

CIME (Centro
de
Investigación
Materiales
Estructurales y
Avanzados)



Centro de Investigación de
Materiales Estructurales



POLITÉCNICA

INDICE



POLITÉCNICA

- ABOUT US
- VALUES/MISION
- CAPABILITIES
- FACILITIES
- INTEGRAL LABORATORIES
- RESEARCH LINES

CIME Centro de Investigación de Materiales Estructurales

Ensayo realizado en los laboratorios del CIME para comprobar la resistencia a fatiga en ambiente marino de las rotulas que conectan el nuevo tablero del Puente de Rande (Pontevedra) al antiguo.

Test carried out at the CIME laboratories to check the fatigue resistance in marine environment of the joints connecting the new decks of the Rande Bridge (Pontevedra) to the old one.

Ensayo de las uniones del nuevo tablero del Puente de Rande
Fatigue test of structural joints for the new decks of Rande Bridge

¿Para qué sirven? ¿cómo funcionan? El ensayo permite a los ingenieros comprobar que los materiales estructurales soportarán las funciones requeridas tras estar expuestos al agua y los suenos debidos por la corrosión del ambiente marino de la vía y evitar la reparación o sustitución prematura de estos elementos.

What is it for? How does it work? The test allows engineers to check that the materials involved will withstand the required functions. That they are capable of resisting and are not affected by corrosion in the marine environment of the railway and avoid unexpected repair or replacement of these elements.

¿Dónde se pueden utilizar? Son muy utilizados en maquinaria industrial, así como en estructuras de gran tamaño. Garantizan la durabilidad ante grandes fuerzas y en un ambiente marino, aumentando las soluciones constructivas en infraestructuras.

Where can they be used? They are widely used in industrial machinery, with great capacity to resist loads. They ensure durability against high forces and in a marine environment, they increase the constructive solutions in infrastructure.

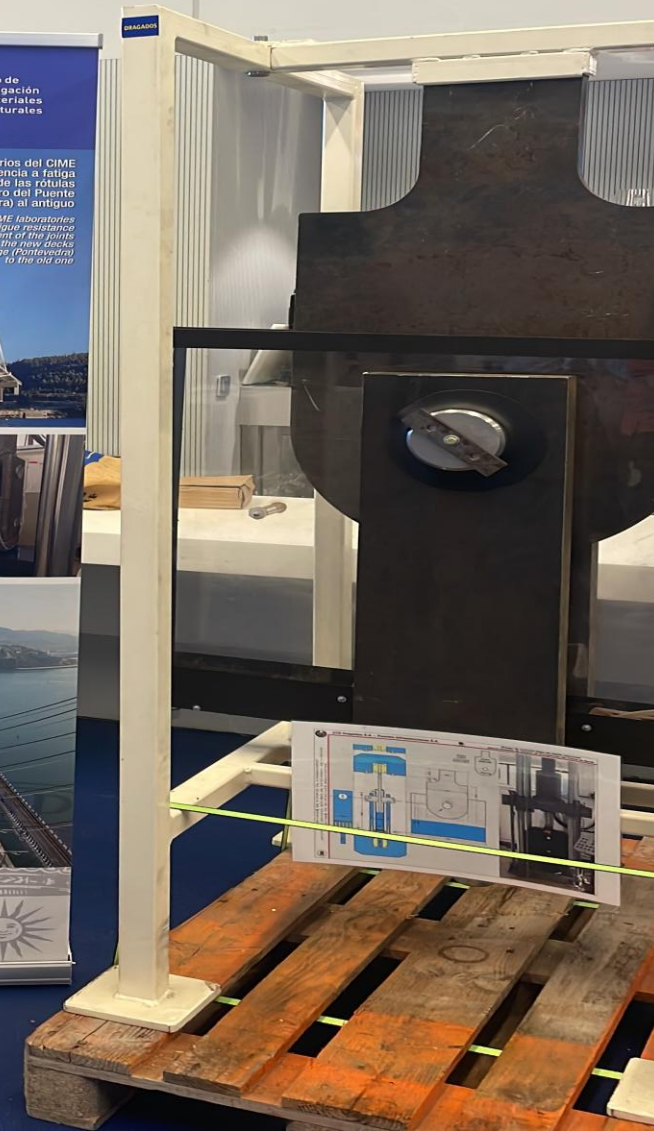
¿Sabéis que...? Estas rotulas soportan fuerzas variables, entre 84 y 104 toneladas, más de dos millones de veces durante de las visitas turísticas receptoras fuerzas de 200 toneladas, el equivalente a 13 autobuses urbanos.

