N-hance®
Performance Filtration

Revolutionising Offshore Gas Turbine Filtration

AAF® INTERNATIONAL
Bringing clean air to life.®

The Offshore Environment

In the offshore environment gas turbines are repeatedly exposed to arduous atmospheric conditions. The ambient air is heavily contaminated with sea salt aerosols, salt in solution, fog and mist. In addition, industrial processes such as drilling, grit blast, mud burn and gas turbine and supply vessel exhaust fumes further contaminate the ambient air quality.

In the majority of offshore gas turbine applications, high velocity air intake filtration systems are the norm, utilising low efficiency bag filters. These bag filters provide inadequate protection against the highly contaminated ambient air, resulting in air compressor blade fouling, corrosion, erosion and the requirement for frequent offline water washing. The turbine section is also affected when the salt in the intake air reacts with the hydrogen sulphide found in the sour fuel, resulting in irreversible damage to the turbine blades. This can lead to unplanned gas turbine shutdowns and potential engine failure.

EPA E12 air filtration

EPA E12 air filtration is now a well-recognised, publicised and extensively proven technology offshore. It removes the necessity for frequent offline water washing of the air compressor section.

The reduction in engine downtime and thus improvements in availability and reliability results in significant cost savings to the operator. However, the challenge has always been how to provide E12 air filtration within an existing high velocity air intake filtration system and maintain a low differential pressure.

Revolutionising Offshore Filtration

After years of development AAF brings to the market an offshore gas turbine filtration solution like no other. N-hance provides EPA E12 efficiency within your existing high velocity filter housing and with no increase in differential pressure. This will significantly increase gas turbine performance, availability and reliability, resulting in a more efficient, more productive and more profitable asset.

- EPA E12 filtration technology
- Unique interlocking design
- Low differential pressure
- AAF's proprietary offshore media
- Long filter life

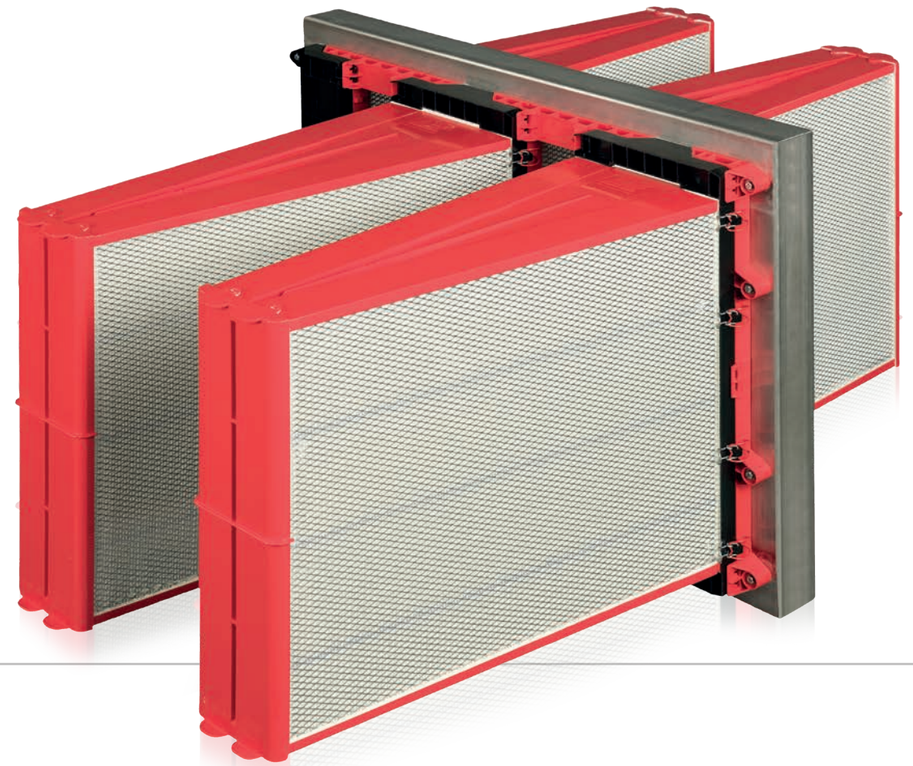
Increase production efficiency

Continuous operation

Lower operational expenditure

Simple internal retrofit

EPA E12 benefits and low pressure drop, all within your existing high velocity filter housing



Continuous Operation

To correctly maintain power and efficiency at a low differential pressure, N-hance's EPA E12 filtration will not only prevent compressor contamination through the removal of hydrocarbons, dust and dirt, but also provide protection against repeated and cyclic exposure to sea salt aerosols, salt in solution, fog and mist, as well as contamination from industrial processes. This removes the need for frequent and very costly offline water washing and generates significant improvements in engine and component life, as well as a considerable reduction in operational expenditure.

