

Electrify Quality Assurance



Seeing beyond

ZEISS Electronics Industry Solutions

zeiss.com

New Growth Drivers on Global Market

Advance in electronics with ZEISS

The global electronics market is characterized by significant growth, above all in the automotive industry. Telecommunications is likewise witnessing soaring demand for high-performance electronics, while new growth drivers like extended reality (XR) mean that the classic consumer electronics market is also booming.

Development is hitting new heights across the board, powered by fresh trends such as the periscope cameras featured in smartphones. Since these require much stricter tolerances extending down to the nanometer range, high-end quality solutions are a must – and a longstanding hallmark of ZEISS.

ZEISS generates optimum solutions based on its rich expertise in electronics. Not only does its high-precision hardware and software ensure high confidence and certainty, its targeted measurement and evaluation processes increase efficiency, productivity, comparability, and repeatability. Future success on the electronics market will depend on all of these factors.



Telecom Electronics



Automotive Electronics



Consumer Electronics



Battery



Display



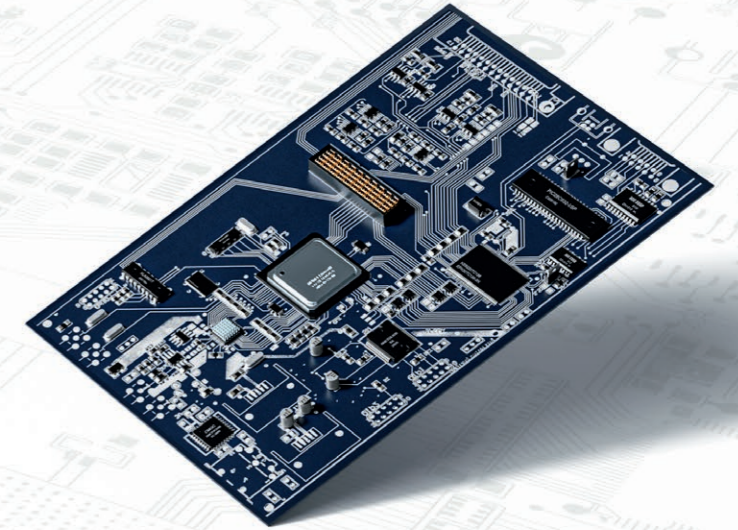
Acoustics



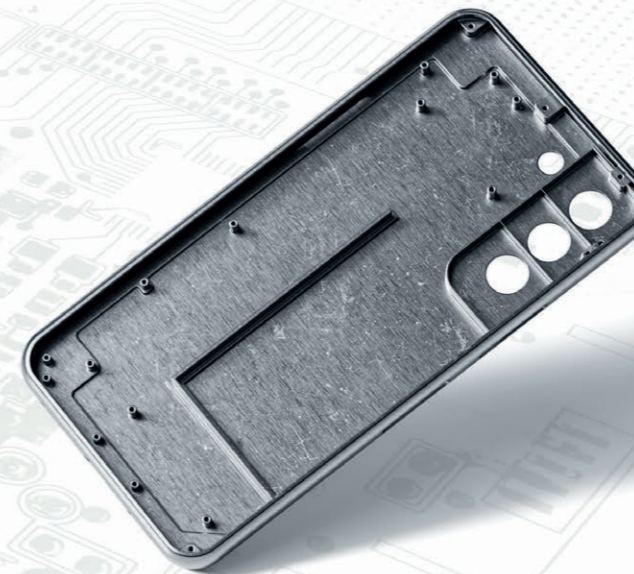
Electrical Connector



Radar



Mainboard (PCB)



Structural Component



Camera Module

Holistic Coverage of Electronics Applications

Quality assurance from a single source

This brochure demonstrates how ZEISS supports customers in numerous common applications spanning consumer, automotive, and telecom electronics. As a one-stop provider, ZEISS tackles key quality challenges, pinpoints new trends, and proposes targeted solutions from its powerful hardware and software portfolio.

For ZEISS, it is not just about resolving production issues but actively adding value. The following pages highlight the challenges, solutions, and vital benefits relating to each of these applications – and present a path to success both today and tomorrow.

