WEG motor/drive packages enable Omani oil field to increase pumping of crude oil
WEG Middle East has successfully overcome a tough challenge to engineer and supply – at short notice – 250kW HgF motors to fit in the same space envelope previously occupied by three 132kW Loher pump motors, at the Daleel Petroleum Oil Field in Oman. The ability of WEG to provide the motors and VFD drives – all with 3 year warranty - is enabling Daleel Petroleum to increase the output of three crude oil shipping pumps by 45% respectively; each pump now being capable of shipping 16,000 bpd, instead of 11,000 bpd previously. This increase also offers the advantage of enabling one pump to be withdrawn at any time for maintenance, without Daleel Petroleum incurring penalties for falling below its contracted pumping rate of 30,000 bpd.

Located in a remote area of Oman, the Daleel Petroleum Oil Field is responsible for a series of exploration and production wells. The crude oil is collected via a series of pipelines and manifolds, treated to remove water, sand and salt, to meet the specification set by Petroleum Development Oman (PDO), and then stored in large tanks. The next stage of the process is to pump the oil from the storage tanks to the PDO pipeline network; this is the task of three crude oil shipping pumps, which until recently were running at close to full capacity in order to meet production targets.

Currently the agreement between Daleel and the Petroleum Development Oman (PDO) stipulates that Daleel has to feed 30,000 bpd (barrels per day) of crude oil into the PDO pipeline. Until recently, this figure was achievable only by running all three of Daleel’s existing crude oil pumps three pumps at the same time (providing 33,000 bpd maximum) Unfortunately, this “full-on” operation posed risks to production, as it was not even possible to stop one pump set for maintenance, for example, without incurring financial penalties.
Pump supplier, Flowserve, was asked to look at this problem with a view to uprating the crude oil pumps, to enable Daleel to meet its daily pumping obligations, and have capacity to spare, by using just two pumps at any one time, instead of all three.

A number of major motor manufacturers, WEG among them, were invited to submit proposals and tender for the project, which involved providing larger motors for each pump (250kW), together with variable speed drives and control equipment built into panels.

The project was complicated by the customer demand that the existing 132kW pump motors be replaced by 250kW units, whilst maintaining basically the same dimensional envelope, to simplify installation. In addition, the requirement for the three motor and VSD control packages was urgent, and so delivery time was a crucial element in determining which supplier would secure the order.

In the final analysis, and despite tough competition, WEG was the chosen supplier, due to the engineering support it provided, plus a faster delivery time and the security to the customer of a 3 year warranty on the motor and VSD packages supplied.

The WEG package comprised 3 – 250kW, 315C/D/E HGF 2-pole motors, plus three CFW-09 variable speed drives assembled into control cabinets. The panels housing the VSD are located 150m away from the pump motors in an electrical control room where the temperature can be controlled, usually below 30°C, even during the summer when temperatures outside may reach 55°C. In addition to the panels, the control room also houses load reactors, which were also supplied by WEG.

These are required to compensate for the capacitive effects of the long cable runs between the motors and inverters.
WEG’s engineering support in the installation and commissioning of the motor/control packages provided by Luciano Rottava da Silva, an automation specialist, and Gurpreet Singh Anand, a motor applications engineer, was crucial in ensuring continuity of production at the Daleel Station. The electrical installation for the first motor provided a pattern for the subsequent two installations, enabling a host of tasks to be undertaken in advance before the two other panels arrived in the site. After the complete installation of the first motor and its associated panel/VSD, the HGF motor was run uncoupled without load for 24 hours. Once this period had elapsed, WEG coupled the pump to the motor and started another 24 hour test run, this time simulating a real operation. When this test was concluded the motor continued in normal operation, providing much improved pumping performance of up to 16,000bpd compared to the 11,000bpd available from the original pump sets.

To date, two of the three motors and their VSD control panels have been installed and are in excellent running order, enabling Daleel to meet its daily pumping capacity even before the final motor package is installed. Moreover, as an added bonus to this improved performance, the new motors - unlike the one’s they replaced, which had DOL starting – benefit from the soft start characteristics and far more controllable operation provided by VSD. This helps with both motor reliability and life, and also provides Daleel with the potential to reduce its costs on the running of the pump motors, due to improved energy efficiency.

Commenting upon the success of the Daleel application, Luciano Rottava da Silva, WEG’s field engineer for the project said: “The climate in Oman is so hostile - ambient desert temperatures that regularly exceed 50°C in the hot season; plus frequent sand storms - that it's critical to have rugged, low-maintenance motors, variable frequency drives, and control packages capable of reliable and repeatable performance.”

“WEG is rapidly becoming the motor and drive equipment manufacturer of choice for oil and gas applications in the harsh Omani environment,” said Mr da Silva. “This is due not only to the performance of our products, but also to our ongoing customer commitment, from engineering design, to on-time deliveries, installation and commissioning, to post-sale support of installed products.”

- Luciano Rottava da Silva

**WEG in Oman Steam Injection Recovery Project**

The Daleel Station project comes hard on the heels of another successful WEG project in Oman: helping EN-FAB, Inc., of Houston in Texas, to achieve demanding production targets in a major steam injection recovery project undertaken to enable Petroleum Development Oman to reverse Oman’s declining oil production.

EN-FAB, Inc. was contracted by PDO to design and install 100 million BTU steam generators in the Omani oil field, which, incidentally, is situated on a vast gravel desert plain, and subject to regular sand storms and some of the World’s highest recorded temperatures.

To date, WEG has delivered 34 motor control systems to EN-FAB to control multiple motors on the oilfield. Each system comprises WEG’s CFW-09 Series variable frequency (VF) drives and customised control packages with direct on line (DOL) starting. This equipment helps run the main and booster pumps that supply water to the steam generators, as well as the large fans for combustion air to the burner assembly. The success of the WEG motor control systems is evidenced by EN-FAB requesting other equipment vendors to supply two and four pole WEG motors on their equipment to complement the use of the WEG VF drives and controls.
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