EN_BRO_TESTENG_2026_00

TEC EUROLAB
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Test Engineering

Skills and instrumentation supporting your technical department

SIDEIUS
EMPOWERING EXCELLENCE

TEC EUROLAB. Part of the Sideius Galaxy

Test Engineering

Effective support for the functional design of your component

In today's dynamic engineering landscape, a product's success depends on its ability to meet increasingly demanding requirements in terms of performance, reliability, and innovation. This requires an in-depth exploration of potential design criticalities, considering the interaction between materials, geometry, and functionality. **SIDEIUS, thanks to its TEC Eurolab brand, stands out for its ability to co-design test paths that go beyond traditional international standards.** Through detailed analysis and the definition of targeted objectives, we develop customized test plans that simulate real operating conditions, ensuring accurate and reliable test results.

Tailored approach

We are able to support customers in the co-design of test paths, analyzing applicable standards and drafting dedicated procedures.

Custom solutions for unique requirements

Design and testing activities aimed at verifying components, simulating real operating conditions, including extreme scenarios, providing an in-depth assessment of functionality and reliability.

The value of accreditation

Accreditations such as EN 9100:2018, UNI EN ISO 9001:2015, and ACCREDIA recognition guarantee our commitment to high quality standards and testing accuracy.

Putting the component to the test

Execution of accurate tests across multiple domains, including fluid-dynamic, pneumatic, hydraulic, thermal, and mechanical-dynamic testing, providing a comprehensive view of component performance.

Support for test bench development

We design, develop and supply control and data acquisition systems for multi-axial and conventional test benches

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Our approach to Test Engineering: from theory to practice

A thorough understanding of each component and its role within the system is fundamental to our work. Through a structured set of targeted questions, we analyze every aspect of the component to be tested, from its function and operating environment to the loads and stresses it experiences. This approach allows us to design and perform tests that not only meet specific customer requirements, but also generate valuable data to optimize the final product.

What is the function of the component within the system?

Before performing any test, it is essential to understand the specific function of the component within its system. This knowledge allows us to **focus testing on critical performance aspects and ensure that every functional requirement is verified with precision.**

What operating environment does the component work in?

The operating environment has a significant impact on component behavior. We analyze **environmental conditions** to ensure that tests reflect **real usage scenarios**, providing reliable and transferable results

Is the component subjected to multiple loads (mechanical, pressure, thermal, etc.)?

During its lifecycle, a component may be exposed to multiple types of stress. Our analysis includes **a detailed assessment of mechanical, pressure, thermal, and other loads** to accurately simulate the **operating environment and evaluate component strength and reliability.**

CAD data sharing for test fixture design

Collaboration with customers during the design phase is essential. **Access to component CAD data** enables us to develop custom test fixtures that replicate real assembly conditions, ensuring that **tests are as representative as possible**.

What are the assembly characteristics of the component/sub-assembly within the system?

Accurately reproducing the installation of the component or sub-assembly within the system is essential for meaningful testing. This approach ensures that the test results accurately reflect the component's performance under real operating conditions.

What is the goal of the test? What final information is required?

Defining the test objective guides the selection of methodologies and technologies. Whether the goal is to identify operating limits, assess durability, or analyze behavior under specific loads, **each test is designed to provide precise and actionable data, supporting product development and optimization.**

Capabilities

Static and Dynamic Mechanical Testing

- 8 modular test benches for customized setups
- Over 20 pneumatic and electromechanical actuators
- 4 test systems for static and dynamic testing
- Vibration and shock: 20kN, 45 kN, 75 kN at RT and in climatic chamber

Thermo-Fluid-Dynamic Testing

- Auxiliary systems for the preparation and execution of custom tests in oil, water, air and aeronautic oils
- Hydraulic test bench for high pressure test or pulsating pressure test up to 3000 bar
- Pneumatic test system for static and dynamic testing up to 16 bar
- Vacuum generation systems for static and dynamic vacuum testing
- Air and oil flow bench:
  - Air flow: up to 7-8 bar // 900-1000 l/min, from RT up to 300°C-400°C
  - Oil flow: from RT up to > 150°C, pressure up to 40 bar, flow up to 70l/min; Injectable contaminants: solid, liquid and gas (air), online particle contamination measurement