Structural Component

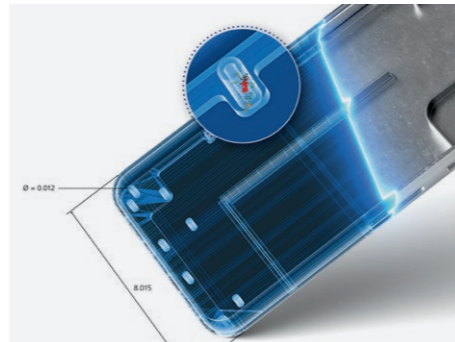
The framework of future technology

Existing Trends

Design verification demands speed and flexibility. Efficient and precise manufacturing then enables fast time to market.

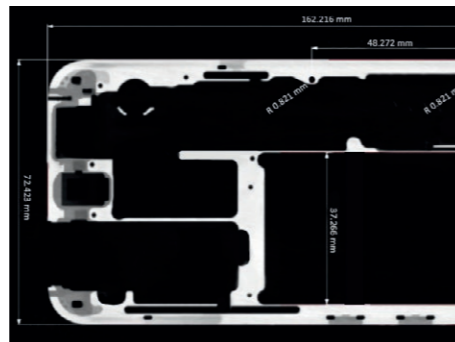
Quality Challenges

- Check production and assembly via GD&T and deformation inspection
- Pre-shipment sample inspection for compliance with design needs
- Track quality of entire production line and perform failure analysis



ZEISS Solutions

- Cosmetic inspection and material analysis with microscopy
- Highly efficient, accurate, and repeatable dimension measurement
- Non-destructive defect analysis and assembly inspection using CT



Added Value

- Greater product performance via cosmetic and coating thickness inspection
- Improved appearance and surface structure boosts customer satisfaction
- Cut waste, reduce costs, and improve efficiency along the production line

New Trend – Freeform Handheld Devices

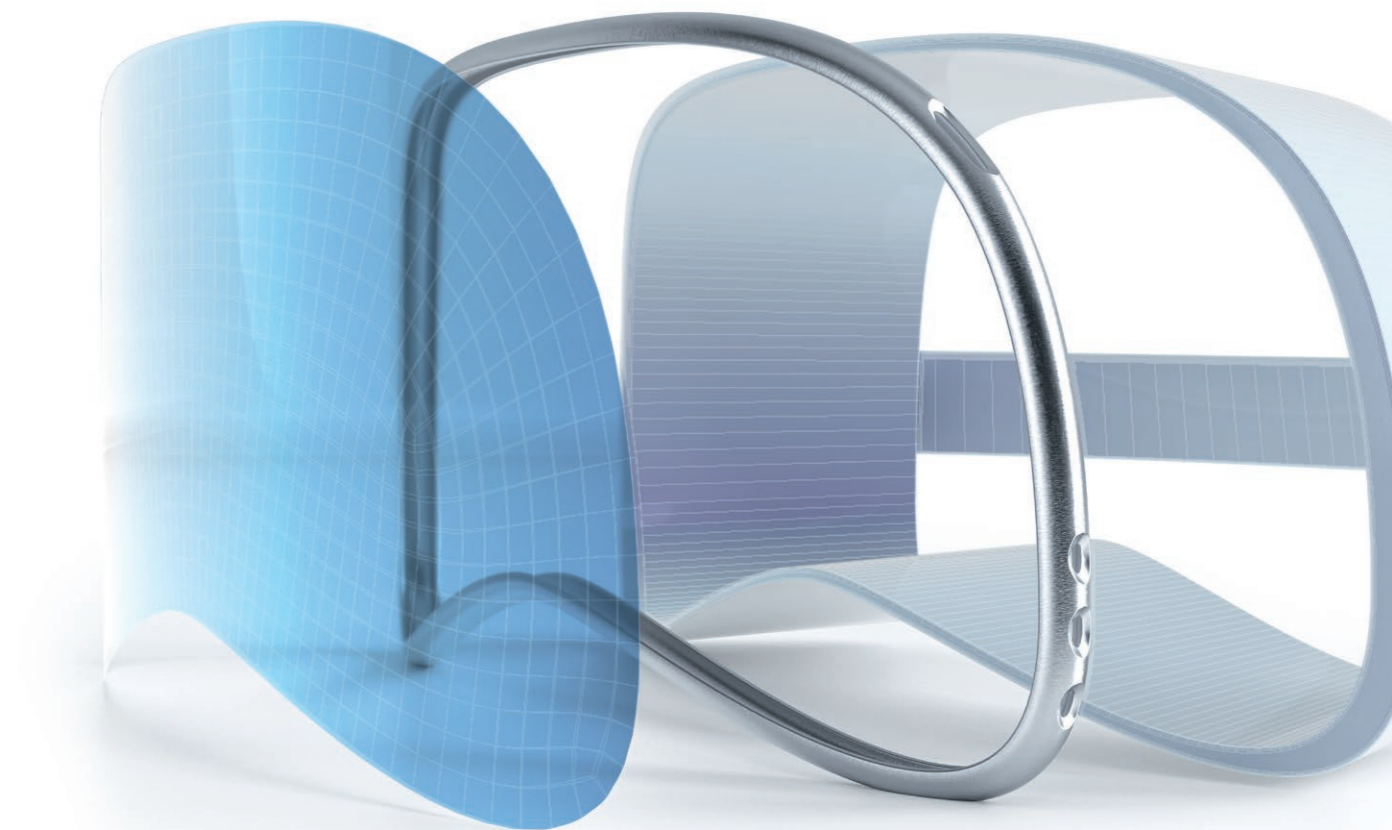
Consumer electronics are largely operated by hand or via input devices. Ergonomic design is key to reducing the prevalence of wrist pain, which is more likely to occur with extended use. Freeform handheld devices such as VR joysticks provide welcome relief, but their complex profiles must be accurately measured to ensure the ideal resting position for users' hands.

