

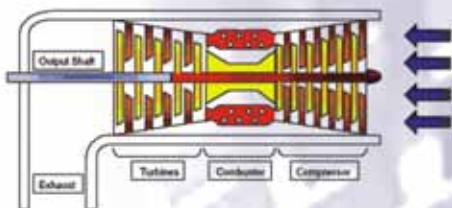
“FILTRATION FOR ROTATING MACHINE INTAKE”?

Today's gas turbines demand maximum protection against environmental effects to ensure performance, longevity, and minimum maintenance. Gas turbines are required to operate in some of the most severe environments on the planet. Operators cannot afford for these engines to breakdown and wants to operate their machinery for longer periods without the need for frequent and expensive stops for water wash / overhaul. Trouble-free operation of a gas turbine is a continual battle against the elements. As modern gas turbines and compressors becomes more efficient the need for high efficiency filtration increases. It is therefore essential that the air inlet filtration system is optimized to meet the specific challenges of a given situation.

Dust and salts of the ambient air are normally retained at 80% -90% by a dry and well maintained air intake filter. But if the filter is overloaded or gets wet due to condensing ambient humidity the separation performance decreases. Volatile air impurities like SO₂, NO_x and VOC pass the filter unhindered and also the small soot particles are hardly retained. The salts, dust as well as the organic air impurities precipitate on the compressor and the air path according to the local flow conditions. The sticky organic molecules act like a binder for the dust and salts. Compressor fouling does not only cause significant power loss but also poses a serious corrosion risk due to the high content of corrosive salts.

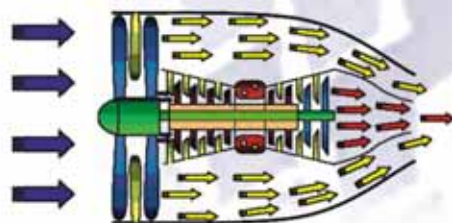
This expensive machinery's life depends on high quality air to prevent **fouling** (Adherence of particles and droplets to the surface of the turbomachine blading), **erosion** (Erosion is the abrasive removal of material by hard particles suspended in the gas stream), and **corrosion** (Corrosion is the loss of material caused by chemical reaction between machine components and contaminants) regardless of site conditions. Since gas turbines are installed in all types of environments from harsh deserts, to inner cities, to coastal regions, **the air filtration system must be designed for specific environmental conditions. Properly conditioned inlet air is critical to keep gas turbines and other rotating machinery operating at peak performance.**

Gas Turbine Schematic



It is a well known fact amongst gas turbine operators that highly efficient filters, in combination with a low pressure drop for the entire inlet system, mean not only low operating and maintenance costs but also maintain high power outputs from the turbine. Therefore **quality Inlet air treatment systems** are essential for providing the clean, tempered air necessary for reliable, high-performance gas turbine operation.

Turbofan



Intake air house manufactured by Spectrum

TYPES OF ENGINE DAMAGE CAUSED BY IMPROPER FILTRATION

Foreign Object Damage (FOD) Most catastrophic of all types of

Damage

- Caused by large objects
- Easily filterable
- Usually a result of poor maintenance



Foreign Object Damage (FOD)

Erosion

- Caused by particles ~ 5 mm and greater in size
- Particles blunt leading edges of compressor blades, decreasing efficiency
- Thinning of blades, which increases thermal fatigue
- Requires a good level of filtration for protection



Fouling

Fouling

- Most common reason for gas turbine performance loss
- ~70% off all gas turbine performance losses attributed to compressor fouling
- Caused by smoke, oil vapors, and various other contaminants
- Particles adhere to rotor and stator blades, decreasing compressor efficiency
- Particles are in the sub-micron to 5 mm size range
- Requires a high level of filtration for protection



By.....Polarized Microscope

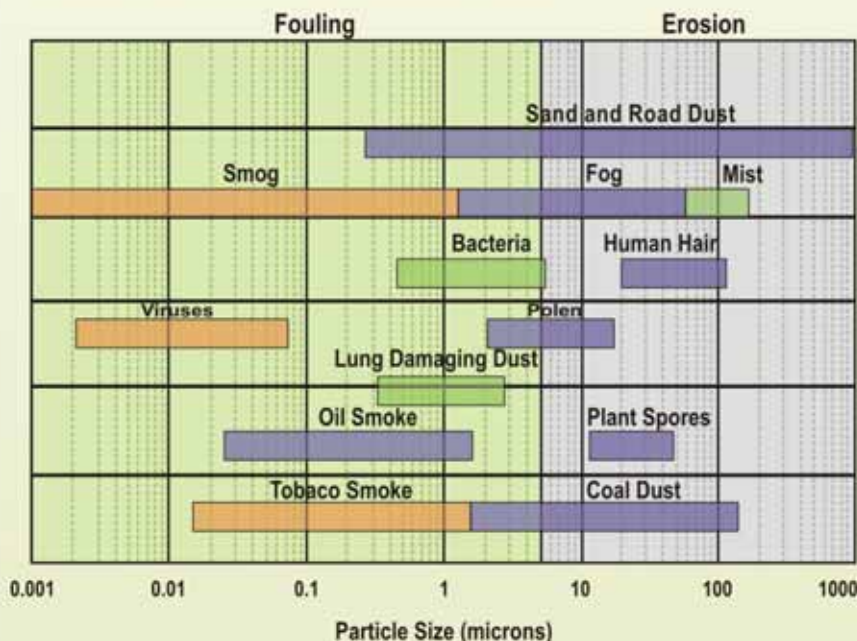
Corrosion

- Caused by solvated salts suspended in an air stream
- Salts can oxidize compressor blades
- Occurs mainly in offshore and coastal applications
- Also occurs in turbine section with the presence of sulfur in fuel source



By.....Polarized Microscope

Particle Sizes of Common Contaminants



EPMA Photograph



EPMA Photograph

THE 'UP-TO-THE-MINUTE' DROP SAFE HOUSING FROM FILTRAIR



Four-bag front hinged Infinidry System Filter House: The Wide Infinidry 2-stage Marine Air Intake System is simply scalable from a single filter unit to large multi-bank systems for hundreds of filter bags.