CERTIFICATIONS

- IPC A610 for PCB analysis
- Leak test , level 2 PND
- Strain gauges measurements

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Environmental testing

- 4 climatic chambers for environmental conditioning (temperature range from -80ºC to 180ºC, RH control, dimensions up to 2 m²)
- Thermal shock chamber
- Thermal vacuum chamber
- Cyclic Salt Spray Corrosion Test Chamber (1500 lt, max. loading 200kg, temperature range up to 45ºC)
- RTCA DO and MIL STD environmental testing

Control and Data Acquisition Systems

- 5 real-time control and data acquisition systems (up to 4 independent and simultaneous control axes, up to 40 acquisition channels)
- 4 dedicated acquisition systems (strain gauges, thermocouples, accelerometers, pressure sensors, force transducers, etc., up to 16 channels simultaneously)

Experimental Testing, Prototyping and Signal Analysis

Experimental testing, prototyping, and signal analysis are at the core of innovation in Test Engineering. These activities allow us to gain an in-depth understanding of component characteristics and performance, from mechanical strength to response under specific loads.

- **Strain Gauge Measurements**: essential for evaluating material deformation and stress under load, providing valuable data on component strength and elasticity.
- **Signal Acquisition**: critical for real-time monitoring of component behavior during laboratory and field testing.
- **Design and Manufacturing of Experimental Test Setups**: testing beyond standard limits by simulating unique and complex operating conditions.
- **Custom Test Specification Development**: ensures that every aspect of the test is planned and executed according to defined objectives, delivering reliable and repeatable results.

Dynamic and customized mechanical Testing

Dynamic tests focus on component response to moving loads such as impacts, vibrations, and cyclic loading, simulating real-life use and extreme conditions.

- **Wear and drop test**: essential for understanding how components maintain integrity and functionality after sudden events or prolonged use. During drop tests it is possible to measure the energy absorbed by the impact
- **Single or multi axial mechanical loading**: for evaluating mechanical strength of components under static or dynamic loading. Test are carried out in force or displacement controls at room temperature or under temperature control and it is possible to apply lap replay mode, standard or custom cycles. Auxiliary measurements: strain gauges, laser, LVDT, temperature, ...

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Environmental Testing

Environmental tests evaluate how components respond to extreme conditions and changes in the surrounding environment, such as high and low temperatures, humidity, UV exposure, corrosive environment, specific fluids contact…

- **Thermal Shock and Climatic Chambers**: assess component performance across thermal extremes and variable environmental conditions.
- **Accelerated Aging Tests (UV Tests)**: simulate prolonged exposure to ultraviolet radiation to evaluate effects on material integrity and performance.
- **Salt Spray and Corrosion Simulation Tests**: assess corrosion resistance of materials exposed to aggressive environments, critical for product durability.
- **Thermal vacuum ageing** of samples and components
- **IP evaluations**: Ingress Protection test according to EN 60529 and ISO 20653 to evaluate resistance of enclosures and devices to the ingress of dust and water
- **IK protection testing**: performed in accordance with **IEC 62262**, it verifies the resistance of enclosures to mechanical impacts. These tests ensure product durability and protection against external shocks, including accidental impacts and vandalism.
- **Testing according to military and aeronautics standards** (RTCA-DO 160G , MIL STD 810H ecc…):
  - Icing
  - Waterproofness/wind/rain
  - Sand & Dust; Solar radiation
  - Vibration, shock and Pyroshock
  - Fungus
  - Bird strike
  - Hail test
  - High-velocity impact testing of shields and glass
  - EMC test
  - Altitude
  - Centrifuge Acceleration
  - Fire test
- **Visible light and UV transparency testing**

Fluid-Dynamic and pressure Testing

Tests performed with the aim of evaluating the behavior and functional characteristics of components through which a fluid passes. These evaluations can be performed through burst and leak tests, static and pulsating pressure and flow tests, applying different pressures and temperatures according to standard or the use of the component.

