

TMP news

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Further Product Innovation in TMP: Duplex stainless steel weld fabricated solution for horizontal split casing pumps

For almost a decade now, Termomeccanica Pompe has opted for the weld fabricated solution for large split casing pumps ("DD" TMP-type pump), which are single stage double entry impeller machines.

The weld fabricated solution offers the great advantage to avoid the construction of patterns, which is otherwise necessary when casing and cover are cast, and subsequently allows to reduce preparation time and costs.

During this period, TMP has developed new design criteria and improved manufacturing technologies.

A new contract has recently been acquired for the supply of 5 condenser cooling pumping units complete with electrical motor for the Kangan Power Station in Iran.

The required pumps performance are:

- capacity: 17.169 m³/h
- head: 35 m
- suction pressure: Nom. = 4.6 bar - Max. = 8 bar
- electrical motor power: 2,050 kW

The units, which are among the largest ones of this types supplied by TMP, are currently being shipped to Neyrperse of the Mapna Group, one of the major Iranian players in the energy production sector (see fig. 1).

Up to this supply, TMP's experience on weld fabricated DD pumps had been limited to carbon steel casing machines. For this new job, though, the project requested the use of duplex stainless steel, such request representing a further innovation for this type of product for TMP. In fact, the use for the first time of this more expensive material, corrosion resistant and with more critical welding characteristics, required the implementation of dedicated procedures and special technical solutions, above all with regards to the welding and machining of the flanges between casing and cover which are of very large dimensions and very high thickness. The design difficulties have been faced and overcome, even with regard to the sizing of the internal diaphragms where the static wear rings are fitted; these diaphragms are made of 2 large discs, each split in two, which are an integral part of the casing and cover and separate the suction area from the discharge one, playing a key role structurally speaking.

Extensive FEM analysis have been performed to limit the stress and strains of the casing and cover, minimizing the number of external reinforcing ribs.

The FEM calculations also allowed to chose a better compromise between the number and the diameter of the stud bolts fixing casing and cover, optimizing the distribution of the relative flanges so as to guarantee perfect sealing both in operating conditions and during hydrostatic pressure testing.

A specific solution has also been studied to ensure a perfect contact between the lower and upper diaphragms inside the pump; to this effect, four long stud bolts have been added which are screwed on the lower diaphragms and extend out of the upper ones for nut assembly.

The traditional post weld heat treatment in furnace has not been considered suitable due to both the type of material and to the very different thickness of the various welds. A stress relieving mechanical treatment called Vibratory Stress Relief – VSR – was used instead.

Through the use of a proper shaker and of a tri-axis accelerometer fixed onto the component to be treated, the first natural frequencies of the structure are measured with a first run at rotating speed with gradually increased stress level.

A second run is performed through several cycles (of the duration of a few minutes), each at constant speed equal to the detected critical frequencies. Such cycles cause vibrations in the system, amplified by the resonance phenomenon and determine the release of the residual stresses on the welded areas.

The performance test of the pumps were carried out in our in-house test center, one of the better equipped ones in Europe for the running of such type of full size tests.



fig.1 - DD pump test preparation in Termomeccanica's in-house test center

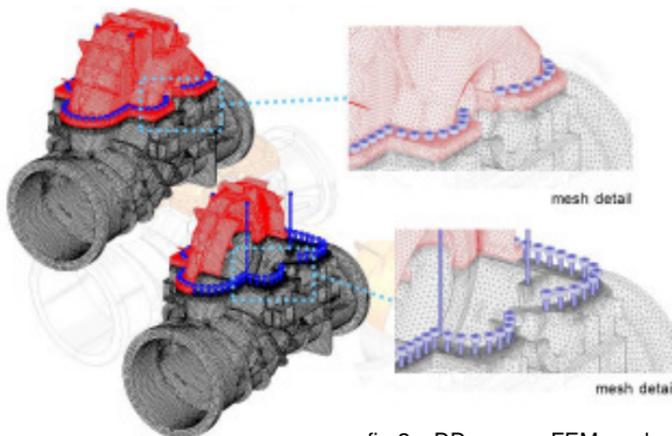


fig.2 - DD pumps FEM analysis

TMP Workshop: New Area Dedicated to Process Pumps – API 610 Std.

