



POLITECNICO
MILANO 1863

DIPARTIMENTO DI ENERGIA



ITALIAN NUCLEAR SUPPLY CHAIN FOR SMALL MODULAR REACTORS

Preliminary investigation and Case Study on Large Components manufacturing
(Case #1: Reactor Pressure Vessel)

INDEX

..... INTRODUCTION	4
..... THE LONG HISTORY OF NUCLEAR AND ITALIAN INDUSTRY	5
..... ACCIAIERIE VALBRUNA S.P.A.	6
..... ANSALDO NUCLEARE S.P.A.	8
..... ASTRA REFRIGERANTI S.R.L.	10
..... ATB RIVA CALZONI	12
..... BREMBANA & ROLLE S.P.A.	14
..... CAEN SYS THE SPECTROSCOPY DIVISION OF CAEN S.P.A.	16
..... CECOM	18
..... CESTARO ROSSI & C. S.P.A.	20
..... DE PRETTO INDUSTRIE S.R.L.	22
..... DEMONT S.R.L.	24
..... FINCANTIERI SI S.P.A.	26
..... FOMAS GROUP	28
..... FORGE MONCHIERI	30
..... FORGIATURA MORANDINI S.R.L.	32
..... FRANCHINI ACCIAI S.P.A.	34
..... GEATOP S.R.L.	36
..... G.I.V.A. S.P.A.	38
..... OCEM POWER ELECTRONICS	40
..... OFFICINE LUIGI RESTA S.P.A.	42
..... RINA	44
..... SIET S.P.A.	46
..... SIMIC S.P.A.	48
..... SOFTEC S.R.L.	50
..... TECTUBI RACCORDI S.P.A.	52
..... WALTER TOSTO	54
..... CASE STUDY ON REACTOR PRESSURE VESSEL MANUFACTURING	56

INTRODUCTION

Italian tradition in manufacturing, construction, testing, engineering and related services for the nuclear field, sinks its roots since the '60s, when the first nuclear power plants were built in Italy.

That tradition of high quality, entrepreneurship, flexibility, innovation has been kept alive up to the present day in the European and international market, ready to be played on the most innovative and challenging projects of new nuclear technologies. Among these, the Small Modular Reactors, a new paradigm that is overwhelmingly appearing on the nuclear market, full of promises and opportunities.

The Italian knowledge and competence also on that SMR technology, largely based on the well-known experience of the pressurized water reactor, with the innovation of the integral approach - i.e. with all the primary components inside the main reactor pressure vessel - is long-standing, the first study and testing dating back in the '90s.

The Italian companies are ready to take up the challenge, strengthened by their experience, competence, initiative and commitment.

They are ready to set up the Italian Nuclear Supply chain for Small Modular Reactors, to provide the future needs components and services with unprecedented effectiveness and quality, to sustain the SMR market development and to deploy SMR solutions.

This brochure offers a flavor of capabilities and quality of the Italian nuclear job.

A first case study shows how the Italian supply chain can effectively provide large and critical components for SMRs. The first example is devoted to the Reactor Pressure Vessel, the most important component for the integral PWR technology.

But other case studies will follow. Stay tuned.

MARCO E. RICOTTI

Politecnico di Milano
Department of Energy, CeSNEF-Nuclear Engineering Division

THE LONG HISTORY OF NUCLEAR AND ITALIAN INDUSTRY

Nuclear Industry and Italy: a quite unexpected story! Foreign people, but also most of the Italians, think that a country which abandoned nuclear generation almost 40 years ago has little to say in terms of industrial capacity in such a sector. Nevertheless, if you dig a little bit more into the subject you find some surprises:

- Italian industry was largely involved in the completion of four (Cernavoda 1 & 2 and Mochovce 3 & 4) out of the five NPP's, put in operation in Europe since the '90s (the other one being Olkiluoto);
- Italy is second only to France in terms of European supplies for ITER, the most advanced nuclear project in Europe, with more than 50 companies involved, some of them in high technology items like Vacuum Vessel, magnets, divertor, etc.;
- going one layer below, you will find a significant Italian content in terms of semi-finished products (e.g. forgings) in NPP components supplied from other European companies.

So, how can we explain this?

Basically, the answer is twofold:

- Italian industry was one of the first in Europe (and in the World) to invest in nuclear, since the '60s, growing up till the post-Chernobyl referendum, when six units were under construction at home and three abroad; both public and private industries were involved at the time, in a quite synergic (even if not easy) equilibrium, so covering the full spectrum of a nuclear supply chain (apart fuel reprocessing);
- even more relevant, we should consider that Italy is the second EU manufacturing economy, with large companies as well as with a strong presence of SMEs: Italian industry is then used to compete, year after year, in the international markets, mainly leveraging on quality, technology, adaptability to the customer. Just an example: over the last 40 years, foreign markets account for an average 85% of Ansaldo Nucleare turnover.

So, don't be surprised if Italian companies are always looking with interest to high technology opportunities, as the best marketplace for them to compete and secure their future.

Therefore, as of today when Europe is on the path to launch several nuclear programs at the same time and has then to face the issue of an adequate Supply Chain, the Italian industry can and wants to provide a qualified contribution to the success of these programs.

ROBERTO ADINOLFI

President of Ansaldo Nucleare



Acciaierie Valbruna S.p.A.
 powergeneration@valbruna.it
 www.valbruna-stainless-steel.com



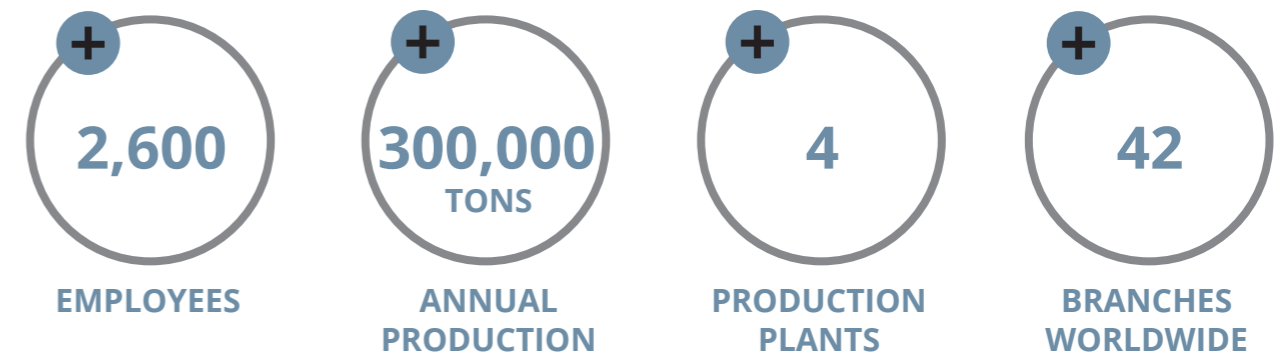
Stainless passion since 1925

For the Nuclear market, Valbruna offers several highly corrosion resistant Stainless Steels grades and Nickel Alloys for special applications in the most severe conditions of the plant, from the system and circuits subjugated to the reactor for the steam generators, through guide-tubes, up to turbines linked to the generators.

Founded in 1925 and now employing more than 2,600 people, Valbruna is a private company with a full integration, from production to distribution, focusing on long products of Stainless Steel & Specialty Alloys. With an experience of almost 100 years, Valbruna counts 4 facilities, with an annual production of 300,000 tons, and 42 subsidiaries worldwide that ensure constant direct contact with customers around the world. Valbruna produces and distributes Stainless Steel & High Nickel alloys available in ingots, blooms, billets, reinforcing bars, threaded rods, forged bars, hot rolled and cold drawn, peeled/reeled and centerless ground in round, hexagonal, flat, square and angle profiles; wire rod and wire.

Valbruna serves the most demanding markets as automotive, aerospace & defense, building, energy, food and pharmaceutical, medical, naval, oil & gas.

TECHNICAL COMPANY OVERVIEW



Valbruna is actively involved into the ITER project, as supplier of round and square bars in 316LN-IG both for cover plates and vacuum vessel, as well as to XM-19 for bolts and fasteners.

In order to assure excellent quality and high safety standards, Valbruna is provided with specific processes and a dedicated team for Nuclear and Power Generation Market.

Valbruna can supply a wide range of grades and profiles according to the ASME and RCCM (Level I, II and III), and according to Customers' specifications.

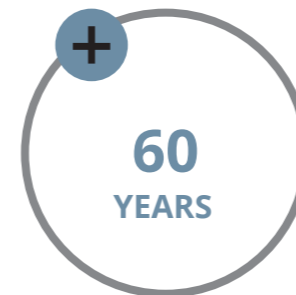
Valbruna currently supplies long products in Stainless Steels and Nickel Alloys, namely Austenitic (as 321, 304L, 316LN, XM-19), Ferritic, Martensitic and PH grades, as well as Fe-base and Ni-base Superalloys, such as A-286 or 625 for Nuclear applications.



Ansaldo Nucleare brings to the client a single entry point and a single multidisciplinary team that can design, procure and follow up the construction, installation and commissioning of complex projects.

Ansaldo Nucleare has consolidated its role as EPC contractor managing the integrated design, the supply of nuclear components and their installation in several recent projects in the domestic markets and abroad.

Ansaldo Nucleare provides tailored design and engineering, manufacturing, assembly, testing, commissioning, on-site installation and integrated logistics services for the following markets: Nuclear plant EPC, New nuclear builds, Fusion, Plant operation assistance.



**OF EXPERIENCE
 IN THE NUCLEAR
 SECTOR**



**SIZE OF THE
 WORKFORCES**



**SIZE OF SUPPLY
 CONTRACTS IN THE
 NUCLEAR SECTOR**

Ansaldo Nucleare
A one-stop shop for nuclear power solutions

Ansaldo Nucleare S.p.A. and its subsidiary Ansaldo Nuclear Ltd (UK) operate together as a "one-stop Shop" specializing in nuclear power.

Ansaldo Nucleare covers all nuclear activities. From the production of critical high-tech components to the design and construction of new builds, from decommissioning to advanced research on radwaste management, Fusion, Generation IV plants and Small Modular Reactors, we can do it all.

Ansaldo Nucleare is devoted to the advancement of nuclear technology, enhancing safety and guaranteeing public transparency. Safety, security, quality and sustainability guide our vision. We believe in a brighter nuclear future, providing carbon-free energy through advanced and modular technologies for dependable and competitive fission and fusion reactors.

We believe in a nuclear industry of the future and for the future.



New decommissioning & waste treatment solutions



Safety upgrade KRSKO2



**TYPE OF NUCLEAR
 QUALIFICATIONS**

- UNI EN ISO 9001:2015
- ISO 19443:2022
- IAEA GS-R-2
- ASME NQA-1
- ASME N-Stamp
- NBBI, Certificate of Authorization
- UNI EN ISO 14001:2015
- ISO 45001:2018
- ROSPA Gold
- IEC61508/61511/61513

**42 IN-HOUSE SKILLS WITH
 THE FOLLOWING MAIN
 TECHNICAL DISCIPLINES**

- Nuclear
- EC&I
- Mechanical
- Production
- Quality
- Civil
- Piping
- Plant design

**WE OFFER SERVICES FOR
 THE FOLLOWING NUCLEAR
 SECTORS**

- Nuclear plant EPC
- New nuclear builds
- SMR
- LFR
- Fusion
- Plant operation assistance
- Decommissioning and Waste Management



At Astra Refrigeranti, we strive to constantly innovate and improve our products and services to exceed Customers' expectations: our team of experts is committed to ensure the safety, performance and durability of our components, in order to meet the highest quality standards and industry requirements


Since 1948, Astra has been committed to provide customized heat exchangers and pressure vessels to clients worldwide. Passion, Innovation, Customer Satisfaction are the values that have driven Astra through decades of successful achievements in the Energy market. The recent acquisition by the Baglioni Group has strongly improved the presence of Astra in the international market as well as its level of competitiveness. The Group's total turnover in 2022 was 175 M€ with 900 Employees. The Galliate (NO) Plant is currently involved in the design, development, and manufacturing of mechanical components (heat exchangers, pressure vessels, balance of plant) for the Oil&Gas, Petrochemical and Green Hydrogen Industries. Since 2010, Astra introduced the most advanced project management SWs to meet and exceed Customers' expectations.

With over eight decades of expertise in the manufacturing of sophisticated mechanical components, Astra is determined to contribute to the development and growth of the nuclear industry in Europe: to this scope, we are ready to invest in resources and equipment.

Astra is among the world leading companies in the development and manufacturing of heat exchangers and Pressure Vessels for the Oil & Gas, Chemical and Petrochemical industries. Our objective is to become a reference company for the Nuclear market, both for the Decommissioning and for the New Nuclear Projects, like the European SMRs. Our capabilities include engineering and manufacturing NNP components, as well as radioactive nuclear waste containers. We pride ourselves on our team of highly skilled professionals who adhere to stringent safety standards and environmental regulations.




