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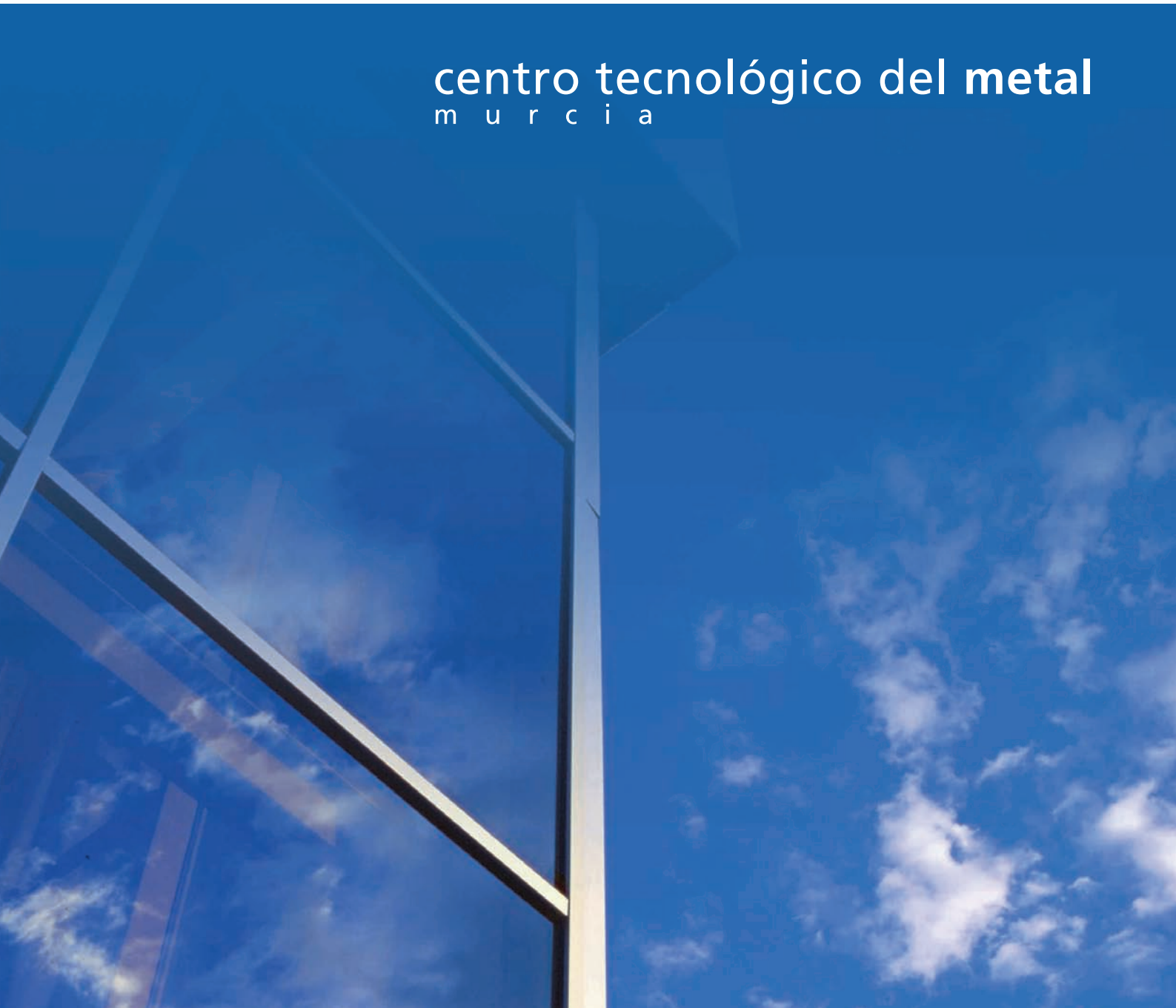

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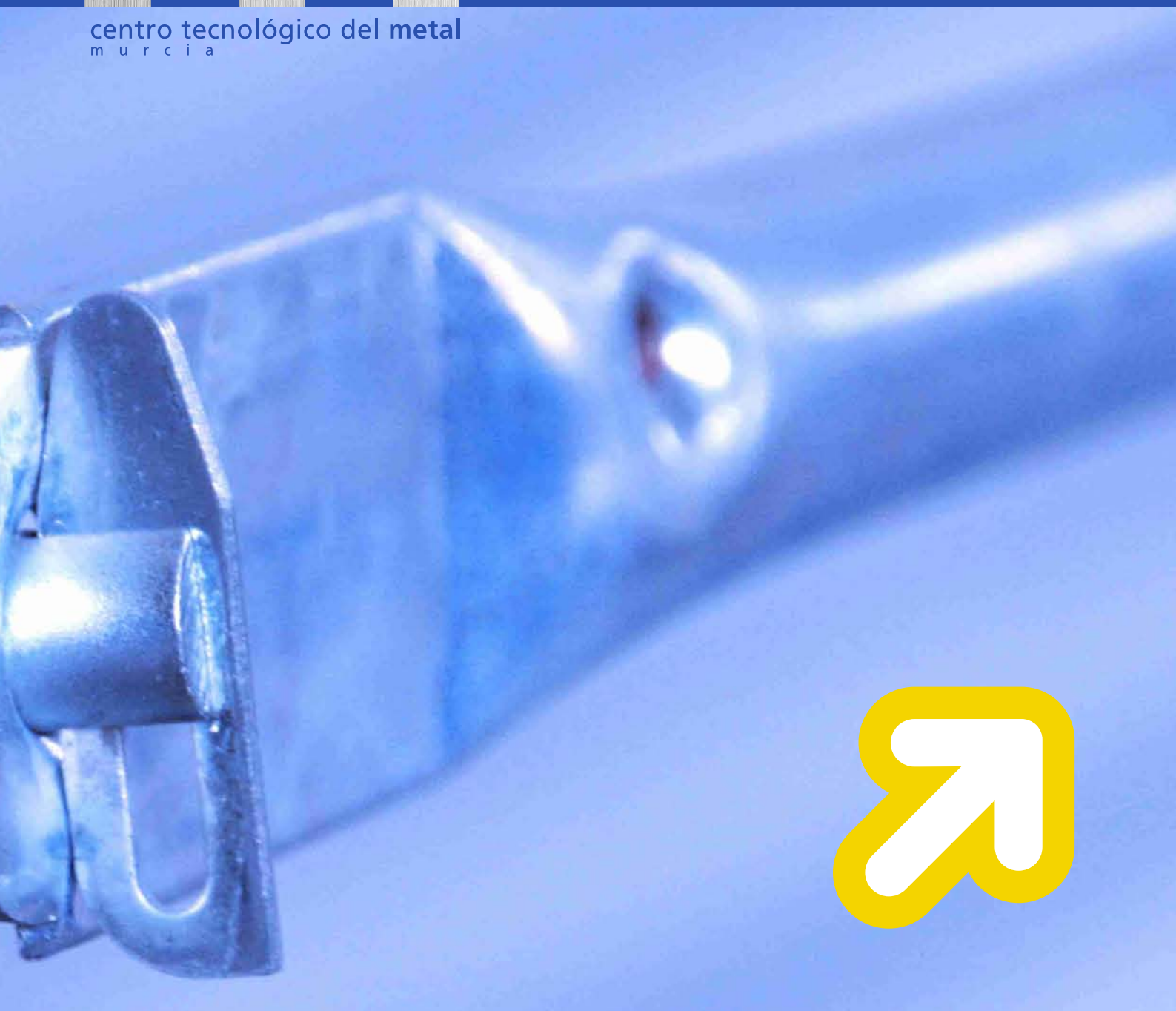


