The National Hydrogen Center (CNH2) has been dedicated to promoting the development and application of hydrogen technologies since its establishment in 2007.

It is a public consortium between the Ministry of Science, Innovation and Universities and the Regional Government of Castilla-La Mancha, with each holding a 50% stake, and its headquarters are located in Puertollano (Ciudad Real).

With a multidisciplinary and highly qualified team, CNH2 carries out research, engineering, consultancy, and regulatory development projects across all links of the hydrogen value chain, from production to end use.

www.cnh2.es



HYDROGEN STARTS HERE

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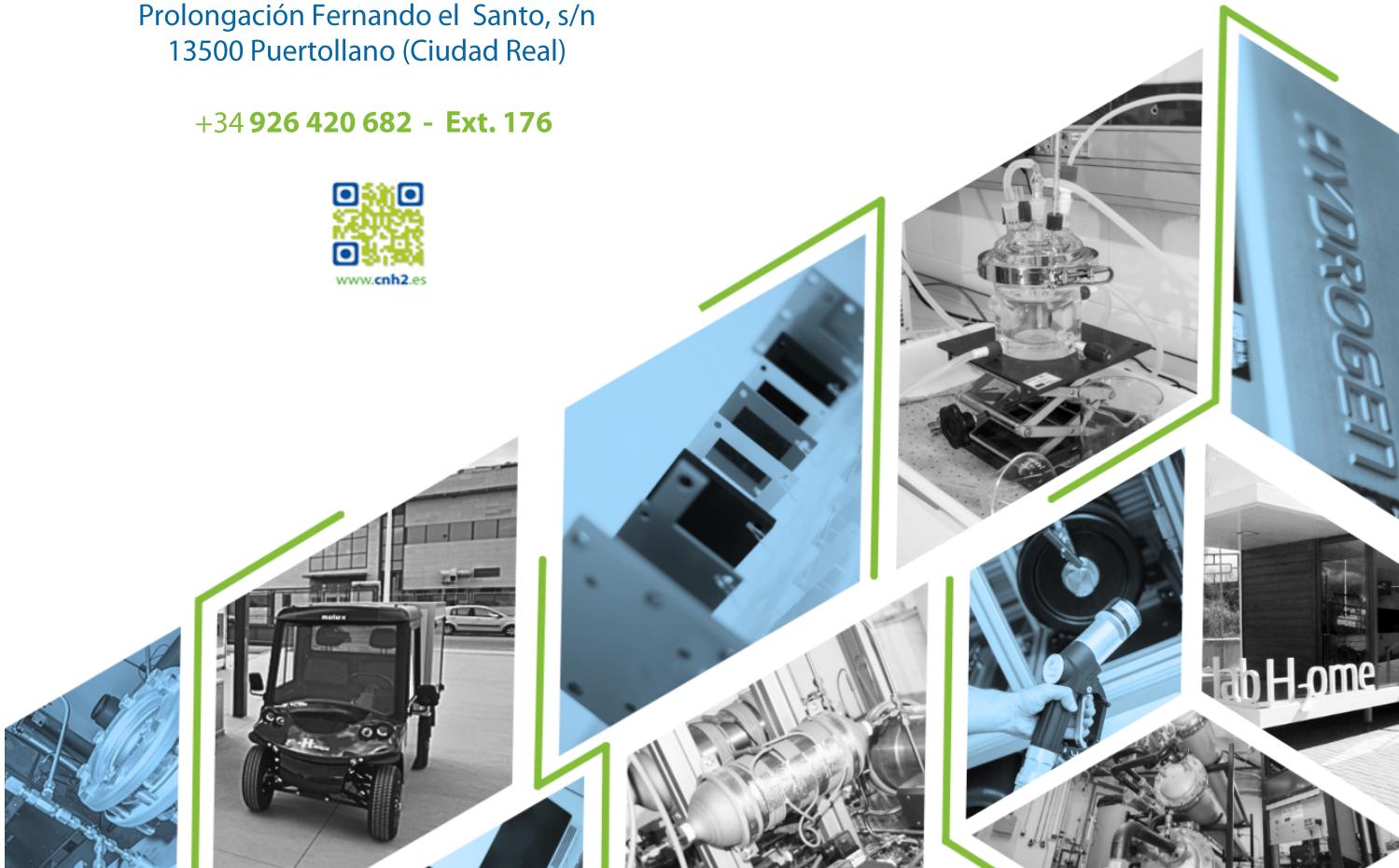
Centro Nacional del Hidrógeno

SIMULATION LABORATORY



The Simulation Laboratory specializes in the study and thermofluidodynamic characterization of different hydrogen-related technologies.

