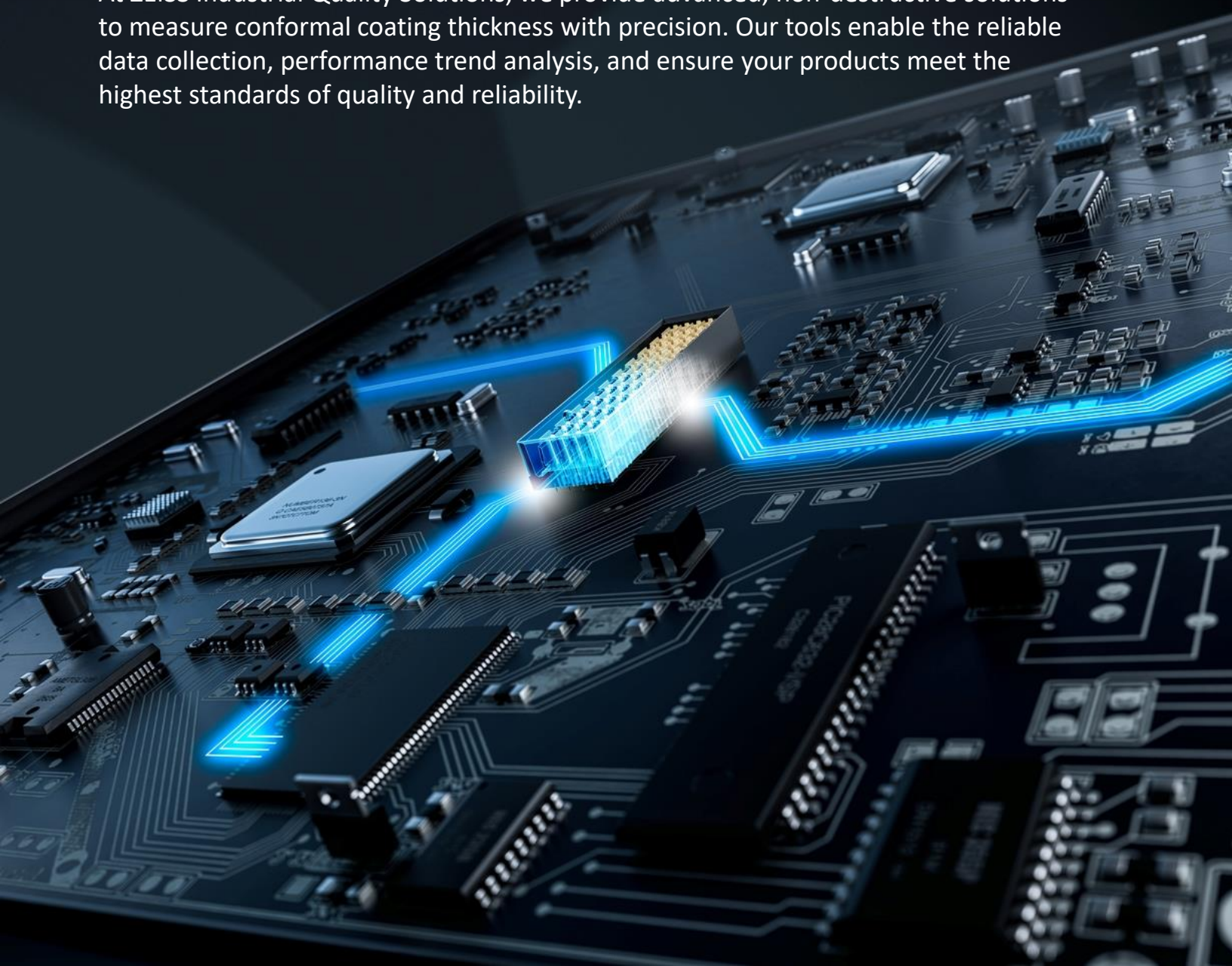
Conformal Coating Inspection Solution Guide

Achieve Consistent Performance in High-Reliability Applications with ZEISS Conformal Coating Solutions

Conformal coatings are critical for protecting PCBs and PCAs in high-reliability products, ensuring long-term performance even in the harshest environments. Achieving precise coating thickness and uniformity is essential to prevent defects and maintain consistent functionality over time.

Traditional measurement methods often fall short as they can be prone to manual errors, require destructive cross-sectioning, or demand significant resources to develop and implement custom systems.

At ZEISS Industrial Quality Solutions, we provide advanced, non-destructive solutions to measure conformal coating thickness with precision. Our tools enable the reliable data collection, performance trend analysis, and ensure your products meet the highest standards of quality and reliability.



