halifax fan

a global force in fan technology

About Us

Established in West Yorkshire in 1965, Halifax Fan has grown to be a global force in industrial fan engineering. Founded to serve the local textile industries, Halifax Fan now serves the needs of some of the world's most renowned companies and today has a fully operational, wholly owned subsidiary in China.

Designing and building fans for global industry is not a simple task and a range of standard products simply will not meet their demanding specifications. Halifax Fan has therefore developed its strength in the bespoke engineering of fans to meet its customers' exact specifications.

The acquisition of affordable high-power computing and sophisticated software means that every fan that leaves either of the factories has been designed, built and tested to match the application for which it is intended. Not only that but each evolution brings fans that are stronger, quieter and more efficient.

Higher efficiency and greater reliability is a continuing goal for Halifax Fan and this is being achieved by continuing investment in its people, plant and processes, to the benefit of both the company and its customers.

"Halifax Fan Ltd may be the largest fan manufacturer in England, but in global terms it punches well above its weight."

Malcolm Staff, Managing Director

Work in progress in Brighouse Plant.

Fans awaiting despatch from Shenzhen Plant.

"In little over a year, the factory has established a skill-set that enabled us to achieve BSI EN ISO9001:2000 accreditation and fans built in China are indistinguishable from those produced in the UK"

Li Yong, Country Manager

Quality and Standards

Quality and Standards

Halifax Fan demonstrates a high degree of excellence throughout the entire organisation. From the earliest days, every one of Halifax Fan's products has been designed, developed and built in its own factory. Every aspect of the product emanates from the company's own designs. All prototype fans are tested and rated to BS848 Part 1; 1980. Proven designs are also regularly monitored through systematic audit. This testing and re-assessment ensures compliance with our registration to BS EN ISO 9001 and all relevant current industry, national and international standards and legislation. All products are CE marked in line with EU legislation. Technical, manufacturing and commercial quality control checks are mandatory and apply to each and every department.

To ensure products are of the highest quality, training continues to enjoy the highest priority at Halifax Fan. An apprenticeship training scheme ensures a constant supply of highly skilled production staff and a strong and experienced engineering and management team.

Halifax Fan enjoys strong relationships with local education and training organisations, including the University of Bradford. Consequently, the staff recognises the benefits to themselves and the company that are brought about by continuing self-development. The result is that Halifax Fan enjoys a unique record of staff retention, ensuring that the products are backed up by many years of collective experience in fan engineering.

Trade Associations

Halifax Fan is a member of the Fan Manufacturer's Association (FMA) of the UK, and a member of the Air Movement and Control Association (AMCA). Active membership of these associations keeps Halifax Fan abreast of all current and pending legislation and standards applicable to the fan industry worldwide.

Manufacturing Specifications and Standards

Halifax Fan's products are built to meet a wide range of the most exacting national and international industry standards, including:

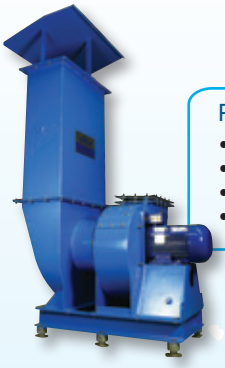
- API 673
- API 560
- AESS 6019 Types A, B & D
- BNFL NF152/2 Type B & D
- BNFL NF152/1 Type A
- ICI General Purpose Specification
- ICI Arduous duty specification
- Shell DEP specifications
- Lloyds Above & Below Deck
- Engineers India Specification
- ATEX Directive
- CDN Regulations
- NNE DSD01/A/SS/2082/001

Halifax Fan is also happy to fulfil other specifications upon request.

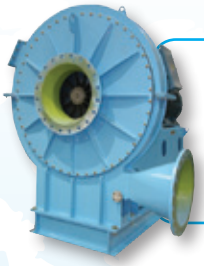
620kW primary air fans for power station biomass co-firing project.

Portable 5.5kW composting aeration fans.