Astra has all the necessary qualifications to manufacture components for the Balance of Plant of Nuclear Plants.



SPECIFIC CAPABILITIES

Engineering capabilities for the design and for the production of mechanical nuclear parts. Manufacturing capacity to machine, weld, assembly, test, and ship complex mechanical components up to 100 tons weight, 45 m length and 5 m diameter. Welding capabilities and certifications for SAW, SMAW, GTAW, GMW, FCAW and electroslag. Helium and Water leak tests are available in house, as well as MPT, MFPT, radiographic and ultrasonic tests



Astra has started its activities in the nuclear market in 2021 and has participated to tenders for the supply of components related to the Italian Decommissioning. At the beginning of 2023, Astra invested heavily to realize a new workshop at the existing Galliate plant to guarantee the Nuclear Industry requirements both for Quality and for Manufacturing. Safety, Environment and Sustainability are at the core of our operations. Astra is ISO 45001, ISO 14001, ISO 9001 certified. **Astra can offer Engineering services and Manufacturing capabilities for the development, design and production of nuclear components, especially for pressure vessels, heat exchangers, containers for radioactive waste and all the mechanical components of the BoP.**



To make available to our customers the experience gained in many years of activity. To provide technologically advanced products and services, in compliance with high safety and quality standards, taking into properly account the nuclear safety culture

ATB RIVA CALZONI (ATB) was founded in 2003 through the merging of "Acciaieria e Tubificio di Brescia (ATB)" and "Riva Calzoni Impianti". Both the companies had global excellent results in the manufacturing of equipment for power generation and Oil & Gas Industries. Since the early '70s, after joining the Italian nuclear program and taking part to Super-Phenix reactor project in France, ATB has become one of the most important international players in the design and construction of nuclear components. ATB has been qualified by major Nuclear Engineering Companies for the manufacturing of critical components. During the last years, ATB has focused its commercial and industrial efforts on the High-Level Radioactive waste transportation and storage containers business. ATB is proud to be one of the most qualified suppliers of ORANO NPS. Recent experiences allow ATB to work on the next generation of components fabrication for Fusion projects both in Europe and USA and on new generation of SMR feasibility studies. ATB has recently established a long-standing cooperation with a key European Nuclear Technology Provider for manufacturing of critical components and/or studies as well as RT special examinations on primary pump casings in both its workshops (Roncadelle - Brescia and Porto Marghera - Venice).

TECHNICAL COMPANY OVERVIEW

Many years of experience combined with the most modern technologies allow ATB to manage the high complexity of nuclear business with versatility and flexibility, ensuring customers the optimization of delivery times and competitive costs reflecting the quality of the service supplied.



OF EXPERIENCE
 IN THE NUCLEAR
 BUSINESS

PRODUCTS

- Steel containment bended/ welded plates
- Pressure vessels
- Handling/assembly of steel structures
- Storage/transport casks
- Stainless steel complex structures
- Mock-ups fabrication
- Nuclear island components fabrication

SERVICES

- RT examination (with linear accelerator in bunker)
- Engineering & design feasibility study
- Special process qualification
- Post Weld Heat Treatment (PWHT)
- Component machining

SPECIFIC CAPABILITIES

- Assembly, Welding, cladding
- Bending & forming of steel plates
- Machining
- Welding machine
- Resin Pouring
- FAT (hydro, pressure, leak tests)
- RT Examination (into the bunker)
- PWHT (into the qualified furnace)
- HVOF coating
- TOFTD & Phased Array instrumentation available for NDT operation



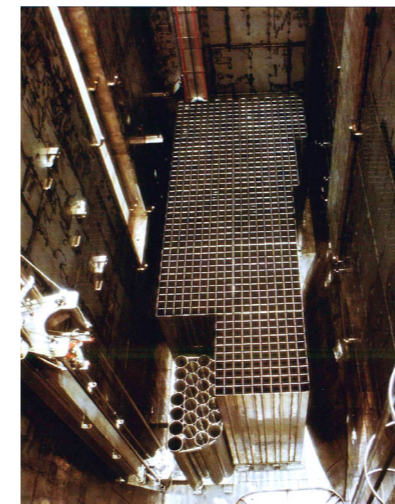


Reliable Engineering, Safe High Pressure Equipment and Sustainable Solutions for the Industry

Brembana&Rolle S.p.A., B&R, is leader in Engineering and Manufacturing of customized equipment for power generation, gas processing facilities, refineries, petrochemical and chemical plants. B&R is licensor of patented EMbaffle® technology, among the few innovations in shell & tube heat exchangers. With acquisition of Villa&Bonaldi and Zanon Pressure Equipment, B&R stepped into the fertilization sector. B&R is also main shareholder in the start-up NRG, developer of a global patented Organic Rankine Cycle multistage process. Group product portfolio includes conventional and advanced shell and tube heat exchangers, waste heat boilers and heat recovery units, API 560 fired heaters, incinerators, pressure vessels, reactors, columns. Counting on a cumulative 250+ year history of the Companies within the Group, B&R gained an incomparable expertise in design & manufacturing of high pressure and high temperature equipment, dealing with almost any kind of materials.

Engineering, fabricating and guaranteeing critical equipment for sustainable future making full use of more than 30 years experience in welding high thickness (up to 300 mm) AISI/Ni Alloys and Cr/Mo/V materials and with high vacuum equipment. Pursuant to Zanon experience in Nuclear and High Energy Equipment supply, B&R is now engaged in two Fusion Research and Development Projects with RFX Consortium

B&R Nuclear Division has been set to complete the Group proposal in sustainable-driven power generation. B&R may rely upon in-depth experience in handling of low and special alloys, welding techniques and innovative mechanical solutions for demanding Process Industry needs. Diligent efforts have permitted to finalize the first projects with Institutional Partners and some major qualification processes. Consolidation of procedures and operational approach are on-going to support incoming opportunities.

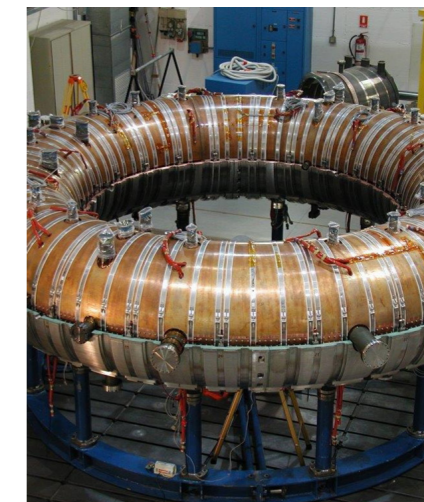


SIZE OF THE WORKFORCE

Potential workforce sums up to 80 blue and white collars. Capacity of Engineering is about 8,000 man hours / year



Selected areas of two workshops in Padua and Schio are devoted to Nuclear Production and segregated by the other production lines



CONTRACTS

RFX-mod2 modification and fabrication of Vacuum Enhancement Module & Thermal Shield for the Neutral Beam Generation Chamber (financed by ITER)

Nuclear Division has been set up in 2020 further to initial expression of interest from selected Group's European Customers. • In same year SOGEFIN issued the first qualification for EALR product category. TUV certification in compliance with EN ISO 3834-2 followed in 1Q 2023

Types of component produced: A. Casks & Containers for the storage of medium and high radioactivity Nuclear Wastes; B. Pressure Vessels & Heat Exchangers for BoPs of Nuclear Facilities; C. Potential capacity with respect to Nuclear Reactor design & fabrication: No limits in material according to ASME Sec.III design; max weight 1,000 Tons; Max thk 300 mm.

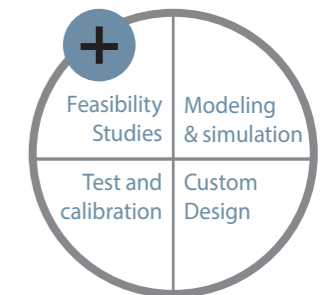
Nuclear measurements in the following Areas:

SAFETY & SAFEGUARDS

Nuclear Fuel Verification, Waste Characterization, Decontamination & Decommissioning, Dismantling / Environmental Monitoring

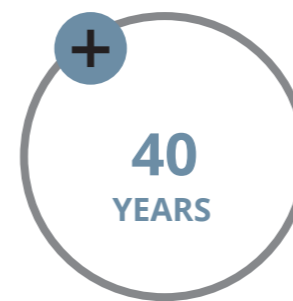
SECURITY

Environmental - Nuclear Emergencies, CBRN Protection / Border



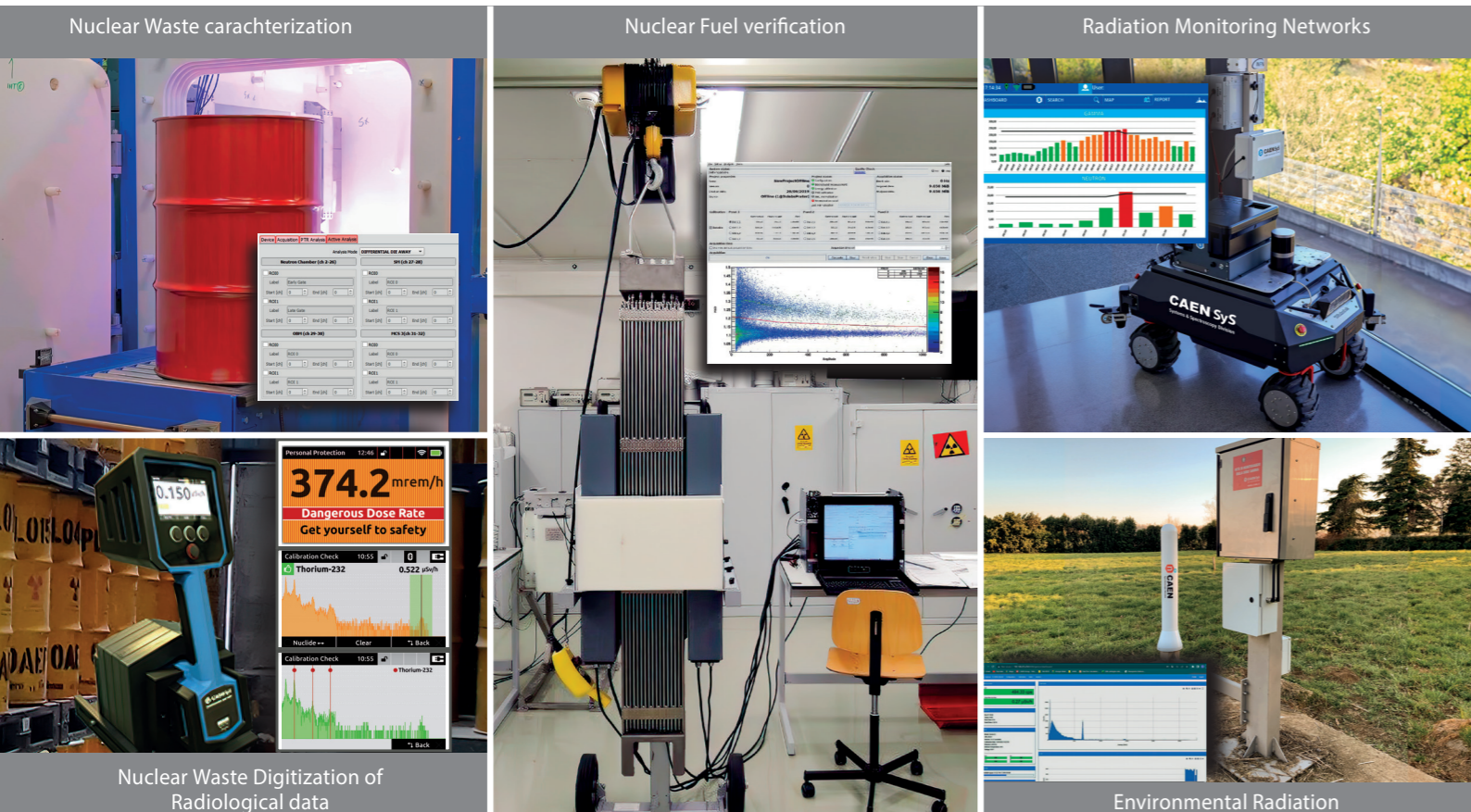
CAPABILITIES

Full electronic design with customization also with Radiation Hardening MCNP and GEANT4 Modeling and simulation for gamma & Neutron system design support Irradiation Laboratory and Calibration Laboratory Static & Dynamic testing of Nuclear Measurement Systems Environmental testing & EMC verification of Instrumentation



OF EXPERIENCE IN THE NUCLEAR SECTOR

Over 40 years of experience in design and manufacturing of Nuclear Electronics; executed several thousands of signal processing and data acquisition systems for fundamental research applications, particle accelerators, and nuclear applications, including extensive projects for CERN, USA DOE Laboratories (Oak-Ridge, Los Alamos, Sandia, Idaho, ARGONNE, Jefferson, Berkeley, Fermi Laboratories; ENEA, INFN, IAEA, CEA, IRSN, PSI, AREVA, ORANO, SCK-CEN, EURATOM, and several International nuclear physics facilities such as ITER, TOKAMAK...