Quality Challenges

- Freeform profiles have thin walls and are prone to deviation and deformation
- These characteristics can cause unstable measurement and impair repeatability
- High resolution, low noise, repeatability < 0.03 mm, scan speed < 10 minutes

ZEISS Solutions

- Non-contact CT measurement means no clamping, no deformation, and no blind spots
- Wide range of ZEISS METROTOM CT systems available to suit your specific needs
- Excellent accuracy, repeatability better than 0.03 mm, scan time approx. 8 minutes



Camera Module

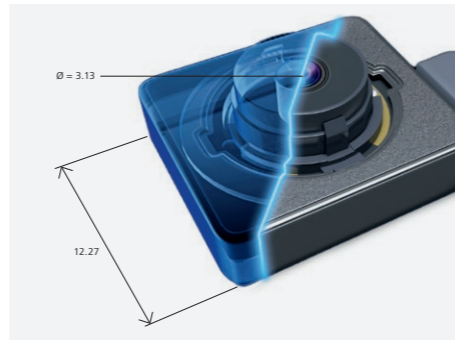
Dimensioning and defect inspection

Existing Trends

Camera modules pose many industry-specific challenges, with the need for miniaturization further complicating matters.

Quality Challenges

- Ensure stable injection molding and proper component mounting
- Handle complex measurements and tight tolerances
- Defect detection and failure analysis to identify root cause



ZEISS Solutions

- Non-destructive analysis with CT, X-ray, and microscopy
- High-precision tactile and optical measurement
- Failure and material analysis with microscopy



Added Value

- ZEISS expertise delivers superlative QA for all aspects of lens barrel
- Tackle miniaturization-related demands throughout the entire value chain
- Ensure your product and process are both innovative and efficient

