



COMPANY PROFILE 2021





THE IDEAL PARTNER TO TEST AND DEVELOP YOUR PRODUCTS

Send us a request for **technical support**: our technicians will contact you within **24 hours**.

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GESTLABS IS A...

- ▶ **Material Science & Reliability Laboratory**
- ▶ **Training Center**
- ▶ **Electronic Design House**
- ▶ **Functional power test solutions**

Located in the Milan Area. Our company has achieved a leadership role in the Italian electronic market for laboratory services, professional education and consultancy, software engineering, and design services on electronic boards and components.

Our customers operate as leading companies in the **Aerospace, Automotive, Home Appliance, Electronics, Power and Automation, Medical, Lighting and ICT industry.**

Here are some of our key statistics:

- ▶ 3.000 sq. meters of workspace
- ▶ 20+ Certified lab technicians, auditors and trainers
- ▶ More than 400 companies served each year
- ▶ Continuous compliance with ISO 9001 and ISO 17025 specifications



LIST OF ISO CERTIFICATIONS:



- ▶ **ISO/IEC 9001:2015** GESTLABS' quality management system complies with the requirements of the ISO 9001 standard
- ▶ The requirements of the standard apply to all business processes, from sales to purchasing management.
- ▶ **ISO/IEC 17025:2017** enables laboratories to demonstrate that they operate competently and generate valid results, thereby promoting confidence in their work both nationally and around the world.
- ▶ It also helps facilitate cooperation between laboratories and other bodies by generating wider acceptance of results between countries.
- ▶ Test reports and certificates can be accepted from one country to another without the need for further testing, which, in turn, improves international trade.

CERTIFIED IPC TRAINING CENTER	QUALITY MANAGEMENT SYSTEM ISO 9001:2015	LABORATORY MANAGEMENT SYSTEM ISO 17025:2017
   	  <p>Certificate No: FM 591727</p>	 
		





LAB & RELIABILITY TESTING

Our lab technicians help customers to eliminate costs caused by products' non-compliances through rigorous application of Failure Analysis Techniques, Root Cause Analysis and Material Characterization Testing.

- Failure Analysis
- Compliance & Non-Compliance Testing
- Product Validation Plan
- Mechanical Testing
- Environmental & Reliability Testing

TRAINING CENTER

Our Certified IPC Trainers and consultants provide companies operating in the electronic industry with IPC certifications and customized training programs.

- Certified IPC Courses
- Professional training Courses
 - Industrial Processes e Technologies
 - Statistics & Reliability
 - Failure Prevention
- Consultancy

ELECTRONIC TEST SOLUTIONS & DESIGN

Our software engineers design, develop, and validate custom made electronic boards and components.

- Functional power test solutions
- Hardware design
- Software design
- Mechanical design
- Re-engineering

PRODUCT COMPLIANCE & MATERIAL TESTING SERVICES

Our lab technicians help customers to eliminate costs caused by products' non-compliances through rigorous application of Failure Analysis Techniques, Root Cause Analysis and Material Characterization Testing.

- Failure Analysis
- Compliance & Non-Compliance Testing
- Non Destructive & Destructive Testing
- Metallographic Analysis
- Chemical & surface Analysis



FAILURE ANALYSIS

Failure Analysis is an investigative process designed to determine how and why a product or component is not able to function properly.

The goal is to **reduce or eliminate the risk of repetition** of the event that caused the failure.

We **identify the causes of product defects** and put our experience at the service of our customers to correct the phases of the production process.

Our laboratory technicians help companies **eliminate the costs caused by product non-compliance** through Failure Analysis, Root Cause Analysis and material characterization tests.



