IK4 IDEKO
Research Alliance

WE SPECIALISE IN MANUFACTURING AND INDUSTRIAL PRODUCTION TECHNOLOGY

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WE ARE
A TECHNOLOGY CENTER SPECIALISED IN INDUSTRIAL PRODUCTION AND MANUFACTURING TECHNOLOGIES

We have been **researching and developing technologies** in the manufacturing and industrial production field for **more than 25 years**. Our activity covers the **identification and analysis of opportunities, the design and development of products, business lines and production processes and the resolution of problems through the provision of technological services such as technical consultancy and equipment based services.**

We are known for the scientific excellence developed in our research lines which are aimed at advancing our specialisation. In this way, **we provide companies with differentiating technology solutions to enhance their competitiveness.**

Our **commitment to offering the best solution,** the loyalty of our customers, our international presence and collaborations, and the recognised prestige of our personnel in our specialist areas attest to our leadership in manufacturing and industrial production.

We have a Technology Research and Development department where our **research lines are developed,** and a Technology Innovation and Exploitation department where **we analyse the current and future needs of our customers,** and we identify opportunities and transfer the **results of our research activity** into value and competitive difference.

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01. RESEARCH LINES

01. STRATEGIC INNOVATION
02. MANUFACTURING AND PRODUCTION SYSTEMS
03. DYNAMICS AND CONTROL
04. MECHANICAL DESIGN
05. INTELLIGENT SOFTWARE
06. MANUFACTURING PROCESSES
07. INSPECTION AND MEASUREMENT
08. MICRO-TECHNOLOGY AND ULTRA-PRECISION

The research and development department encompass the 8 research lines which makes up the backbone of our centre. They are key factors in the development of the IK4-IDEKO specialisation, they offer a comprehensive solution in manufacturing and industrial production technology and provide the necessary balance to transfer research results to the company, based on the generation of knowledge .

01. RESEARCH LINES

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Based on our knowledge of manufacturing technology and industrial production we offer advanced solutions to improve companies' capacity for production and competitiveness in various sectors.

1.1 STRATEGIC INNOVATION

Design and support in the accomplishment of innovation plans.

Activity in the Strategic Innovation line is focussed on the definition of models and methodologies for the Management of Collaborative Innovation in industry.

It encompasses various themes, all aimed at providing a method and systematic approach to the innovative process within the company, such as competitive intelligence, technological prospective, competitive positioning studies, definition of innovation plans, establishment of multi-year R&D plans based on mixed development teams or use of results and diversification based on technological training.

We develop, in close collaboration with the Intelligent Software research line, the necessary tools for the optimal application of the designed methodologies.

RELATED OFFER

- Comprehensive innovation models.
- Competitive intelligence systems.
- Technology watch reports. Markets, sectors and technologies.
- Innovation schemes.
- Strategic positioning study in target sectors.
- Feasibility study of development of new products.
- Design and implementation of new product development.
- Industrial property analysis.

PROJECTS

- Support in the definition of M4FUTUR E , Innovation management system, in Mondragon Corporation.
- Dynamization of exploitation processes of European Research projects on emerging and pre-competitive technologies.
- Design, development and implementation of a Competitive Intelligence System (IDK Intelliegence Suite).
- Innovation management courses in MONTEREY.

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1.2 MANUFACTURING AND PRODUCTION SYSTEMS

Design, development and improvement of production processes.

Supported by theoretical-experimental knowledge of materials transformation processes (turning, milling, drilling, grinding, folding and punching), this research line brings the latest technologies and solutions in machining processes to the broadest production organisation concepts.

Thus, the Manufacturing and production systems line focuses its activity on knowledge and command of machining processes and their application in production by improving production processes from different perspectives: organisation of production flows, management of a variety of products and the optimisation of manufacturing processes.

RELATED OFFER

- Design of plant lay-out.
- Re-engineering of processes and adjustment of production flows based on Lean and Six Sigma techniques.
- Design of manufacturing processes supported by programming and simulation tools: devices, processes and programs.
- Design and optimisation of transformation processes.
- Testing and checking of machines, including thermal deformations.
- Design and optimisation of machining processes.

PROJECTS

- Design and optimization of manufacturing processes: cryogenic grinding.
- Design of manufacturing processes supported by programming and simulation tools: devices, processes and programs.
- New intelligent grinding processes for the elimination of defects in high added value parts.
- New Eco-Efficient processes for strategic industrial sectors in the Basque Country

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WE SPECIALISE IN MANUFACTURING AND INDUSTRIAL PRODUCTION TECHNOLOGY

1.3 DYNAMICS AND CONTROL

Description and optimisation of dynamic behaviour of machines and processes.

The Dynamics and Control research line addresses the resolution of vibration problems in all types of industrial machinery from two different and complementary approaches, on the one hand the dynamic design of machines and drives and on the other hand, the diagnosis and subsequent implementation of specific development solutions that eliminate chatter and vibrations in various machining processes.

In addition to solve vibration problems, we also perform dynamic analysis of devices and machines.

The Dynamics and Control research line is carried out by highly qualified researchers who make up a multi-disciplinary group of recognised prestige in the international field of science and technology.

RELATED OFFER

- Diagnosis and solving of vibration problems on industrial machinery.
- Elimination of vibrations in stock removal process.
- Development of passive and active dampers.
- Measuring of vibrations and natural frequency on industrial machinery pursuant to international standards.
- Modal Analysis.
- Finite element aided dynamic design (FEM).
- Design, adjustment and setting of motors and drives.

