Application Case Study: Zollner Elektronik AG, Germany

Data Matrix Symbols Guarantee Consistent Traceability of PCBs

Company Profile

As a system service provider of Electronic Manufacturing Services (EMS), Zollner Elektronik AG offers production and service of electronic, mechanical, and inductive components. The company manufactures products such as modular electronic PCBs in Zandt, Germany, as well as in twelve other factories worldwide. Zollner provides automated final assembly inspection operations for assemblies such as PCBs for safety-related electronics for the automotive sector. Zollner's quality control procedure incorporates a PCB inspection system that rejects defective or low-quality items before they reach dispatch. Printed circuit boards (PCBs) are logged, inspected, and tested to ensure only faultless products reach their customers. As PCBs are placed in test adapters, a small Data Matrix symbol tells the adapter which test to run to ensure the functionality of each particular board.

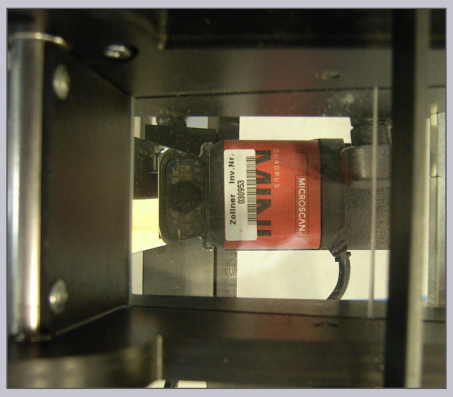
In order to guarantee consistent traceability of PCBs, from logging the material charges used for their components to inspection and testing of the final PCB assemblies, Zollner tracks each PCB using a Data Matrix symbol containing unique identifying information. These Data Matrix symbols are decoded at each stage of production and saved in a database as process and material data are collected for each PCB. This provides confirmation that upstream inspection processes to ensure accurate PCB assembly have been successfully completed before the start of testing, as well as restricts the number of repeat tests and permissible remedial actions required.

For final testing of the PCB assemblies, Zollner uses test adapters from the Twister Adapter system supplied by ATX Hardware GmbH. In this system, voltage is applied to the PCBs and defined routines are executed and documented based on each PCB's unique testing requirements. A reject component gate ensures that imperfect components are safely eliminated from the process chain. To ensure that correct tests are applied to each PCB and all boards are logged and tracked throughout inspection and testing procedures, a compact 2D barcode reader was needed to read the Data Matrix symbols on each PCB from within the testing adapter.

The Solution

Each PCB assembly bears a 15 mil, 12 x 12 Data Matrix symbol, which is applied to a label made of PP foil by means of thermo-transfer printing. The brightly-polished surface of the foil poses challenges in barcode reading because reflections of light can make it difficult for a reader to obtain a complete, high-contrast image of the symbol. Furthermore, restricted integration space within the test adapters meant that the selected barcode

- **Requirement:** Administer testing operations and log PCBs based on identifying data stored in Data Matrix symbols on each part.
- **Project:** Embed compact barcode readers within the PCB test adapter system to read each Data Matrix as a PCB enters the system for testing and/or is rejected due to failing the test.
- **Solution:** Quadrus MINI Barcode Imager embedded in the testing adapter and reject component gate.
- **Result:** Accurately read each Data Matrix and guarantee that only PCBs that pass inspection and testing are distributed to the customer.



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reader would need to have a very compact form factor.

Zollner Elektronik consulted WI-SYSTEME GmbH, a company specializing in automatic marking and barcode reader integration, on the selection of the optimal reader for their requirements. The WI-SYSTEME technical department proposed the Quadrus® MINI imager from Microscan because its mounting size of 2.1 x 1.8 x 1 in. (5.3 x 4.6 x 2.5 cm) permitted integration into the Twister Adapter system without impeding the handling of the PCB assemblies as they are inserted. A second Quadrus MINI with a 90° mirror was proposed for mounting in the testing adapter's reject component gate to read the Data Matrix on each rejected PCB assembly to provide confirmation that all imperfect components have been eliminated from the process chain.

Quadrus MINI Barcode Imager

Results

The small size of the Quadrus MINI proved to be the right fit for Zollner's limited integration environment, and even offered considerable freedom in operating clearance for the movement of parts through operations. In addition, the Quadrus MINI was well-suited for decoding on the highly-reflective PP foil labels thanks to embedded LED lighting to ensure proper illumination of the symbol. Its autofocus capability facilitated quick part change-over regardless of the placement of the Data Matrix or distance of the PCB from the reader, and reliable decoding through powerful decode algorithms prevented unnecessary downtime due to read errors.

With the implementation of Quadrus MINI imagers in its test adapter system and at the reject component gate, Zollner Elektronik can easily guarantee that only components that are inspected and tested for absolute quality are delivered to their customers.

OVERVIEW

- **Customer:** Zollner Elektronik AG, Germany
- **Industry:** Electronics manufacturing
- **Application:** PCB assembly inspection and testing
- **Products:** Microscan Quadrus® MINI Barcode Imager
- **Partner:** WI-SYSTEM GmbH, Germany

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