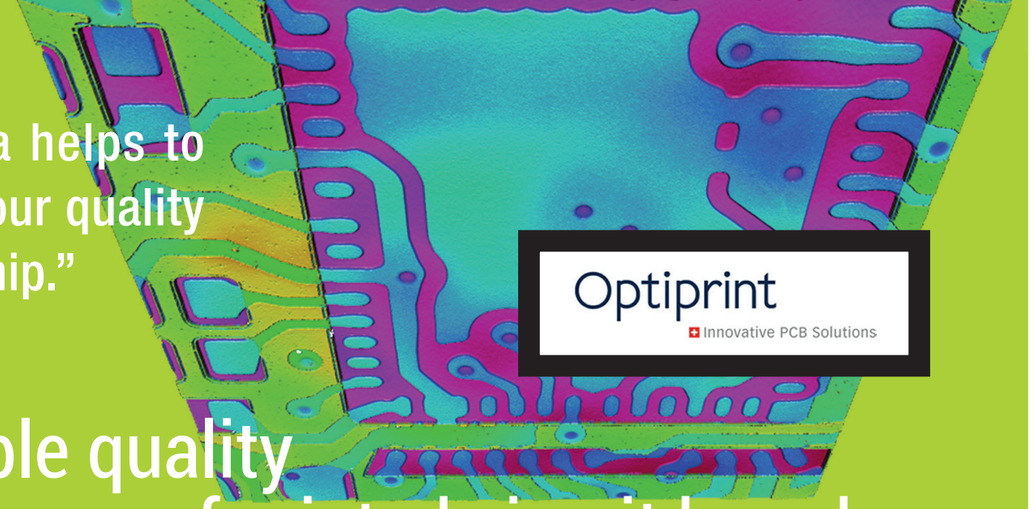


”Alicona helps to secure our quality leadership.”

Reliable quality assurance of printed circuit boards

Optiprint is a supplier of highly innovative printed circuit boards for use in medical engineering, the automotive and sensor industries, and space engineering. When the company was probing the market for a non-contact, areal surface measurement system, Alicona‘s 3D measurement systems attracted its attention. Optiprint now relies on InfiniteFocusSL in the quality assurance of printed circuit boards. The solution by Alicona allows Optiprint to measure form and roughness of complex, miniaturized component surfaces with just one system.

Today‘s printed circuit boards are carriers for simple to highly complex electronic. For 30 years now, Optiprint in Berneck (Eastern Switzerland) has been producing highly innovative circuit boards solutions. New high-performance materials and more efficient ways of assembly, such as the Chip-on-Board technology, are becoming increasingly relevant. In light of these challenges, Optiprint was in need of a system for areal topography and flatness measurement of so-called chip pockets. ”Alicona‘s 3D measurement system have allowed us to optimize our processes significantly and take major steps in securing the quality leadership of our products,“ quality manager Simon Hütter explains. The 3D measurement solutions provided by Alicona have made it possible for customers of Optiprint to ensure flawless chip bonding (attaching of the chips) and wire bonding (attaching wires to connect chip and circuit board carrier).

Microvias: optical 3D measurement of diameter and depth

Optiprint’s quality assurance puts great emphasis on providing printed circuit boards that are well-suited to further processing by customers. In order to ensure proper electrical connection of multi-layered circuit boards, it is vital that the so-called microvias have been drilled according to pre-defined depth and diameter parameters. Alicona‘s measurement systems allow Optiprint to verify diameter and height step of the microvias to confirm that the correct layers have been connected.

Another type of measurement of laser-dilled microvias is checking for traces of powder. Traces of powder form at the outer edge of laser drill holes when molten material lumps together. With optimized laser parameters for the different materials these bulges are minimized. To identify bulges, the planarity at the transition of the surface to the microvia is carried out with roughness measurements by Alicona systems.

Apart from the above-mentioned measurements of depth, diameter, and planarity, microvia bottoms also need to be examined during quality assurance. The most critical fault to check for here is residual insulating material, as this can impede the electrical conductivity of the entire circuit board. It is therefore essential to verify that this area of the microvia is clean before further processing. Optiprint accomplishes this with Alicona‘s high-resolution true-color 3D visualization systems.

