



WDA No 000 AAAA AFA

Objective. Compressor #AAAA Air Filter Media Analysis from 16/03/2015

Method. Filter Ferrogram Sample preparation in accordance with R&T's Procedure No. 27D. One sample processed of dirt and wear debris caught in a 75 mm X 75 mm section of the oil filter filtering media. The section of filter media was ultrasoniced in prefiltered solvent and a portion of the Washing Solvent filtered @ 3 µm until filter blockage with an additional sample processed through the Ferrogram Maker. The amount seen in the video pictures is not relatable to the debris concentration per cc of fuel.



Compressor #AAAA Air Filter

This filter was Dated "02/03/2014"

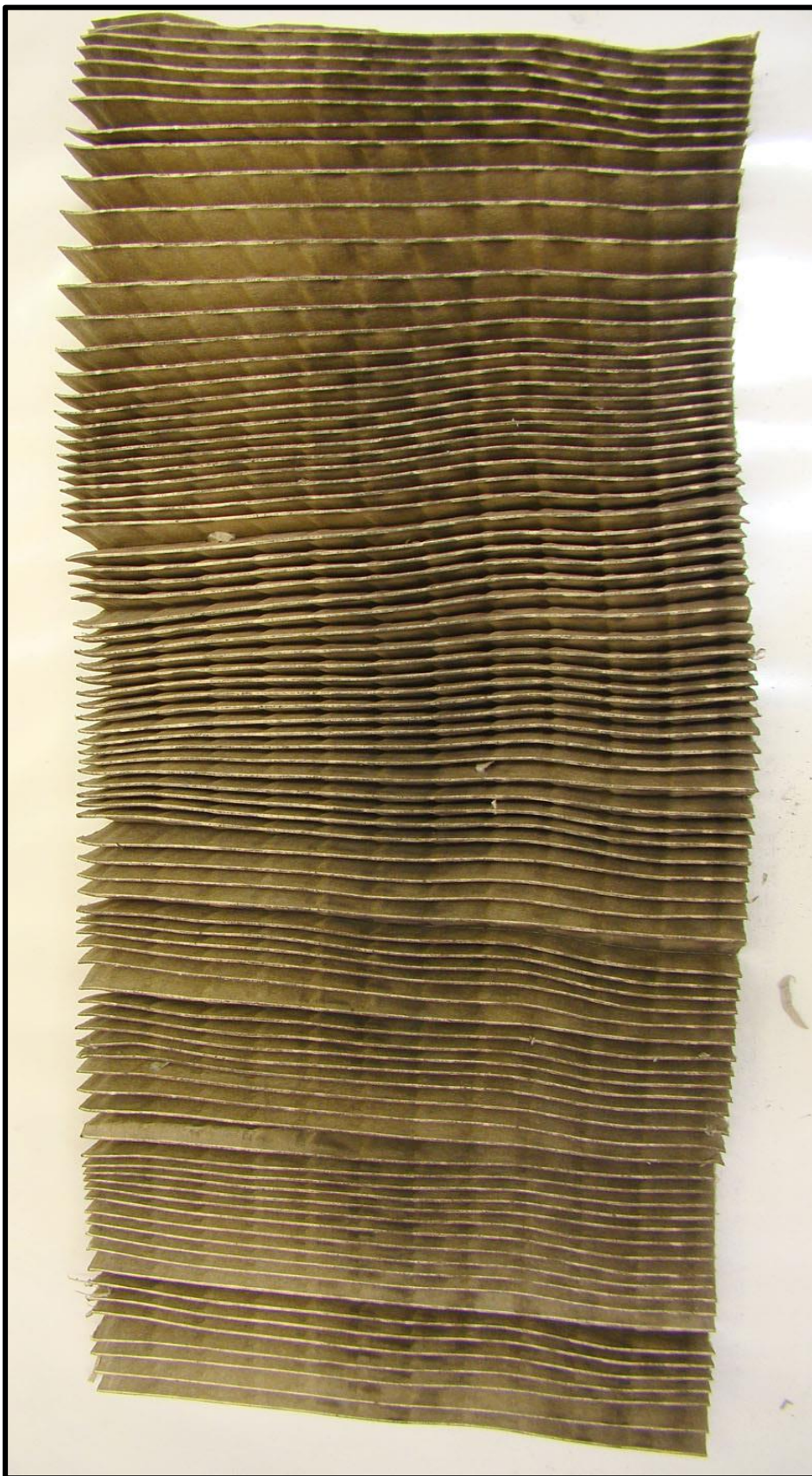
There was no attempt in the lab to tap this filter to dislodge any of the trapped contaminants out of the filter media.

