The skills and experience of our Advanced Technology Centre are also at the disposal of other companies, organizations and institutions for the development of processes and applications with high technological value.

Aware of the importance of synergies and the exchange of knowledge with other institu tions, Ensa's ATC maintains close connections with the University of Cantabria and the Components Technological Center, although there is also a lively, dynamic relationship between the ATC and other universities in the country and main technology centers in the north of Spain. Thus forming a unique, high-level cooperative unit. There is also a network of cooperation with international universities and technology centers, especially in the United Kingdom, Italy, France and the USA.

Ensa's passion for constant improvement through its ATC is a clear indication that the Center's capacity will increase, allowing it to continue providing technological support for manufacturing, progressing towards the Industry 4.0 model, one of the key projects in the Company's strategy.

NUCLEAR EQUIPMENT

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ilac-MRA

ENAC
Entidad Nacional de Acreditación
ENSAYOS
Nº 942 / LE1053
CALIBRACIÓN
Nº 22/LC10.014

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ADVANCED TECHNOLOGY CENTRE

ADVANCED TECHNOLOGY CENTRE
ENSA'S TECHNOLOGICAL DRIVING FORCE

The Advanced Technology Center is the technological driving force behind Equipos Nucleares S.A., S.M.E. (Ensa), the scenario for the development of the welding, automa tion and robotics processes that will be used to manufacture equipment. Its method is working with the most advanced technology and supply the company with the resources needed to be at the forefront of the sector and be more competitive.

Its highly qualified staff combines the expertise and experience of senior staff with the enthusiasm and innovative approach junior younger mployees.

The ATC comprises various units:

WELDING DEVELOPMENT
In charge of the design and development of the welding processes used in manufac turing and research into new processes.

DEFECT ANALYSIS UNIT
This unit studies the nature of incidents concerning materials and manufacturing processes for different components, providing solutions and improvements.

ROBOTICS - AUTOMATION UNIT
Responsible for designing new automated, mechanized and robot-operated manufac turing equipment and systems to improve the efficiency and quality of the production process.

CHEMISTRY LABORATORY
In the testing laboratories, that accredit the EN-ISO 17025 , the tests required by manu facturing codes are carried out. Together with research trials and the validation of improve ments and new processes. Also, in the chemistry laboratory, tests are carried out to determine the composition of the metals, non-metals and waters required in the sector. In Mechanical Testing we examine the mechanical and physical properties of materials. And in the Metallography Labora tory we analyse the crystalline structures behind the processes involved in the produc tion of the component.

METROLOGY UNIT
The unit comprises various calibration labora tories (dimensions, pressure, temperature, torque, electrical characteristics, etc.), which are responsible for calibrating the equipment used for manufacturing. This is essential in this sector as all measurement units must be controlled and traceable. Ensa has its own calibration laboratory, which accredits EN-ISOI 17025 .

DESTRUCTIVE TESTING LABORATORY

- **Tests accredited by ENAC (ISO 17025). Accreditation no. 942/LE1853.**
- **Testing of metals and welded joints.**
- **Water analysis.**
- **Training and advisory services.**
- **Thermal and mechanized treatment.**

1 METALLOGRAPHICAL TESTING

- Macroscopic and microscopic testing, both quantitative (grain size, layer thickness, phase analysis, etc.) and qualitative (morphology of readings, metal microstructures, corrosion, etc.).
- Optical microscope up to 1880x magnification.
- Stereoscopic lens up to 50x.
- Control system for macro-examination of welds.
- Vickers micro-hardness testing
- Corrosion testing.
- Metallographic replicas *in situ*.
- Test for standardizing welded joints.

2 CHEMICAL TESTING

- Chemical analysis of stainless steel chips and shavings, low alloy and nickel alloys with optical emission spectrometry.
- Measurement of carbon, sulfur and nitrogen.
- Chemical analysis with inductively coupled plasma optical emission spectometry (ICP-OES).
- Water analysis: Conductivity, pH, ion chromatography (anions and cations), dissolved oxygen, silica in water, dissolved and/or suspended solids, iron suspension, metals, colorimetric determination of sulfides.
- Measurement of dew point, oxygen in gases, humidity in coating and fluxes.

3 MECHANICAL TESTING

- 1000 kN traction testing at ambient temperature and up to 550°C.
- Charpy impact test according to EN and ASTM standards from -170°C.
- Pellini drop weight test up to 1600 joules at temperatures from -190°C.
- Brinell, Rockwell and Vickers hardness tests with loads from 0.01 to 30 kg.
- Bend and crushing tests with loads up to 1000 kN.