PROJECTS

- ikDAS. Platform for signal acquisition and processing for machine tools.
- Active damping system for removing vibrations in machine tool.
- Development of a new high rigidity material with a high damping capacity.
- Active dampers on machine tools to eliminate vibrations.

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1.4 MECHANICAL DESIGN

High-performance product design and development.

The Mechanical Design research line has focussed its activity on the conceptualisation and detail design of advanced performance machines with high levels of precision and productivity, this phase is being completed with the manufacture of a prototype.

To this end, simulation techniques are used and the most advanced and appropriate technologies and concepts are incorporated into the designs for each application as regards structures, materials, guidance systems and integration of actuators and feed-back systems.

Furthermore, the designs are conceptualised from the point of view of product lifecycle management, through the analysis, during the first phases of the process, of reliability, maintainability, availability, environmental impact and cost, among other concepts.

RELATED OFFER

- Design of machines and components.
- Simulation and calculation of machines and components.
- Uncertainty analysis.
- Prototype design and manufacture.
- Product lifespan management.
- RAM parameter management (Reliability, Availability and Maintainability).

PROJECTS

- Design of a dynamic test bench for bogies.
- Standarization of mechanical elements: linear guides and ball screws.
- Design and manufacture of a stand-alone scraping machine.
- Reduction of impact and improvement of machine tool production times by means of reusable modular structures.
- Development of a collaborative design method for developing customised Machine Tools.

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01. RESEARCH LINES

Contact:
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We capture, develop and generate new knowledge capable of responding to current and future challenges in industry.

1.5 INTELLIGENT SOFTWARE

ICTs for manufacturing and industrial production technology.

The Intelligent Software research line incorporates knowledge of the latest advances in the ICT environment into the manufacturing and industrial production field.

In this way, we develop automation and advanced software solutions that use artificial intelligence for the improvement of production processes of stand-alone machines and production lines.

Due to its complementary nature, the Intelligent Software research line actively collaborates with other IK4-IDEKO´s research lines, such as Strategic Innovation or Inspection and measurement, which it supports through the development of different systems.

RELATED OFFER

- Automation of manufacturing processes.
- Development of software and interfaces for any type of CNC/PLC.
- Control and improvement of existing manufacturing processes though the incorporation of proprietary MES systems in the plant (alarms, maintenance and machine performance).
- Specialisation in industrial networks, Safety, Security and Cloud Computing with focus on the industrial sector.

PROJECTS

- Sustainability: New distributed software architecture for Monitoring Energy Consumption.
- Tailored solutions for integrated management of production lines.
- Implementation of new ICT technologies for the machine of the future.
- Development of an innovative system for the improvement of profitability, maintenance, repair, renovation and reuse of machine tools.

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1.6 MANUFACTURING PROCESSES

Non-conventional technology of material manufacturing processes.

This Research Line covers the theoretical-experimental development of new manufacturing/transformation processes such as hybrid, laser, chemical, cladding processes or manufacture and machining of composite material parts.

The solution developed for internal chip extraction through the tool in machining processes was awarded by “Manufacturer of the Year” prize at “Strategic Manufacturing Awards”, and also received first prize in the “Green Manufacturing” category at the same event.

RELATED OFFER

- Development of laser sintering processes.
- Development of manufacturing processes for composite parts.
- Development of new manufacturing processes.

PROJECTS

- Development of a prototype for scaffolds manufacturing
- Development of a new process for material cutting by laser.
- Application of natural fibres in the manufacture of environmentally sustainable parts.
- Development and optimisation of the laser material cutting process.
- Technologies and processes for the manufacture of composites outside the autoclave.
- On-line monitoring and control of laser processes (cutting, cladding).

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1.7
INSPECTION AND MEASUREMENT

Precision, Quality, Reliability and Productivity in manufacturing processes.

The Inspection and Measurement research line has the firm objective of providing differential value to the production process, focussing its activity on the development of technologies and systems for the inspection and measurement of parts and processes. Within technological areas such as ultrasound, thermography, photogrammetry, laser and optical measurement, the line develops tailored and integrated solutions that provide a differential advantage to the production process.

With cutting edge facilities and equipment and diverse practical applications in industry, the Inspection and Measurement research line is a benchmark in its field of application.

RELATED OFFER

- Non-destructive testing (NDT) of quality of part: Surface defects (ultrasounds, etc.) and residual stress (diffractometry, X-rays, etc.).
- Development of contactless dimensional measuring systems (1D/2D/3D) by means of laser and advanced optical techniques.
- Development and integration of inspection and measuring systems on machines and production lines.

PROJECTS

- Geometry measurement apparatus of wheels on rail track.
- Feasibility study for a gap measurement system in aeronautical rotors.
- Non contact inspection systems for cracks in machined parts.
- Aeronautical rotors' GAP measurer
- Intelligent fixtures development

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1.8
MICRO-TECHNOLOGY AND ULTRA-PRECISION

Advanced precision engineering: from micro-manufacturing to the machining of large parts.

The research line in Microtechnology and Ultra-precision aims to develop machines, systems and manufacturing processes for parts with submicron dimensions and tolerances. Specifically it works in the three activity areas below: ultra-precision actuation and guidance systems with macro and micro applications, clamping and handling systems for microtechnologies and design and development of manufacturing processes for parts in the micron range.

Due to the knowledge in Microtechnology and Ultraprecision field, we have developed and manufactured three prototypes that have become a milestone nationally and internationally.

