

Reliable recognition
of solder splashes
on bond pads



Case Study AOI

Inspection solutions for all demands

Since 1991, BuS Elektronik in Riesa, Germany, has produced electronic assemblies and systems on customer order. The EMS services provider receives orders from the sectors industrial electronics, medical and security electronics as well as automotive electronics. To secure high product quality, the company has deployed AOI systems for automatic optical inspection already since 2002. However, when a customer granted an order for a COB electronic assembly (Chip On Board) and during the solder process sporadic solder splashes reached the pads, a special solution needed to be found so first class quality could also be delivered here.

BuS Elektronik in Riesa: Intelligent EMS solutions – individually manufactured

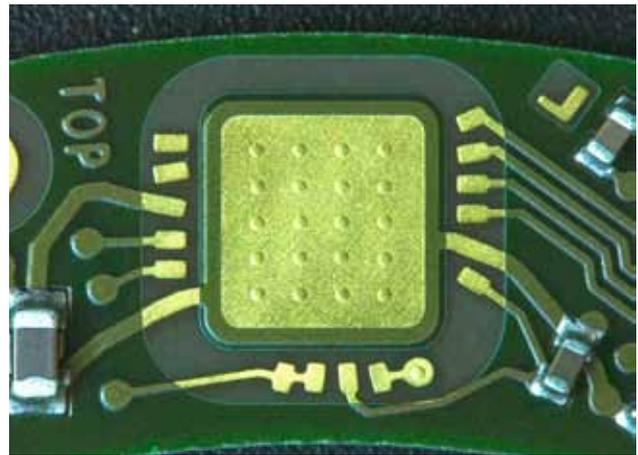
Ever since the company was founded, BuS Elektronik GmbH & Co. KG has been a reliable partner when it came to developing and manufacturing electronic assemblies with considerable expertise. The range of services encompasses the entire value-added chain. Starting with the development phase, through design, test concepts, material management, through production, logistics and distribution up to After Sales Service.

Their modern production facilities are equipped with both universal lines and product-specific islands for SMT, THT and press fit technology. As regards the processability of components, the spectrum ranges from chip component types 0201, ICs with 0.4 mm raster, BGAs, flex and oversize printed circuit boards (610 x 480 mm²), to shielding plates, Action Pins and others. In addition, various special technologies such as cleaning, varnishing and potting supplement the standard technologies placement, soldering, inspection and assembly.

With over 900 employees and a production surface of around 17,000 m², the company offers the highest level of quality, flexibility and reliability in electronics production. Their numerous commendations substantiate this claim.

Special solutions for special requirements

Where optical inspection in assemblies production is concerned, BuS Elektronik and Viscom are now looking at a successful collaboration going back nearly 10 years. In particular, the AOI systems are deployed to inspect solder joints in-line after the reflow process. In 2010, a COB customer order made it clear that another system – at that point, the tenth in all – was needed to reliably detect solder splashes on gold metalized pads as oc-



COB electronic assembly

curred during soldering. A special solution and the expertise from Viscom as complete supplier for wholly different inspection tasks was called for here because as it later was determined, a standardized AOI system was not suitable for this task.

Rolf Gaffke, employee of the Technology department at BuS Elektronik, describes the initial situation as follows: “The reason was a customer order for an automotive application in which the customer assembled the dies themselves. The FPY after placement and soldering was indeed 98 %, but for the rest of the electronic assemblies, despite process optimization solder splashes landed on the bond pads during soldering. Axel Jacob, head of Technology at BuS Elektronik, continues: “When the solder splashes contaminate the gold surface of the pads, a bond can no longer be made there because it is not possible to rework the surface. And because even the solder paste manufacturers concede such splashes can never be entirely avoided, we needed a solution to reliably detect this defect.” The goal was to have all pads meet the requirements set by the customer.

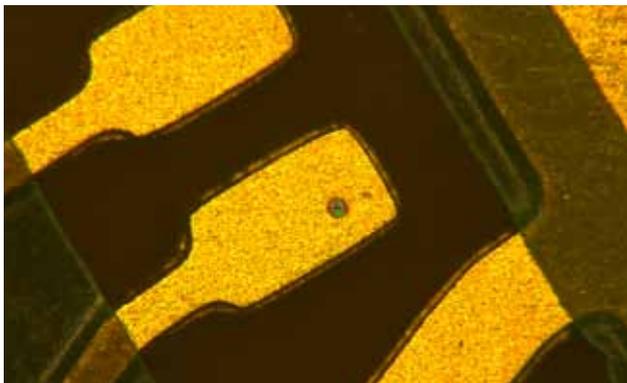
Viscom was able to bring the benefits of over 25 years of experience in inspection technology to this request. After the company began with customer-specific inspection solutions based on industrial image processing in 1984, the first series systems for placement inspection had already been delivered to the automotive industry by the beginning of the 90s. These were followed by systems with X-ray inspection and computed tomography and those for wirebond applications – always aligned to the demands of the industry. Viscom has never relinquished this expertise; but even today offers a wide spectrum of inspection systems are offered and views itself as generalist for inspection solutions for quality control. The major advantage comes from the concentrated synergies that result, which Viscom then realizes as inspection solutions for their cus-

tomers – whether it be fast, integrated handling solutions or new algorithms for the image processing software.

