

Case Study - Filter Element Upgrade

Beryl Field UKCS

The Beryl Field utilises 3 No. 24 MW Gas Turbines in power generation and mechanical drive application (2 x PG, 1 x MD) across its Beryl assets.

The original combustion air inlet filtration housing arrangement was a low velocity 2 stage system, utilising F8 (EN779:2002) grade filtration to the specified OEM standard.



Problem

The operator was experiencing heavy compressor degradation and thus frequent trips due to fouling. In turn this had significant cost impacts as power demand could not be met and production was halted during periods of down time.

In summary, the machine in Sales Compressor Service was operating at max exhaust gas temperature (typically 24 MW) and was being water washed based on compressor performance on 5-6 week intervals.

Alternatively, the two power generation packages were being operated at part load (typically ~12 MW) and were historically being washed on a 6 week interval, however this was frequently delayed due to operational power redundancy requirements.

Solution

The HydroCel excels in the environment found offshore in the North Sea. It is the ability of the AAF HydroCel to operate in constant wet/dry conditions, effectively removing sub-micron particulate, dry salt and water containing salt in solution, that makes the HydroCel the leading technology in this environment.

Due to the recognised successes of the HydroCel in the North Sea, AAF was approached to offer its solution. On the back of discussions with the AAF Oil & Gas team, the operator made the decision to upgrade the filter elements in their existing filter housings, moving from F8 classification filters to AAF HydroCel E12 filters on all 3 packages.



Compressor package boroscopes 6,570 hrs
Operation (9 months) post AAF E12 upgrade



The operator also quoted;

“the only maintenance was; the unit had the compressor section serviced at 50,000h to replace the damping media on the compressor stator vanes.”

“Other considerations, the engine was 99.9% of the time on gas fuel, the engine was loaded 50-70% in generator service so had very few stops.”

“Post strip down the engine was in excellent condition, hot section damage was blistering of the nozzle guide vanes, this was attributed to a known period of salt contamination in the units mid-life period prior to E12 technology application. The rest of the engine was basically like new.”

The Successful Outcome

Economic Benefits to the Operator

Following the installation of the HydroCel E12 (H)EPA elements, Exxon Mobil reported;

Benefits of AAF HydroCel E12 filters on Compressor Package;

- Operated for 6,570 hours operation (9 months) at max exhaust gas temperature, with no measurable loss in compressor efficiency.
 - At 9 months unit shutdown to complete safety critical maintenance.
 - Operator settled on fixed 6 month 2 day outages to complete package maintenance.
 - Significant reduction of package trips from on engine pneumatic control hardware.
- Subsequent yearly availability increased from 96% to 99% due to trip reduction and reduced water wash outage.

Benefits of AAF HydroCel E12 filters on Power Generation Packages;

- Extended operation possible during periods of power critical activities
 - In one instance the machine ran for 22,000 hrs. with no water wash and remained very clean.
- Increased package reliability with fixed 6 month planned maintenance shutdowns
 - Increased planned maintenance effectiveness.
 - Reduction in outstanding maintenance.
 - During shutdown the operator took advantage of opportunity to water wash, despite the compressors not showing evidence of wash requirements.
- Record 84,000 hrs. hot end life - a world record for this GT model.

It should also be noted that filter elements were installed as an upgrade to the existing filtration equipment and as a result were over rated in terms of air flow per cell. Therefore during 'normal offshore operational conditions' filter operational life will significantly exceed the periods of time stated below. Nevertheless, the operator still reported filter operational life on the compressor package at maximum exhaust gas temperature of 6 months for AAF AmerKleen M80 pre-filters and 18 months for the AAF HydroCel E12 (H)EPA filter.



GAS TURBINE
SOLUTIONS

Quality, expertise and innovation

Sales Offices:

North & South America

AAF International Building

9920 Corporate Campus Drive, Suite 2200
Louisville, KY 40223-5000, USA
Tel: +1 502 637 0408
Toll Free: 888 AAF 3596
Fax: +1 502 637 0147

AAF, S de RL de CV

Av. Primero de Mayo 85
San Andres Atenco
54040 Tlalnepantla
Estado de Mexico
Tel: +52 55 5565 5200
Fax: +52 55 5390 5814

Middle East & Asia

AAF International

P.O. Box 28564
Dubai, UAE
Tel: +971 4 339 7688
Fax: +971 4 339 7881

AAF (Wuhan) Co. Ltd

268 CheCheng Road
Wuhan Economic & Technological
Development Zone
Wuhan, Hubei Province PR
China 430056
Tel: +86 27 84236698
Fax: +86 27 84236646

Europe & North Africa

AAF Ltd

Bassington Lane, Cramlington,
Northumberland NE23 8AF, UK
Tel: +44 1670 713 477
Fax: +44 1670 714 370

AAF-SA

Urarteia, 11
Polig. Ali Gobeo
01010 Vitoria, Spain
Tel: +34 945 214851
Fax: +34 945 248086

AAF-SA

Rue William Dian,
B. P. 3
27620 Gasny
France
Tel: +33 2 32 53 60 68
Fax: +33 2 325 21917

AAF S.r.l.

Via Lario, 1
22070 Fenegrò (CO)
Italy
Tel: +39 031 35 25 311
Fax: +39 031 35 25 333



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