RELATED OFFER

- Micro-manufacturing: Five-axis micro-milling, ultra-precision single point diamond turning and laser micro-machining with ultra-short pulsed beam.
- Ultra-precision: Compensation of thermal errors on machine, ultra-precision mechatronics for sub-micrometric requirements, guided by high precision machinery (hydrostatic, hydrodynamic and aerostatic) with own calculation and design, and analysis of volumetric errors and compensation via PLC/CNC.
- Characterization of micro-components: qualitative analysis of parts by electronic microscopy (burrs, inclusions, pores ...), dimensional study by µ-CMM (Zeiss F-25) with uncertainty <250nm, and topographic analysis on up to 5 axes with optical microscopy and subnanometric resolution.

PROJECTS

- Development and manufacture of an ultraprecision lathe.
- Table for positioning and setting of photovoltaic wafers.
- Development of intelligent auto-compensated guidance systems.
- Reduction of defects in micro-manufacture.
- New thermal expansion compensation strategy.

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02.

HOW TO COLLABORATE WITH US

2.1. CONTRACT SERVICES

2.2. SUPPORT TO PRODUCT/ PROCESS/ SERVICE DEVELOPMENT STRATEGY

2.3. COLLABORATION IN INTEGRATED INNOVATION MANAGEMENT

The
Technology Innovation
and Exploitation department has
accomplished two missions: On the one hand
it aligns current and future needs of our customers
with research objectives of Technology Research and
Development department and on the other hand, analyses
and identifies opportunities to transfer into value and
competitive difference, the results of our research activity.

We empower companies by technological solutions that enable them to improve their competitiveness.

02.
HOW TO COLLABORATE WITH US

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COMODE, our collaboration model, is flexible and adapts to all kinds of customer: from the timely provision of technological services to the establishment of multi-annual R&D plans and, in between, the provision of support to the customer's development strategy for product, process or service through the implementation of R&D projects

2.1. CONTRACT SERVICES

This is the first and most basic level of our collaboration levels with our customers.

This is a service that is as timely, quick and effective as possible for example, the resolution of vibration problems, modal analysis, FEM calculations and simulations, or the provision of advanced measuring, inspection and verification services.

At IK4-IDEKO, we know how to adapt ourselves and respond to our customer's requirements. We offer quick and flexible services that respond to the timely needs of our customers, urgent in some cases.

2.2. SUPPORT TO PRODUCT/ PROCESS/ SERVICE DEVELOPMENT STRATEGY

At the second collaboration level, customer tailored R&D projects are proposed that facilitate the incorporation of new technologies, the result of IK4-IDEKO's research work, to its products and processes through transfered projects.

These are fully defined individual projects of specific duration that respond to a customer need, such as technological and market studies, product and technology innovation and development plans, component and complete machine design, analysis of thermal and dynamic behaviour of structures, ecodesign and sustainability, modelling and management of production lines, review and selection of parameters and tools in machining processes, improvement of production processes, validation, manufacture and refining of prototypes, etc.

At Ideko-IK4, we provide companies with differentiating technology solutions to enhance their competitiveness.

2.3. COLLABORATION FOR INTEGRATED MANAGEMENT OF INNOVATION

This is the top collaboration level that goes beyond a single project and is based on establishing collaboration plans together with a multi-annual horizon.

This relationship model enables us to design R&D&I plans together through which we can align Research, Development and Innovation activities as far as is possible with the current and future needs of our customers. In short, we help our customers draw up the innovation plan their company needs and to implement it, involving ourselves in the obtaining of results from the first research phases to the implementation of results in innovations for the market.

At IK4-IDEKO, we are committed to establishing firm relationships with our customers.