Enhance fuel efficiency

Fuel efficiency is increased, while operational expenditure and maintenance costs are reduced.

Retain power output

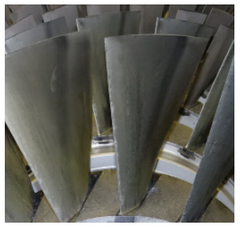
Compressor cleanliness is maintained with low pressure drop, ensuring maximum available power output.

Protect moving parts

No seizure of variable guide vanes and pneumatics are also free of contamination.

Eliminate frequent offline water washing

Titan 130 compressor:



16,000 hrs with AAF's EPA E12 filtration and no water washes

8,000 hrs with high velocity bag filters and frequent offline water washes

Eliminate hot end corrosion

Eliminate hot end corrosion and ensure cooling passages remain blockage free, protecting turbine blades from fatigue and cracking.

Extend engine life

Engine and component life will be extended with the destructive effects of erosion, fouling and corrosion (cold & hot end) removed.

Reduce CO_2 emissions

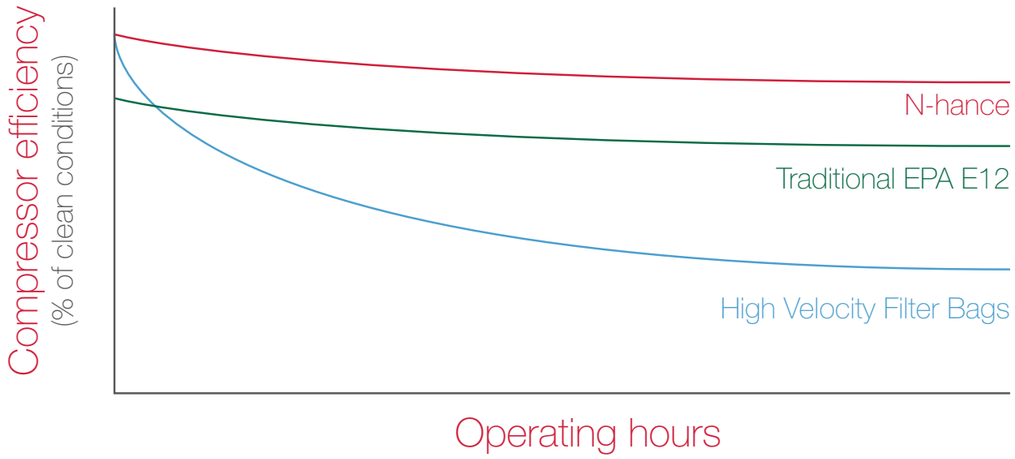
A clean, healthy and efficient gas turbine will significantly reduce CO^2 emissions.

Increase Production Efficiency

The class-leading N-hance Filtration System provides maximum protection for your offshore gas turbine. N-hance eliminates the need for frequent offline water washing and removes the risk of an unexpected shutdown due to inadequate filtration performance. This results in a significant increase in both power generation (megawatts per hour) and production output (BOE).