This ultra-compact Marine Air Intake System in a 2 stage configuration is an exceptional advancement in Air Intake technology. Combining the high-efficiency Wide ME moisture separator with the newly developed and patented Filtrair PTL-DS "Drop-Safe" pocket filter represents a totally re-engineered Marine Air Intake design-philosophy: The Infinidry System.

The forward-draining, non-re-entrainment pocket filter provides highest quality air filtration and water separation in a single unit.

Consequently, the Infinidry 2-stage system outperforms traditional 3 and 4-stage systems in every aspect of performance and economy:

Dramatic performance improvements:

- Efficient salt removal in highly loaded marine environments.
- Filter clean side stays clean: No re-entrainment or salt deposits.
- Reduced pressure loss for improved dirt holding capacity.



Up to 6 m/s face velocity Up to 7 700 m³/hr for each Drop Safe pocket filter

High Efficiency Inertial Separator

First stage replaces traditional Louvre/Hood and Pre-Filter with a single stage high efficiency Wide ME inertial separator. A first stage separator is usually kept very clean by occasional rough weather, requiring minimal additional maintenance. Coarse dust and soot particles are also separated and then flushed out along with the water.

Drop Safe Salt Barrier Filter

In the patented Filtrair PTL-DS, the very fine droplets entering the filter is not only coalesced, but also accumulated and drained into the water-sealed bottom of the pocket filter. From there the water is drained forward, and never enters the clean side. This completely eliminates the problem of saturated droplets entering the clean side and potentially contaminating clean-side air with salt and other water soluble contaminants

Dramatic cost savings:

- Fewer components for more compact and cost efficient system
- Efficient salt and water barrier reduces maintenance cost.
- Reduced pressure loss improves system energy efficiency and reduces operational costs.



THE SPANKING NEW "HIGH AIR FLOW"

ASHRAE GRADE FILTER FROM "FILTRATION GROUP"

The GeoPleat filter utilizes a thermal embossing pleating and glue bead media separation techniques, which created a three-dimensional pleat in the media. This patented method of pleating and spacing allows the air stream to gently transition into the media, distributing the air evenly throughout the depth of the media.

- Advanced pleat geometry for even dust loading and maximum service life
- Patented filter technology
- Very low resistance to air-flow results in lower energy costs.
- UL Class 2
- Robust filter media resists tearing or damage. The rigid pleat pack requires no upstream or downstream grids to protect the media from damage. The media is also resistant to moisture and microbial growth.
- Compact design. No Aluminum Separators. The glue bead is completely adhered to the media and has no sharp edges, eliminating the threat of damage to the filter media during shipping, handling and installation.
- Lightweighteasily dispose



Advanced pleating geometry minimizes resistance to air flow

The strength, durability, low pressure drop and high dust holding capacity make the Geo Pleat the ideal filter for use in turbines, power plants and utilities.

1. World's first sea water pumped storage power station is located at ?

- (a) Mexico (b) Jamnagar (c) Thaneerbavi (d) Okinawa

2. Energy Conservation Day?

- (a) September 5 (b) August 9 (c) December 14 (d) September 8

3. India's First Hydel Project ?

- (a) Pallivasal (b) Sabarigiri (c) Narmada (d) Sidrapong

4. NPC was formed in which year?

- (a) 1981 (b) 1985 (c) 1989 (d) 1987

5. Energy meter are used for?

- (a) Measuring consumption (b) Measuring current (c) Measuring Power (d) For controlling consumption

THE RIGHT ANSWERS OF THE PREVIOUS ISSUE ARE :

1. b

2. a

3. b

4. b

5. c

Quiz Answer

We are waiting for your answers at 'quiz@spectrumfiltration.com'. In case of more than one correct entry, a lucky draw will be made and the winner will be given a reward. The name of the winner will appear in our next issue. So, just pen down a few lines along with your complete contact details and wait for a surprise!!!!!!!

Noise Controls for Construction Equipment (from Schneider et al. ⁽⁵¹⁾)

Equipment	Noise Controls
Pile driver	Enclosure, muffler
Stone cutting saw	Noise control pad with water
Handheld impact drills	Reduction of reflected sound
Circular saw blades	158 tooth angle, new tooth configuration, slotted saw blades, viscoelastic damping
Pneumatic tools	Muffler
Pavement breaker/Rock drill	Muffler, enclosure of cylinder case and front head, moil damping
Portable air compressor	Muffler, acoustic enclosures
Earth movement equipment	Cab-liner material, enclosure, sound absorption in canopy, sealing of all openings
Wheeled loader	Absorption of sound cooling air route
Vibratory roller	Flexible mounting for pump compartment
Joint cutter	Antivibration mounting fixtures

Provision of green belt around the plant will further reduce noise levels



Spectrum High End Filtration Products



Spectrum Product Range Catalogue

Interactive CD ROM Presentation



available on request
Call 91-33-2210 4667 or mail helpdesk@spectrumfiltration.com

Spectrum invites you to put your valued suggestions & articles you would like to cover in our next issue at info@spectrumfiltration.com.



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