TMPnews

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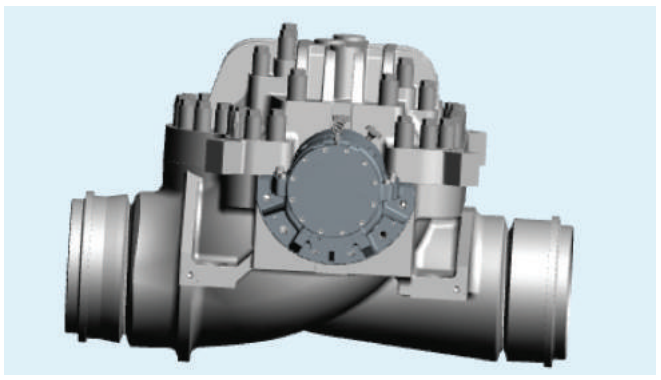
TMP designs high energy pumps for a Russian pipeline

As already announced in the January edition of our Newsletter, Termomeccanica Pompe acquired in 2015 a major order for the supply of pumps for the transport of crude oil for the ESPO (East Siberia Pacific Ocean) pipeline, including numerous pumping stations spread over a more than 4000 km long system. The order is for pumps to be installed in some of these pumping stations; among the machines included in the contract, the 8 + 5 Main Oil Pumps are particularly relevant. They are high power large horizontal single-stage pumps with double suction impeller and volute casing (API 610 BB1 type), which fall within the category of the so-called "High Energy" pumps.
The pumps to be supplied are of two different models denominated respectively MOL 7000-250 and 10000-380 which require particularly high efficiency values in order to minimize energy consumption and consequently the plant operating costs.



3D model of the 7000-250 MOL pump

To comply with this contractual commitment, Termomeccanica Pompe's R&D Department had to get involved in the hydraulic and mechanical design of the pumps, while the Engineering Department was called upon as the contract system integrator, defining and managing all auxiliary, electrical, mechanical and instrumental systems (motors, inverters, lubrication systems, hydraulic coupling, heat exchangers, etc.).
In total, a team of 6 mechanical engineers, including specialists in computational fluid dynamic and static & dynamic structural analysis, was involved in the hydraulic and mechanical design of the pumps. The need to guarantee the required efficiency resulted in a revision and optimization of the hydraulics already available in the company, whose geometrical parameters had to be modified to ensure a correct dynamic behavior of the rotor. To this end, it was necessary to maximize the ratio between the hub and outlet diameters of the impeller, to limit to the minimum possible the distance among the radial bearings, reviewing the axial volume of the stator channels, and to reduce the pressure pulsations at the impeller output, adopting a solution with staggered blades and a particularly generous radial distance between the delivery of the impeller and the cut water volute. To implement all these modifications, an extended campaign of hydraulic analysis and CFD calculations was carried out for both machines as their hydraulic parts have different geometric shapes (different specific speeds).
To experimentally validate the results of the theoretical analyses, two reduced-size model pumps were built with hydraulic components of geometric similarity with respect to the two full-size pumps. Various impellers with different geometry were tested on each model pump and the one providing the best performance was chosen.
The impellers and pump casing of the model pumps were made of a metallic material and casted with 3D printer technology, which allowed to consistently reduce production lead times and obtain very precise dimensions of the hydraulic channels. In order to assess whether the performance measured on the pump model was such as to ensure the value of the contractual efficiency of the full size pump, reference was made to the revaluation formulas available from technical literature, formulas which are based on statistical analysis and, therefore, affected by a certain degree of unpredictability. The first 10000-380 MOL pumps have recently been subject to functional testing in the company test center. These variable speed pumps are driven by a 12 MW electric motor and a frequency converter, used during the functional tests along with all the other auxiliary systems of the pumping unit (string test). In order to feed the 10000-380 MOL pump during testing, two new vertical booster pumps (type API 610 VS1) had to be installed in the test center, pumps which suction from the suction tank at atmospheric pressure and have each a flow rate of 8000 m^3/h and a head of 124 m. Such pumps are driven by a variable speed electric motor in order to facilitate the regulation of the system, especially during the NPSH tests. The test bed is equipped with two regulating valves installed in series on the delivery piping. The role of the main valve, DN 800 PN 80, is to reduce most of the pressure generated by the pumps while the role of the secondary one is to guarantee, for the various schemes of the system, the counter-pressure values necessary to avoid cavitation at the discharge of the main valve as well as a regular flow towards the discharge area of the system. The expected hydraulic performance has been respected and the value of the contractual efficiency achieved, thus confirming the validity of the revaluation formulas used. For the calculation of the efficiency, the power absorbed by the machine was measured by a torquemeter placed between the pump and the electric motor in order to eliminate possible errors in the evaluation of the efficiency of the drive system.
The mechanical behavior of the 10000-380 MOL pumps, throughout the entire range of variation of the rotation speed and flow rate, resulted very satisfactory (low levels of vibration and noise and metal temperatures of the radial and lower thrust bearings lower than the theoretical values expected).
Therefore, when the customer, KONAR, and the end user, Transneft, witnessed the final tests, they issued the certificate of acceptance of the machines.

