

How to test?

- **Manual checks**

- **Automated optical inspection (AOI)**

- **Automated X-ray inspection (AXI)**

Visual inspection; checking the components for presence, position, orientation and solder quality. The X-ray technology is used for non-visible areas.

- **In-circuit testing (ICT, FPT, BST)**

Checks the components and PCB's electrical properties/parameters via analogue ICT, digital ICT, flying probe, boundary scan test methods, etc.

- **Functional testing**

Checks the functions (electrical, optical, acoustic, wireless, etc.) of clusters, assemblies, modules, devices and sub-systems. Digital functions, electrical performance data, evaluation of analogue signal waveforms, bus simulations, built-in-self-test (BIST) are measured partly in real time and under load. Stimulators and actuators and other general requirements are simulated.

- **Programming (ISP) and calibration/adjustment**

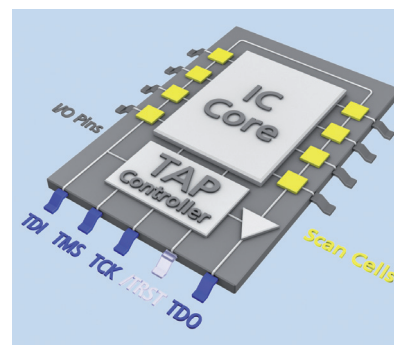
Calibration and in-system programming as well as verification are conducted as part of the electrical tests.

- **Dynamic stress test/ environmental stress screening (ESS)**

Operating conditions are tested by applying vibration, temperature cycling, climatic and other environmental simulations. The aim is to identify failures with sporadic or continuous verification of function.

- **Safety verification**

Verification of leakage current, PE conductor continuity, high-voltage and insulation resistance ensures electrical safety.



**Optimal test depth without redundant tests –
Development of a custom
device-under-test concept**

The following ZVEI members ...

- Offer services tailored to customers' requirements.
- Are committed to quality and environment management.
- Have the expertise required to perform the services.
- Determine the desired results and performance indicators together with the customer.



ZVEI:
Die Elektroindustrie

ZVEI - German Electrical and Electronic Manufacturers' Association e. V.
PCB and Electronic Systems Division
Lyoner Straße 9 • 60528 Frankfurt am Main • Germany
Telephone +49 69 6302-437 • Fax: +49 69 6302-438
E-mail: pcb-es@zvei.org • www.zvei.org

ZVEI:
Die Elektroindustrie

The World of Testing

Quality achieved safely



With the right technology straight to
your destination

Services
in **EMS**

PCB and Electronic Systems Division

Why conduct tests?

To achieve the required functionality and reliability!

By conducting a combined failure mode and effects analysis (FMEA) for

- material
- production and
- function

a targeted test strategy is developed to eliminate or minimize remaining potential risks.

The ideal test strategy observes

- Requirements of laws and standards
- Coordination of responsibilities
- Product design (DfT – Design-for-Test)
- Quantities and batch sizes
- Desired target quality

Potential consequential costs due to defective products significantly exceed the costs of optimal tests.

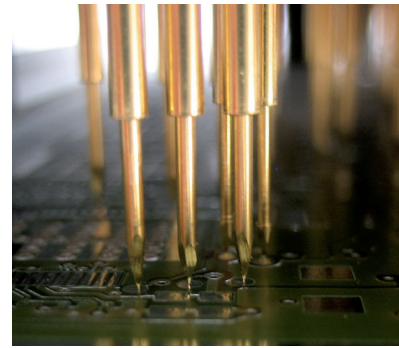
An optimized test strategy minimizes the overall costs.

- Warranty & service costs
- Recall campaign
- Company image

- Initial costs
- Testing costs



Quality consistent with expenditure



Our offer: Take us on board from the start and lay the foundations for effective testing

Make best use of expertise and knowledge by involving an EMS partner during product design. Quality targets are thus achieved efficiently.

• DfT – Design for Testability

Each testing method has specific requirements.