New Trend – Periscope Camera

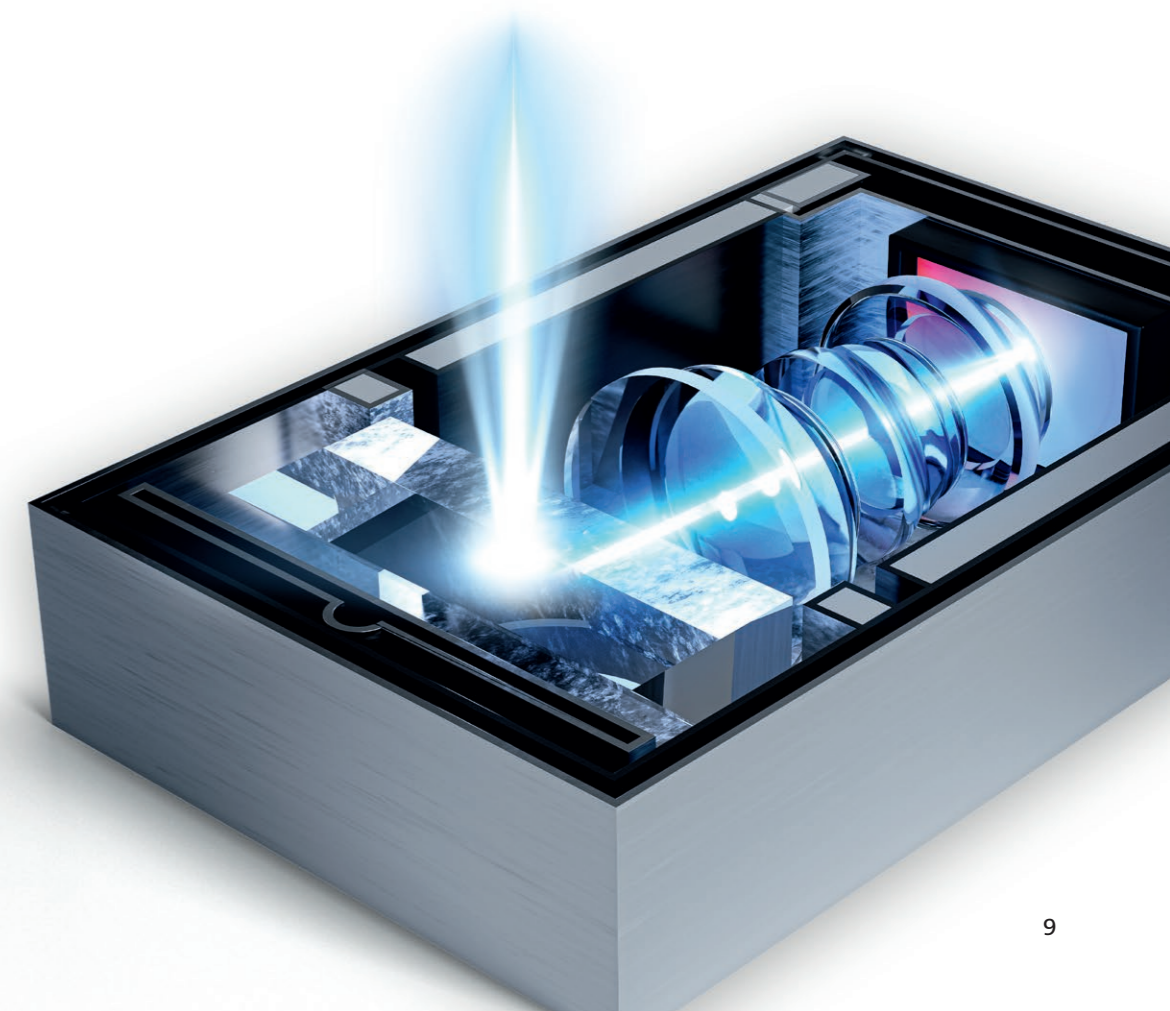
Featuring the long focal length needed to meet market demands for high magnification and long-distance detail, dual-prism periscope cameras are sufficiently thin for use in smartphones. Optical image stabilization (OIS) is needed to counteract blurring. Additional lens improvements can further increase the light intake and thus the overall image quality.

Quality Challenges

- OIS raceway: GR&R < 10% of tolerance, small stylus requirement of 0.3 or 0.2 mm
- High resolution, accuracy, repeatability, and stability for measurement and inspection
- Lens module status inspection, plus failure analysis of coil and CMOS OIS

ZEISS Solutions

- Virtual ball simulates actual assembly after CMM measurement of raceway dimensions
- ZEISS microscopy reduces potential goods return rate and improves production processes
- Failure analysis without camera disassembly thanks to industrial microscopy and CT



PCB/PCBA

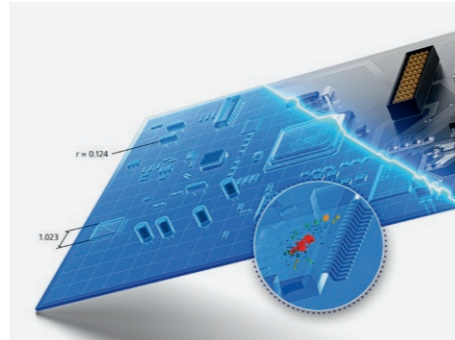
Product quality through process quality

Existing Trends

From the substrate materials to the finished board, PCB quality is a core requirement on the growing electronics market.