Did you know that...? These joints withstand variable forces, between 84 and 104 tonnes, more than two million times. Come of force were subjected to forces of 200 tonnes, the equivalent of 13 city buses.

¿En qué consiste el ensayo? Durante un año, la rotula ha estado sometida continuamente a carga cíclica en ambiente marino artificial, un experimento duro agotador. La carga máxima equivale al peso de un camión con 11 semipermos. Hay un punto de ensayo en el laboratorio con cualquier ensayo a escala real o reducida. Estos ensayos permiten comprobar los resultados de la teoría antes de la construcción, así como la seguridad, economía y una mayor calidad.

How was the test performed? For one year, the joint was continuously subjected to cyclic loading in an artificial marine atmosphere without interruption. The applied load is equivalent to a truck passing by every 11 seconds or loaded down. These tests allow the results of the theory to be checked before construction, with greater safety, economy and higher quality.

UNIVERSIDAD POLITÉCNICA DE MADRID



ABOUT US

- We are a research center at the Polytechnic University of Madrid focused on the study of structural materials and structural behavior.
- We have several laboratories and a total of 54 researchers, including 16 university professors and 13 tenured professors.
- Our Mission: CIME's mission is to contribute to the development of more efficient, safe, and sustainable structural materials and structures, through the generation of scientific knowledge and technology transfer to industry.

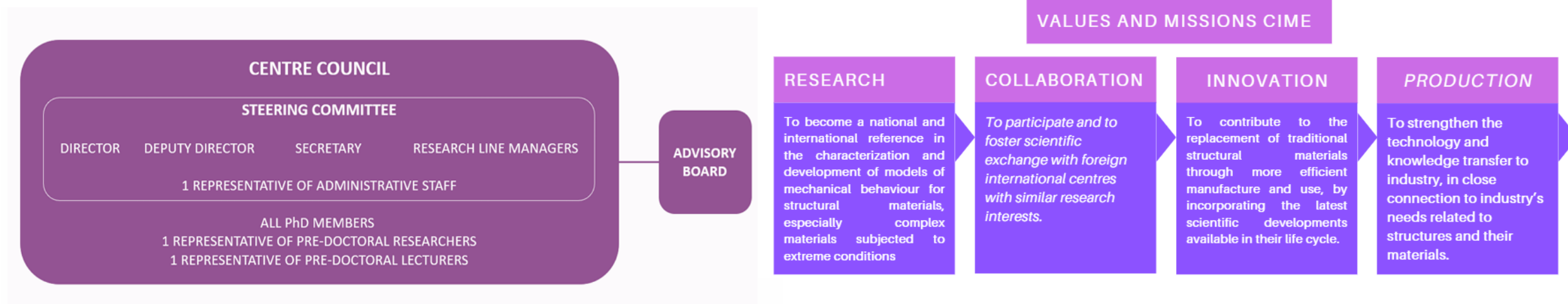
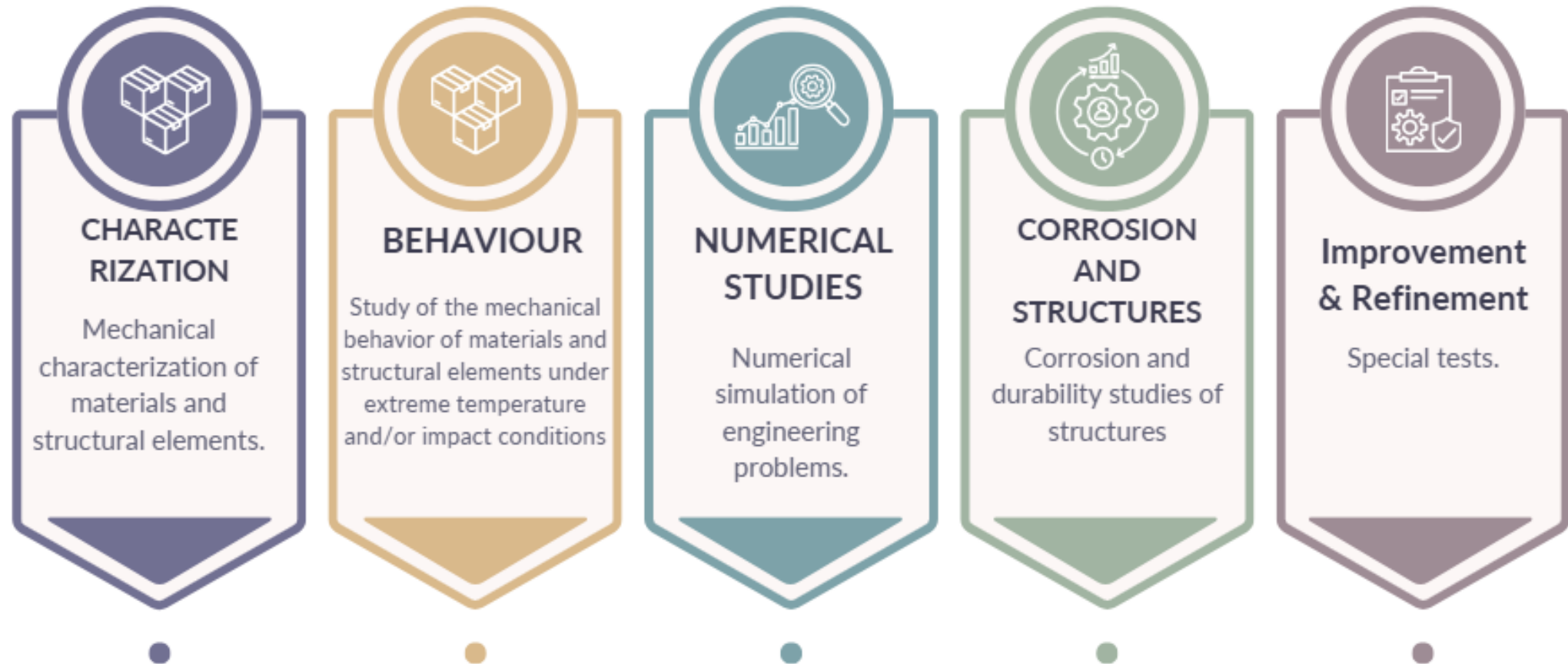


