



# Saki Celebrates Over Two Decades of Technology and Expansion

By Michael Skinner, Assistant Editor

In 1994, Sakie (Jodie) and Yoshihiro Akiyama founded Saki Corporation in Japan. “When we began, AOI was a luxury,” says Jodie Akiyama, CEO of Saki. “Now it’s a necessity.” At the time, the electronics inspection market was dominated by large corporations that offered AOI technology, but were not focused on PCB manufacturing, or on using the technology to improve the manufacturing process.

As the fledgling company looked for its place in the electronics sector, the Akiyamas noticed that production speed and throughput as market drivers were not being considered.

In 1995, the company launched its proprietary high-speed inspection technology and its journey began. Today, Saki not only offers 2D AOI, but a complete line of 3D automated X-ray inspection (AXI), solder paste inspection (SPI), and AOI technologies.

Now in its 22nd year, the company has grown into a worldwide organization with over 15,000 units in the field, and continues to develop. In addition to Japan, Saki has offices in China, Korea, Taiwan, Thailand, Malaysia, Singapore, Indonesia, Mexico, Brazil, Europe, and

the United States. Though still a Japanese company, Saki has a complete research, development and design center in the Czech Republic, with distributors located in 23 countries throughout Europe, as well as a software design team in Shanghai, China.



*Saki America's headquarters in Fremont, CA.*

The company's recent news includes its expansion in the Americas. In July, 2015 the company completed the relocation of the Saki America office to Fremont, California. The new office, part of the offices of its distributor Lean Stream, serves as a sales, training, demonstration, service and application support facility for Saki's 2D and 3D automated inspection systems. In the past year, five new representatives were

added in the U.S. along with reps in Chile.

## Line Scan Technology

In the early days, Saki separated itself from the competition with the introduction of its Line Scan Technology. Unlike conventional field-of-view (FOV) type AOI systems, the technology scanned an entire PCB with a specially designed line-array CCD camera, in one pass. It no longer mattered how many components were on a board and allowed for accurate inspection data at high speeds.

“Saki continually strives to implement the most advanced image processing technology to improve automatic recognition by robotic vision systems,” says Yoshihiro Akiyama, the company's CTO and executive vice president. From the start, the company employed a Coaxial TopLight illumination system to replicate the qualities of human vision. It projects light perpendicular to a board's surface, which eliminates shadows from other objects. It is especially beneficial when inspecting solder fillets, because of the difference in reflection between a

formed and unformed fillet. The company also introduced high-speed inspection of both sides of a PCB in 2005.

In today's market, it is not enough to only inspect; it is also necessary to measure. The company's 3D systems are able to both inspect and measure height and volume, locate defects, generate the associated data, and provide reports for each component on a board.

### 3D AOI and SPI

3D technology was a natural progression for the company, and it is now introducing its third generation of 3D AOI systems. The company studied positioning systems — specifically their application in AOI, SPI and AXI equipment — and has implemented a new positioning system which is 50 percent faster than its predecessor.

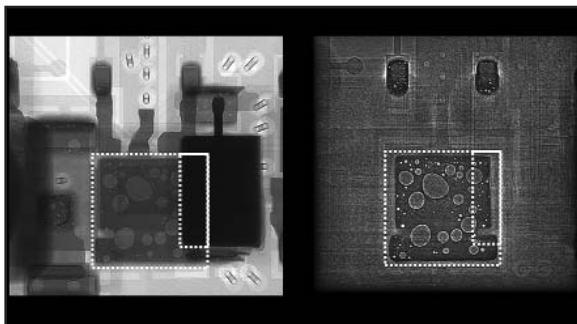
The new system increases throughput, accommodates XXL board sizes and offers dual-lane configurations.

Like previous systems, the new generation inspects and measures components from 0 to 20mm (0 to 0.08in) in size. It is capable of achieving 1 $\mu$  height resolution and a false call rate of less than 100ppm with no escapes. It also includes new camera and lighting systems that capture clear, detailed images, with no shadows. This allows the system to find such defects as lifted leads, tombstones, reversed polarity, and variations in component height.

The system uses a process of reconstruction to create its images. Saki's planar-computed tomography (PCT) is an extension of CT scanners used in the medical field, and developed by the company's scientists and engineers.

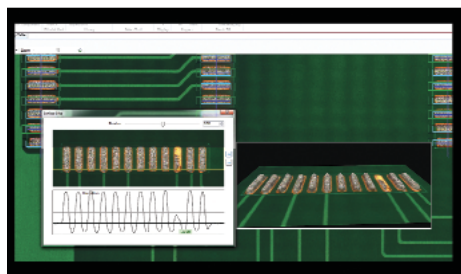
The inspection process completely separates the top- and bottom-side images of the board so they are unaffected

by back-side mounting. The technology creates a high-resolution image composed of 200 imaging slices acquired through the board, solder joints and components. It combines the layers, measures components and features,



*X-ray scan revealing hidden components.*

determines placement variance and warpage, as well as analyzing their internal structures for a volumetric representation in 3D. Defects are identified and classified, including head-in-pillow defects, voids and dry joints.



*A screenshot of the company's solder paste inspection software.*

This type of analysis is important for the high-reliability requirements of aerospace, medical, and military products.

For solder paste inspection, the company has developed phase measurement profilometry with LCoS (liquid crystal on silicon) technology and

applied it to the SPI process. This has resulted in a speed-boost for the system.

The technology ensures high repeatability of inspection results, with height inspection repeatability of 2 $\mu$  at 3 sigma, volume inspection repeatability of  $\pm 3$  percent, and GR&R (Gage repeatability and reproducibility) of less than 10 percent. Other notable features of the system include closed-loop process functionality, pad-based warpage compensation and measurement performance specifically designed for printed solder paste.

The company realized that spending time training, programming and debugging slows the inspection process and drains resources. Its entire lineup of 3D systems contains the same software and graphical user interface for easy programming and operation, and network compatibility. Another time-saver and advantage to a manufacturer is that debugging and programming can be done off-line with software that simulates production.

### The Future in Focus

"We gave Saki the tagline 'The Future in Focus,' although 22 years ago, even with that vision, we couldn't have imagined where we'd be today," says Jodie Akiyama. One of the company's goals is to create machine vision technology that can make decisions and judgments similar to a human brain. Now more than two decades have gone by and company is still determined to look forward and contribute to the future by creating new technologies.

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