After the expansion of the test centre we dealt with in the July 2012 edition, the investment plan regarding the standardized process pumps designed in compliance with the API610 Standard ended up with the creation of a dedicated area within the Termomeccanica Pompe workshop.

In reality it is limiting to talk about a dedicated area since its development and implementation is only the last phase of a study that stemmed from product analysis involving all technical and marketing functions and leading to the design of a real department, separated from the others, where an operational production line occupying over one tenth of the workshop total area has been installed.

This department has been based on the optimization of the flow of materials in order to allow a noticeable reduction in assembly time in compliance with the quality standards that have always characterized Termomeccanica products.

In the 1000 m² dedicated to process pumps, a detached TMP storeroom has been organized where the materials necessary to assemble the assembly kit for the different pump sizes are stored.

The whole system is set up for computerization: starting from requirements that activate the stockroom which prepares the pump assembly kits according to the required sizes. The kits consist of two groups: the stator pack (casing, cover, etc.) and the rotor assembly (impeller, shaft, supports, etc.), each following a different production line:

- welding the connections to the auxiliaries and pressing for the stator pack,
- balancing and assembly of the rotor.

At the end of processing, the two kits are assembled together and the completed free shaft pump is ready to be sent to the Test Centre where the performance test is carried out.

The last phases of the production cycle include cleaning, painting, maintenance and final skid assembly.

Below we list in detail the various investment stages that made possible what we have just described:

- identification of the most suitable workshop area where to locate the new department;
- reorganization of the workshop areas near the selected area;
- purchase of a dedicated balancing machine;
- creation of a separate area where welding of the auxiliaries takes place and purchase of the appropriate equipment;
- purchase of a penetrant booth;
- creation of an automated hydrostatic pressing area;
- purchase of a controller with 6 degrees of freedom to assemble the rotor – stator;
- purchase of various assembly tools and auxiliaries.

The implementation of a department such as the one we have just described allows us to make a pump every five hours which means about six hundred pumps a year at full capacity.

The investment will be completed this year with the purchase of a centre dedicated to processing the main components, activity which is currently carried out by the traditional departments or outside suppliers and the readying of an area for final skid preparation.



Area dedicated to process pumps

Success of TMC compressors at Hannover's Com Vac Trade Fair

The biannual trade fair of Hannover, Com Vac, is recognized internationally as the leading exhibition for compressed air industrial equipment and technologies.

With more than 185 exhibitors, the fair hosted the major players of the sector, who introduced innovative products and customized solutions.

The event confirmed the widespread presence of TMC's products in the market. In fact, the entire TMC product range was represented in numerous stands of packagers, customers of the company.

It is worth to highlight the development of the Turkish and Bielorussian markets this year, besides Italy and Germany, with the addition of key new customers.

TMC is continuing to assert itself as a key reference in the screw air and gas end for industrial applications related to air and technical gas compressions, presenting itself as the right international partner symbol of performance and quality.

FIT PROJECT – Innovation and standardization of the vertical pump product

At the beginning of this year, Termomeccanica Pompe successfully concluded the bureaucratic process regarding the “innovation and standardization of the vertical pump product”, project partially funded by the Fund for Technological Innovation (FIT).

The purpose of this Fund, established in the Eighties, is to support experimental and research projects aimed at new knowledge to be used to develop new products, processes or services or to promote a marked improvement in existing products, processes or services.

The project developed by TMP was completed over six years ago involved various other departments, amongst which the Engineering, R&D and Production departments and aimed at the innovation of one of our niche products: vertical pumps. The objectives successfully achieved have been as follows:

