



CASE STUDY

FPSO CARTRIDGE UPGRADE INCREASES PROFITABILITY

- Feasibility study minimized downtime
- Production increase of 8-10 million barrels/year
- ROI less than 2 days operation

CLYDEUNION®
PUMPS

Industry: Oil & Gas - Upstream

Region: Americas

Territory: Offshore

Category: Hydraulic re-rate

API Type: BB5

CHALLENGE

The customer, an integrated energy company, wanted to increase the output of their FPSO to a combined target of 50,000 m³/day at 30,000 kPa. This required an increase in sea water injection flow of 13.5%.

SOLUTION

Celeros Flow Technology brand ClydeUnion Pumps conducted a feasibility study before the project was given the go ahead. The motor manufacturer confirmed that the original motors and gearboxes could cope with the power increase required for the new targeted flow rates. A pump factory test was performed to ensure the re-rated cartridges were within API duty tolerances. A new casing was manufactured for the purpose of the test.

Following the feasibility study, we were engaged by the operator to supply three new pump cartridges for the CUP-BB5 type OK-6E-36 FPSO units as part of the upgrade plan.



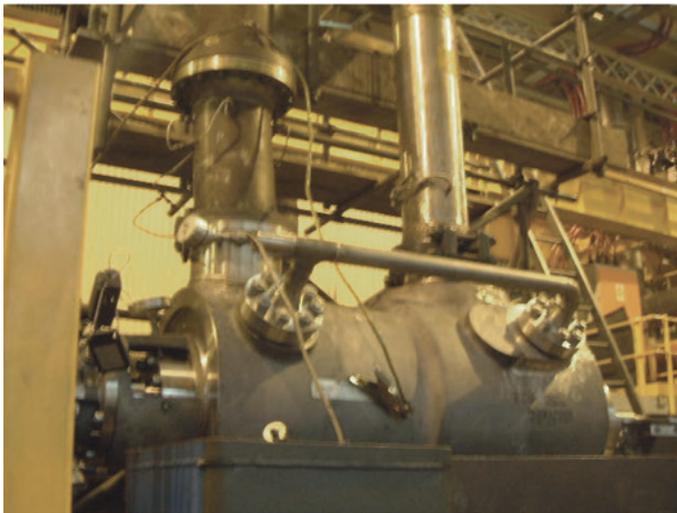
MOB 3 X 4 - 5 stage pump

In order to minimize outage and capital expenditure, a strategy was devised to utilize the existing spare cartridge and re-rate the existing cartridges to meet the project requirement. This approach offered significant benefits over the supply of new units because the up-rated spare cartridges could be supplied on staggered milestones.

The required duty condition was within the hydraulic envelope of the pump. An upgrade in impeller size to maximum diameter was needed to meet the proposed head and flow requirements. The work to re-rate the cartridges to the required specification was undertaken at the ClydeUnion Pumps site in Glasgow, Scotland.

OUTCOMES

The project was completed with minimal downtime and to the customer's satisfaction. The 13.5% increase in flow at the pump enabled production of an additional 27,333 barrels of oil per day. The payback period for this project was less than 2 days operation.



Up-rated cartridges with test barrel

PUMP PERFORMANCE COMPARISON

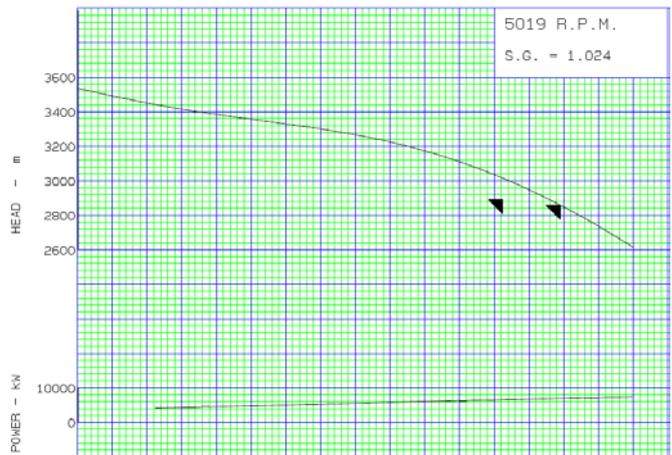


TABLE 1 - DUTY COMPARISON

	CURRENT	PROPOSED	% CHANGE
Head	3004 m	2978 m	-0.9%
Flow	612 m ³ /h	694.4 m ³ /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 m ³ /day	50,000 m ³ /day

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Anney Service Center
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Baton Rouge Service Center
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Battle Creek Service Center
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Burlington Service Center
P: (+1) 905 315 3813

Calgary Service Center
P: (+1) 800 352 8294

Corpus Christi Center
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Downey Service Center
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Glasgow Service Center
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