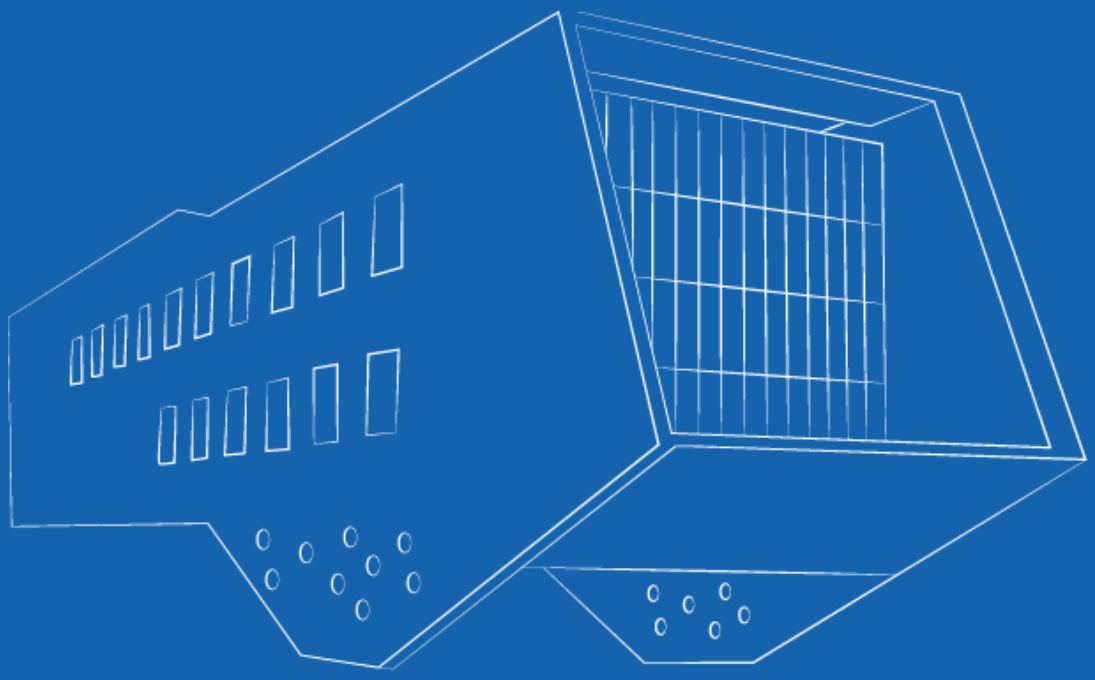
ANNUAL REPORT 2023

CINTECX

CINTECX
Universidade Vigo

INDEX

LETTER FROM THE DIRECTOR



As 2023 ended, the indicators for CINTECX showed its strong commitment to scientific excellence and reflected the fruit of a joint collaboration strategy that will be key for the Centre's future development. There were 144 publications indexed in Journal Citation Reports (JCR), of which 91 are to be found in the first quartile and 33 in the first decile. At the same time, 2023 saw a significant attraction of new national projects, five of which are in the State Subprogramme for Knowledge Generation, and another eight of which belonged to other programmes. That makes a total of 14 new national projects, attracting €1.4m in innovative research lines that are in line with European strategy such as power converters for electric vessel propulsion, smart infrastructure maintenance, new corrosion detection methodologies, among others. Four international projects were attracted, of which three correspond to the INTERREG programme and one to the ERC-Pathfinder programme, which involved the attraction of €1.3m. This funding is in addition to already running European projects bringing the total to 7 currently active projects, four led by CINTECX. Furthermore, this year has seen the achievement of 73 new contracts with companies, attracting 950 thousand euro through direct collaboration, guaranteeing the transfer and collaboration capacity of CINTECX's research staff with industrial sectors.

Regarding talent attracted over the year, CINTECX had a total of 19 post-doctoral positions, including seven *Ramón y Cajal* researchers, four *Margarita Salas* researchers, and one *María Zambrano* researcher, in addition to 23 predoctoral students on various programmes. CINTECX's training capacity can clearly be seen in the 15 Ph.D. theses that were defended, six of which had an international mention.

Support of egalitarian training of young talent and accompaniment throughout research careers continue to be among the Centre's priorities. Along these lines, five specific transformations have been carried out in scientific equipment handling. Of particular note is the success of the Mentoring programme, under which four scientific seminars have been held and two one-day events on underpinning themes, where topics of vital importance for the first stages of a research career were covered. These included the importance of being published, the opportunities map, and ethical issues in research.

Outreach to society is part of CINTECX's spirit. So, several activities were organized in 2023 such as the open-doors day events for young students, which aimed to awaken technological vocations with a view to creating the research system of the future and reaching out to groups that have limited access to science such as senior citizens. There were also open-door events for companies and other agents in the innovation ecosystem, and participation in various events such as sector fairs, science fairs, or talks to the general public, among others.

CINTECX is firmly committed to introducing equality and non-discrimination as central elements in all its activities through its Committee on Equality, Diversity and Inclusion. The Committee defined an Equality Policy that led to its own Equality Plan being implemented in 2022. The positive impact of the measures adopted is reflected in the 2023 equality indicators: the number of female

researchers rose by 3 percentage points to reach 35%, way above the national and European averages in the technological and industrial sphere. The Glass Ceiling Indicators also have positive values in terms of pre- and post-doctoral staff, showing progress in the careers of our women researchers and the number of professors, reflecting an increase in women in positions of responsibility. Numerous campaigns for the promotion and visibility of the women researchers at CINTECX were held. At the same time, in order to provide a practical handbook containing criteria for action and specific guidelines for applying a gender perspective in the projects of CINTECX research staff, the *Operational Guide for Incorporating the Gender Perspective in Research in the Technological-Industrial Sphere* was drawn up. This initiative received funding from the *Cátedra de Feminismos 4.0* of the *Diputación de Pontevedra* local authority.

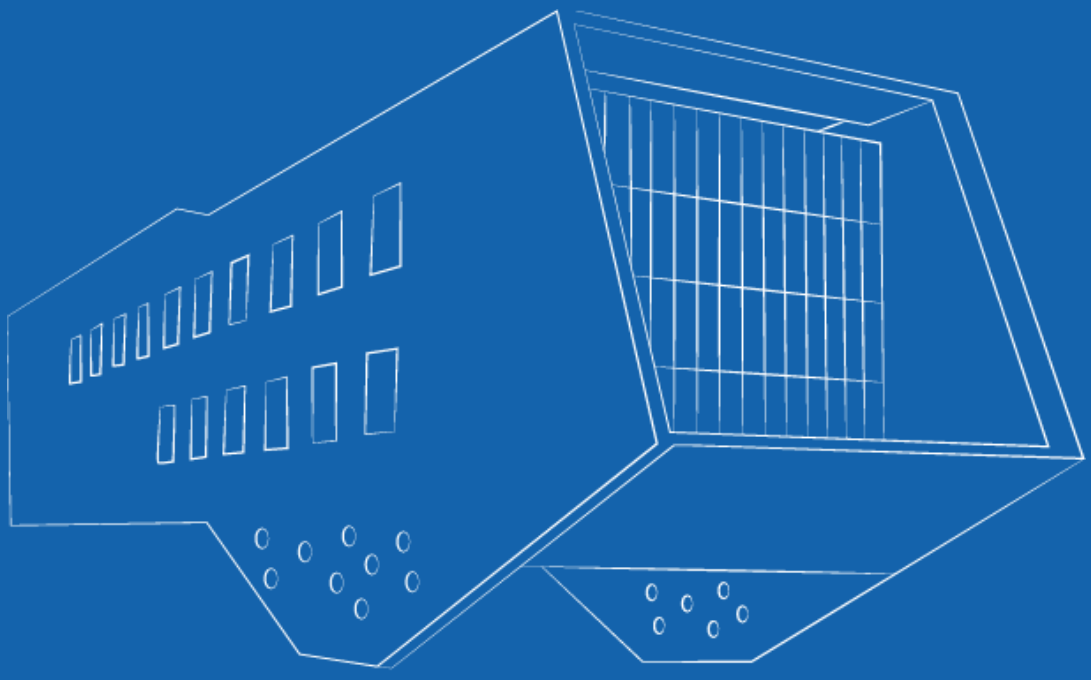
Our commitment to quality is reflected in the renewal of the certification for the Quality Management System in compliance with ISO 9001:2015. In addition, four new pieces of scientific equipment have been incorporated during 2023 to the system and made available to the scientific community and industrial sector, which expands the existing services on offer—services which, at the same time, receive high ratings for satisfaction from users.

All these achievements are the fruit of a journey that began in 2020 with the implementation of the 2020-23 Strategic Plan. Now that plan has finished, and so new reflection and rethinking were required for our objectives. Thus, a committee to draw up the strategy that would define the actions for the 2024-27 period was set up. The strategy rests on four pillars: research, transfer, and innovation; people; the relationship model and quality, evaluation, and recognition; and five overarching axes that define and identify us as a centre—sustainability, trust, efficiency, excellence, and equality. This framework document is an exercise by CINTECX—now a mature centre—in being able to face any major new purposes in the search for excellence. This document presents the main achievements of CINTECX during 2023, the figures and the main milestones reached from its position as a consolidated centre in the technological-industrial field in its environment and with its sights placed on future challenges.

María Concepción Paz Penín.

Directora de CINTECX

INTRODUCTION



Mission, vision, and values

VISION

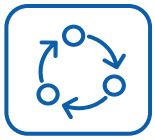
The vision of CINTECX is to become consolidated as a centre of reference in the technological-industrial sphere through research excellence, producing a real impact on its surroundings and on our technological and industrial partners and generating a critical mass in research.

MISSION

The mission of the Centre is to generate and spread excellent knowledge and transfer innovation in the sphere of energy, technologies, and industrial processes, with the focus on people and sustainable development.


Sustainability


Confidence


Efficiency


Excellency


Equality

Technological areas

ELECTRONICS AND AUTOMATICS

- Artificial Intelligence and robotics
- Sensors
- Optoelectronics and micro/ nanoelectronics
- Power electronics
- Flexible and efficient power management systems

MANUFACTURING AND MATERIALS

- Additive manufacturing
- Advanced manufacturing methods and materials processing
- Consumption reduction and materials recycling
- Advanced materials
- Manufacturing processes simulation and advanced materials

ENERGY

- Renewable energies
- Energy efficiency in industry and construction
- Energy storage
- New fuels
- Batteries
- Networks

TRANSPORT

- Propulsion and emissions
- Electric vehicles
- Fuel-saving systems
- Vehicular dynamics
- Accessible, safe, and sustainable transport
- Smart mobility and safety

BIOMEDICAL ENGINEERING

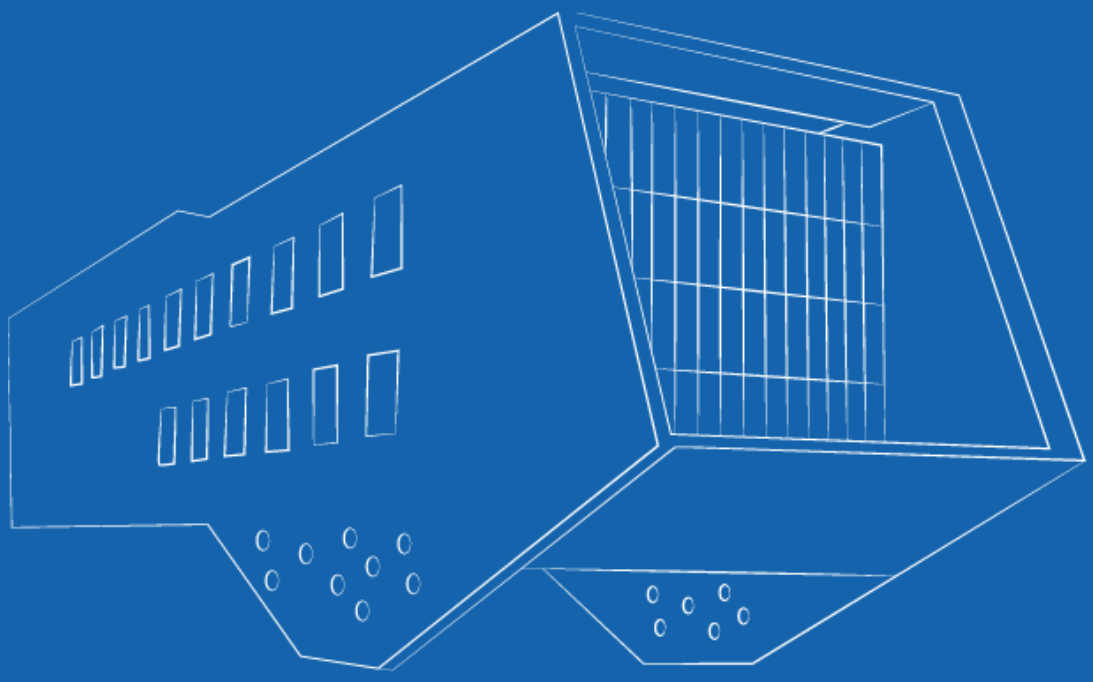
- Biomaterials
- Biosensors
- Biofluids
- Implants and tissue engineering
- Tools, technologies, and digital solutions for health and care