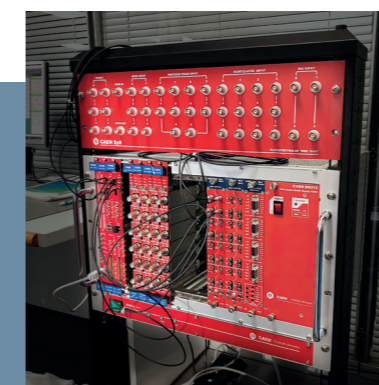


Nuclear Waste Digitization of Radiological data

Environmental Radiation

CAEN SyS: Systems & Spectroscopy Division of CAEN SpA, is a worldwide leader in development of Radiation Measurements Systems and Spectroscopy Solutions for Nuclear Facilities, Nuclear Power Plants, Nuclear Security and Nuclear Safeguards Applications

CAEN SyS is committed to delivering exceptional nuclear measurement instrumentation, expertise, offering radiation detection instrumentation and integrated turn-key solutions with added value and operational benefit, enhancing safety and security through nuclear measurements.



NUCLEAR INSTRUMENTS PRODUCED

- Radiation Monitoring Systems (GAMON-S and GAMON-D)
- Radiological Survey Systems (Gamon-Mobile, Gamon Drone)
- Nuclear Waste Characterization System: Gamma & Neutron: Passive and Active interrogation MICADO, DigiWaste-RadHand
- Underwater Measurements (GAMON-Diver)
- Nuclear Safeguards Unattended (CAEN Shift Register)
- Nuclear Security (SNIPER G-N and DiscoverRad)
- Health Physics : Low Background Whole Body Counter
- Neutron Measurements (Counting and Position)

SERVICES OFFERED

- Feasibility Studies for Nuclear Measurements Applications
- Design of Customized Nuclear Systems (Fuel Cycle, Nuclear Power, D&D Nuclear Safeguards analysis and design of solutions
- Nuclear Waste Characterization System Design with Digitization & AI



High Precision Solutions

CECOM was founded in 1964 in Rome by Cesare Ceracchi. Its growth was due to the prestigious collaborations with top organizations such as CERN, INFN, ENEA, Italian University, and LEONARDO.

Excellence, precision, quality, flexibility and the use of frontier technology have made CECOM a leader in high precision mechanics for nuclear, UHV, defense and aerospace fields, where provided expertise of designing, manufacturing and testing high-precision mechanical parts.

The production takes place thanks to the most up-to-date machineries for NC milling and turning, wire-eroding and CMM for dimensional inspection.

In order to finalize assemblies, CECOM carries out TIG welding, testing and leak detection with helium. Especially, The UHV department has a Bakeout, RGA and desorption rate measurements facility.

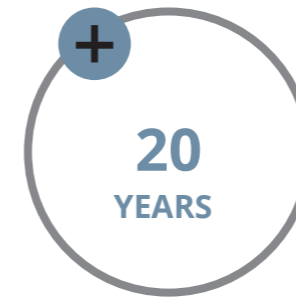
Special processes available are a copper deposition specifically developed to be used in nuclear, aerospace and cryogenic environments to replace critical welds

The company developed a team of qualified suppliers of other special technologies, such as explosion bonding, diffusion bonding, vacuum brazing, vacuum firing, EB welding, pressworking, galvanic treatments, laser and water jet cutting, and the development of electrical systems.

TECHNICAL COMPANY OVERVIEW

Keep fusion cool

The nuclear fusion business has been the flywheel for CECOM in last two decades. The experience begun with SPIDER Project, where CECOM developed a process to manufacture copper grids internally cooled by channels obtained by copper plating, in order to design review and manufacture the electroplated grids for a ITER plasma heating system. Later, within the framework of the MITICA project, the PDPQs, SCLWs, GSBPs and FSBPs have been entirely design reviewed, manufactured and successfully tested.



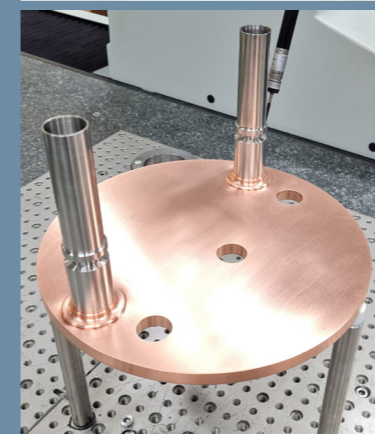
**OF EXPERIENCE
IN THE NUCLEAR
SECTOR**



**OF ENGINEERING
WORKED PER YEAR**

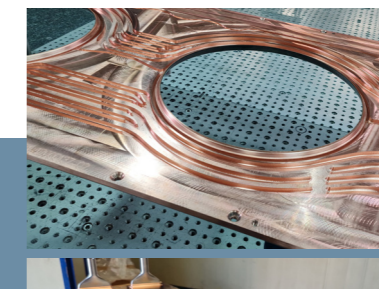


**SIZE OF SUPPLY
CONTRACTS IN THE
NUCLEAR SECTOR**



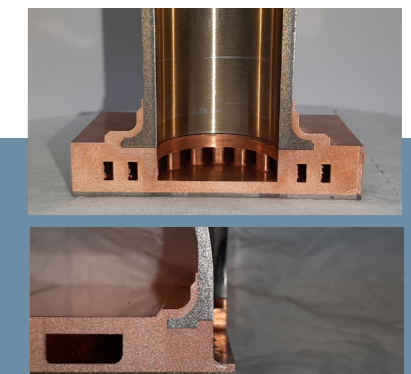
TYPES OF NUCLEAR QUALIFICATIONS

- ISO 9001
- ISO 9100



SPECIFIC CAPABILITIES

NC turning and milling of parts and assemblies up to 1,000 x 1,000 x 2,000 mm, welding, assembling and testing



TYPES OF COMPONENT PRODUCED

- Electroformed grids with heterogeneous non welded joints (copper/ stainless steel)
- Embedded sensors
- Fasteners for and neutron-irradiated and cryogenic environments
- Plasma facing components, Current leads



Cestaro Rossi & C. S.p.A.
 Via Vitantonio de Bellis, 37, CAP 70126, Bari (BA)
 +39-0805421066
 commerciale@cestarorossi.com
 www.cestarorossi.it



Cestaro Rossi & C. S.p.A. is an Italian Company engaged in Construction Erection and Maintenance of Mechanical and Electrical-instrumental Plants for Oil Refineries, Nuclear Plants, Power and Industrial Plants

Cestaro Rossi & C. S.p.A. embodies all the experience acquired by operating in different industrial settings, both in the field of maintenance and in the field of advanced plants construction & erection

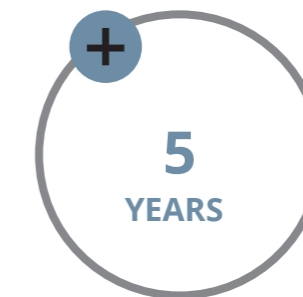
Cestaro Rossi & C. S.p.A., established in Bari in 1921, is a leader in the Prefabrication, Erection and Mechanical Maintenance (Turnaround) of Oil Refinery, Petrochemical Plants as well as Power Plants and Industrial Plants. Field of activity: Piping prefabrication and erection (carbon steel, AISI and alloy steel), Steel structures prefabrication and erection, Mechanical equipment installation, Equipment maintenance.

The Electrical Division of the Company is leader in the Electrical/Instrumental installations and maintenance for MV and LV Systems, including Explosion-proof electrical installations, Electrical Panels and Instrumental Calibration/Installation/Maintenance for Oil Refinery, Power and Industrial Plants.

Cestaro Rossi SpA leader in Italy in the industrial services field is your multi skilled partner for prefabrication, installation, commissioning and maintenance of the Industrial and Nuclear Plants.

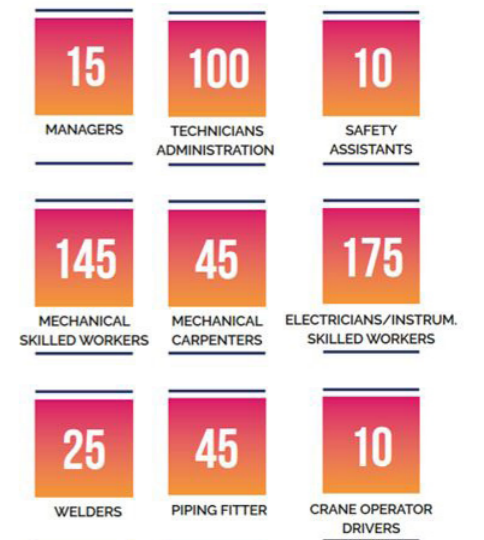
Cestaro Rossi is currently awarded two news contracts related to ITER Project for mechanical and electrical/ I&C installation plant sections.

Starting his activity in Iter site on 2018 Cestaro Rossi executed many prefabrication & installation works both for Iter Organization directly and the Domestic Agencies. The activities were done in the domains of AC DC conversion and the Cooling Water System.



5 YEARS
 OF EXPERIENCE
 IN THE NUCLEAR
 SECTOR

WORKFORCE



CERTIFICATIONS AND LICENCES

- Quality Certification: UNI EN ISO 9001:2015 - ASACERT
- Environmental Certification: UNI EN ISO 14001:2015 - ASACERT
- Safety Certification: ISO 45001:2018 - ASACERT
- S.O.A. Certification: OGg VIII - OG10 VII - OG11 IV - OS18-A VI
- Other Certifications:
 - MASE /UIC (Safety French)
 - VCA For personnel
 - EN ISO 3834-2:2006 (Welding quality)
 - EN 1591-4 Flanged joints personnel qualification
 - EN-1090-1 STEEL STRUCTURE
 - F-GAS fluorinated greenhouse gases
 - Welding Training Center - Certified by IIS

- Licences:
 - Legge 37/08 (ex 46/90)
 - NOS (Nulla Osta Sicurezza)
 - ESCO (Energy Service Company)
 - Fiber Optic - TCK.LAN Authorized Installer
 - SA8000:2014 - Social Accountability System
 - UNI/PdR 125:2022 - Gender equality



CONTRACTS

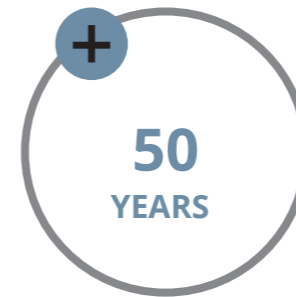
20 contracts for Procurement, construction & installations in the Nuclear sector with a global value of 35M€



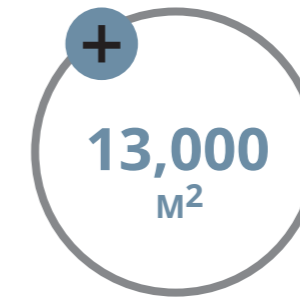
TECHNICAL COMPANY OVERVIEW

De Pretto Industrie: since the seventies the right partner for engineering challenges

De Pretto Industrie, est. 1885, has a long history with a primary role in the Nuclear Plasma Science mechanical elements. We have collaborated with over 20 research institutes in multiple projects in the development of mechanical components for nuclear applications. Many factors have contributed to our success, but we would like to highlight some of them: respect for tradition, innovation and teamwork, all values in which we have always believed in. Today, as we did in the past, we share a positive vision of the future and the commitment to guarantee a high level of standard and skills.