The engineering team in front of the 10000-380 MOL pump

Termomeccanica Pompe Group takes part in ADIPEC, the most important Oil & Gas exhibition in the Middle East

Termomeccanica Pompe and its controlled company Adicomp, specialized in compressor packages, exhibited at the Italian Pavilion of ADIPEC 2016 (Hall 2 – stand 2153).

The Abu Dhabi International Petroleum Exhibition and Conference, took from November 7 to 10, was under the patronage of the President of the U.A.E. himself, H.H. Sheikh Khalifa Bin Zayed Al Nahyan, and sponsored by ADNOC – the Abu Dhabi National Oil Company.
It represents the most important Oil & Gas industry related exhibition in the Middle East and one of the most relevant at international level.

Indeed, with more than 2000 exhibitors and 95000 visitors from over 120 nations involved in Oil & Gas exploration, extraction, production, refining, storage and transport, ADIPEC unites all of the Oil & Gas sectors and provides for companies such as Termomeccanica Pompe and Adicomp a unique platform where to share the latest technological developments, network and do business with the main international players of the market.

TMPnews

The Service Division wins a new contract for Indonesia

Last July, Termomeccanica Pompe's Service Division was awarded the order for a bare-shaft pump for the Kamojang Geothermal Power Plant, located in the western area of the island of Java in Indonesia. This contract is part of the project assigned to the Italian EPC contractor Ansaldo Energia by the end user Indonesia Power (a PT PLN company) for the complete refurbishment of the 30MW unit of the plant and corresponds to the replacement of one of the three pumps from the original Russian supply (the other two will be reconditioned by local companies). TMP will use the "316L" austenitic stainless steel for the wet parts of the pump while the remaining parts will be in carbon steel. The pump delivery is scheduled for late May 2017.

Thermal pipes_kamojang geothermal power plant

The New Product Division acquires new contracts in Oman and Uzbekistan

Late June, Petrofac E & C Oman LLC (CEEC) awarded an order to Termomeccanica Pompe for a total of approximately 3 million euros for the supply of thirteen API610 pumps for the Yibal Khuff project, an oil field located at about 350 km Southwest of the capital Muscat. This supply is composed of ten VS6-type and three BB3-type pumps.
The contract covers a strategic importance for Termomeccanica Pompe for various reasons. First, it allows to further consolidate the company's relationship with both its client, Petrofac, and with the end-user, PDO (Petroleum Development Oman). Furthermore, the supply of six of the VS6-type pumps will be carried out in Alloy 825, a noble material. The choice of this material by the customer is mainly motivated by the will to optimize costs which is currently driving the Oil & Gas market. Alloy 825 (Incoloy 825) is indeed a fully austenitic nickel-iron-chromium super alloy which is very resistant to corrosion whether by stress (SCC) or localized (pitting, crevice). This is an illustration of the attention Termomeccanica Pompe pays to adapting to the increasingly stringent standards of its customers, in the Oil & Gas world but not only, which are intended to improve the reliability of critical system components such as centrifugal pumps, and consequently to reduce maintenance costs.