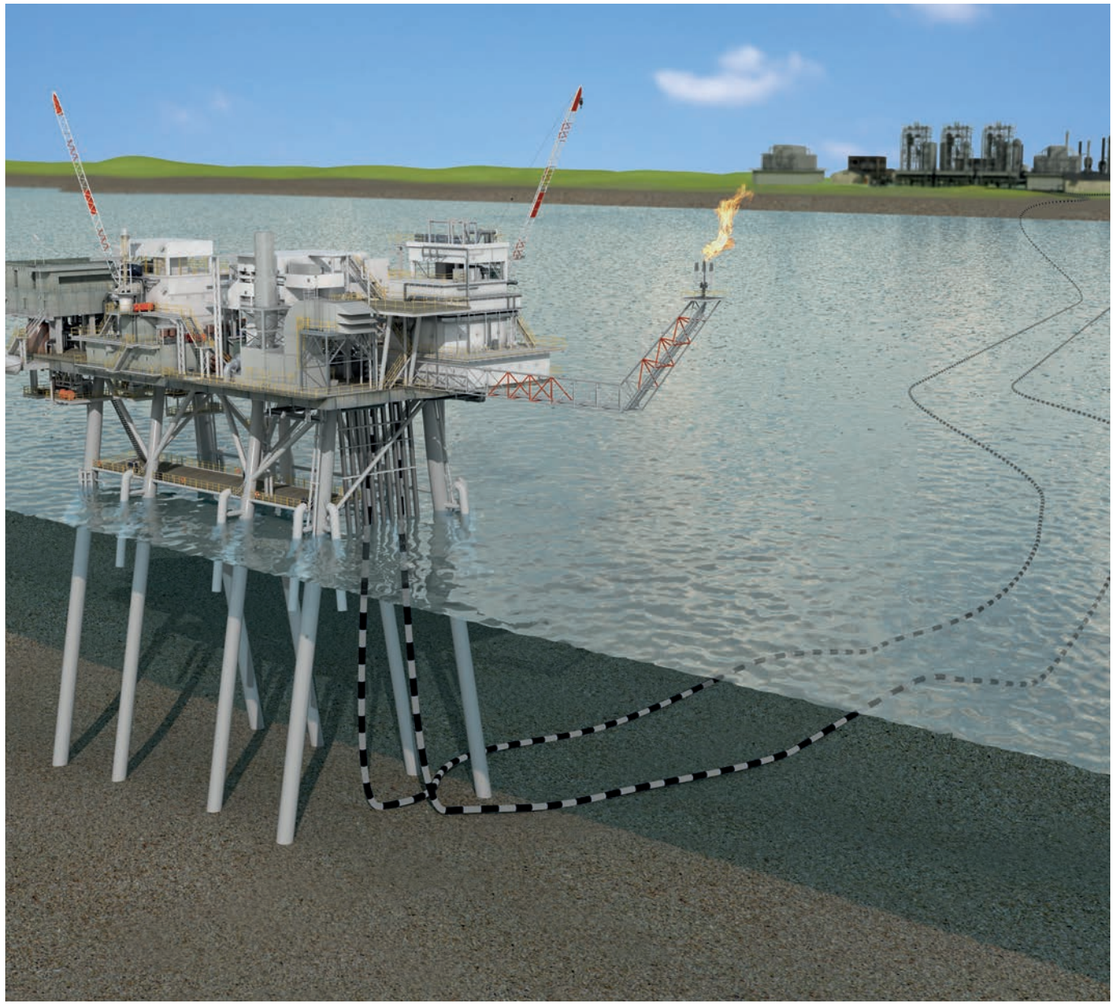
The N-hance EPA E12 filtration system provides the best technology in the market. This includes the highest intake air quality and lowest differential pressure of any gas turbine high velocity filtration system in the world. This will result in the cleanest compressor condition possible, highest retained output and lowest retained heat rate.

N-hance also acts as a water barrier to eliminate the harmful effects of water penetration and leakage through the filter system. By eliminating the cause of planned and unplanned production loss the economic benefits of N-hance are considerable, with improved availability and increased revenues the payback of the system can be achieved in a matter of weeks.



The graph above illustrates just why the N-hance Filtration System maximises production efficiency. By maintaining compressor efficiency and eliminating frequent water washing this will result in a significant increase in production per annum. The engine will remain clean and healthy so unexpected shutdowns and reduced engine life will be firmly in the past, resulting in significant cost savings.

A spotless engine that does not need to be frequently water washed will significantly increase production output.



Eliminate frequent offline water washing

Retain compressor efficiency, extend component and engine life and significantly reduce output losses.

Increase production yield

With frequent offline water washes and unexpected shutdowns eliminated, the gas turbine can run efficiently, providing a greater production yield.