SUSTAINABILITY AND NATURAL RESOURCES

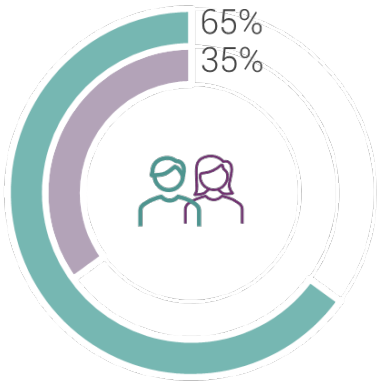
- Soil and water sustainability
- CO2 Capture
- Circular industry
- Geoengineering,
- Environmental engineering, and resilience
- Conservation of heritage

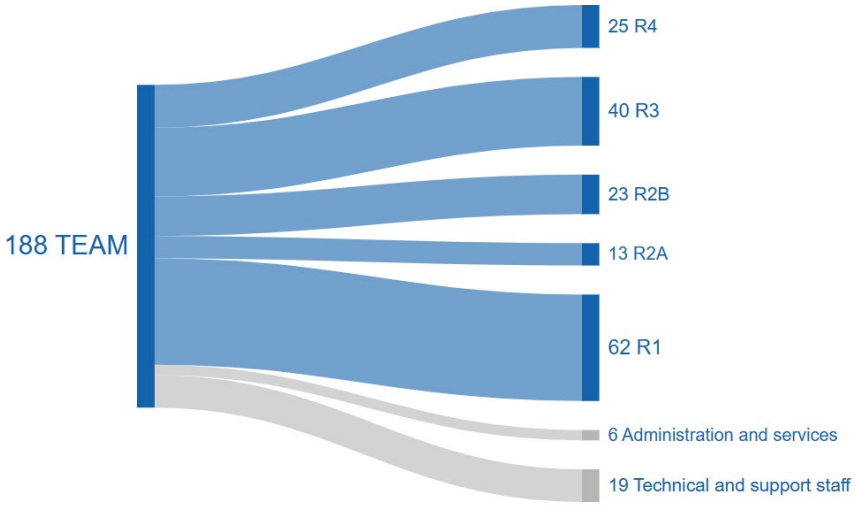
CINTECX IN NUMBERS

2



TEAM

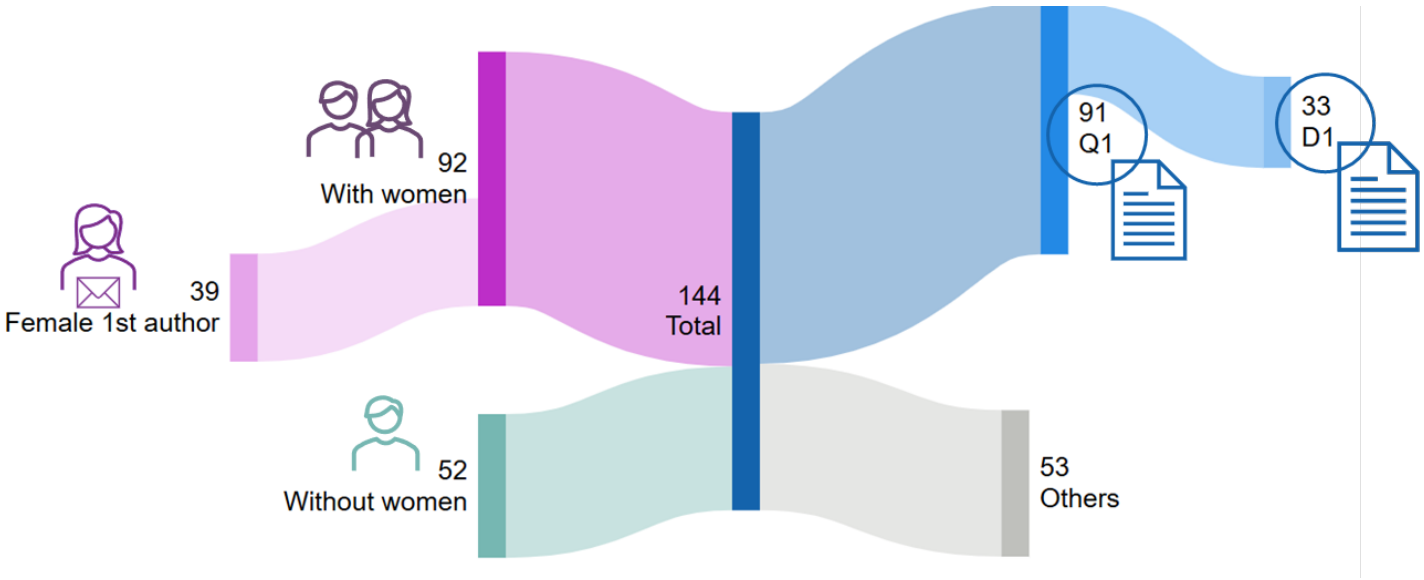




7	4	2	1	1	4
Ramón y Cajal Researcher	Margarita Salas Researcher	MSCA Researcher	María Zambrano Researcher	Distinguida Uvigo Researcher	Posdoc. Xunta Researcher

9	7	7
FPU Researcher	FPI Researcher	Predoc. Uvigo Researcher

SCIENTIFIC PRODUCTION

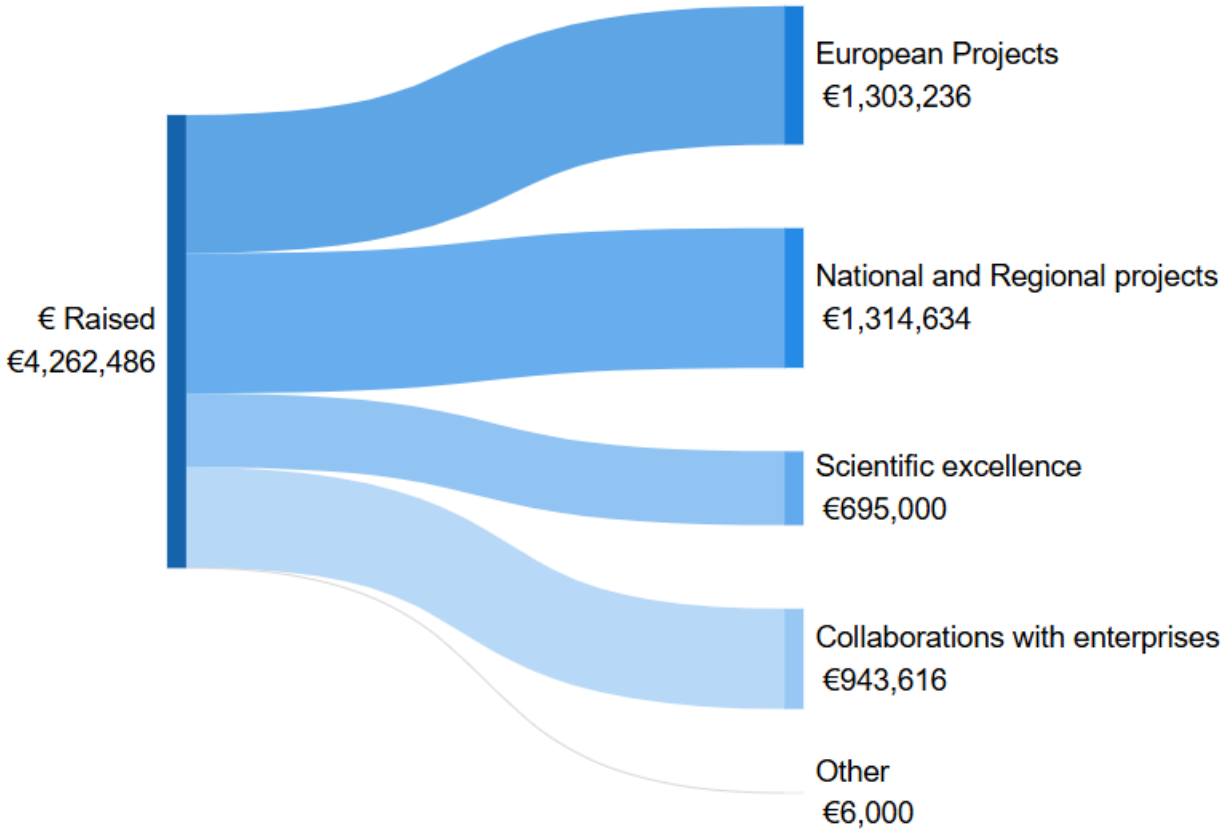


DOCTORAL THESES

15 Doctoral Theses

6 International mention

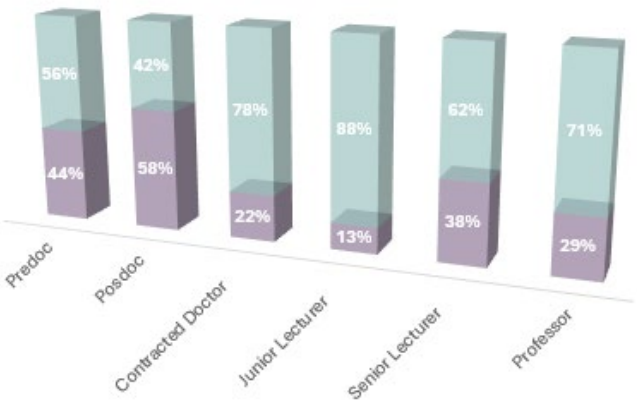
FUNDING ATTRACTED



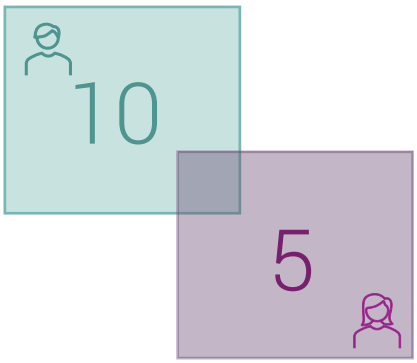
4	9	5	73
International projects	National projects	Other Projects	Collaborations with industry

EQUALITY INDICATORS

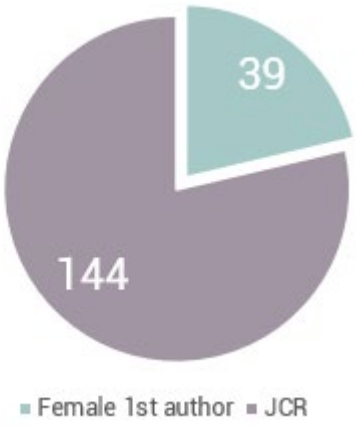
Team



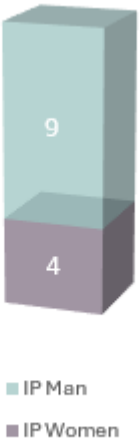
Theses



Scientific publications

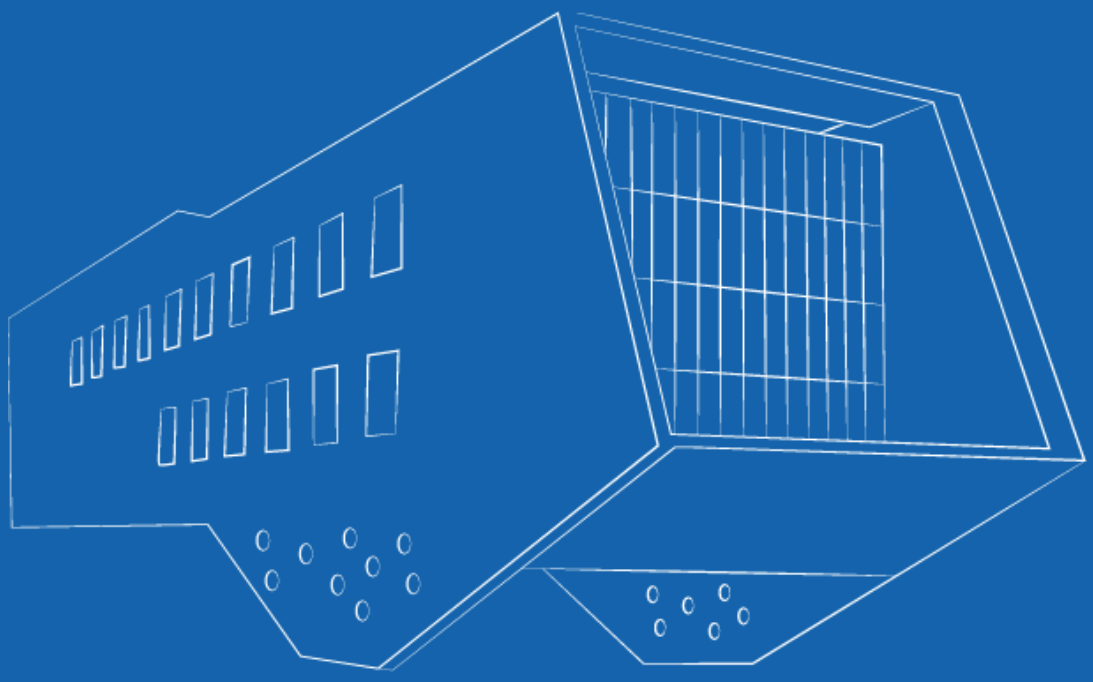


Projects



Glass Ceiling Index (GCI)				
Catedrático/a	Post-doctoral	Pre-doctoral	1st Author	Project RL
1.24	0.61	0.8	1.31	0.8

