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CASE STUDY

RETROFIT OF AN AIR INTAKE SYSTEM LAND BASED ENHANCES FILTER LIFE

Introduction:

An Independent Power Producer designated for power supply wanted to retrofit a static filter house that provides clean air to the turbines. The user's objective was to reduce frequent filter replacements which was 3-5 months for all three stages. Also, they wanted to reduced the Initial pressure drop of 70mmWC to a considerable amount when the filters are replaced.

Challenge:

Independent Power Producer has a set up of 225 MW Gas based Combined Cycle Power Plant in Uttarakhand, India and is operational since Nov-2016. It consists of two units(75 MW each) of Fr-6FA (GE Model-PG6111FA) Gas Turbines and one unit (75 MW) Steam Turbine.

The plant is situated rural countryside environment, amidst farming fields and raises a lot of fine dust by mechanized ploughing, fine husk when machines do the harvesting, and soot when harvest residues burnt. In winters, smog created when fog is laden with moisture, fine dust, husk, and soot. Some nearby industries are also emitting smoke and soot into the atmosphere.

Air intake filtration came with GT Package with a typical compact Single module V-shape static filter system with Coalescer, Prefilter & Final filter stages. With this arrangement, the customer has faced a problem like frequent start/stop of the machines and numerous filter replacements. Frequent clogging of GT intake air filters causes a decrease in mass flow of air through Gas Turbine, thus causing an increase in heat rate. The finer dust also fouls the GT compressor, which reduces efficiency.

Original filter house

New Airfilco filter house

Solution:

Based on the site survey, Airfilco Filtration Systems proposed replacing the existing typical compact Single module V-shape static filter system with a flat three-stage static filter system.

The newly installed Inlet Air Filtration System consists of the first stage of coalescer cum Prefilter Aero HydroPleat G4, preventing coarse particles and water droplets from entering the following stages. The second stage is a larger media area rigid Pocket Aero PolyPac M6 Bag Filter with high dust holding capacity. For maximum protection against sub-micron particles, the final stage equipped with an Aero Cell VGT XXL F9 compact filter with a positive sealing deep-V (430mm) design met all of the requirements like high efficiency, low initial pressure drop, high dust holding capacity and robust construction.

Erection of new filter house

Dismantling original filter house

Result:

Initial pressure drop reduced less than half (i.e.)70mmWC to 23.6mmWC when the filters are replaced Minimal pressure drop increases over the six months continuous runtime.

The stable and predictable filter pressure drop allows for continuous Operation for long periods Extremely high system reliability achieved by trouble-free running of the filtration system.

Filter lifetimes of 6 months in Coalescer, 12 months in Prefilters and 18 to 24 months in the final filters can be expected despite the highly adverse atmospheric conditions (Customer used to replace all three stages within 3 – 5 months earlier).

Money invested in retrofit payback in 6 months of Operation!!

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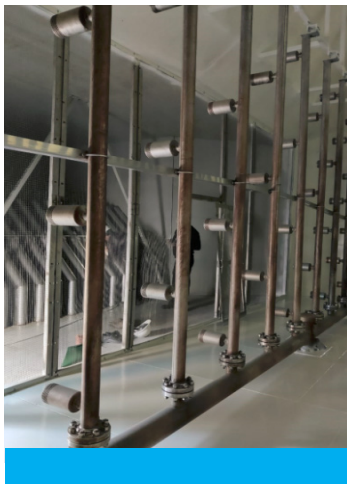
KEY DATA	
Location	Kashipur, Uttrakhand, India
Gas Turbine	Fr-6FA (GE Model-PG6111FA)
Intake air flow	604,800 m^3/hr
Initial Pressure Drop	23.6mmWC
Intake air system/ Filters fitted	3-stage Filter system 1st Stage: Aero HydroPleat G4 which is a coalescer cum Prefilter, Filter class ISO coarse 76% 2nd Stage: Aero PolyPac M6 which is a rigid pocket Bag Filter with high dust holding capacity, Filter class ISO $_ePM_{10}$ 55% 3rd Stage: Aero Cell VGT XXL F9 which has maximum protection against sub-micron particles, Filter class ISO $_ePM_1$ 75%
Scope of Filter house delivery	• Design, manufacturing and supply of Three stages Static Inlet air filtration system • Hoods with Droplet Separator, 3stage static Filter house, transition, Inlet Bleed Heat shifting, structure, Stairs, platform and ladder • Dismantling of existing filter house, Erection & commissioning of newly supplied filter house



Shifted Inlet Bleed Heater

Aero Cell VGT XXL F9

Aero Poly Pac M6

Aero HydroPleat G4 and DS30

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