

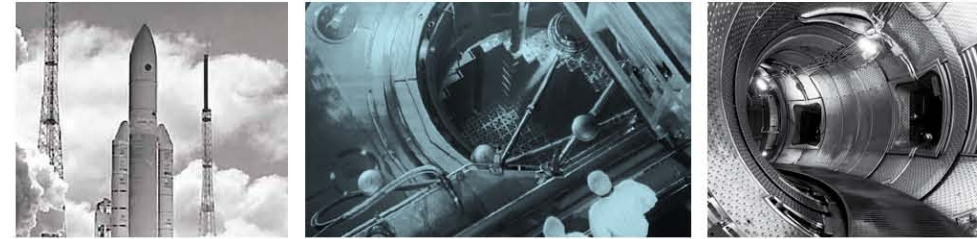


maestral
science in sealing



Technetics
GROUP
EnPro Industries companies

**maestral : the laboratory that uses science
to serve sealing.**



OUR AMBITION

The challenges that we take on every day push away the boundaries of technology.

The level of performance to be achieved is increasingly demanding. The objectives of end users are to reach extremely low leakage rates of around 10^{-12} to 10^{-11} mbar.l.s⁻¹ corresponding to the volume of a pinhead, which would take 200 or even 2 000 years to leak out!

The challenges faced are linked to increasingly difficult operating conditions, which can combine different constraints, such as high pressure and temperature, complex mechanical stresses, interactions between materials and in relation to fluids, bacterial aggressiveness.

This is the case, for example, with energy technologies, both in the nuclear field and that of alternative energies.

maestral offers a multi-scale scientific approach combining tests, characterization and simulation in order to develop sealing solutions that meet present and future needs. **maestral** brings together the strengths of **TECHNETICS GROUP FRANCE**, leader in the field of high-performance industrial sealing and **CEA (French Atomic Energy and Alternative Energy Agency)**, a major player in research and innovative developments for energy technologies.

maestral makes available to all its partners and clients the R&D support of a high-tech laboratory.



OUR SKILL AND EXPERTISE

maestral's expertise is the result of a successful collaboration, since 1969, between **CEA** and **TECHNETICS GROUP FRANCE**. Our skill is constantly growing as a result of the real-life cases we study and our experts have the ability to quickly assess situations in order to offer suitable R&D programs and solutions. **maestral** technicians are experienced and certified to COFREND (French Confederation for Non-destructive Testing) II, Leak Testing.

maestral has the latest generation test and characterisation equipment, amply instrumented, offering the ability to quickly and thoroughly analyse the behaviour of seals.

In order to develop product lines or for special applications, **maestral** designs and develops specific benches or mock-ups reproducing actual operating conditions. To do so, it calls on the advanced analytical skills of **CEA** and on the manufacturing and research abilities of **TECHNETICS GROUP FRANCE**.



OUR TEST EQUIPMENT

MEANS OF CHARACTERIZATION AND MEASURE:

- Instrumented Press
 - 2500KN / 450°C
 - 200KN / 450°C
 - 500KN / 900°C
 - 50KN / -60°C to +250°C
- Helium Leak detectors
 - ASM 142 / 192T2 / 181T2H
 - UL5000
- Perthometers
 - with mechanical contact
 - 3D Laser
- Microscopes
 - 3D optics
 - For metallographic analysis
- HV Microhardness measuring equipment

DEDICATED TESTS BENCHES:

- Valve stem sealing test bench
- Bolted joint assembly with internal heating (900°C)
- Fatigue test bench for cylinder head gaskets (250 bar / 200Hz)
- High pressure water test bench
- Endurance test bench for valves

TESTS ON MOCK-UP:

The laboratory is equipped with a variety of furnaces and ovens:

- 5 large ovens of 1,5 to 3m³ up to 600°C
- 3 big furnaces (125L) for high temperature up to 1200°C
- Numerous ovens of smaller dimensions

Specific mock-ups designed to be tested in these ovens can allow:

- Simulation of radial motion due to differential expansion
- Accelerated ageing (up to 75 000 hours) of metallic seals
- Simulation of nuclear pool gate seal operation
- Test of sealing solutions for high temperature electrolysis (HTE)
- Characterization of air lock door sealing
- Characterization of aircraft engine sealing
- Characterization of autoclave sealing

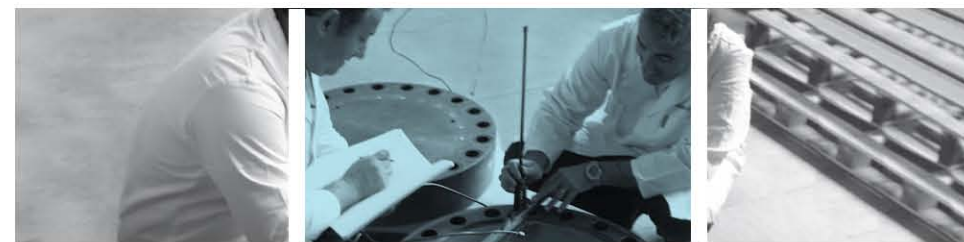


NUMERICAL SIMULATION

Simulation is an effective tool for designing and optimising sealing systems by checking their performance in all circumstances, in order to resolve clients' problems. Modelling of mechanisms, with varying degrees of detail depending on the scale considered, is extremely useful. Our modellers have, in particular, expertise in the mechanics of very non-linear behaviour, such as large deformations, creep, complex contacts with flanges and friction.

Simulation does not replace tests on mock-ups but it allows the latter as well as experimental artefacts to be reduced. Today, prediction abilities of models are advanced enough to extrapolate life-size results when the size of the mock-ups or the duration of the tests makes them impossible in real conditions.

maestral is committed to actively developing numerical simulation tools and resources, applied to sealing.



OUR PARTNERSHIP

maestral is the result of a unique partnership between **CEA (French Atomic Energy and Alternative Energy Agency)** and **TECHNETICS GROUP FRANCE**. This laboratory, located in Pierrelatte (France), is characterised by a shared patent portfolio and synergy in terms of teams and resources.

The Commissariat à l'Energie Atomique et aux Energies Alternatives is a scientific, technological and commercial public body. It has over 15,000 employees, 1,000 PhD students and postdoctorands as well as international collaborators. **CEA** research covers the areas of Military Applications, Nuclear Energy, Physical Sciences, Life Sciences and Technological Research, notably for Alternative Energies and Information Technology.

maestral collaborates with **CEA Marcoule** where nuclear fuel cycle, waste management, dismantling and remediation technologies are studied.

TECHNETICS GROUP specialises in designing high-performance systems and components, supplied to high-tech industries throughout the world.

TECHNETICS GROUP FRANCE is an international leader in the field of high-performance sealing equipment. The company designs, manufactures and supplies sealing systems and devices used in many high-tech industrial sectors such as nuclear, aerospace, pharmaceuticals, oil, the chemical industry and scientific research... It employs 280 people in Loire.

FOR MORE INFORMATION,
CONTACT US



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