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IV Foro

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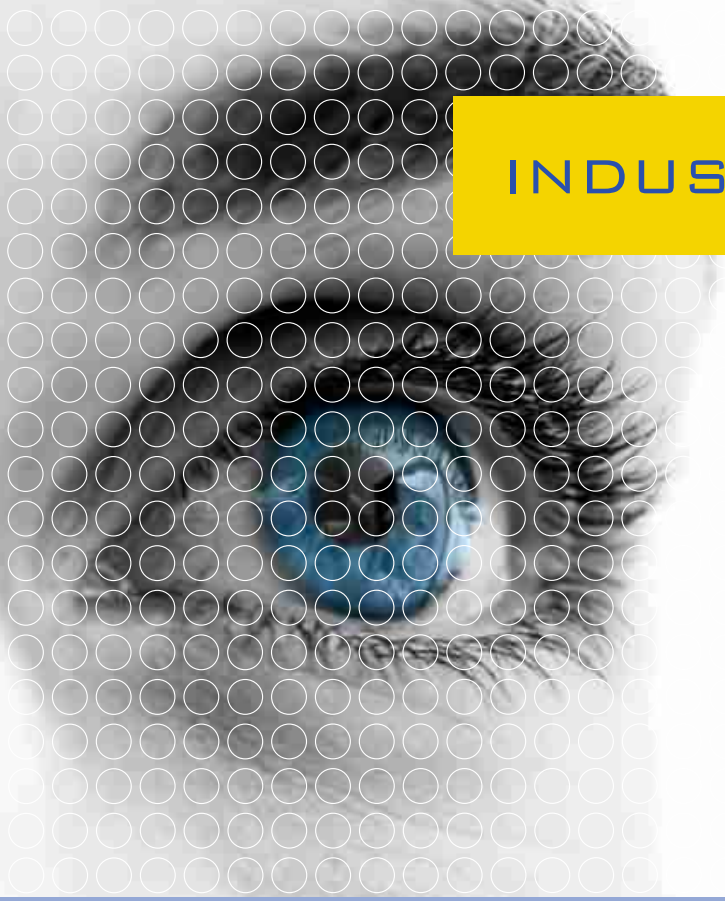
METAL TECHNOLOGY CENTRE OF THE REGION OF MURCIA (CTMETAL)
Horizontal technology and research centre for the generation of scientific-technological knowledge for application in industry.

RECOGNITIONS
- Centre for Technology and Innovation - CIT (registration No. 66)
- Industrial Liaison Office - ILO (registration No. 128)
- Centre for the technical inspection and regular servicing of equipment for the application of phytosanitary products.
- Inspection centre for autonomous breathing equipment bottles for underwater and surface-work activities (registration No. 30/32420).

ACCREDITATION - CERTIFICATES
- ENAC pressure gauge calibration laboratory No. 138/LC 290.
- ENAC test laboratory for windows and doors No. 263/LE 1613.
- ENAC test laboratory for portable extinguishers No. 263/LE 589.
- Certified as compliant with the UNE EN ISO 9001 2008 standard.

NETWORKS
- Federation of Innovation and Technology Centres of the Region of Murcia (CITEM).
- Spanish Federation of Innovation and Technology Entities (FEDIT).
- Network of Technology Centres of the Region of Murcia (CECOTEC).
- Spanish Representative on the European Standards Committee CVEN TC-70.



# INDUSTRIAL ORGANISATION

The mission of this department is to encourage the continuous improvement of industrial enterprises through the application of tried-and-tested techniques that make it possible to reach maximum levels of efficiency, optimising resources and obtaining increases in production of around 20-30%.

- Diagnostics Current Situation Enterprise
- Industrial Viability Studies
- Market Studies
- Documentary Development of Specific Procedures
- Quality Control
- Warehouse Logistics
- Training


- Production Planning and Management
- Cost Studies
- Times and Motion Studies
- Assembly/Manufacturing Ranges
- Welding Ranges (Eps/Wps)
- Design and Balancing of Assembly Lines
- Plant Distribution/Layout/Routes

- Lean Manufacturing Techniques
- SMED (Single Minute Exchange of Die)
- 5S Action (Seiri, Seiton, Seiso, Seiketsu, Shitsuke)
- Visual Communication
- Implantation of Traceability Systems



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# INDUSTRIAL QUALITY

The industrial quality department has designed and implanted various management systems in 85 industrial enterprises. Thanks to the technological services infrastructure in place at CTMETAL, we satisfy all the requirements associated with the implantation of a management system (approvals, certificates, calibrations, consultancy services, training, advice on standards, internal audits, the adaptation of machinery, renewals and updates, etc.).

