

## CASE STUDY

# Solving of Ethylene Cracker Complex (ECC) Bottleneck and Flare Revamp Projects in Singapore

Our customer wanted to execute the front-end engineering design (FEED) work of the ECC debottlenecking and flare revamp projects in Singapore. A retrofit was needed for four CD 16x20x34F/1s quench oil circulation pumps, of which three were motor driven and one was steam turbine driven. In addition, one new pump unit was required to achieve their new process parameters.



Performance test of the customer's new unit in a Sulzer factory in England

*“ Sulzer is the original equipment manufacturer of the pumps that this customer is using. Thanks to this revamp project, the pumps now achieve the new target parameters. ”*

Sulzer project leader

### The Sulzer difference

With retrofit, the customer achieves its target parameters by minimizing required modifications as much as possible.

### The challenge

Four pumps had to be refurbished, of which three were motor driven and one was steam turbine driven. The required retrofit had to be in line with the customer's target parameters which included an increased capacity and head for each pump.

In addition to retrofitting the pumps, Sulzer engineers checked the suitability of the existing motors and ascertained the required modifications of the steam turbine.

### The solution

**Four existing CD 16x20x34F/1s pumps and one new pump unit by Sulzer**

Essentially, the set of upgrade components comprised

- New increased diameter impeller
- Stationary wear rings
- Casing gaskets and O-rings

### Three existing motors and one new unit with the new pump

The original motors were rated for 1300kW only and were, therefore, not suitable for the new duty. New motors rated for 1560kW were required and they needed to be mechanically and electrically interchangeable with original motors.

The scope of work included the modification work (assembling of revamped pumps) at the Sulzer Singapore workshop.



The brand new unit produced by Sulzer in England with the new duty parameters

### One existing steam turbine

The existing turbine was sent to the manufacturer to enhance power output to achieve the required new parameters.

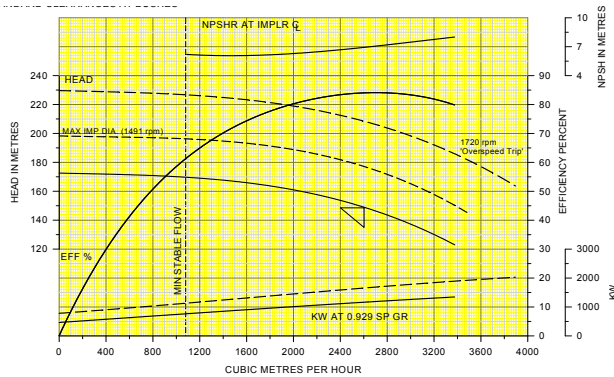
The following components had to be replaced by new ones

- Complete gearbox set, including set of gears whose service factor is 2.0, set of bearings, oil pump (same footprint and shaft dimensions as the existing one)
- New nozzle block including set of screws
- Complete new turbine rotor assemblies (HS rotor and LS rotor) including new turbine wheel, complete including blades, shroud band locking piece, wheel nut, and locking washer
- Blades for reversing segment, including shroud band and locking piece
- Four new double valve cones (multivalve system) including necessary gasket

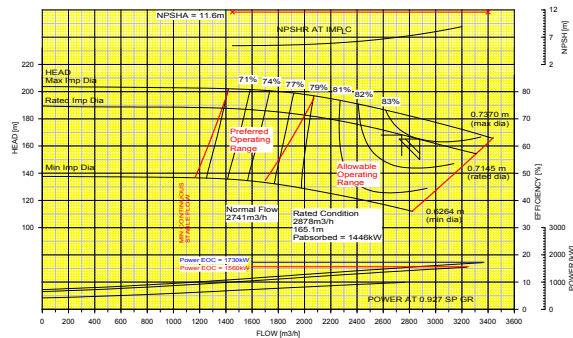
### Customer benefit

- Pump flow and pressure now match the new process parameters
- Bearing oil temperature used to be +90°C, and after the retrofit it dropped down to +70°C
- The shaft vibration in x and y directions dropped from 100 microns to 60 microns
- Singapore workshop performed HVOF coatings on the volute casing and casing covers to enhance lifespan of these parts, which were eroded due to hard fuel coke particles present in the liquid

### Product data



Before retrofit:  
Original performance curve



After retrofit:  
New revised pump performance curve showing an increase in both flow rate and differential head to achieve the customer's target parameters

### Contact

lee.cockerrill@sulzer.com

### Applicable markets

Hydrocarbon processing

### Applicable products

Sulzer CD pump, Laurance Scott motor and Dresser Rand turbine