New trouserleg design + material upgrade

Industry: Industrial - desalination  
Region: Middle East + Caspian  
Territory: UAE  
Category: Material upgrade  
API Type: VS7

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 supply of a new trouserleg design to an updated material type for the desalination 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: New casing being installed

Situation
The general scope of the project was to supply a new trouserleg design to an upgraded material type to withstand stress corrosion cracking which had occurred on the previous pump.

Challenge
As part of the scope, as well as upgrading the materials, ClydeUnion Pumps had to ensure the materials were fully isolated from the previous materials to guarantee there will be no galvanic corrosion issues. The main contribution towards the stress corrosion cracking of the pump casing was the material used. The casing was manufactured from Ni-Resist cast iron, the resistance of the material is reduced when allowed to come into contact with sea water.

Solution
ClydeUnion Pumps solution to the problem was to supply a new pump casing that would be manufactured from Duplex stainless steel which is renowned for its high resistance to corrosion. This solution prevents galvanic corrosion between the new casing and the original parts. Our solution to this problem was to use Tufnol composite between components with a galvanic potential.

Stress corrosion cracking visible on trouserleg
To maximise casting integrity, reduce cost and accommodate the upgraded material properties, our solution was to supply a redesigned 3 piece casing. The casing was hydrostatically tested at the ClydeUnion Pumps, Cathcart, Glasgow site.

- A Tufnol spacer was used to prevent galvanic corrosion between the new casing and the discharge bend and a Tufnol isolation bush was inserted to divide the suction bellmouth and the snubber.
- At the customer’s request, the line shaft coupling was also re-designed to be more aqua-dynamic.
- Extensive design review was performed to provide improvements over the original design.

**3D DESIGN METHOD EXPLOITATION**

The main benefits were exploitation of recent advancements in 3D design technology and their rapid pattern manufacturing techniques.

These benefits allowed:

- Pattern manufacturing time was less than half of the normal allowance.
- Patterns were completed 6 weeks ahead of the original plan.
- Net weight reduction of 10% on original design.
- Castig thickness reduced by 22%.

**FIELD SERVICE SUPPORT**

Having a ClydeUnion Pumps engineer on site during installation benefited the customer in several ways.

- On hand input to technical queries.
- Resolution of problems.
- Relationship building between end user and OEM.

**QUALITY CONTROL**

- Project completed in accordance with ISO 9001.
- Quality plans in place.
- Material certification to ensure quality.
- Project carried out to OEM standards.
- 3 piece casing assembly hydro test.
- Non-destructive testing and heat treatment performed.

**OPERATIONAL IMPROVEMENTS**

Since initial installation and start-up, the pump has operated well, with no failures to date.

As ClydeUnion Pumps developed a new 3 piece casting for the pump casing, it now opens the opportunity to supply the customer with an individual section of the casing as required, instead of replacing the entire unit.

For more information about our worldwide locations, approvals, certifications, and local representatives, please visit www.spx.com.

SPX Corporation reserves the right to incorporate our latest design and material changes without notice or obligation. Design features, materials of construction and dimensional data, as described in this bulletin, are provided for your information only and should not be relied upon unless confirmed in writing.

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