TEST CONFIRMS GAP IN MEDIA PERFORMANCE

AIR INLET FILTRATION MOBILE TESTING LAB PROVIDES IN-DEPTH DATA

Turbine filters in salt laden and high humidity environments have typically suffered from unstable pressure drop (dP) with frequent dP spikes, but new medias are now changing the game.

Camfil's latest field test, utilizing one of our mobile labs, highlighted key differences in cartridge media performance.

Field testing

The industry has been talking about how new synthetic medias can improve performance. However, most users need more than a sales talk before investing in just another new product to protect their turbine. With new tools such as the Camlab, it's now easier to compare filter performances based on real data.

A **CamLab** is a testing trailer with 4 separate ducts that replicate the gas turbine operating conditions and allows for remote monitoring of air inlet filter performance. Placed on a site, the trailer monitors multiple parameters such as ambient dust concentration, temperature, humidity, airflow, dP and efficiency by particle size over time; typically 3 to 4 months.

The test site

Duke Energy, as part of its continuous improvement culture, is assessing the performance of inlet air filtration products at key locations within its large combustion turbine fleet.

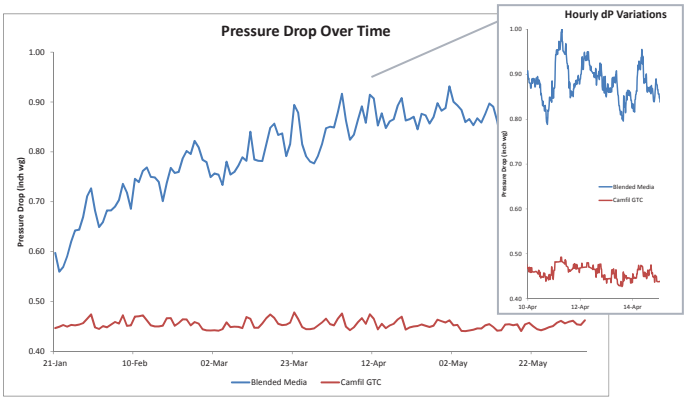
For part of this evaluation, Duke performed a Camlab onsite field test where data was gathered on the performance of various filter products.

A coastal southern site was chosen specifically because of its challenging environmental conditions. The area not only suffers from salt laden air, but also has a humid, subtropical climate with hot, rainy summers and recurrent relative humidity levels approaching 100%.

The Camlab was used to compare a new synthetic media for coastal environments, CamPulse HemiPleat™ GTC, to a widely used F7 blended media.

Results

The Camlab monitored detailed environmental and performance data over a 3 month period.



The Camlab measured stable dP over time for Camfil's newly developed F9 synthetic media, the HemiPleat™ GTC.

[1]*Airflow set at 1610 cfm/filter (2735 m³/h), dP sampled hourly and efficiency sampled daily.*

CASE **STUDY**

Power Systems

Site data

Total run time	2367 hrs
Median relative humidity (RH)	83%
Time with RH over 99%	832 hrs / 34% of time
Median temperature	68.5 °F (18.7 °C)

Filtration data

	Synthetic HemiPleat™ GTC	Typical blended media
Initial dP	0.45"wg	0.55"wg
Average dP	0.47"wg	0.82"wg
DP after 3 months	0.49"wg	0.95"wg
DP increase over test	5%	72%
Max. daily fluctuations	0.10"wg	0.24"wg
Average efficiency on 0.4 um	84% / F9	45% / F7

Camlab Take-Aways

Despite starting at similar dP, the results showed very different dP fluctuations. This highlights that looking only at lab test results or filter classifications is only the beginning of understanding how a filter will react in real-world conditions.

As filter performance over time has more impact on the filter total life cycle cost than just the intial data, this also highlights the importance of carefully selecting a media that is appropriate for the environment.

The Camlab is the perfect tool to gather all the necessary data to make that evaluation.

Lower and stable dP means:

- more power for the user[2],
- reduced risk of engine tripping,
- longer element life, leading to longer intervals between shutdowns.

Higher efficiency also means:

- more power from the reduced fouling,
- less downtime thanks to reduced need for water washing
- reduced corrosion risk by lowering salt and water penetration.

Understanding the differences

Although pulse filters have been supplied all around the world, they were originally designed for high dust areas. Traditional pulse filters rely on the formation of a dust cake on the media surface to optimize their efficiency. In coastal environments when salt is present and humidity increases, salt particles in the dust cake can swell causing high dP.

With the GTC synthetic 3-Dimensional media, the fine fibers are located in the central layer, capturing salt particles throughout the depth instead of the surface. It also offers low impedance to airflow resulting in lower dP through the filter life. The smooth synthetic fibers are also water repellant.

In addition to the media performance, the HemiPleat™ open pleating technology in Camfil cartridges offers wider spacing, exposing more surface media to the air stream and resulting in lower overall dP and more importantly, minimal dP increases in high humidity as well as improved dust release during pulse cleaning.

[2] Based on literature, 1"wg dP increase results in 0.45% power loss for an operator.

Top: The open pleats of Camfil HemiPleat™ filters.
Bottom left: the CamPulse double cylinder fits 2 filters in 1 box
Bottom right: the CamPulse HemiPleat™ GTC 3D media.

Projections on potential savings from lower dP based on a 200MW turbine	
Power loss due to DP per 1 "wg (250 Pa)	0.45% per "wg
Average lower DP of CamPulse HemiPleat™ GTC	0.35 "wg (80 Pa)
Total power loss [0.0045 x 0.35 x 200]	0.315 MW
Test running hours	2367 h
Power loss per 100 days of test	745 MWh