The filter's outer steel mesh was carefully removed to preserve the filter's media intact and in good condition to provide information on the filter's remaining efficient working life.



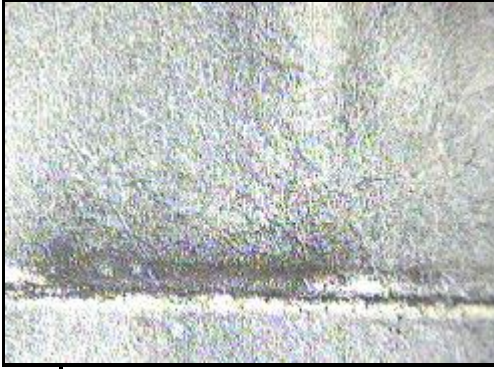
Closer view of the air filter media after removal from the air filter cannister.

Sections of the darker media and the lighter contaminated media were examined under the low power and industrial microscopes to assist with ascertaining if there was any remaining life in the air filter.



Direct viewing off Air Filter Media

Darker Filter Media Track Side



**Air Filter Media
@ 15X/35X**

These images were taken without any attempt to dislodge the dirt caught in the filter media note how in the following images how the filter media surface is commencing to be sealed off with environmental debris



Direct viewing off Air Filter Media

Darker Filter Media Track Side



**Air Filter Cellulose Media
& Dirt Particles.
@ 50X/200X**

There was a moderate amount of environmental dirt and debris caught on the filter media.

50 µm



Direct viewing off Air Filter Media

Darker Filter Media Track Side



**Darker Coloured Areas of
Cellulose Air Filter Media
Track Side.
@ 200X Sized 0.5-20 µm**

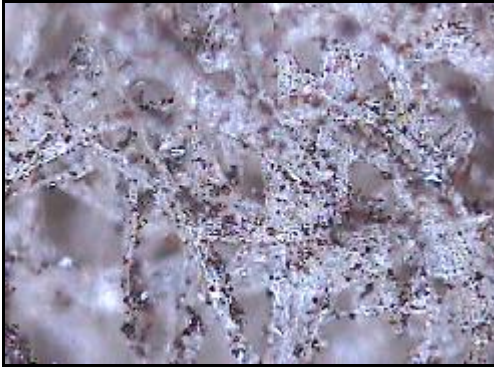
These images indicate the amount of dirt and debris particles adhering to the media, once this amount of particles are caught on the outer filter media the dirt will tend to continue on into the media.

50 µm



Direct viewing off Air Filter Media

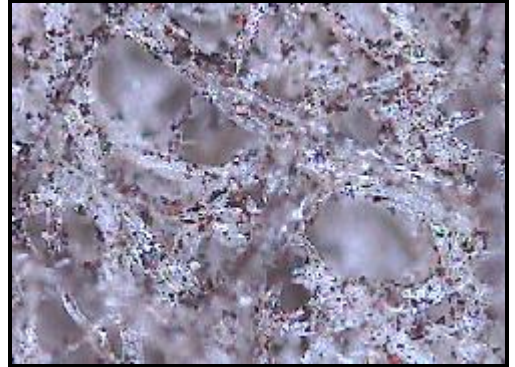
Darker Filter Media Track Side



**Darker Coloured Areas of
Cellulose Air Filter Media
Track Side.
@ 200X Sized 0.5-20 µm**

These darker areas tend to align with the filter media pleats and the holes in the outer mesh.