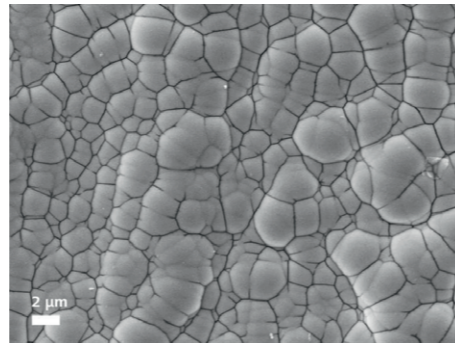
Quality Challenges

- Check surface roughness and morphology of copper foil
- Manage adhesion, 3D sizing, and finish for quality and precision
- Dimensional measurement, defect inspection, and welding quality



ZEISS Solutions

- Rapid surface analysis to ensure high binding force
- ZEISS microscopy captures a vast number of PCB features
- Welding analysis and rapid detection of layer thickness



Added Value

- Fast measurement and inspection for high production throughput
- Establish process quality at every stage from base material to surface finish
- Root cause analysis of welding issues for improved process and circuit integrity

New Trend – Substrate-Like PCB

Smartphone users demand thinner devices that simultaneously offer increased battery life. Compared to a high density interconnector (HDI) board, a substrate-like PCB (SLP) reduces phone thickness by 30% while taking up 50% less area. By making extra space available for the battery, the SLP promotes extended battery life and improved user experience.

Quality Challenges

- Plating is more likely to crack, dry film is harder to remove, high risk of foreign objects
- Limited time for flash etching and potential for residual copper to be left behind

ZEISS Solutions

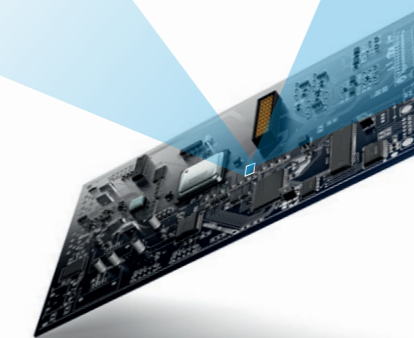
- Quick and easy location of cracks with multiple industrial microscopy tools
- Accurate cutting and polishing of region of interest, enabling in-depth analysis



Light microscopes provide valuable functional information but are very limited in resolution



EM provide high resolution, but lack functional information



Electrical Connector

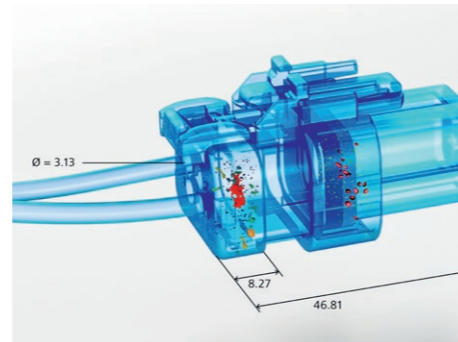
High functionality, throughput, and speed

Existing Trends

From initial mold to final assembly, both speed and productivity must be combined with accuracy and repeatability.

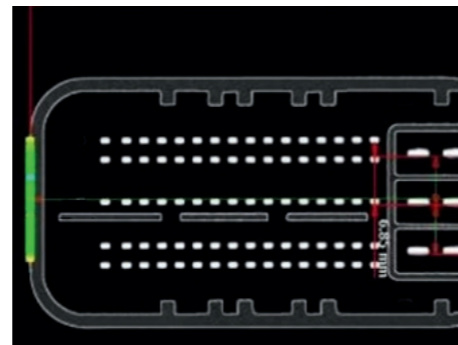
Quality Challenges

- Inspect small features, injection molding, and CAD data of housing
- Sampling at scale, precise measurement, ensure homogeneous coatings, meet tight mold tolerances
- Verify correct pin and component alignment to meet specifications



ZEISS Solutions

- Top-class measurement and automated correction with CMMs and CT
- Failure analysis, defect inspection, and CAD comparison
- Coating failure detection via microscopy, virtual slicing with CT



Added Value

- Innovative and efficient operations thanks to ZEISS' knowledge of manufacturing
- Faster mold processing saves time and resources through reduced iterations
- Swift evaluation ensures proper fit, high-quality data, and excellent accuracy

