

Supplying not only Design & Manufacturing but also Integrated Services Solutions

Termomeccanica Pompe is confirming its presence as a key player in the oil & gas sector and, more specifically, in the ever-growing LNG market offering engineered pumps and integrated service solutions which cover any customer need that may arise during the pumps' as well as the plant's entire life cycle

Cristian Ricci - TMP SpA - Termomeccanica Pompe



Fig. 1- SWP installation at Dapeng LNG receiving terminal

pipelines, liquefied natural gas and on-shore & off-shore water injection.

Since its beginning, the liquefied natural gas (LNG) trade has increased steadily at over 5%/year, as the worldwide gas market continues to grow to meet the consumption demands of both domestic and industrial users.

In this scenario, Termomeccanica Pompe has been intensifying its commercial efforts towards products such as Sea Water Pumps (SWPs), with high value-added for this type of plant and towards countries such as China, where the construction of LNG receiving terminals has been increasing significantly over recent years.

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Termomeccanica Pompe (TMP) entered the petrochemical and oil & gas markets in the early 1960s but recently renewed and enhanced its production program to supply a wide range of API 610 centrifugal pumps so as to cover the most demanding main process services, including oil

LNG receiving terminal functions

An LNG receiving terminal is the arrival point for LNG tankers in a gas utilization region. It is where a ship's liquefied natural gas cargo is unloaded and stored in its liquid state, then re-gasified and fed to the natural gas pipeline system as required by market demand. LNG terminals have therefore four main functions:

- receiving LNG tankers and unloading their cargo;
- storing LNG in cryogenic tanks;
- regasifying LNG to meet demand;

- feeding gas into the national transmission network.

During the re-gasification phase, Open Rack Vaporisers (ORV) are commonly used to heat and vaporize the LNG using the seawater that is pumped from vertically suspended pumps installed in a sea water intake.

As such Sea Water Pumps play a critical role in this kind of application, both in terms of reliability and energy consumption. Therefore, Termomeccanica Pompe's offer has not been limiting its offer to the supply of the complete package itself, which includes the pump and its relevant instrumentations, electric motor and air release valve, but has extended it to other services.

Indeed, Termomeccanica Pompe has been cooperating with the end users / EPC contractor for the design of the pump intake given that the settlement of the definitive geometry of a pump intake is generally on the critical path of an LNG project schedule and that, consequently, the SWPs are the equipments to be commissioned first.

Inspection and quality criteria

TMP's Research & Development Department actually verifies that the pump intake meets the criteria the Department has defined through its own experience and that it also complies with the recommendations established by the Hydraulic Institute Standards through two different steps:

- a Computational Fluid Dynamic Analysis, which

allows to implement the modifications necessary to eliminate disturbances and vortices in the approach flow patterns, and within each pump sump; this study implies to consider all possible operating conditions;

- physical tests on the intake model of reduced dimensions which allow to observe any type of vortex (free-surface, sub-surface) with the help of dye or artificial debris and to verify whether the HI acceptance criteria are satisfied; finally, swirl angles in the pump suction can be measured by proper swirl meter and compared with the maximum allowable value.

A case-specific pump design can thus be performed which optimizes its efficiency and the appropriate materials are also selected according to the specific characteristics and temperature of the sea water (duplex or superduplex are commonly used for this application).

In order to guarantee a high level of quality, an accurate Pump Inspection Test Plan, including several preliminary tests on each main components, is strictly followed. For instance, hydraulic tests on the pressure components and a balancing test on the impeller are performed at TMP's workshop.

In accordance with the API 610 standard, a perfor-

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Fig. 2- SWP for Zhuhai LNG receiving terminal before the delivery



Plant	Location	Owner	Main contractor	Pump characteristics					Current status
				Qty	Flow (m ³ h)	Head (m)	RPM	Power (kW)	
Yuedong LNG receiving terminal	China	Cnooc	Cnooc Yuedong LNG Co. Ltd	3	6800	35	745	950	Delivery expected by March 2014
Dunkerque LNG receiving terminal	France	EDF	TS LNG	5	8976	36	595	1250	Delivery expected by October 2013
Qingdao LNG receiving terminal	China	Sinopec	Sinopec Europa Handles GmbH	4	6073	33	745	800	Delivery expected by April 2013
Zhuhai LNG receiving terminal	China	Cnooc	Guangdong Zhuhai Golden Bay LNG Ltd	5	6983	41	745	1100	Delivered and ready to be installed Commissioning is expected by August 2013
Terminal methanier de Fos Cavaou	France	GDF Suez	Société du Terminal Méthanier de Fos Cavaou	5	9600	35	595	1250	In operation since 2010
Dapeng LNG receiving terminal	China	Cnooc	Guandong Dapeng LNG Co. Ltd	8	6440	34	745	815	Nos. 6 in operation since 2007 (Phase 1) Nos. 2 in operation since 2009 (Phase 2)
Revithoussa LNG terminal	Greece	Depa	Sofregaz	3	2875	53	990	575	In operations since 2006
Inchon LNG terminal	South Korea	Kogas	Kogas (Korea Gas Corp.)	4	1200	44	510	2000	Supplied in 1999 In operations since 2002

mance test of each pump and relevant electric motor is finally carried out at the company's in-house test center in order to verify the contractual parameters such as flow, head, power consumption, minimum submergence level, vibration, temperature and noise level.

An integrated services system

Besides design, manufacturing and testing activities, Termomeccanica Pompe also provides an integrated services system covering any need that may arise during the pumps' & plant's entire life cycle.

After-sales service starts with skilled TMP supervisors assisting client's maintenance and operational staff during the on-site installation and commissioning activities by holding a dedicated

maintenance training course for them.

A 3 to 5-year Long Term Service Agreement (LTSA) is also always proposed to the end user as an added value for plant operators. In fact, this agreement includes services such as the supply of spare parts for minor and major overhaul activities as well as capital spare parts, maintenance & field engineering support for planned and unplanned on-site activities. A remote monitoring system that verifies the main pump parameters 24/7 is also available.

Table 1 reports the company's latest supplies of Sea Water Pumps in LNG receiving terminals.

In short, Termomeccanica Pompe has acquired key references in all main process and water injection services, becoming a player to reckon with in the petrochemical and oil & gas international markets. ■

Table 1 - TMP's latest supplies of Sea Water Pumps in LNG receiving terminals



Cristian Ricci

Cristian Ricci, born in 1978, has an Aerospace Engineering Degree from the University of Pisa. After two years of experience in the Marine Industry, he joined TMP SpA Termomeccanica Pompe in 2008. He initially started as a project manager in the

company's Service Division. In 2011, he changed to a Sales Engineer position, always for the Service Division which further promoted him last year to Middle & Far East Country Manager.