

VERCORS: A Unique Experimental Platform for Nuclear Containment Ageing

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VERCORS is not just an experimental mock-up — it is a strategic enabler for the future of nuclear safety. Developed by EDF, this world-unique platform simulates 80 years of ageing in less than 10, providing unprecedented insights into the long-term behaviour of containment structures. In a context of global nuclear fleet extension and increasing safety requirements, VERCORS bridges the gap between research and industrial deployment, offering validated solutions for predictive maintenance, regulatory compliance, and life extension beyond 60 years.

Technical Identity

- Dimensions: 30 m height, 16 m diameter, 5,000 tons of concrete.
- Instrumentation: Over 750 sensors, 2 km of optical fiber, advanced humidity and strain monitoring.
- Concrete: Identical to that of the Nogent-sur-Seine plant, with controlled environmental conditions.
- Construction Timeline: Designed in 2013, built in 2014–2015, operational since 2016.

Objectives and Capabilities

- Accelerated Aging: Simulates 10 years of reactor aging per year of operation.
- Leakage Testing: Annual pressurisation tests at 5.3 bars to monitor airtightness evolution.
- Repair Validation: Tests composite coatings, biocicatrisation and water imbibition under realistic stress conditions.
- Digital Twin Development: Supports predictive modeling and maintenance optimization.

Scientific and Operational Impact

VERCORS provides high-resolution data on leakage evolution, material ageing, and the effectiveness of repair solutions. It validates predictive models, supports digital twin development, and informs regulatory justifications. The platform has confirmed the absence of cliff-edge effects and enabled the qualification of innovative repair techniques.

Applications and Benefits

- Long-Term Operation: Supports life extension beyond 60 years.
- Maintenance Optimization: Enables condition-based strategies and reduces unplanned outages.
- Instrumentation Innovation: Validates advanced sensors for deployment on reactors.

- **Environmental Impact:** Reduces carbon footprint through targeted maintenance and repair.

Strategic Value

VERCORS is a cornerstone of EDF's Long-Term Operation (LTO) strategy. It enables safe life extension, reduces maintenance costs, and supports regulatory compliance. Recognized by stakeholders and regulators, VERCORS is not only a research tool but a strategic asset for the future of nuclear safety and infrastructure resilience.

Stakeholder Benefits

VERCORS is more than a research facility — it is a strategic asset shaping the future of nuclear infrastructure. By combining experimental rigour, industrial relevance, and international visibility, VERCORS empowers EDF and its partners to lead the way in safe, sustainable, and long-term nuclear operation.