



# TAKING UP YOUR MAJOR CHALLENGES

High performance solutions

# High Safety Solutions

## High Safety Nuclear Handling Solutions

Combining strong expertise in electromechanical engineering & control command and compliance with international nuclear standards, CNIM designs and delivers critical handling products exposed to radiation, all over the fuel life cycle.



Georges Besse II, the enrichment plant with 99% efficiency reached thanks to equipment performances.



### WHAT WE DID

High precision uranium container handling system for enrichment plant

### HOW WE DID IT

- / Turnkey system, from design to on-site installation & tests
- / High earthquake resistance to ensure the UF6 container integrity
- / High accuracy ( $\pm 1\text{mm}$ )



OL3 (Finland), Taishan (China), French Nuclear Power Plants



### WHAT WE DO

Spent Fuel Cask Transfer Facility transferring used fuel from the storage pool into a safe container

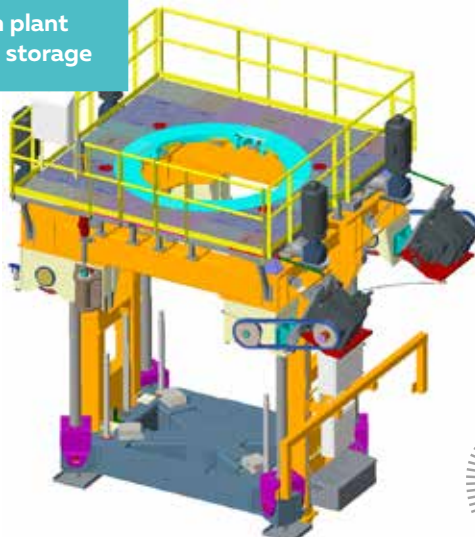
### HOW WE DO IT

- / In service in 16 French NPP's
- / On-going deliveries for 3 international EPR units
- / Reliability & risk analysis
- / On-site delivery & integration
- / Globally recognized for its performances, efficiency & durability

**SEISMIC RESISTANCE**



POSIVA's encapsulation plant for geological storage



### WHAT WE DO

Remotely operated spent fuel handling and transferring machines

### HOW WE DO IT

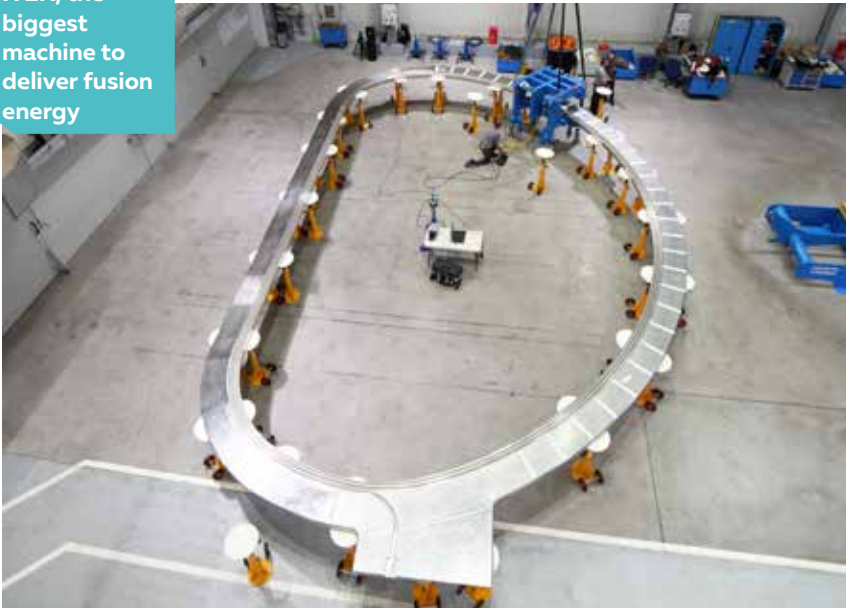
- / Design of secured & automated handling systems
- / Compliance with Finnish requirements
- / High quality specifications throughout the whole process

**HIGH PRECISION**

# Advanced Nuclear Equipment Manufacturing

CNIM provides a unique combination of material know-how and advanced industrial capabilities to deliver high value added nuclear equipment, complying with the most stringent nuclear codes.