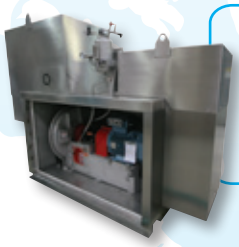
A Global Force



Petroleum
- *2 x 24" – backward inclined impeller*
- *2 pole 55kW motors*
- *3 coat marine paint finish*
- *Supplied with venturi*



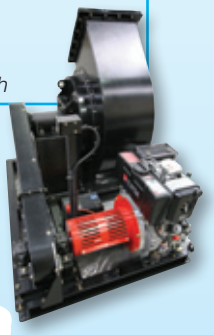
Chemicals
- *58"– open radial fan*
- *2 pole 250kW motor*
- *Titanium impeller*
- *GRP lined case*
- *3-coat chemical paint finish*

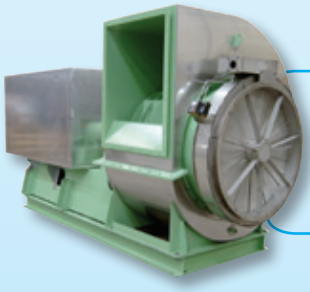


Pharmaceutical
- *4 x 24" – open radial fans*
- *2 pole 7.5kW motor*
- *Pressure tested to 6 barG*
- *Polished stainless steel finish*
- *c/w acoustic enclosure*

Paper
- *16 x 36" – backward curved impeller*
- *4 pole 22kW motor*
- *High temperature – 400°C*
- *c/w anti-sparking features*

Aluminium smelting
- *27" – paddle bladed*
- *Diesel engine driven*
- *High temp 300°C*
- *c/w centrifugal clutch*





FPSO
- *4 x 48" – backward inclined impeller API 560*
- *4 pole 315kW motor ExD marine spec*
- *Fully welded marine paint finish*
- *Stainless steel IGV, silencers and lagging*

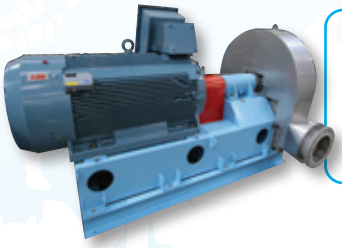
Biomass
- *74" – backward inclined impeller*
- *4 pole 315kW motor*
- *Hardox impeller*
- *High temp – 300°C*
- *Manufactured in China*

"Whatever it takes, our mission is to minimise customer downtime and get the process up-and-running efficiently in the fastest possible time."

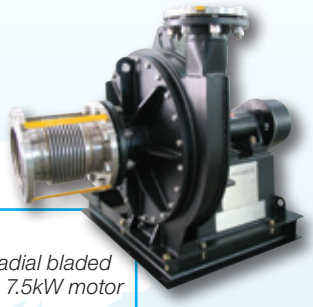
Ian Crum,
Operations Director

Worldwide Service

In the industrial market, where fans are a critical component in the manufacturing process, quality after-sales service is an essential element of the package offered to the customer. Despite the high quality and reliability of Halifax's products, there are occasions where a site presence is required to identify and correct a problem, perhaps a bearing or a belt drive. When the call comes from whatever corner of the globe, the response must be prompt, the problem rapidly identified and the cure effected quickly and permanently so that production can continue unhindered. Recognising the costs of downtime, the Halifax Fan service department is on call 24/7 from either Brighouse or Shenzhen, whichever is the closest to site. If necessary, Halifax supplements this by utilising staff from manufacturing.