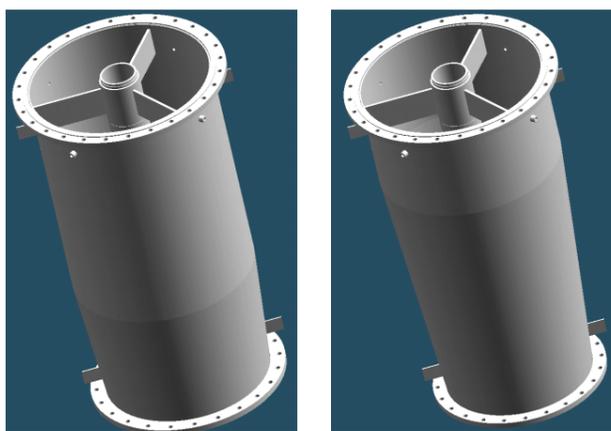
- Increase in product quality standards;
- reduction in design times;
- creation and optimization of unequivocal production criteria;
- radical reduction in human mistakes during production.

The results achieved by far exceeded expectations thanks to a drastic revision of the design process that allowed to implement the following activities:

- Introduction of parametric design techniques;
- standardization of work cycles;
- introduction of new machine tools;
- introduction of work islands for the production of large-dimension shafts;
- complete machining of hydraulic parts.

These themes are still topical and, starting from the experiences gathered on the project itself, have found further openings and definitions, the fruit of which we are still collecting today. An example is the recent decision to acquire for the TMP workshop another vertical lathe with perforating units as well as the choice of repeating the La Spezia workshop experience of the horizontal lathe with a milling head for the Saudi Termomeccanica workshop in Al Jubail.

As stated above, the complex approval and financing process ended successfully only recently, over six years after the completion of all our work, an obvious proof of the tenacity and determination of the Team responsible for the project that allowed the company to achieve this prestigious result.



Introduction of parametrical design on vertical pump column – lower flange reduction

Pump Upgrading - a solution to increase Energy Efficiency and Eco-sustainability in Existing Plants

The necessity to reduce emissions and, concurrently, to optimize energy consumption has created an increasing demand of eco-sustainable and high efficiency products/solutions, not only for the new industrial projects related to plants or machines themselves but also for the “existing” installed base, that is to say the machines or plants with a commercial life of 20 to 30 years which, having been designed and built quite a while ago, result today either inefficient or polluting.

Improving the energy efficiency of existing plants may initially seem easy, as easy as changing machines by stimulating their purchase through public funding for example, but in reality, the situation is much more complex.

First and foremost, large plants cannot simply be “scrapped” without, in their turn, causing a great environmental impact nor generating very high costs which turn out to be unsustainable, whether by their owners or governments themselves whom have to face tighter and tighter budgets each year.

Furthermore, machines such as pumps, compressors, etc. often represent a plant’s “beating heart” and, as such, their substitution results in most cases very costly, if not dangerous for the operations of the plant itself.

Over the past five years, Termomeccanica Pompe has developed many projects related to energy saving, supporting its customers in choosing the best solution tailored to their real plant needs, thus becoming a leader in the sector.

More specifically, the pumps solutions offered are designed for the power generation, desalination and water handling sectors and range from the simple upgrading of a single component to the refitting of an entire pumping station, including design, manufacturing, supply, installation and commissioning activities.

One of the latest project developed by TMP for DUBAL’s Desalination plant in Dubai is actually one of the most complex and ambitious energy saving project ever implemented in pumping systems.

The Desalination Plant, inaugurated in 1979, consists of six MSF distillers, each having a capacity of 5 MIG, and is equipped with twelve brine recirculation and six seawater supply pumps which have remained in rather good operational conditions.

However, in 2010 the end user decided to study an energy saving project related to the plant’s pumps, considering the substantial progress made in pump design and operating efficiency since the commissioning of the Desalination plant. The outright replacement of entire pumps was not taken into consideration as not financially justifiable.

For this reason, the end user chose to study the possibility to only change some components of the major power consuming pumps installed, such as the brine recirculation and sea water pumps.

As the company whom originally supplied both types of pumps had shifted its business to other types of machinery over the years, the end user decided to search the market for another pump manufacturer able to substitute the key components of the machines (such as the impeller and pump casing), leaving the others unchanged (for example shaft, sleeves and discharge column), respecting their existing physical and functional interfaces.

By proceeding this way, the objective was to give a “new life” to the existing pumps, reducing their operating costs as well as maximizing the energy saving/ investment ratio.