New Trend – Increased Performance

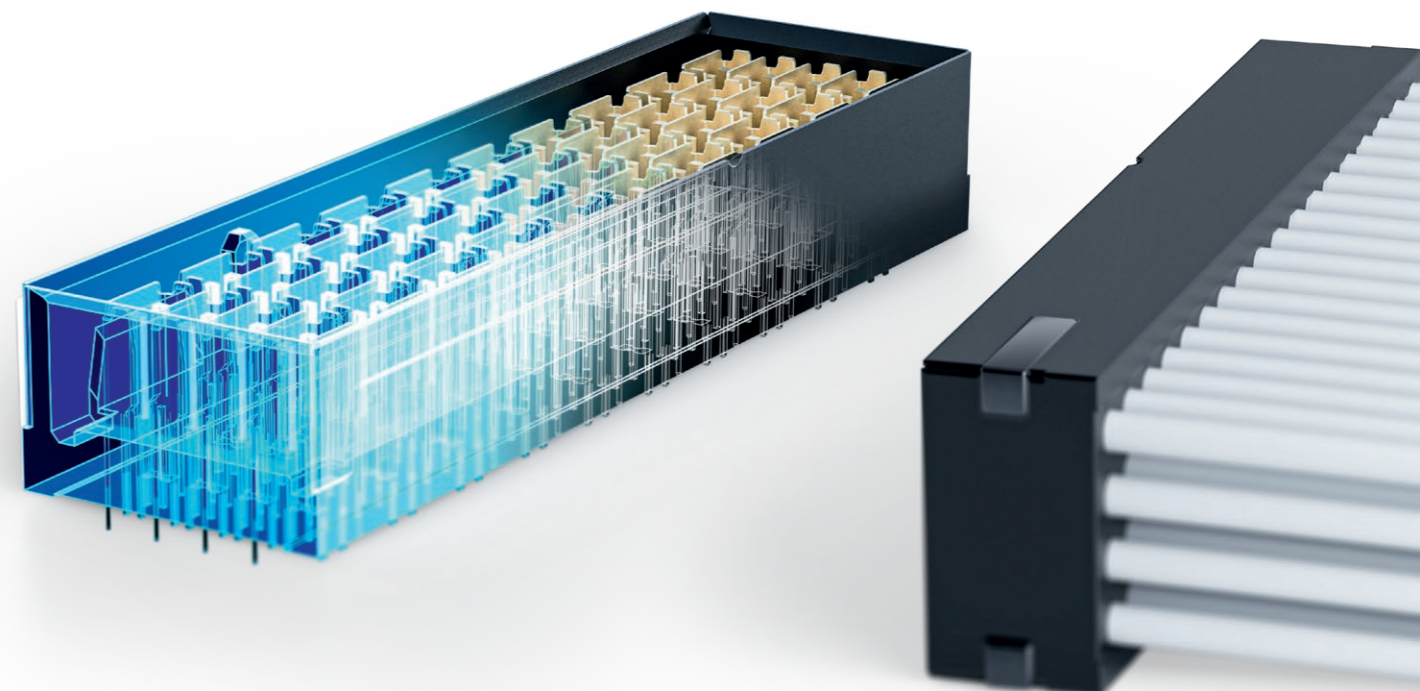
Signal transmission speeds are increasing, which is leading to demands for higher frequencies and electrical connector speeds. There must also be reduced noise generation, improved connector performance, and compliance with more stringent coating requirements. Manufacturers must enable ever more precise measurements.

Quality Challenges

- Precision and durability in challenging conditions
- Multi-material, high-resolution, non-destructive, and efficient size measurement within ± 0.015 mm
- Failure analysis of high-frequency conduction to meet strict (gold) plating requirement

ZEISS Solutions

- Parallel optical measurement of multiple elements in same field of view
- More efficient dimension detection, improved angle, artifact elimination
- Pressure test, salt spray test, failure analysis to improve coating process



Battery

Sleek, robust, and high-performance

Current Trends

As batteries become lighter and thinner, they must also offer greater endurance – and a higher safety factor.

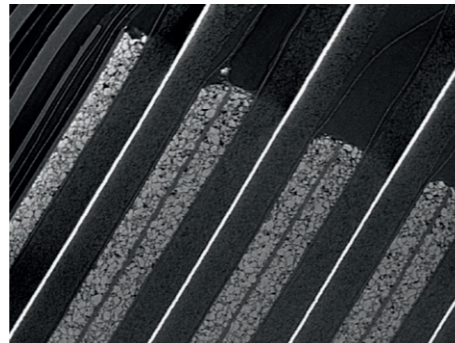
Quality Challenges

- Boost the safety factor via comprehensive non-destructive inspection of problem parts
- Enable powerful and precise high-resolution inspection
- Generate holistic solution for analysis and processing, including offline and online inspection



ZEISS Solutions

- Non-destructive inspection of the interior with CT
- Accelerate the launch cycle of new products



Added Value

- Non-destructive internal fluoroscopy inspection ensures that the battery remains intact
- Faster and more stable measurement

Display

Folding adds a new dimension

Current Trends

Displays with an inside fold or outside fold can now be realized according to user preferences and individual needs.