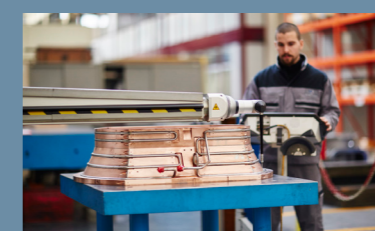
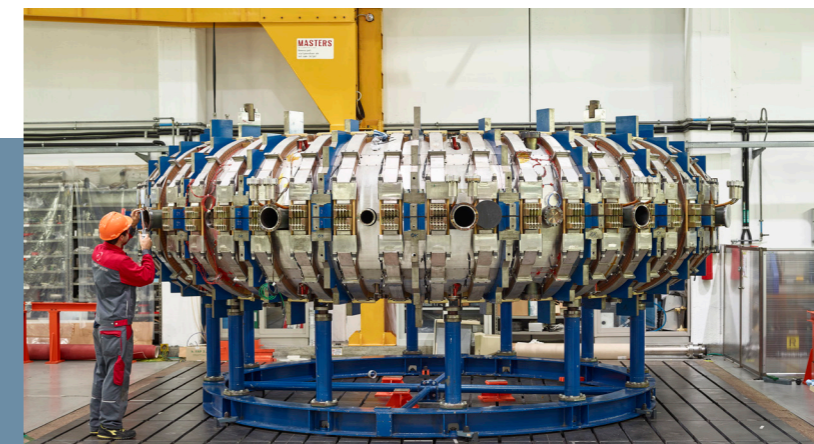
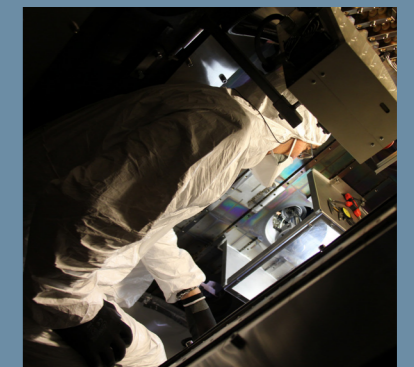


**OF EXPERIENCE
IN THE NUCLEAR
SECTOR**



**Comprehensive
workshop facilities for
welding, machining,
assembly and testing of
mechanical equipment.**

**More than 30 projects
executed in the last 8
years, average size 0.5
to 5 M€.**



REFERENCES:

- Large Vacuum Vessels
- High Vacuum Mechanical Components
- Neutral Beam Injectors
- Service and revamp on Vessels and Mechanical Components
- Handling and Lifting Tools for Nuclear Components

De Pretto Industrie: your partner for cutting edge bespoke mechanical solutions

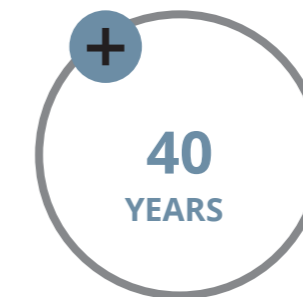
De Pretto Industrie Special Projects Business Unit specializes in the development (Design, Engineering, in-house Manufacturing and Testing) of tailor-made mechanical equipment for a wide range of industrial applications in the Nuclear, Oil&Gas and Renewable industries.



Tailored Solutions for Engineering, Manufacturing & Installation in Nuclear Power Plants

With 50 years of activity, Demont has an extensive experience in nuclear conventional and innovative technologies:

- Maintenance, mechanical erection in Nuclear Area of Research Center design (Ispra/Trino)
- EPC: HVAC systems NPP Mochovce
- EPC: sludge transfer, activated parts recovery and water removal in fuel pool NPP Latina
- EPC: interconnecting piping - Cryogenic and Chilling plants and HVAC System - LHC project CERN
- Installation activities in Fusion Plant (ITER)



OF EXPERIENCE
IN THE NUCLEAR
SECTOR



Tailored Solutions for Manufacturing & Turnkey Plants

Thanks to its 50-years' experience and on-site knowledge, Demont can guarantee the achievement of client's goals and the highest quality level of the works, combined with the compliance to the most stringent HSE regulations.

Able to design and build complex, safe, and sustainable plants as EPC Contractor in Oil & Gas, Power Generation and many strategic sectors, both in Italy and abroad.

Demont integrates the role of EPC Contractor by offering multidisciplinary erection and engineering services and in-house manufacturing.

Specialized in a wide range of manufacturing, fabrication and machining works applied to Oil&Gas, Power Generation and Industrial sectors. The manufacturing activities for pressure vessels and heat exchangers, fabrication of storage tanks, piping, steel structures and boilers & heaters pressure parts, together with other machining works are carried out in our facilities located in Millesimo (SV) that covers a total area of 23.550 m², 10,350 of which are covered.

The continuous research for improvement of production processes is the main feature of our manufacturing activities, to ensure the best efficiency and the supply of a product always in line with client's needs, through the application of top-level quality standards.



SERVICES

Engineering,
Manufacturing & Erection
of special components/
Systems for conventional
and fusion N.P.P



SIZE OF THE WORKFORCE

In-house manufacturing
workforce: 100,000h
In-house engineering
hours: 90,000h
On-site worked hours:
> 1.000,000 h



CONTRACTS

20+ from 500,000€
to 60M€

QUALIFICATIONS

Expertise on ASME III,
ASME AG 1, IEC/IEEE



Innovation and green energy solutions for sustainability and respect for the environment

Fincantieri is one of the largest shipbuilding companies in the world. The Group is a pioneer and an international key player in many high value-added segments. Although the construction of ships represents the main business, Fincantieri, through its own business units and subsidiaries operates wide-ranging in the industrial market. It's the case of Fincantieri SI, which is the reference for the Group for electric, electronic and electromechanical systems in industrial, marine and nuclear sector.

Fincantieri SI main activities rely on innovative system integration, development of electrical and mechanical plants (piping, HVAC, special and qualified components) design and management of complex projects.

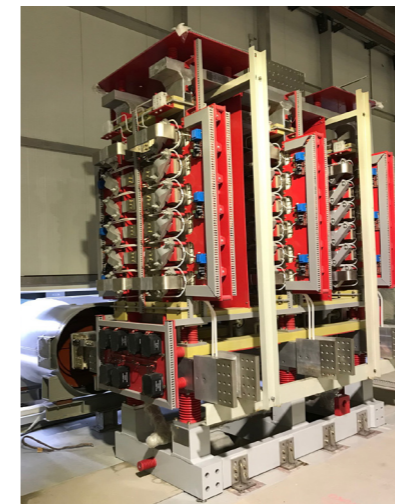
In particular:

- Renewable Solutions, Smart power management and Energy Storage
- Nuclear sector

Fincantieri Si plays a fundamental role for the Group about green solutions and sustainable technologies, also making use of the experience and the well-developed know-how of the FINCANTIERI Group.

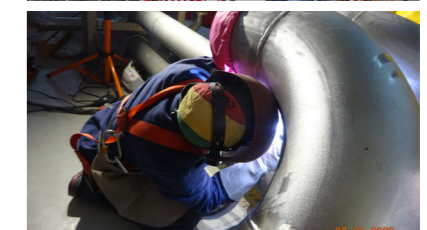
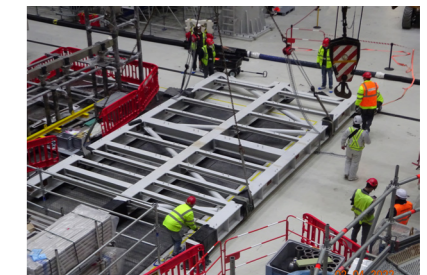
Supply, qualification and installation of PIC/NON-PIC electrical and mechanical systems

FINCANTIERI and FINCANTIERI SI are actively participating in the ITER (International Thermonuclear Experimental Reactor) project for the construction of an experimental nuclear fusion reactor for the supply of clean energy. The contracts are usually awarded to a Consortium in which Fincantieri plays the role of leader.



SIZE OF THE WORKFORCE

Approx 45 people between field and back-office engineers with more than 20,000hrs/y of engineering. Around 65 people as direct workforce



SPECIFIC CAPABILITIES

Project management, activities coordination, effective operative organization in complex and international environments



SERVICES

Engineering, procurement, installation and integration of electrical and mechanical systems and equipment qualification

Several are the contracts awarded by Fincantieri SI in the nuclear sector. The most important are the following:

ITER - BOP5 (order 2018) abt. 30M€ - Installation of Fast Discharge Units, Aluminium water-cooled Bus-Bars and auxiliary systems. **ITER - BOP6 (order 2018) abt. 12M€** - Installation of AC/DC converters, reactive power compensators and harmonic filters, transformer dressing and prefabrication and installation of cooling piping. **ITER - TCC 1 Project (order 2019) abt. 100M€** - Installation of innovative equipment (waveguides and gyrotrons). Prefabrication and installation of special piping (tritium, cooling pipes, high vacuum, high pressure). Supply, prefabrication, and installation of fire-protected platform, with tritium decontamination coating. Helium test execution. LAC qualification. **ITER - Temporary HVAC (order 2020) abt. 6M€** - Tokamak building temporary HVAC and related systems: turnkey engineering, supply, and installation. **ITER - BOP3 (order 2021) abt. 9,1M€** - Installation of Cooling Water Systems, building surrounding Tokamak interconnection and communication. **F4E - TB13 (order 2022) abt. 5,6M€** - Engineering, supply, and installation of NON-PIC/PIC equipment of HVAC systems. **F4E - TB21 project: framework contract awarding for MECHANICAL WORKS FOR THE TOKAMAK COMPLEX AND SURROUNDING - LOT2) - possible value abt. 300M€** **SOGIN-ERSMA rad-store building project (order 2021) abt. 15M€**



FOMAS Group
 Via Martiri della Liberazione, 17 - 23875 Osnago (LC) - Italy
 +39 039 99811
 info@fomasgroup.com
 www.fomasgroup.com



Mastering the science of metals

FOMAS Group is a multinational group with eight companies worldwide and more than 1,400 employees. It supplies open-die forgings, and seamless rolled rings in every type of steel and non-ferrous alloys. Furthermore, it produces Iron, Nickel, and Cobalt base powders. Its solutions meet the demand of Power Generation, conventional and nuclear, Oil and Gas, Industrial, and Aerospace markets with the highest levels of quality and delivery service.

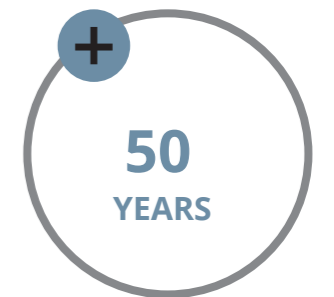
The expertise within the Group allows it to optimize processes and materials, minimize cost, and maximize product quality.

Its roots, from which its knowledge descends, go back to 1956, when the Metallurgy Professor Gastone Guzzoni establishes FOMAS, a company located in Osnago and specialized in forgings, which is still today the headquarters of the Group. Today the third generation carries on the vision of the founder, keeping the company at the forefront in terms of innovation.

TECHNICAL COMPANY OVERVIEW

Mastering the science of metals

FOMAS has successfully provided forgings to Nuclear Power Plants for the past 50 years. Nowadays, with a maximum capacity to manufacture forgings up to 100 tons, FOMAS can supply 1st to 4th generation primary/secondary circuit forgings, equipment for nuclear waste management, and components for nuclear hot fusion – ITER Project.



OF EXPERIENCE IN THE NUCLEAR SECTOR



QUALIFICATIONS

FOMAS supply forgings in accordance with:

- ASME
- RCCM
- TÜV
- KTA
- ISO EN
- BS
- GOST
- JAW
- NNSA-HAF604

Furthermore, the Group Companies' management systems are certified by DNV in accordance with ISO 9001, ISO 14001, ISO 45001, ISO 50001



CAPACITIES

Actual as forged weight and dimension limits

- max. diameter: 5,500 mm
- max. length: 18,000 mm
- max. ingot: 125-ton ESR
- (Equivalent to 170 tons conventional ingot)
- max. shipped weight: 100 ton

5 presses (all with integrated manipulators): 12,500 tons; 6,000 tons; n. 2 - 3,500 tons; 2,000 ton
 Three ESR stands



SERVICE

TYPICAL COMPONENTS

- Steam Generator
- Primary Heads
- Main Tube sheets
- Feedwater Nozzles
- Valve body & auxiliary components
- Inlet - Outlet Super Heater Nozzles
- Manway nozzles
- Sever Accident Safety Valve Nozzles Safe End
- Primary nozzle Dam Rings
- Core Support Components
- Primary Feedwater Pump Components
- Spray nozzle Transition Rings
- Boron Control System Motor Cases
- Low Pressure Steam Rotors
- Cask



MISSION: Excellence and Sustainability in the Forging Industry

Forge Monchieri is a leading Italian Forge Master, it is one of the most famous Italian enterprises in the forging sector; it has been operating for over 50 years and is continuously expanding.

With its production capacity of up to 100 tons, it's leader in the forgings industry of large sized parts in finished or rough machined condition. With a workshop area of about 40,000 m² it has a strong presence within the industrial district near Milan area, all the production activities are localized within the same zone, optimizing the logistic flows.

The quality of the supplied forgings is guaranteed by an efficient know-how, an expert R&D department and state-of-the-art plant systems.

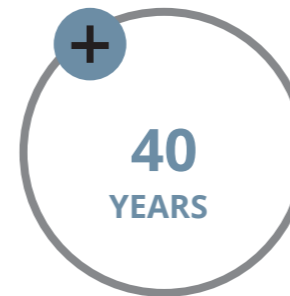
These characteristics allow Forge Monchieri to promptly respond to the numerous requirements of a rapidly evolving market.

TECHNICAL COMPANY OVERVIEW

Forge Monchieri is the right partner in nuclear market thanks to its long-time experience and know how especially on:

- **New POWER PLANTS/REVAMPING**
- **WASTE management**
- **SMR small modular reactor**

More than 30 years in the sector as leading company; documentation & procedures: an experienced supply chain team able to provide customized documents; qualified personnel: level II and III NDT, project management, PM approach as single point of contact, product portfolio.