50 µm



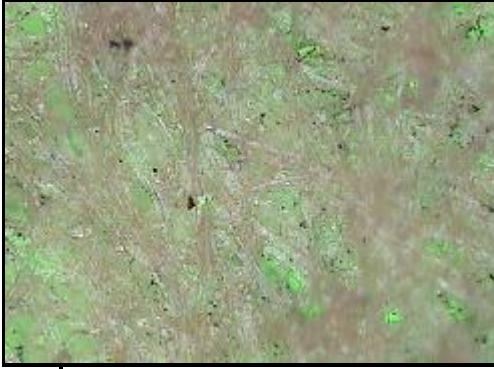
Direct viewing off Air Filter Media

Darker Filter Media Compressor Side

**Inner "Clean" Side of the
Air Filters Cellulose Media
@ 100X Sized 5-15 μ m**

These images are taken off the clean inner side of the air filters cellulose media to ascertain the amount of dirt continuing on through the filter media and into the compressor.


100 μ m



Direct viewing off Air Filter Media

Darker Filter Media Compressor Side

**Inner "Clean" Side of the
Compressor Side of the Air
Filters Cellulose Media
@ 200X Sized 0.5-15 μ m**

Note how when the microscope is focused into the compressor side of the media we can see a light to moderate amount of dirt is being pulled through the filter media and into the compressor.


50 μ m



Direct viewing off Air Filter Media

Darker Filter Media Compressor Side

**Inner "Clean" Side of the
Compressor Side of the Air
Filters Cellulose Media
@ 200X Sized 0.5-15 μ m**

Note the large voids in the filter media, this is normal as the media works by catching particles and as the media becomes full on the track side dirt will be pulled through the media.


50 μ m



Direct viewing off Air Filter Media

Darker Filter Media Compressor Side

**Inner "Clean" Side of the
Compressor Side of the Air
Filters Cellulose Media
@ 200X Sized 0.5-15 μ m**

Note how when the microscope is focused into the compressor side of the media we can see a light to moderate amount of dirt is being pulled through the filter media and into the compressor.


50 μ m



Direct viewing off Air Filter Media



Lighter Areas of Filter Media Track Side

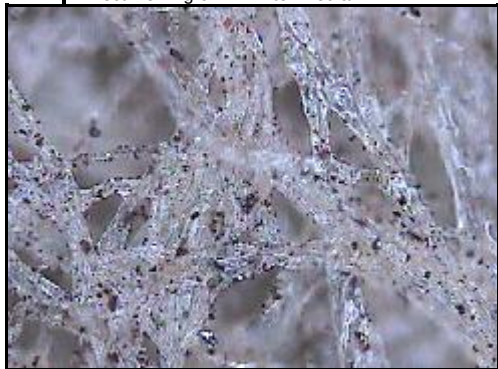
**Lighter Coloured Areas of
Cellulose Air Filter Media
Track Side.
@ 50X Sized 0.5-20 μ m**

These images indicate the amount of dirt and debris particles adhering to the media, once this amount of particles are caught on the outer filter media the dirt will tend to continue on into the media.


100 μ m



Direct viewing off Air Filter Media

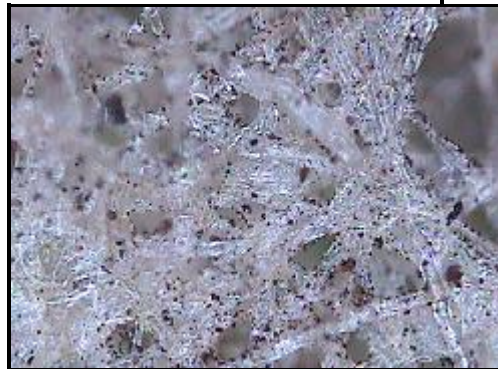


Lighter Areas of Filter Media Track Side

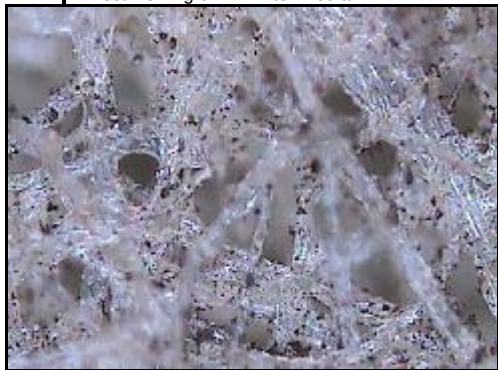
**Lighter Coloured Areas of
Cellulose Air Filter Media
Track Side.
@ 100X Sized 0.5-20 μ m**

There was a light amount of dirt and debris particles adhering to the lighter coloured areas of the trackside of the air filter media.