**ITER, the biggest machine to deliver fusion energy**



**WHAT WE DID**

D-shaped 14 x 9 m radial plates for ITER toroidal field coil magnets

**HOW WE DID IT**

- / Local vacuum electron beam welding
- / Large 9 x 36 m portal machining center
- / Manufacturing processes according to nuclear Codes & Standards

**Jules Horowitz Reactor, a unique research reactor under construction**



**8** m height, 0.7 m diameter and 20 tons

**WHAT WE DO**

Nuclear pressure vessel

**HOW WE DID IT**

- / Complex, large & oil free metal machining
- / Electron beam welding
- / RCC-M\* standards
- / Equipment under nuclear pressure

\* RCC-M: Rules for design and construction of nuclear components

**ILL High-Flux Reactor, the most powerful neutron flux in the world**



**WHAT WE DID**

Beam tubes

**HOW WE DID IT**

- / Complex vessels manufacturing
- / with nuclear RCC-MX codes
- / Electron beam welding of Ag3NET

# Comprehensive Nuclear Site Protection

NEW PRODUCT



Smart radiation portal monitor for vehicle & load control



Radon monitoring & measurement

NEW PRODUCT



Multiprobe contamination monitor for alpha & beta radiations

**ENSURE THE SAFETY OF WORKERS AND POPULATION**  
Radioprotection solutions



# 360° PROTECTION OF NUCLEAR POWER



**PROTECT AGAINST INTRUSIONS**  
Day & night Observation & Surveillance solutions



Night & day vision Monocular



Wireless mesh networked Unattended Ground Sensor (UGS) platform

## PROTECTION NUCLEAR PLANTS



Environmental Radiation Monitoring Systems



Air Monitoring



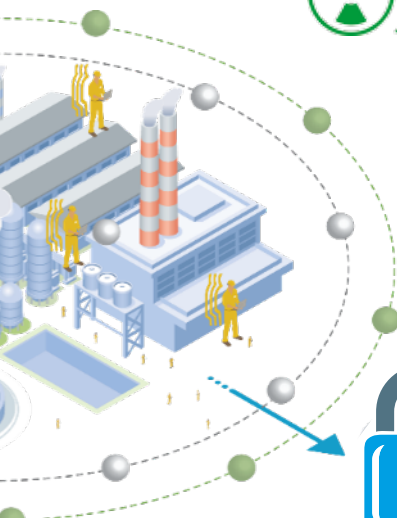
Data communication and global networks



**MONITOR RADIOACTIVITY IN THE ENVIRONMENT**  
From sensors to turnkey networked solutions



Secured Data Transmission solutions & Data Management Software



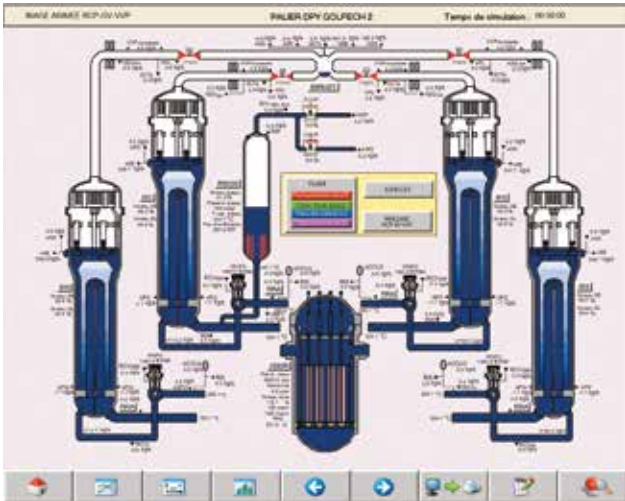
### ANTICIPATE CYBER THREATS AND PROTECT CRITICAL SYSTEMS

Secure and control file transfers in and out of a sensitive network  
Monitor the web and detect malicious activities targeting your organization





## Multidisciplinary engineering expertise



### WHAT WE DO

Modeling, Simulation and Calculations to ensure our solutions comply with nuclear safety standards