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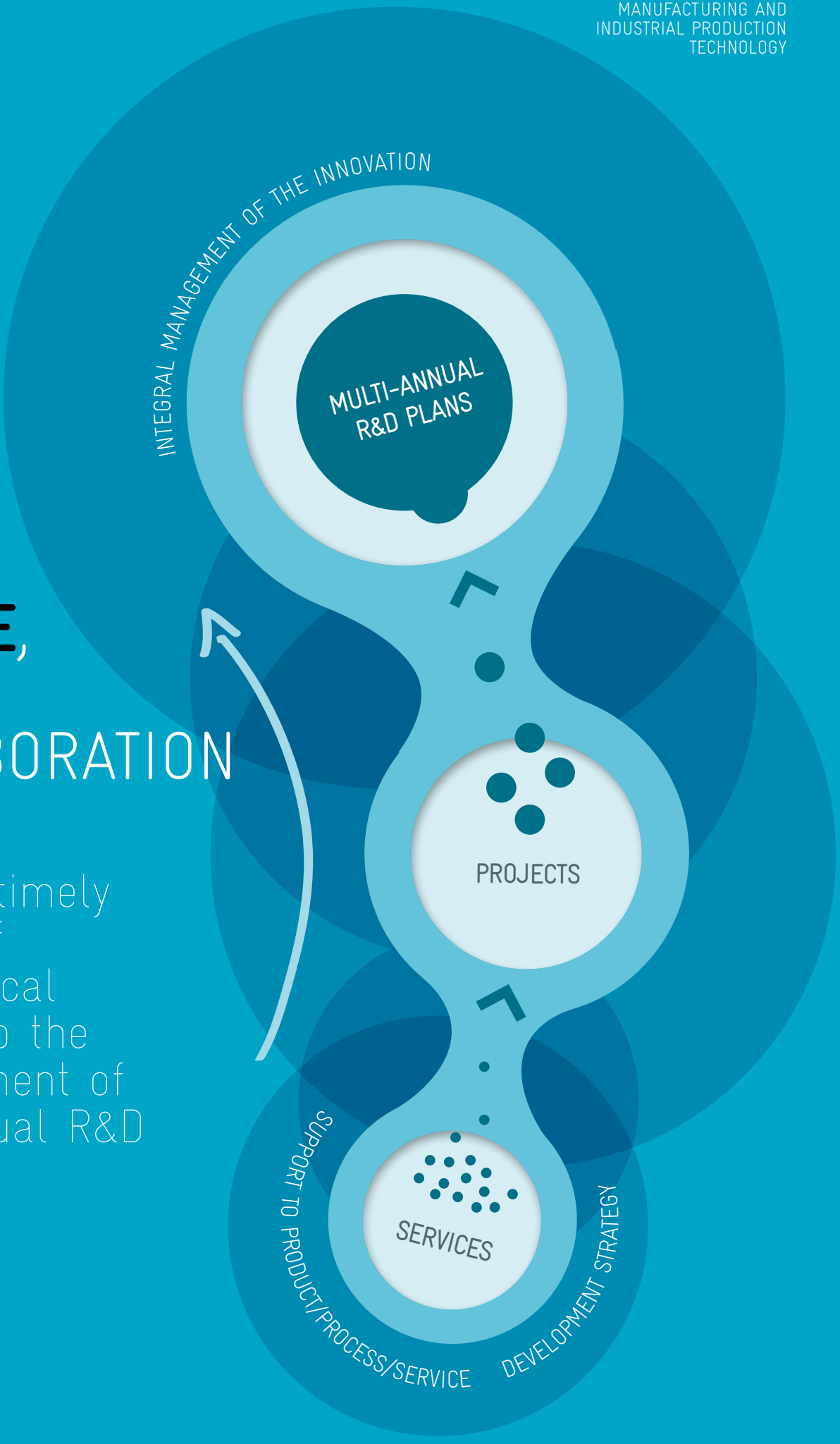
COMODE, OUR COLLABORATION MODEL

From the timely delivery of technological services to the establishment of multi-annual R&D plans