FAILURE ANALYSIS

- ▶ **Electrical characterization** and product circuit analysis
- ▶ **Tomography (X-Ray 3D)**: control and research of defects, dimensional analysis, evaluation of voids in volume, reverse engineering with methods validated by AIPnD (Italian Association of Non-Destructive Testing Diagnostic Monitoring)
- ▶ **Scanning Acoustic Microscope (C-SAM)**: ultrasound for the determination of delaminations / voids in integrated components and other materials
- ▶ **Decapsulation** of discrete electronic components and MSI (Medium Scale Integrate) by chemical etching
- ▶ Morphology analysis through electron microscopy (**SEM**), **cross-sectioning**







METALLOGRAPHIC ANALYSIS

Visual Inspection & Optical microscope Analysis

Optical microscopy allows to evaluate the quality of solders joints and coatings (heat treatment anomalies, presence of cracks, and foreign objects, contaminants).

Norme Tecniche:

- ▶ IPC A-600 (Acceptability of Printed Boards),
- ▶ IPC A-610 (Acceptability of Electronic Assemblies),
- ▶ IPC 6012 (Qualification and Performance Specification for Rigid Printed Boards)

Cross-Section sample preparation

The sample is cut and encapsulated in a special resin; after further mechanical processing (grinding, polishing), it can be analyzed through optical and electronic microscopes.

- ▶ Test method: IPC TM 650 2.1.1 (Micro sectioning, Manual method)

3D X-Ray (Tomography)

The analysis of electronic boards with X-rays is a non-destructive technique that allows to check the correct welding of components, to identify and evaluate any failures and / or defects at the level of open, voids, Solder Ball and solder cracks.

Test method: IPC A-610 (Acceptability of Electronic Assemblies), IPC 7095 (Design and Assembly Process Implementation for BGAs).

METALLOGRAPHIC ANALYSIS

SEM (Scanning Electron Microscope) – EDX (Energy Dispersive X-Ray) Spectroscopy

The Scanning Electron Microscope, EDX Spectroscopy (Energy Dispersive X-ray Analysis) is a type of microscope that allows a morphological investigation at very high magnifications.

Solderability Test

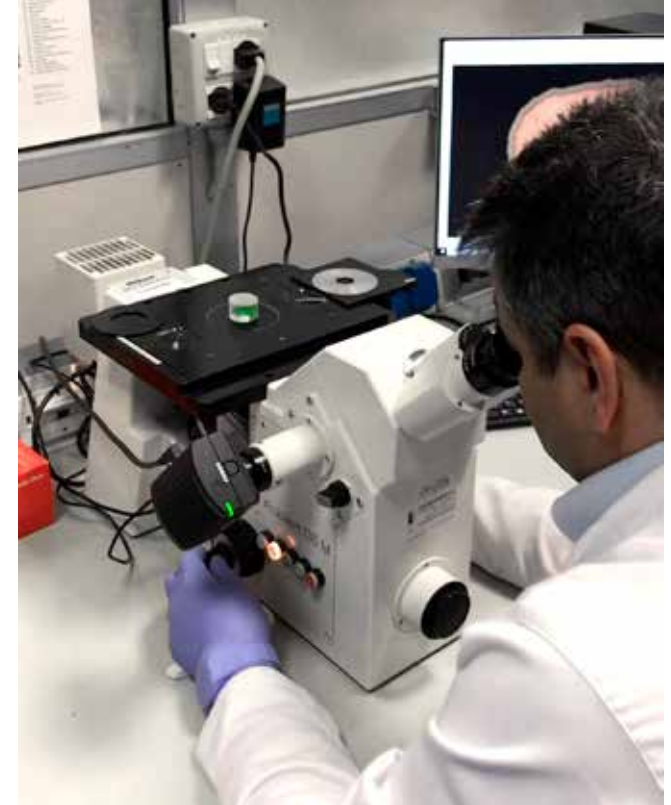
- ▶ Test method: IPC J-STD-002 (Solderability Tests for Component Leads, Terminations, Lugs, Terminals and Wires), IPC J-STD-003 (Solderability Test for Printed Boards)

Dye&Pry Test

- ▶ Test method: Internal Method Solder Float Test
- ▶ Test method: IPC TM-650 2.6.8 (Thermal Stress, Plated-Through Holes)

Peel Strength Test

- ▶ Test method: IPC TM 650 2.4.8C (Peel Strength of Metallic Clad Laminates)