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ZEISS Coordinate Measuring Machines (CMM)

Coordinate Measuring Machines (CMMs) are high precision machines that measure the geometry of objects with exceptional accuracy. Equipped with advanced sensors like tactile probes, optical cameras, and non-contact technologies such as the ZEISS DotScan, CMMs adapt to diverse measurement needs.

Efficient and precise.

From flat surfaces to complex geometries and transparent materials, CMMs ensure reliable results, driving quality assurance and process optimization

Figure 1: ZEISS DotScan sensor measuring conformal coating on a processor.

The **ZEISS DotScan sensor** delivers an automated, non-destructive method for accurately and efficiently measuring the thickness of conformal coatings.

Deliver results you can trust.

Transform your coating measurement with ZEISS DotScan to ensure exceptional quality and consistency in your products.

Operating principle

ZEISS DotScan utilizes white light to perform non-contact distance measurements. The sensor emits white light, which is composed of a spectrum of colors. As the light interacts with the surface of a workpiece, each color is refracted at different angles, creating distinct focal points.

The color that aligns with the surface reflects the strongest signal. A spectrometer then measures the wavelength of this reflected light to determine the distance to the workpiece.

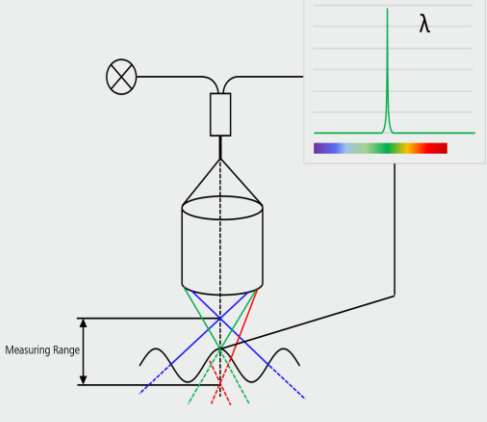

Figure 2: DotScan operating principle

ZEISS DotScan is a perfect solution to measure transparent materials.

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Conformal Coating Thickness Measurement

Dotscan Measurement Overview

ZEISS DotScan sensor technology allows for rapid scanning of specified areas along user-defined tool paths, as illustrated in Figure 3.

The sensor measures in the Z-axis with a specified incidence angle tolerance of up to ±30 degrees. The high accuracy of the sensor (starting from 1.9µm + L/150) ensures reliable results.

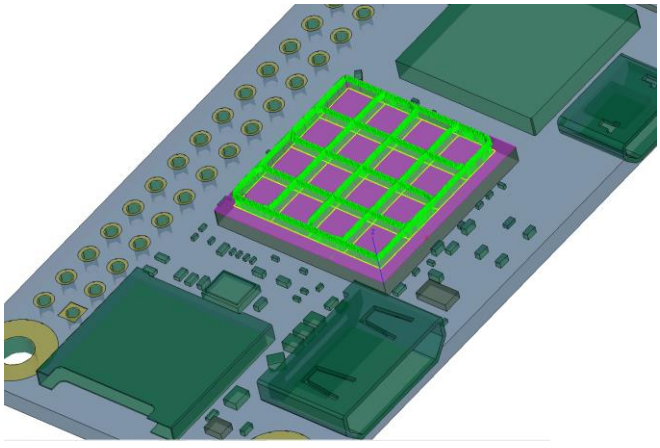

Figure 3: Thickness measurement sensor path

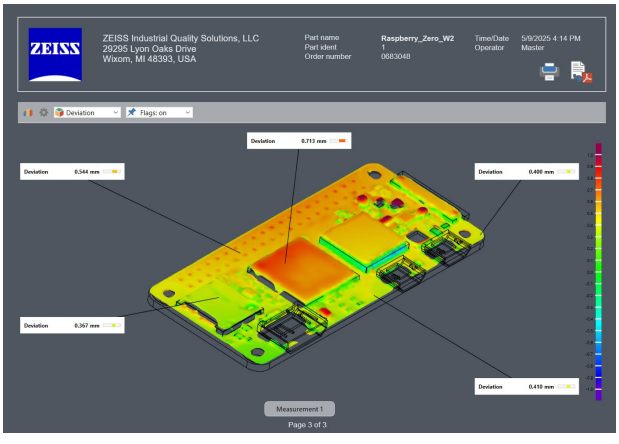

Figure 4: Conformal coating thickness heat map

Visualize Results

Users can easily define nominal values and acceptable tolerances to evaluate measurement results, generating heat maps with just a few clicks.

Integrating ZEISS DotScan into the ZEISS Calypso metrology software is intuitive, simplifying the setup and execution of automated measurement routines.