ORGANIZATIONAL STRUCTURE



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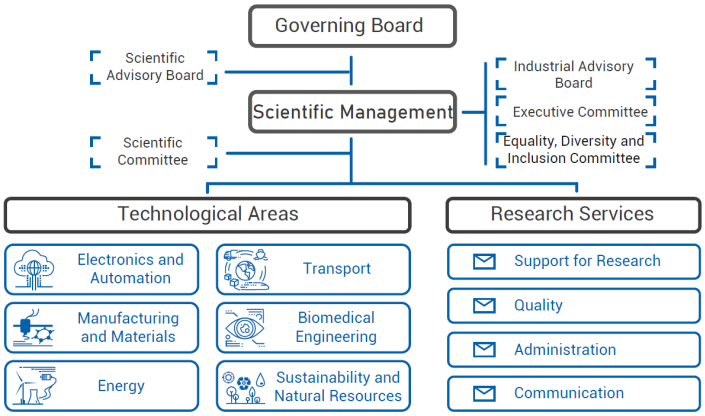
Organigram



The structure that governs CINTECX follows the operational organization indicated in the norms for research groups and centres of the University of Vigo. Scientific Management leads the Centre's governance. Activity is overseen by the Governing Board for Research Centres of the University of Vigo, with the advice of the Scientific Advisory Board (SAB), comprising academics and professionals of recognized prestige, which is responsible for drawing up assessment reports for the Centre.

The scientific management coordinates the six areas of Technology and Research Services shown, which they do with the support of four committees:

- The Industrial Advisory Committee is made up of professionals from leading technological companies and administrations. Its functions include guiding the Centre in transfer tasks, training, and diffusion to the business fabric, and identifying common interests, promoting public-private collaboration. This committee holds annual meetings with the Centre's Management.

- The Equality, Diversity, and Inclusion Committee has the job of drawing up, tracking and proposing CINTECX's policies within its remit. This committee includes a representative from the University of Vigo's Equality area.

- The Executive Committee carries out support functions for the Centre's Management in tasks such as management, promotion, or drawing up of this annual report, among others.

- The Scientific Committee is made up of the coordinators from each of the Centre's research groups and acts as a consultative body in research and transfer matters.

Scientific Advisory Board

Manuel Andrés Rodrigo Rodrigo

Received a degree with honours in Industrial Chemistry from the University of Valencia in 1993 and a doctorate in Chemical Engineering in 1997. In 1999, he conducted post-doctoral activities in Switzerland and focused his research line on high-temperature fuel cells. Since 2009, he has led a research team in electrochemistry, energy, and the environment. He belongs to the editorial board of three WoS journals. In 2020, he received an award from the Royal Spanish Chemistry Society for the work of the Chemical Engineering group.

Carlos Luís Molpeceres Álvarez

In 1991, served in the Spanish Army in the optics laboratory at the army research and development centre. Has undertaken stays abroad at centres in France and Germany. A CIEMAT Researcher in optical techniques in 1993. From 1998 to 2011 he was director of the UPM Laser Centre and is also currently directing the centre. His research activity is focused on developing new laser micro- and nano-processes in energy, biotechnology, and oncology.

Leopoldo García Franquelo

Graduated in Electrical Engineering in 1977 at the University of Seville, where he obtained his Ph.D. in 1980. He has been a University Chair since 1986. Director of the Electronic Engineering dept. from 1998 to 2005. He has led an award-winning research group which received the Andalucian R&D Award in 2009. Since 2006, he has been a distinguished professor of the Industrial Electronics Society. Senior Member of AdCom since 2008.

Salvador Ivorra Chorro

Doctor in Mechanical Industrial Engineering. Vice-rector for Infrastructures, Sustainability, and Occupational Safety at the University of Alicante. Senior Lecturer in continuum mechanics and structure theory at the Civil Engineering Dept. of the University of Alicante. Coordinator of the GRESMES research group. His research line focuses on the dynamic behaviour of structures and structural reinforcement. He was director of Civil Engineering at the University of Alicante and coordinator of the Civil Engineering area at the State Research Agency.

María del Pilar Dorado Pérez

Doctorate degree in Agricultural Engineering from the University of Cordoba. Made Chair of the university in 2012. Vice-rector of the University of Cordoba from 2010 to 2012. Has led the BIOSHAE research group since 2002. Her research line focuses on the application of process engineering to renewable alternative fuels and energy efficiency, particularly biorefinery technologies, second-generation biofuels. She received the Gold Medal for professional merit with red distinction in 2018.

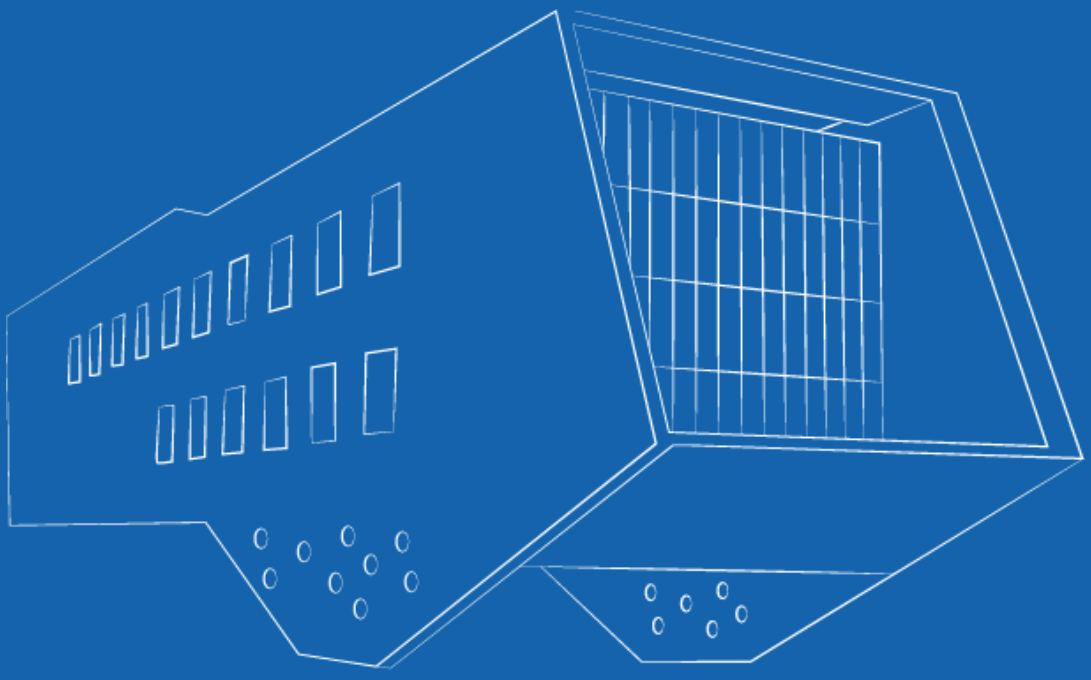
Rui L. Reis

Ph.D. in Chemical Engineering from the University of Porto in 1994. Vice-president of the University of Porto since 2009. His research line focuses on regenerative medicine and tissue engineering. He is a founder and director of the 3Bs Research Group in Biomaterials, Biodegradables, and Biomimicry. Editor in chief of the journal Materials Science and Engineering. He received the title of Doctor Honoris Causa from the University of Mons, Belgium.

Alba Diéguez Alonso

Ph.D. in Engineering from Faculty III Process Sciences of the Berlin Technical University. She was junior lecturer at the Institute of Fluid Dynamics and Thermodynamics of the Otto von Technische Universitat Dormund, where her research line centred on the thermo-chemical conversion of biomass and plastics. In her current role at that University, she is a leader in the development and optimization of thermo-chemical and thermo-catalytic conversion processes. Her work not only includes current challenges in natural resource conversion, but also drive innovation towards a more sustainable future.

FACILITIES AND SCIENTIFIC EQUIPMENT



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Building

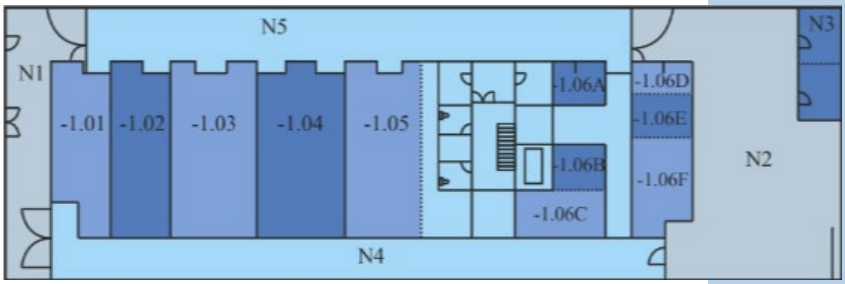
CINTECX has over 2000 m^2 of floor space, distributed in a two-storey building, a workshop building and a roof area, which houses technical rooms and the waste storage area.

It is located on the University of Vigo Campus

This building is equipped with supply facilities for compressed air, ultrapure air, nitrogen, oxygen and other fluids. It also has fuel storage and a wide range of unique scientific equipment such as: combustion engines, particle generation systems, analysers and meters, biomass boilers, cooling systems, climatic chambers, laser equipment for materials processing, power electronics test benches, additive printing equipment, boiling equipment, automatons and heat imaging cameras, among others.

Workshop-Bay

The workshop-bay has five laboratories as well as a machining workshop equipped with machining equipment and tools where services are provided to the research staff. There is also an additive manufacturing workshop, where the 3D printing equipment is located. The space is equipped with an air conditioning and humidity control system to ensure optimal manufacturing conditions.