Detect even the smallest solder splashes with higher resolution

The explicit request from the customer BuS Elektronik was to detect all solder splashes on the pads that were larger than or equal 25 µm in size. The requirements for inspection on the die bond surfaces were rather more generous. Here, only solder splashes 100 µm or larger had to be reliably detected.

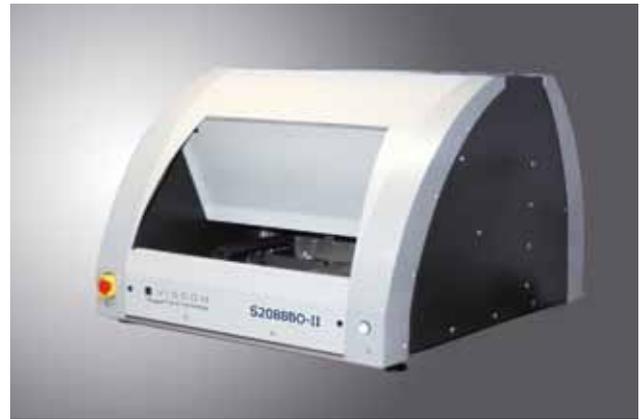
Detlef Beer, responsible for product development at Viscom, describes the approach as follows: “We conducted our initial examinations on an AOI with 8M camera technology, which reliably detects defects down to 70 µm without false calls. Yet for this application, we found ourselves against the limits of a standard AOI. But because we also had completely different solution approaches ready in house, for example in the context of high resolution wirebond inspection, we could continue this project from this approach and ultimately arrived at success.”



Solder splashes on gold pads

The in-line S6053BO-V typically used for wirebond inspection did have the right solution, but was too cost-intensive for the BuS application. This meant an adequate solution with an appropriate price/performance ratio had to be found. In the end, an inspection system based on the Desktop AOI S2088-II appeared to be optimally suited to the task. The corresponding inspection was set up on this manual tabletop system. This new inspection system S2088BO-II is equipped with two camera modules with 5 and 2.5 µm resolution, so the required accuracy could be attained with high gains in efficiency.

“Before we had the Viscom system in use, the electronic assemblies were visually inspected under a microscope,” states Rolf Gaffke. “Yet because the defects were very small and hard to detect, some of the splash-



S2088BO-II deployed at BuS

es were overlooked. With the special AOI system, now we are able to detect many times more of what we previously attempted to find with manual inspection. Now we not only have better quality control, but also a cost advantage. We no longer need to furnish an employee to inspect the pads; instead, the team member can take on other tasks at the same time,” Gaffke is pleased to say.

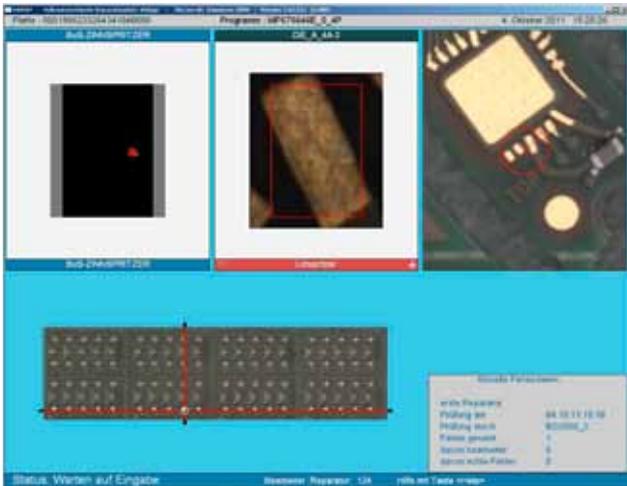
The inspection of the electronic assemblies is conducted as follows: Four multi-panels of about 100 x 100 mm², each with ten single panels, are placed within a workpiece carrier and inserted into the system for inspection. The inspection of all 40 single panels takes about five minutes. In parallel, the employee classifies the defects from the previous inspection and prepares a workpiece carrier with the next 4 multi-panels for inspection. After these task are completed, the employee can take on others, such as looking after the in-line AOI systems.

Defects are classified at the Viscom verification station HARAN. In most cases, real defects and false calls can already be differentiated based on images captured on the AOI. When not, a microscope is brought into play.

“In order to make verification even easier, the solder splashes should be characterized on another image,” says Gaffke. We had hoped for this software extension and Viscom realized it for us. Also, the labeling on the printed circuit boards of the four multi-panels had to be read so the results could be correctly assigned. A software extension was implemented by Viscom here as well.” Detlef Beer adds, “In principle we have generated a multi-panel in order to correctly depict traceability.”

Overall, the system is completely compatible with the other Viscom systems in house at BuS, with the major advantage that training on the new S2088BO-II could be dropped or was necessary only for specific applications. This meant the tenth joint project could also be concluded quickly and to the complete satisfaction of the customer. Axel Jacob: “We are extremely satisfied with our new AOI system. That Viscom succeeded in

finding the right solution for our requirements in a relatively short time was especially helpful. The system has been in use since August 2010. By January 2012, we had already inspected over 1.7 million single panels with it."



Viscom verification station (HARAN)

Are you interested in more details on this application or do you have any question regarding combined inspection? The Viscom SP Division will be glad to help you.

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