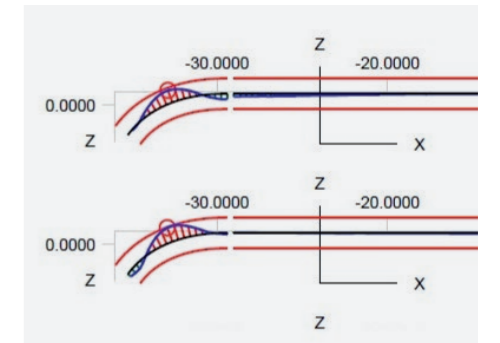
Quality Challenges

- Quality detection for lighter and thinner hinge, plus inspection of folding times
- Check suitable and durable opening and closing angles with corresponding FPC status analysis
- Complex post-processing of thin parts prone to deformation and fracture



ZEISS Solutions

- In-situ analysis of internal element status at different folding angles with CT
- Assembly analysis to confirm the proper interaction of each component
- High-precision dimensional measurement of structural hinge parts via CMM



Added Value

- Quick and effective problem identification
- Non-destructive measurement for thorough analysis of entire process
- More efficient and non-invasive detection of the surface cross-section

Radar

Boosting safety via intelligent detection

Current Trends

Intelligent detection of driving safety requires comprehensive image analysis as part of an early warning system.

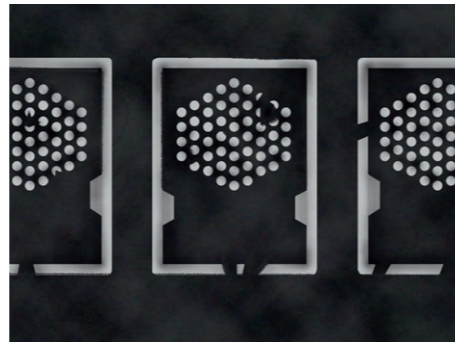
Quality Challenges

- Selection of ideal reception and laser modules to get closer to the scenario
- Need for rapid response that can handle high-precision technical barriers
- Ability to support and warn drivers through intelligent safety detection



ZEISS Solutions

- CT for non-destructive internal defect inspection
- Monitoring of PCBA module quality and accuracy with OMM
- Optical sensor for highly accurate non-contact lens measurement



Added Value

- Non-destructive inspection pinpoints internal defects and speeds up the launch cycle for new products
- Greater efficiency and reduced labor costs thanks to automatic optical inspection
- Even more efficient non-contact inspection reduces product scrap rate

Acoustics

Sound quality on a smaller scale

Current Trends

With less space available, these thinner and lighter components must still provide high sound quality.

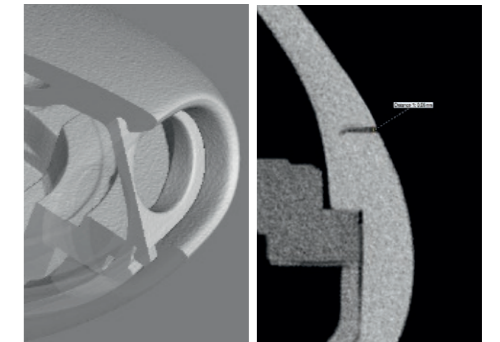
Quality Challenges

- Handle the corresponding resolution, hierarchy, and sound density
- No mechanical contact point and no electric noise, driven directly by integrated circuit



ZEISS Solutions

- Rapid morphology analysis of injection-molded shell with 3D scanner
- CT for non-destructive internal defect inspection
- Mold and housing dimension measurement performed by CMM
- Optical measurement of structural components with OMM



Added Value

- Rapid morphology analysis speeds up the launch cycle for new products
- Faster and more stable measurement via non-destructive internal defect inspection
- Reduced labor costs thanks to more accurate and efficient dimension measurement

An Ever More Immersive Experience

The future in virtual and augmented reality

Given the increasing popularity of virtual reality (VR) and augmented reality (AR) content, the market for VR and AR headsets is on a steep growth curve. To satisfy the expanding demands of users worldwide, VR and AR headsets are becoming slimmer and more ergonomic while providing a more high-resolution and immersive experience.

Upgrading VR and AR headset performance in this way requires numerous high-end components such as acoustic and display equipment. Manufacturers must therefore fulfil the stringent quality assurance requirements that relate to each individual component within every headset. And to remain competitive, they must maintain both speed and efficiency in production.

The ZEISS portfolio is perfectly suited to tackling these challenges on the VR and AR headset market. By performing detailed scans on highly complex structural components featuring freeform profiles, for example, its CMM and CT systems boost ergonomic performance. In addition, ZEISS 3D scanning solutions support precision failure analysis on components such as the 3D cameras that deliver high-resolution VR and AR content.