METROLOGY LABORATORY

- **Calibration accredited by ENAC (ISO 17025). Accreditation no. 22/LC10,014.**
- **Laboratory, in situ and customized calibration.**
- **Training and advisory services.**
- **Measuring equipment repairs and adjustment.**
- **Calibration plan management.**

1 ELECTRICITY

- *In situ* calibration of welding equipment (automatic, manual, etc.) up to 2500 A.
- Calibration of multimeters, ammeters, voltmeters, clamp ammeters, etc.
- Recording welding parameters.

2 PRESSURE

- Calibration of hydraulic manometers up to 5,000 bar and air-pressure gauges up to 20 bar.
- *In situ* calibration up to 2800 bar, pH recording.
- Calibration of vacuum equipment up to 0.0001 mbar and absolute pressure.
- Verification of safety valves, pressure switches and pressure gauges.

3 TORQUE

- Calibration of torque measurement equipment from 0.2 N.m to 80,000 N.m, torque wrenches, gauges, torque multipliers, electric screwdrivers, hydraulic equipment, bolt tensioners.
- *In situ* calibration of torque equipment.

4 TEMPERATURE

- Calibration of temperature measuring equipment from -80°C to 1000°C with uncertainties from 0.1°C.
- *In situ* calibration of recording equipment, gauges, simulators, TLDs and loops.
- Characterization and calibration of thermostatic baths and heaters.

5 DIMENSIONAL MEASURING EQUIPMENT

- Calibration of all types of dimensional measuring equipment, including axle aligners, distance meters, gauges, tooling design, etc.
- Laser Tracker and 3D measurement.
- *In situ* verification of machine tools, both CNC and geometric.
- Customized calibration using techniques developed in our laboratories.

6 MECHANICAL TESTING

- Calibration of dynamometers and tensioners up to 2,000 kN.
- *In situ* calibration of Charpy ASTM and EN pendulum units, Brinell, Rockwell and Vickers hardness testers, traction testing equipment, etc.

7 NEW ENAC ACCREDITATION

- Welding equipment.
- Distance meters.
- Axle/motor aligners.
- Electronically controlled torque screwdrivers.

8 OTHER CALIBRATION AND VERIFICATION

- Verification of explosimeters.
- Calibration of densitometers, X-ray films, thickness gauges, UT, gas flow meters in welding equipment, special machines and equipment (Charpy plastics pendulum, VICAT, tension meters, strength, tear resistance and fragility).
- Development of customized calibration procedures.

9 NEW DEVELOPMENTS

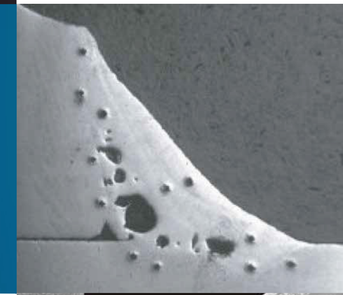
- Autoclave for testing differential pressure in pressure transducers.
- New calibration service for accelerometers and vibration meters.
- New calibration service for explosimeters and H2 meters.
- New calibration service for SMD air welding units.
- New calibration service for LASER displacement transducers.
- New calibration service for stroboscopes.

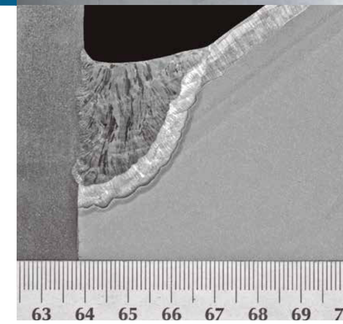
3 DEFECTS TO EVALUATE NON-DESTRUCTIVE TESTING

- Generation of defects for non-destructive testing.
- Production of coupons with defects caused by corrosion under pressure, fatigue, etc.
- Production of coupons with realistic defects.

DEFECT ANALYSIS

- **Extensive knowledge of faults and failures in welded metal components.**
- **Estimation of residual life, possible mitigation of damage and repairs if appropriate.**
- **Training and advisory services.**
- **Support from ENAC-accredited laboratories.**





1 FAILURE STUDIES AND REPAIRS

Determination of causes of faults and identification of repair processes for metal structures in general and studies of the nature of faults occurring in welded structures. Training and advisory services in these fields.

2 REAL-SIZE COMPONENT TESTING

Corrosion testing, passivation and a range of pressure and/or temperature tests on coupons and industrial-scale components