

NUCLEAR CONSTRUCTION 4.0



Boccard offers you a **seamless solution** with **complete integration** of our expertise: **engineering, manufacturing, construction and maintenance of fluid networks of civil nuclear installations.**





EDF UTO piping-sheet metal work domains
NDT, civil works, large component operations
Manufacturing and installation ASME III and IV
HAF 604 Classes 1, 2 and 3
PED Module H

Boccard is established on five continents and is capable of mobilising the teams required for your project, no matter where you are located.



CONSTRUCT BETTER, MAINTAIN BETTER, OPERATE BETTER THROUGH DIGITAL CONTINUITY

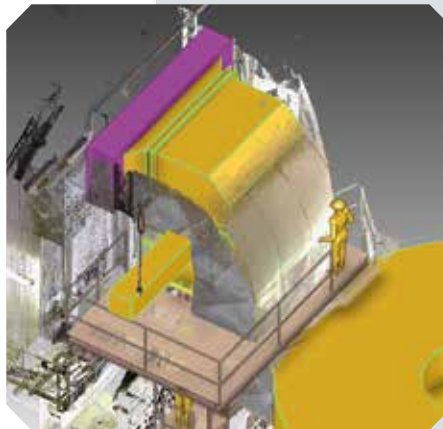
Depending on whether or not it is provided, digital continuity influences the efficiency of all phases of your project, from design through deconstruction.

For reactors, whose lifetimes are extending and whose maintaining in operational condition is crucial and complex, the cost linked to the life-cycle may be higher during the operating phase than during the design phase. In addition, the life-cycle of reactors goes beyond the operating period therefore digital continuity is essential for decommissioning and deconstruction.

The traceability and sharing of data during the construction and operation of the facility poses a major challenge for nuclear safety.

3D LASER MAPPING

At the start of the design studies of the fluids lot of the Jules Horowitz Reactor project, we carried out 3D laser mapping of the entire civil works. This operation allowed us to verify the quality of the Catia 3D model provided to us. This mapping made it possible, among other things, to detect the differences between the model and the constructed civil works, in particular wall verticality anomalies, which are detrimental to the correct positioning of piping supports. Particular attention was therefore given to the scans of the pre-embedded anchor plates, thus making it possible to adapt the design of the supports.



AUGMENTED REALITY

All manual operations are subject to potential human errors. During the erection phase of an industrial installation, position markings are usually made using basic (tape measure, level, etc.) and/or metro optical means. This marking is based on geodetic points, which themselves have been transferred. Errors may therefore add up. Thanks to the application we have developed, the marking of part locations is done directly on the wall / floor / structure by projection through holographic glasses. In this way, we eliminate the risk of potential human error due to transfers of dimensions, misreading of the measuring instrument, etc.

As part of the design studies of the modification of an ultimate emergency circuit (secours ultime), we were asked to study the implementation of a filtration skid to be installed on each of the CP1 CP2 900 MW units. During the site investigation phase, over the course of which we used 3D laser mapping, we equipped our designers with augmented reality headsets. They projected the 3D model of the skid to the predefined location and discovered that the skid was creating major installation difficulties. They were therefore able to immediately test the repositioning of this skid in several other locations. The detailed studies were reoriented accordingly. This simultaneity enabled us to avoid multiple trips to the site and made it possible to quickly propose viable solutions to the customer.



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BocTrack

The Best Manufacturing System for Piping, Design, Fabrication and Construction



Boccard owns a custom-developed production management tool: BocTrack. Interfaced with design softwares, it ensures the planning, the traceability and the management of the entire production process, providing real-time monitoring data.

BocTrack was chosen by our customers for the achievement of the following projects: Hinkley Point C, J. Horowitz experimental reactor, Lucciana thermal plant and the Flamanville EPR. To ensure traceability monitoring, BocTrack was used from the start of the FA3 project, both in the workshop and on site. It also allowed us to meet the inspection requirements of the Q2 controlled lines (subject to an assessment module).

BocTrack provides the following functionalities **online and in real time**:

- reporting for our customers,
- material assignment and scheduling of fabrication by priority (will / will not run),
- measurement of progress at the various phases, i.e. detail design studies, manufacturing and installation,
- tests and traceability of materials and welds,
- quality control.

In general, BocTrack provides searchable digital documentation for each progress step, allowing the end-of-manufacturing file to be created.



A unique manufacturing system dedicated to piping industry



Reduced overall turnaround time and improved productivity



Latest technology innovation to provide instant and real time data



A team of experts on all key fields



100 years of experience from a world leader



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-FOCUS
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-SALE

NETWORK SEARCH



NEW SERVICES!

