FAGIOLI

Nuclear Industry

Since 1955

MAIN ACTIVITIES

Every contract for the transportation of steam generators is unique and has very specific requirements, and contingencies, due to the size of the components, to the delivery locations and the nature of the industry. These activities require detailed and very specific attention, long before the shipment can be scheduled.

WORLDWIDE EXPERIENCE

Fagioli has a department dedicated to the transport, lifting and final positioning of Replacements components for the Nuclear industry (steam Generators, mock-up heads, reactor vessel closure head...).

Since 1980, Fagioli has successfully been awarded either by Manufacturing or Utilities companies for the performance of this challenging activity.
Every contract for the transportation of nuclear components is unique and has very specific requirements and contingencies, related to the final destination and size. Our qualified team has demonstrated to have the engineering and construction expertise to safely and economically meet the transportation and heavy lift rigging needs for the nuclear power industry. These activities require detailed and

Transport of Steam Generators into Organ Pipes National Park.

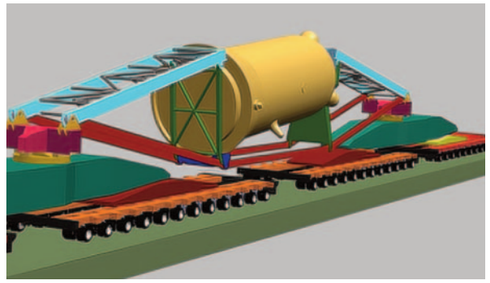
PLANNING ASPECTS

Successful completion of the transportation activities requires close contact with both the fabricator and the ultimate client utility. Only with close co-operation with the fabricator and the utility can consideration be given to all possible risks.
For instance for the transportation of No. 2 Steam Generators from Italy to Arizona, Fagioli was also responsible for detailed survey of the entire route.
As a result of this survey it was decided that the components would be shipped in two pieces to the port of embarkation and a final closure weld was made there.

After each steam generator was completed it was loaded on the ship in one piece.
A tailor made transport frame was designed and built to be used in several ways in the different phases of the transport.

USA: Transport of No.4 x 327 ton each Steam Generators from Spain to USA

IN-HOUSE ENGINEERING STUDIES



Using the most sophisticated computer programs to perform accurate engineering 3d simulations and studies in order to complete safe transport of the steam generator.

Design and realization of tailor made structures to allow safe performance of operations, optimizing time and resources and reducing costs.

Example of tailor made saddles , specifically designed for the transport of Steam Generators

TIME AND MOTION (PLAN) STUDIES

USA: Challenging passage under a bridge with levelling and dragging operations.

Compliance with the clients required delivery date is given top priority in the shipment of nuclear steam generators. This requires long range planning and careful consideration to every detail

In order to prevent any delay, Fagioli prepares an integrated schedule of all activities, taking into consideration all possible contingencies based upon our years of experience in shipping heavy components:

- Detailed analysis of road transport feasibility day by day
- Detailed scheduled of barge, sea vessels
- Interface with authorities

SAFETY RELATED MATTERS / QUALITY

Fagioli management policy requires that :
- adequate resources are alocated to insure the health and safety of all personnel, equipment and cargo
- risk assessments are thoroughly performed and periodically reviewed

Fagioli has upgraded the entire organization to comply with the latest HSE rules

FAGIOLI CERTIFICATES :

- ISO 45001:2018

- ISO 9001:2015

- ISO 14001:2015

USA: Challenging passage onto a bridge with SPMTs onto a Fagioli overbridge for the TMI project.

CASE STUDIES

Fagioli has a long record of heavy transport and lifting activity for the Nuclear Industry on a world-wide basis. Here below you can find a brief summary of three projects executed by Fagioli which required a huge involvement in terms of engineering, equipment and personnel. Available the videos of these projects on request.