CHEMICAL & SURFACE ANALYSIS

TIC – Total Ionic Contamination

- ▶ Test method: IPC TM 650 2.3.25.1 (Ionic Cleanliness Testing of Bare PCBs),
- ▶ Test method: IPC TM 650 2.3.25D (Detection and Measurement of Ionizable Surface Contaminants by Resistivity of Solvent Extract (ROSE))

XRF - X-RAY FLUORESCENCE

XRF (X-ray fluorescence) is a non-destructive analytical technique used to determine the elemental composition of materials. XRF analyzers determine the chemistry of a sample by measuring the fluorescent (or secondary) X-ray emitted from a sample when it is excited by a primary X-ray source.

- ▶ Test method: IPC 4552 Amendment 1 & 2, IPC 2221, IPC 4554

IC - Ion Chromatography

- ▶ Test method: IPC TM 650 2.3.28 (Ionic Analysis of Circuit Boards, Ion Chromatography Method), IPC TM 650 2.3.28.1 (Halide Content of Soldering Fluxes and Pastes), IPC TM 650 2.3.28.2 (Bare Printed Board Cleanliness by Ion Chromatography)

ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry)

Inductively coupled plasma atomic emission spectroscopy (ICP-AES), also referred to as inductively coupled plasma optical emission spectrometry (ICP-OES), is an analytical technique used for the detection of chemical elements.

- ▶ Test method: Internal method



CHEMICAL & SURFACE ANALYSIS

FT-IR (Fourier Transform Infra-Red Spectroscopy)

- ▶ Test method: ASTM E1252 (Standard Practice for General Techniques for Obtaining Infrared Spectra for Qualitative Analysis)

Contact Angle Measurement

- ▶ Test method: 2.4.24.2 Glass Transition Temperature of Organic Films
- ▶ Test method: ASTM D7490 Standard Test Method for Measurement of the Surface Tension of Solid Coatings, Substrates and Pigments using Contact Angle Measurements
- ▶ Test method: ASTM D7334 Standard Practice for Surface Wettability of Coatings, Substrates and Pigments by Advancing Contact Angle Measurement

Tg–Glass Transition Temperature

- ▶ Test method: 2.4.24C Glass Transition Temperature and Z-Axis Thermal Expansion by TMA
- ▶ Test method: 2.4.25C Glass Transition Temperature and Cure Factor by DSC

CTE – Coefficient of Thermal Expansion with TMA

- ▶ Test method: IPC TM650 2.4.24 (Glass Transition Temperature and Z-Axis Thermal Expansion by TMA)



PRODUCT RELIABILITY TESTING

Reliability, describes the ability of a system or component to function under stated conditions for a specified period of time.

Our lab technicians help customers to ensure the reliability of their products through certified analyses and testing:

- Product Validation Plan
- Reliability Test Plan
- Environmental & Reliability Testing
- Mechanical Testing





ENVIRONMENTAL TESTING (TEMPERATURE & HUMIDITY)

Environmental testing allow the measurement of the performance of equipment under specified environmental conditions, such as:

H.T.S. (High Temperature Storage)

S.I.R. (Surface Insulation Resistance)

A.T.C. (Accelerated Thermal Cycling)

T&H (Temperature & Umidity)

T.S. (Thermal Shock)

Our highly qualified team develops goes the extra mile in the development of customized test protocols guaranteeing reliability, reproducibility, and traceability of results (**ISO 17025**).