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NUCLEAR INSULATION AND SCAFFOLDING

The LOVEMI company makes all of its experience and know-how available to its nuclear service provider customers.

Its professional experts are at your disposal for all custom solutions in terms of hot and cold thermal insulation as well as sound insulation. As an active member of the SNI (National Insulation Union), LOVEMI is constantly in search of technical innovation in order to offer you the solutions the most adapted to your project while meeting your planning and cost requirements. Our mastery of the insulation trade will allow you to optimise your energy consumption and minimise impact on the environment.



As experts in scaffolding, we are able to offer you all types of scaffolding, from the simplest to the most complex: fixed, rolling, offset, suspended and negative, roof, high strength work platforms and construction site stair towers. We manufacture our products using multi-directional components made of steel or aluminium. Signatory of the Professional Charter of Scaffolding (Charte professionnelle de l'échafaudage) and a major player in the improvement of the scaffolding trade, LOVEMI Insulation-Scaffolding works in close collaboration with the French Scaffolding, Formwork and Shoring Union (Syndicat français de l'échafaudage, du coffrage et de l'étalement).

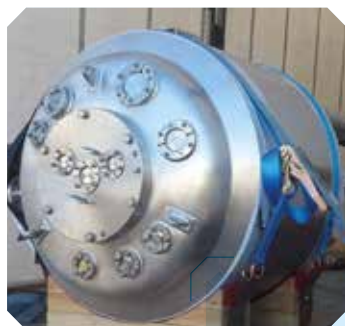


RCC-MX, Q3 AND NON-CLASSIFIED NUCLEAR TANKS AND VESSELS



Boccard Process Vessels designs and manufactures stainless steel and noble metal (nickel, Hastelloy and Uranus alloys) boiler equipment in compliance with the requirements of your market.

We integrate climatic, seismic or thermal constraints into the design of the equipment. The nuclear equipments which we produce meet the requirements of the construction codes currently used in the nuclear field: RCC-M, RCC-MX or EN 13445. We pay special attention to material and welding traceability compliance.



We also design and manufacture the agitation systems installed in some of the nuclear equipment which we build. Using the simulation software Siemens Star CCM+, these agitation systems are sized for their rheological, mechanical or heat exchange performance when coupled to a heating / cooling circuit.

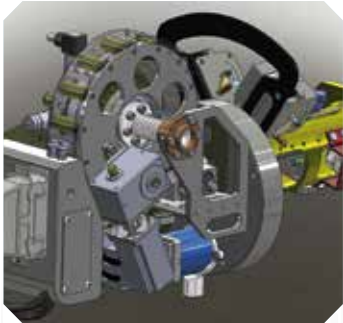


NEW SERVICES!

CONTACT

office@optim-technologies.com
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SPECIAL-PURPOSE MACHINES AND INTEGRATED SERVICES IN HARSH ENVIRONNEMENTS



OPTIM Technologies realises special-purpose machines, which operate mainly in nuclear and defense environments. Capable of intervening in delicate dimensional spaces or irradiated environments via remotely operated machines, OPTIM products allow you to perform all types of precision machining: surfacing operations, chamfering, milling, cutting, etc.

OPTIM know-how displays its efficiency in all the phases of your product's life, from design to delivery:

- design of the technical solution, design of the machine and creation of part drawings,
- installation and testing of the special machine,
- receipt/acceptance of the machine, training of customer personnel, then delivery.



CONTACT

contact@darkadia-ing.com

ARKADIA Ingénierie's missions are focused on two activities:


- expert management support: creation of site works files, coordination and monitoring of maintenance activities,
- methods engineering: creation and updating of operational documentation and information systems, engineering of site modifications.





CONTACT


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MORE REFERENCES

 **EDF, France**
Design studies and manufacturing of the nuclear island piping, Flamanville EPR FA3.

 **CEA, France**
Design studies and manufacturing of piping for the RES (ground-based test reactor: experiments for nuclear powered vessels), Cadarache Centre.

 **AIR LIQUIDE TA, Switzerland**
Cryogenic lines of the LHC, CERN Geneva.

 **CNPEC, China**
Design studies and manufacturing of piping supports, Taishan 1 & 2 nuclear island.

 **SOFINEL, China**
Pipe stress analyses including seismic sizing, Ling Ao.

REALISATION OF AUXILIARY SYSTEMS

FUEL

 **DIOXITEK, Argentina**

Design, design studies and manufacturing of skids and piping networks (uranium dioxide filtration cells) for a new uranium dioxide treatment plant (NPU02) in Formosa.

