



TATA POWER TROMBAY RETROFIT

NEW BARRIER TYPE FILTER SYSTEM AND DIVERTER DAMPER REFURBISHMENT FOR GAS FIRED UNIT 7

THE CHALLENGE

Tata Power was looking for a retrofit solution of Air Intake System and Diverter Damper for their gas-fired Unit 7. Camfil Power Systems was awarded the contract through Siemens for supply and supervision of Air Intake System and through Tata Power for Diverter Damper, which specified 6 months from order to commissioning and a maximum shutdown of 37 days for dismantling and installation.

TATA POWER

TATA Power Ltd, India is India's largest integrated power company with a significant international presence. The Company has an installed generation capacity of 8,521 MW in India and a presence in all the segments of the power sector: generation (thermal, hydro, solar and wind), transmission, distribution and trading. Trombay Power Station is a 1,580 megawatt (MW) thermal plant in Mumbai, Maharashtra, India supplying the city of Mumbai with approximately

50% of its power needs. The plant has four steam turbine units and one 180 MW gas-fired combined-cycle unit powered by a Siemens GT Model V94.2.

THE EXISTING PULSE CLEANING SYSTEM

The original filter housing was supplied by LUWA, Germany. The installed filter housing with vertically hanging CO-3512-TL pulse cartridges has been in operation since 1993. This site is located close to the ocean and exposed to high humidity and salt-laden winds across the system. Accordingly, the filter housing suffered from heavy corrosion damage and the operator suffered from a high pressure drop across the system. A site survey performed by Camfil Power Systems and Siemens jointly indicated improper weather protection and lack of a dust removal system in the pulsing unit. Several pre and pulse filter elements' filter cartridges were damaged or missing, so unfiltered air could by-pass through both filter

stages. Both Camfil Power Systems and Siemens advised that Air Intake System should be exchanged to ensure Turbine safety and performance.



Pictures from the original filter house. Dismantling and erection of the new barrier type Inlet Air System

RETROFITTED CAMFIL BARRIER TYPE SYSTEM

Based on the site survey, Camfil Power Systems proposed replacement of the pulse filter system with a three-stage static/barrier filter system to Siemens, considering the local environment with refineries and a thermal power plant nearby. The sea coast is just behind the power plant and relative humidity ranges from 20-85%. A hot and humid climate may degrade the performance of a pulse filter system due to particles mixed with water droplets penetrating the surface layer and not being released from the media when pulsed. The barrier filtration system design was vetted by Siemens Engineering and proposed to Tata Power.

FILTER ELEMENTS

The newly installed Inlet Air Filtration System consists of a first stage of coalescer pads preventing coarse particles and water droplets from entering the following stages. The heavily polluted industrial area requires a pre-filter solution with high dust holding capacity, the Cam Flo XMGT EN779 class M6 bag filter. For maximum protection against sub-micron particles and salt penetration, the final stage is equipped with an F9 Cam GT 4V-300 compact filter.

Camfil Power Systems was awarded the order in April 2013 and the solution was commissioned by Siemens under Camfil supervision by September the same year, on time. Engineering, procurement

and project management was executed in teams across Europe and India. Major fabrication was done at the Camfil Power Systems workshop in Trichy, India.



Cam-Flo XMGT M6 Bag filter with non-discharging synthetic media and high dust holding capacity.

CamGT 4V-300 F9 Barrier type filter with high filtration efficiency and low pressure drop.

MODIFICATION OF THE DIVERTER DAMPER

The exhaust system is equipped with a hydraulically driven diverter damper system including guillotine damper. This system was manufactured in 1993 by WHALCO Engineered products, Inc., formerly known as Bachmann Industries, Inc. The diverter damper suffered to an equal extent from corrosion, hot spots and heat leakages around the expansion joints. In addition, a malfunction of the hydraulic system was discovered as well as several areas of damage to the internal insulation.

In order to reduce heat loss and enable a smooth start of the power plant to avoid thermal stress inside the HRSG, Camfil Power Systems offered a specific range of repair work including exchange of the complete drive system.

The Diverter Damper refurbishment scope supplied by Camfil Power Systems:

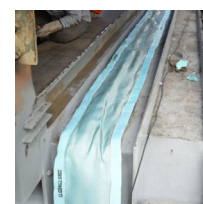
- Insulation: Internal diverter repair work to reduce heat leakages and hot spots.
- Replacement of Expansion joints
 - a. Diffuser - Diverter
 - b. Diverter - HRSG

- Hydraulic Power Unit incl. PLC
- Hydraulic actuator

Installation and commissioning were completed by Camfil Power Systems within the specified 37 days for plant shutdown according to the commissioning plan.

The retrofitted Diverter Damper System of Camfil Power Systems had following advantages:

- New HPU and actuator guarantee a high reliability of the diverter system for long term and safe operation of the plant.
- Oil used in HPU is synthetic, fire-resistant, biodegradable hydraulic fluid for improved life time performance.
- New expansion joints with flanges and improved internal insulation reduced heat leakages and hot spots. Thereby the loss of thermal energy was reduced and efficiency of the plant was improved. Further a safe and reliable operation is possible



Retrofitted diverter damper system with replaced expansion joints, actuator and HPU.