Air Inlet Treatment for Combustion Turbines
Pneumafil Inlet Air Filtration

Full service supplier of complete air inlet filtration systems for combustion turbines. Customers include:

- Alstom
- General Electric
- Mitsubishi
- Siemens
- others
Company Hierarchy

- Owned by Nederman out of Sweden
- EFT – Environmental Filtration Technologies
  - Pneumafil
  - MikroPul
  - Menardi
Our designs and equipment have been applied on a wide assortment of turbine models including:

- **Frame**
  - GE - F5, F6, F7, F9
  - Siemens – V84.2, V84.3, V84.4 W501D, W501 F/G, W501
- **Aeroderivative**
  - LM1500, LM2500, LM6000
Pneumafil Inlet Air Filtration

Pneumafil gas turbine inlet systems are custom designed. Through a combination of innovative products, experienced engineering, and quality manufacturing, our inlet systems provide cost-effective solutions for:

- Air filtration
- Cooling
- Anti-Icing
- Moisture removal
- Humidity control
Pneumafil Air Inlet Systems

• Multi-stage static intake air systems
  – Combining a variety of filter stages, we can achieve an infinitely variable range of efficiency and performance characteristics to meet the needs of each customer's engine.

• Up Draft and Cross Flow Self cleaning systems
  – Surface loaded filters designed with self-cleaning pulsing systems that remove debris and dirt regenerating filter porosity. Designs feature updraft Twist Lock “no tools” design along with conventional cross flow filter sets.
Gas turbines are constant volume machines. Their performance can be impacted by unabated ambient conditions such as temperature, dust concentration and density. Changes can cause increased degradation in the output of the compressor and significantly reducing the amount and consistent of power generated by the turbine system.

Why Inlet Air Treatment
Multi Stage Air Treatment

- Weather protection
  - Ice, Snow, Rain, birds, large debris
- Coalescer
  - Remove moisture
- Evaporative cooling, Chilling, Fogging
- Anti-Icing
- Air filtration
Example: Anti Icing Retrofit

Remove the weather hoods to make way for a separate heating coil module.

Install heating coil or heating panel module.
Side view of inlet housing after the heating module has been inserted and the weather hoods re-attached.
Air Filtration Options

• Pre-Filtration
  – Particles 2-5 microns

• High Efficiency filtration
  – Particles < 2 Microns
Pre-filtration

- Synthetic depth loading filter media.
- Available for all static filter systems and used as “wraps” when conventional pulse style systems are either ineffective or not in use.
- Capture larger particulates and debris
- Lesson the dust loading to primary higher efficiency filter
- Extends filter life
What’s in the air?

Particles by Count
Typical Atmospheric Air Sample
69 micrograms per Cubic Meter

97% below 0.5 Micron

100 μm = 1/10 mm
50 μm = hair
10 μm = visible
1 μm = 1/1000 mm
0.3 μm = smoke

Number 99 % < 1 μm
Weight 30 % < 1 μm

Particle Size in Micrometers
Pulse Filter Efficiencies

**Blended MATREX**
- MERV 11: 20%
- MERV 12: 36%
- MERV 13: 50%
- MERV 15: 85%

**Synthetic MATREX**
- MERV 14: 60%
- MERV 16: 91%
- H 12: 99.9%

**Fractional Efficiency of 0.3μ – 0.4μ particles**
Summary

• Due to financial consideration of capital equipment contracts, filter houses may not incorporate all inlet treatments available.
• Upgrades are available
• Water/moisture is your enemy
• Very high levels of inlet air particulate filtration are available without spending 4X the cost of standard filters.
• For users... take the time to understand the filter house design you have and consider the best bang for your buck based upon plant performance.