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INNOVATIVE SOLUTIONS

ArmorPUMP® Unveil High Energy Savings with Vertical Turbine Pumps

A gold mining plant utilising four vertical turbine pumps for pumping freshwater to a processing plant had been experiencing serious operational inefficiencies. The pumps were not performing in line with the client's expectations with regards to service life and performance. The client's main concern lay with the high cost of the pump parts, long lead times (40 weeks) and the lack of OEM maintenance and support for onsite issues. After an onsite assessment, ArmorPUMP® provided them an ideal solution that improved their pump performance, provided high energy savings and amended their regular operational dilemmas.

Problem

An operational and mechanical assessment of the pumps revealed excessive clearance between the spigot location diameter and the counterbore on the flange ends of the column. This resulted in misalignment, causing uneven wear in the spider bearing bush and shaft that created excessive vibration within the assembly. Consequently, this affected the abrasion and corrosion properties of the medium flowing through the pump.

Further inspection of the parts determined that the product flowing through the pump had a river sand/silt base. This had increased the abrasive operational conditions within the pump leading to accelerated wear on components where no protective coatings had been applied. Other possible factors included the lack of a detailed assembly process with wrongly assembled configurations, poor maintenance practices and a need for regular dredging and cleaning of pump pits.



Solution

Following site assessment, ArmorPUMP® offered to install two pumps with a sixteen-week lead time and the other two pumps with a twenty-two-week lead time as per the client's requirements. The design changes and initiatives that were implemented into the quotation offering included:

- Shaft coupling assembly that incorporated split collars with fitted keys
- Coupling – stepped key design
- Sealing arrangement utilising spiral trac and restriction bush design
- Wear rings – flange head design change (bolt on design)
- Column – design change to eliminate misalignment
- Column bearings – material and flange head design change
- Ceramic coating for columns, pump cases, impellers and suction bells
- Discharge housing – ceramic coating of pipe internals with ARC SD4i – advanced polymer/high loading ceramic composite
- Complete assembly coating of external surfaces – coated with ARC S1 a polymer/surface modified mineral composite
- Fully assembled wet end components offered by ArmorPUMP® with customer site personnel
- Complete traceability on manufactured parts for quality control
- Regular pump status reports to assist the client site with scheduling installations
- Pump assembly manual provided with video hyperlinks for training of site personnel



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- ArmorPUMP® representation during commissioning to assist with the correct assembly procedure

Assembly and Installation

ArmorPUMP® travelled onsite to view the installation of two pumps and decided that one pump would be installed and operated in order to approve its performance for four weeks before the installation of the second pump.

The remaining pumps were then installed as per the client's requirements. ArmorPUMP® performed flow rate readings for all the OEM pumps that were running prior to the installation of the vertical turbine pumps. A video recording of the assembly procedure was taken along with suggestions for assembly tooling required for inclusion with the pump manual; to assist with future assemblies.

Result

With the complete installation and operation of the pump onsite, flow readings were taken that revealed a significant improvement in flow rates and reduced energy savings of \$177,118.80/running pump. In addition, initiatives towards the client were taken to establish a continuous pump performance improvement program to ensure their efficiency needs were being met.

The installation of ArmorPUMP® pumps demonstrated that the incremental design change significantly improved supply lead time and aided site personnel in adeptly providing spare pumps and performing future maintenance to the pump assembly in more efficient timeframes.

