

Pump Supply for a New CCGT Power Plant in England

A strategic order from EDF Energy to Termomeccanica Pompe

■ **Alessandro Valle** - *TM.P. SpA Termomeccanica Pompe*

TM.P. SpA. Termomeccanica Pompe, one of the leading manufacturers of engineered centrifugal pumps, is entering the English energy market through the acquisition of an important order for the supply of the main pumps for a new power plant in West Burton, located in Nottinghamshire, 39 miles from Nottingham. EDF Energy, the wholly-owned UK subsidiary of the French EDF Group, is constructing at its West Burton site a new Combined Cycle Gas Turbine (CCGT) power station composed of 3 units. The total installed power of the new plant is 1300 MW, to be added to the existing 2000 MW coal fired power station.

Works commenced on site in January 2008 and the power station will be ready for commercial operation at the end of 2011, with a life of 25 years. Once completed, the CCGT plant will generate enough power to supply the needs of around 1.5 million homes.

TM.P.'s scope of supply mainly consists in supplying all the strategic pumping systems of the plant:

- 6 boiler feed water pumps;
- 6 main circulating cooling pumps;
- 6 auxiliary cooling water pumps and all relevant accessories.

The supply also includes all the strategic spare parts as well as supervision during erection, commissioning and start-up.

Some technical data concerning the pumps being supplied is reported below.

Boiler feed water pumps

The boiler feed water pumps (**figure 1**) are horizontal, multi-stage barrel casing centrifugal type with first stage double suction type (due to the critical suction

TM.P. SpA Termomeccanica Pompe enters into the English energy market through the supply of 18 pumps for strategic services for the new power plant operating with a CCGT (Combined Cycle Gas Turbine) of EDF Energy in West Burton (Nottinghamshire). TM.P.'s scope of supply also includes all the strategic spare parts as well as supervision during erection, commissioning and start-up.



Fig.1 – Boiler feed water pumps

pressure condition) and full cartridge inner element: this item consists essentially of the complete rotating elements, the diffuser and the stage casings that allow a quick replacement of the component, thus considerably reducing the required maintenance time.

The casing design is based on a finite element stress analysis simulating extreme thermal and pressure transient conditions (**figure 2**). All major pump items

Fig. 2 - Example of barrel casing stress analysis

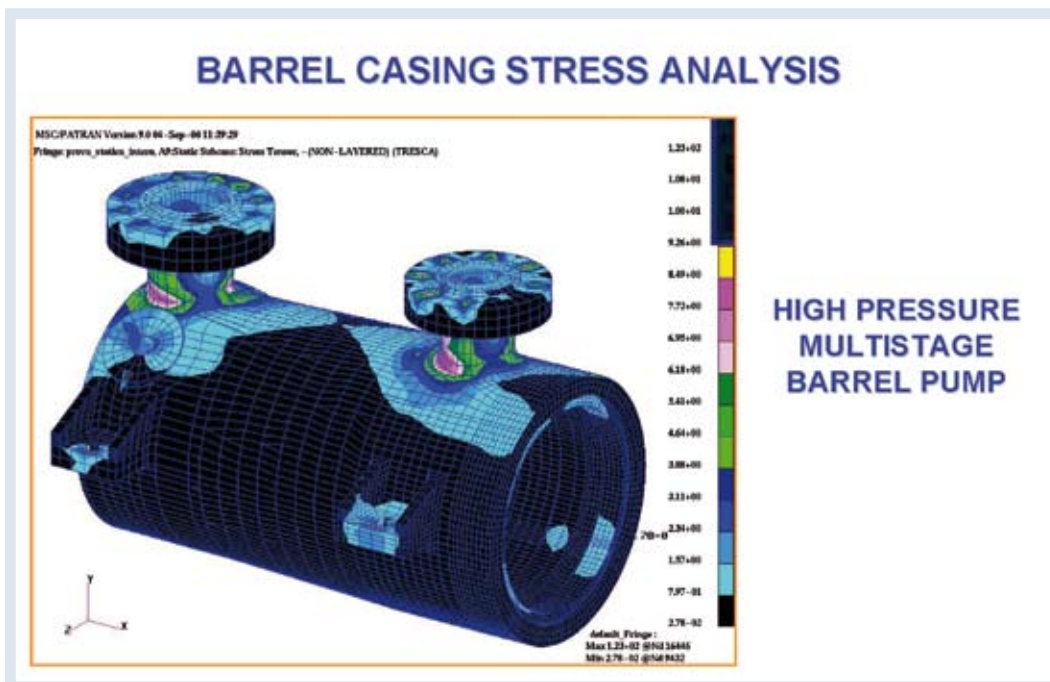
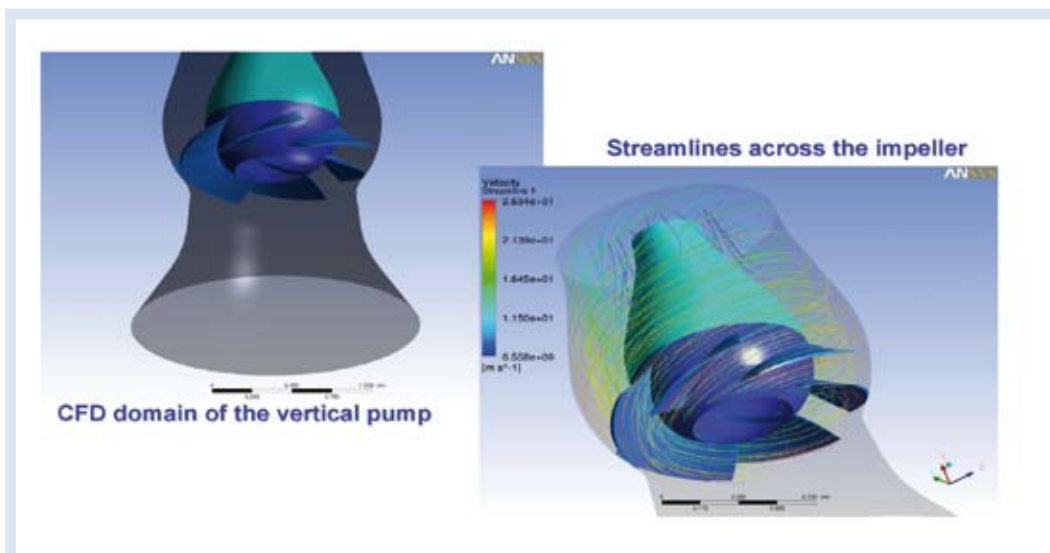


