



Not All 3D Inspection Is Created Equal

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Harald Eppinger, the Managing Director of our Koh Young Europe team likes to compare the situation with true 3D inspection with "real" orange juice. Harald says, "two bottles of orange juice can be vastly different. The real thing might cost more, it might be organic, but it is 100% orange juice squeezed from real oranges. It is not orange juice from additives, not artificial flavorings, and no fillers." And Harald is right, it's a big deal. If you don't know the difference between true 3D and 2D or augmented 2.5D, you're comparing oranges with apples and if you start with the wrong ingredient, you'll never get the right result.

People think if a machine can create a 3D image, then it is a 3D system. That's not really the case. When you go back to the beginning, we founded Koh Young on those 3D principles, firstly with the SPI (Solder Paste Inspection) tool in the early 2000, when Dr. Koh introduced the world's first dual projection Moiré interferometry system for SPI. That was certainly something the industry received very well and quickly carried us to the number one global market share position in the segment. Next came 3D AOI (Automatic Optical Inspection) and that really made people stand up and take notice when Koh Young released the first true 3D Zenith AOI Zenith in 2010.

Since then we've seen an abundance of so-called 3D inspection systems, but most start with their 2D system and bolt on some type of a 3D element to give either an image or some type of measurement capability. But in most cases, it is still using that 2D approach for a lot of the heavy lifting. We refer to that as 2.5D. It's not pure orange juice, but it's better than some of the cheaper stuff that has no fruit at all!

The Main Ingredients of True 3D

The three keys to success of true 3D inspection are getting the right kind of data - first and foremost. That data must be parametric, absolute profile-metric quantitative data. Not data analyzed from zero to 255 shades of black, white, and gray. Secondly, what's under the hood really matters, and you need to look under the hood to understand the mechanics and subsystems the machine is using to acquire that data. For example, the lens should include very fine grating to be highly accurate. The use of precision PZT motors to move that image through the grating to collect a true 3D image for every field of view is essential. Lastly, you need enough data to be statistically relevant and it is that robust data set that allows better decision making. A Koh Young AOI acquires 32 unique true 3D images for every field of view that we're inspecting, plus another 39 2D images. And we acquire those 2D images because they are valuable too, but not on their own. Simple 2D alone results in a high false call rate due to its intrinsic qualities; however, when combined with our true 3D algorithms it helps perform a more thorough measurement resulting in higher accuracy and less false calls on certain inspections like OCR, OCV, and FMI.



Data is like Rocket Fuel for the Smart Factory

Ok, so we've shifted from orange juice to rocket fuel, but the principle is the same - you need the right ingredients to get the best result. This time the desired result is to launch a manufacturer toward their goal of the digitally transformed smart factory. And that is powered by absolutely rock-solid reliable data with granular detail, available in real-time.

Suppliers must measure the true 3D information of components and solder joints. If properly accomplished, the inspection machines can offer very valuable data, thus, becoming the most reliable "sensor" on the line. Companies can only guarantee the validity of 3D data if the system uses True 3D technology to extract the exact body dimensions for all components types. "Blob detection" is simply not reliable and compromises the data, while contributing significantly to false calls.

The combination of multipoint measurement and process data collected from SPI, pre-reflow AOI, and post-reflow AOI systems, combined with data from printers, mounters, and reflow ovens will allow manufactures to deliver an AI-powered, zero defect, self-healing line. [Image 1] Indeed, the quality of data is more important than the quantity of data to create effective and reliable solutions with high value proposition. Yet, it is the combination of reliable data, along with a statistically relevant quantity of data, is what delivers next level of reliable results.



Image 1: Example of a line configuration to improve yield with multipoint data correlation

That data set gives us tools that enhance auto programming, control the screen printer speed, pressure, and release at the print process using feedback from the SPI. Additionally, the AOI data provides mounter feedback to adjust for things like spindle or nozzle anomalies. It all comes from that true 3D data set. Without that, it's exceedingly difficult, if not impossible, to achieve that smart factory initiative.



We are well into this connected factory initiative now, right. With the CFX initiative and the underlying partnerships between the various players that are creating connectivity solutions to try to achieve a self-healing concept where SPI, pre-reflow AOI, and post-reflow AOI inspection feedback can make corrections on the fly without any human intervention.

Smart Choices for the Smart Factory

From a manufacturer's perspective equipment investment needs to have the capability of connectivity first and foremost. A manufacturer will need a very granular, very robust data set going forward. Connectivity of all systems within a line help define correlations between the distinct circuit board assembly processes. [Image 2] There's a lot of things to consider, but it really just comes down to really two things, ability to connect and the ability to generate the right kind of parametric, absolute, robust data that you can really trust. You should only be using data you have complete confidence in to make adjustments up and down the line or to help power an AI engine.