Some of the equipment and methods used to perform environmental testing in our facilities are:

TEST DESCRIPTION	TEST METHOD
CONSTANT TEMPERATURE	CEI EN 60068-2-1, CEI EN 60068-2-2
THERMAL SHOCK	CEI EN 60068-2-14 Na
TEMPERATURE CYCLING	CEI EN 60068-2-14 Nb
CONSTANT TEMPERATURE AND HUMIDITY	CEI EN 60068-2-78
TEMPERATURE AND HUMIDITY CYCLE	CEI EN 60068-2-30, CEI EN 60068-2-38

CHAMBER MODEL	TECH SPECS
Angelantoni ACS CHALLENGE 250	FROM - 40°C TO + 180°C (DELTA MAX: 3.9°C/min raising, 2.5°C/min descending)
Angelantoni ACS HYGROS 600	FROM - 40°C TO + 180°C (DELTA MAX: 3.2°C/min raising, 2.5°C/min descending)
VOTSCH VC4057	FROM - 40°C TO + 180°C (DELTA MAX: 2.2°C/min raising, 2°C/min descending)
VOTSCH VC 7018	FROM - 70°C TO + 180°C (DELTA MAX: 4°C/min raising, 2.3°C/min descending)
VOTSCH VT 7012 S2	FROM +50°C TO +220°C (hot chamber)
Angelantoni ACS 157 / 2T	FROM +20°C TO +220°C (hot chamber)



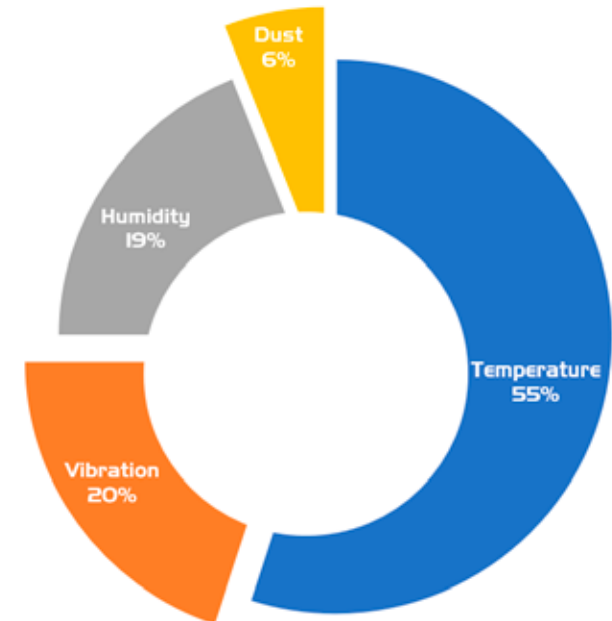
MECHANICAL TESTS (SHOCK & VIBRATIONS)

Package Transportation Testing is carried out to determine how a packaged product perform under simulated conditions.

Vibration and Shock Environmental Testing are used to validate products according to international standards (ISTA, ASTM, ISO, MIL-STD...), and to obtain key information about the behavior of critical components, through models that simulate real world conditions.

Some of the mechanical tests performed in our facilities are:

- ▶ Vibration Tests (random and sinusoidal for X, Y, Z)
- ▶ Drop Tests
- ▶ Impact Tests (sinusoidal and trapezoidal pulses seeds)
- ▶ Tensile and compression Tests



SOURCES OF FAULTS DUE TO ENVIRONMENTAL STRESSES (Aeronautical Applications)

▶ Temperature ▶ Vibration ▶ Humidity ▶ Dust
T.L.Landers et Al., Electronics Manufacturing Process, Prentice Hall International Editions

MECHANICAL TESTS (TRANSPORT SIMULATIONS)

GESTLABS can verify and certify the integrity and reliability of your product's packaging

Our certified technicians are able to perform tests according to customer requirements, as well as several test methods for package testing standards published by international organizations:

- ▶ ASTM International - American Society for Testing and Materials
- ▶ CEN - European Committee for Standardization
- ▶ ISO - International Organization for Standardization
- ▶ ISTA - International Safe Transit Association
- ▶ MIL - Military Standards





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IPC CERTIFIED COURSES

Courses follow a standard program with a final examination in order to release a formal IPC Specialist", certificate world wide recognized.

Certification is valid for 2 years from release date.