Chip pockets: Area based measurement of shape and flatness

As the next step of the production process, chip pockets are milled into the circuit board to make room for the chips the end customer will later attach to the circuit board. Attaching the chips to the milled pockets is also called Chip-on-Board technology. In order for the silicium chips to remain in place securely, the milled pockets must have the correct shape and be flat. Thanks to Alicona’s roughness measurement system, Optiprint has managed to gain a better understanding of the interaction between surface properties and assembly process. This in turn has resulted in a much more efficient manufacturing process. In order to ensure proper surface quality and, consequently, flawless attaching, Optiprint measures the height steps as well as shape and flatness of the chip pockets. ”Only when we started using areal roughness measurement was it that we mastered the process for milled pockets,“ says Simon Hütter.

3D profile form measurement of bondpads

Another step in the manufacturing process is the electrical bonding (interconnecting) of the Chips on Board. The electrical interconnecting of chips with the circuit board with using the so-called bond wires is also called wire bonding. Bondpads must be free of faults such as roughness and dirt, as these weaken the bond interconnection. Alicona‘s 3D profile measurement system enables Optiprint to verify the form and co-planarity of contact pads on the printed circuit board and ensure perfect conditions for wire bonding.

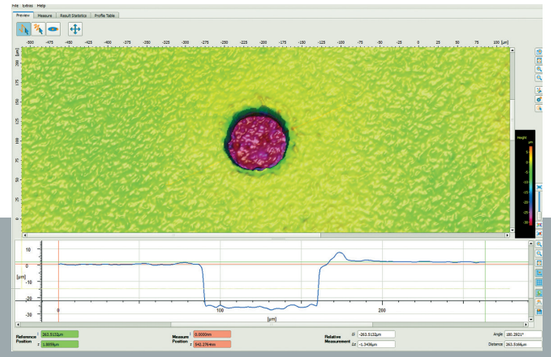
The following parameters of multi-layer circuit boards can be measured and documented precisely with 3D measurement systems by Alicona:

- Depth and diameter of microvias
- Areal roughness at the transition of surface to drill hole
- Areal roughness and flatness at the bottom of microvias
- Areal topography and roughness of milled pockets (chip pockets)
- 3D profile form of bondpads
- Analysis and rating of quality characteristics

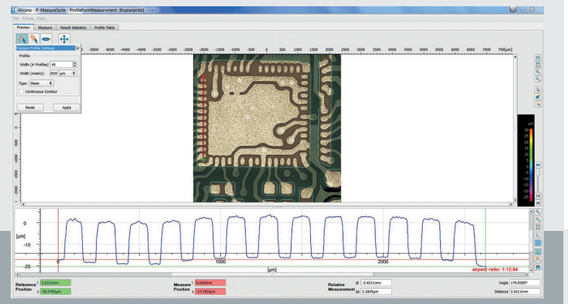
Simon Hütter
Quality Manager
Optiprint AG, Berneck (CH)

”Our customers use printed circuit boards by Optiprint to manufacture products of the highest quality. Alicona‘s customized 3D measurement solutions play a key role in enabling us to provide our customers with the exceptional quality they need. Their systems contribute significantly to our company’s success. We can only recommend Alicona to everyone.“

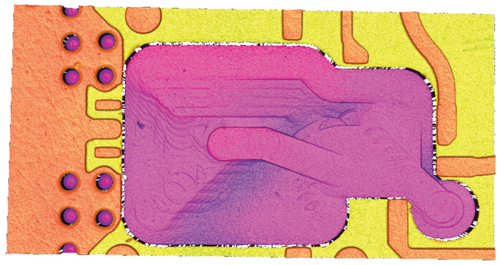
Simon Hütter, Quality Manager



Area based roughness measurement of the microvia to identify traces of powder



3D measurement of shape an co-planarity of contact pads to ensure perfect conditions for wire bonding



3D visualization of the chip pocket before surface finish. The visualization has helped to optimize the Chip-on-Board technology. Optiprint has managed to gain a better understanding of the interaction between surface properties and assembly process.