



Abrasive process upgrade for DVMX 10 stage pumps

Industry: Industrial - steel
Region: Europe
Territory: France
Category: Service centre overhaul
API Type: BB3

ClydeUnion Pumps Aftermarket Technical Services team has experience across a range of services on critical rotating and reciprocating equipment to improve operational safety, reliability and efficiency. The overhaul and upgrade for DVMX 10 stage pumps for the industrial market is one of our success stories documented in our library of case studies. These case studies highlight the requirement from the customer, how we achieved the goal and the process we followed to deliver the improvements.

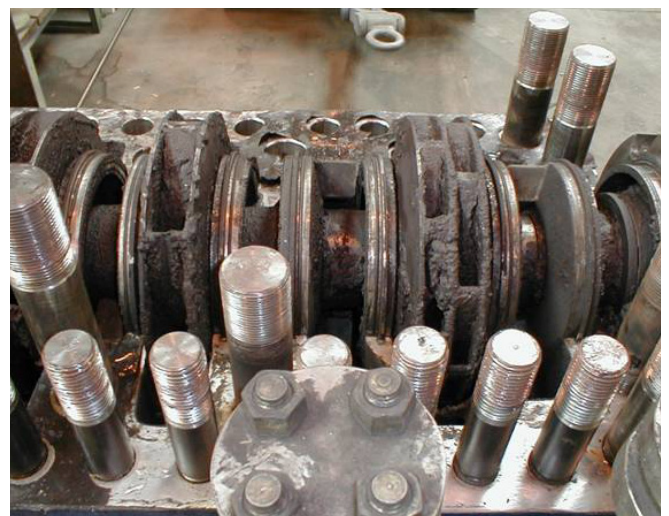
Image left: Erosion/scaling of pump parts

Situation

A rolling mill in France was looking to repair and improve the reliability of their DVMX pumps within the framework of a maintenance contract. The factory had three DVMX 6.8.11 packaged pumps that are used to remove the scale on steel sheets during their manufacturing process.

Challenge

The function of the pumps is to water blast the scale off processed metal passing through the rolling mill. The water, containing the pulverised scale, goes to retention and decantation pools, then passes through a system of filters before being reused to blast the processed metal. Despite the system of filters, the water containing small particles of scale that is re-pumped was causing considerable damage to the inside of the DVMX pumps.



Erosion/scaling of pump parts

Solution

Not being able to eliminate small scale particles from the reused water, the solution was to plan regular maintenance of the pumps and repair erosion created by scale and to check the balancing, functional dimensions and tolerances. Several design upgrades were made to the pumps to help reduce damage to parts and improve their service life.

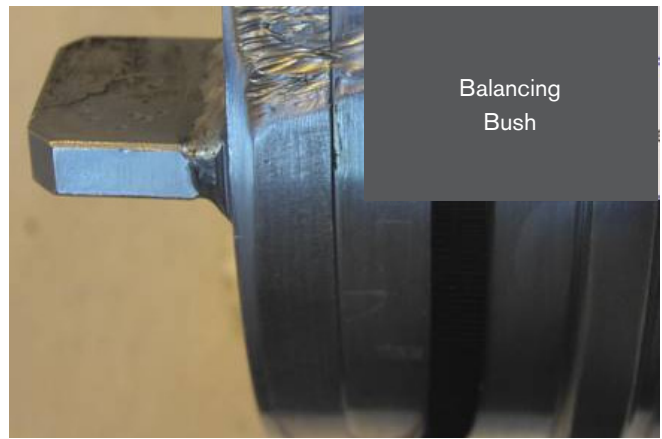
Repair procedure:

- Strip down and full dimensional inspection of parts
- Refurbishment of parts by weld deposition where possible
- Reconditioning of threaded holes
- Heat treatment and re-machining of weld repaired parts including gasket faces
- Re-boring for shaft concentricity and re-machining of gasket faces where necessary
- Cleaning of pipes and channels
- Re-assemble and hydrostatic test
- Clean down and paint

Design upgrades:

- Modifications included changes to clearances, redesign of parts and additional gaskets. The purpose of these modifications was to decrease erosion on some sensitive areas of the pumps (gasket face) and channel it to the wear parts.
- Hard tungsten-chromium carbide coatings on central bearing bush, sleeve, piston and wear rings.
- Hard tungsten carbide coatings on impellers 5 and 10 (on each side of central bearing). When the water containing small particles of scale passes between wear rings, it causes damage to the back shrouds of these impellers.

Since the first repairs the MTBO has been significantly increased from a few months (\approx 6 months) to more than 24 months. This increase was gained from a series of planned maintenance visits leading to successive design modifications.



Balancing
Bush



Damage to the back shrouds of impellers

Financial illustration

Investment cost of parts supplied

180,000 Euros per complete spare rotor and refurbishment of various stationary parts.

30,000 Euros to 40,000 Euros for service in our workshop.

Savings due to increased 'Mean Time Between Overhauls' – 'MTBO'

From a very short MTBO of approximately 6 months we have now increased it to more than 16,000 hours of working (24 months), in accordance with the maintenance schedule of the factory. Moreover the successive upgrades have eliminated the wear on the pump casing and limited it to the wear parts. The instrumentation provides a means to monitor the pump's behaviour which is now undertaken by the customer, consequently there have been no unplanned stops of the rolling mills for more than 10 years.



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