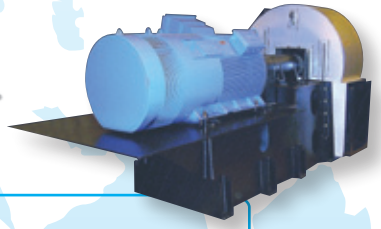
Petrochemical
- *3 x 44" – radial bladed*
- *6.6 kV, 2 pole 200kW motor*
- *304 stainless steel*
- *Double mechanical lubricated seal*

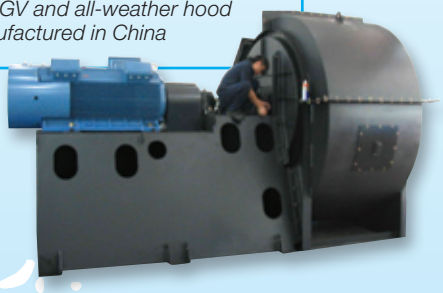


Food
- *8 x 36" – backward curved impeller*
- *4 pole 11kW motor*
- *High temperature – 600°C*

Chemical
- *25" – twin stage radial bladed*
- *flameproof 2 pole 7.5kW motor*
- *PVDF lined*
- *Hastelloy impeller*
- *Manufactured in China*

Power
- *4 x 48" – backward inclined impeller*
- *4 pole 280kW motor*
- *High temp – 350°C*
- *c/w IGV and all-weather hood*
- *Manufactured in China*





Cement
- *2 x 52" – backward inclined impeller*
- *4 pole 315kW tropicalised motor*
- *Split bearings*

Gas
- *4 x 46" – backward curved impeller*
- *4 pole 90kW motor*
- *Designed to API 560*
- *c/w inlet box and silencer*

Food
- *10 x 18"- 66" – backward curved impeller*
- *5.5 to 315kW motor*
- *304 stainless steel*
- *Impellers pickled and passivated*
- *Manufactured in China*

Petroleum
- *2 x 56"– backward curved impeller*
- *4 pole 230kW motor*
- *Built to API 560*
- *c/w IGV and lagging*
- *Fully performance tested*

Case Studies

Customers

Aker Solutions

BASF

BP

British Gypsum

Croda Chemicals

Eastman Chemical Co

E.ON

Getinge

GBA Flare Systems

Hamworthy Combustion

Huntsman Tioxide

Johnson Matthey

Merck Sharp & Dohme

Novartis

Pepsico

Pilkington

Shanghai Lianheng Isocyanate

Simon Carves

Dealing with a high temperature environment

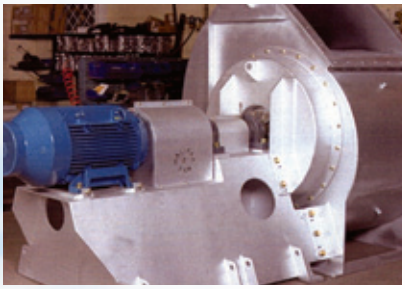
A middle eastern customer with a particularly demanding application for combustion gas handling, turned to Halifax Fan who designed and manufactured a customised solution. The customer, recognising this strength, presented Halifax with a major complete design and build project challenge.

The end user, located in Dubai, not only needed to comply with a harsh operating environment but also with compliance to complex specifications in addition to comprehensive documentation detailing that compliance.

The working temperature of the assembly was specified as up to 390°C with an ambient temperature of up to 50°C. The fan was tested in the Halifax test facility to BS848 Part 1; 1980 Type C with no negative tolerance permitted on either flow or pressure.

The assembly, including an Inlet Vane Control Damper and speed sensor complies with the relevant Engineers India specifications, which required adherence to complex procedures and full documentation, all of which Halifax accepted and undertook as part of the overall contract.

The two systems are now fully operational in Dubai and the customer has expressed his entire satisfaction with the way the contract was enacted and with the performance of the overall installation.



Efficiency at Hong Kong Gas

To meet rising demand for gas, Hong Kong and China Gas Co. Ltd. carried out a major refurbishment of its gas plant at Tai To in the New Territories to increase production to 115% of previous levels

Halifax Fan won the contract to supply 4 off 200kW and 4 off 75kW ID fan systems complete with speed control and soft-start back-up. The fans will operate in a Zone 2 environment and Halifax's experience in hazardous areas was critical in their selection. High volume, medium pressure Beaufort models met the need for greater volume capacity within the physical envelope of the fans they replace. Self-cleaning, backward inclined impellers ensure fan efficiency is maintained despite particulates in the air stream and reduce periodic maintenance and downtime. In addition the fans were constructed to the original ICI Arduous Duty specification with increased service factors for improved life and reliability. Despite this, the high efficiency of the Beaufort design means that the operational duty requirements were met with little increase in motor rating, a critical factor owing to main supply transformer limitations at the gas plant.