## QUALITY MANAGEMENT SYSTEMS

Design and implementation of management systems based on the UNE-EN ISO 9001:2008 standard.
Internal audits. Preparation for renewal audits. System monitoring. Training.

## ENVIRONMENTAL QUALITY MANAGEMENT SYSTEMS

Design and implementation of management systems based on the UNE-EN ISO 14001:2004 standard.
Internal audits. Preparation for renewal audits. System monitoring. Training. Annual Environmental Declaration. Annual Declaration of Containers and Container Waste. Minimisation Studies. Inclusion on the Register of Small Hazardous Waste Producers. Completion of the Hazardous Waste Register. Initial Environmental Report.

## R&D&INNOVATION MANAGEMENT SYSTEMS

Design and implementation of management systems based on the UNE-EN ISO 166000 standard.
Internal audits. Preparation for renewal audits. System monitoring. Training.

## OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM

Design and implementation of management systems based on the OHSAS 18001:2007 standard.
Internal audits. Preparation for renewal audits. System monitoring. Training.

## CORPORATE SOCIAL RESPONSIBILITY (CSR)

Design and implementation of corporate social responsibility systems.
Preparation of reports.



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# INDUSTRIAL SAFETY

The industrial safety department provides the consultancy services and support required to ensure that industrial activities meet the legislative requirements associated with machine safety. Development and documentation of technical reports, adaptation of equipment to the current directive, consultancy services for the design of machinery, the updating of reports and answers to queries.

## CE MARKING

Study of machine safety conditions.

Preparation of the documentation.

Consultancy services for the design of machinery for compliance with EC safety directives.

Training.

Review and updating of reports for compliance with Spanish Royal Decree 1644/2008.

Adaptation of machinery to Annex I of Spanish Royal Decree 1215/1997. Certificates.

CE

## SONOMETRIC STUDIES

Measurement of noise levels at the enterprises' facilities.

- Study and analysis of applicable legislation on noise levels.
- Measurement of noise levels using a sound level meter.
- Preparation of the results report.



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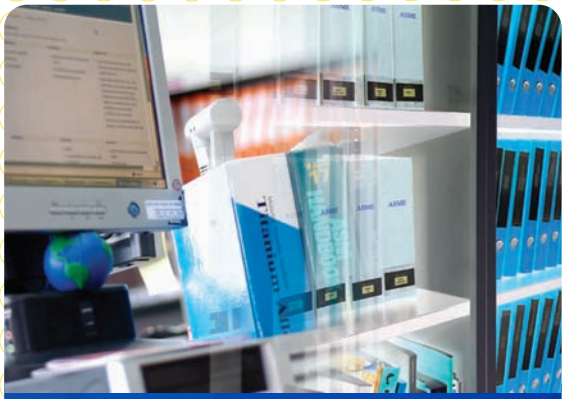

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## INDUSTRIAL LIAISON OFFICE (ILO)

CTMETAL's ILO works to turn scientific-technological know-how into technical solutions that provide industrial enterprises with competitive advantages.

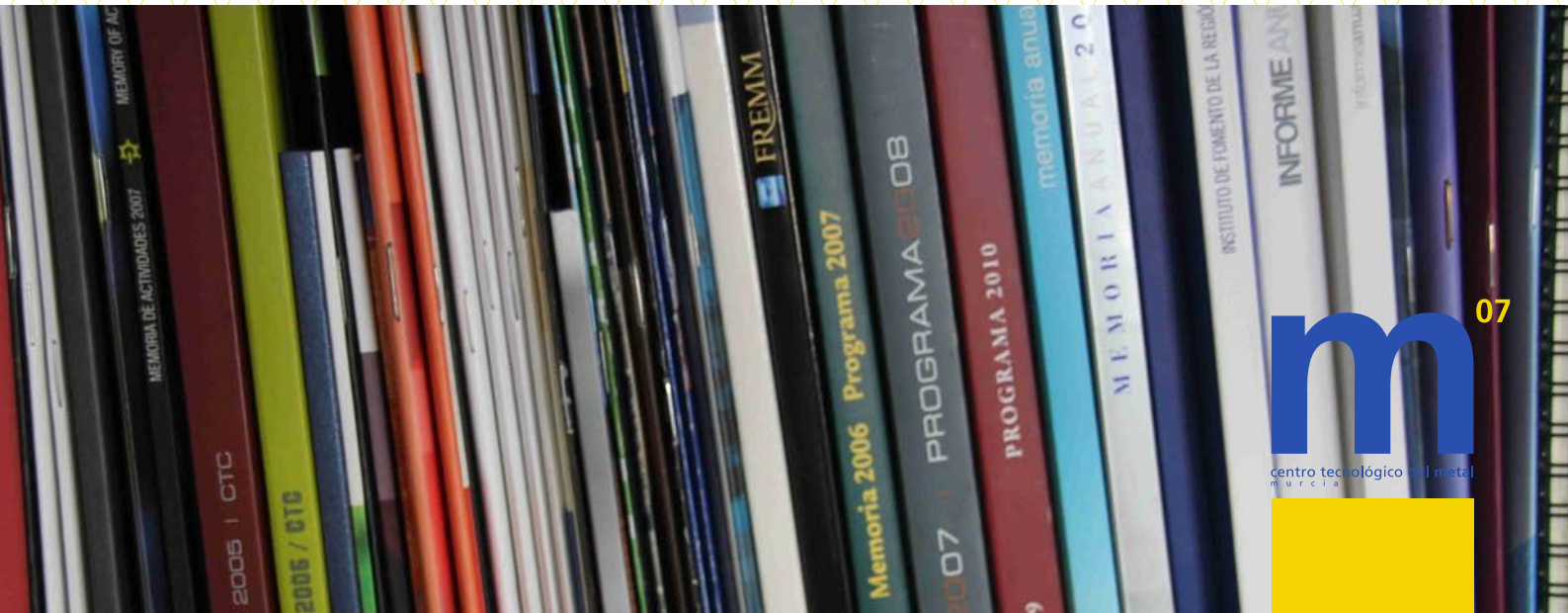
# DOCUMENTATION

Our information and documentation department is at the disposal of professionals, researchers and technicians to solve the problems that arise in their projects and investigations, offering them a service for solving queries and learning to satisfy their information requirements.