- **Burst, Leak, Proof and pressure cycling test**: critical for determining strength limits of components such as pipes, valves, and tanks under static pressure or cyclic variations.
- **Flow Testing at Different Temperatures**: verifies component sealing performance and functionality under varying fluid temperatures, essential for hydraulic and pneumatic applications.

Vibration and Shock Testing

Shaker testing is used to evaluate the reliability of components or systems exposed to severe mechanical conditions, such as those encountered during operation or transportation. By integrating shakers with climatic chambers, pressurization systems, and external data acquisition, tests can be performed under controlled environmental conditions on fluid-dynamic piping or electronic systems.
Tests can be customized to meet specific customer requirements or performed in accordance with standards such as RTCA DO-160, MIL-STD, ECSS, ISO, and ASTM. Test profiles including SINE, Random, and shock can be executed on shakers of various sizes to accommodate a wide range of test requirements and specimen dimensions.

These tests include:

- **Transportation simulations**
- Functional testing under **vibrational loads**
- Simulation of real **mechanical vibration environments**
- **Packaging validation**
- **Failure prediction and predictive maintenance based on advanced vibration analysis** (e.g. on internal combustion engines, electric motors, transmissions, bearings, etc.)

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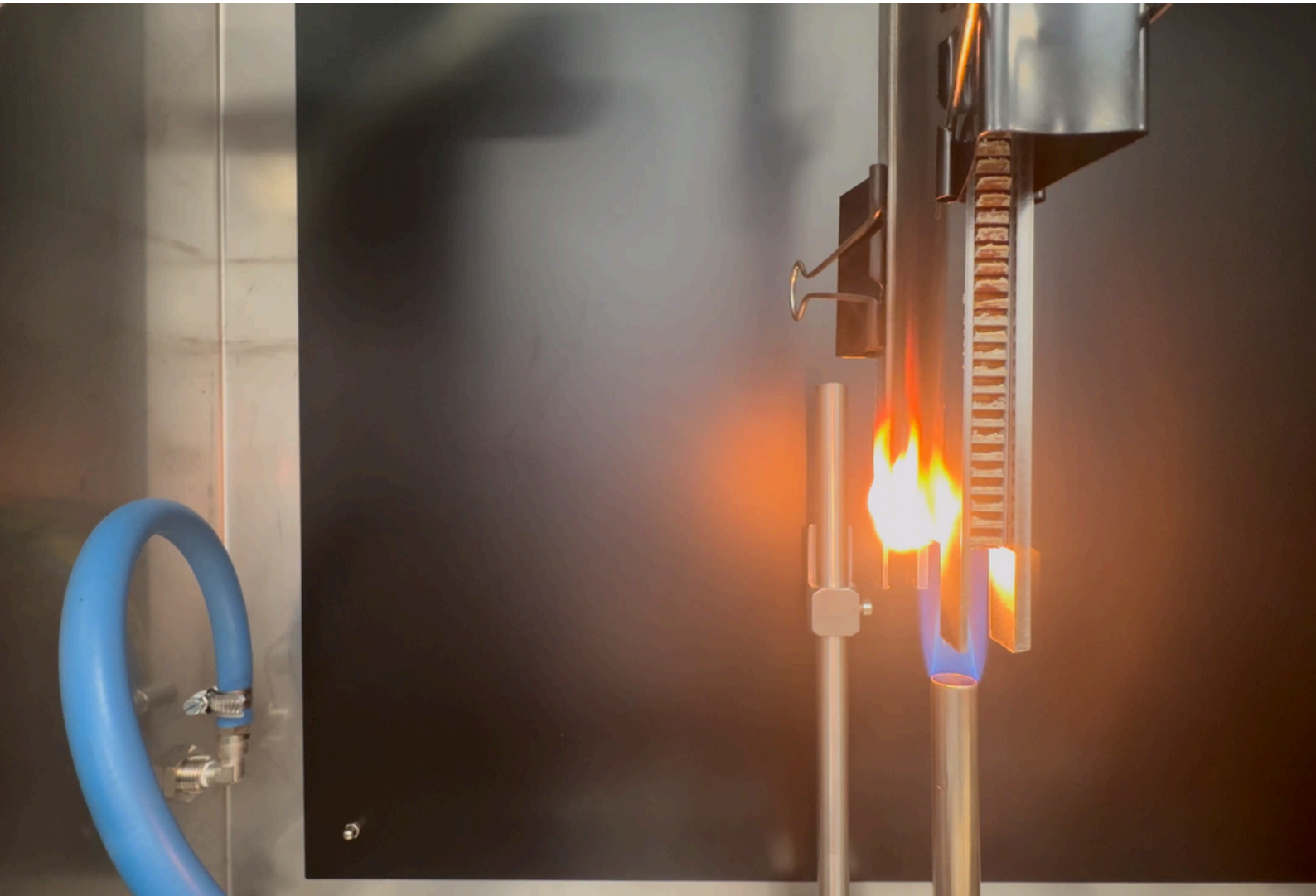
Flammability Testing