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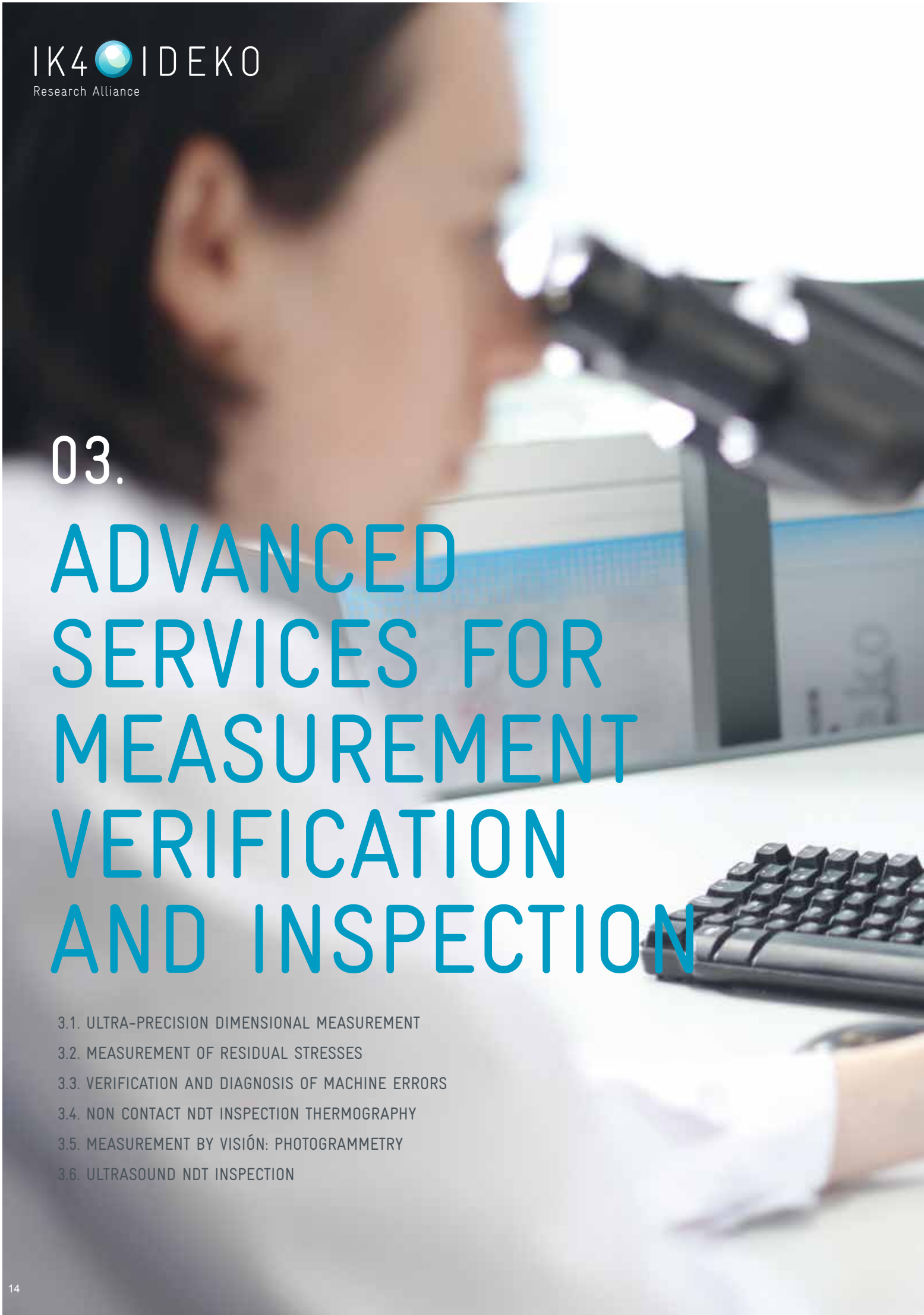
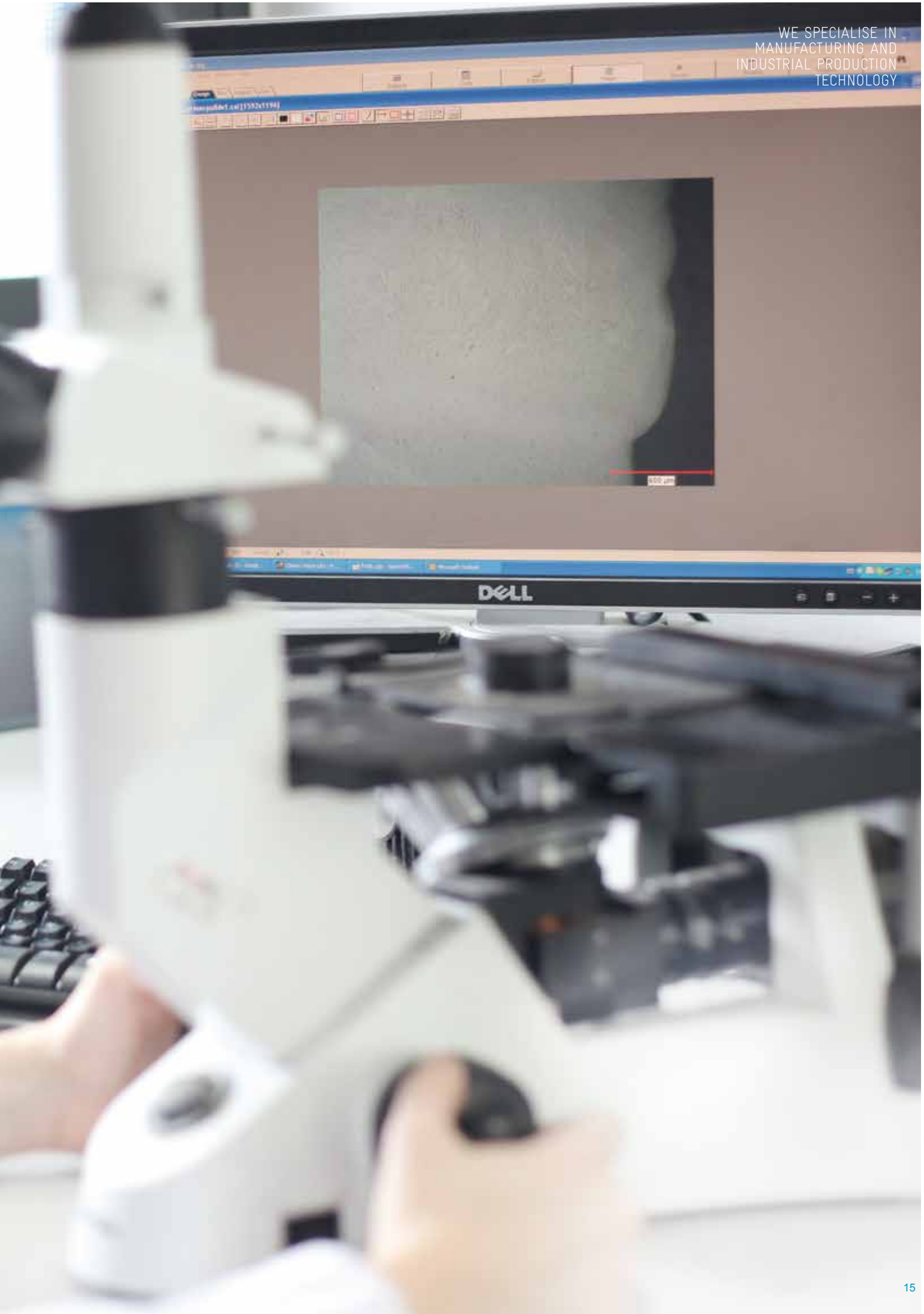


03.

ADVANCED SERVICES FOR MEASUREMENT VERIFICATION AND INSPECTION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03.
ADVANCED SERVICES FOR MEASUREMENT VERIFICATION AND INSPECTION

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WHAT WE OFFER
EQUIPMENT | APPLICATIONS

3.1
ULTRA-PRECISION DIMENSIONAL MEASUREMENT

WHAT WE OFFER
- Measurement of forms, profiles and roughness.
- Electronic microscopy. Analysis of chemical composition. (Magnification 1,000,000, resolution 3 nm).
- Submicrometric optical profilometry 300 x 300 mm (accuracy 0.1 nm).
- Submicrometric measurement on 3 axes (accuracy 250 nm) 100 x 100 x 100 mm.
- Measurement in 3 axes of parts up to 1200 x 900 x 700 mm (1 micron accuracy).