- IPC A-600/610/620 CIS
- IPC 7711/7721 CIS
- IPC/J-STD-001 CIS

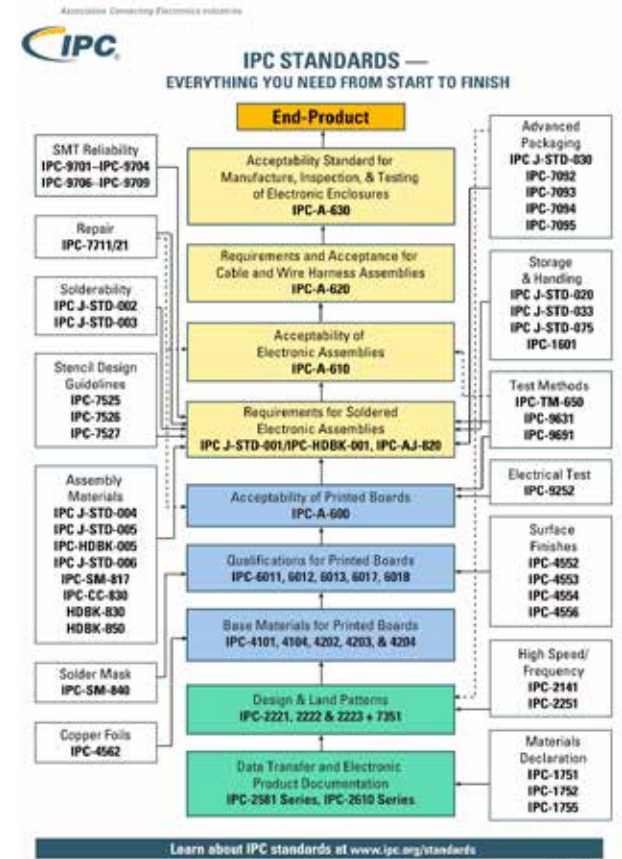


WHY CHOOSE IPC?

IPC, (Association Connecting Electronics Industries), is the leading international standard-setting body for the electronics industry.

IPC's main purpose is to standardize assembly and production requirements for electronic equipment and assemblies.

GESTLABS, as authorized distributor, offers training courses designed by IPC. Our instructors, in addition to being certified as "Certified IPC Trainer", are primarily process & technology specialists with extensive on-the-field experience.



PROFESSIONAL COURSES

These courses, based on IPC/ISO standards, allow multiple participants per session providing the best value to our customers.

At the end of the course a participation certificate is issued to all participants.

- Industrial processes and technology;
- Reliability and statistics;
- Laser safety



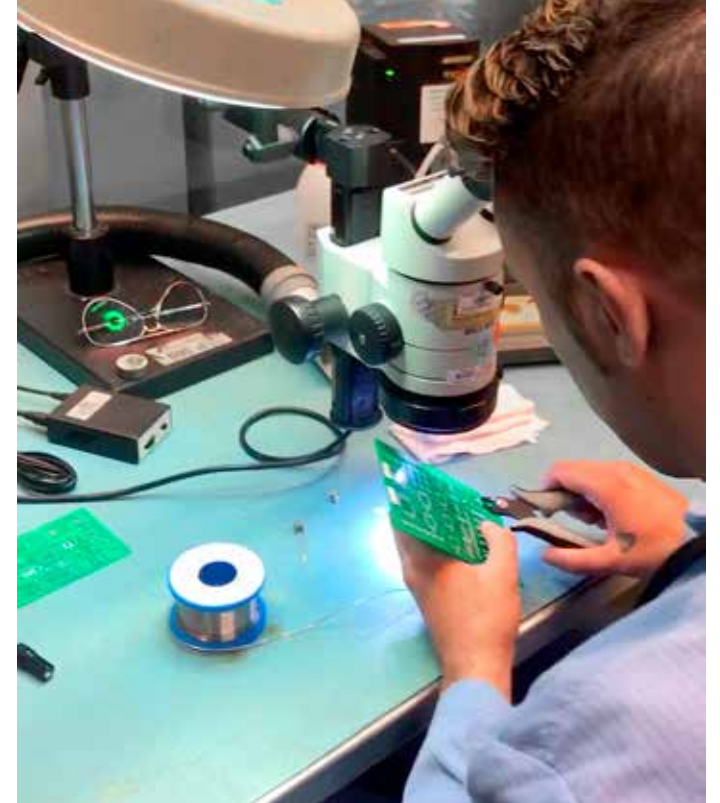
CUSTOMIZED TRAINING PROGRAM FOR YOUR BUSINESS NEEDS

The training activities provide the technical staff with the appropriate skills for **receiving inspection** (IPC / sampling plans), for **process control** (IPC / SPC, control cards, CP-CPK etc) and for the implementation of **tests for failure prevention** (BURN-In; HASS).

