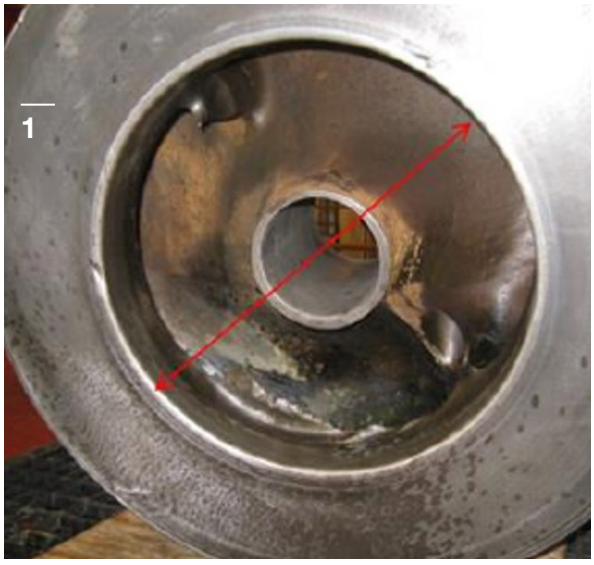
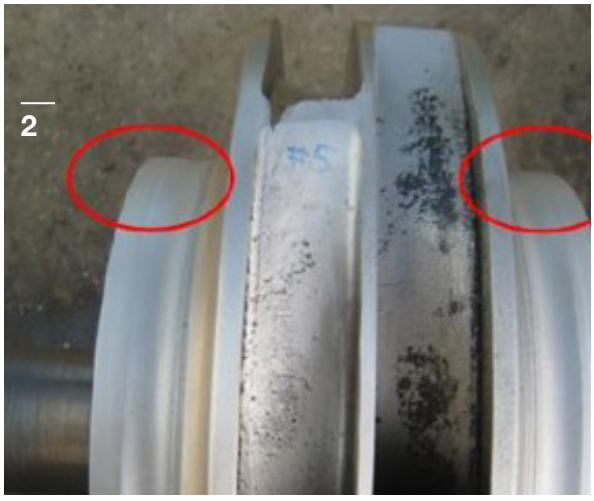
Pump retrofit **extends MTBF** from 6 weeks to 3 years

CUSTOMER	Petrochemicals Major
LOCATION	Philippines
INDUSTRY	Petrochemicals
KEY SERVICES	1. Root cause analysis
	2. Retrofit
	3. Reverse engineering

THE CHALLENGE

Reduced reliability and a 64% capacity increase requirement for quench oil pumps





Quench oil pumps in a naphtha cracker facility in the Philippines were suffering from reduced reliability due to the drive-end seal barrier pressure dropping and causing frequent failures. The plant operator also needed a solution that would not require extensive alterations to the surrounding infrastructure.

- Breakdowns cost the company more than USD 1 million per day in lost output.
- The pumps had been designed for a less aggressive operating environment.
- Hard coke particles in the oil were causing severe wear due to 'three-body' abrasion.
- Plans for a 64% increase in production needed to be addressed at the same time.

1. Very high abrasive damage on guide vane locations and on the inlet of the pumps

2. Impeller wear ring and casing wear ring worn out

3. Impeller vane plate eroded and exhibited crack gap on end of vane plate

THE SOLUTION

Comprehensive re-rate across multiple pump components to meet new duty requirements

Sulzer's design and engineering teams used their extensive knowledge and experience in the chemical process industry to identify the root cause and deliver the most effective solution in terms of cost and time. By understanding the details of the wear process, the teams could select the best alternatives in terms of materials and design.

A comprehensive re-rate was undertaken with upgrades and modifications on metallurgy, parts, baseplate, motor and turbine.

- The improvements included the selective replacement of critical pump components with new parts made from high chromium steel, along with the addition of an abrasion resistant coating on the wetted areas.
- Wear ring clearances within the pumps were increased to allow larger coke particles to pass through them and new ports were introduced to allow the wear rings to be flushed to remove accumulated particles during pump changeovers.
- Provision of new motor, coupling and coupling guard
- The baseplate was modified with robust set of tests such as alignment using laser alignment technique and independent tests on motor to prove performance within tolerance levels.
- Turbine was re-rated for higher power rating for turbine driven pumps
- All improvements were achieved with an absolute minimum of changes to the surrounding infrastructure.