Whether measuring **a single board or an entire batch, ZEISS delivers reliable solutions.**

Insightful Reporting

ZEISS PiWeb is a software solution for reporting and statistical analysis. Its user-friendly interface makes reports easy to interpret and provides quick access to specific results.

The tool includes features such as Gage R&R analysis, customizable report templates, real-time notifications for active data monitoring, and capability studies.

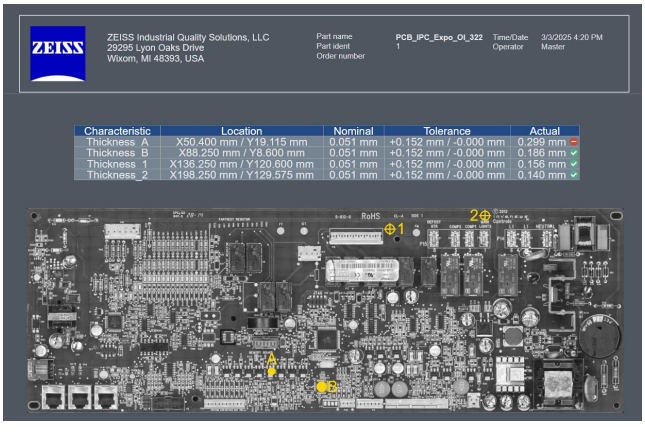

Figure 5: Example of a PiWeb Report

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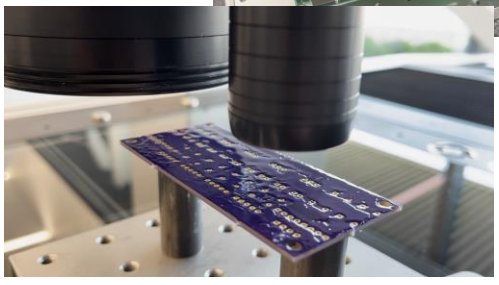
Fixturing & Setup

- Flat PCBs or PCBAs can typically be mounted directly onto the CMM.
- To ensure stability and prevent movement during measurement, parts should be securely fixed using methods such as double-sided tape or clamping brackets.
- In some cases, depending on the DotScan sensor being used, it may be necessary to place the part on an elevated fixture to accommodate the sensor's working distance.



Measurement Strategies

Spot Check

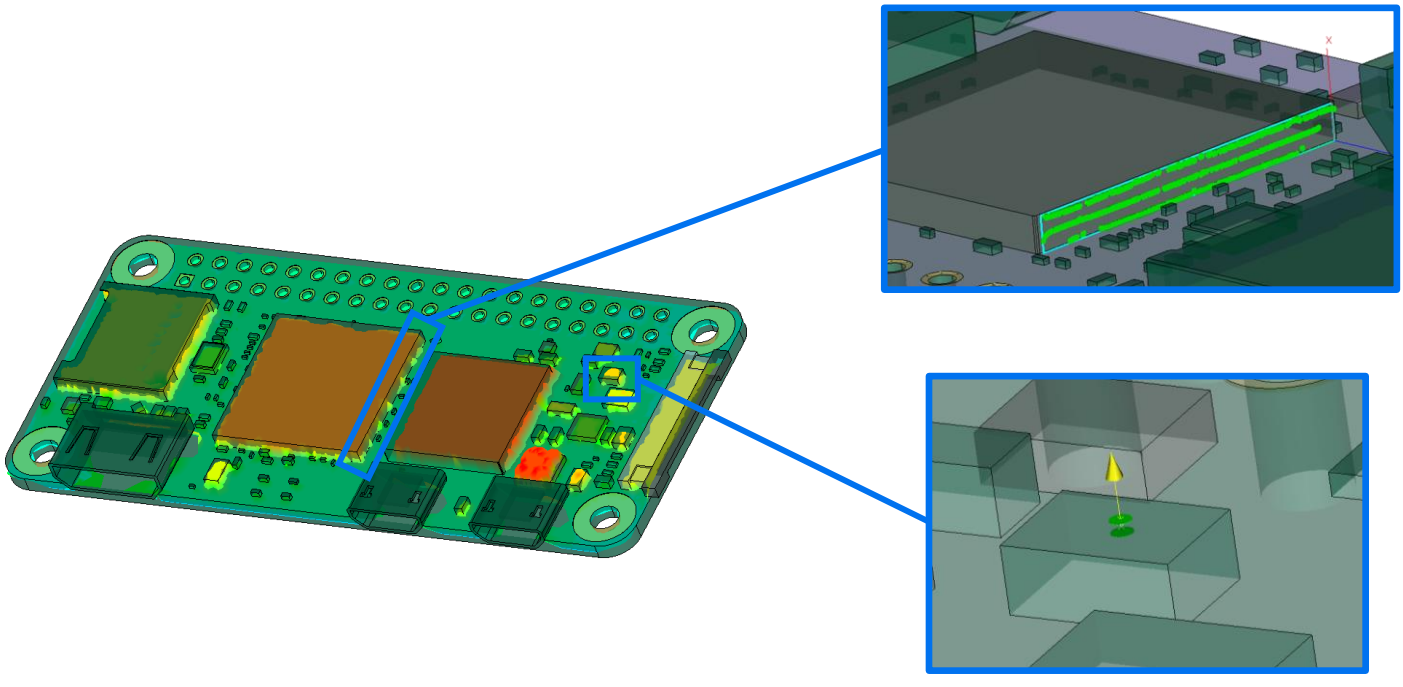
- Perform targeted measurements on specific areas to quickly verify critical regions. Ideal for routine inspections or high-risk zones, with results easily documented using standard or custom reporting protocols.