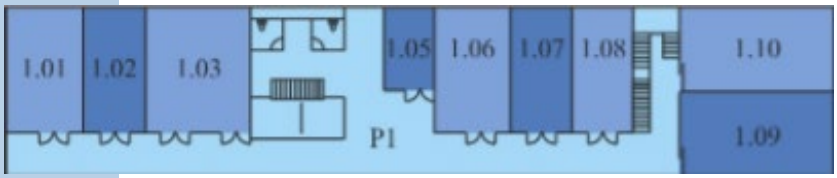


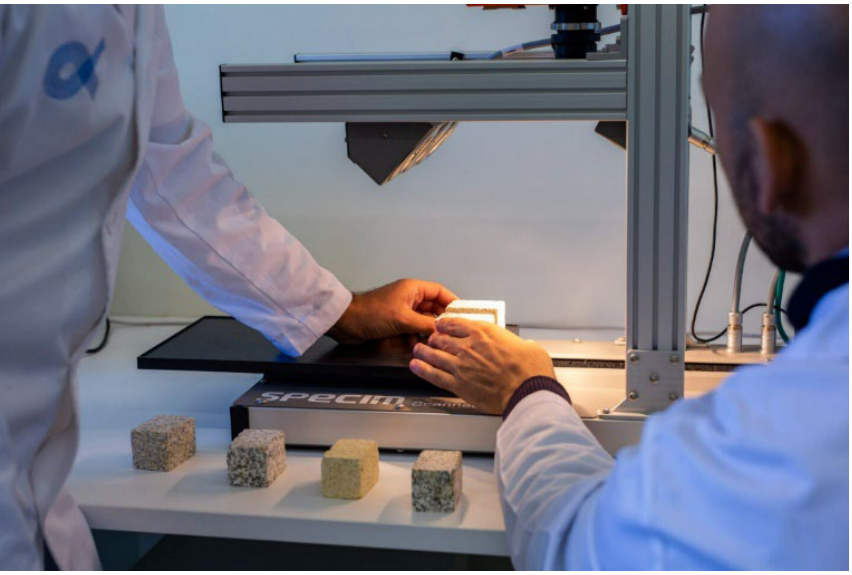
-1.01 – ADDITIVE MANUFACTURING WORKSHOP
-1.02 – LASER MACROPROCESSING
-1.03 – POWER ELECTRONICS
-1.04 - POWER ELECTRONICS
-1.05 – GEOSPATIAL E-SYSTEMS
-1.06 – ENERGY AND FLUID TECHNOLOGY
N1- LOADING BAY
N2 – GARAGE AND SUPPLY AREA
N3 – MACHINING WORKSHOP
N4 – ACCESS AND SERVICES
N5 – SERVICE AREA

Floor 1

The first floor of CINTECX houses three laboratories, the Management and Administration offices and also has two Coworking areas: the Auditorium and the Meeting Room, the latter recently equipped with a 65-inch monitor and mobile structure that can be reserved by the centre's staff for use in different activities, talks, or meetings. A highlight on this floor is Laboratory 1.02, for surface characterisation, where a wide variety of equipment for shared use is available both for the Centre's staff and for the research community in general, on a service and self-service basis. The provision has grown over 2023 thanks to the acquisition of new equipment following the Infrastructure Roadmap.

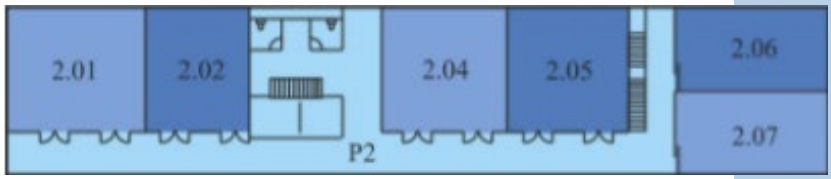
1.01 – COWORKING AREA
1.02 – SURFACE CHARACTERISATION
1.03 – SAFE AND SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES
1.05 – MANAGEMENT
1.06 – MULTI-MEDIA ROOM
1.07 – MEETING ROOM
1.08 – RESEARCH SUPPORT
1.09 – NUMERIC SIMULATION
1.10 – CONVERSION OF WASTE AND BI-PRODUCT FLOWS



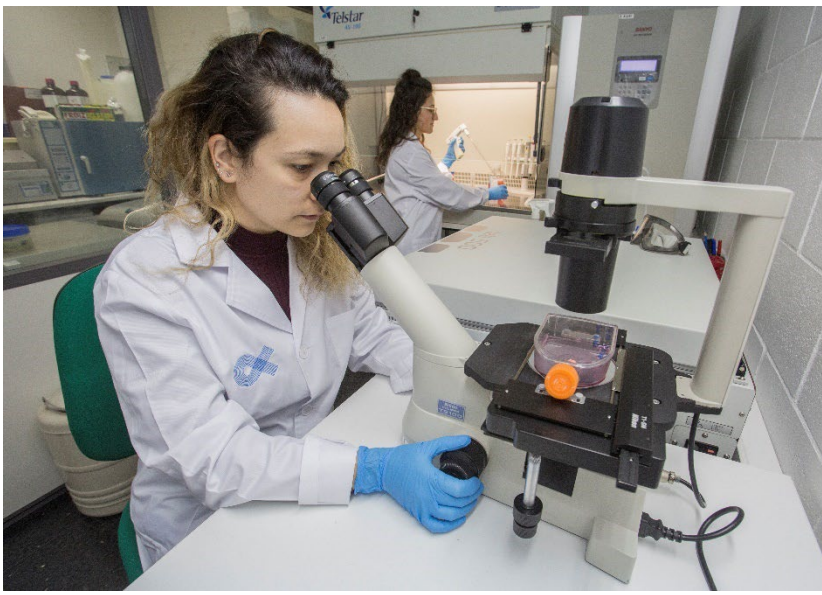


Floor 2

On the second floor at CINTECX, there are five labs where the Centre's researchers undertake their projects. Furthermore, there is a multi-use area.



2.01 – BIOENGINEERING AND SUSTAINABLE PROCESSES
2.02 – LASER MACROPROCESSING
2.04 – NEW MATERIALS
2.05 – MECHANICAL ENGINEERING
2.06 – CORROSION AND MATERIALS CHARACTERISATION
2.07 – MULTI-USE ROOM

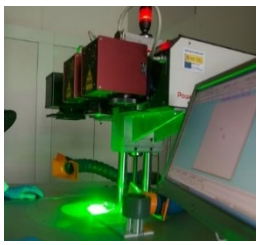


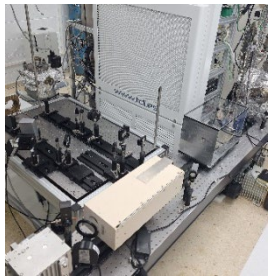
Equipment

In addition to each lab's own equipment, CINTECX coordinates, annually and in a centralized manner, investments in scientific infrastructures for common use, with the aim of boosting technological areas. To this end, it has a working group that identifies the common equipment needs aligned with its scientific agenda and that can serve current and envisaged projects, prioritizing them in its Infrastructure Roadmap. To prioritize the acquisition of equipment, the criteria taken into account include the number of internal users that would require it, the number of projects and/or lines of research it would serve, the costs associated with maintenance, and the need or otherwise for additional infrastructure or technical staff.

The Centre currently has over 20 infrastructures, which include:

- Data Processing Centre
- Clean Room
- Laser Processing Station
- Additive manufacturing station for concrete
- Mobile mapping system
- Subsoil georadar
- Fermentation pilot plant
- Electroadsorption pilot plant
- Climate chamber
- Engine test bench
- Multiphase electric machine lab

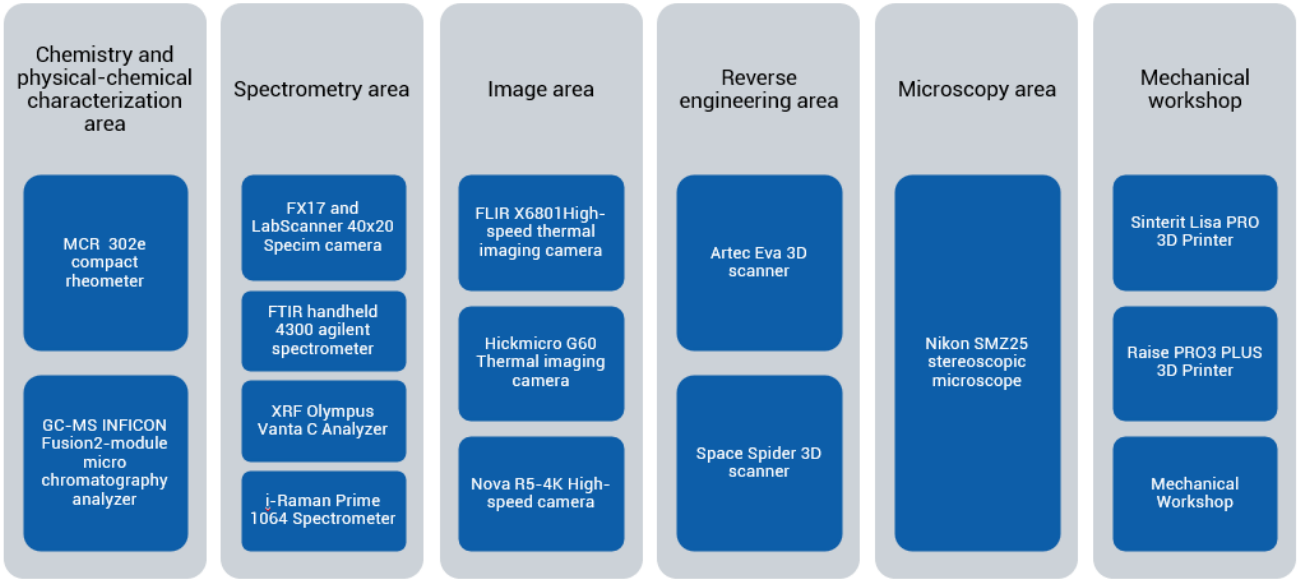






Service and Self-service

The services and self-services are available for users via the LIMS platform. The services and self-services on offer are grouped into six areas and currently include the following equipment:



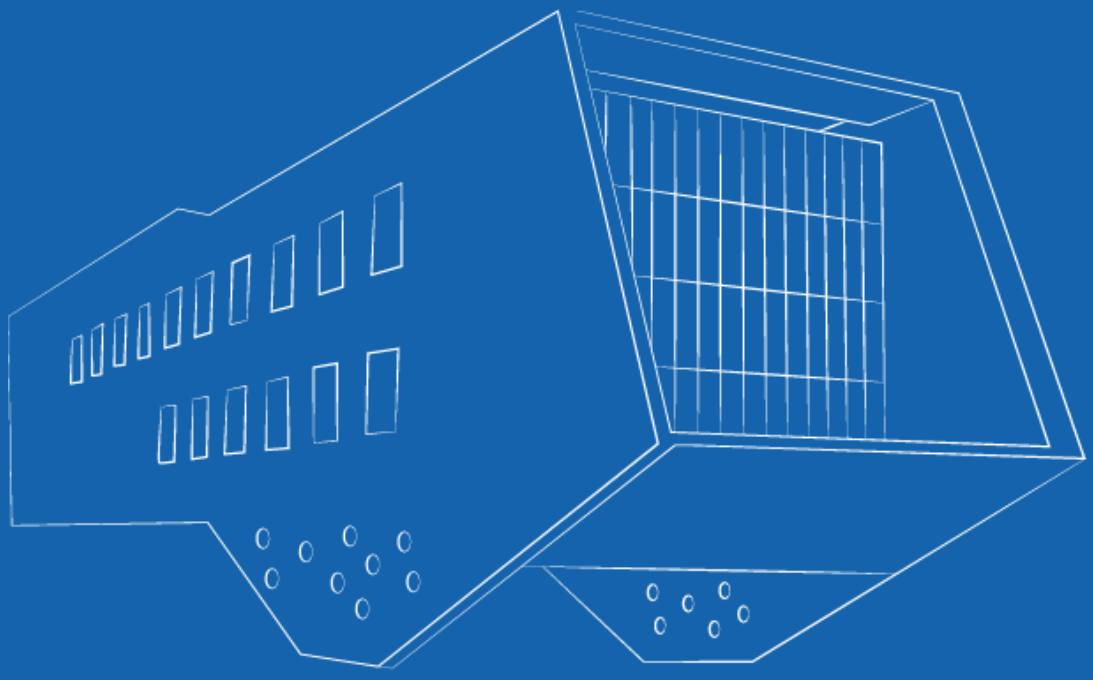
AENOR GESTIÓN DE LA CALIDAD ISO 9001

For yet another year, CINTECX has shown its commitment to quality by renewing ISO 9001:2015 certification for its Quality Management System.

During 2023, self-service requests have increased by 36% to a total of 99 and services requests by 67% to a total of 80. In addition, the Quality Management System establishes the measurement of the degree of user satisfaction. For this purpose, it is possible to score services from 1 to 5, with a participation rate of 45% and an average score of 4.87 in 2023. In the case of the self-service facilities, there is an annual survey with various questions relating to the booking process, the content of the equipment sheets and protocols, the suitability of the laboratory, the treatment by the staff, and comments. The level of participation in 2023 reached 65% with an average score of 4.78.