These solutions from ZEISS are crucial to success within the demanding and evolving field of VR and AR headsets. Fast and highly repeatable scans improve the inspection efficiency, boosting performance in priority areas like ergonomic handling and high-resolution graphics. They also reduce the potential goods return rate as part of more productive operations overall.

In VR and AR headsets, the trend toward more ergonomic and immersive performance is powered by a large variety of highly sophisticated components. When it comes to resolving the QA requirements of all these components in a smooth and efficient process, manufacturers can enjoy full coverage from a single expert source in ZEISS.



ZEISS Portfolio



Want to explore all hardware and software solutions across the entire ZEISS portfolio? Visit us at zeiss.com/metrology

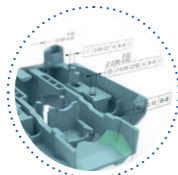
Coordinate Measurement Solutions



ZEISS CMMs deliver stunning speed, accuracy, and flexibility, while ZEISS VMMs offer outstanding point density for fast optical measurement results.

ZEISS CALYPSO

ZEISS CALYPSO is your dimensional metrology software solution for CMMs.



ZEISS Smart Services

ZEISS Smart Services boost safety, availability, and productivity.



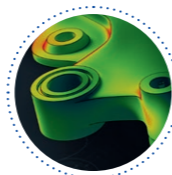
Optical Solutions



ZEISS manual and automatic scanning delivers fast high-resolution results for small to medium components. ZEISS optical solutions enable dynamic object measurement to test for deformation or movement.

ZEISS INSPECT

ZEISS INSPECT Optical 3D software takes inspection and evaluation to a whole new level with features such as full-field data acquisition and trend analysis.



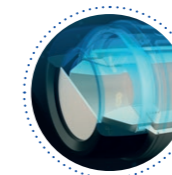
CT and X-Ray Solutions



2D and 3D X-ray from ZEISS are ideal for fast and non-destructive scanning. ZEISS industrial CT performs measurement and defect analysis in a single X-ray scan, supporting fast handling even of more dense parts.

ZEISS INSPECT

ZEISS INSPECT X-Ray software performs in-depth visualization using the data generated with industrial CT.



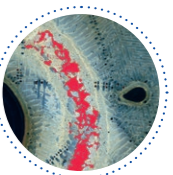
Microscopy Solutions



ZEISS offers precision solutions in light, digital, electron, and X-ray microscopy, from specific surface inspection to general material characterization.

ZEISS ZEN core

The powerful imaging and connectivity software ZEISS ZEN core enables traceable analysis and ensures compliance with regulatory demands.



Supporting software

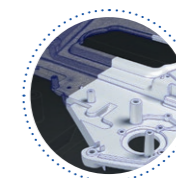
Data Management

ZEISS PiWeb scalable reporting and quality management software combines metrology results from different measuring technologies for efficient tracking of production quality. Its powerful features and intuitive templates handle huge amounts of data and provide immediate results.



Reverse Engineering

ZEISS REVERSE ENGINEERING surface reconstruction software promotes the automated, interactive, and highly precise creation of CAD models. The additional tool correction option helps improve CAD data quality.



Your Global Partner

Present in all regions

32

Sales & Service
Organizations

10

Production Sites

63

ZEISS Quality
Excellence Centers

100

Business Partners

As electronic components are rarely manufactured and assembled in a single location, measurement and inspection issues can occur in any country and at any supplier. Our global network of application engineers and service technicians provide quality assurance solutions to help you keep traceability and quality at a consistently high level. Boasting a comprehensive knowledge base and the world's most accurate measuring machines, ZEISS strives to exceed expectations around the globe.

Find your perfect solution today.
Get in contact with our global experts.



info.metrology.de@zeiss.com



Carl Zeiss IQS Deutschland GmbH

Carl-Zeiss-Straße 22
73447 Oberkochen

Vertrieb

Telefon: +49 7364 20 6337
E-Mail: sales.metrology.de@zeiss.com

Service

Telefon: +49 7364 20 6337
E-Mail: info.metrology.de@zeiss.com

www.zeiss.de/imt

Carl Zeiss Industrial Quality Solutions, LLC

6250 Sycamore Lane North
Maple Grove, MN 55369, USA

Phone: +1 800 327-9735

Fax: +1 763 533-0219

Email: info.metrology.us@zeiss.com

www.zeiss.com/metrology