**OF EXPERIENCE
IN THE NUCLEAR
SECTOR**

Since 2009 (Accreditations:
HAF 604 Nuclear since 2009
and ASME III since 2010)



CAPACITIES

- 12,000-ton press
- 5,000-ton press
- N. 10 forging furnaces
- N. 10 heat treatment furnaces
- special heat treatment equipment
- N. 6 cooling tanks
- internal laboratory
- special testing machines



SERVICES

Types of component produced:

- Steam Generator
- Reactor Vessel
- Core Makeup Tank
- Pressurizer
- Passive Residual Heat Removal
- Reactor Coolant Pump
- Shell
- Tori spherical Head
- Lower Head with Integral Nozzle
- Support Cone
- Upper Head
- Lid for monobloc cask
- Anticrash
- Primary Lid



QUALIFICATIONS

"ASME sec. III div. 1",
"RCC-M", customer specifications

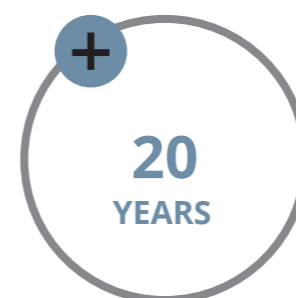




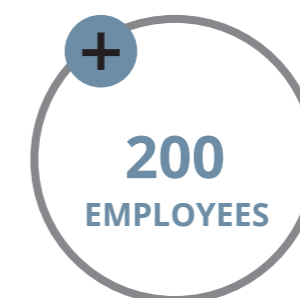
TECHNICAL COMPANY OVERVIEW

Looking to the Future

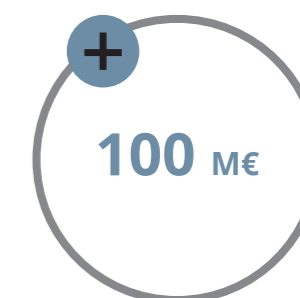
Strategically positioned to be a leading supplier of complex forgings to the Small Module Reactor nuclear market globally thanks to its wide & large production capabilities combined with its organization & robust supply chain.



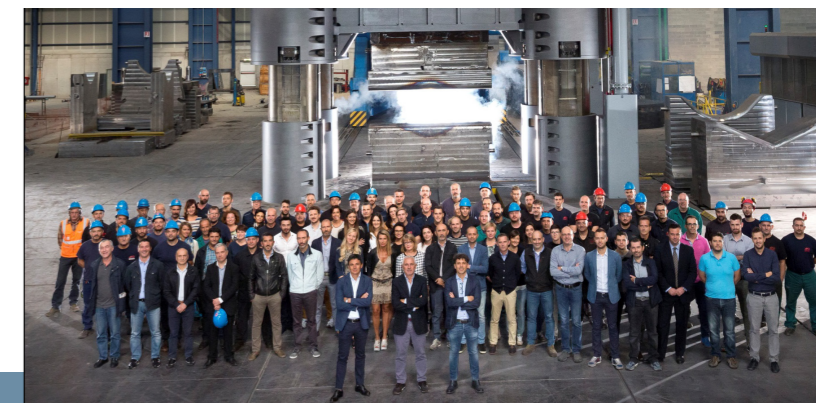
**OF EXPERIENCE
 IN THE NUCLEAR
 SECTOR**



**ANNUAL SALES
 OVER 120M€**



**SIZE OF SUPPLY
 CONTRACTS IN THE
 NUCLEAR SECTOR**



**Looking to the Future.
 Your top edge technology for Nuclear Forgings**

Forgiatura Morandini was established by the Morandini Family in the late seventies in Cividate Camuno, province of Brescia.

Today the factory covers an area of 100,000 m². During its **fifty years of forging production experience** it excelled in combining family **passion, innovation, technology and high quality** in the manufacture of open-die forgings made of carbon, specialty steel, alloy, stainless steel and nickel based alloys for its customers globally.

The **Innovative Soul** of the Company, its **Constant Commitment technological progress** and **Looking to the new future the needs of the market** has allowed it to reach:

- 1) A production capacity of 75,000 tons per year providing both open die & ring rolled forgings to numerous industrial sectors
- 2) An organization of 200 employers with a managerial team and structured to support its customers globally in complex production and supply of forgings

**TYPICAL COMPONENTS
 PRODUCED**

- Pressurizers Shell**
 - Upper head
 - Lower head
- Steam generators**
 - Shell
 - Tori spherical head
 - Tube sheets
- Tube Forgings**
 - Hot legs
 - Straight & curved forgings tubes
- Nuclear casks**
 - Shell
 - Bottom
 - Cover
 - Flanges
- SMRs**
 - RPV
 - Component

Complete forging solutions to the nuclear market comprising of:

- Wide range of open die forging presses (5) from 1,000 tons to a 16,000 tons press providing forgings in size ranging from 100 kgs to 90 tons in rough machined or finished machined condition
- Large rolling mill to supply large shells and rings / flanges (maximum size range Ø 8,000 mm - H 4,000 mm) which complements our open-die forging production capabilities
- In-house machine shop and laboratory facility as part of our vertically integrated operations to ensure a high service level and quality control of forgings to our customers
- Consolidated supply chain including European steel melt shops suppliers

**NUCLEAR
 QUALIFICATIONS**

- ASME III Materials Organization
- RCCM
- KTA 1401
- TURKISH ATOMIC ENERGY AUTHORITY



Tradition, Innovation, Technology & Know-How to Forge the Future Now and together.

Franchini Accia SpA (FA), founded in 1968, is specialized in the production of medium/large-size forgings for high-demanding applications. Headquarters & Production plants, with about 150 employees, are located at Mairano (BS), in the north part of Italy. FA has continuously improved its manufacturing processes (70 kton of production capacity) in order to meet the growing requirements of the global market. FA starts from the accurate selection of ingots from qualified European steelmakers and produces components with very complex geometry through open-die forging, heat treatment, and machining operations. The forging shop is equipped with 3 presses (2,500, 3,500 and 8,000 tons) with integrated and mobile manipulators. Along with traditional furnaces for ingot and forgings heating, FA is also equipped with:

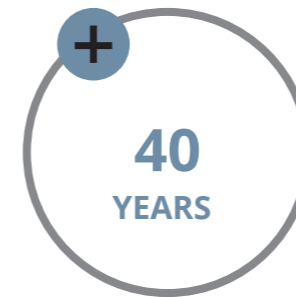
- a) new furnaces for quality heat treatment with semi-automatic loading system (transfer time from furnace to quenching less than 90 s);
- b) machining shop for finished components with complex geometry.

FA carries out Research & Development Projects through the Product Engineering and Quality Departments and the involvement of metallurgical consultants, universities, advanced laboratories and research centres. FA invests nearly 1.8% of its turnover a year on R&D.

TECHNICAL COMPANY OVERVIEW

FA follows the most stringent requirements in terms of grade composition, material integrity, dimension tolerances, quality documentation and quality control

Combining outstanding industrial capabilities, manufacturing skill and metallurgical expertise, FA has supplied forgings for international nuclear projects such as EPR, HPC, NORIA, NORTH ANNA, JPP, SZC, EPR2, FLAMANVILLE, OLKILUOTO, TN EAGLE, BK15-prime, TNG3. We are proud to accompany first class companies such as FRAMATOME (previously AREVA), Areva Dongfang China (FDJV), Velan (Tractebel Engie), SKODA, Orano NP, and many other important customers and partners.



OF EXPERIENCE IN THE NUCLEAR SECTOR

FA operates according to RCC-M, RCC-MR, RCC-MRx, as well as to ASME code and many customer certifications: RCC-MM140, Framatome, VELAN. In 2011 FA achieved Material Organization certification according to ASME BPVC section III NCA3800.

Franchini Accia invested huge resources –equipment, tools and skilled technicians- to be able to provide components required by the modern nuclear industry: forgings up to 120 tons



Examples of our products are:

Containers for exhaust nuclear fuel (Casks), constituted of Shell and bottom (ASME SA-350M LF2 Cl. 1), Primary Lids and Trunnions (X3CrNiMo13-4), Semi-products (ASME SA-350M LF2 Cl. 1); Monoblock casks (ASTM A350 LF5), Shells + bottom (X2CrNi18-9 + S325G).

Components for nuclear plants: Main Flanges (16MND5); Motor shafts (25NCD 8-05); Suction adapters (Z2 CN 19-10+N2); TB flanges (Z2 CN 19-10+N2); Pump shafts (Z6 CNNb 18-11); Spool pieces (30M5); Pipes (P355NH), Connecting Parts (P355QH); Valve bodies (ASME SA-182M F316), etc.

Product portfolio - Nuclear

 Cask	 Pump shaft	 Main flange	 Shell
 Cover	 Pipe	 Generator shaft	 Suction adapter


3,500 t Press


2,500 t Press


8,000 t Press



Nuclear sector constitutes 7-8% of FA turnover

FA has more than 40 years of experience in the nuclear sector and ~Hours worked per year: 20,000



Geatop S.r.l.
 Via Mattatoio 3 – 12037 Saluzzo(CN) – ITALY
 +39 (0)175 219399
 info@geatop.it
 www.geatop.it



Transform the power of measurements into value

Geatop S.r.l. stands as a pioneering metrology company, boasting over a decade of experience in the nuclear sector. We have earned a well-deserved reputation as a top-tier provider of high-precision measurement solutions.

We take immense pride in collaborating closely with our clients to understand their unique requirements, tailoring our solutions to meet their specific needs effectively.

At Geatop S.r.l., we firmly believe that precision is not just a goal but an inherent value in all aspects of our work. We understand that precise measurements are not merely data points but the foundation for enhanced operational efficiency and elevated product quality for our clients.

We also recognize the crucial role of quality control in various industries. To that end, we utilize our expertise and advanced metrology solutions to streamline quality control processes, translating measurements into tangible value for our clients.

Innovation is at the heart of our endeavors. We continuously invest in the latest technologies and stay ahead of industry advancements, positioning ourselves as pioneers in the metrology field.

Experience the Geatop advantage and witness how our precision, technology, and commitment to excellence elevating measurement capabilities to new heights.

TECHNICAL COMPANY OVERVIEW

EMPOWERING NUCLEAR ENERGY WITH PRECISION MEASUREMENTS

Geatop S.r.l. is working closely with the top principal nuclear projects throughout Europe. Our experience and expertise have earned us the privilege of collaborating with prestigious initiatives like ITER, DEMO, DTT, CFS and RSG.

As preferred metrology partner for these groundbreaking projects, Geatop, providing high-precision measurement solutions, ensure the success of such ventures. We take immense pride in contributing to the advancements and innovations in the field of nuclear technology.

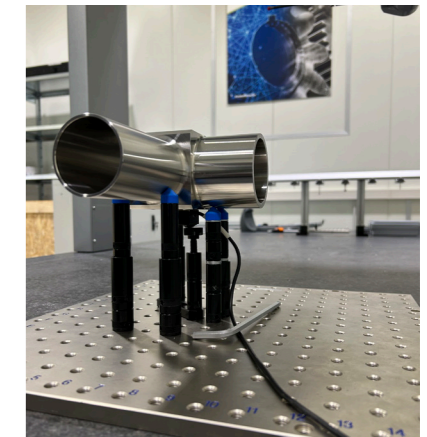


OF EXPERIENCE IN THE NUCLEAR SECTOR



43 collaborators/81,000 hours of engineering worked per year.

22 collaborators who work for the nuclear sector and develop 42,000 hours per year



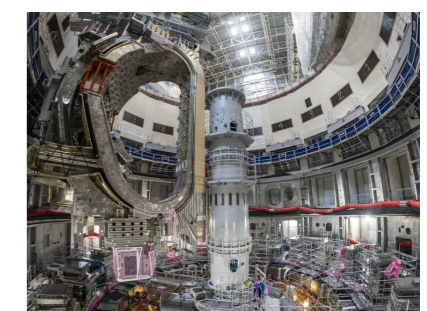
CONTRACTS

11 of supply contracts of the Company in the Nuclear sector



SERVICES

metrological consultancy services and dimensional tests for the nuclear sector





G.I.V.A. S.p.A.
Via Risorgimento, 63 - 20017 Rho (MI) Italy
+39 02 93901503
info@givagroup.it
www.givagroup.it

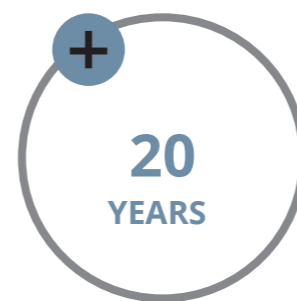


TECHNICAL COMPANY OVERVIEW

WE SUPPORT THE WORLD IN ITS NON-STOP CHANGING

Experience and skills, combined with the technological power of their plants, make GIVA's steel mills and forges a reference in forged components for **nuclear power industry applications since early 2000s**.

Our companies count the main international **nuclear certifications and approvals** and have always invested in professional training and cutting-edge technologies, including melting, re-melting, forging, ring rolling, and machining facilities.