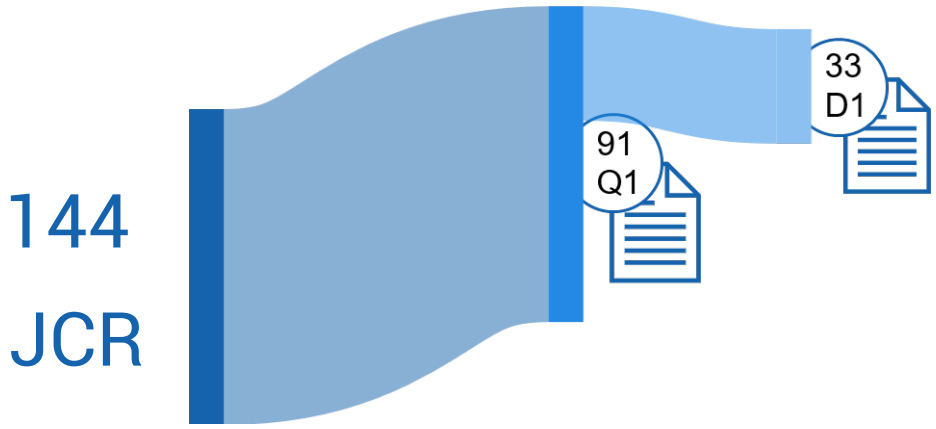
SCIENTIFIC AND TECHNOLOGICAL PRODUCTION AND TRANSFER

5



Publications

CINTECX is committed to scientific excellence in order to generate useful knowledge for the environment and position itself as a centre of reference both nationally and internationally. This strategy is stated in Objective 1 "Generation of excellent scientific and technical knowledge, supporting an open and accessible science ecosystem and fostering ethics in research" of the 2024-2027 Strategic Plan.



The Centre is also committed to Open Access publication by means of its own policy that contains the directives and development for correct open publication, in order to increase the visibility and impact of research findings, guarantee long-term preservation, and facilitate authors being duly recognized and cited. This makes it clear that research activity is reflected in society, favours innovation, and facilitates transparency and accountability for public investment in research.

80 % of open publications in 2023

Project

One of the main objectives of the Centre is to increase the funding opportunities map, among others, through international, national and private calls for proposals. In this respect, a high percentage of the funding raised is through competitive calls.

During 2023, CINTECX participated in seven active European projects, four of them new ones and three of which are led by researchers from the Centre itself. The effort in attracting European projects also aims to position the Centre and its recognition at an international level. In terms of national and regional projects, 58 projects were active, 14 of which were newly funded. At national level, the main source of funding is the Ministry of Science and Innovation through calls for proposals such as Knowledge Generation Projects, Research Consolidation or Projects oriented towards Ecological Transition and Digital Transition, among others.

International Projects Attracted

During 2023, CINTECX researchers have attracted four new international project proposals—two of them led by CINTECX staff—representing a fundraising of 1.3 million euro. Three of the four projects correspond to the Interreg VA Spain-Portugal (POCTEP) call, and the fourth one to the Horizon Europe programme.

Funded by the European Union

Interreg

Co-funded by the European Union

Projects Attracted

EVERGLASS. The new role of glass in a sustainable society. Technology for the integral recycling of glass.

CINTECX: €783,750 2023 - 2026

LR: Juan María Pou Saracho, Rafael Comesaña Piñeiro

IBEROS+. Institute of networked biofabrication for healthy ageing.

CINTECX: €203,936 2023 - 2026

LR: Pío Manuel González Fernández

AOWINDE. Atlantic Offshore Wind Energy. Plan for industrial support and improvement of the value chain linked to offshore wind energy in the Galicia - North Portugal Euroregion.

CINTECX: €162,198 2023 - 2025

IP: María Concepción Paz Penín

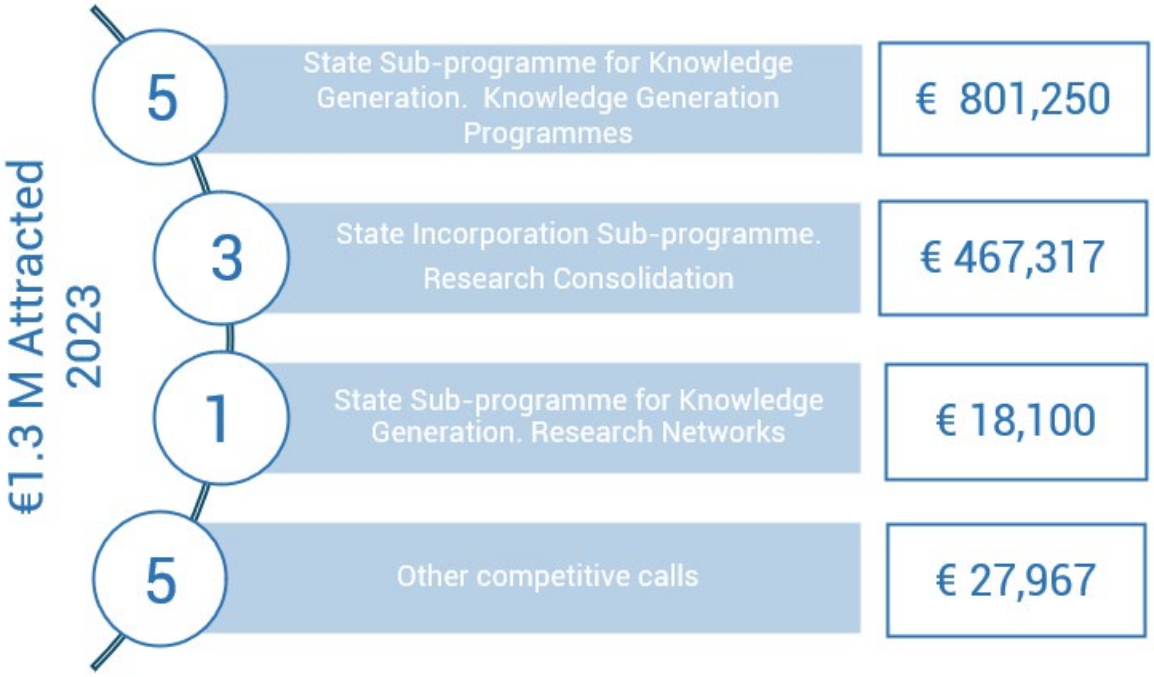
COMENERG. Cross-border energy community for the transition towards energy autonomy and sustainability of the Raia localities.

CINTECX: €153,351 2023 - 2026

LR: Daniel Torres Villanueva, Pablo Eguía Oller

National and regional projects

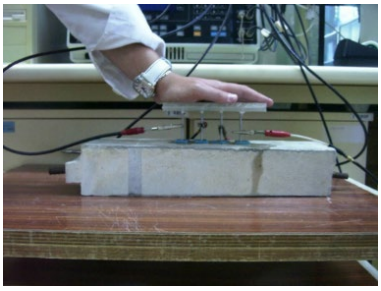
In 2023, CINTECX's research staff attracted a total of 14 national and regional projects in different competitive calls for proposals, amounting to more than 1.3 million euro in funding. In addition, the centre's researchers have continued working on a further 44 current projects.



Projects Attracted

Control of power electronic converters in electric propulsion ships.

PID2022-136908OB-I00 CINTECX: €82,500
LR: Jesús Doval Gandoy 2023 - 2025

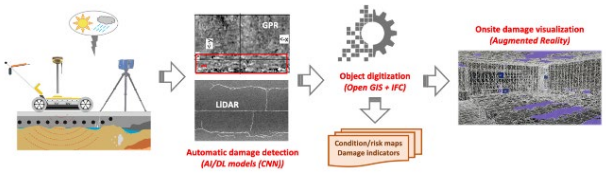


CoMeCAR. Development of a non-contact method for concrete corrosion assessment.

PID2022-137096OB-I00 CINTECX: €172,500
LR: Xosé Ramón Nóvoa Rodríguez 2023 - 2025

Geotechnologies for early damage detection in reinforced concrete pavements and bridge decks.

PID2022-138526OB-I00 CINTECX: €208,750
LR: María Mercedes Solla Carracelas 2023 - 2025

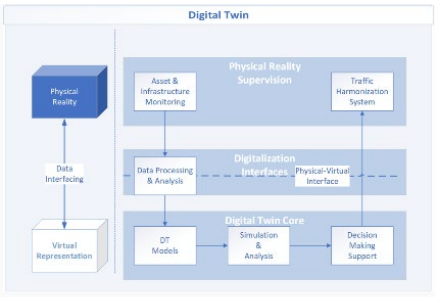


Application of LDED additive manufacturing to glass and glass ceramics: towards materials with high mechanical performance.

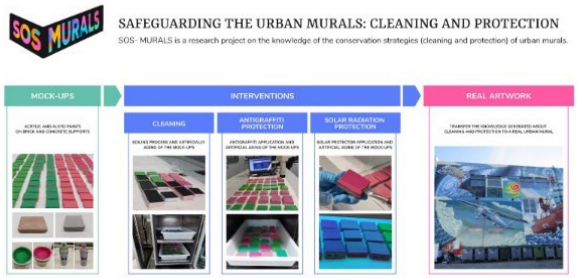
PID2022-138763OA-I00 CINTECX: €125,000
LR: Rafael Comesaña Piñeiro 2023 – 2025

ROADS2Win. Enhanching ROAD Safety through digital twinning technologies.

PID2022-140662OB-I00 CINTECX: €212,500 2023 - 2025
LR: Pedro Arias Sánchez, Joaquín Martínez Sánchez



Outline of the Methodology and Concepts of RoadS2Win

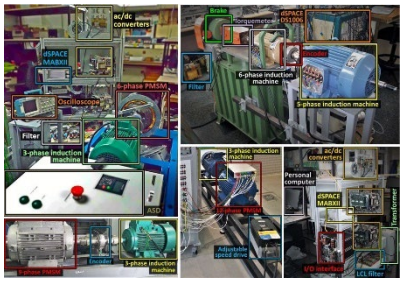


Safeguarding urban murals: cleaning and protection.

CNS2022-135645 CINTECX: €180,053
LR: José Santiago Pozo Antonio 2023 - 2025

TOTWIN. Towards a digital twin based on a data-driven strategy for improved progress monitoring and quality control in constructions.

CNS2022-135730 CINTECX: €166,501
LR: Lucía Díaz Vilariño 2023 - 2025

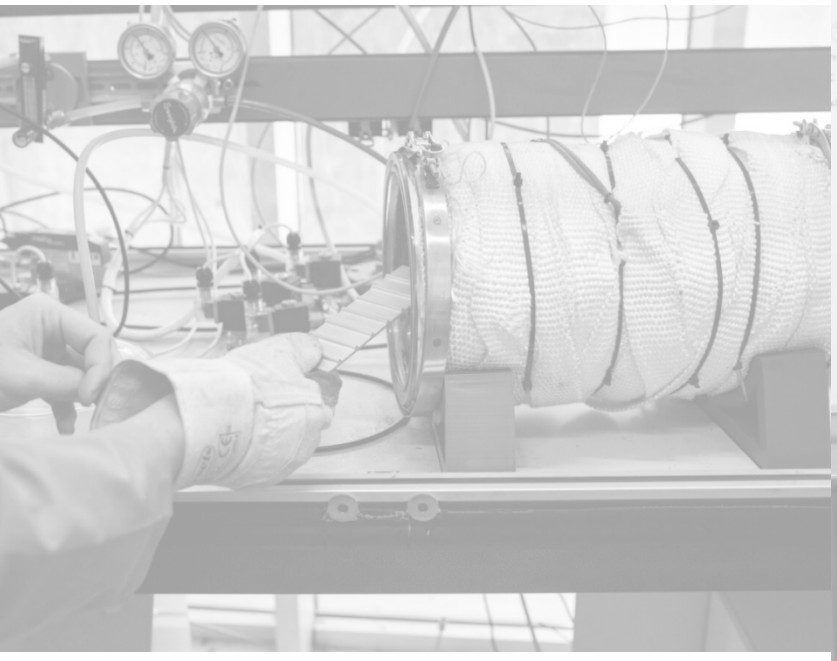


Improved performance and post-failure efficiency of multiphase motor drives for electric vehicles.

CNS2022-135773 CINTECX: €120,763
IP: Alejandro Gómez Yepes 2023 - 2025

RED: monitoring and inspection for the assessment of in-service structures.