EQUIPMENT
- Microscope: Zeiss EVO 40.
- Ultra-precision: MMC Zeiss F25: Sensofar Plu Neox optical profilometer.
- Standard: MMC Zeiss Prismo: Profile and roughness measuring systems.

APPLICATIONS
- Medical uses.
- Optics.
- Dental components.
- Precision mechanisms.
- Energy: power cells, solar cells.
- Parts with micro-machined details.
- Microfluidics

3.2
MEASUREMENT OF RESIDUAL STRESSES

WHAT WE OFFER
- Non-destructive measurement of residual stresses.
- Portable equipment for measurement in situ.
- Determination of retained austenite.

EQUIPMENT
- StressTech 3000 X-ray Diffractometer.
- X ray sources for different materials.
- Electropolisher for detailed determination of stresses.

APPLICATIONS
- Measurement of residual stress.
- Validation of manufactured parts.
- Control and improvement of manufacturing processes.
- Validation of materials and large components in situ.

3.3
VERIFICATION AND DIAGNOSIS OF MACHINE ERRORS

WHAT WE OFFER
- Experimental modal analysis.
- Checking of straightness and angular positioning errors in linear movements.
- Verification of volume errors (ISO 230-6)
- Verification of thermal effects of operation (ISO230-3).
- Verification, calibration and correction of errors on linear and angular axes in accordance with specific standards for each application.
- Exactness and repeatability of movement of linear and angular axes (VDI 3441, UNE-EN-ISO-230-2 etc.).
- Verification of interpolation error by simultaneous movement of 2 axes.

EQUIPMENT
- Agilent Technologies laser axes measurement equipment.
- Renishaw linear axes and rotary axes laser measurement equipment.
- Proximity measurement sensors in nanometre range.
- Zerotronic high precision capacitive inclination sensors.

APPLICATIONS
- Lathes: vertical and horizontal.
- Milling machines: column and gantry.
- Grinding machines: horizontal, vertical, flat, exterior, interior, gantry, etc.
- Punching machines.
- Saws.
- Automated lines.

3.4
NON CONTACT NDT INSPECTION THERMOGRAPHY

WHAT WE OFFER

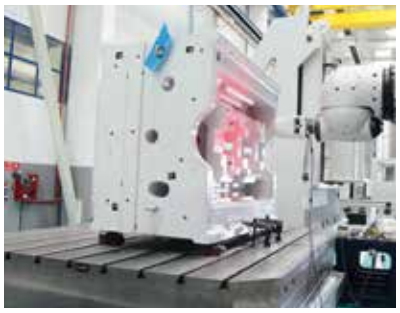
- Non-contact NDT inspection of surface and internal defects of metallic and composite materials (cracks, delaminations, voids…).
- Fatigue limit assesment through non-contact NDT.
- In situ thermographic inspection with portable equipment.
- Technical instructions and reports generated by qualified personal.

EQUIPMENT

- Thermographic cameras NEC TH9100 and FLIR SC5000.
- Edevis (OTvis, Ptvis) active thermografic system.
- Thermografic image processing software.
- Heating sources: IR , pulsed lamps, modulated lamps...

APPLICATIONS

- Assessment of fatigue failure zones by means of NDT techniques, instead of common material testing.
- Non-contact NDT inspections of surface and internal defects of metallic and composite materials (sectors: railway, automotive, aeronautics, energy)
- Optimization of machining processes.



3.5
MEASUREMENT BY VISIÓN PHOTOGRAMMETRY

WHAT WE OFFER

- Photogrametic measurement for non-contact dimensional control of large parts (precision>1/10.000)
- In-situ geometric measurements with portable equipment.
- Comparison between measured and modeled part (from CAD)
- Technical instructions and reports generated by qualified personal.

EQUIPMENT

- NIKON D3X SLR camera
- Retroreflective targets
- Carbon scaled bars
- DPA-Pro (AICON 3D) photogrammetric software.
- Polyworks: data proccesing and report genation.

APPLICATIONS

- Large parts measurements: wind rotor hub, wind blades, railway bogies, ship structures and aeronautic components.
- Measurement of low accessibility areas
- Alignment of large raw parts.

3.6
ULTRASOUND NDT INSPECTION

WHAT WE OFFER

- Non-contact NDT inspection of surface and internal defects of metallic and composite materials.
- In-situ ultrasonic testing with portable equipment.
- Design of advanced inspection solutions using finite element modeling.
- Technical instructions and reports generated by qualified personal. Levels 2 and 3 in Ultrasonic.

EQUIPMENT

- Olympus OmniScan MX: portable conventional ultrasound unit and phased array .
- M2M MultiX++: conventional ultrasound unit and phased array .
- Innerspec Temate PowerBox H: portable ultrasound unit EMAT.
- Motorized rotation scanners for inspection of flat and curved surfaces.

APPLICATIONS

- Non-contact NDT inspections of surface and internal defects of metallic and composite materials applying pulse-echo, through transmission and TOFD inspection modes.
- Defect characterization.
- Welding inspections applying pulse-echo and TOFD inspection modes.
- Thickness measurement.

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04.

FACILITIES AND EQUIPMENT

WE SPECIALISE IN
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04.
FACILITIES AND EQUIPMENT

Contact:
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To support IK4-IDEKO's research activity, we make strategic and differentiating investments in equipment and facilities that put us in the front line nationally and internationally in our specialisation.

