

CASE STUDY

PUMP MODIFICATIONS SOLVE ENDEMIC ISSUES IN PWR NUCLEAR POWER PLANTS

- Industry-wide benefits
- Premature failures understood and resolved
- Costly pump changeouts avoided

CHALLENGE

Prior to 1990, a large number of Pressurised Water Reactor (PWR) nuclear power plants in the USA had experienced widespread premature failure of their reciprocating coolant charging pumps. Typical symptoms included:

- Excessive leakage around packing shortly after packing replacement
- Premature valve failure – cracking (performance drop off)
- Overheating of packing
- High stress on valves and valves seats
- Gas entrainment in pumpage

An alternative centrifugal pump solution was proposed and adopted in some plants, but it was a costly addition that involved plant design changes as well as pump purchase and installation.



CLYDEUNION®
PUMPS

Industry: Power – nuclear
Region: Americas
Category: Site fault investigation
API Type: API 674 Reciprocating pump

SOLUTION

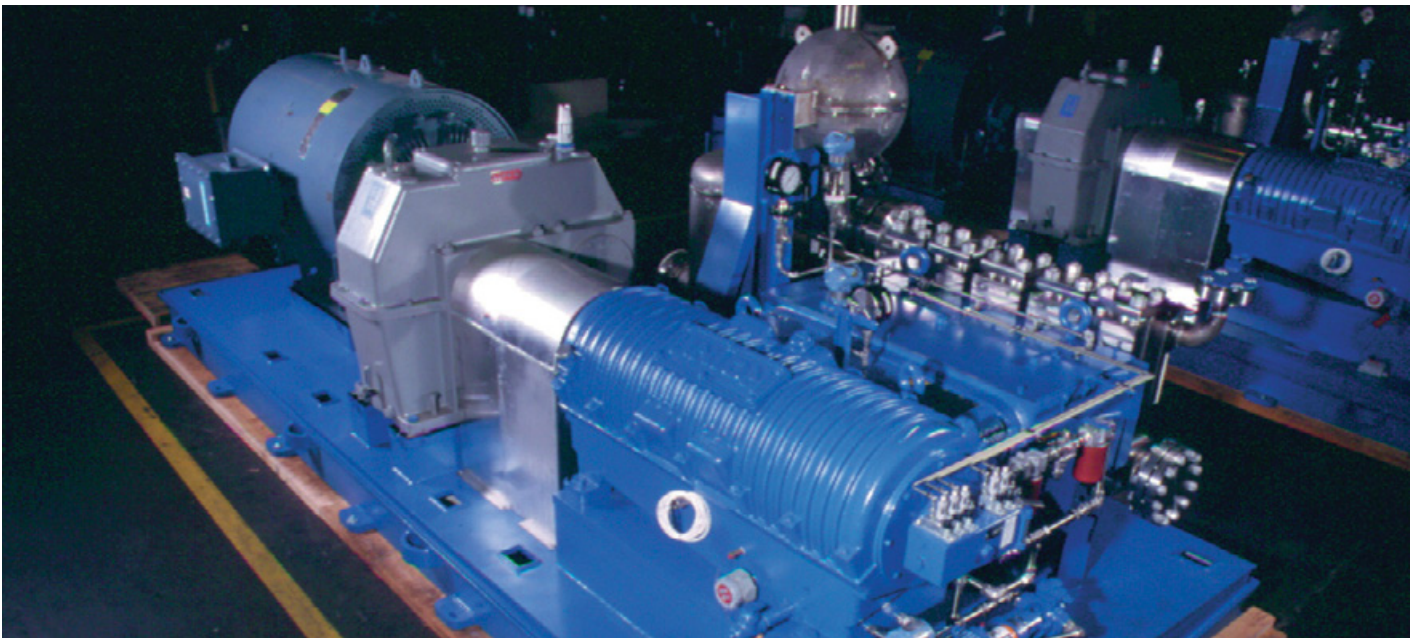
Given the normal hydraulics of the application, a reciprocating coolant discharging pump should have performed perfectly well. ClydeUnion Pumps (a Celeros Flow Technology brand) and several nuclear plant operators decided to investigate the origins of failure in more detail in order to arrive at a cost-effective, long term solution.

ClydeUnion Pumps was able to significantly improve reciprocating coolant charge pump performance by changing the packing materials and lubricants, making modifications to the valve and valve seat, and increasing the valve thickness slightly. Increasing the size of the valve to better match the seating surface improved load distribution. Bleed-off and venting capabilities were also added to prevent gas build-up.

OUTCOMES

Mean time between failure was significantly increased following these modifications. Implementation of these upgrades correspondingly resulted in lower cost of operation and greater efficiency, reducing the need to pursue a costly centrifugal pump alternative and associated site modifications.

By fully investigating the root cause of the premature failures, we have been able to engineer a solution that brings major benefits – not just to a single customer, but to the nuclear and process industries across the globe.



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