

THE NEED FOR GAS TURBINE INLET AIR FILTRATION

Due to the large amounts of air required to operate a gas turbine, the cleanliness of the air is of primary importance for the turbine performance and life expectancy. Dirty intake air will cause erosion, fouling, corrosion and cooling passage plugging.

Erosion is caused by sand and mineral dusts, in the 10 to 20 micron sizes, impacting axial compressor blades. Fouling is normally due to ingestion of mineral or plant matter, smoke and hydrocarbon fumes, which adhere to rotor and stator blades. In both instances blade profile is changed reducing aerodynamic performance with subsequent continuous drop in compressor efficiency. Erosion is permanent and requires parts replacement. The fouling can be corrected by cleaning.

Generally, average airborne dust does not result in corrosion; however, combinations of moisture and airborne aerosols containing sea salt, or ammonium compounds result in compressor blade pitting. Pitting causes a roughening of the airfoils with consequent reduction in the aerodynamic performance of the compressor.

Airborne sodium chloride and certain metals contribute to hot gas path corrosion. The corrosion occurs during the combustion process. Sodium combines with sulfur and/or oxygen forming a liquid flux depositing on hot gas components. Potassium, vanadium, and lead, either as sulfates or oxides causes the normally protective oxide film on hot gas components to be disrupted so that parts oxidize faster.

Cooling air for passages in the combustion liner and first stage nozzles is pulled from the turbine compressor. When dirty inlet air is present in the cooling air, dust particulate builds up in the cooling passages, reducing heat transfer, causing temperatures to increase, therefore giving rise to cracking.

Mueller can provide an inlet air filtration system designed to remove solid particulate, moisture, and salts in a compact, low-pressure drop, cost effective product.