Fan for harsh acid environments

Many fan applications demand something more than a stock fan solution. When a multinational chemical company required a large fan assembly to operate in a harsh environment in their Malaysian plant, they turned to Halifax Fan to draw upon the company's extensive experience in the design, manufacture and test of fans for specialist applications

This particular application, the manufacture of titanium dioxide, called for a 1.8m diameter impeller to operate at 75°C and capable of handling air saturated with concentrated sulphuric acid and chlorine ions. Such an operating environment demanded the use of a corrosion resistant alloy and Halifax Fan, based upon previous experience, selected Hastelloy® C22 for this installation.

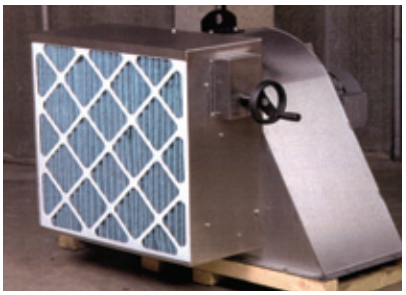
Water jet cutting and specialist welding skills were both employed. The impeller/shaft assembly was constructed to the ICI Arduous Duty specification, which in turn, necessitated over-speed testing of the assembly. To meet this need and ensure compliance, Halifax Fan designed and constructed a special test rig.

The mild steel shaft was part overlaid with Hastelloy® to ensure corrosion resistance in the contact area.

Fan/damper with a polished finish

Halifax Fan's client, a manufacturer of high quality bottling equipment, required an integrated fan and filter assembly with a hand-wheel operated damper control, as a standard piece of OEM equipment. Hygiene regulations were stringent, demanding an assembly fully housed within an easily cleaned, polished, stainless steel housing.

Halifax Fan not only met the design specification but also created a cost effective design suitable for



manufacture in volume production batches, critical to the resale need of their client. The buyer, having developed a cooperative partnership with Halifax Fan over a number of years, rightly demanded the highest quality engineering and high standards of cosmetic finish.

The result of this partnership was a high quality fan assembly built to rigorous quality standards, meeting the customer's requirements for a mechanically robust yet aesthetically pleasing assembly.

Halifax Fan prides itself in its flexibility to meet customer demands and in its quality of workmanship, coupled with prompt delivery whilst maintaining a cost effective solution.

Gas-tight fan assembly

The hazardous and corrosive chemical environment in which this fan had to operate, required a fully compliant customised solution for this major international customer.

In entrusting to Halifax Fan the design and manufacture of this critical assembly, the client demonstrated total confidence in Halifax Fan's standards of engineering excellence and project management.

The Halifax Mercury fan adopted for this custom project included a nickel alloy impeller and an EExd Zone 1 30kW motor, driving through a Halifax designed gas tight sealed bearing unit via a Steelflex grid coupling at 3000 rpm.

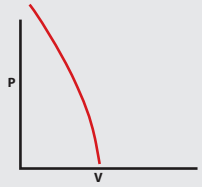
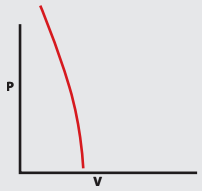
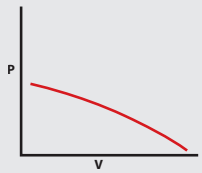
Bearing temperature sensors and vibration monitoring sensors were included in the bearing/coupling design.

To prevent sparking, the case lining was fabricated from non-corrosive GRP into which was bonded a non-sparking material. Externally, three coats of special polyurethane paint were applied to resist corrosion.