RED2022-134431-T CINTECX: €18,100
IP: Belén Riveiro Rodríguez 2023 - 2025



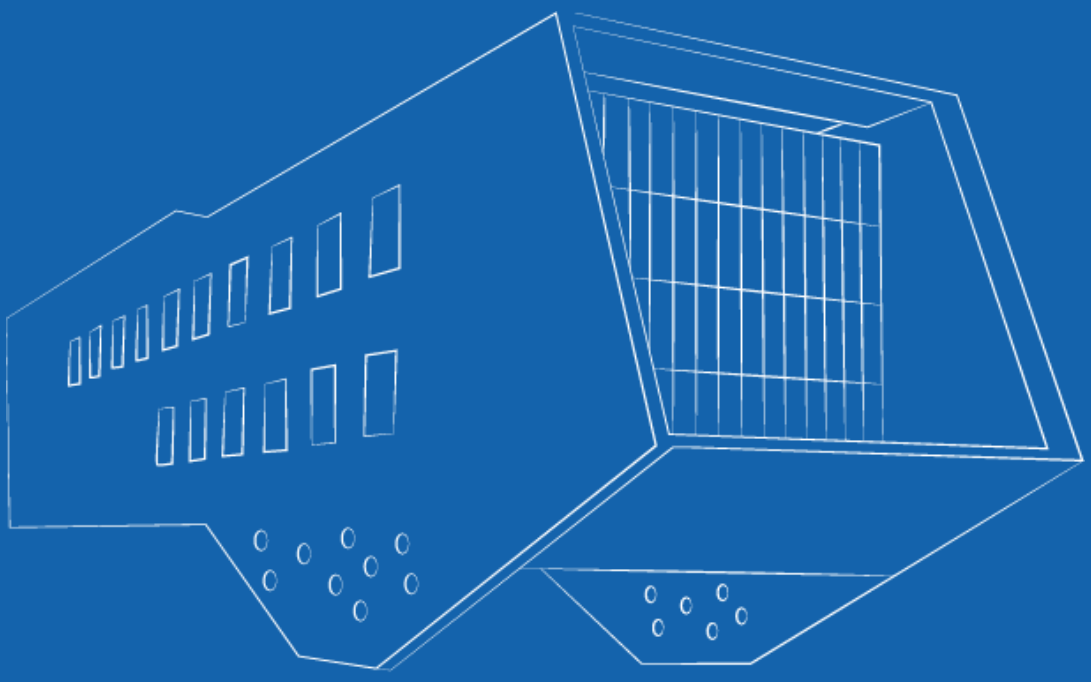
Collaboration with companies

CINTECX has extensive experience collaborating with the productive sector and a long track record in technology transfer and complementarity with technology centres in the surrounding area. CINTECX collaborates with companies both nationally and internationally, providing services to the industrial sector, helping to improve the technological specialization of companies and promoting direct technology transfer.

In this way, 73 new contracts with more than 50 different companies were signed in 2023, reaching a total of around 0.95 million euro. In terms of income, this has remained at 1.13 million euro.

73 new contract **+50 companies** **€0.95 M**

TRAINING, ATTRACTION AND RETENTION OF TALENT



6

Training programme

CINTECX supports egalitarian training of young research talent, making a major effort with its training programme. Each year, technical training related to the Centre's own scientific equipment and cross-cutting skills has been provided for both young researchers and senior staff, with the aim of increasing their capabilities and giving rise to research excellence.

Moreover, 2023 saw the continuation of the Mentoring programme through Scientific Seminars, where young researchers—both pre- and post-doctoral—put their presentation skills in practice and tell the staff as a whole about their research lines.

January

- 30, 31 – SPECIM FX17 Hyperspectral Camera training course

March

- 9 – NOVA R5-4K High-speed Camera training course

May

- 4 – XRF Olympus Vanta C training course

June

- 21 – 1st Scientific Seminar
- 21 – "The Importance of Publishing" Mentoring
- 28 – "Drawing up the Research Career Map" Mentoring

September

- 13 – 2nd Scientific Seminar
- 13 – INFICON Gas Micro-chromatograph Fusion 2-Module training course
- 27 – 3rd Scientific Seminar

October

- 25 – 4th Scientific Seminar

November

- 19- Raise 3D PRO3 PLUS Printer training course

Attraction and retention of talent

As a centre belonging to the University of Vigo—recognized in 2017 by the EU Commission with HR Excellence in Research—CINTECX is committed to following EU recommendations in matters related to attraction and retention of talent. To that end, the Centre attempts to guarantee an open, transparent process that ensures the growth and continuity of its researchers.

Regarding attracting talent to the Centre in 2023, twenty-three young pre-doctoral researchers and nineteen post-doctoral researchers have joined various programmes:

Pre-doctoral researchers

9 – Pre-doctoral FPU

7 – Pre-doctoral FPI

7 – Pre-doctoral Uvigo

44%

Post-doctoral researchers

7 – Post-doctoral Ramón y Cajal

4 – Post-doctoral Margarita Salas

1 – Post-doctoral Ayuda María Zambrano

4 – Posdt-octoral Xunta

1 –Uvigo Distinguished Researcher

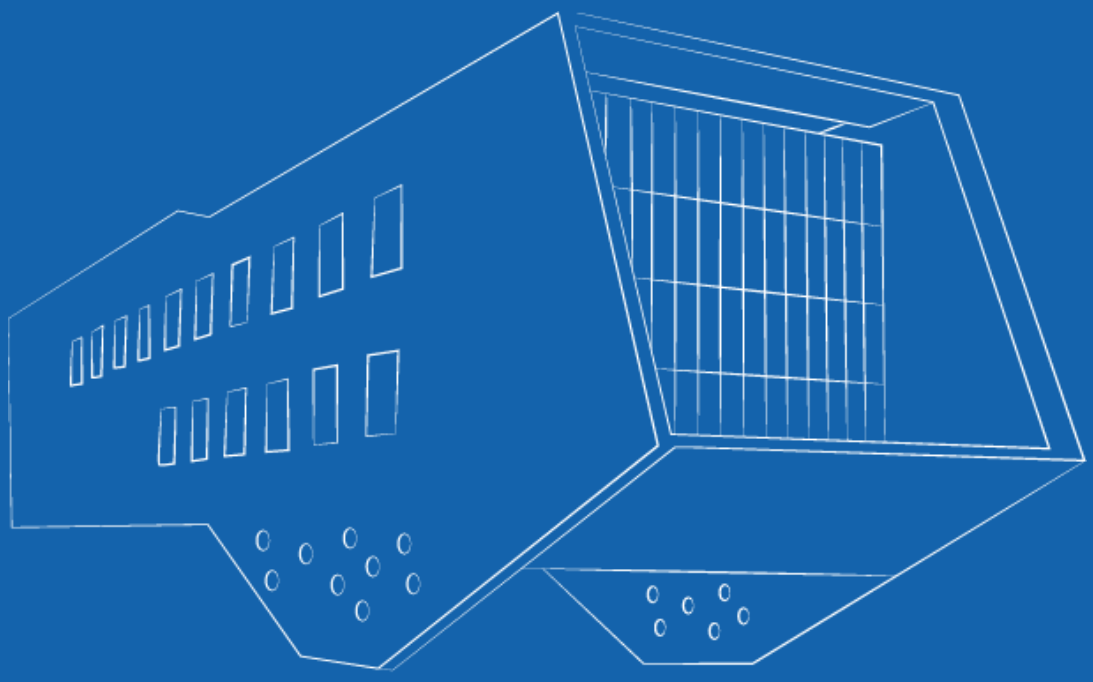
2 – Post-doctoral MSCA

58%

It should be noted that the progress and promotion of researchers is reflected in the 15 new doctoral theses presented in 2023.

PROJECTION AND VISIBILITY

7



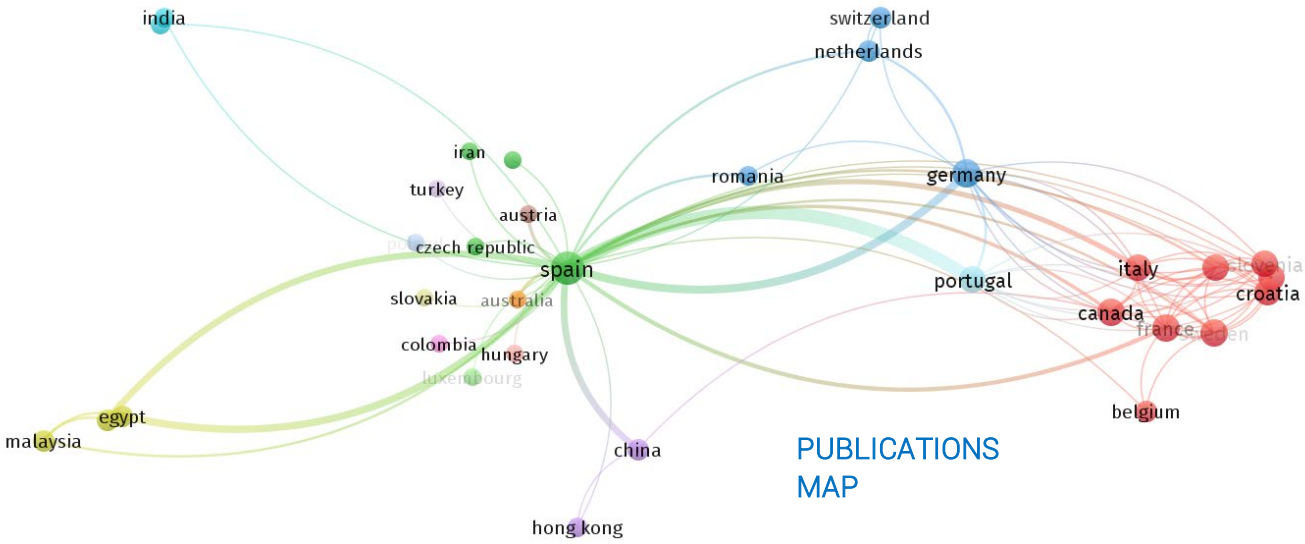
National and international projection

At an international level, the Centre's researchers form part of distinct networks, programmes, and institutions.

Since 2022, researcher Carmen Pérez has been President of Division 4 of the "International Society of Electrochemistry (ISE)". This non-profit organization, based in Lausanne (Switzerland), is where Carmen Pérez holds presidency of the division focused on Materials Sciences—herself being involved in Electrochemistry.

CINTECX researcher, Jacobo Porteiro, has been the Spanish representative for the Technology Collaboration Program of the International Energy Agency (IEA), since 2014.

Other forms of international projection are the collaborations through scientific publications, stays, and projects.



PUBLICATIONS MAP

+15 International researchers received at CINTECX

+20 CINTECX researchers on international stays

6 Thesis with international mention

National Projection

Throughout the year, CINTECX participated and organized, fairs, and conferences to increase its visibility at a national level and contribute to the dissemination of science. Some examples of these activities include:

Representation in institutions

At an individual level, researchers from CINTECX represented the Centre in distinct entities, associations, and networks. Researcher Belén Riveiro is the coordinator or the national MonitorRED network, which monitors and inspects in-service structures for assessment purposes, funded by the Science and Innovation Ministry to bring together the most renowned research groups in Spain in structural monitoring.

Awards and recognition

In terms of awards received during 2023, researcher Belén Riveiro obtained the National Award for Young Researchers 2022, which was created to distinguish the merit of Spanish researchers who have made significant achievements at the start of their career at a Spanish institution and that are recognized internationally. Belén received the award in the category for Engineering and Architecture, called the National Matilde Ucelay Award.

In addition, the Centre's Director, Concepción Paz, received the María Josefa Wonenburger Award which recognizes Galician women scientists. It was presented to her by the regional government Minister for the Promotion of Employment and Equality, Elena Rivo, who highlighted the career of the award winner in her work to position the Centre at the cutting edge of research and development in key areas for Galicia such as renewable energy, energy efficiency, or artificial intelligence.

Participation in activities

On 29th March, the Centre's Director, Concepción Paz, participated in the first plenary session of the *Alianza Galega do Hidróxeno Verde*, (the Galician Alliance for Green Hydrogen). This event assessed the incorporation of new members to the Alliance, such as the recent incorporation of Ence, which means that there are now ten driving companies and ten clusters and business associations representing more than 700 companies. In addition, the three Galician universities and various agents and public administrations are also part of this initiative.

To increase visibility among professionals in the technological environment and as part of the strategy of approaching companies, the Centre for Research in Technologies, Energy and Industrial Processes (Cintecx), received members of the Vigo Delegation of the ICOIIG in a guided tour of its facilities in April 2023.

Communication

As far as external communication is concerned, CINTECX attempted, throughout 2023, to make the work it undertakes known. Several activities were carried out to do this such as:

Posters and merchandising

Through posters and merchandising, the aim is to make our own brand image visible and known, through all kinds of media such as table fronts, roll-ups, notepads, fabric bags, pens, etc. This material is used both at events held in the Centre itself and at those held further afield, the aim being to create an image for the Centre and its brand, making CINTECX recognizable to the general public. The merchandising elements are used as gifts at the different events held at the Centre or at external fairs, and also give the Centre an image and make it recognizable.