Areas

- **Modeling Area:** development of simulations and electrochemical, thermal, and fluid-dynamic modeling of fuel cells, electrolyzers, and auxiliary equipment.
- **Experimental Area:** Conducting tests related to the study of mass and energy transport phenomena present in hydrogen technologies.

Services

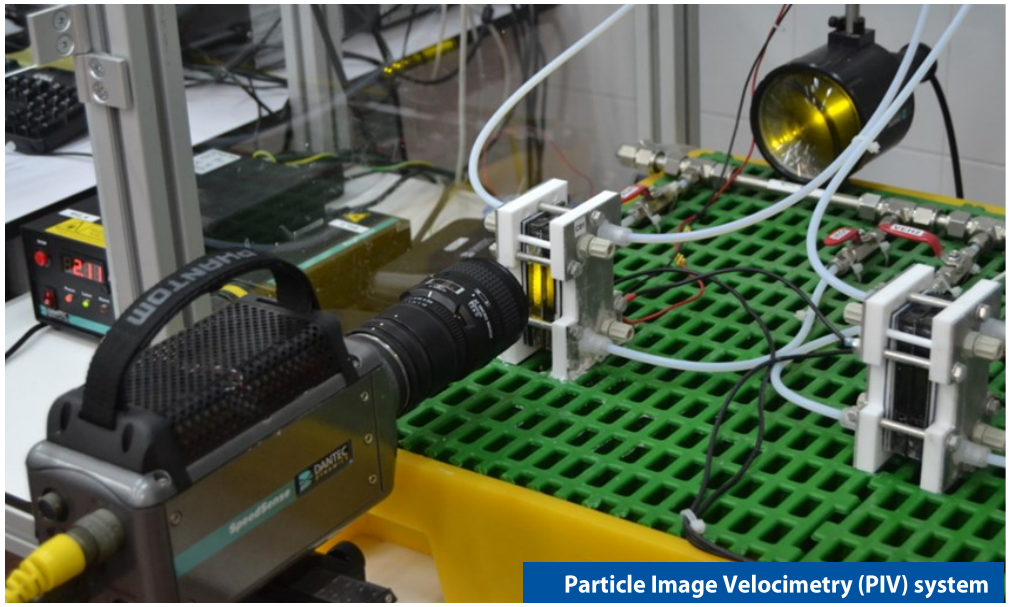
- **Experimental Testing and Techniques:**

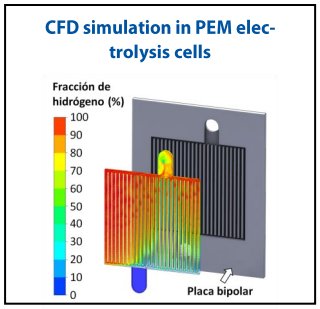
Thermography studies; Climatic testing of components, cells, and stacks; Fluid-dynamic characterization of different electrochemical devices using cells with transparent Windows; Gas leak monitoring in enclosed spaces using a wireless sensor network

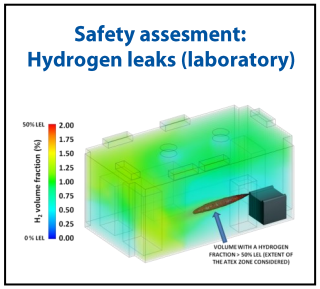
- **Modeling and Numerical Methods:**

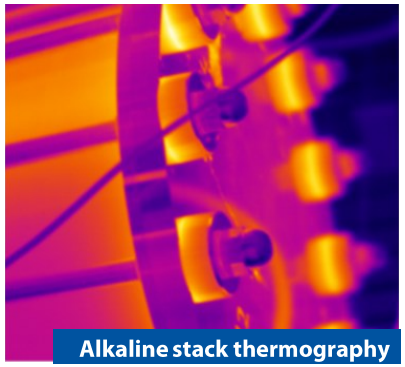
CFD simulations of electrolyzers, fuel cells, auxiliary equipment, and chemical reactors; Gas leak monitoring in enclosed spaces using a wireless sensor network; Development of mathematical models to evaluate and size transient applications based on renewable energy sources (RES), as well as to describe gas leak behavior (safety studies); Development of models to evaluate and optimize processes related to hydrogen technologies

Equipment


Particle Image Velocimetry (PIV) system






Alkaline stack thermography


Hydrogen sensor network

Software

- **CFD:** COMSOL Multiphysics, ANSYS FLUENT, and OpenFOAM
- **Energy simulations:** TRNSYS
- **Process simulations:** Aspen HYSYS, Aspen Plus, Simcenter Amesim
- **Modeling:** MATLAB, Python

Other Equipment

- Electrochemical cells with transparent windows
- Direct flow visualization techniques (PIV/PLIF)
- High-resolution infrared (IR) thermographic camera
- Climatic chamber for cells and small stacks
- Sensor network for hydrogen leak detection and characterization