These courses include the participation of more people per session, with a reduction of per capita training costs.

To develop them, we took as reference the main industry standards and the best industry practices.

- ▶ Processes and Technologies
- ▶ Reliability and Statistics
- ▶ Laser Safety



PROCESSES & TECHNOLOGIES

These courses are designed by our Education Center for the training of both operational and specialist staff.

- ▶ Rework SMT and PTH
- ▶ Introduction to ESD and MSD
- ▶ Orientation course for electronic assembled inspections
- ▶ Laboratory analysis for processes and products and analysis of electrical defects
- ▶ Production Processes of Electronic Assemblies
- ▶ Training and Validation of Electronic Assembled Production Processes

PRODUCT RELIABILITY

These courses are aimed at technicians who deal with designing products or setting up processes, product engineers and quality engineers.

- ▶ Identify and prevent failure mechanisms - FMEA methodology (Failure Mode and Effects Analysis) with application examples
- ▶ Basic statistics with calculation examples
- ▶ Statistical techniques for product control and sampling plans, with calculation examples
- ▶ Reliability of the product: basic notions, models for accelerated tests and burn-in and examples of calculation
- ▶ Metrology, calibration and measurement systems set up.

LASER SAFETY

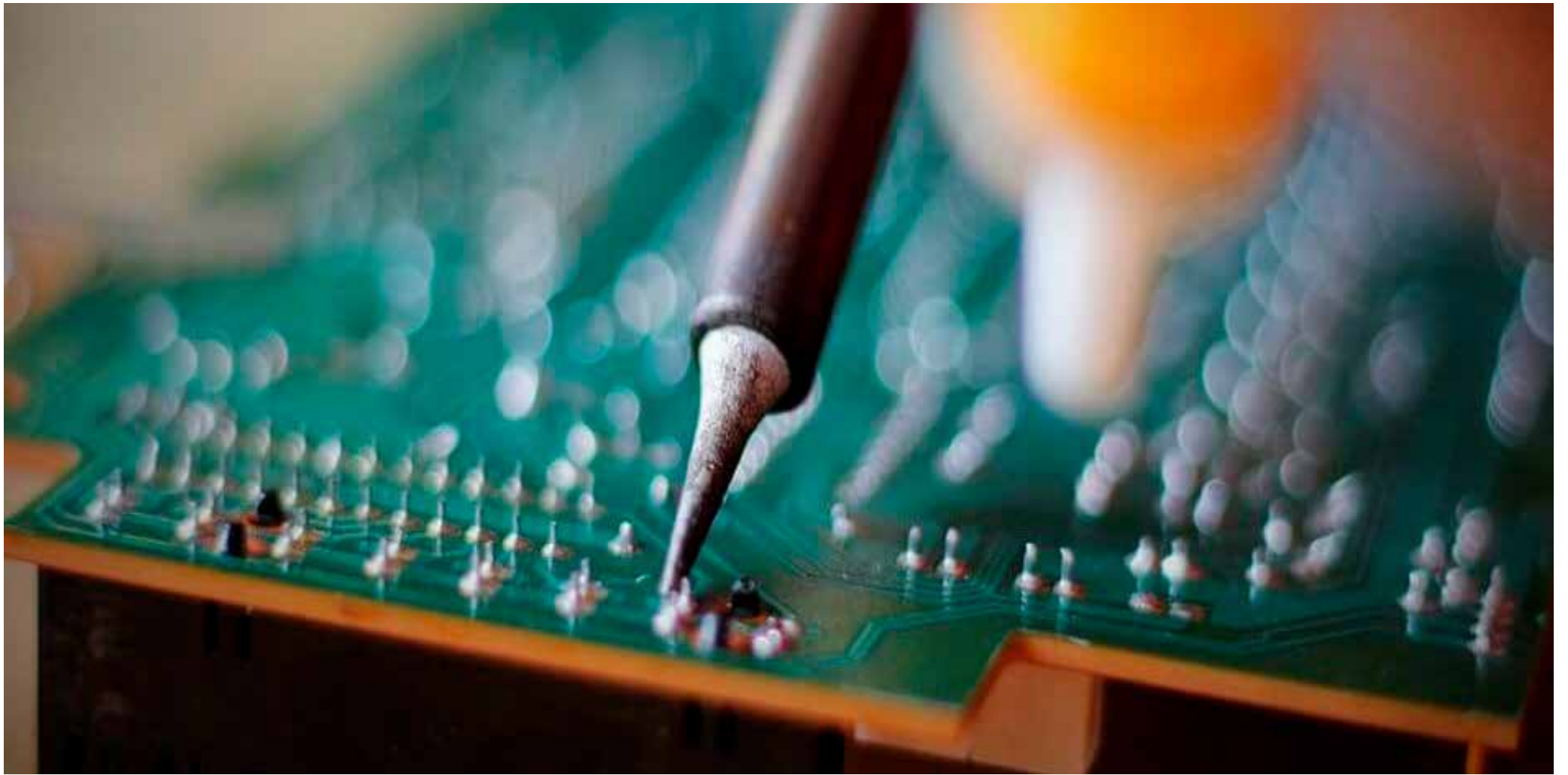
Our courses allow your business to operate safely with LASER equipment, in compliance with the latest laws and regulations.