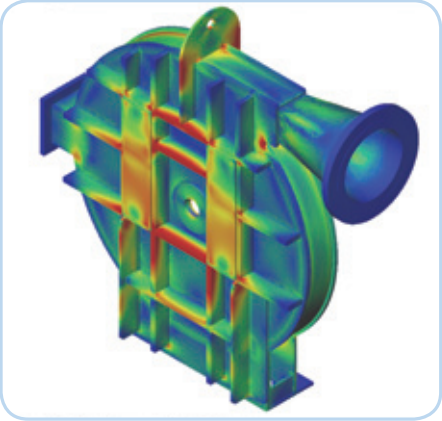
Breadth of Range

Halifax Fan offers a wide range of standard impeller designs. These designs are engineered to meet the customer's exact requirements.

Our team of experienced engineers will advise on the best fan for your application.

Fan Type	*Key features*	*Performance curves* **P** = Fan static pressure **V** = Volumetric flow	*Typical range*
Beaufort 	• Large volume/medium pressure • High efficiency • Clean air and light particulate loading • Aerofoil, backward curved and self cleaning backward inclined impellers • Non-overloading option		• *Volumes up to 450,000 m^3/hr* • *Pressures up to 25,000 Pa* • *Powers up to 1,000kW* • *Efficiencies over 80%* • *Handling clean air through to heavy particulate loadings* • *Hazardous, arduous, erosive, corrosive and high temperature applications* • *Wide range of materials;* *- Mild steel* *- Stainless steel* *- Hastelloy* *- Titanium* *- Aluminium* *- Plastic* *- Hardox* *- Cruesabro* *- Ferralium*
Mistral 	• High volume/high pressure • Good efficiency • Heavier particulate loading • Backward curved, backward inclined and radial impellers • Self cleaning backward inclined impellers • Non-overloading option		
Chinook 	• Medium volume/high pressure • Good efficiency • Medium particulate loading • Backward curved and self-cleaning backward inclined impellers • Non-overloading option		
Mercury 	• Small volume/higher pressure • Good efficiency • Medium particulate loading • Backward curved and self-cleaning backward inclined impellers • Parallel curved impellers for higher efficiency at increased pressure • Non-overloading option		
CNZ & ORB 	• Low volume/high pressure or suction • Good efficiency • Light conveying • Radial impeller • Self cleaning impeller • Two stage/higher pressure design		
Multivane 	• High volume/low pressure • Good efficiency • Low noise emissions • Clean air applications • Forward curved impellers		
Paddle blade 	• Designed to handle relatively large amounts of product and dust • Highest particulate/product loading • Basic radial impeller • Conveyor and paper trim chopper range • Self cleaning • Easily maintained		

Finite Element Analysis



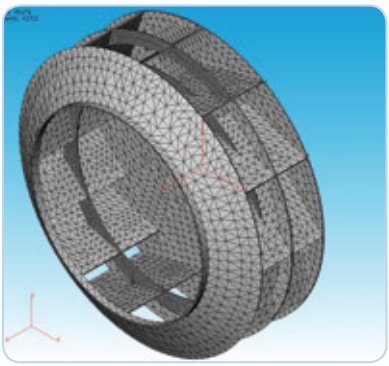
On this fan casing, the red colour pinpoints the areas of greatest stress.

Finite Element Analysis ensures that Halifax fans are more than just fit for purpose but are engineered for long term reliability, greater efficiency and at a competitive cost.

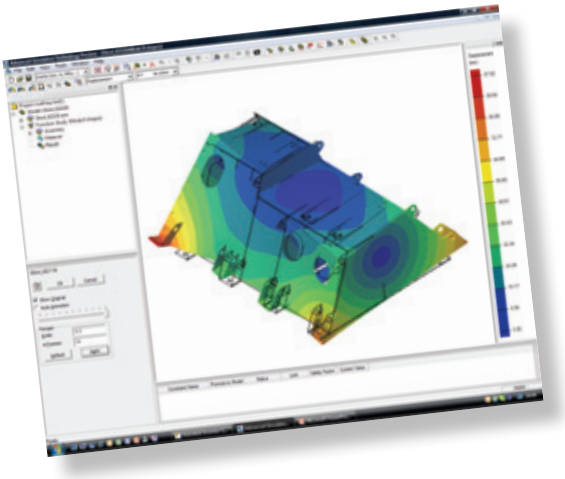
Finite Element Analysis (FEA) enables Halifax Fan's designers to assess not only the rotating elements of the fans but also the stresses on high pressure and explosion-proof fan casings and the motor and bearing pedestals. Vibration analysis and the identification of natural resonant frequencies can also be analysed and thus catered for.

