

***FIRMUS France services
help improve the conditions
for using water resources
with respect for local
ecosystems.***



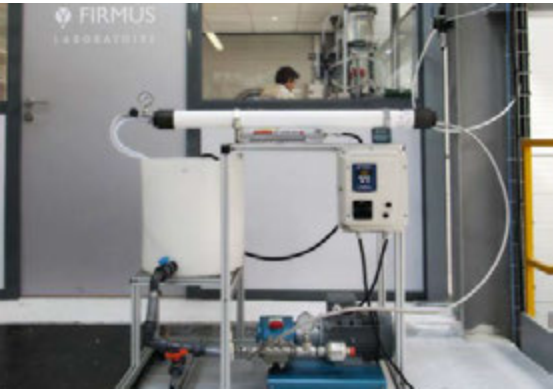
This focus has enabled FIRMUS France to elaborate a proactive approach to sustainable development. Our strength is based on innovative processes and high quality partnerships established with complementary companies that share our values.

*treat, purify, separate,
and recycle water
and wastewater*

FIRMUS[®]

FRANCE

Firmus/alum: Latin, meaning "strong, solid, reliable, lasting"



FIRMUS NANOFILTRATION PILOT – REVERSE OSMOSIS



ESA PROTOTYPE – GREY WATER TREATMENT UNIT



ULTRAFILTRATION LAB PILOT – NANOFILTRATION

Specialised in treating water and wastewater to respect discharge and recycling requirements, **FIRMUS France** works with all today's latest technologies, leveraging over 20 years experience in membrane-related techniques, including: microfiltration, ultrafiltration, nanofiltration, reverse osmosis, electrodialysis, membrane electrolysis, bipolar membrane electrodialysis, dialysis and more.

FIRMUS France was recognized through the French Research Tax Credit initiative as a qualified company to carry out research and development projects for 2012, 2013, and 2014.

FLAGSHIP PROJECT: RECYCLING GREY WATER

FIRMUS France is a major contributor for the design and implementation of a specific process based on its expertise: recycling grey water. The Firmus Grey Water Recycling System process (FGWRS) is based on ESA research being carried out on the Franco-Italian Concordia Antarctic Station since 2005. Its operation is tracked weekly by Jean-Christophe Lasserre, technical manager for **FIRMUS France**.

FGWRS provides hygienic-quality water, enabling complete recycling within the sanitary network, notably showers and sinks.

The system recycles over 80% of the site's grey water, which results in substantial savings in terms of both operating costs and resource use. Recycling is combined with a calorie collection process that also provides significant energy improvements.

This solution is directly transferable to collective installations involving heavy water consumption, such as hotels, public swimming pools, hospitals, clinics,

Expertise developed in these fields enables the company to help its clients with a variety of different needs, such as:

- Service and training
- Needs analysis, feasibility studies
- Process design, development, and implementation
- Auditing, operational tracking

FIRMUS France proudly participates in international research programs with the European Space Agency (ESA).

laundry operations, and more. **FIRMUS France** works in partnership with SHERPA Engineering and EDF Optimal Solutions to integrate and optimize the process in the context of energy management solutions for buildings.

- SHERPA Engineering: System engineering service provider (www.sherpa-eng.com)
- EDF Optimal Solutions: Designer-integrator of eco-efficient energy solutions (www.edfoptimalsolutions.fr)

ANOTHER HIGH-POTENTIAL PROJECT: DIGESTATE METHANE TREATMENT

FIRMUS France established a partnership with LANDCO (www.landco.lu) for the patented "LANDCO Module" digestate treatment process. With its low size constraints, this technology offers a solution that resolves the challenge of digestate treatment. This solution produces water that respects discharge requirements and enables higher levels of biogas production, while collecting mineral salts that can be used subsequently.

FIRMUS France has acquired a wide range of equipment that gives the company access to the latest technological innovations. This enables us to analyze test samples under the best possible conditions, both as part of our service offer and for research programs.



This professional equipment includes:

- DIONEX ICS1100 ion chromatography system equipped with dual pistons for analysing the principle anions and cations present in water
- TOC (total organic carbon) measurement with Shimadzu TOC-V CSN
- Chemical oxygen demand (COD) analysis with Hach Lange DR 2800
- Microtrac laser granulometer
- Shimadzu AA – 7000 Series spectrophotometer

FIRMUS France designs and assembles pilot solutions for performing tests as part of its service offers and for research programs.

FIRMUS France is equipped with:

- Ultrafiltration / nanofiltration pilot to work with pressure ranges from 1 to 35 bars
- Reverse osmosis pilot to handle pressure up to 65 bars
- Microfiltration / ultrafiltration pilot for hollow fiber membranes
- Conventional electrodialysis pilot
- Micropilot workbench to work with plane and tubular membranes, both organic and mineral, in order to run tests for evaluating membrane selectivity
- Test bench for ion-exchanging zeolites and resins



Water treatment process using electricity from solar panel and windmill production.
Project developed with the UNESCO-SIMEV Chair in partnership
with BELECTRIC (www.belectric.com)



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FIRMUS is a member of EAU and TRIMATEC clusters, and the French Membrane Club, and is a partner of the UNESCO-SIMEV Chair.