Full Board Heatmap

- Conduct a comprehensive scan of the entire board to generate a color-coded map of coating thickness. This approach quickly identifies inconsistencies, ensures uniform application, and integrates seamlessly with CAD for detailed analysis.

Component Vertical edge

- Focus on the sides or vertical edges of components to verify coating in hard-to-reach areas. This strategy ensures proper coverage, enhancing the reliability of complex assemblies.



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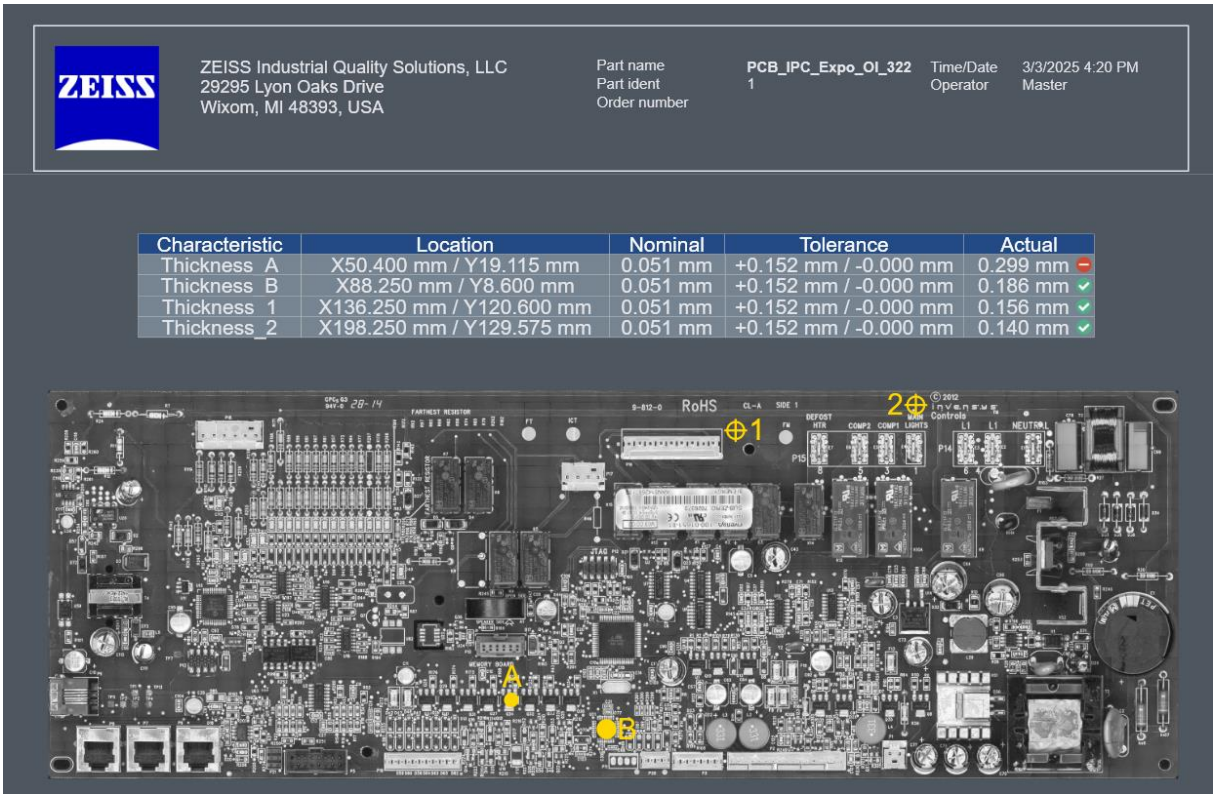
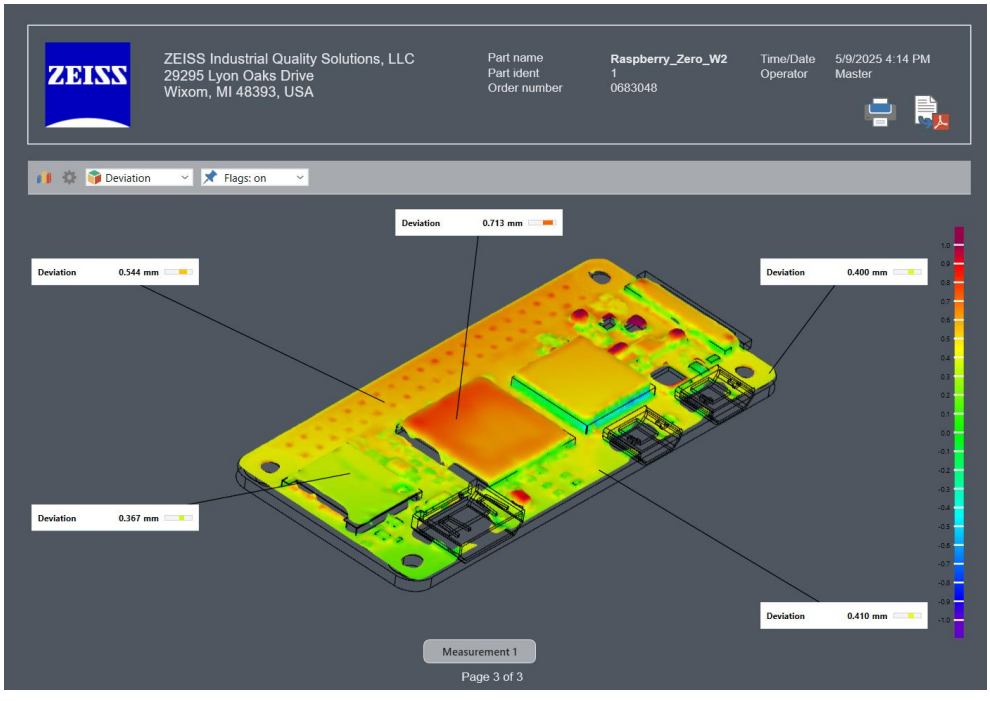
Reporting Results