Termomeccanica Pompe, using its own R&D resources, performed an extensive engineering study and proposed two high-tech solutions for the sea water and brine recirculation pumps. All the latest technical developments were used to optimize the hydraulics of the pumps, maintaining the existing interfaces as well as the existing materials, as per the end user’s request. Thanks to these specific characteristics, the expected energy savings for the Termomeccanica-modified machines resulted higher than the ones requested and largely contributed to the assignment of the order to the company by the end user.

The project was executed according to the following phases:

- Site assessment and testing of the pumps to verify the actual pump-performance;
- Further performance testing on one of the pumps at Termomeccanica’s in-house test center;
- Retrofitting of the pumps (new hydraulic components, impellers and casings) and re-testing of their performances up to contractual specifications at Termomeccanica workshop;
- On-site installation and final testing.

More detailed results related to the brine recirculation pumps are summarized below:

Pump	Head (m)	Flow (m3/h)	Speed (RPM)	Power (kW)	Efficiency (%)
Design	67	5,309	980	1,243	81
Factory test post-upgrade	67.5	5,309	993	1,144	88.7
Site test post-upgrade	66	5,309	990	1,120	88.6
Energy Saving (post-upgrade/design)				-123 KW eq. to 9.8% saving	

The results actually achieved exceeded the initial expectations, with an enhancement in efficiency of to 9.8%, yielding an energy savings of 1.5 MW which equates to a reduction of 7,630 tons of carbon dioxide emissions per annum. In conclusion, such type of pump upgrading project allowed to reach two objectives: energy saving through efficiency increase of the modified pumps and improve eco-sustainability by reducing CO2 emissions. Termomeccanica Pompe is currently involved in other energy saving projects around the world, such as the refitting of turbo boiler feed pumps and complete pumping systems rehabilitations, maintaining in all cases the interfaces with the existing plant system and upgrading the efficiency of the machines involved, thus achieving not only great energy and cost saving for the customer but also benefiting the environment.

Flash News

Job for the Indian Power Generation market

Last January, Termomeccanica Pompe acquired a new contract for the Indian Power Generation market in collaboration with the Engineered Pumps & Projects Division of the local company Jyoti Ltd. The supply consists of n. 4 concrete volute pumps for the “2x660 MW Power Plant – Condenser Cooling Water System Pumps Package” to be installed by 2014 by NCC Ltd (End User ed EPC contractor) in the state of Andhra Pradesh. The scope of the supply covers the design, engineering, manufacturing and on-site erection & commissioning of the pumps. The pump prototype testing, which will take place at TMP’s La Spezia Test Center, will validate the pumps performances as requested in the project technical specifications. Such supply has been made possible because of Termomeccanica Pompe’s now consolidated know-how in super and ultra super critical thermal power projects. Our Indian partner will supply of the components of the pumps (of TMP engineering) except for the impellers which will be directly supplied by TMP.



Impeller during non destructive testing phase.

Reaching for Excellence (A.R.D.E.) Project Year 2013

For all the companies of the Termomeccanica Group and TMP in particular, training represents a fundamental aspect for the development and growth of human resources and can be considered a distinctive characteristic of the continuous improvement of business.

For this reason, once again in 2013 new activities related to the enhancement of the technical and professional background of resources have been developed within the scope of the Reaching for Excellence project.

The training courses programmed involve almost all sectors: there are some courses on Components with External Technology, others on Non Destructive Testing, which lead to the obtainment of the related certificates; other courses still are on the development of the knowledge of the software used in the company or on other transversal themes such as foreign languages and Health & Safety.

Some of the “transversal” training activities are also organized directly by the Competence Teams. In fact, the five groups who represent the FIVE COMPANY COMPETENCES, on top of carrying out their specific projects identified at the beginning of the year, are promoting structured sessions such as workshops or film showcases so as to allow personnel to improve their familiarity with TMP’s key competences.

The editors of this issue are:

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To contribute to the success of our customers through our experience and know-how. We pursue this goal giving the utmost consideration to the hard work and commitment of both employees and suppliers, respecting the Environment and complying with the expectations of our Shareholders.