 **AREVA, France**
Process fluid lot of the Georges Besse (GB II) plant, Tricastin site.

NUCLEAR INSTALLATIONS

 **EDF ENERGY, United Kingdom, Hinkley Point C**
Cavendish Boccard Nuclear was selected as preferred bidder for the mechanical installation lot of the BNI (systems and auxiliary equipment of the nuclear island). Currently in the Early Work Contract phase, the aim of our activities is to prepare the first site installations (procurement of raw materials, design studies of special parts, constructibility analyses to optimise design).

 **BYLOR, United Kingdom, Hinkley Point C**
Boccard was awarded the lot for the double-walled piping of the RPE network embedded in the civil works. Following design studies and material procurement in 2017, Boccard is currently prefabricating spools in its workshop in Portugal for an on-site installation starting in mid-2018.



TURNKEY FLUID SYSTEMS

NUCLEAR INSTALLATIONS



CEA, France

Design, design studies, manufacturing and commissioning of the fluid systems of the Jules Horowitz experimental reactor, Cadarache Centre. Levels 2 and 3 of the RCC-MX code, manufacturer of nuclear pressure equipment (ESPN) assemblies.



AREVA, Russia

Design, design studies, procurement and supervision of the fluid lot of a UF₆ treatment unit (similar to Plant W at Pierrelatte, France) for the Zelenogorsk site.

REPROCESSING OF WASTE



VINCI ENVIRONNEMENT, France

Design, design studies and manufacturing of a pumping and preparation system for effluents containing nitrates prior to treatment for storage at the Malvesi site (Orano).



CEA, France

Design, design studies and manufacturing of the fluid networks of the Effluent Advanced Management and Processing Facility (AGATE), Cadarache Centre.

DECOMMISSIONING



AREVA, France

Design, design studies and manufacturing of the sodium disposal skids at Creys-Malville.

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MAINTENANCE

The nuclear maintenance line designs, studies, engineers, installs and improves fluid networks to increase safety and availability of nuclear installations. We proceed with high-quality services, highly skilled specialists and high performance culture.

For your strategic investment programme, Boccard is your innovative solution to extend the lifetime of your units and save costs.

Refurbish or replace the components reaching their lifespan limit, Boccard is your engineering and operational solution.



EDF, 58 nuclear power plants, France

- Maintenance and inspection of piping supports of the primary and secondary circuits.
- Regulatory inspections of pressure equipment.
- Regulatory tests of pressure equipment.
- Opening and closing of steam generators and primary and secondary reservoirs and tanks.
- Pipe welding interventions on main primary circuits (CPP), main secondary circuits (CSP), nuclear island circuits and conventional circuits.

54 ☐
56 ☒
76 ☐
87 ☐
89 ☒
90 ☐
96 ☐
100 ☐

MODIFICATIONS REVAMPING

Reach the latest safety level by implementing additional safety modifications, Bocard is your solution to strengthen it.

EDF, 58 nuclear power plants, France

- Engineering and installation of modifications to increase safety and availability of basic nuclear installations.
- Design and installation of the Post-Fukushima ultimate make-up networks (réseaux d'appoint ultimes).
- Design studies and design of the major refit (Grand Carénage) improvements of the fourth series of ten-year inspections of the 900 MWe fleet.

AREVA, various CNPE EDF, France

Design studies and installation of the fluid networks for chemical cleaning of steam generators.

ENGIE (Tractebel), Belgium

Replacement of the fire fighting networks in the reactor buildings of the Tihange power plant.

DISMANTLING

Dismantle your facilities, Bocard is your rational approach and expectations :

- Planning process and documentation from operation to implementation.
- Cost estimation scenarios.
- Physical and radiological characterization for health and safety concerns
- Waste management studies for hazardous materials.
- Dismantling technologies for metal alloys.

CEA, Grenoble, Marcoule, Cadarache and Valduc, France

We dismantled parts and components in restricted areas, with all needed protection before, during and after.



NUCLEAR SERVICES

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About Boccard

Boccard is a benchmark industrial integrator specialising in fluids and processes with more than **3500 employees in 35 countries**.

Since 1918, Boccard has established itself in France and around the world as a major player in the implementation of ever more efficient and innovative industrial installations.

Over the decades, Boccard has consolidated its trades: **engineering, manufacturing, construction and maintenance**.

Thanks to its excellence in project management based on its «Safety First, On Time, On Spec, On Budget» commitment, Boccard is a key global player in the optimisation of the investment life-cycle of its customers, in particular for the Nuclear, Oil & Gas, Power, and Steel industrial markets, as well as for the process industry markets such as Brewery, Food, Beverage, Cosmetics-Hygiene and Pharma-Biotech.

INTERNATIONAL PRESENCE AND LOCAL SITES



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