To ensure compliance with global safety regulations for electronic enclosures and insulating materials, we perform **flammability assessments based on the UL 94 standard and IEC 60695 series**. The testing process evaluates the material's reaction to direct flame or thermal stress, classifying its behavior based on burning rate, self-extinguishing capability, and the formation of flaming droplets.
Key validation capabilities include burning test to determine the flammability rating of materials used in devices and appliances to verify their ability to inhibit flame propagation:

- **Vertical & Horizontal Burning Tests** (UL 94 V-0, V-1, V-2, HB) on plastic materials
- **45° and 60° Burning Tests**
- **Wiring harnesses and cables Burning Tests**



Electronics Validation

Our Test Engineering department provides vertical expertise in the electronic sector. Through functional and environmental testing, we ensure that every component meets its specified performance benchmarks under ctual service conditions.
TEC Eurolab supports the entire supply chain: **PCBs**, **wiring harnesses**, **electric motors**, **solenoid valves**, and **sensors**, acting as a strategic third-party partner to validate components against rigorous technical specifications, in accordance with key industry standards, such as MIL-STD and RTCA DO.

Our service include:

- **Conductivity, Electrical Resistivity, and Insulation Testing**: assessment of dielectric strength and electrical integrity to prevent short circuits, leakage currents, and insulation breakdown.
- **Climatic Chamber Testing**: characterization of component behavior and electronics reliability when exposed to extreme environmental conditions and hygroscopic stress.
- **Thermal Shock Testing**: evaluation of the robustness of solder joints and material interfaces against rapid, high-gradient temperature fluctuations.
- **IP Rating (Ingress Protection) for Water and Dust**: verification of sealing systems and enclosures to ensure protection against solid particle penetration and liquid ingress.
- **Cross-section analysis of electronic boards and metallographic analysis**

Applicable standards

Our Test Engineering department is able to conduct test campaigns on electronics according to key industry standards.

RTCA DO 160G
Environmental, EMC, vibration, sealing testing on avionics (commercial and defense aircraft, avionic equipment and LRUs, onboard electronic systems, equipment intended for fixed-wing aircraft, rotary-wing aircraft and UAVs)

RTCA DO-254
We test the electronic design and reliability of avionic hardware

MIL-STD
In accordance with MIL-STD standards, we are able to perform a range of functional tests

- **MIL-STD-810G**: Vibration, shock, temperature, humidity
- **MIL-STD-461G**: Electromagnetic compatibility
- **MIL-STD-202H**: Resistance, vibration, humidity, functionality on electrical components

IPC A 610
According to this international standard, we carry out quality inspections on electronic assemblies (**PCBA**).