4.1 PROTOTYPE WORKSHOP

Currently, we have a prototype workshop of more than 2000 m2 between the two buildings, an air conditioned space aimed to the validation and testing of new machine prototypes and precision machining processes as well as related technologies.

EQUIPMENT

- Five continuous axis milling machine with spindle-head changing systems.
- CNC Lathe.
- Linear motor machining module.
- 2 machining centres.
- Parallel kinematics module for laser jobs.
- Fiber deposition machine.
- Machine to manufacture scaffolds.

Apart from permanent equipment, our prototype laboratory can have other machines and systems related with R&D project working in each moment.

We have provided the Technology Centre with 2 Ultra precision Laboratories, a Measuring Systems Laboratory, a Component Testing Laboratory, a Laboratory for Laser Technology management and a laboratory for the study of Composite Materials. These labs are the perfect complement to the prototype workshop, a space for experimental development and testing of machines and production systems.

4.2 MACHINE AND ULTRA-PRECISION PROCESSES LABORATORY

This laboratory gives a clear indication of IK4-IDEKO's commitment to ultra-precision, not only aimed at miniaturisation and the micro world but it also significantly covers the macro world, where there is already a considerable demand.

These facilities are larger than 400 m2 with temperature and humidity control and an anti-vibration system, in which we carry out activities from several performance fields related to machine testing and ultra-precision manufacturing processes.

Within this area, we are concerned with, on the one hand, the testing of ultra-precision machines and/or devices that we develop within our research activity.

EQUIPMENT

Ultra-precision micro-milling machine:

- Natural granite structure.
- Aerostatic guiding: friction 0 Tools up to 50 nm.

Three axis laser micro-machining:

- Three picosecond pulse laser wavelengths:
- Ultraviolet, infrared and green.
- Precision 500 nm.
- Repeatability 200 nm.
- Laser power: 25W at 1MHz laser micro-milling and micro-machining.

Single point diamond ultraprecision turning:

- 3 axle lathe.
- Granite structures.
- Aeorostatic guides with linear motors and nanometric resolution scales.
- Aerostatic spindle head.

4.3
ULTRA-PRECISION METROLOGY LABORATORY

To support our ultra-precision activities, we have a metrology and inspection laboratory equipped with the latest systems. An example of the latter is the Carl Zeiss F25, one of the ten units available worldwide and the only one on the Iberian Peninsula. With this equipment, we ensure that our developments are properly checked and, furthermore, we offer a part measurement service to the sector with a single piece of equipment.

We must point out that the major investment in the Ultra-precision Metrology Laboratory is also reinforced by the collaboration agreement signed with Carl Zeiss, the world leader and benchmark organisation in optics and precision metrology, for the joint development and exploitation of the laboratory. Within this agreement, IK4-Ideko has become the preferred partner of Zeiss at a national level in the precision field, the “Zeiss-IK4-Ideko Ultra-precision Centre” has been set up in our laboratory.

EQUIPMENT

- Microscope: Zeiss EVO 40.
- CMM: Zeiss F25.
- Optical profiler: Sensofar Plu Neox.
- CMM: Zeiss Prismo.
- Profile and roughness measuring systems.

4.4
MEASUREMENT SYSTEMS LABORATORY

As a third activity in the ultra-precision laboratory, we have located the development of our measurement systems. This is a line of research that is being increasingly developed at IK4-IDEKO. It is aimed at developing new part measuring and inspection systems for measurements currently not possible or carried out using external means, with a major loss of precision and productivity.

Noteworthy in this field are for example the line of optical and laser measuring devices for railway lines, the laser measuring devices for turbine blades, all these being non-contact measuring systems, or the family of measuring devices for multi-diameter cylindrical parts. Other development areas are the photogrammetric techniques, also non-contact measurement, and identification of defects using non-destructive tests using ultrasound and laser ultrasound technology.

EQUIPMENT

- X ray diffractometer for measurement of residual stresses.
- X ray sources for different materials.
- Electropolisher for detailed determination of stresses.
- Active and passive thermographic solutions.
- NEC TH9100 and FLIR SC5000 thermographic cameras.
- Edevis active thermography system (OTvis, Ptvis).
- Thermographic image processing software.
- Excitation sources: IR, flash, modulated halogen, etc.
- Measurement by vision equipment Photogrammetry.

04.
FACILITIES AND EQUIPMENT

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4.5
HIGH PERFORMANCE DYNAMICS LABORATORY

Experimental characterisation of the dynamic behaviour of machines and manufacturing processes and identification of vibration problems.

The high performance dynamics laboratory is the experimental branch of our activity in Dynamics and Control. Its work is focussed on the analysis and dynamic characterisation of devices and machines of any type or area of application, as well as on the identification and characterisation of vibration problems in manufacturing processes. For this, the laboratory is equipped with advanced hardware and software for vibration analysis. Experimental Modal Analysis, shear force measurement over different force ranges (from micro-field to processes with high loads), characterisation of rotating machinery, etc.

EQUIPMENT

- Equipment for vibration measurement and analysis: electromagnetic drivers, impact hammers, accelerometers.
- Measurement of cutting forces. Kistler Torque plates (fixed and rotary plates for milling and turning, micro and macro range).
- Range of active/pasive damping systems.
- Platform for signal acquisition and processing for machine tools - IKDAS.

4.6
COMPOSITES LABORATORY

Automation of manufacturing processes for composite parts:

Aimed at the study and improvement of composite part manufacturing processes, which can lead to the manufacture of machines and devices that would allow operations to be automated that currently are carried out manually.