Accordingly, our collection of documents contains information sources that specialise in the mechanical-metal sector: monographs, manuals, national and international technical standards and specialised magazines, etc.

We also have a technology alert service to keep our users up to date and inform them of the changes that occur in the standards that are of interest to them, as well as the latest subsidies and lines of aid as they are published, etc.

- Consultancy service for the acquisition of production technologies.
- Contracts and projects with businesses.
- Preparation of technical terms and conditions.
- Participation in events and forums on the transfer of technology.
- Identification of technological requirements.
- Consultancy services for the protection of industrial and intellectual property.
- Consultancy services for businesses looking to employ research personnel.
- Promotion of R&D&innovation.
- Organisation of one-day events for the transfer of technology.
- Organisation of the 21st Century Factory Technology Forum.
- Support and consultancy services for the creation of technology-based firms (TBFs).
- Search for finance for R&D&innovation activities.
- Dissemination of scientific-technological know-how.
- Participation in knowledge networks.



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# INDUSTRIAL CALCULATION AND DESIGN

## INDUSTRIAL DESIGN

We offer industrial enterprises the possibility of outsourcing their technical office requirements to the Metal Technology Centre. We have highly qualified personnel and the latest industrial calculation and design programmes for the development of your products, as if the processes were carried out on your own premises, providing 100% confidentiality for every development.

The services available include the following:

- Generation of manufacturing plans.
- Industrial technical drawing.
- Development of industrial designs for machinery and the end product.
- Customised CAD training.
- Rendering of parts so that your end products can be seen with a photographic finish without the need for manufacturing them.
- Preparation of technical catalogues.
- Making of videos showing the assembly of units for inclusion on your website or in a CD catalogue.

## INDUSTRIAL CALCULATION

Legislation requires the calculation of a wide variety of items, such as lifting accessories, edge-protection items, such as handrails, and a variety of structures, such as scaffolding, shelves, etc.

When building new machinery, the parts that are subjected to load requirements must be calculated to ensure their optimisation.

In addition, many machines that have traditionally been manufactured and work to perfection can be optimised through calculation and by reducing the material used in their construction to reduce manufacturing costs.

The Metal Technology Centre has programmes based on the finite element method (FEM) and personnel with the experience required for performing the corresponding calculations.

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# R&D&INNOVATION PROJECT DEPARTMENT

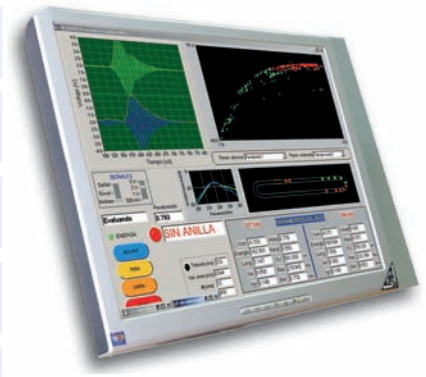
The mission of this department is to provide the technological development and innovation process, foster quality and all the aspects that contribute to strengthening the capacity for competition of the businesses in the mechanical-metal sector and related sectors. It also seeks to provide associate companies with a level of organisation capable of providing effective solutions for the technological requirements through the development of projects and activities designed to improve competitiveness in the area of industrial innovation.

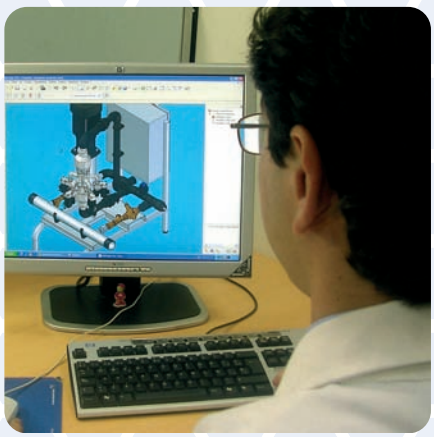
The department's activities include the following:

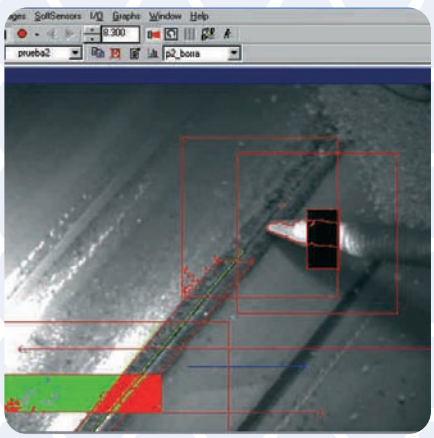
- Help with the definition of projects.
- Coordination, monitoring and control of planning and resources.
- Processing of public finance and subsidies.
- Help with internationalisation.
- Processing and traceability of the documentation that is generated.
- Support for the creation of technology-based firms (TBFs).
- Support services for the entrepreneur.

On the current European scenario, international cooperation stands as a need for growth and an increase in business competitiveness.

To help businesses set up in other countries, we have opened the European Projects Office with the aim of involving CTMetal's research groups and businesses in European collaboration projects (Seventh Framework Programme FP7, Competitiveness and Innovation Framework Programme CIP, etc.).



