



Hydraulic re-rate on F 580-1850 pumps

Industry:	Industrial - desalination
Region:	Americas
Territory:	Trinidad + Tobago
Category:	Hydraulic re-rate
API Type:	VS1

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 hydraulic re-rate of the F580-1850 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 re-rated impeller

Situation

Our customer required a re-rate on the performance of their Clearwell pumps for a desalination plant.

Challenge

The customer required to modify the total capacity of six Clearwell F580-1850 single stage pumps, from the actual 46,543 USgpm (7,757 USgpm per pump) to more than 54,000 USgpm (9,000 USgpm per pump). The request imposed that the increase in capacity would not require a change of the motors (600 hp).

Solution

ClydeUnion Pumps changed the impeller hydraulic type to meet the new rated points, this involved several design modifications on the suction casing and wear rings. The seawater service of the pump also required a change in material to high corrosion resistant stainless steel (nickel-chromium URANUS 45).

The following work was undertaken to achieve this:

- Change of impeller type from L to H type. This change decreases the required NPSH and allows operating at a higher flow rate without changing the motor power.

L type impeller (6 blades)

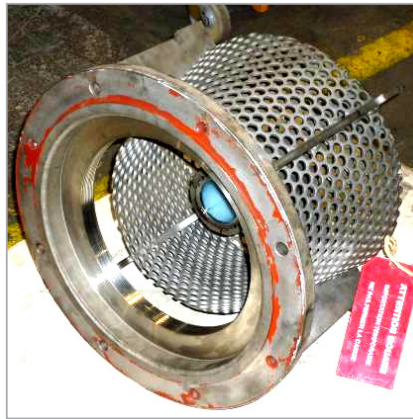
Average diameter = 410 mm Suction eye diameter = 285 mm

H type impeller (6 blades)

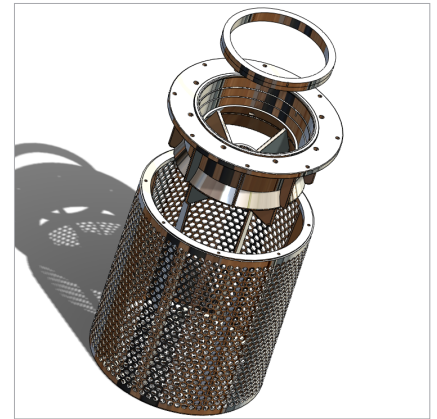
Average diameter = 407 mm Suction eye diameter = 320 mm

- Checking of the implantation of the new impeller in the diffuser casing. The important increase in size leads us to change wear ring dimensions and optimise the calculation of impeller diameter to meet the new rated flow.
- Design modification of the thrower below the impeller. The width increase of the impeller led us to change the length of the thrower.

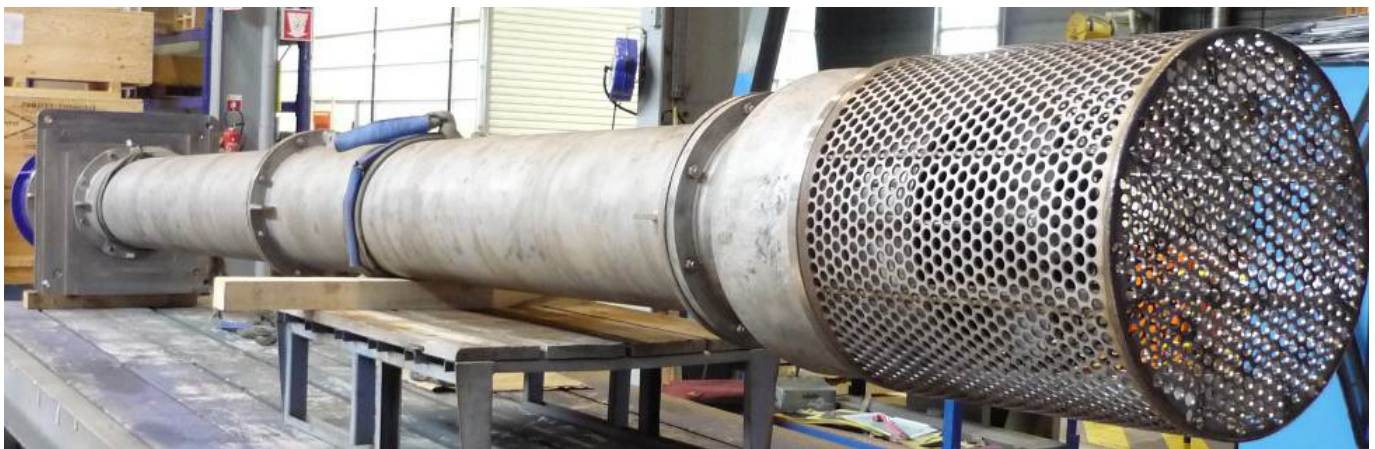
- Design modifications on the pump suction casing for the implantation of the new wear ring and to work in accordance with the new rated flow. Without these modifications problems of critical speeds and flow area would appear at the suction of the pump.
- Reassembly and test of the pump was undertaken.



Former suction casing



Re-design suction casing



Reassembly and test of the pump

Operational improvements

At the maximum power (600 hp) the pumps performance is the following:

Flow: 9,588 USgpm

TDH: 180 feet

Efficiency: 74.9 %

Our customer also requested the supply of a seventh pump. With seven pumps the expected total capacity is superior to 65,000 USgpm.

Financial illustration

At motor full power (600 hp) the increase in capacity is more than 20% (from 7,757 to 9,588 USgpm) for a cost on one pump:

- Supply of H type wheel = 27,000 Euros
- Supply of suction casing set (suction casing + suction bell + wear ring) = 20,000 Euros



P: +44 (0)141 637 7141 F: +44 (0)141 633 2399 E: cu.sales@spx.com

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