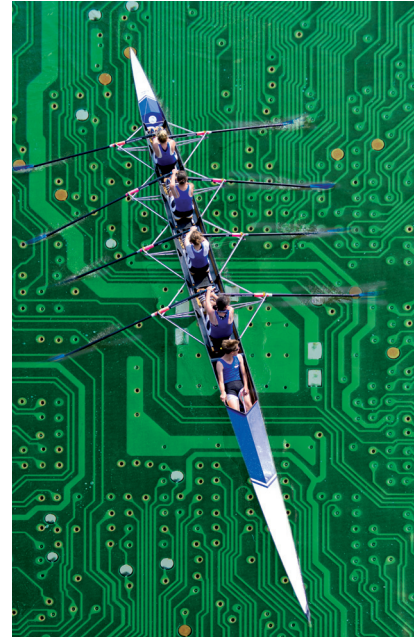
After a joint risk evaluation, we develop the ideal test strategy and thus support the implementation of wiring and design requirements.

• NPI – New Product Introduction

NPI is a service package offered by the EMS companies aimed at the fast implementation of optimum series production for your product innovations.

This also includes the service packages DfM, DfC and DfL.

Additional information is provided in the ZVEI brochure „NPI - The Fast Way to the Series Product.“

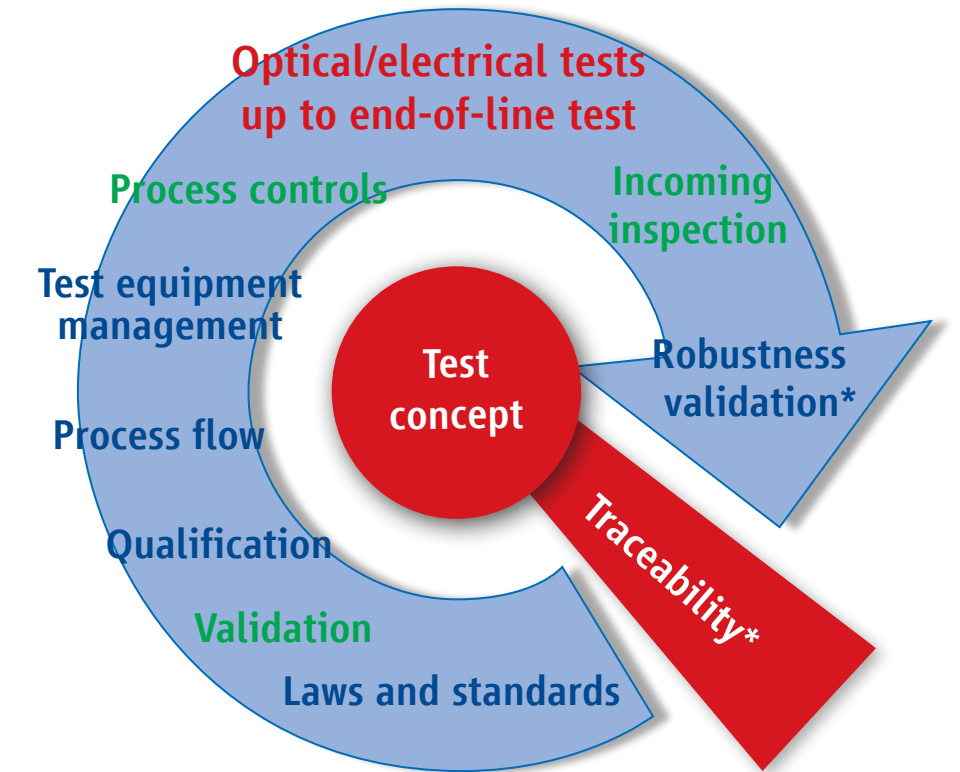


- DfM – Design for Manufacturing
- DfT – Design for Testability
- DfC – Design for Cost
- DfL – Design for Logistic

Testing and NPI – Pin-(test)-point quality

Our optimized test strategy: Core of our common quality plan

Coordinated process controls and intelligent test method combinations ensure that the quality target is efficiently met.



The product-specific, efficient test concept as core of the quality plan supports, among other things, the following points:

- **Incoming inspection:** Identification, first article inspection, supplier management ...
- **Process controls:** Solder paste inspection (SPI), AOI or visual inspection, set-up checks, regular process parameter checks and sample tests ...
- **Validation:** Proof that quality targets are met

The technical and economic feasibility of the comprehensive test concept with regard to the quality target determines the responsibilities between customer and contractor.

* see ZVEI Guidelines: Identification and Traceability in the Electrical and Electronics Industry for the Entire Value Chain, November 2009
Implementation Guide Robustness Validation, January 2010
Robustness Handbook for Robustness Validation of Automotive Electrical/Electronic Modules, December 2006

Holistic approach for best functionality