TMI PROJECT

TRANSPORT OF TWO 550 TON STEAM GENERATORS FROM FRANCE TO PENNSYLVANIA

Fagioli performed the transportation of two replacement steam generators from Chalon-St. Marcel, France to Three Mile Island, Pennsylvania in the USA . The dimensions of the generators were 22.7m long, 5.5m wide and 5m high, weighing 473 tons. Each generator was seated on a skid transport frame. The RSGs were loaded onto a specialized hopper barge using the fabrication shops overhead cranes in Chalon Saint Marcel (France). The generators were moved by barge to Fos-sur-Mer for about 500km. The self-geared ship vessel performed the transshipment of the RSGs. The ship arrived 2 weeks later in Claymont (Delaware, USA): a total of 4,000 miles.
In Delaware, Fagioli provided local barges for the transshipment of the generators. From Delaware the barges offloaded the generators to a private facility in Maryland. Once the generators were unloaded with ro/ro operations, the SPMTs started the journey to final destination.
Each single convoy configuration was 37m long, 7.3m high and 5.3m wide with a total weight of 789 ton. The total land journey was 14 days duration for a total of about 75 miles. Apart from all the permits required to travel through 23 municipalities, Fagioli were forced to use multiple temporary bridge structures (50 and 80 feet over-bridges) to allow the passage of the heavy convoy on roads with restricted capacity.



APS PROJECT

TRANSPORT OF No. 6 x 750 TON STEAM GENERATORS FROM MILAN (ITALY) TO PALO VERDE SITE IN ARIZONA

Over a period of nine years Fagioli have been awarded three major contracts for the international transport of a total of 6 x 750 ton steam generators from Milan to Phoenix, Arizona. Five years of engineering and pre-planning studies and finally thetransports executed in three different periods of time.Thanks to a great team and a state-of-the art fleet of equipment Fagioli managed toperform one of the most binding projects in its history with great satisfaction,overcoming endless contingencies occurred during the three contracts. A few of the multitude of activities executed were: Transport with Schnabel structures, use of gantry cranes to lift the items and change the equipment and configuration for the 100 km road transport from the busy Milan to Cremona river port; Transport by means of group-owned barges on rivers due to the restrictions imposed by the road which did not allow our team to travel straight up to Venice; Building of an artificial temporary dam (due to the low water level from a dry summer) and use of group-owned ship to transship the modules; Ocean transport with self-geared H/L vessels for the oceanic journey to Mexico, transshipments of generators onto local barges (low draft prevented the big shipto proceed further); Building of a quay to allow the barges to unload the items positioned onto SPMT's; Road transport for 200 miles in the hot Mexican/Arizona desert.

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DIABLO CANION PROJECT

TRANSPORT OF No. 4 x 327 TON STEAM GENERATORS FROM SANTANDER (SPAIN) PORT TO DIABLO CANYON NPP

Fagioli performed the transport of four 327 ton steam generators from Santander (Spain) port to California.
The stema generators were lifted at workshop in Spain by means of bridge crane and unloading directly into H/L vessel hold.

Due to the low draft the generators were transhipped from H/L vessel onto two local ocean-barges by means of heavy-lift vessel gears.
The generators were positioned onto tailored saddles specially prepared to fit the lifting activity of the Screw Jacks.
It was decided to position the items onto saddles rather than stools due to the violent swells on ocean navigation by barge. After 22 hours the barges approached the internal port of client premises.
The generators were lifted using a "Screw-jack" system (thanks to the tailor-made saddles) and was positioned onto 2 x 14 SPMT axles and unloaded ro-ro. The generator was than transported for about one kilometre and stored inside the client's premises on stools.

Once the 4 generators had been positioned inside the warehouse, the SPMT's took the items one by one and lifted the generators using the "Screw–jack" system and positioned them onto rollers.




Turn-Key Projects Service Provider for The Nuclear Industry

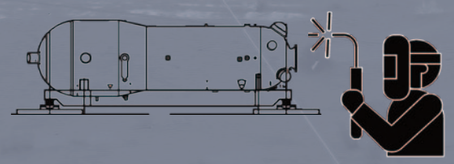
Engineering - Heavy transport and Lifting - Shipping Activity

FAGIOLI IN

Feasibility Study

Design Phase

Fagioli Engineering department working side by side with the client and proposing the most suitable alternative cost-saving solutions.