20 YEARS
OF EXPERIENCE
IN THE NUCLEAR
SECTOR



50 CONTRACTS
More than 50 supply
contracts



TYPES OF COMPONENT PRODUCED

- Steam generators
- Collectors
- Spherical heads
- Tube sheets
- Cask for nuclear transportation storage
- Cooling pump system
- Core make up tanks
- ITER projects components
- ITER tokamak components



SPECIFIC CAPABILITIES

- Several forging presses up to 100k tons
- Quality heat treatment furnaces
- In-house restricted area
- Finishing machining equipment
- Quality and certified production process



TYPES OF NUCLEAR QUALIFICATIONS

- Quality System Certificate as Material Organization according to ASME Code Sec. III
- Part qualifications according to RCC-M Code (shell barrels for steam generators in 20MND5)
- Part qualifications according to RCC-MR for different forgings for component for ITER project (in 316L(N)-IG and Steel 660)
- Other local EU & Asian

Together, ahead of the game

GIVA – Italian family-owned group founded by Mr. Antonio Vienna in the 1960s – is worldwide leader in **manufacturing of steel products** as ingots, forgings, valves and actuators. It boasts consolidated know-how, technologies and records, and delivers value to **international projects** in the construction of large-scale infrastructures, energy systems, plants and machinery.

GIVA controls **2 steel mills, Nunki Steel and Italfond**, integrated into the production process of the **3 forges, Forgiatura A. Vienna, Ofar and Forgia di Bollate, and 9 machining workshops** which provide continuity to the forges by completing their process up to the finishing activities.

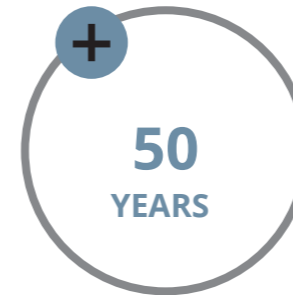
It's a **fully integrated network of complementary companies** in northern Italy and counts 19 modern and highly specialized production plants, 13 open die forging presses, 6 ring rolling machines and more than 30 manipulators, furnaces and machining centres.

Thanks to its **business-integrated model**, GIVA handles the entire manufacturing process from scrap melting to the final product, guaranteeing full control over quality, timing and cost. The whole network implements a **Quality Management System** according to specific international standards and pays attention to the **ESG Program** as a functional approach to the business.

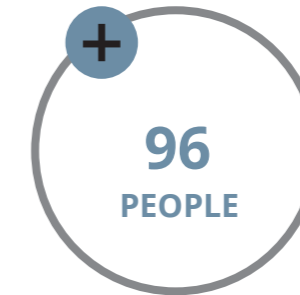


Power Converters with Currents up to 100 kA and Voltages up to 120 kV

OCEM Power Electronics has a worldwide experience in Thermonuclear Fusion with more than 20 customers served, and a wide range of solutions in power conversion, providing High Current power supplies, High Voltage DC and Pulsed power converters, Radio Frequency Amplifiers at various frequencies both solid state and tube-based.



OF EXPERIENCE IN THE NUCLEAR SECTOR



45% Engineers, 20% below 35 years old, 20% women, 13 nationalities, 15 spoken languages.



SIZE OF SUPPLY CONTRACTS IN THE NUCLEAR SECTOR



Ion Source and Extraction Power Supplies for ITER. A turn key integrated system capable to generate voltage up to 1000 kV, Energy up to 17 MW and 3600 s of pulse length

OCEM Power Electronics supplies power systems worldwide for research, thermonuclear fusion and particle physics

OCEM Power Electronics develops power systems for premier research laboratories worldwide. Its custom power systems and solutions are enabling advances in the fields of plasma and particle physics, and medical research, driving advanced industries such as transportation and food processing. Taking advantage of its power electronics know-how and its cutting-edge technology, OCEM has become a leader in this niche industry. In recent years, OCEM engineers have developed and patented new power electronics technologies, and have authored, presented and published several papers at conferences around the world. The company's ongoing scientific research and commitment to high quality, combined with a flexible and customer-oriented approach, have made OCEM's tailor-made solutions an invaluable asset for customers and other partners. The company has supplied power converters to more than 50 research facilities in 20-plus countries, including several Nobel-Prize winning labs.

Since 1943 OCEM Power Electronics has supplied: Highly stabilized current power converters for magnets and coils; High-voltage modulators; RF Amplifiers; High-voltage power converters for IOTs, gyrotrons, tetrodes, klystrons; Pulsed power converters; Capacitor chargers and Railroad converters and gearboxes.



20,000 A 80 V power supply for high current magnets. OCEM provides modular solutions with switching modules in parallel connection to reach very high currents. Available for normal and superconducting magnets and coils

TYPES OF COMPONENT PRODUCED

- High Current power supplies and protection systems for Coils and Magnets
- High Voltage power converters
- High Power Radio Frequency amplifiers
- Complex Power Electronics systems
- Maintenance and Services on site

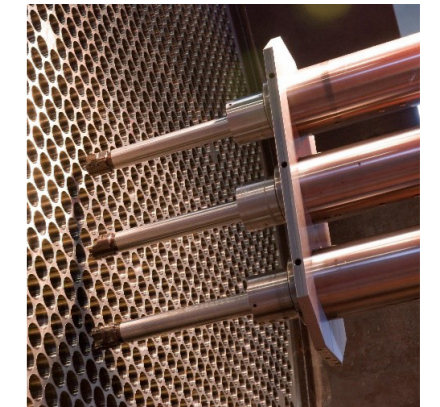


Officine Luigi Resta S.P.A.
 Corso Europa 49, 24020 Scanzorosciate (BG), Italy
 +39 035661130
 resta@officineresta.it
 www.officineresta.it



TECHNICAL COMPANY OVERVIEW

Officine Luigi Resta S.p.A. has been active on Nuclear market for 15 years. On 2011 the Company also got the ASME N, NS and NPT stamps and is currently manufacturing some critical equipment intended for a major European Nuclear power plant under construction.



Focus on Excellence

Since 1950 Officine Luigi Resta has been designing and manufacturing critical process equipment for the Oil & Gas, Fertilizer, Petrochemical and Power Industries.

Over the years the Company has continuously improved their manufacturing techniques and facilities in order to properly respond to the market demand in the supply of high pressure equipment, critical items and in the welding of exotic and unconventional materials.

The Company is also pleased to announce its involvement in the Low Carbon Industry having already successfully manufactured equipment for the capture and processing of CO₂, as well as for the production of renewable fuels.

The extensive experience acquired over more than 70 years guarantees our after-sales team the possibility of providing efficient, fast and reliable maintenance and repair services at the Customers' plants. Thanks to the high quality standards, reliability and continuity expressed over the years, Officine Luigi Resta today stands as a point of reference in the static equipment market and as an ideal partner for End Users, Licensors and Engineering Companies.



Officine Luigi Resta S.p.A.
 has the capability to
 manufacture Heaters,
 MSR, Reactor Pressure
 Vessels

QUALIFICATIONS

ASME N, NS and NPT
 stamps



SIZE OF THE WORKFORCE

Manufacturing:
 200,000h/year
Engineering:
 20,000h/year



Rolling capability: 5'500mm
 diameter and 180mm
 thickness
**Maximum welded
 thickness:** 350mm
 **Tubesheet drilling
 capability:** 6,000mm
 diameter and 1,040mm
 thickness
Lifting capability: 500ton



RINA
 Via Corsica, 12, 16128 Genova (GE) - Italy
 +39 010 53851
 info@rina.org
 www.rina.org/it



Make it Sure. Make it Simple.

RINA is a multinational group providing a wide range of services across the Energy, Marine, Certification, Real Estate, Infrastructure and Mobility, and Industry sectors. With net revenues in 2022 of 664 million euros, over 5,300 employees and 200 offices in 70 countries worldwide, RINA is a member of key international organizations and an important contributor to the development of new legislative standards.

Founded in 1861 as a ship classification society, RINA, starting in the 1990s, began a process of diversification. RINA's goal is to support stakeholders throughout the value chain, with a strong focus on aspects of energy transition, digitalization, and ESG sustainability.

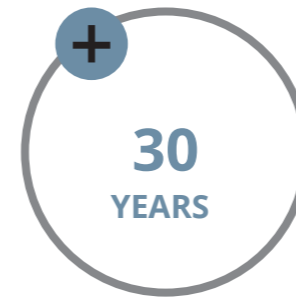
RINA S.p.A. holds 100% of the shares in RINA Services S.p.A. and RINA Consulting S.p.A., operating companies that provide certification, inspection and testing, and consulting engineering services, respectively, directly or through companies controlled by them.

RINA Services and RINA Consulting are Italy's first certification company and first engineering consulting company, respectively.

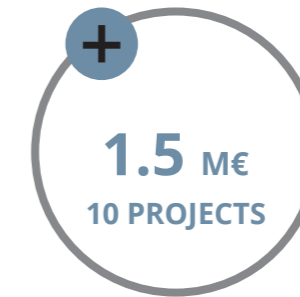
TECHNICAL COMPANY OVERVIEW

A global team of engineers, inspectors, material scientists, consultants and field supervisors supporting the nuclear industry

RINA is committed to the energy transition and its aim is to lead solutions to enable a low carbon energy economy. Nuclear is one of the main pillars for energy transition and RINA, as a services provider, supports nuclear technology development leveraging on its technical experience and competences gained as a certification, classification society, inspection and international consulting engineering.



**OF EXPERIENCE
 IN THE NUCLEAR
 SECTOR**



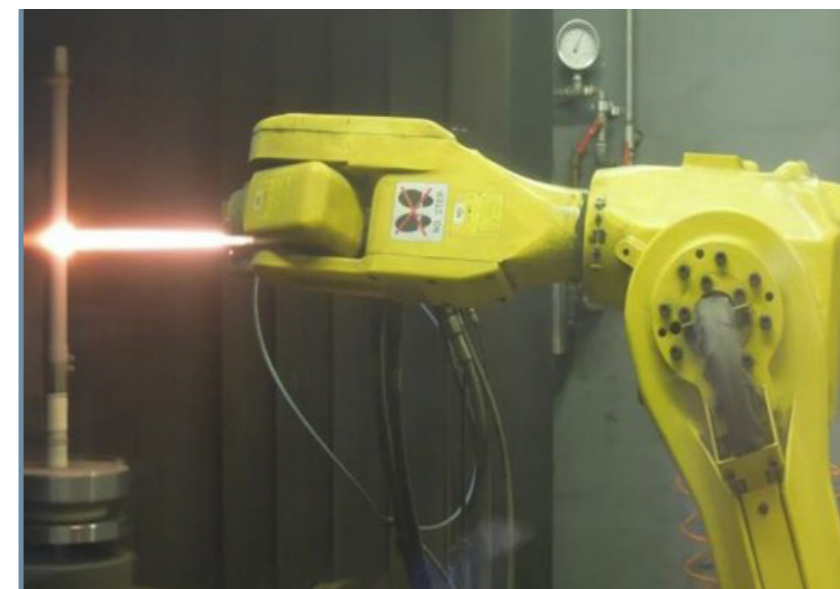
**2022 RINA REVENUES
 IN THE NUCLEAR
 SECTOR**

Our client base in this sector includes ENEA, Sogin, Eskom, Ansaldo Nucleare, Sellafield Ltd, Slovenske Elektrarne and the European Commission.



CAPACITIES

System integrator, multidisciplinary engineering consulting (geotechnics, seismic and geo-hazards, environment), risk & safety studies, supply chain management and construction supervision, QA/QC, materials development & testing, corrosion assessment, welding processes and procedures, waste treatments assessments, prototyping and nuclear R&D&I



RINA certifies companies according to ISO 19443:2018 quality management systems - specific requirements for the application of ISO 9001:2015 by organizations in the supply chain of the nuclear energy sector supplying products and services important to nuclear safety (ITNS)

Experimental support for safety assessment of Light Water Reactors with special attention to SMR

SIET's capabilities allow experimental activities to take advantage of infrastructures and energy potentials that are difficult to find worldwide. The on-site availability of large power and fluid capacities for experiments allows SIET to test large scale LWR components and systems under nominal operating conditions.