Social media

In terms of social networks, CINTECX actively participates on YouTube, X, and LinkedIn. Through these networks, campaigns are carried out to disseminate research results, the

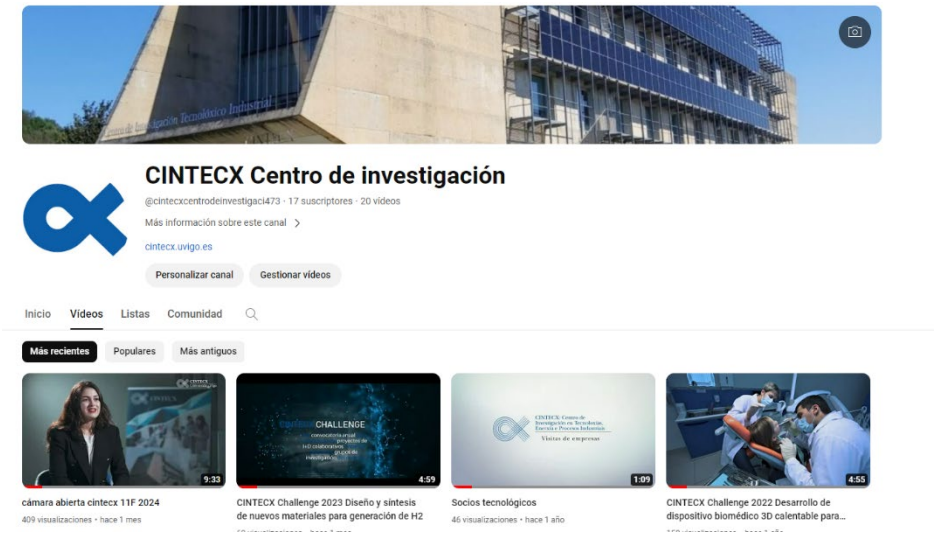
activities carried out at the Centre, or the publication of job offers for the different groups that make up the Centre.

+ 900 New views	+ 70 New followers	+ 600 New followers

Video

Every year, different activities are carried out in the Centre that are directly or indirectly associated with the production of videos. The videos are posted on the Centre's YouTube channel.

During 2023, five videos were published corresponding to the 2022 open days, the annual video of the CINTECX Challenge, and a promotional video of CINTECX's technological partners. In this way, the Centre's image and its dissemination of research results continue to be reinforced.



Media and news

CINTECX makes itself known by posting its own news on the website and using social media, in addition to appearing directly on media channels.

+40

Appearances in the press

+70

News items of its own

21/11/2023 | NOTICIAS

La Xunta distingue a la directora de CINTECX, Concepción Paz Penín, con el premio María Josefa Wonenburger para mujeres científicas

20/11/2023 | NOTICIAS

VICUSdt y Zeltener presentan los resultados de los planes de innovación InnovaPeme2022 en CINTECX

13/11/2023 | NOTICIAS

CINTECX participa en la jornada de lanzamiento del proyecto AOWINDE

22/09/2023 | EVENTO

Jornada CINTECX: Perspectiva de género en el ámbito tecnológico e industrial

29 de septiembre de 2023

Auditorio de CINTECX

21/09/2023 | EVENTO

Continúan los Seminarios Científicos de Cintecx

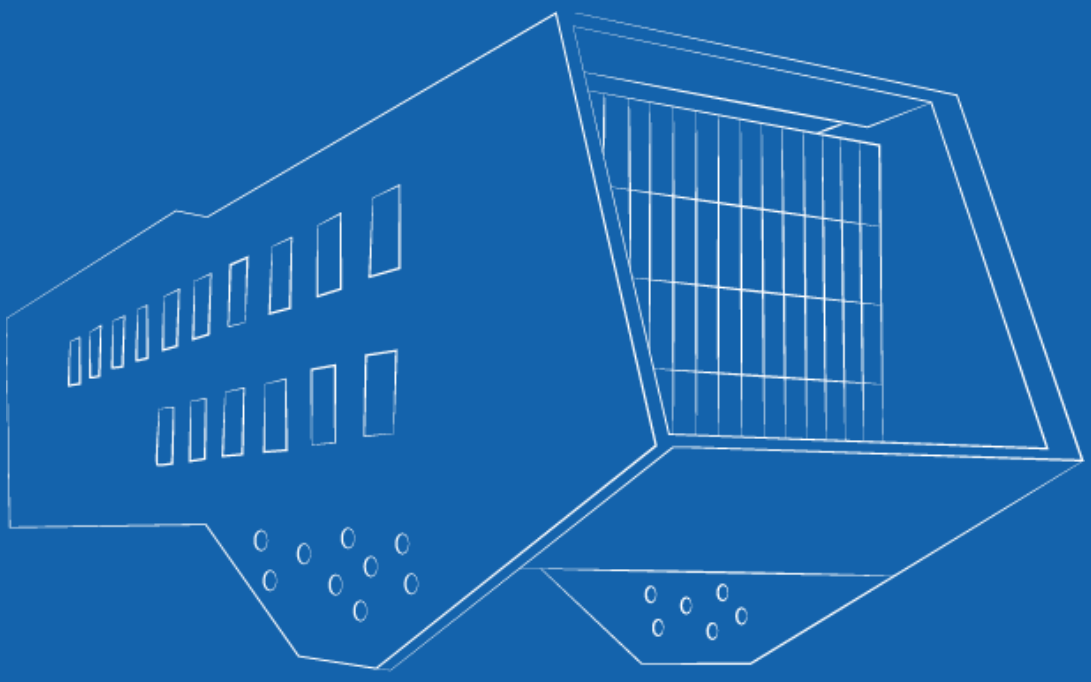
27 de septiembre de 2023 a las 16:00h

Auditorio CINTECX

18/09/2023 | NOTICIAS

Descubriendo el manejo del analizador Micro GC Fusion en CINTECX

FOSTERING THE CENTRE'S CULTURE



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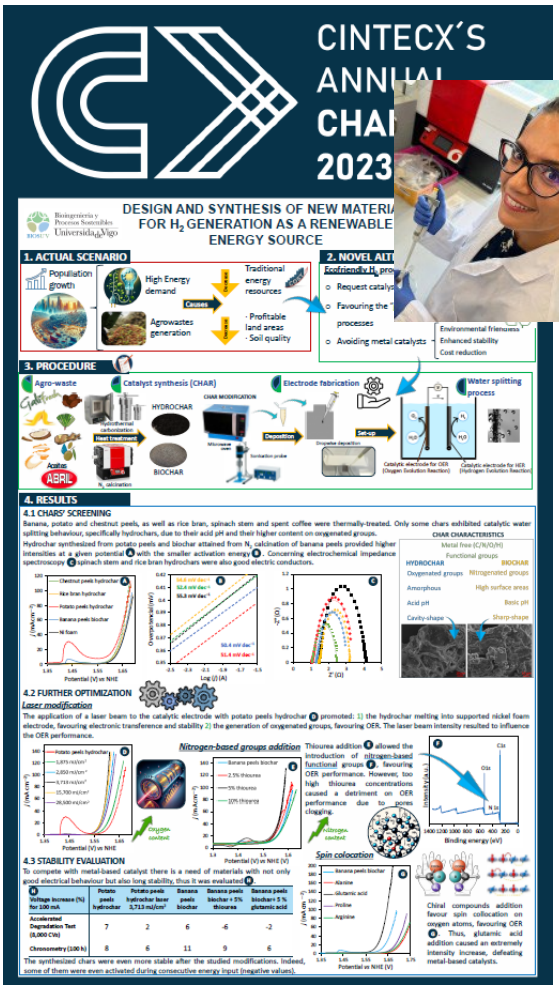
CINTECX Challenge

In 2023, the traditional annual CINTECX Challenge was held by the Centre. This is a yearly internal call, created specifically to promote internal cooperation by providing funding support for a year-long collaborative research project

The call and the requirements for qualifying for the funding are published every year. Collaborative R&D project proposals should be presented by several researchers at the Centre, in line with the technological areas and priority lines of CINTECX's scientific agenda. They should have the potential to contribute to the projection and visibility of the Centre.

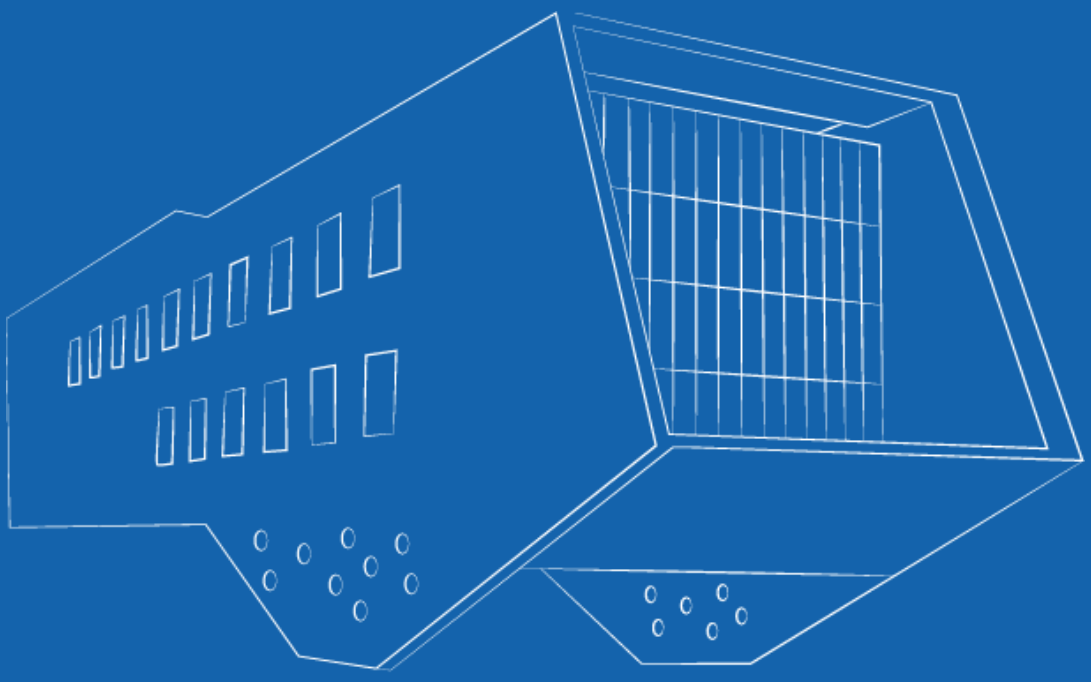
The winner of the CINTECX Challenge 2023 was "Design and Synthesis of New Materials for the Generation of H_2 as a Renewable Energy Source", presented by Aida Diez Sarabia, lead researcher of the project along with another researcher from the Biosuv group and two researchers from the New Materials group.

The general aim of the project was to perform synthesis of several materials for their use as catalysers from hydrothermally treated residues (biochar) and metallic oxides (perovskitas). The former have a high level of porosity that promotes water splitting properties, and the use of residues favours the circular economy. At the same time, the perovskitas promote the movement of electrons in the catalyser to improve the electrochemical process, and this can be done with metals that are abundant. Both catalysers can be combined to complement their advantages.



As a result, a poster was created for the project and future scientific publications are expected. A video summary is also available at this link.

RESPONSIBLE INNOVATION



Scientific dissemination

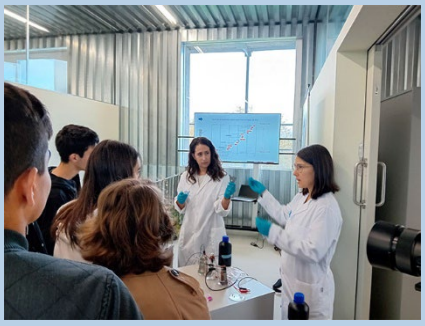
Every year, CINTECX carries out its own scientific dissemination activities and takes part in those promoted by other bodies such as the University of Vigo's Scientific Culture Unit.

CINTECX open-doors days

On 27th October 2023, the annual Open-Doors Day was held at CINTECX, when over 100 technology baccalaureate students from several Galician centres and a group from the University of Vigo Senior Citizens Programme could discover the Centre first-hand and find out about its research staff and the activities they carry out.

By taking two different routes through various laboratories, the students could find out directly about some of the research being performed at CINTCX by carrying out tests and experiments themselves. At the end of the route, there was a short Kahoot online interactive quiz which let them show off what they had learned and win prizes.

Laser processing



Corrosion: a problem, a solution, and an opportunity

Biosurfactants: new biodegradable compounds

The group of students from the senior citizens programme could also enjoy a guided visit, during which they could discover the different laboratories and facilities at the Centre and the activities undertaken by our researchers.

