(H)EPA Air Intake Filtration for Gas Turbine Offshore Applications

Apache North Sea Limited - Forties Field UKCS

"AAF Hydrocel E12 EPA technology was undoubtedly the correct air inlet filtration choice for our critical gas turbines across the Forties assets, eliminating compressor fouling and dramatically reducing the potential for hot end corrosion related breakdowns by the unmatched removal of hydrocarbons, salt and seawater from the combustion airstream. For the first time since installation, ANSL are now able to plan for the phased replacement of their Solar Titan fleet as the units approach their scheduled 30,000 running hour target"

Ray Bratton
Turbine Controls Engineer
Apache North Sea Limited

15MW Gas Turbine Forties Field with hot end corrosion failure circa 8,000 operating hours (2007), first stage compressor blades showing high levels of salt loading and blade damage.

Installation of AAF low velocity system, original high velocity system in the foreground

Installation of AAF low velocity system

Problem

The gas turbines were frequently failing due to hot end corrosion issues, the average operational period between failures being 6,000 to 16,000 hours. The units were hot water washed at regular service intervals of 4,000 hours, and also on an ad hoc basis where it was noted that generally the compressor sections of the gas turbines were found to be in a fouled condition. The frequency of the failures across the assets meant that long term strategic planning from both production and maintenance perspectives was severely limited. Apache North Sea Limited, were aware that the cause of the failures were due to 2 major contributing factors: (1) the poor quality of air entering the combustion process, contaminated with hydrocarbons, dry salt particles and salt in solution and (2) the high level of sulphur present in the fuel gas.

Solution

Apache North Sea Limited made a decision to eliminate one of the hot end corrosion failure contributing factors, which was the poor quality of air entering the combustion process, contaminated with hydrocarbons, dry salt particles and salt in solution. Due to a sound legacy of success in the North Sea, AAF were approached to offer its solution. AAF's global site services division initially surveyed the units in February 2010 to collect the relevant existing dimensional data and to ensure any potential solution would be practical from a destruct and subsequent install perspective. AAF's proposed low velocity solution, in order of airflow consisted of Snow Hoods, AmerVane mist eliminating vane, Amerkleen M80 coalescing pre filter and HydroCel E12 grade (H)EPA filter. AAF has been installing (H)EPA grade filtration for use on Gas Turbines based in the North Sea dating back to 2006. 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.

Following AAF's proposal, Apache North Sea commissioned AAF to manufacture and install the 4 No. 15 MW replacement air intake housings. Unit 1 being commissioned 16 weeks from the initial site survey. The period from PO placement, to equipment delivery being 11 weeks.

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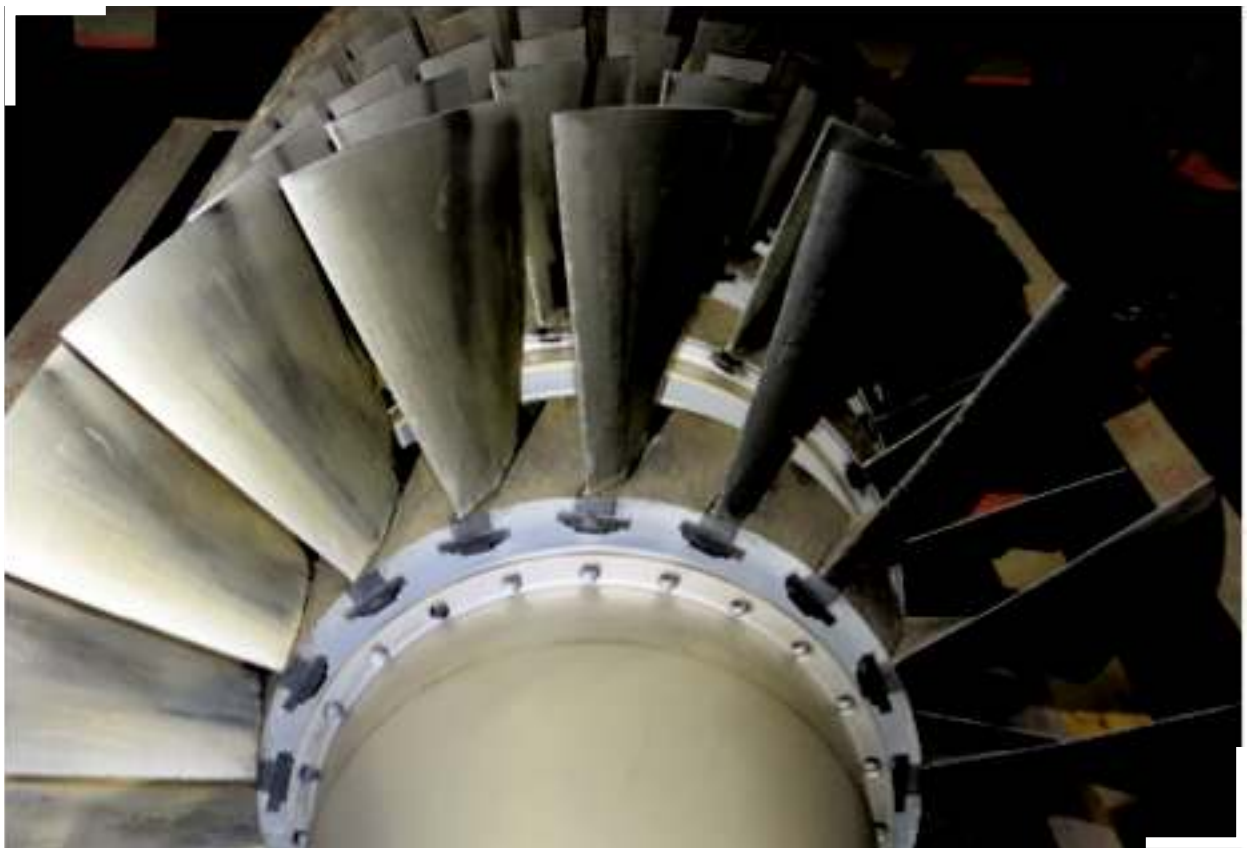
GAS TURBINE DIVISION



15MW Gas Turbine Forties Field circa 16,000 operating hours

15MW Gas Turbine Forties Field boroscope circa 8,000 hours post upgrade to AAF E12

The Successful Outcome

Economic Benefits to the Operator

Following the installation of AAF HydroCel E12 grade (H)EPA filtration technology, Apache North Sea have reported no failures due to hot gas corrosion issues. This is on units that have now operated for up to 24,000 hours with no sign of the onset of Hot End Corrosion. The compressor sections of the gas turbines were also found to be noticeably cleaner when inspected during the routine maintenance schedules. The engines are still hot water washed every 4,000 hours as per the service schedule, however the compressor sections of the gas turbines are considerably cleaner than before the upgrade. The planning stage for both production and maintenance is now a much more efficient process, leading to clear strategic gains in terms of TARS etc.

AAF the solutions provider for Gas Turbine auxiliary equipment repair, refurbishment, upgrade, retrofit & noise abatement solutions to meet your assets specific requirements:

Air Intake Filtration Systems / Intake systems / Hot gas exhaust systems / Waste heat recovery units (WHRU) / GT & AC Generator acoustic enclosures / Ventilation systems / Tailor made acoustic screens, barriers, enclosures for noise suppression.

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