- Saturated Steam [40 kg/s, 7 MPa]
- Water [200 kg/s, 17 MPa, 330 °C]
- Electrical Power [14 MW]
- Laboratory Area [≈10,000 m², 30 m elevation]

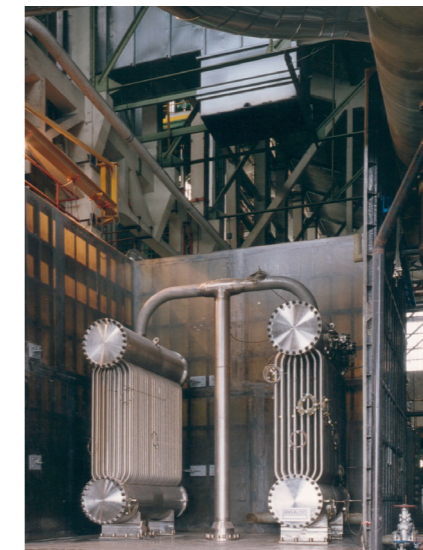


OF EXPERIENCE
IN THE NUCLEAR
SECTOR



SERVICES

Testing services from facility design, installation, test execution, data analysis and reporting, pre-test and post-test analysis using the RELAP5 thermal-hydraulic code



High Capacity Thermal Hydraulic Testing Laboratory

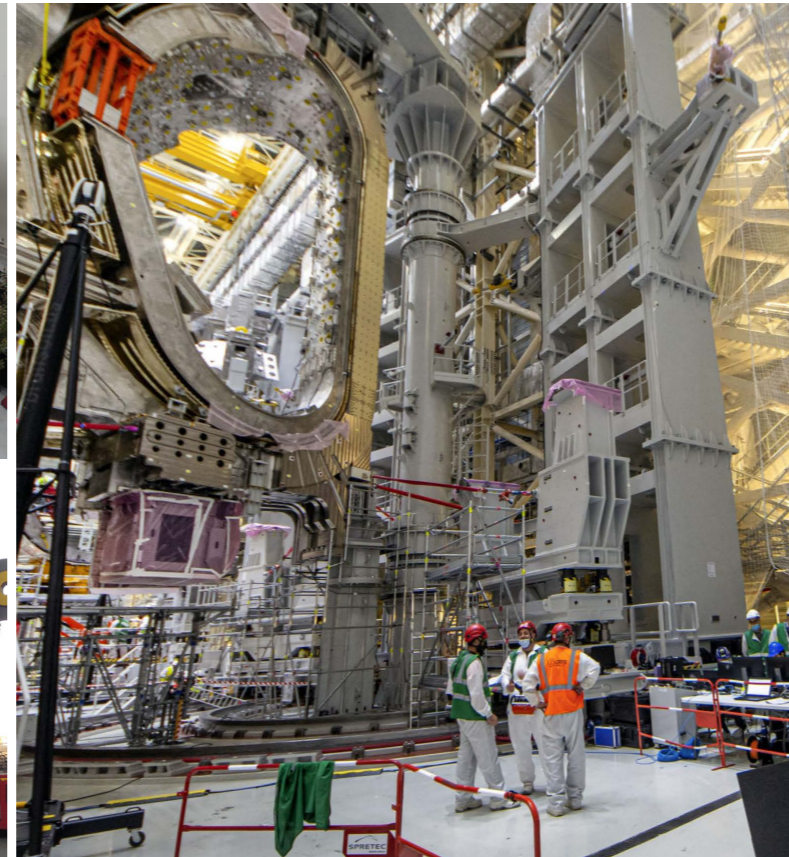
SIET began operations in 1983 with the primary objective of performing tests on components and systems for the production of energy from nuclear power plants. The company has high technology structures capable of simulating, at full or reduced scale, the operation of the thermo-hydraulic circuits and main components of nuclear power plants, as well as systems designed to improve their safety characteristics. Thanks to its extensive expertise in the field of thermo-fluid dynamics, SIET has become a recognized international leader in the field of testing for the development and certification of industrial equipment and components. SIET also plays an important role as a calibration laboratory and metrology consultancy. In recognition of the quality of its services in the nuclear field, over the years, SIET has received important recognition from its customers, including ENEA, ENEL, Ansaldo, General Electric, Westinghouse, Mitsubishi, Toshiba, Doosan, NuScale Power, etc.

SIET key test experience:

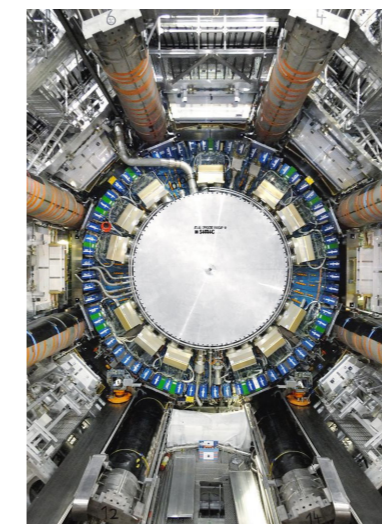
- Integral systems - spes plants (1988-2015) Enea, Wec, Enel
- In pool heat removal systems - IC, PCCS - Panthers Plant (1994-2003) Enea, Enel, Ansaldo, General Electric
- Steam generator characterization (1997-2023) Ansaldo, Nuscale Power, Politecnico di Milano
- Steam water separators (1995-2006) Westinghouse, Doosan, Toshiba

SIMIC - A Passion for Challenges

Since the late '90s, SIMIC is proudly committed in delivering cutting edge components for Nuclear and Big Science sectors. Thanks to the internal technical and management know-how, SIMIC has been demonstrating a customer-oriented approach able to follow the clients in the most challenging projects, from early prototype phase to series production industrialization, with long term company commitment.

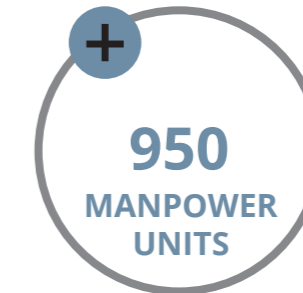


**OF EXPERIENCE
IN THE NUCLEAR
SECTOR**



QUALIFICATIONS

- ASME BPV CODE (U; U2, S, under evaluation ASME N Stamp)
- RCC-M
- RCC-MR
- ISO 19443 acquisition ongoing
- ISO 9001:2015
- EN 1090/1 & EN 1090/2
- EN ISO 3834-2
- ISO 14001: 2015
- ISO 45001: 2018



**SIZE OF THE
WORKFORCES**



SIMIC SKILLS USEFUL TO NUCLEAR MANUFACTURING

- #1: Design and Manufacturing of High-Pressure Vessels and Heat Exchangers
- #2: Design and Manufacturing of Jacketed/Double Chamber Equipment
- #3: High Technology Welding & NDE, including Special Coating
- #4: High Precision Machining
- #5: Final Integration, Testing and Assembly of complex Structures
- #6: From Prototyping to Series production of complex and critical components
- #7: Site Installation



**of contract values awarded to
SIMIC just within ITER Fusion
Project in the last 15 years.**



MAIN PARAMETERS ACHIEVED IN PAST MANUFACTURING EXPERIENCES

- Thickness: up to 220 mm (welding up to 300mm)
- Diameter: up to 7000 mm ID
- Weight: up to 1300 t, single piece
- Length: up to 50 m, single piece
- Height: up to 19 m, single piece
- Temperature: from -269°C (4K) up to 1050°C
- Electrical Testing: up to 19.5 kV in DC (Paschen condition up to 8kV)
- Hydrostatic test: up to 625 bar and 2100 tons

Materials: Carbon steel; Low alloys; Stainless Steels; Duplex; Super duplex; Copper; Copper Alloys; Aluminum; Aluminum Alloys; Nickel; Nickel Alloys; Cr-Ni Alloys; Titanium; Niobium

SIMIC - A Passion for Challenges

Since 1975, SIMIC is an Italian diversified company with a worldwide solid experience in engineering, high-quality manufacturing of critical process equipment, assembly and maintenance of industrial plants. SIMIC can reliably provide clients with a whole range of high-pressure products: from heavy wall Pressure and Vacuum Vessels, Reactors, Heat Exchangers, Cryogenic equipment to mechanical components with very strict tolerances.

The main sectors within which SIMIC operates are: Oil & Gas - Chemical and Petrochemical - Fertilizers - Nuclear Energy & Decommissioning - Fusion Energy - Power Generation - Aerospace - Scientific Research - Renewable Energy.

In addition to the series production of already industrially mature products, SIMIC is specialized in the engineering of complex components and prototypes with industrialization both for one-off and serial production.

SIMIC is present in Italy with 3 main production facilities:

- Camerana (Cuneo) – Headquarter;
- Venice (Marghera Port) - High-capacity Workshops up to 3000 ton with direct dock access;
- Vicenza (Schio - Zanon R&I) – specialized in Ultra-High Vacuum, EB welding, High Vacuum Thermal Treatments and ISO clean rooms.

SIMIC is also present in several countries with Offices and Facilities: Germany, France, Belgium, Romania, Turkey, U.K., U.S.A., Canada, Mexico, Chile and Brazil.



Softec s.r.l.
 Scali Bettarini, 15 - 57123 Livorno (LI) Italy
 Tel. 0039 0586 881416 int. 217
 Federico Giustarini (Technical Manager)
 federico.giustarini@softeceng.com
 www.softec-impianti.com



Innovation meets experience

Softec is an Engineering Company, established in 1986 and based in Leghorn, Italy. The core business is the global market of the engineering design services. Our skills and specialized knowledge cover all the engineering disciplines: we perform complete, multidisciplinary projects in a quick and successful way, in Power Generation and Oil&Gas upstream/downstream projects either on-shore or off-shore. Our unique methodology of working involves adopting innovative, digitalized technological proprietary solutions to develop fast track optimized projects. The business model adopted aims to reduce the cost of plant design through innovative and complete integration of ICT and AI technologies in engineering processes. Main focus is to ensure our customers the best combination of engineering services, technical expertise, on time delivery, quality and price. Our customers include the main multinational EPC Contractors, International Oil Companies and Electric and Utility Companies.

Nuclear design and Nuclear Decommissioning

Over the years, Softec has gained consolidated experience in nuclear design both in the field of power plants and in the field of new experimental fusion plants or in the nuclear decommissioning sector. Our experience covers both design of parts, systems or structures of new plant and the independent third-party verifications carried out on existing systems or structures of existing plants.



SIZE OF THE WORKFORCE

we can provide 100,000 MH of multidisciplinary engineering services (structural, mechanical, ELE and I&C)



Our skills include specialized analysis relating to drop objects, dynamic analysis, fatigue and blast analysis on structures or mechanical components of nuclear plant



EXPERIENCE

15 years of experience in nuclear field



TECTUBI RACCORDI S.p.A.

TECTUBI RACCORDI S.P.A.
Via Roma, 150 - 29027 Podenzano (PC), Italy
r.velli@tectubiraccordi.com
p.francesconi@tectubiraccordi.com
www.tectubiraccordi.com



Tectubi Raccordi, the fitting choice worldwide

Founded in 1954 and incorporated into Allied International Group in 2003, Tectubi Raccordi was the first Italian world-leading manufacturer of steel butt welding pipe fittings to be used in nuclear and thermal power plants, LNG plants, oil & gas and water pipelines, offshore & subsea and petrochemical plants. It is a top supplier of fittings for the nuclear power plants.

For over half a century the company has been collaborating with the most important players in the nuclear sector and EPC companies, offering its products at the highest quality and manufacturing standards. Its workers' craftsmanship and experience and its technical service is key to meeting any client's request in terms of materials, design and international specifications.

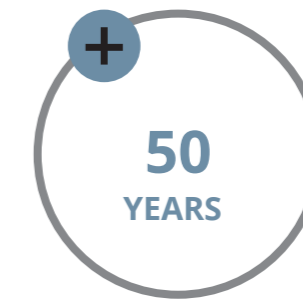
During recent years, Tectubi Raccordi has developed a major facility in Castel San Giovanni (Piacenza, Italy) and has acquired the historical manufacturers OMP Mongiardino (Carbonara Scrivia, Alessandria, Italy) specialized in pipes bending and Gieminox (Schio, Vicenza, Italy) leader in the production of welded pipes, so as to increasing penetration in all target markets. These new facilities have enhanced the overall capacity by 48,000 tonnes/year of fittings, 10,000 tonnes/year of bends and 7,500 tonnes/year of welded and clad pipes.

Tectubi Raccordi, worldwide leader for over 50 years in the production of fittings for nuclear power plants

Tectubi Raccordi has more than 50 years of experience in the production of fittings for the nuclear sector:

- '70s: production for Italian NPPs in Caorso and Trino Vercellese in cooperation with Ansaldo Nucleare and General Electric, first relationships with Framatome and EDF for the construction of Phoenix and Super-Phoenix in France;
- '80s & '90s: production for the Montalto di Castro NPP and the first NPPs in China in cooperation with Framatome (AREVA NP);
- 2000 - today: supplies of standard and special fittings for the new generation of NPP (EPR and AP1000) in France, China, South Korea and South Africa.
- Tectubi Raccordi is also involved in the feasibility study of critical system of EPR2 and SMR.

Tectubi Raccordi is addressing notable investments to supply the NPPs of the latest generation and has obtained the main certifications such as ASME (Section III NCA 3800), China NNSA-Nuclear Safety Certificate and compliance to RCC-M code.



