

CASE STUDY

PUMP REDESIGN IMPROVES CORROSION RESISTANCE AND REDUCES DOWNTIME

- Dramatic reduction in manufacturing timer
- 3-part casting makes future repair easier
- Upgraded materials prevent future corrosion



New casing being installed

CHALLENGE

A desalination plant in the Middle East was experiencing high levels of corrosion on one of its pumps. Stress corrosion cracking was clearly visible in the steel 'trouser leg' casing. The operator asked ClydeUnion Pumps, a Celeros Flow Technology brand, to come up with a solution.

SOLUTION

ClydeUnion Pumps undertook a design review to determine where improvements to the existing pump design could be made. They used advanced 3D modelling and rapid pattern manufacturing techniques to redesign the trouser leg, as well as upgrading the material specification to cope with the harsh operating conditions at the desalination plant. The new three-part pump casing is made from Duplex stainless steel, renowned for its corrosion resistance. The redesign also uses an advanced composite material (Tufnol) between new and existing components with galvanic potential.



CLYDEUNION®
PUMPS

Industry: Industrial – desalination

Region: Middle East

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.

SOLUTION

The use of advanced modelling and manufacturing techniques delivered significant time savings during the repair. Pattern manufacturing time was halved, with patterns completed six weeks ahead of the original schedule. Casting thickness was reduced by 20 per cent, saving on raw materials, and a net weight reduction of 10 per cent was achieved over the original design. The new three-piece pump casing offers the opportunity for future savings because the customer can be supplied with an individual section as required, instead of replacing the entire casing.

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:

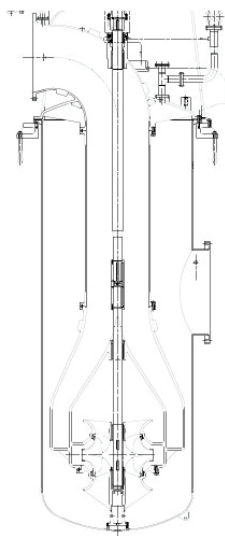
- Pattern manufacturing time was less than half of the normal allowance
- Patterns were completed 6 weeks ahead of the original plan
- Net weight reduction of 10% on original design
- Casting thickness reduced by 22%



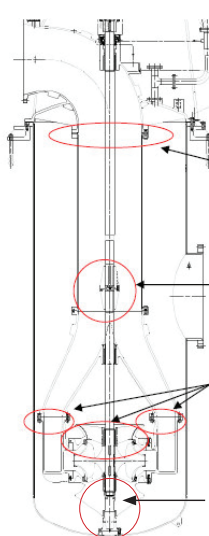
FIELD SERVICE SUPPORT

- 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



Galvanic isolation of Zeron rising main and Ni-Resist discharge bend

Modified flanged coupling

Separation of trouserleg and suction bellmouth from bowl

Galvanic isolation of snubber from suction bellmouth

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.

Aberdeen Service Center
P: +44 1224 756 100

Abu Dhabi Service Center
P: +971 02 4081900

Annecy Service Center
P: +49 405 220 2401

Baton Rouge Service Center
P: +1 225 778 3310

Battle Creek Service Center
P: +1 269 966 4782

Burlington Service Center
P: +1 905 315 3813

Calgary Service Center
P: +1 800 352 8294

Corpus Christi Center
P: +1 361 371 6519

Downey Service Center
P: +1 562 622 2371

Glasgow Service Center
P: +44 141 637 7141

Jenks Service Center
P: +1 281 217 6359

Odessa Service Center
P: +1 704 808 3780

Penistone Service Center
P: +44 1226 763 311

Singapore Service Center
P: +65 6513 9276

Zhengzhou Service Center
P: +86 371 8665 2391

E: cu.sales@celerosft.com
www.celerosft.com



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