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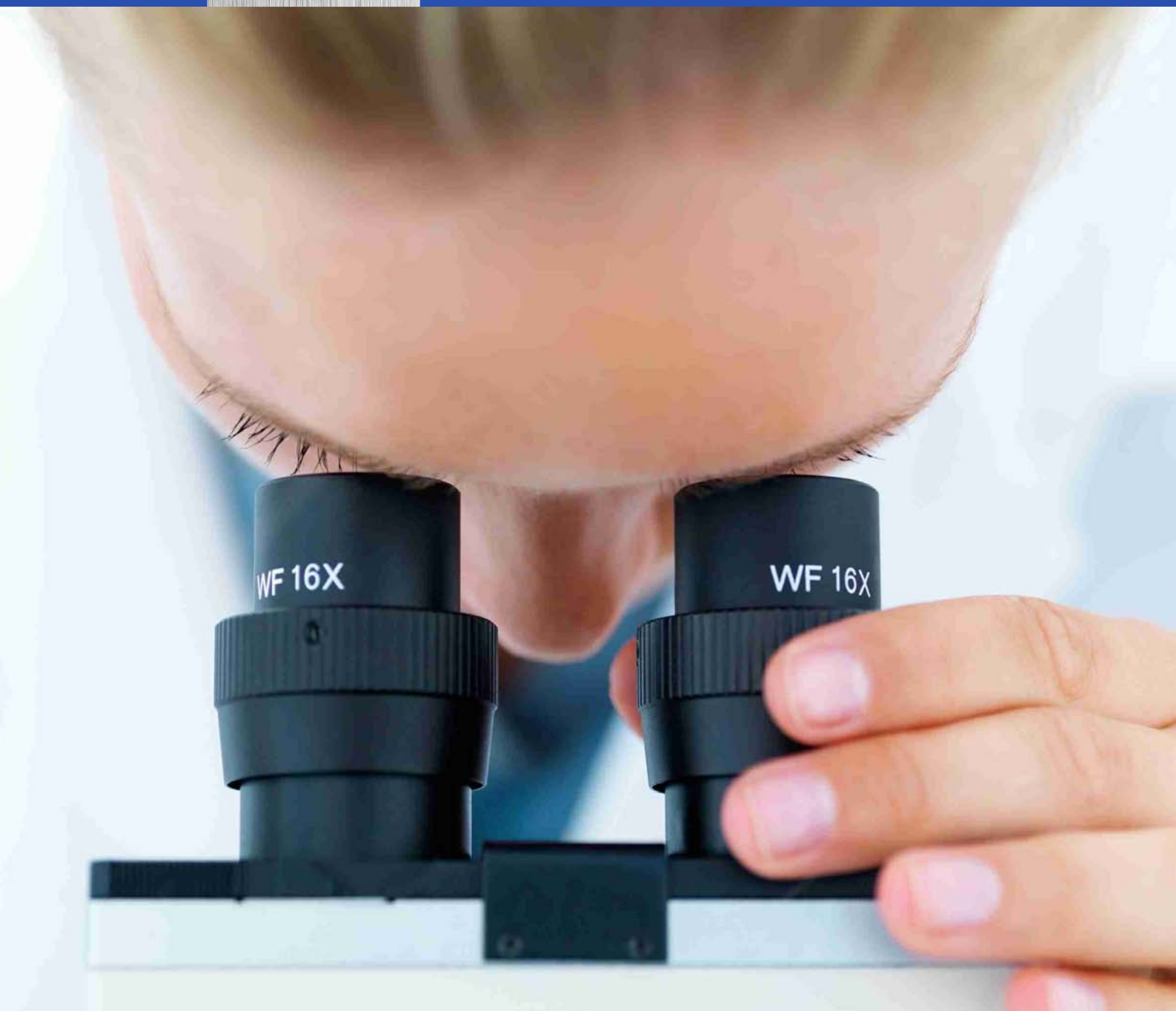
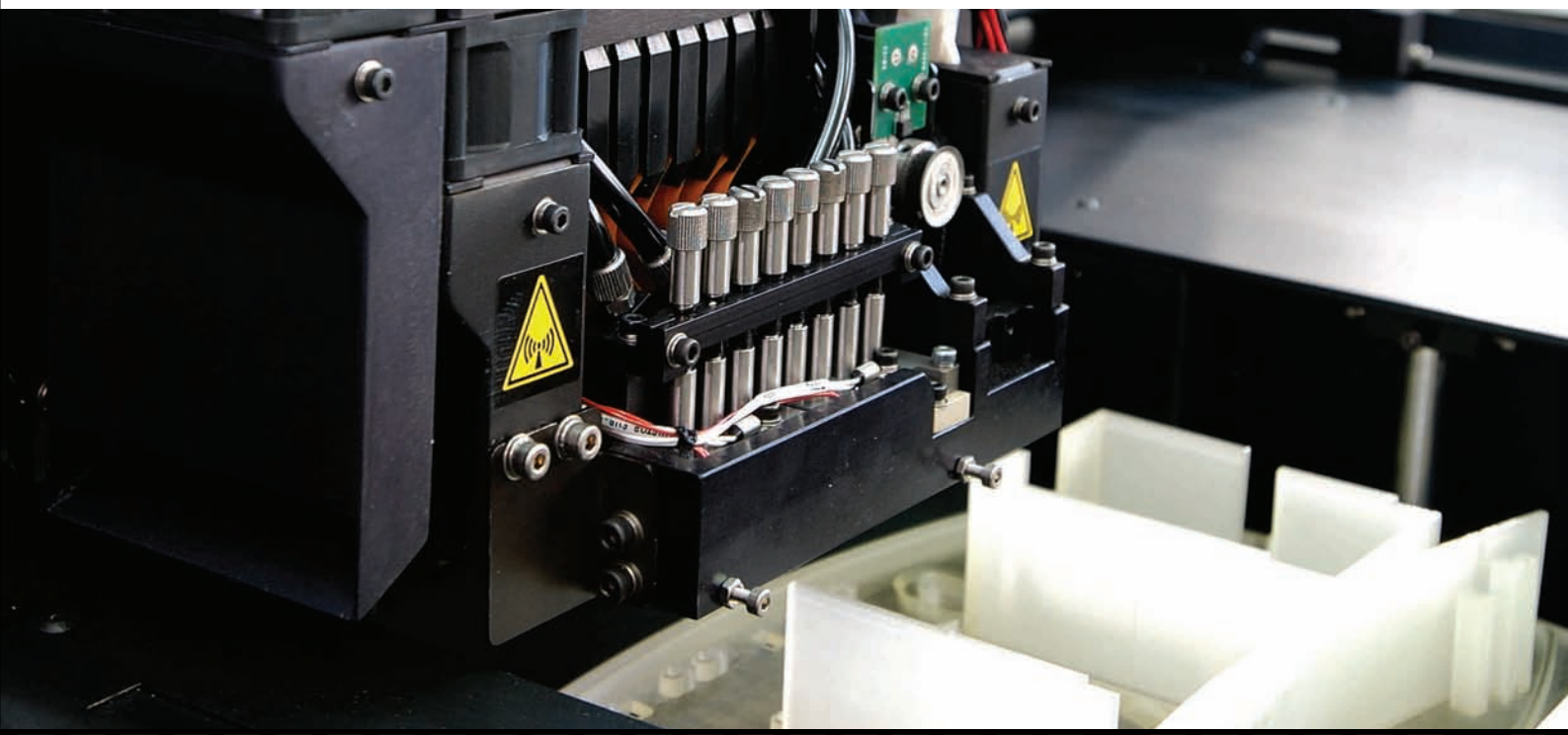