**OF EXPERIENCE
IN THE NUCLEAR
SECTOR**



TYPE OF COMPONENT PRODUCED

**superpipes/clarinettes,
seamless elbows, long
tangent elbows, special
tees and crosses, special
reducers, custom bends**



SIZE OF THE WORKFORCE

**351 people employed (6
management, 68 offices,
277 production)**



CONTRACTS

**250 contracts since the
'70s > 130 contracts during
last 12 years**

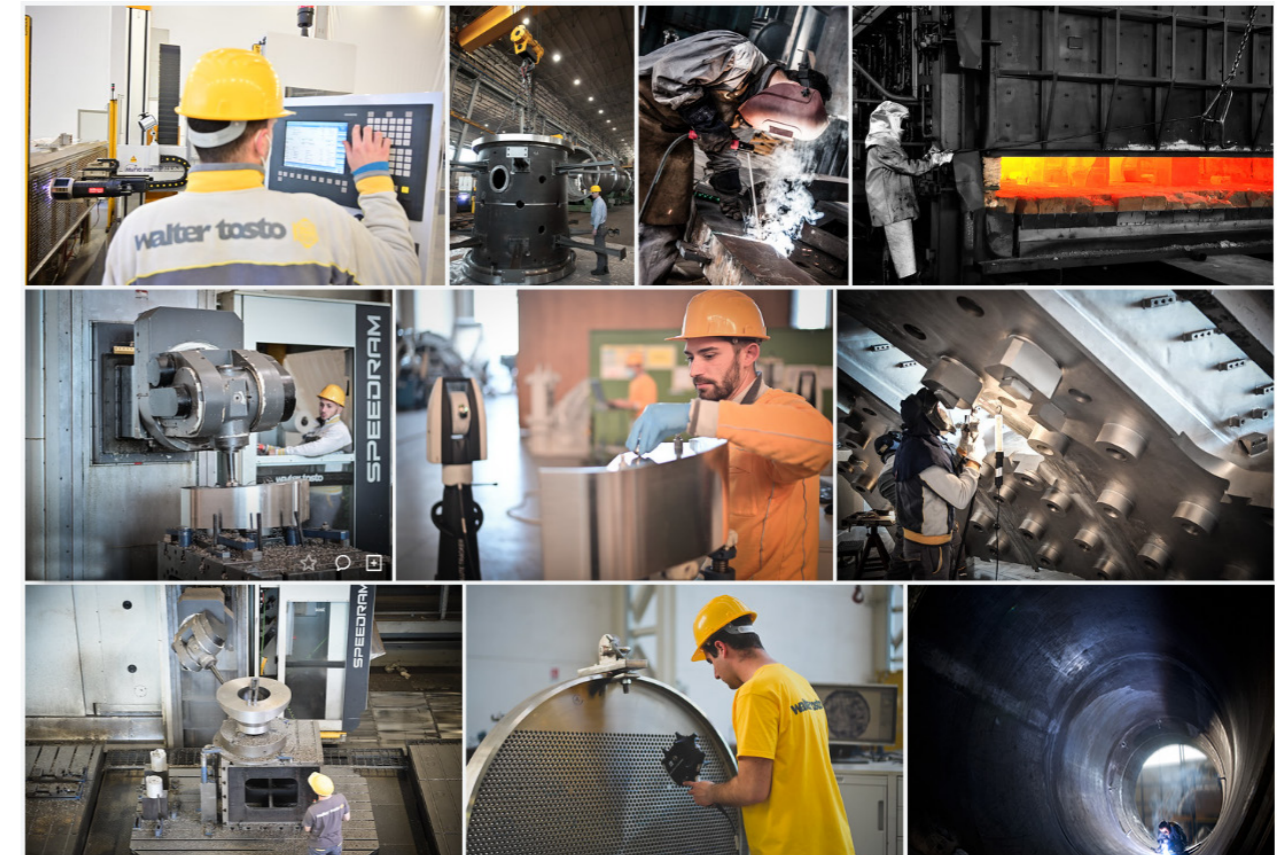
QUALIFICATIONS

**ASME (Section III NCA 3800),
China NNSA-Nuclear Safety
Certificate and compliance to
RCC-M code**

Numbers/Info related to specific capabilities & capacities of the Company in (or for) the Nuclear sector: historical plant of Podenzano, Nuclear Division management (1), sales (2), project management (2), customer care and expediting (2), quality assurance (5), quality control (15), production (80)

Engineering and manufacturing solutions to empower the future

Walter Tosto's extensive mastery in the Power industry encompasses Nuclear, Renewable and Conventional Energy.



Innovation and Delivery

With a consolidated experience in the design and fabrication of critical items for the process industry, in particular Chemical, Petrochemicals, Oil & Gas and Power Plants, today Walter Tosto is recognized worldwide as a leading manufacturer of top quality high pressure equipment and vessels.

The company owns six workshops in Chieti (Italy), a seafront workshop in Ortona (Italy), directly connected to the main international ports and routes, a subsidiary facility Walter Tosto WTB based in Bucharest, and an additional plant in Oltenița, Romania with direct access on the Danube river.

With consolidated know-how, extensive track record, unique manufacturing facilities and capabilities and through water-front and strategic manufacturing locations, the Group offers limitless capabilities in terms of weight and materials of fabrication with technology and delivery consistency as main drivers.

Walter Tosto S.p.A. being an engineering manufacturing company specialized in the production of critical components, it is versatile in the manufacture of various types of components for the nuclear industry. In fact, Companies belonging at Tosto Group has gained more than 60 years of experience in the nuclear sector, manufacturing: various types of Heat Exchangers, Feedwater Heaters, Containment vessel, Pressure Vessels, Steam generator, Steam condenser, Spent fuel Casks, MSR, Feedwater tanks, Reactor Vessel, Vacuum Vessel, and special components for Nuclear Fission and Fusion

The aforementioned projects were carried out with standards:

- EN 13445
- ASME BPVC IX & sect.VIII div.3
- CODAP 2000/2010 Edition
- RCC-M
- RCC-MR & MRx
- ASME sect. III, cl. 3, div. 1,2
- ASME sect. III, Code Case N-47

The companies belonging to the TOSTO Group are in possession of all the following accreditations and meet the Quality Assurance requirements established by the French code RCC-M.

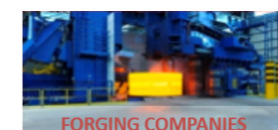
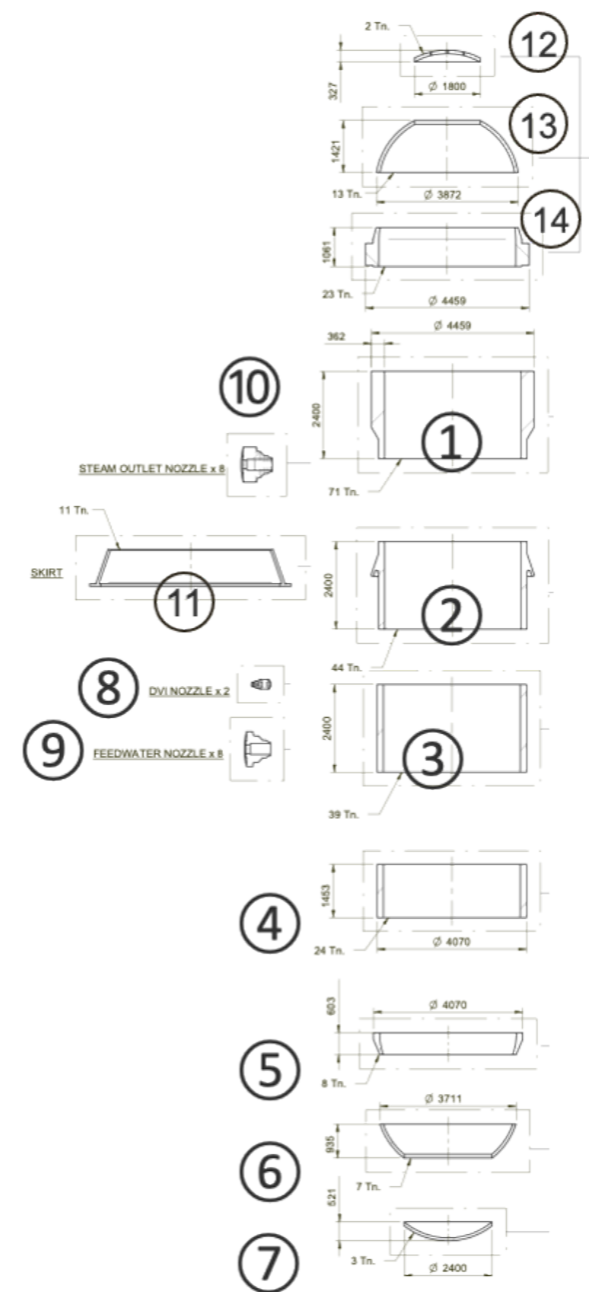
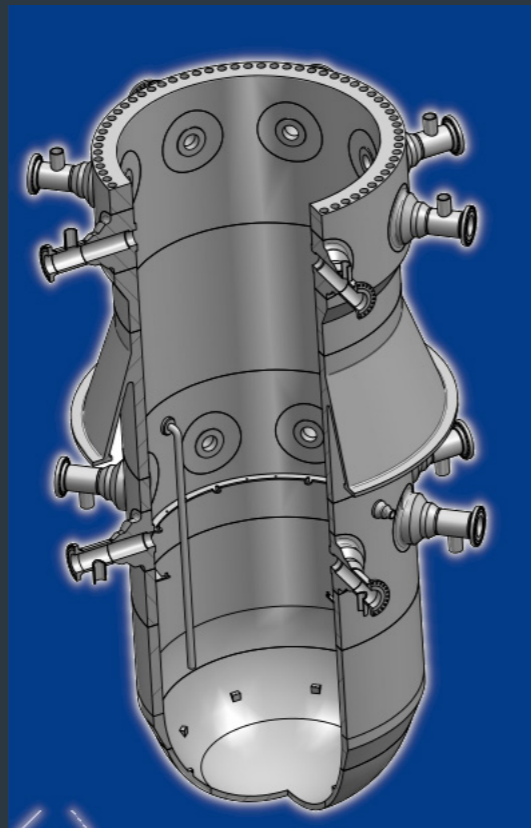
- ISO 9001
- ISO 3834-2:2006
- ISO 14001
- CNCAN
- ASME U
- ASME U3
- ASME U2
- ASME S
- SQL China
- SELO Boiler
- SELO Pressure V
- National Board R Symbol Certificate
- ASME N
- ASME NPT
- ASME NS
- ASME NB
- AEO – Full
- PED H, H1
- CU TR Compliance Certificate
- CU TR Certificate for Heat Exchanger
- ASME PP
- GOST for Heat Exchangers
- GOST for Pressure Vessels

CASE STUDY ON REACTOR PRESSURE VESSEL MANUFACTURING

The Case Study has been developed on the basis of a generic Small Modular Reactor of integral PWR type, with a Reactor Pressure Vessel hosting all the main primary components (Steam Generator modules, Main Recirculation Pumps, Pressurizer, Control Rod Drive Mechanisms).

The RPV accommodates 8 + 8 nozzles for the Steam Generators / Pump connections plus smaller penetrations for the Safety Injection & Shut-down Systems.

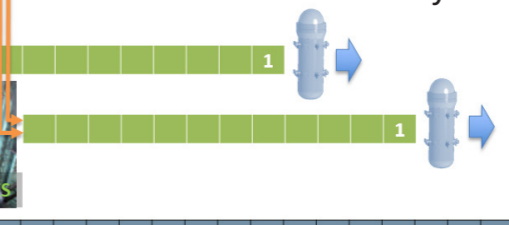
RPV Main data:	
Overall height	13 500 mm
Inside diameter	3 700 mm
Nominal thickness	170 mm
Min. cladding thickness	6 mm
Design pressure	17.3 MPa
Design temperature	343 °C
RPV material	SA 508, Tp.3, Cl.2
Cladding material	Stainless steel



FORGING COMPANIES



MANUFACTURING COMPANIES



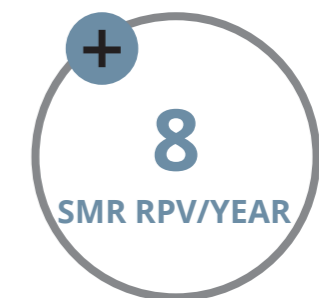
FORGING & MANUFACTURING

The RPV adopted for the case study is framed into 14 forged components. The forging & manufacturing capabilities have been evaluated from the arrival of the steel to the forging workshops to the final quality controls in the manufacturing sites for the RPV delivery



INTEGRATED SUPPLY CHAIN

The whole delivery process has been structured considering a fully integrated and optimised approach: the Forging companies feed with full or partial set of components the Manufacturing company, ready to receive and start the RPV construction once the full set is reached



Estimated number of Reactor Pressure Vessels for SMR the Italian Nuclear Supply Chain is capable to produce per year.

NOVEMBER 2023

POLITECNICO DI MILANO - DEPARTMENT OF ENERGY
CAMPUS BOVISA - VIA LAMBRUSCHINI, 4A - 20156 MILANO
comunicazione-deng@polimi.it
www.energia.polimi.it