

Petersen Advanced Lithography Inc.

ClearCube PC Blades Power High Performance Computing Solution

Creating a viable microchip is a rigorous and time-consuming task that can take months to execute. Using specialized photomasks and illumination, engineers must carefully build over thirty layers of images just to produce a single chip. At any one of these layers an image design violation can occur, setting the manufacturer back on both time and money as its engineers work to discover and repair the error.

Petersen Advanced Lithography Inc. provides semiconductor manufacturers, foundries and fabless companies with a unique solution that accelerates product learning cycles. By accessing Petersen's high performance computing (HPC) cluster and specialized software, customers can quickly simulate and test their chip designs and imaging processes. As president John Petersen says, "Trial-and-error simply is not a cost-effective system for testing microchips anymore."

OVERVIEW

► The Challenge

Decrease space requirements while maintaining the processing power needed to support a high performance computing (HPC) cluster.

► The Solution

Replace all desktop PCs in the existing cluster with PC Blades and Ethernet-connected I/Ports.

► The Benefit

A super-efficient HPC cluster that can be stored and maintained in a single data closet, increasing security and decreasing support costs.

The Challenge

Petersen Advanced Lithography's customers prepay for an allotted amount of GHz hours on the company's HPC cluster. During this time, either Petersen's skilled staff or the customers themselves can run test simulations on the microchips. "Other companies can achieve approximations of what a chip image is going to look like, but they can't do extensive rigorous exploratory work," says Petersen. "With a well defined set of input parameters, our lithography simulator can produce predictions with less than 1% error."

To harness the processing power needed to solve complex imaging problems, Petersen distributes chip imaging simulations over a hundred computers. Although this procedure completes testing and imaging in record time, the box PCs that originally outfitted the cluster caused major spacing issues. "Desktop computers are too big and cumbersome and do not lend themselves to a small footprint," says Petersen. "The latency associated with long network runs also was not acceptable. Furthermore, 1U server boxes lack the compute per volume that we want to achieve for our application."

Petersen was initially attracted to the ClearCube solution for its space-saving capabilities. ClearCube removes the PC from the work area, condenses it into a PC Blade form factor, and rack mounts it in a secured data center. Only the peripherals and a small connection device called a User Port remain at the user's desk. "I realized that I could put a whole lot of

computing power into a smaller space," says Petersen. "I also discovered that the energy usage was quite small, especially considering what I put the Blades through. The low utility costs are definitely an added bonus."



"The ClearCube architecture and management software clearly meets the requirements for a small footprint HPC solution."

**-- John Petersen, President
Petersen Advanced Lithography Inc.**

The Solution

After discovering the space-saving benefits of the ClearCube solution, Petersen grouped his PC Blades in a dedicated cluster called the “Image Design Factory” that runs and manages KLA-Tencor’s PROLITH™ lithography simulator. These Blades run at greater than 90% efficiency and can submit, generate and monitor customer simulations using a fraction of the time, cost and resources normally needed to produce a high-yield product. “Most true device-like test simulations take approximately 240 hours to complete because of the resources needed to execute repetitive learning cycles,” says Petersen. “But because our simulations are distributed across multiple Blades, we can cut down on learning cycles and produce the same result in a single hour.”

In addition to providing a dense computing solution, centralized ClearCube PC Blades also ensure hardened security for both Petersen Advanced Lithography and its customers. “The increased security that ClearCube is able to deliver over both physical and data assets is critical,” says Petersen. “The centralization and remote management also give us server-class uptime, since we can immediately hot swap the Blades if one ever fails. I’ve even been able to lower my support and maintenance costs because all the computers are right there in one spot.”

The Benefits

By incorporating ClearCube hardware into its solutions, Petersen Advanced Lithography extends its value-added service and products to its customers. These innovative software/hardware/service combinations help semiconductor customers reduce design failures, shorten learning cycles, improve performance and yield, and increase revenue potential. “ClearCube’s products enable us to study processes faster and more accurately than ever, which means developmental costs go down while the potential for success goes up.”

“The architecture was fairly easy to install, and now that it’s in, I see a limitless number of ClearCube PC Blades in our future.”

**-- John Peterson, President
Peterson Advanced Lithography Inc.**