- ▶ “Laser Safety” training course
- ▶ Laser instruments / systems
- ▶ Non-coherent optical sources (LEDs, lamps)

PROCESS & TECHNOLOGY CONSULTING

All topics covered in the courses are also subject to consultation.

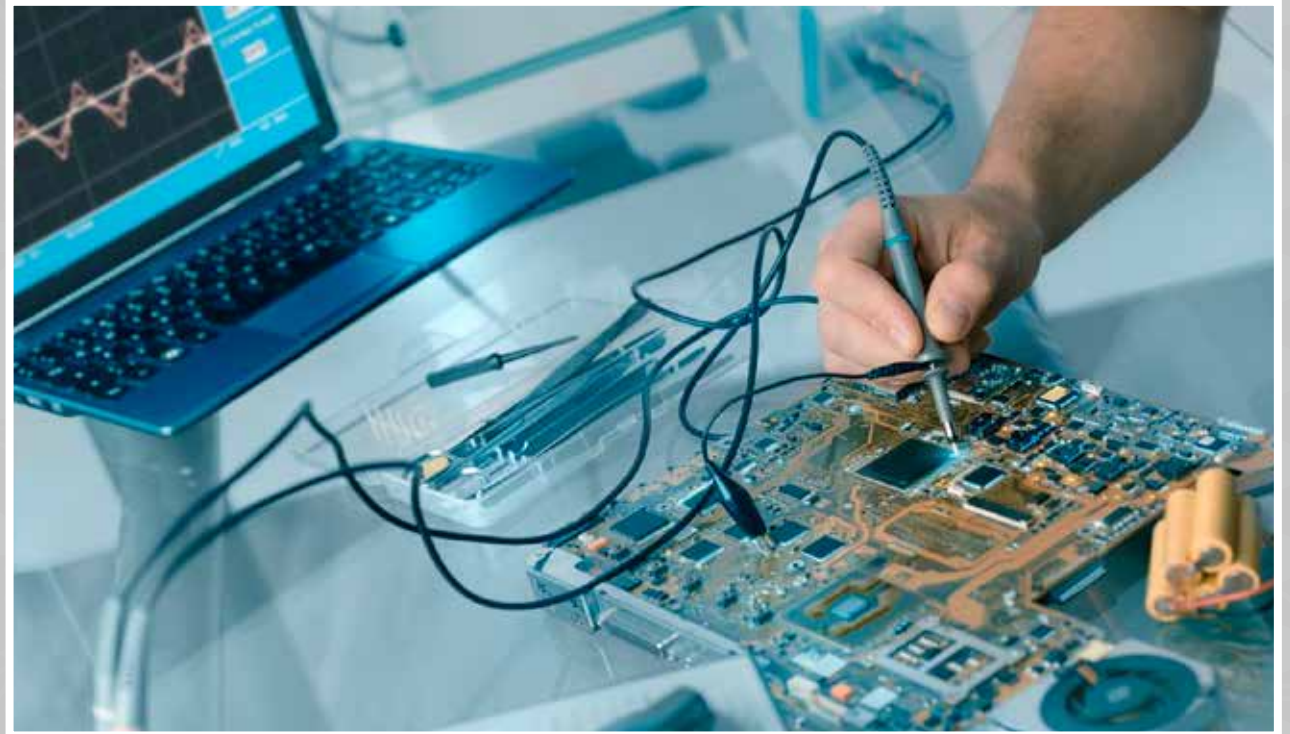
Our training and consulting offer covers all issues related to product reliability, from the Design phase to Process Control.