# Laboratories

# RAPID PROTOTYPING

Seeing, touching and even checking some of the specifications of a future product before it is manufactured is possible thanks to the concept of rapid prototyping. Will it be easy to use? Will it be easy to mount and dismount? Will all the parts fit together? Will it look right? Will it be accepted by my customers? These and other questions need to be answered well before a new product reaches the market.

The Metal Technology Centre of the Region of Murcia has this technology available and offers it to industrial enterprises. It makes it possible to obtain a working prototype in as little time as possible so that experiments can be performed to confirm the theoretical specifications awarded to the product during the design phases.



## TECHNOLOGY

EDEN 330

Build size (X x Y x Z): 340mm x 330mm x 200mm

Accuracy: 0.1- 0.2mm typical (accuracy varies according to geometry, part orientation, etc.)

PolyJetTM inkjet technology works by jetting state of the art photopolymer materials in ultra-thin layers (16µ) onto a build tray layer by layer until the part is completed.

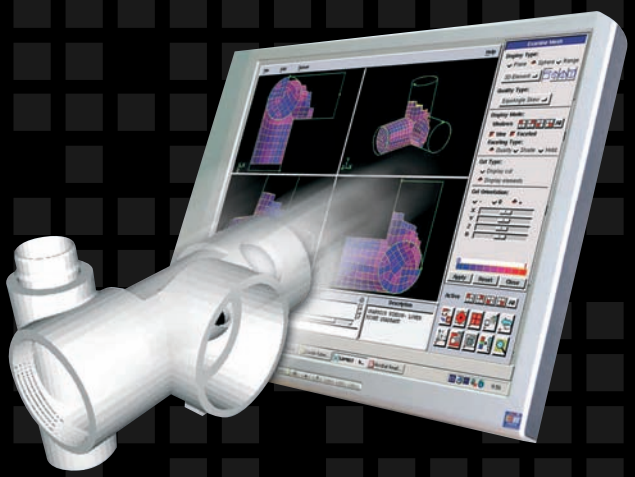
Each photopolymer layer is cured by UV light immediately after it is jetted, producing fully cured models that can be handled and used immediately, without post-curing.

Impeccable accuracy.

Excellent finishing without marks at the curves, 16 microns thick layer.

Allows wall thickness up to 0.6 mm, independently of the geometry.

Volatilizable material for patterns of sacrifice. Allows perfect assemblies.



## SERVICES:

- Generation of a 3-D model based on a 2-D file or drawing.
- Manufacture of phase-1 prototypes in resin, polyamide, ABS, plaster, cellulose and metal.
- Manufacture of phase-2 prototypes and pre-series in rigid polyurethane and elastomeric resins.
- Prototypes with post-finishes: polishes, electrolytic baths, paints and varnishes, etc.

## APPLICATIONS:

Silicone Molding.

Microfusion and sacrifice patterns.

Rapid Tooling.

Sand Casting.

Aluminium Epoxy Molding.

Jewelry Molds Using VLT Rubber Process.

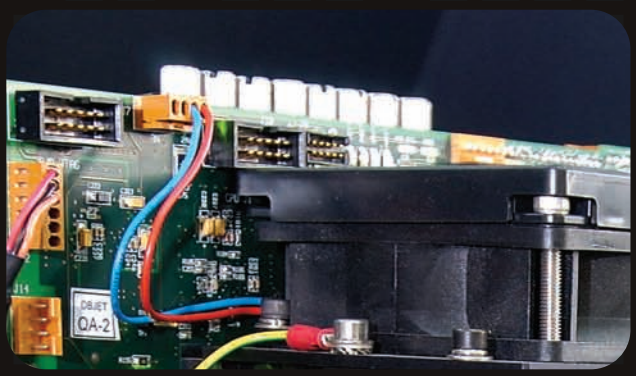
Medicine, surgery, orthopedic, dental and maxillofacial.

Thermoshaped.

Painting.

## ADVANTAGES:

- Seeing, touching and checking the aesthetic and functional specifications of a future product.
- Reducing errors in the product development process and reducing the time required to develop a product (time to market - development costs).
- Marketing of the product before it has been manufactured. The commercial department can obtain prototypes for use at fairs and product presentations well before the product is manufactured.
- Reduction of development costs. The possibility of correcting design errors before they are reproduced in the manufacturing phase. A market design test will make it possible to include modifications during the initial phases of development.




## SECTORS IN WHICH IT IS USED:

Metal, plastics, furniture, electronics, prostheses, footwear, modelling, toys and moulds, etc.

# MATERIALS LABORATORY

A correct study of the properties, behaviour and faults that are present or produced in a material provides the information a firm requires to take the right decisions about the product, avoid the re-occurrence of the fault and improve the product or have the possibility of filing the corresponding claims. Accordingly, the Metal Technology Centre currently has one of the most complete and technologically most advanced materials laboratories which, together with the centre's broad experience and the know-how of its technical personnel, makes it possible to solve and offer advice on any problem or issue that arises in relation to metal materials and their coatings.

The new CTMETAL materials laboratory has sufficient capacity for performing all kinds of tests, including destructive and non-destructive tests such as x-rays, ultrasound and penetrating liquids, climatic tests, coating tests, mechanical tests, electronic microscopy, metallography or chemical composition analysis, among others. In addition, the performance of studies and the consultancy services provided to businesses by the laboratory's technical personnel help attain the levels of quality and safety required by applicable legislation and by the centre's customers.

