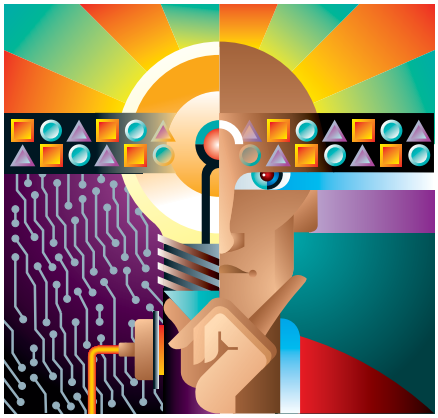
Finding Faults, Flaws and Defects at 2µm

OVERVIEW

Optical inspection applications involve compute-intensive algorithms and require high-performance computing solutions that:

- process large amounts of data
- accommodate bit-level searching
- facilitate streamed processing

Two trends have driven the evolution of fault detection and inspection: a greater variety of progressively smaller objects to inspect, and the technology-need to detect ever-smaller variances. While each of these may grow in a linear fashion, together they broaden exponentially the sample of data which analysts must examine. Tarari Processors, suited to the high-performance computing needs of optical inspection, ease the workload and enable analysts to probe reliably all test points as required.



The flat glass industry produces raw glass used in laptop computer displays, vehicle windshields and window panes. The quality of the glass depends not only on consistency in the thickness of glass delivered (ranging from a few millimeters to as low as 1mm), but also on the absence of optical defects, which can distort images and generate blind spots. Using optical interferometry, manufacturers can scan surfaces of glass with Charge Couple Device (CCD) cameras and generate a stream of image data containing variances as slight as 2µm in size.

The compute-intensiveness required to find those 2µm variances in testing glass and to test increasingly complex printed circuit boards drives the need for acceleration.

Similarly, printed circuit board manufacturers must inspect their products for inaccurate deposits, missing components, polarity, conductor width and spacing faults. The variety and complexity of boards pose a significant test challenge. Different approaches (e.g., automated optical testing, automatic optical inspection) involving images generated by CCD cameras have evolved, but the same result remains where a stream of data—representing circuitry and layout—needs defect analysis.

These sample applications in optical inspection, then, involve streams of bit-oriented data from CCD cameras or other image-acquiring devices, as well as code to run the devices, apply fault-detection algorithms to the stream, and summarize findings. However, the compute-intensiveness required to find those 2µm variances in glass and to test

increasingly complex printed circuit boards drives the need for acceleration. In the high-performance computing solution of a Tarari Processor, these applications in optical inspection benefit from *bit-level processing* and *parallelism*.

Processors in most servers and clusters can only move data back and forth in bytes, working at single- or double-word levels. While this may be optimal for running peripheral devices and creating reports, it is not optimal for operations on bit-oriented data streams because bit-processing is very inefficient on byte-oriented processors. In the Tarari solution, the fault-detection algorithms process the data stream on the Tarari Processor at the bit-level. Furthermore, the Tarari Processor works in parallel with the host processor, freeing up the latter to process the byte-oriented results from the accelerated algorithms without the overhead of actually running the algorithms.

By offloading cycles from the host processor, the Tarari solution relieves processing bottlenecks in the application, allowing fault-detection technology to take optical inspection to the next level.

ISSUES

- Bit-level processing of inspection data
- Increasing variety in objects to be inspected
- Decreasing tolerance for variances
- "Extension of senses" through advanced measurement technology

Tarari, Inc. – The award-winning acceleration company designs and produces Tarari Processors that offload and accelerate compute-intensive algorithms used in network security, Web Services and high performance computing environments.

Tarari's customers include independent software vendors, computer manufacturers and networking manufacturers.

To learn how Tarari can help your applications run at wire speeds, contact Tarari.

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