IEC 60068-2
Environmental Simulation: heat, cold, vibration, shock

IEC 60529
IP Protection Rating: dust and water ingress protection

IEC 62262
IK Protection Rating: resistance to mechanical impact

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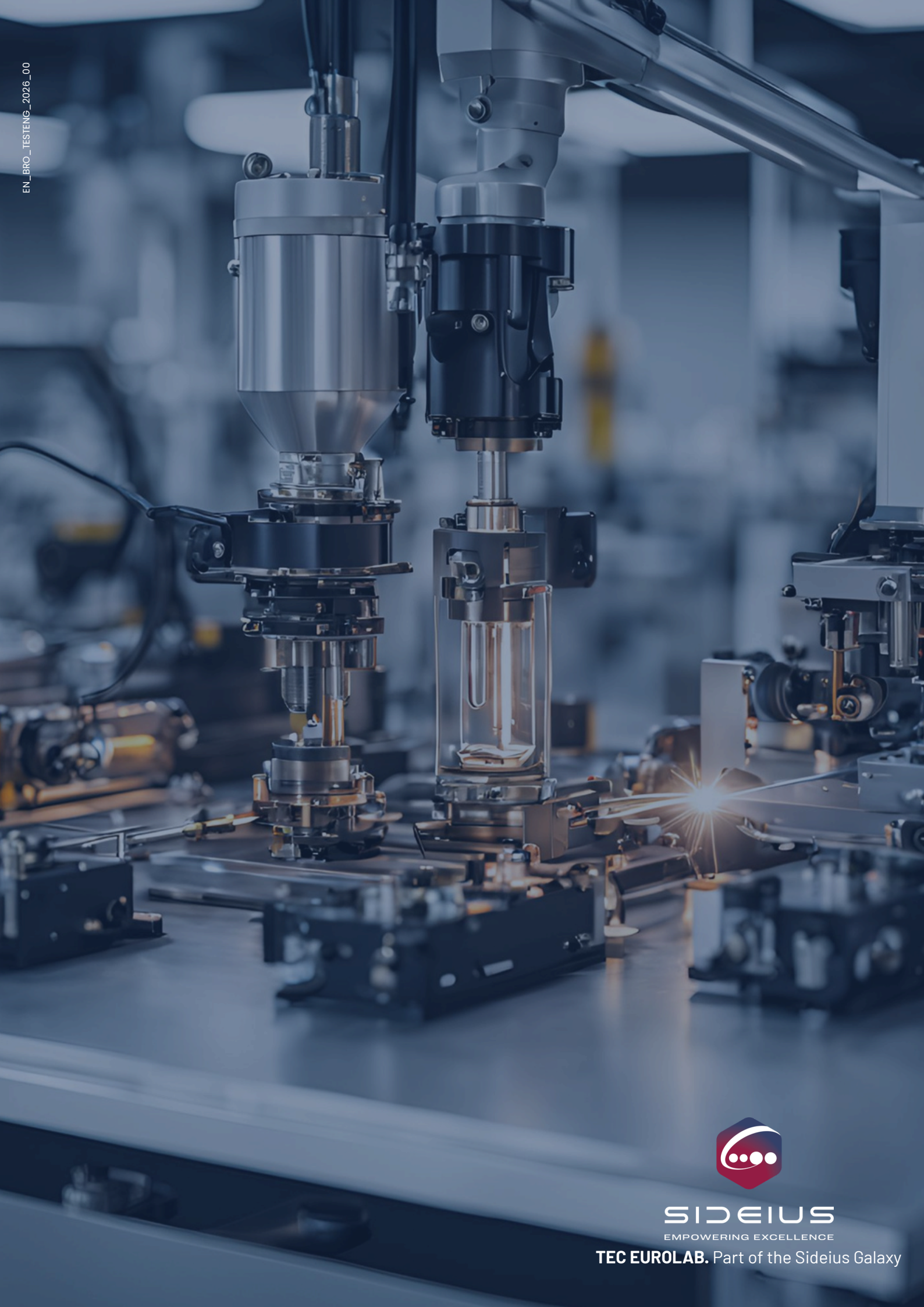

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