We perform the tests in accordance with the corresponding standards, offering the support required for the product certification processes that apply to various sectors. The laboratory's main activities are as follows:

## TESTS

Physical and mechanical (traction, resistance, flexion, hardness).

Fatigue, wear and tear, ageing.

Corrosion, coatings, climatic.

Structure and properties of materials.

Non-destructive tests (NDTs): industrial radiography and ultrasound tests.

## ANALYSES

Characterisation.
Faults and fractures.

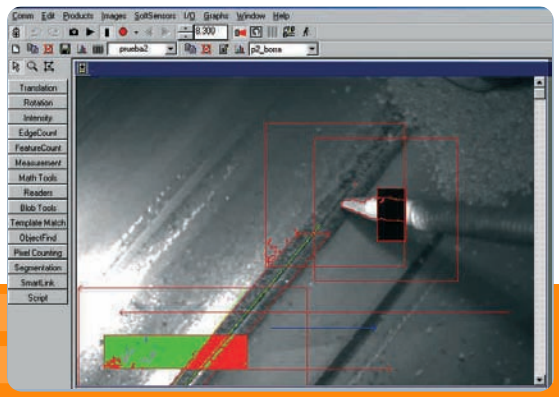
Approval of welding processes and welders in accordance with the ASME and EN codes, etc. Preparation of welding procedures.

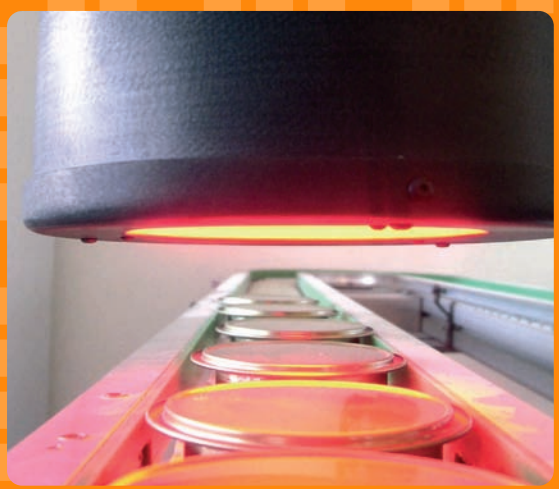
# ARTIFICIAL VISION, AUTOMATION AND ROBOTICS LABORATORY

This laboratory focuses on improving industrial processes through automation and the application of new technologies. It uses low-cost-high-performance control systems with autonomous systems, such as embedded computers.

The artificial vision, automation and robotics laboratory is made up of a multi-discipline team of engineers with a wealth of experience in the field of artificial vision, in which they have developed solutions and integrations for counting, sorting, presence-absence of parts and precision measurement.

In the area of automation and robotics, the laboratory has solved problems for the development of specific tools to automate certain operations, together with their corresponding integration in the production system.





# METROLOGY LABORATORY

This laboratory provides a technologically advanced service to help businesses guarantee the levels of quality of their products, check the dimensional parameters (parts, moulds, dies, etc.) and develop new products through reverse engineering.

## METROLOGY:

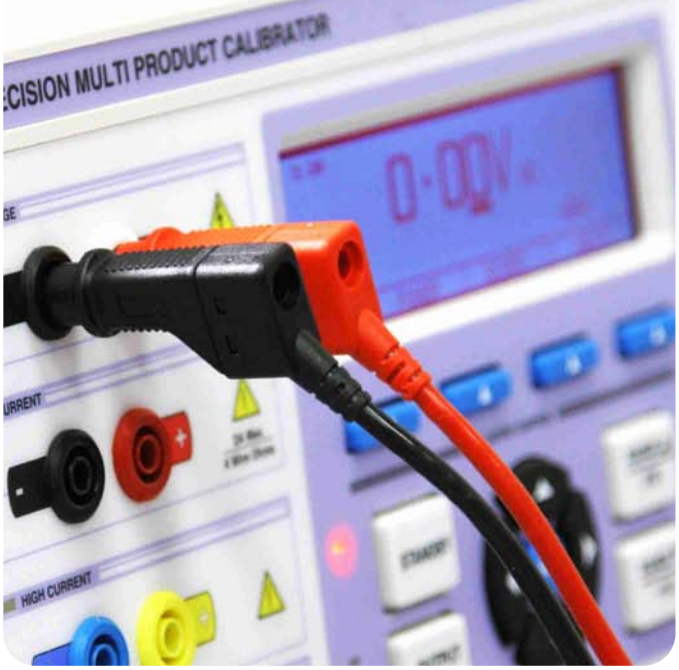
- Dimensional measurement, metrological validation and dimensional reports on parts, moulds, dies, prototypes, tools, machining, gauges, gears and complex geometries.
- Dimensional studies for solving assembly problems.
- Estimation of uncertainty associated with direct or indirect measurements.
- Training and consultancy services.

## REVERSE ENGINEERING - DIGITALISATION:

- Obtaining manufacturing drawings for three-dimensional models from physical parts.
- Measurement using the comparative-CAD method, preparation of graphic reports.
- Digitalisation of surfaces and sections.
- Digitalisation and geometrical reconstruction of surfaces.
- Touch-scanning, generation of CAD files (dxf, igs and vda, etc).

# CALIBRATION LABORATORY

Every enterprise uses equipment that needs to be calibrated to ensure the traceability of the measurements. The measurements taken are used to take decisions, such as the acceptance or rejection of a product depending on the fulfilment of tolerance levels specified by the user or the end customer. The growing application of standards from the ISO 9000 and ISO 14000 series involves stricter requirements on the control of gauges in enterprise.




## CALIBRATION AREAS:

**Fluids: pressure**

The Metal Technology Centre pressure gauge calibration laboratory has been certified by ENAC (138/LC290).
Using digital pressure calibrators as reference standards, our laboratory performs calibrations for pressure ranges from vacuum to 70 MPa.

**Dimensions**

The dimensional calibration laboratory meets the calibration requirements of the dimensional equipment commonly used in the metal-mechanical sector and associated sectors, including the following: slide gauges, exterior and interior micrometers, clocks, comparators, alexometers, line standards and flexometers, etc.