The retrofit dramatically improved the pumps' durability, and the new impellers enabled the existing pumps to support the increased capacity of the plant. The in-house metallurgical expertise and engineering knowledge ensured the most effective and robust solution was supplied to meet the customer's requirements.

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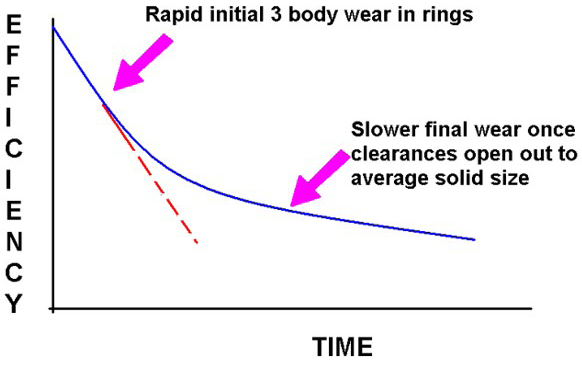

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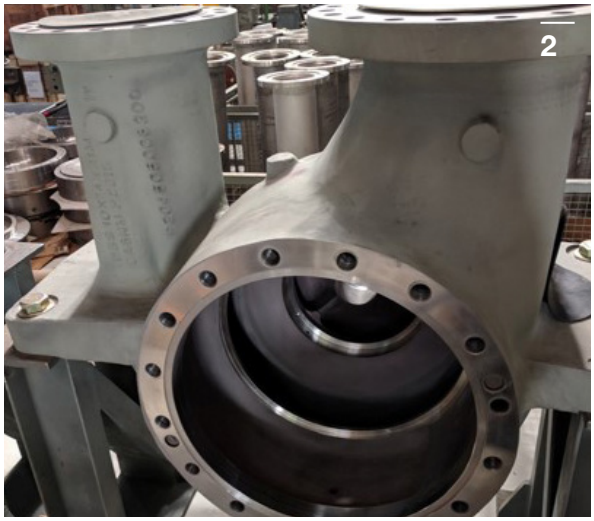

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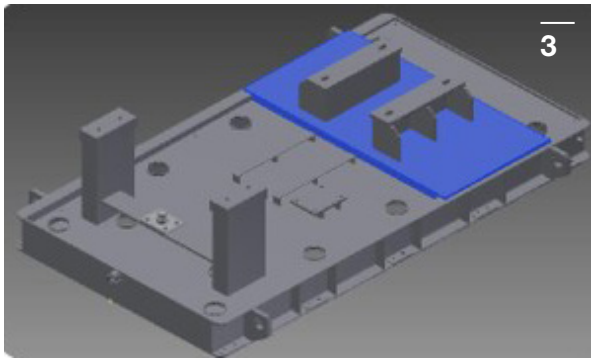

1. Curve reflects what happens when clearances open up- recirculation, the flow starts to move back around and not into the discharge, thus having a double negative effect on the pumps

2. Material upgrade using high-chromium steel

CUSTOMER BENEFIT

Providing an efficient pathway with minimal cost, timeline and site impact

The plant managed to improve the oil quench pumps' design to achieve the required three-year maintenance cycle as well as increasing performance to achieve a 64% increase in output.

By selecting the retrofit option instead of installing new equipment, the lead time for the delivery of the pumps was cut by 50%.

In addition, the retrofit option delivered a 20% saving in equipment costs. One big benefit of Sulzer's retrofit proposal was minimal disruption at the plant. The pumps were upgraded and tested at Sulzer's facilities, ensuring that they could be reinstalled with no major changes to pipework or ancillary equipment.

To further minimize costs and streamline project speed, the existing motor base plates were retained and adapted. This ensured a 60% lead time reduction due to minimal site modification. Having proven its credentials in pump upgrades, the petrochemical plant has engaged Sulzer on similar projects in other processing units of the facility.

1. Retrofitted pumps eased operator's concerns in meeting production goals

PROJECT KEY FACTS

INCREASE IN CAPACITY REQUIRED

64%

LOSS FOR PUMPS FAILURE/PER DAY

USD 1 milllion

REPLACEMENT COST SAVINGS

20%

LEAD TIME REDUCTION BY GOING FOR RETROFIT OVER NEW PUMPS

50%

LEAD TIME REDUCTION FOR MINIMAL SITE MODIFICATION

60%

THE IMPACT

Successful retrofit paves way for replication of effort on other pumps and a re-think for pump assets purchase and upgrade strategy.

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