Fig. 3 - One of the main circulating cooling pumps



Fig. 4 - Example of CFD (Computational Fluid Dynamics) study on vertical pump



are chromium-nickel precision castings to ensure dimensional conformity.

The internal thrust balancing is effected by means of the balance drum in high alloy chromium steel forged.

The pumps are driven by electrical motor with a power of 2400 kW. The package is completed with an external forced lubrication system, built in the pump-motor basement, all accessories for pre-warming and cooling system, and an external hood for noise protection.

Main circulating cooling pumps

The main circulating cooling pumps (**figure 3**) are of vertical shaft, centrifugal mixed flow type and are mounted on the cooling tower basin. All the parts in contact with the handled fluid are made in inox stainless steel. Each pump is equipped with electrical motor (1100 kW) coupled on pump motor stool and a combined operation discharge butterfly valve of counter weight type working with an electro-hydraulic system rack.

Furthermore, in order to avoid any risk of bad suction feeding during pump running, TM.P. has also included an intake basin dimensional study for the main cooling water system, consisting of an hydraulic & CFD

(Computational Fluid Dynamics) investigation (**figure 4**), followed by the construction of 1:10 scale model of the system, simulating all the worst suction conditions.

Finally, all the pumps shall be tested at full load conditions in TM.P.'s test centre located at the main factory in La Spezia (Italy). Such test center is actually one of the most capable test centers in Europe, allowing to provide performance test of high capacity vertical pumps (up to 65,000 m³/h) and high pressure horizontal pumps (up to an absorbed power of 12 MW at 50 Hz and 4.5 MW at 60 Hz, and up to an operating temperature of 200 °C). ■



Alessandro Valle, born in 1964, with a Mechanical Engineering Degree from the University of Pisa, has been a Senior Area Manager for the New Product Sales & Marketing Department of Termomeccanica Pompe (TMP) since 2007. He has been working for TM.P. (La Spezia, Italy) for 16 years. He initially started in 1995 as Estimates Engineer in the New Product Engineering Department. In 2000, he was promoted Sales Engineer of the New Product Sales & Marketing Department, where he successively became Area Manager for the Domestic Market in 2003. His positive results lead him to be further promoted in 2007 as Senior Area Manager, adding key foreign markets, such as Egypt and Russia, to his domestic portfolio.