

SGI helped the manufacturer optimize its HPC operations, including deciding what workflows should be run locally and what should be run on worldwide shared resources. This included implementing technologies such as fast file transfer and remote visualization. SGI consultants, located on-site, facilitated the technical and procedural changes needed to make sure that the company’s users – no matter where they are located – get the results they need as quickly as possible.

Here are a few other key SGI Professional Services:

**SGI Workflow and Application Tuning Services**

These professional services ensure that SGI systems are ready to run with pre-tuned apps upon customer receipt.

Expert SGI engineers provide assessments of the target CAE application workflows and performance requirements. SGI professional services engineers then design, configure, tune, and test the SGI system for optimal performance within the manufacturer’s CAE environment. This includes matching the workflow to the system by examining data on jobs submitted and jobs size and mix. They recommend modification to the job scheduler for an optimum workflow environment. The SGI engineers also fine-tune the CAE applications to achieve maximum throughput.
SGI Job Scheduling Services

SGI support engineers help customers maximize the number of potential users on the system at any given period of time. This is particularly important for providing fast access to results data and post-processing services.

Many CAE jobs, especially those involving modeling and simulation, are memory intensive. SGI professional services helps customers optimize their handling of large memory jobs as well as dealing with large results files and intensive post-processing. The result is a significant reduction in project turnaround times – in some cases from weeks or months to minutes or days.

SGI VizServer QuickStart Services

The fast turnaround time mentioned above is in part made possible by SGI VizServer QuickStart Services. The visualization nodes in the SGI system are preconfigured with SGI VizServer while still in the factory. Once the system is delivered, SGI consultants provide knowledge transfer, training and best practices. These services allow SGI customers to streamline their results data workflow and remotely access this information for post-processing and analysis.

The services include basic hardware installation and system verification, and a detailed overview that encompasses hardware, software, storage and networking. By the end of this one to two day QuickStart service, customers have a comprehensive working knowledge of the system and where to turn if they need help.

Other options include a remote system administration service for new SGI customers. The service helps IT staff to make the most of their investment in the first 90 days of implementation.

The VizServer Services CAE Bundle provides a highly comprehensive services package to ensure that the implementation happens as smoothly as possible and doesn’t interfere with business.

The Bundle includes:
• Application tuning services
• VizServer QuickStart to run pre- and post-apps on the new cluster
• Installation services covering site installation and configuration
• Remote system administration services
• SGI Professional Services consulting
Make SGI Solutions for Virtual Product Design Work for You

SGI products, such as SGI ICE X and SGI VizServer, are designed to meet the rigorous demands of your CAE based modeling and simulation jobs both today and in the future. You can scale over time using the same platform and add new technology as your needs grow.

SGI products are flexibly architected, resilient, ultra-high performance, cost effective, easy to deploy, and easy to administer. Plus they are backed by SGI Professional Services, which provide the expertise and support you need to achieve the maximum return on your infrastructure investment.

No matter where you are in your IT lifecycle, SGI can not only provide the products you require, but also the professional services needed to optimize your most demanding virtual product design efforts.

About SGI

SGI is a global leader in high-performance solutions for compute, data analytics and data management that enable customers to accelerate time to discovery, innovation, and profitability.

For more information, visit: www.sgi.com/manufacturing/