Oman - Petrofac yibal kuff project

Termomeccanica Pompe acquired another important order for Oman. It is a supply of eight API 610 standard pumps for a total of around 5 million euros for ORPIC's petrochemical Liwa Plastics Industries Complex project located in the existing Sohar Industrial Port facility, which already comprises a refinery.
TMP's customer is a joint venture (CCJV) between CTCI and CB&I.

The first six pumps, supplied with motors and accessories, are VS1-type in super-duplex with a 12-pole 2.25MW motor and have a capacity of 15,610 m^3 / h. Such pumps cover the saline cooling water service.
The additional two pumps, supplied with motors and accessories, which include a soft-starter and n ° 2 butterfly valves actioned by a single hydraulic control unit, are also VS1-type in super-duplex with an 8-pole 2.4 MW motor. They have a capacity of 10,000 m^3 / h and a head of 59,7 m and cover the sea water service.
This the first order for Termomeccanica Pompe with CTCI and CB&I and consolidates the company's presence on the Omani territory.

Oman_ORPIC_Sohar_Liwa_Plastics_Projects

Termomeccanica Pompe was recently awarded its first order to the Uzbek territory. The supply consists of four pumps in full compliance with the API 610 11th Edition standards.
The first two pumps are HP Boiler Feed Water pumps while the remaining two are MP Boiler Feed Water pumps. They are for the UNF project, a large-scale ammonia and urea fertiliser plant located in Navoiy, a city in the central region of Uzbekistan. Utilizing the country's abundant natural gas resources as feedstock, the plant will have the capacity to produce 2,000 mtpd (metric tons per day) of ammonia and 1,750 mtpd of urea supergranules.

Termomeccanica Pompe's customer is Mitsubishi Heavy Industries (MHI) while the end-user is Navoiyazot JSC, the company that manages the Uzbek chemical plants.

The two HP pumps are equipped with a 2.1 MW driver and are complete with an API 614 General Purpose (Part 1 & 3) lube oil system.

One of these two pumps is powered by an MV electric motor while the other is powered by a turbine and gearbox. Both drivers are supplied by the customer but will be assembled by TMP before shipment.

The MP pumps will be driven by a 450 kW driver and their motors will be provided by the customer, as for the HP pumps.

Project UNF -Navoiy - Uzbekistan

Training in TMP - interview with Human Resources Development & Organization Manager

In Termomeccanica Pompe, continuing training has always been considered a hallmark of the integration and development of human resources. In recent years, an intensive training program has been implemented, program which has involved the entire staff of the company with the objective to improve and consolidate their professional skills and growth. Here below, an extract of the interview to Dr. Gaia Iapoce, Termomeccanica Group Development & Organization Manager, conducted by ANIMP (the Italian Association of Industrial Plant Engineering) on how such training program is elaborated, planned and carried out:

What are your main sources of funding?

We finance our training using either cross-industry funds (such as Fondimpresa and Fondirigenti,) or our Social Security "system account" based on the communication of the availability of funds. In addition, whenever there are specific tenders dedicated to training, we also use funds from the Province, the Region or the European Social Fund. Therefore, as you can see, funding possibilities and alternatives abound. What is important is to stay informed on the different options available and to take action in time.

What is the procedure followed to identify training needs and plan activities?

Our internal procedure provides for annual meetings, usually in November, with managers aimed at defining the training needs of the various business areas of the company, also taking into account what was provided for and implemented during the previous year. During such meetings, based on the indications given, suggestions are made on possible training activities considered as key for the continuing update of resources. At the end of the process, the annual training plan is prepared and successively presented to Executive Management for final approval at the beginning of the new year.

Who in the company is responsible for training management?

Training is managed internally by our Department. In the case of training activities that use public or cross-industry funds, we are supported by an external training body, with whom we have been working for years.

The editors of this issue are:

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