

## **Marine Service GmbH**

Marine Service GmbH is a German marine consultancy firm, specializing in LNG shipbuilding and LNG logistics. Since the late 1960's Marine Service has been involved in design, plan approval, and construction supervision of LNG carriers. Marine Service has been involved in the construction of about 70 LNG carriers out of the current global fleet of about 350 vessels. Marine Service typically works as owner's engineer, providing support for the owner of the vessel throughout the construction project, from initial feasibility study through the construction phase to warranty issues.

Typical Marine Service work scope includes:

- Feasibility studies for construction and conversion projects
- Initial design and drafting of vessel specifications
- Drafting of tender documents
- Tendering to shipyards
- Tender bid evaluation
- Construction contract negotiations
- Plan approval
- Construction/conversion supervision on-site at the shipyard
- Factory acceptance tests for major equipment
- Attendance of sea trials
- Resolution of warranty issues for the owner/operator

Besides marine consultancy services, Marine Service also provides turn-key solutions. In 2009, a complete LPG cargo system for a bunker vessel was delivered to Lindenau shipyard in Kiel (Germany).

Current projects include:

- Project management, plan approval and on-site supervision for the construction of a number of offshore wind park high voltage AC/DC converter platforms for a German customer.
- Plan review and conversion supervision for E.On for the conversion of an existing LNG carrier into LNG FSRU in Dubai Drydocks (UAE).
- Project management for design, tendering and construction of a Coast Guard vessel for Middle Eastern customer.
- Construction supervision for two Very Large Crude Carriers (VLCC) in Dalian New Shipyard in Dalian (China).
- Design and engineering of an engine room with gas-injected slow speed diesel engines for a new LNG carrier design for a Chinese shipyard.
- LNG shipbuilding consultancy to a European ship owner ordering up to four LNG carriers in South Korea. Services include reviewing the construction specifications, commenting on the proposed propulsion arrangements, assistance in negotiations with the shipyard.
- Design and construction of a 40' ISO LNG tank container to be used as LNG fuel bunker tank on-board commercial vessels trading in the Baltic region.

- Design and construction of an excess boil-off gas reliquefaction plant for LNG carriers.
- Design of a Ethylene cargo compressor system for a Nordic customer.
- LNG shipping consultancy for an LNG import project in Southeast Asia.
- LNG FSRU project management consultancy services to an LNG importer in Southeast.
- Cold ironing project using LNG as fuel for mobile power generation in Hamburg harbor.
- LNG as marine fuel project for Nordic ferry operator.

Alexander Harsema-Mensonides, Senior Engineer for Marine Service is assigned to this project. Alexander has worked on the construction of the existing LNG fueled ferries in Norway and on many other LNG fueled vessels. He is working with Norwegian and other ferry systems on the potential conversion of diesel ferries to LNG and this year prepared a report for a Norwegian ferry system on LNG logistics and availability as they consider a new LNG fueled vessel.

### **Relevant Project Experience: Alexander Harsema-Mensonides**

#### **Conversion project of gas turbine driven fast ferry for Nordic owner (2008-09)**

Issues reviewed included:

- LNG supply and logistics
- LNG pricing structure and expected price development
- LNG storage on-site
- LNG bunkering
- LNG storage on-board
- LNG fuel system
- Conversion of ship's engines to LNG fuel
- Regulatory compliance (IMO, Class)
- Safety

Project terminated due to financial constraints.

#### **Conversion project of gas turbine driven fast ferry for Nordic owner (2009)**

Items addressed:

- LNG storage on-site
- Conversion of ship's engines to LNG fuel

Project terminated due to high conversion cost and short remaining lifetime of the vessel.

#### **New construction project for RoRo ferries for Nordic owner (2011)**

Items reviewed:

- LNG availability and price in the Northwestern Europe
- LNG logistics
  - Marine transport in bulk
  - LNG containers
- Small scale LNG production on-site
- LNG storage on-site
  - Regulatory framework
  - Cost
  - Safety

- LNG bunkering scenarios
- LNG storage on-board
- Impact of LNG as marine fuel on ship operations

Project report presented to technical department, management and board of directors.