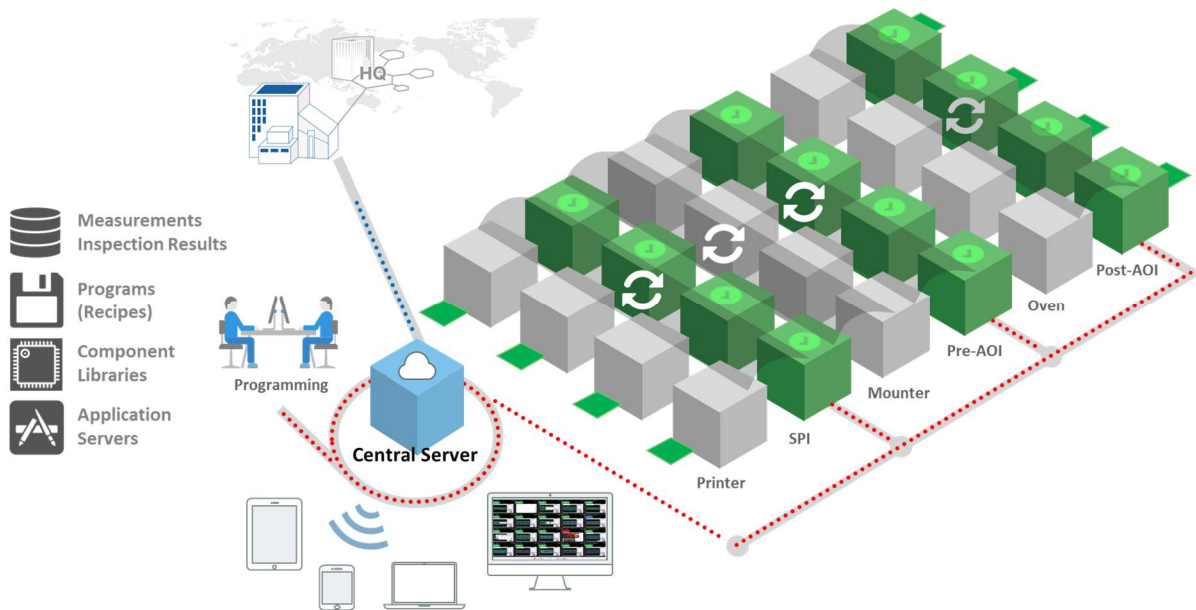


Image 2: Factory connectivity example using Koh Young KSMART – the gateway to a smart factory

Anytime we're talking about data, it must be manageable, and it must be usable. We have to make data manageable, both in an automated fashion for our customers and partners and for other systems on the line and in the factory. But also, from a human perspective and from an analysis perspective. The real drive is not how much data, but how usable and accessible that data is to the process. We have to take that data and put it in a format where either another machine or a human can do something valuable with it in real time.



Our customers want to have the assurance that they're not going to ship that product. They need to know there are no escapes, not just from our tool, but from the line. You need to understand that as manufacturers adjust tolerances, the results will change. We have numerous EMS customers that build very different products from the simplest to the most complex. The tolerances selected and the data applied will affect how the line performs and the results achieved. The setup needs to consider this.

We're all trying to get to the point where the line is like a machine, a single system that you start at one end with the push of a button and a product pops out the other end and you put it in a box. Just remember to start with a glass of 100% fresh-squeezed orange juice.

If you want to learn why so many electronics manufacturers trust Koh Young Technology for accurate measurement and inspection technologies, visit www.kohyoung.com to learn more about its best-in-class inspection solutions.

About Koh Young Technology

In 2002, Koh Young pioneered a new market by launching the first 3D Solder Paste Inspection (SPI) system using a patented dual-projection Moiré technique. Since then, it has become the global leader in 3D measurement-based inspection equipment for the electronics industry. In addition to its corporate headquarters in Seoul, Koh Young Technology has sales and support offices in Germany, Japan, Singapore, Penang, China, Brazil, Argentina, Canada, Mexico, and the United States. These local facilities ensure Koh Young keeps a close relationship with its growing customer base and provides them with access to a network of inspection and measurement experts.

Based on our True3D™ measurement-based inspection technology, Koh Young has developed 3D Machining and Assembling Optical Inspection (MOI), 3D Dispensing Process Inspection (DPI), Semiconductor Packaging Inspection (MEISTER Series), and Medical Robotics for brain surgeries (KYMERO), in addition to our pioneering SPI and AOI systems for circuit board assembly. Through our technological innovations, we have secured thousands of global customers, and maintain the largest global market share in the SPI and AOI markets. Additionally, with our user-centric R&D, we continue to leverage our core competencies to develop innovative solutions to enter new markets.

For More Information

Learn why so many electronics manufacturers trust us for reliable inspection solutions

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True  Smart Factory Solutions, Powered by AI