Moreover, it is collaborating in order to introduce composites in sectors and applications which, due to production difficulties, are considered unsuitable or inaccessible.

For this purpose, we have devoted a closed space of 100 m^2 for research into materials processing, covering the various technologies and operations involved: placing of dry or pre-impregnated material in different formats and fabrics, impregnation by different techniques, cutting, gluing and curing, all supported by inspection and verification techniques of the processes and manufactured parts.

EQUIPMENT

- Epoxy/polyester resin injection equipment (Composite Integration, Ciject Two).
- Heated mould with transparent countermould for making flat sheets.
- Vacuum pump.
- ESI group simulation software for resin transfer processes (PAM RTM 2008).
- Mould for making prototype parts for validation of fibres and resins in the actual part.
- Ultrasound cutting equipment (Tironi Ultrasounds) for cutting different glass, carbon and natural fibres.
- Machine for fibre deposition.
- Equipment for testing the infusion, moulding and curing process, final part inspection equipment, process simulation systems.

4.7
LASER LABORATORY

Laser material processing tests (cladding and cutting), the laboratory has a 2 kW fibre laser, mainly for the research of additive processes, in particular aimed at the repair of high value added parts, which we consider an industrial niche that is growing in strategic sectors such as aeronautics and energy.

IK4-IDEKO has established a major collaboration in this area with the manufacturer Rofin, one of the world leaders in laser technology, with whom, in addition to their becoming a collaborating partner with the centre, we have signed a collaboration agreement for the exchange of knowledge and a joint development that enables us to progress more quickly and securely towards the final objective of developing technologies with practical industrial application.

The laboratory has been completed with the equipment necessary for the analysis and characterisation of manufactured parts, at a defect, material structure, composition level, etc., for both metal and polymer parts.

EQUIPMENT

- Equipment for metallographic characterisation and hardness.
- Parallel kinematics machining centre with laser cladding head.
- Laser source Rofin Baasel (fibre laser). Two spot sizes depending on the diameter of the used fibre: 150 and 400 µm.
- Gas injection system for studies in different atmospheres.

4.8
COMPONENT TESTING LABORATORY

Room for testing components to improve performance.

The activity is focussed on the experimental study of the behaviour of special mechatronic elements such as hydrostatic and aerostatic guiding, active guiding and advanced drive systems.

For this purpose, there are specific test benches, configurated and fully equipped for the analysis of key parameters of the studied devices.

Another work area is the application of new intelligent materials such as magnetorheological and ferromagnetic fluids.

EQUIPMENT

- Drive test bench with advanced controller.
- Guide and hydrostatic and active bearings test benches.
- Magnetic fluid test benches.
- Test benches for damping drives.

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05.

REFERENCES AND COLLABORATIONS

At IK4-IDEKO, we believe in working together and for this reason, we are committed to maintaining and increasing our extensive network of collaborators that, over the years, we have established nationally and internationally. Thus, from our specialisation in Manufacturing and Industrial Production Technologies, following the course of Open Innovation, we are contributing greater value to industry by acting as successful collaborative relationship catalysts at national and international level.



REFERENCES AND COLLABORATIONS

ACCIONA
AFM
AIMPLAS
AITIP
AJL
AMRC
ASCAMM
BATZ
BIDASOA ACTIVA
BIGUMETRIC
BIMATEC
BOEING BRTE
BUTE
CADENAS VICINAY
CAF
CEA
CEDRAT
CEN-CENELEC
CESI
CETIM
CNR-ITIA
CNRS
CONSTRUCCIONES ANTZIBAR
CRF
CRIF
DANOBAT
DANOBATGROUP
DELCAM
DELFT
DIAD GROUP
DRS
EATON
EDERTEK
EPFL
ETH
FAGOR
FAGOR EDERLAN TALDEA
FEDIT
FIDIA
FRAUNHOFER ILT
FRAUNHOFER IPA
FRAUNHOFER IPK
FRAUNHOFER IWU
FRAUNHOFER IZFP
FUNDICIONES ESTANDA
FUNVERA
GAMESA
GESTAMP
GKN
GOIMEK
GOITI
GRUPO FUMBARRI
GUIVISA
HEGAN
IBERIA
IBV
ICT CERAMICA
IDS
IFW
IK4
IMH
INASMET
INDUSTRIAS GARITA
INDUSTRIAS GOL
INESCOP
INGETEAM
ITP
JMA
KALE AERO
KENDU
KONDIA
KONIKER
KTH
LATZ
LEITAT
LKS
LOIRE SAFE
LOXIN
LZH
MACH4LAB
MATRICI
MONDRAGON
MONDRAGON UNIBERTSITATEA
NECO
NEWALL
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OVERBECK
PATRICIO ECHEVERRIA
PHILIPS
PMG
POLI MILANO
POMPEU FABRA
PRIMA
PRODINTEC
PROFACTOR
RENAULT
ROFIN
SAKANA
SALVA
SAVERA GROUP
SENER
SINTEF
SIRRIS
SORALUCE
SWEREA
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TALLERS FIESTAS
TECNALIA
TNO
TWI
ULMA
UNIV. BREMEN
UNIV. CACERES
UNIV. CARDIFF
UNIV. CARLOS III
UNIV. CHEMNITZ
UNIV. CRANFIELD
UNIV. DARMSTADT
UNIV. DUBLIN
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