CASE STUDY

FPSO CARTRIDGE UPGRADE INCREASES FLOW

White rose offshore cartridge upgrade

Industry:	Industrial - sea water injection
Region:	Americas
Territory:	Offshore
Category:	Hydraulic re-rate
API Type:	BB5

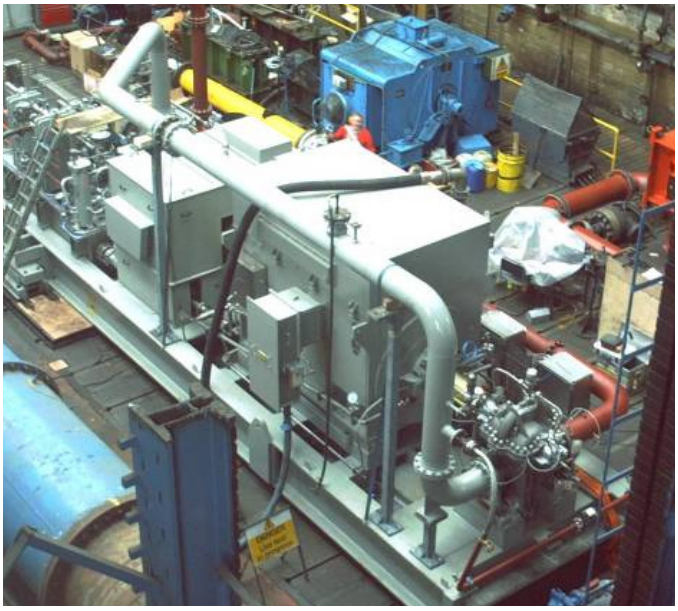
ClydeUnion Pumps Aftermarket Technical Services team has experience across a range of services on critical rotating and reciprocating equipment to improve operational safety, reliability and efficiency. The hydraulic re-rate of the CUP-BB5 for the industrial market is one of our success stories documented 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: CUP-BB5 Pump

Situation

The general scope of the project was to supply three new pump cartridges for the CUP-BB5 type OK-6E-36 for the FPSO units as part of an upgrade plan.

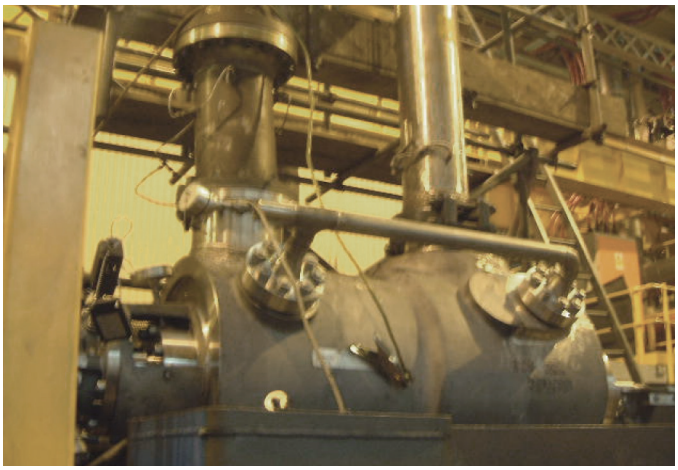
The three pumps with the upgraded components aim to increase the flow by 13.5%.



Challenge

The customer expressed an interest in increasing the pump flow to a combined target of 50,000 m^3/day at 30,000 kPa. In order to minimize outage and capital expenditure, a strategy was devised to utilize the existing spares cartridge, through providing two overhauled and one new up-rated spares cartridges to meet the project aim. This would have significant benefits over supply of new units as up-rated spares cartridges could be supplied on staggered milestones.

ClydeUnion Pumps



Up-rated cartridges with test barrel

Solution

The required duty condition was within the hydraulic envelope of the pump and so the proposed head and flow requirements needed an upgrade in impeller size to maximum diameter. The Glasgow, Cathcart site received the spare cartridge from the customer for an overhaul and upgraded hydraulics. The company also supplied two new cartridges, all with the re-rated maximum diameter hydraulics.

- The motor manufacturer confirmed that the original motor and gearbox sets could cope with the power rise necessary for the new targeted flow rates.
- A feasibility study was conducted before the project was given the go ahead. The Cathcart site overhauled the spare cartridge and returned it to the customer along with the new cartridges.
- A pump factory test was performed to ensure the new cartridge was within API duty tolerances. A new casing was manufactured for the purpose of test.

Financial illustration

- Cost of project = £1.2 million
- Profit per barrel = $35/ £21
- Barrel increase per day = 37,333 barrels
- Profit increase per day = £783,993
- Payback period = < 2 days operation

Pump Performance Comparison

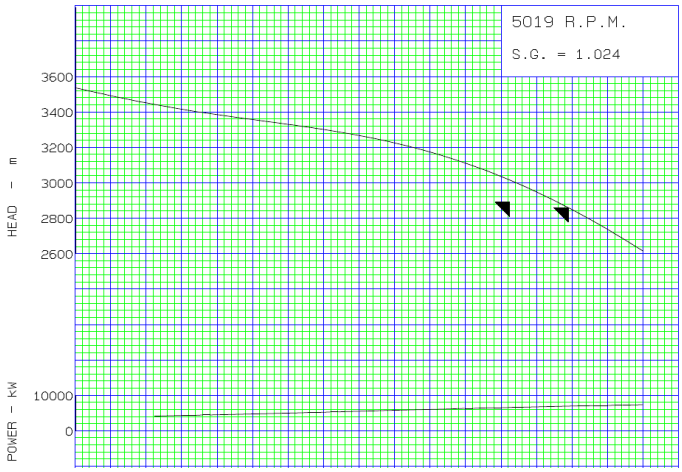


Table 1 - Duty Comparison

	CURRENT	PROPOSED	% CHANGE
Head	3004m	2978m	-0.9%
Flow	612 m³/h	694.4 m³/h	+13.5%
Power	6,398 kW	7,224 kW	+13%
CV Diff Head	354.2 bar	370.2 bar	+4.5%
Suction Pressure	0.92 barA	0.92 barA	-
CV Discharge Head	356 bar	372 bar	+4.5%

Table 2 - Combined Pump Comparison

	CURRENT	PROPOSED
Discharge Pressure	30,200 kPa	29,905 kPa
Total Flow	44,064 m³/day	50,000 m³/day

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

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