

Industrial Inspection Systems

Get SMART

SKY Computers®, a subsidiary of Analogic Corporation, is an OEM-centric engineering company that builds high-performance embedded servers for mission-critical industrial inspection and other applications. SKY offers complete image processing and analysis systems for integration with OEM imaging systems on the factory floor.

These systems are based on the SMART Systems Architecture and industry-standard hardware, software, development tools and interconnects, providing all the “capabilities” critical to the success of an inspection application: scalability, flexibility, reliability, maintainability and (downtime is the nemesis of every inspection customer) high availability, which enables continuous 24-hour-a-day, 7 day-a-week operation.

The Inspection Challenge

Industrial inspection systems today demand the utmost in speed and accuracy in order to cope with the rising complexity of electronic products. Certain trends, however, are straining the capabilities of these systems, particularly in the semiconductor industry, and the future points toward greater complexity still.

The resultant explosion in the amount of data coming off a front-end imaging subsystem, as well as the potential interconnect bottlenecks this creates, are the motivation behind a new generation of high-performance embedded servers with both the horsepower and the interconnect bandwidth to handle the job in real time.

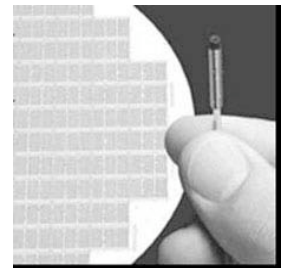
Trends in Semiconductor Manufacturing

Semiconductor manufacturers continue to relentlessly reduce the physical geometries of their products and, as feature sizes shrink, the inspection challenges grow more difficult. Semiconductors, wafers and masks become substantially more dense and complex. The imaging subsystem, as a result, must become more sensitive and finer grained, requiring more and more data to flow in larger chunks and greater frequency. The ability to accurately detect defects, analyze those defects and make the necessary tooling and/or process changes to increase yield is a critical factor in cost effectively bringing a semiconductor to market.

The SMART Solution

The SMART Systems Architecture provides all the abilities required to handle the most demanding inspection tasks of today, and it has the performance and interconnect headroom to manage the complexity to come.

- ◆ The high-performance architecture is scalable all the way from a single server with a handful of processor blades up to a whole rack of servers with hundreds of processors and, indeed, even to very large multi-rack system implementations.
- ◆ It has the modularity and flexibility to be tailored for particular application needs, whether the inspection system requires a simple daisy-chain processing approach, a complex full-mesh topology or any configuration between.
- ◆ SMART servers provide the ultimate in reliability, manageability and availability through a comprehensive Health Monitoring and Management facility. This interactive GUI-based facility gives manufacturers a window on critical system parameters at the rack level, chassis level, blade level and even down to the processor level on an individual blade.
- ◆ Many OEMs have found that their applications naturally decompose into a front end for data acquisition and a back end for processing and analysis. The first members of the SMART Systems Architecture family, the SMARTpac™ 600 data acquisition server and the SMARTpac 1200 compute server, readily support such application partitioning.



SKY Systems are used for complex Defect Detection Applications.

SKYCOMPUTERS
THE MULTICOMPUTING EXPERTS

Industry Standards

Widely supported industry standards provide OEMs with significant leverage for reducing development, deployment and maintenance time, cost and risk, as well as ensuring the stability of a computing platform over the lifetime of equipment. The SMART Systems Architecture leverages the open-source Linux operating system, as well as industry-standard languages, development tools, math libraries and middleware, plus the InfiniBand™ switch-fabric interface.

Originally developed for the enterprise computing arena, InfiniBand excels in delivering the ultimate throughput and robustness for the most demanding applications. For the industrial inspection arena in particular, it is extremely well suited to distributing streams of incoming sensor data among the large arrays of processors required to perform an analysis.

With InfiniBand's inherent scalability, upgrading a system in the field to satisfy evolving needs can be done at the blade or box level, rather than requiring the "forklift" upgrade of systems that have run out of steam. Whereas previous generations of embedded servers have had to rely on multiple interconnects, InfiniBand enables all the traffic to be consolidated into a single interconnect, and thus solving what has been a serious systems management nightmare.

Getting the Job Done

SKY Computers has a quarter-century history of solving problems in mission-critical real-time applications by working closely with OEMs. SKY's image processing experts, for example, frequently map the customer's algorithmic requirements onto a high-performance multiprocessing architecture, delivering highly optimized algorithms that are specifically



SKY Imaging Systems in the Clean Room providing 24/7 continuous operations.

tuned to application needs. Carefully tuned algorithm mappings provide the ultimate in system optimization.

In conjunction with the OEM, SKY also develops and conducts design verification tests to validate that an industrial inspection system meets its design goals. Outgoing acceptance tests, typically including the OEM's actual imaging application, are also developed for the run-time environment to ensure that production goals are met on an ongoing basis.

Many industry leaders at the high-end have turned to SKY to discuss their inspection problems with electronic packaging, rolling stock, semiconductors, photomasks, reticles, etc. SKY continues to work with a major industry OEM customer solving complex, industrial yield management problems in a demanding 24/7 operation.

Into the Future

As time goes on, competitive pressures will make automated inspection equipment even more important than it is today. The ability of the semiconductor industry, for example, to keep up its relentless pace, will rely heavily on inspection systems that can cope with the ever-smaller feature sizes of bleeding-edge silicon and do so at a rate which makes that silicon cost-effective to produce. And the success of that inspection equipment, in turn, will rely heavily on high-performance embedded servers based on the SMART Systems Architecture and the InfiniBand interconnect technology they employ.

Industry Segments to Benefit from SMARTpac Technology:

Semiconductor

Wafer Inspection

Packaging Technology

Photo Masking

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