100 μ m



Direct viewing off Air Filter Media



Lighter Areas of Filter Media Track Side

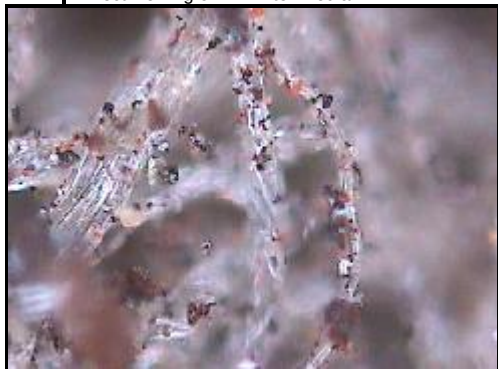
**Lighter Coloured Areas of
Cellulose Air Filter Media
Track Side.
@ 100X Sized 0.5-20 μ m**

Note the types of contaminates caught are the same as the first analysis on these filters.


100 μ m



Direct viewing off Air Filter Media



Lighter Areas of Filter Media Track Side

**Lighter Coloured Areas of
Cellulose Air Filter Media
Track Side.
@ 200X Sized 0.5-20 μ m**

These images indicate the amount of and type of dirt and debris particles adhering to the media.


50 μ m



Direct viewing off Air Filter Media

Lighter Filter Media Compressor Side



**Inner "Clean" Side of the
Air Filters Cellulose Media
@ 100X Sized 5-15 μ m**

These images are taken off the clean inner side of the air filters cellulose media to ascertain the amount of dirt continuing on through the filter media and into the compressor.

100 μ m



Direct viewing off Air Filter Media

Lighter Filter Media Compressor Side



**Inner "Clean" Side of the
Air Filters Cellulose Media
@ 200X Sized 5-15 μ m**

Note the amount of dirt and debris being pulled through the filter media on the lighter coloured continuing on through the filter media and into the compressor.

50 μ m



Direct viewing off Air Filter Media

Lighter Filter Media Compressor Side



**Inner "Clean" Side of the
Air Filters Cellulose Media
@ 200X Sized 5-15 μ m**

These images indicate that time as well as dirt load are factors that influence the amount of dirt continuing on through the filter media and into the compressor.

50 μ m



Direct viewing off Air Filter Media

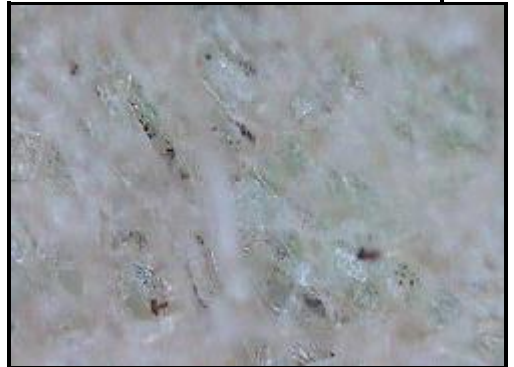
Lighter Filter Media Compressor Side



**Inner "Clean" Side of the
Air Filters Cellulose Media
@ 200X Sized 5-15 μ m**

These images are taken off the clean inner side of the air filters cellulose media to ascertain the amount of dirt continuing on through the filter media and into the compressor.

50 μ m



160315 Results Conclusions and Recommendations

The analysis to Compressor #AAAA Air Filter sample indicated that although the dirt load was not as high as the first filter analysed from these compressors but the amount of time was long enough to allow fine dirt and debris to work through the air filter media and on into the compressor.

To prevent the dirt migration completely through the air filter media the filters change out period most likely will need to be reduced back but the amount of time cannot be decided until we have data on how long these filters were in use.

Because of the different weather and environmental conditions the compressors encounter the amount of airborne contaminants available for the compressor to ingest varies and it's difficult to establish when these filters should be changed. With the compressors, by monitoring by microscope we can see the fine dirt commence to be pulled through the air filter media and once the air filter is serviced the particle count and rate of wear both return back to a low level of normal wear again often without oil changing.



Rob Simmonds
Reliability Manager

The analysis provided is indicative of conditions based upon sample information received and quality of sample processed. Recommendations are provided as a guide only. Any decisions relating to repair of components or changes to procedures are entirely at the discretion of the customer.