**Mechanics**

The Metal Technology Centre has set up a laboratory for the calibration of direct- or trigger-read dynamometric tools.

**Temperatures**

Our calibration laboratory has the means required for the calibration of thermometers and thermocouples, as well as the characterisation of isothermal media, such as ovens, heaters, freezers and autoclaves, etc.

**Mass**

Calibration of weighing machines, scales and masses. Calibrations in the laboratory or on-site at your facilities.

**Electricity**

The Metal Technology Centre has a laboratory for calibrating electrical equipment for direct current and low frequency. Traceability is guaranteed through the reference standards that have been calibrated in certified laboratories.
This laboratory is equipped with the corresponding human and technical resources, as well as the facilities required to meet the calibration demands of enterprises in different sectors: low- and medium-voltage fitters, installations maintenance, electrical equipment distributors, telecommunications, solar energy.

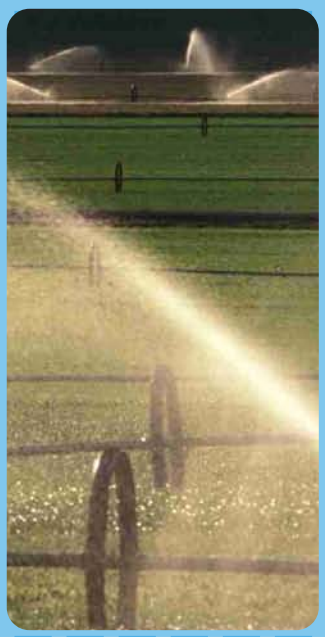
# AGRICULTURAL MACHINERY LABORATORY

## PHYTOSANITARY MACHINERY TESTING LABORATORY

- Preparation of UNE 68083-90/1 and UNE 68083/90-2 technical sheets and descriptions.
- Test methods according to the UNE 68096-89 and UNE 68105-99 standards.

## INSPECTION OF PHYTOSANITARY MACHINERY IN USE

Official laboratory recognised by the Department of Agriculture, Water and the Environment of the Region of Murcia for the technical inspection and periodical servicing of the equipment used to apply phytosanitary products. The corresponding environmental standards and quality protocols (GlobalGap, Integrated Production and Nature Choice, etc.) include the periodical servicing of treatment equipment as a required practice.
The mobile laboratory travels to the farms to perform the inspections. The producers and marketers of fruits and vegetables and every professional in the sector who applies treatments for third parties can request the tests.
The effectiveness of the phytosanitary application depends largely on the specifications of the equipment that is used and the wear and tear of its parts, especially those that are affected by ageing or wear and tear with use. It is therefore important to realise that treatment equipment in good condition is more effective and, consequently, guarantees the saving of large amounts of water and product, reducing the risks of environmental contamination through drifting, filtration into the subsoil and incorporation into the food chain.



## LABORATORY FOR LOCALISED IRRIGATION SPRINKLERS AND PIPES

Tests on the mechanical and functional specifications of sprinklers, pipes and other accessories for irrigation installations.
This laboratory tests the mechanical and functional specifications of irrigation equipment, which mainly use the various types of polyethylene, polyvinyl chloride (PVC) cast copper and cast ductile steel.

As far as the irrigation systems and accessories are concerned, the personnel have received the appropriate training and the equipment and procedures that are used have been adapted to the following tests:

# FIRE EXTINGUISHER TESTING LABORATORY

## PORTABLE EXTINGUISHERS

Laboratory certified as compliant with the ENAC 236/LE589 standard for the performance of tests in accordance with the EN 3-7 and EN 3-8 standards.

Laboratory certified as compliant with the ENAC 236/LE589 standard for the performance of tests on extinguisher powder in accordance with the EN 615 standard.

Only Spanish Representative on the European Standards Committee CEN TC-70.


## TRAINING: FIRST AID FIRE FIGHTING COURSE

The Metal Technology Centre of Murcia gives courses on the basic aspects of fire fighting at the workplace to complete the training received by workers as part of the prevention of occupational hazards.
The fire fighting courses are given by highly qualified personnel and they are separated into two parts: one on theory where students become familiar with the basic concepts of fire and extinction mechanisms; and a practical part in which they perform real fire fighting trials under controlled conditions.
All the activities take place in the FIRE SHED, which is the only facility of its kind in Spain for fire tests.

# AUTONOMOUS BREATHING EQUIPMENT INSPECTION CENTRE

The autonomous breathing equipment bottle inspection centre is certified by the Ministry of Industry, Tourism and Trade in accordance with Spanish Royal Decree 2060/2008, which adopts the regulations on pressurised equipment and their complementary technical instructions. Laboratory certified as compliant with the UNE EN ISO 9001:2008 quality standard by the certification body Bureau Veritas.

For surface work, the inspections are for autonomous breathing equipment used by fire workers, emergency workers, oil companies, gas companies, industrial refrigeration companies and supermarkets. They also apply for underwater uses, such as professional divers and sports diving, aquaculture, salvage and environmental studies.

## EQUIPMENT FOR USE UNDERWATER AND FOR SURFACE WORK

### BOTTLES

Periodical, visual inspection of bottles.
Volumetric dilation test.
Ultrasound for measuring bottle thickness.
X-rays for bottle rejection study.
Repair of bottle exteriors: painting.
Exterior and interior sand-blasting of bottles.
Tap maintenance and repair.
ERA: inspection, cleaning and maintenance of masks, backpacks and pressure reducers.

### TRAINING

Training courses for the use of ERA.
Instructions for filling bottles.

### COMPRESSORS

Inspection and repair of compressors.

### UNDERWATER EQUIPMENT

Repair and maintenance of regulators.
Repair and maintenance of jackets.

# WINDOWS AND DOORS TEST LABORATORY

Laboratory certified by ENAC (263/LE1613) and notified body (No. 2226) for the performance of air permeability tests, watertightness, wind resistance and the capacity for supporting the loads corresponding to safety devices. Tests required for the CE marking of pedestrian doors and windows in accordance with the European Directive on Construction Products 89/106/CEE.

Consultancy services for businesses wishing to adapt their products to the directive.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