ELECTRONIC TEST SOLUTIONS & DESIGN

Our software engineers design, develop, and validate custom made electronic boards and components.

- Functional power test solutions
- Hardware design
- Software design
- Mechanical design
- Re-engineering



DESIGN AND ENGINEERING SERVICES

GEST Labs design team is the percent to develop and design PCBAs including product validation process. Some of the main design skill and competences of our team are:

- ▶ **Hardware design:** desing process starts from High Level Design definition going through technical product specification analysis, logic design, chip design and simulation (ASIC CPLD, FPGA) including use of VHDL language, physical design, signl integrity ending with first prototypes series. Design product validation test includes prototypes bring-up lab testing and measurement.
- ▶ **Software design:** wide and consolidated experience by the software and firmware design team in using main programmable languages like C/C++, asm, phyton, perl, scripting.
- ▶ **Mechanical design:** use of main mechanical design tool (solid works) to develop the product based on functional requirements in order to get it simple and cost effective from a manufacturing stand-point.
- ▶ **Re-engineering:** product management and optimization both from quality and process point of view including miniaturisation and cost reduction.





FUNCTIONAL POWER TEST SOLUTIONS

TEST SOLUTIONS:

Our engineers design, develop and implement test solutions:

- ▶ Flexible, Versatile, and Modular.
- ▶ Customer-tailored based on every need and product spec to be tested.
- ▶ Expandable (HW, FW, SW) to safeguard future investments

Our testers are easily connectable to any ERP system, in order to record the device test history granting:

- ▶ The collection of qualitative information
- ▶ Product traceability
- ▶ Data exchange with existing factory data loggers



FFT (Flexible Functional Tester)

Our new and latest FFT System allows to perform functional tests on electronic boards and modules.

The system is focused on testing:

- ▶ Small and medium Power Supplies (from few Watts up to 5kW in the basic version)
- ▶ Actuating unit (motor driver)
- ▶ Analog/digital interface devices
- ▶ Our FFT System can be customized in order to test any electronic device (sub-assemblies, PCBAs, finished products)

The Device Under Test (DUT) is treated as a Black-Box in which inputs are stimulated according to product specs and response outputs are measured

The main inputs measured by our FFT System are currents, voltages and frequencies.



Our core services are:

- ▶ Custom product design and development.
- ▶ Installation, testing and release of testers.
- ▶ Training for operators, technicians and engineers.
- ▶ Yearly calibration.
- ▶ Maintenance (yearly contract or on-call service).
- ▶ Repairs of boards and modules.
- ▶ Software customization and updates.
- ▶ Remote assistance (hot-line) and on-site assistance for problem solving.
- ▶ Supply of spare parts.



XT_DSP Module - Engine Sense Processor



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