Fabrication

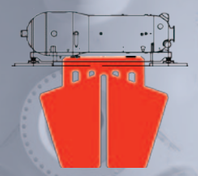
Heavy Transport and Load out Operations

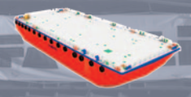
FAGIOLI IN

-Heavy Road Transport with Specialized Equipment
- *SPMTs*
- *Modular Trailers*

Load out Activity:
- *Skidding and Strand Jacking Systems*
- *High Capacity Crawler Cranes*

Sea/ River Transport





-Chartering of Dedicated H/L Ships through Fagioli Project Logistics Department

-River barges activity with group owned equipment

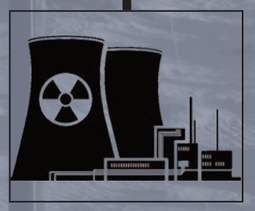
Load in / Heavy Transport

-Load in Activity by means of:
- *SPMTs*

-Heavy Transport up to final site

Installation / Assembly Operations

-Installation by means of
- *Strand Jacking System*
- *Gantry Lifting System*
- *Skidding System*

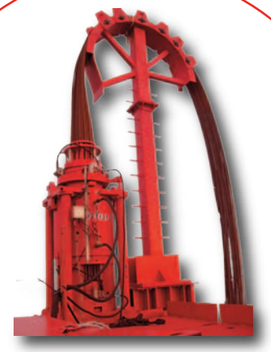


FAGIOLI

MAIN EQUIPMENT

over 1,800 Axle Lines

SPMTs



over 600 units (15 - 750 ton)

STRAND JACKS

20,000 ton capacity

ELEVATOR SYSTEM

We own an extensive set of conventional trailers to latest generation of SPMTs, including all necessary equipment to carry out any foreseeable heavy transport. Fagioli offers one of the biggest fleet of Strand jacking and Tower lift system on the market; Skid Shoes (capacity up to 64,000 ton); Jack-up system able to lift extra-heavy loads up to 24,000 ton; Weighing systems up to 20,000 ton; Crawler cranes with capacity up to 1350 ton; Gantry lifting system, Screw jacks and Climbing jacks; river barges and rail cars for heavy rail transports.

STATE-OF-THE-ART

-GANTRY CRANES

-MODULAR TRAILERS

WEIGHING SYSTEM

-BALLAST MOORING SYSTEMS

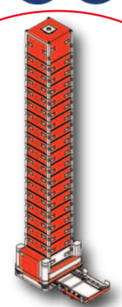
-RAIL CARS

64,000 ton capacity

SKIDDING SYSTEM

up to 3,000 t capacity

CRAWLER CRANES



up to 2,000 t capacity

JACK-UP SYSTEM

11 units sea/river

BARGES / RIVER PUSHERS

OPERATING ON A WORLDWIDE BASIS

Sustainability

FAGIOLI has a dedicated "sustainability "program which follows what it's commonly called "The Three pillars of Sustainability":
-ENVIRONMENTAL PROTECTION-ECONOMIC DEVELOPMENT -GOVERNANCE AND SOCIAL DEVELOPMENT Fagioli Sustainability Reports available on www.fagioli.com website

Environment

Environmental Protection

Fagioli Group is very close and extremely sensible to problems related to environmental protection

Spill Prevention → **Hydraulic System with Electric PPU's** → **Noise and Pollution Reduction** → **Waste Management Procedure**

Economy

Economic Development: Research and Innovation

Fagioli provides to all its personnel, suppliers (downloadable online)a «code of conduct» booklet for a sustainable economic approach

Innovation → **Time Saving** → **Lowering the eventual impact on Environment** → **Money Savings for Customers**

10 INNOVATION AWARDS

Governance and Social

Corporate Social Responsibility (CSR)

Fagioli is committed to a sustainable social campaign focused on worldwide site operations activities and the welfare of all its personnel

Employment of Local Forces → **Local Civil Intervention** → **Personnel Welfare: Health Care Fund** → **Smart Working**

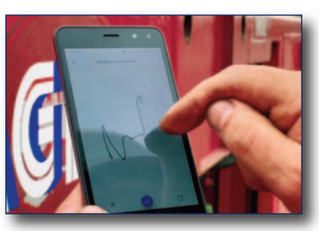
Hse & Quality

FAGIOLI CERTIFICATES : - ISO 45001:2018 - ISO 9001:2015 - ISO 14001:2015

SAFETY Campaigns / HSE Contests → **SAFETY Training** → **IT TOOLS to monitor HSE** → **Reduction of Accidents** → **HSE AWARDS**

HSE CAMPAIGNS - CONTESTS

DEDICATED SOFTWARE TO MONITOR FAGIOLI HSE



SAFETY AWARDS: SPMT SAFETY E-LEARNING

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