- Local spot checks can be documented using a standard template, or custom reports can be created to highlight inspected areas with a variety of design options.



- If CAD of the PCA is available, the full board scan can be evaluated and visualized as a heatmap.



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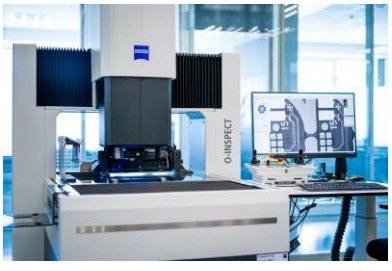
Solution 1: O-INSPECT 3/2/2 with DotScan

ZEISS DotScan on O-INSPECT 3/2/2 VMM is ideal for applications requiring lower Z-dimension sampling. This multi-sensor CMM offers camera and scanning tactile probe measurement capabilities, making it a versatile solution for smaller-scale needs.

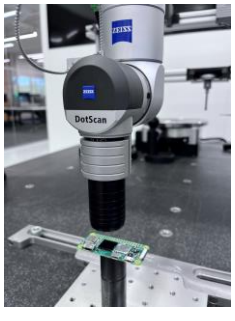
Solution 2: O-INSPECT 543 with DotScan & Rotary Table

ZEISS DotScan on O-INSPECT 5/4/3 is designed for measuring conformal coatings across multiple axes. The rotary table enables precise part rotation for handling complex geometries, while also offering camera and scanning tactile probe measurement capabilities.



Solution 3: CONTURA 7/7/6 with DotScan

ZEISS DotScan on CONTURA 7/7/6 provides maximum flexibility for measuring component sides on a PCA. It also features scanning tactile probe measurement capabilities, making it suitable for more advanced and detailed inspections.



CMM Machine	Z-Axis Conformal Measurement	X & Y Axis Conformal Measurement	Camera Based Metrology	Tactile probe Metrology	Batch processing
O-INSPECT 322	✓		✓	✓	
O-INSPECT 543	✓	✓	✓	✓	✓
CONTURA 7/76	✓	✓		✓	✓

Find your perfect solution today
Schedule a demo with us!

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