Other dissemination activities

On April 21st, researchers took part in the science expo-fair "The Science of Tomorrow has a Woman's Name", organized by the Scientific Culture Unit and funded by FECYT in collaboration with Vigo City Council.

CINTECX took part in the event with three stands and a total of six activities:

- FAHRENHEIT 751
- Reverse Engineering
- Biotechnology, Chemical and Environmental Technology
- Artificial vision and mining
- Who are you?
- Virtual Reality and Augmented Reality

On 22, 23, and 24 May, Pint of Science was held. This is a scientific dissemination festival that is committed to taking science and knowledge to bars to move it closer to the people. Specifically, on 22nd May, researcher José Lorenzo Alonso took part with his contribution called "Chiral Molecules for Green H2?".

For yet another year, on 29th September, CINTECX was present at G-Night. At this event, the researchers from the Centre took part in both the Expo-fair organized in the Redeiras Building and the "Science in the Bar" activity.

Equality in research

During 2023, CINTECX was heavily committed to backing equality in research. As every year, activities were held to foster a vocation for science among girls and to promote and make visible the careers of women researchers.

To commemorate International Day for Women and Girls in Science, a poster was placed at the main entrance with the slogan "Innovation and Technology for Gender Equality" to demonstrate our commitment and support for the role of women in science, technology, and research, and give them visibility. In addition, February saw the publication of three interviews with young women researchers from the Centre, who described their own experiences.

On March 10th, to celebrate International Women's' Day, a round table was held at CINTECX entitled "Equality and Analysis of the Gender Perspective in the Engineering Field". Participating in the event were Concepción Paz (CINTECX), who moderated a panel made up of Tarsila Pérez (Acciona Enerxía), Janeth Lorenzo (Talgo), and Paula Froiz (delegate from the Official Galician Industrial Engineers' Organisation).

Catedra de Feminismo 4.0

In 2023, CINTECX presented a proposal to the Cátedra de Feminismo 4.0 DEPO-Uvigo which was passed and given funding of €4,083. The aim of the project was to create an operational guide for the incorporation of the gender perspective in the technological-industrial sphere. On 29th September, CINTECX held a day event called: Gender Perspective in the Technological and Industrial Sphere as part of the Guide's development. Lorena Fernández and María López were present as experts on the subject. The training session was open to the whole

university community and made it possible to identify the guidelines that should be followed to integrate gender/sex analysis in research projects in the technological and industrial sphere. These guidelines can help staff to increase their knowledge on matters of equality so that they can go on to apply it in their future research proposals at both a European and national level.

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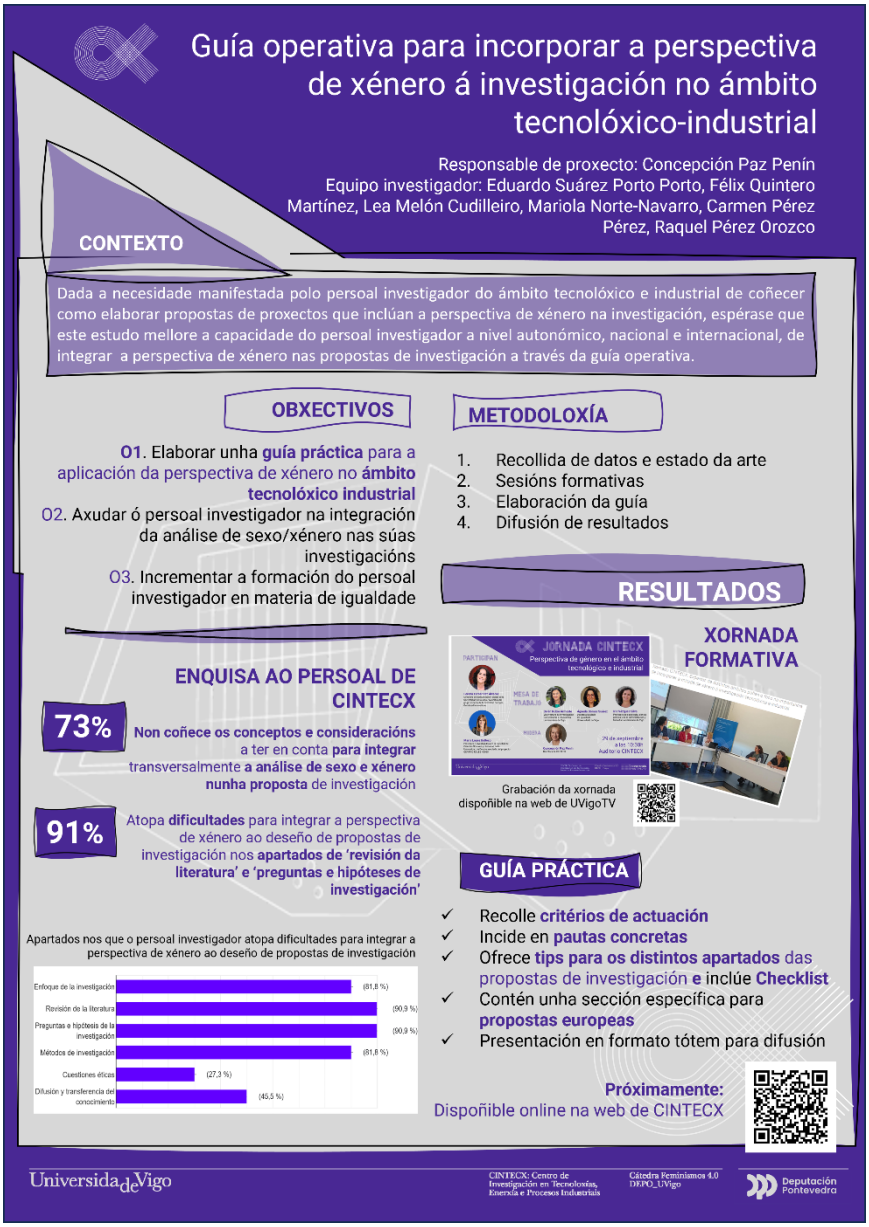

APPENDIX

Production JCR: 144

Listado de artículos indexados en el JCR (Journal Citation Reports) del WoS (Web of Science). No se incluyen capítulos de libros, comunicaciones a congresos, comunicaciones breves, cartas al editor, ni otras publicaciones científicas no indexadas en JCR.

[1] Chikondra, B., Yepes, A.G., Al Zaabi, O., Al Hosani, Khalifa, Doval Gandoy, J., Behera, R.K. Open-Phase Fault-Tolerant DTC Technique for Three-Level NPC VSI-Fed Five-Phase Induction Motor Drives. IEEE Journal of Emerging and Selected Topics in Power Electronics. 2023. https://doi.org/10.1109/JESTPE.2022.3224529

[2] Perez-Estevez, D., Doval-Gandoy, J., Crego-Lourido, A. Grid Current Control for Active-Front-End Electric Propulsion Systems in AC Ship Microgrids. IEEE Journal of Emerging and Selected Topics in Power Electronics. 2023. https://doi.org/10.1109/JESTPE.2021.3133271

[3] Lopez, O., Komrska, T., Alvarez, J.,Adam, Lukas, Yepes, Alejandro G., Medina-Sanchez, M., Doval-Gandoy, J. Post-Fault Operation Strategy for Cascaded H-Bridge Inverters Driving a Multiphase Motor. IEEE Transactions on Industrial Electronics. 2023. https://doi.org/10.1109/TIE.2023.3281688

[4] Shawier, A., Abdel-Azim, W.E., Yepes, A.G., Abdel-Khalik, Ayman Samy, Hamad, Mostafa S., Ahmed, S., Doval-Gandoy, J. Hysteresis Current Control for Six-Phase Induction Motor Drives With Reduced Ripple and Improved Tracking Based on Subspace Decomposition and Restrained Voltage Vectors. IEEE Transactions on Industrial Electronics. 2023. http://dx.doi.org/10.1109/TIE.2023.3308136

[5] Yepes, A.G., Abdel-Majeed, M.S., Che, H.S., Abdel-Khalik, Ayman Samy, Ahmed, S., Doval-Gandoy, J. DC-Signal Injection for Stator-Resistance Estimation in Symmetrical Six-Phase Induction Motors Under Open-Phase Fault. IEEE Transactions on Industrial Electronics. 2023. https://doi.org/10.1109/TIE.2022.3192695

[6] Yepes, A.G., Abdel-Azim, W.E., Shawier, A., Abdel-Majeed, Mahmoud Said,Che, Hang Seng,Abdel-Khalik, Ayman Samy;,Ahmed, S., Doval-Gandoy, J. Online Control Strategy for Tolerating Resistance Asymmetry with Minimum Copper Loss in the Full Torque Range for Symmetrical Six-Phase AC Drives. IEEE Transactions on Power Electronics. 2023. https://doi.org/10.1109/TPEL.2022.3204911

[7] Yepes, A.G., Fonseca, D.S.B., Antunes, H.R.P., Lopez, O., Marques Cardoso, A.J., Doval-Gandoy, J. Discrimination Between Eccentricity and Interturn Faults Using Current or Voltage-Reference Signature Analysis in Symmetrical Six-Phase Induction Machines. IEEE Transactions on Power Electronics. 2023. https://doi.org/10.1109/TPEL.2022.3206141

[8] Medina-Sanchez, M., Yepes, A.G., Lopez, O., Abdel-Khalik, A.S., Doval-Gandoy, J. A Carrier-Based Overmodulation Strategy With Minimum Voltage Distortion for Symmetrical -Phase Induction Motor Drives. IEEE Transactions on Power Electronics. 2023. http://dx.doi.org/10.1109/TPEL.2023.3308599

[9] Medina-Sanchez, M., Yepes, A.G., Lopez, O., Doval-Gandoy, J. Assessment and Exploitation of the Minimum Current Harmonic Distortion under Overmodulation in Five-Phase Induction Motor Drives. IEEE Transactions on Power Electronics. 2023. https://doi.org/10.1109/TPEL.2022.3231138

[10] Rios-Castro, D., Perez-Estevez, D., Doval-Gandoy, J. AC-Voltage Controller for Grid-Forming Converters. IEEE Transactions on Power Electronics. 2023. https://doi.org/10.1109/TPEL.2022.3233137

[11] Yepes, A.G., Abdel-Azim, W.E., Shawier, A.,Abdel-Khalik, Ayman Samy, Hamad, Mostafa S., Ahmed, S., Doval-Gandoy, J. Open-Phase-Tolerant Online Current References for Maximum Torque Range and Minimum Loss With Current and Torque-Ripple Limits for -phase Nonsalient PMSMs With Nonsinusoidal Back-EMF. IEEE

Transactions on Transportation Electrification. 2023. http://dx.doi.org/10.1109/TTE.2023.3288525

[12] Yepes, A.G., Shawier, A., Abdel-Azim, W.E., Abdel-Khalik, A.M., Ahmed, S., Doval-Gandoy, J. General Online Current-Harmonic Generation for Increased Torque Capability With Minimum Stator Copper Loss in Fault-Tolerant Multiphase Induction Motor Drives. IEEE Transactions on Transportation Electrification. 2023. https://doi.org/10.1109/TTE.2023.3244742

[13] Kali, Y., Rodas, J., Doval-Gandoy, J., Ayala, M., Gonzalez, O. Enhanced Reaching-Law-Based Discrete-Time Terminal Sliding Mode Current Control of a Six-Phase Induction Motor. Machines. https://doi.org/10.3390/machines11010107

[14] Camilo José Carrillo González , Eloy Díaz Dorado, José Cidrás Pidre, Julio Garrido Campos, Martín Casal, Fernando Guitán Guitán, Alejandro Arias Blanco, Isabel Fernández, Diego Acebedo Iglesias, Ángel Manuel Fernández Vilán. Evaluación del comportamiento de una bomba usada como turbina (butu) bajo condiciones reales de funcionamiento en una estación de tratamiento de agua potable (ETAP). Dyna. 2023. https://doi.org/10.6036/10874

[15] Dumbser, M., Busto, S., Elena Vázquez-Cendón, M., Peshkov, I. Preface for the special issue "Hyperbolic PDE in computational physics: Advanced mathematical models and structure-preserving numerics". Applied Mathematics and Computation. 2023. https://doi.org/10.1016/j.amc.2023.127994

[16] Abgrall, R., Busto, S., Dumbser, M. A simple and general framework for the construction of thermodynamically compatible schemes for computational fluid and solid mechanics. Applied Mathematics and Computation.2023. https://doi.org/10.1016/j.amc.2022.127629

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