FIGURE 1: Governance structure of CIME

CAPABILITIES



FACILITIES

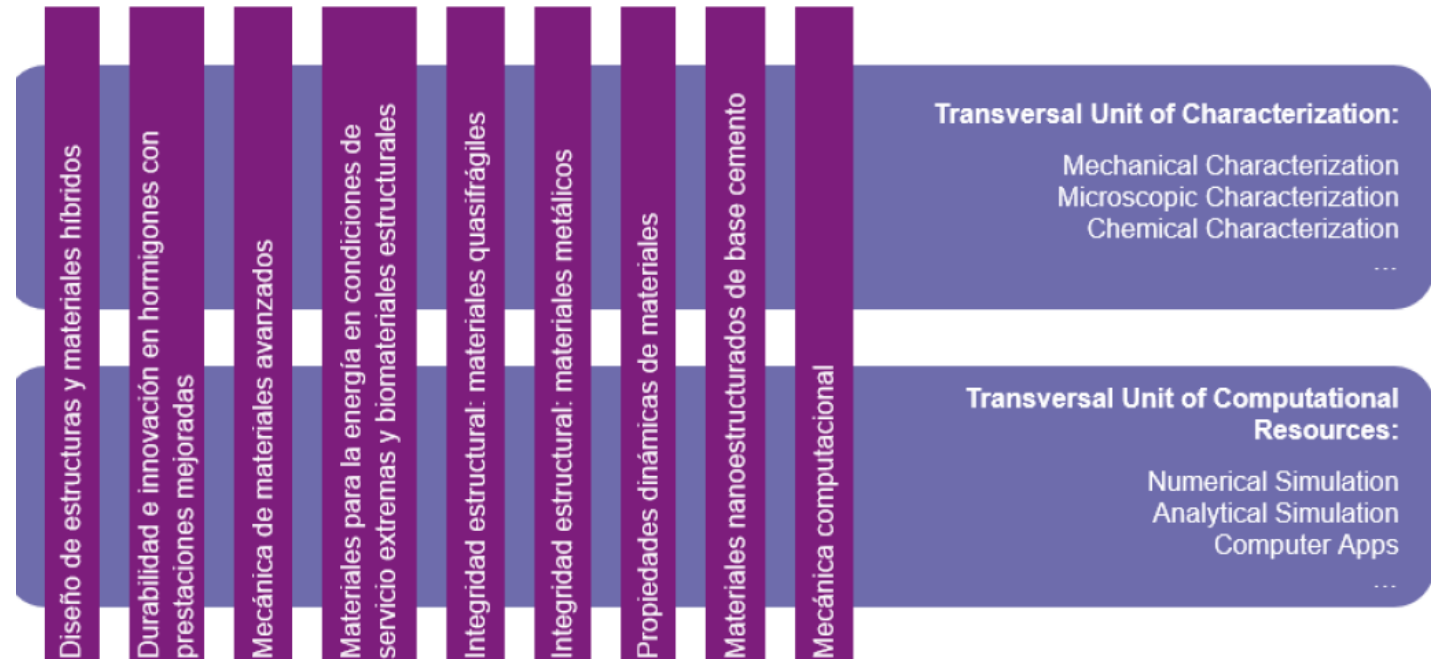
- *Mechanical characterisation:*
- *Universal testing machines (up to 1,200 kN)*
- *Environmental chambers (77 - 2,200 K and ultra high vacuum)*
- *Hopkinson Bars (up to 1,100 K) with high speed video recording*
- *Ballistic testing on gas cannon and explosion test bench*
- *Nano-indenter (MTS-XP) and micro-hardness testers*
- *Tribometer wear tests (up to 1,300 K)*
- *Physical and microstructural characterisation: (LabEnd, Madri+D Laboratory Network)*
- *Residual stress measurement laboratory (LMTR, UNE-EN ISO/IEC 17025 accredited by ENAC, the only one in Spain)*
- *Non-destructive testing laboratory*
- *Oxygen, nitrogen and hydrogen analyser*
- *Thermal analyser (ATD, TG, DSC)*
- *Mercury porosimeter*
- *Optical and scanning electron microscopy*
- *Equipment for metallographic preparation*