### HOW WE DO IT

Nuclear Risk & Safety analysis tools

- / ASTEC: Accident Source Term Evaluation Code
- / CATHARE: Calculations of thermal-hydraulic transients in nuclear reactors
- / FLICA: a 3D two-phase flow computer code with advanced numerical methods for nuclear applications
- / NEPTUNE: software platform for advanced nuclear thermal hydraulics



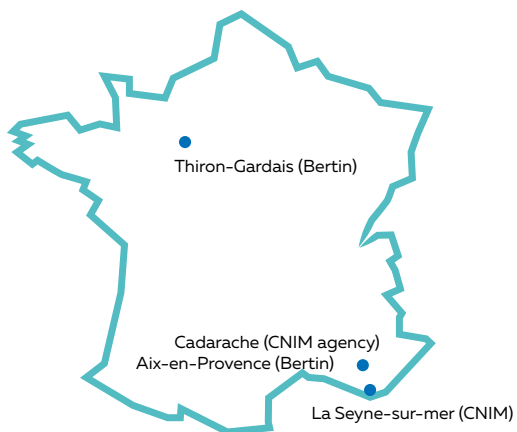
### WHAT WE DO

Large-scale capacity of industrialization

### HOW WE DO IT

- / Setting-up special manufacturing processes according to your project
- / Dedicated project teams & facilities

## Cutting-edge facilities



### Thiron-Gardais

State-of-the-art infrastructure, including a certified calibration center for ionizing radiation.



Integration



Calibration



Manufacturing



Services & Maintenance



# Forefront industrial capabilities

## La Seyne-sur-Mer

A cutting-edge industrial site sized for large-scale and high performance projects.



### Large-scale



3,000 m<sup>2</sup>  
air-conditioned  
workshop



Cleanroom  
assembly ISO 7

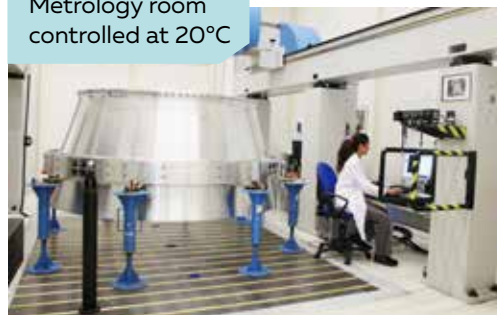


### High Precision Machining & Metrology



0,1 mm flatness  
tolerance on large  
mechanical structures  
(14m x 9m x 110mm)

Metrology room  
controlled at 20°C

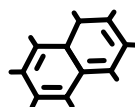


### Electron beam welding

**230 m<sup>3</sup>**  
One of the largest  
facilities in France



Electron beam welding of high  
performance materials, inc.  
AG3NET, one of the toughest  
aluminum alloys to work with



### Composite & Polyurethane



**WHAT WE DID**  
Chernobyl new  
safe confinement  
leak tightness  
membrane

#### HOW WE DID IT

- / High performance polyurethane
- / 18 months of development
- / 6 months of series manufacturing
- / Implementation of an automated manufacturing line
- / Over 2 km of membrane manufactured

Backed by its long experience with nuclear projects, CNIM takes up your challenges by providing innovative solutions meeting the requirements of the most difficult environments. Relying on its expertise in materials and its advanced manufacturing means, CNIM designs, manufactures and integrates tailor-made, high-security solutions complying with international standards. CNIM is also a choice partner for the manufacture of complex and specific secure fuel handling systems.

Focused on preventing risks of very different types, Bertin Technologies, subsidiary of CNIM, helps you make your sensitive sites completely secure. Its comprehensive offer for the complete protection of nuclear sites includes ionizing radiation detection and measuring equipment ensuring the safety of people and the environment. Its cybersecurity solutions and networked sensors surveillance solutions also protect your installations against any threats.



## OUR COMPREHENSIVE SERVICES ON THE ENTIRE FUEL LIFE CYCLE



**Research  
& Innovation**



**Design  
& Engineering**



**Manufacturing  
& Assembly**



**On-site  
installation  
& services**



**Maintenance  
& Upgrade**

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