

CASE STUDY

Retrofitting Improves Feed Pump Reliability

A major retrofit of the boiler feed pumps at Ratcliffe Power Station delivers a step improvement in reliability, increased efficiency and greater operational flexibility.



Retrofitted pump undergoing performance testing

“ Sulzer were able to listen to our problems and requirements, then take them away to develop innovative solutions that have delivered results beyond our original expectations! ”

Chris Harris, E.On UK

The Sulzer difference

Sulzer is the world's leading manufacturer of engineered pumps. Our unrivalled experience in producing high energy custom designed pumps into the power and petroleum sectors allows us to optimize existing pump systems no matter who the original supplier was. Our dedicated retrofit engineering teams specialize in delivering the optimum solution for any given pumping system. Before they commit customers are provided with payback details allowing investment decision to be made with confidence.

The challenge

The original Weir feed pumps at Ratcliffe Power Station were designed for each generating train constantly producing 480-500 MW. Modern operating practices require flexible output in line with demand which led to an operating regime between 180 and 520 MW. The original feed pump designs meant that for generation of 220 MW and below, operation had to be shifted from main feed to start standby feed pumps. This was due to the inefficient operation of the main feed pump hydraulic at these lower loads.

The solution

Sulzer designed a custom engineered replacement of the existing pump internals with a state-of-the-art removable cartridge design fitted to the existing barrel casing. The new Sulzer HPT350-540 6-stage pump cartridge was designed to address the challenges of the new operating regime. The custom engineered hydraulic design allowed for a much broader efficiency curve allowing efficient operation at lower loads and negating the requirement for the start standby units under these conditions. Whilst retrofitting the pump cartridge, Sulzer were also able to modernize the design further by changing out the geared coupling design for flexible membrane type, replacing packed glands with mechanical seals, and introducing a balance piston and thrust bearing in place of the dated balance disc design.



The original non-Sulzer installation



The Sulzer retrofitted installation

Customer benefit

Feature	Customer benefit
No requirement for motor driven start/standby units for long periods during low load	£5,000 per unit, per day in additional power sent to the grid (based on electricity price of £0.1 per KW/h)
Increased Mean Time Between Failure (MTBF) from 2 years to circa 8 years	Maintenance costs reduced from average £100,000 per unit per annum to £20,000 per unit per annum
Increased reliability	More uptime, increased operating revenue
Maintaining critical and ancillary interfaces	Minimal project costs
Retention of existing drivers	Major cost and complexity saving
Retention of existing barrel	Cost saving
Minimum impact on pipe-work and foundations	Major cost and complexity saving
Hydraulics sized for today's low flow duty requirements	Flexible operation
Optimized inlet geometry for improved suction performance	Flexible operation
Minimized vibration reducing the blade pass excitation at low flow-rates	Increased reliability
Increase in peak and off load efficiency	Lower operating costs and carbon emissions
Balance drum in place of the existing balance disc	Increased reliability
Mechanical seal in place of existing labyrinth seals	Increased reliability
Bearings suitable for a barring speed of 28 rpm and the introduction of a modern thrust bearing	Increased operational flexibility and reliability
Service life approaching 60,000 hours	Minimized operation costs
Non-lubricated coupling	Increased reliability and reduced maintenance
Grounding	Prevent potential shorting across the seal faces
Upgraded oil system	Improved reliability over a wide operating range

Contact

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Applicable markets

PRN, power generation

Applicable products

Retrofit, non Sulzer equipment