RESEARCH LINES

Currently, CIME's research activities are arranged around nine research lines. Further to these lines, two transversal units are assisting and providing services to all of them.

- Structural Integrity: Quasi-brittle Materials
- Structural Integrity: Metallic Materials
- Dynamic Properties and Impact
- Design of Hybrid Materials and Structures
- Computational Mechanics
- Mechanics of Advanced Materials
- Durability and Innovation in Concretes
- with Enhanced Characteristics
- Nano-Structured Cement-Based Materials
- Materials for Energy Under Extreme Conditions and Biomaterials
- Transversal Unit of Characterization



COLLABORATION

- Collaboration with diferentes members of our innovation ecosystem, wehere we can find synergies and somo other linkhoods.
- Different expertises in order to cover all the spectrum of the innovation and research in the materials fields.

Colaboraciones Estratégicas

Instituciones de la UPM	Instituciones ajenas a la UPM	Empresas
Cátédra-Empresa SIKA	CIEMAT- Centro de Investigaciones Energéticas-Medioambientales y Tecnológicas	ALLOYED LIMITED
Centro Láser	Fundación IMDEA Materiales	AMVALOR
Centro de Tecnología Biomédica (CTB)	Fundación para la Investigación Biomédica del Hospital Universitario La Paz	IXBLUE
Grupo de Investigación Tecnología de Imágenes Biomédicas UPM	Instituto Nacional de Técnica Aeroespacial (INTA)	Compass Ingeniería y Sistemas SA
CIME - Centro de Investigación en Materiales Estructurales (UPM)	CIMNE - Centre International de Méthodes Numériques en Ingénierie (UPC)	TSi Técnicas y Servicios de Ingeniería, S.L.
	CETIC - Centre of Excellence in Information and Communication Technologies	CARBON3 SYSTEMS
	CENTRUM VVZKUMU REZ.S R.O.	PHYONA LTD
	Institut e for Nuclear Research e Nuor Energy	BIOXEGY SAS
	Institut Jozef Stefan	XEV SRL
	Paul Scherrer Institut	AVS Added Value Industrial Engineering Solutions SLU
	Forschungszentrum Jülich GmbH	EnerOcean S.L.
	Karlsruher Institut für Technologie (KIT).	
	VTT - Tiednologiai "utk muskeskus VTT Oy	
	IREN: Institut de Radioprotection et de Sureté Nucléaire	

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