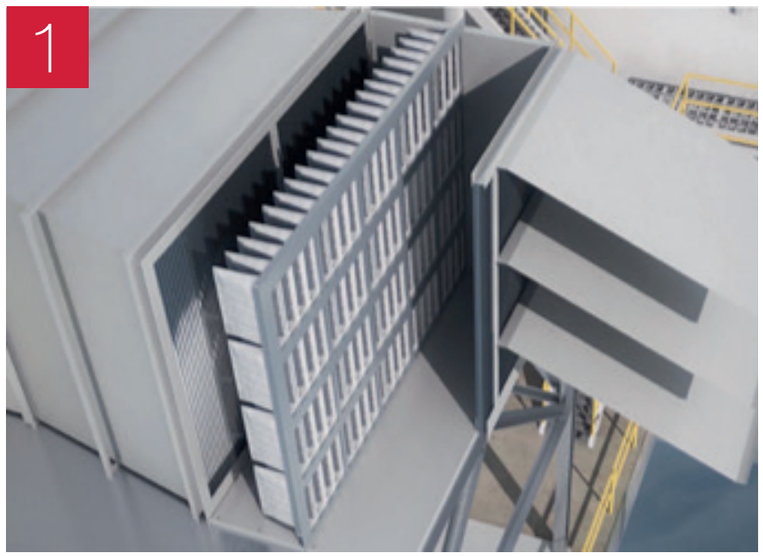
EPA E12 cleanliness

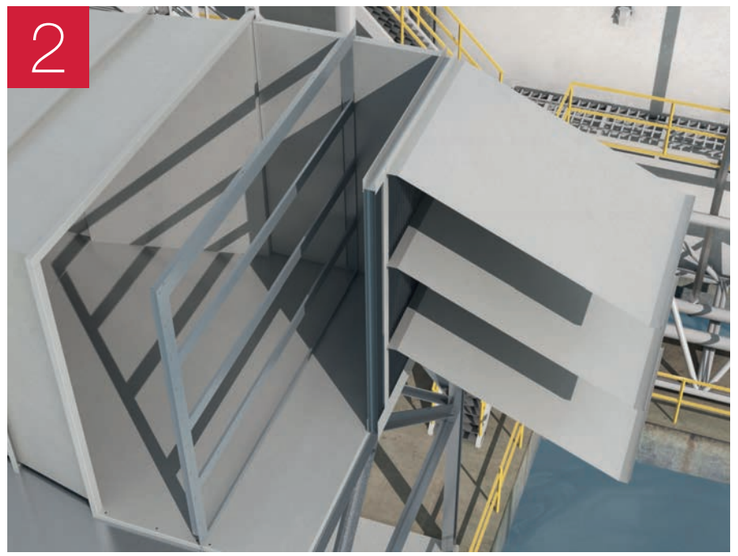
EPA E12 protection removes the need for frequent offline water washing, providing continuous operation

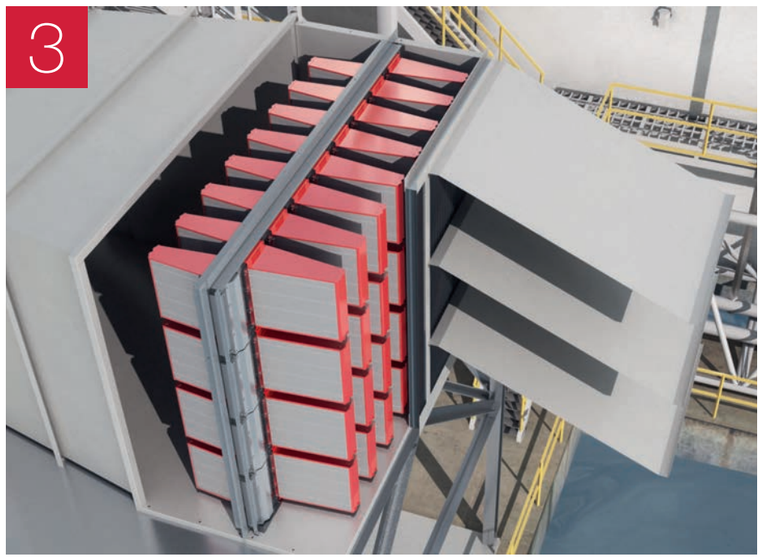
Increase machine availability

N-hance removes downtime and increases machine availability and reliability.

Simple Internal Retrofit







N-hance filtration installation

Historically, to install EPA E12 filtration offshore required the complete removal of the high velocity air intake filter housing and the installation of a much larger low velocity air intake filter housing.

This was often not a viable option due to space restrictions, meaning the existing filter housing had to remain in situ. Even if space restrictions were not a limitation it still presented major challenges. It resulted in a complex and costly installation process, an extended shutdown period and a reduction in usable space on the platform.

The N-hance Filtration System is installed within an existing high velocity air intake filter housing. This quick internal retrofit requires no hot work and once installed the outcome is a clean and healthy engine; combining EPA E12 benefits with a low pressure drop.

Furthermore, the N-hance Filtration System is a scalable solution with component commonality, tailored to accommodate standardisation across various gas turbine air intake filtration system configurations. As the system is a water barrier the downstream vane separator can be removed. This reduces differential pressure and allows inspection and cleaning of the previously contaminated downstream air intake system.

Challenge	Performance
Engine cleanliness	Assured EPA E12 efficiency
Media	Advanced hydrophobic and oleophobic
Drainage	Improved performance over existing offshore solutions
Water barrier	Gaskets, media and construction tested and proven
Pressure drop	Equivalent to existing high velocity bag system
Lifetime	>12 months
Installation	Fits within the existing high velocity housing – no hot work required
Materials	Corrosion resistant, suitable for the offshore environment

The N-hance Filtration System is installed within an existing high velocity air intake filter housing and requires no hot work

Features and Benefits

Interlocking design

The intelligent overlapping and interlocking design ensures a leak free gasket seal, ensuring the system mitigates any risk of bypass contamination and acts as an effective water barrier.

Efficient drainage

Proprietary AAF media provides enhanced moisture protection; any excess water is efficiently drained away even in the most extreme offshore conditions.

Latching system

The N-hance front filters are hinged and latched with a ‘lead-in’ for easy installation; a secure latching system ensures an air and water tight seal.

Ultimate offshore protection

The unique and patented N-hance Filtration System is like no other offshore gas turbine filtration solution. Compared with an existing high velocity filter bag system the N-hance filtration system will provide a step change in media area and includes integral pre-filtration. N-hance filters can withstand the rigors of the offshore environment, providing superior protection and long filter life.

Increase production efficiency

Continuous operation

Lower operational expenditure

Simple internal retrofit

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