



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.

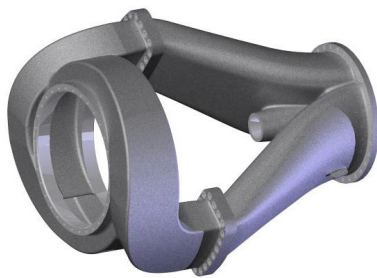
- A Tufnol spacer was used to prevent galvanic corrosion between the new casing and the discharge bend and a Tufnol isolation bush was inserted to divide the suction bellmouth and the snubber
- At the customer's request, the line shaft coupling was also re-designed to be more aqua-dynamic
- Extensive 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
- Casting thickness reduced by 22%

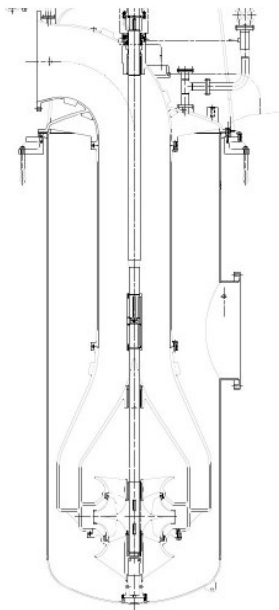


FIELD SERVICE SUPPORT

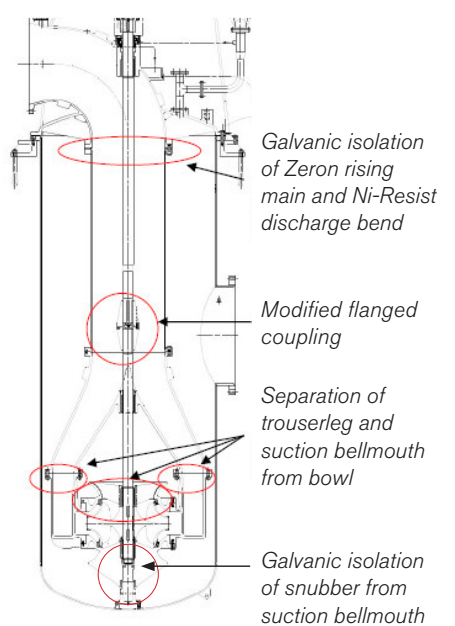
Having a ClydeUnion Pumps engineer on site during installation benefited the customer in several ways.

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

Old Pump Design



New Pump Design



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.



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Ref no: CS-VS7-I-I-01 Rev no: 002 UK

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