The Finite Element Method, more commonly known today as FEA, was originally developed in the 1940s by pioneers such as Richard Courant and is a mathematical tool for examining the elasticity and strength of complex structures by mathematically breaking the structure or domain down into a mesh of discrete sub-domains or elements.

However, only with the evolution of the computer, has FEA today become a cost-effective tool for studying fabrication designs in great detail. Halifax Fan's FEA software interfaces with its CAD system and simplifies and speeds the creation of the mesh structure to be analysed. FEA greatly improves the application of stress analysis and, using graphical methods, quickly and clearly, shows on the computer screen, areas of high stress to pinpoint where a stronger material might be needed to meet the specified operating conditions.



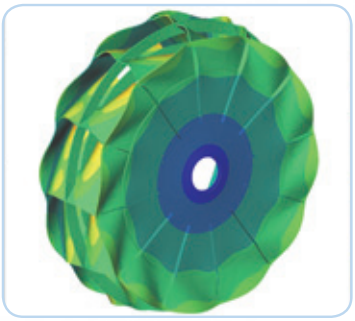
The CAD software generates the mesh on this impeller according to the operator entered parameters.



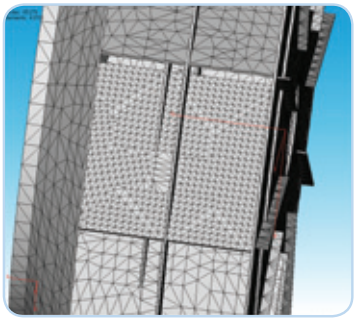
FEA can also be used to examine the natural frequency on the motor pedestal.

The most common use of FEA at Halifax Fan is to examine the stresses on fan impellers, especially for more critical models such as high speed fans and those subject to high cyclic stress and temperatures. In the case of high pressure and explosion-proof fans, FEA also facilitates a detailed stress analysis of the fan casings and their explosion containment capabilities. Case deflection studies ensure that when working with mechanical seals there is minimal case movement ensuring pressure integrity.

Recently, where high efficiency, variable speed operation is required, FEA has been invaluable for calculating the natural frequencies of the bearings and motor pedestals to help with the avoidance of potentially damaging mechanical resonance.



The anticipated mechanical distortion can be greatly magnified for closer examination - in this case by 200 times.



By reducing the mesh size on a single impeller blade, a closer, more accurate analysis of blade stress and distortion can be made.

Case Studies

Customers

Alstom

Bayer

British American Tobacco

British Nuclear Fuels

Corus

DuPont

Eli Lilly

Fairport Engineering

Foster Wheeler

GlaxoSmithKline

Hong Kong & China Gas

Kronospan

Doosan Babcock Energy

Pfizer

Schering Plough

Shell

Statoil

UK Atomic Energy Authority

High temperature asphalt plant fans

Working with Halifax Fan, Mixlance chose 45kW Beaufort fans with backward inclined impellers for the exhaust fans on two new 3 ton asphalt batch plants. The exhaust gases contain a mix of particulates from the process and the impeller design offers the excellent self-cleaning properties essential for this application. In addition, the fans were supplied as extra heavy construction models for arduous operation. Handling gases at temperatures up to 200°C, each fan was fitted with a cooling disc around the main shaft between the fan casing and the bearing unit to 'sink' heat from the casing to atmosphere.

Deep-groove ball and roller bearings are employed to withstand the end thrust experienced with impellers fitted with back plates, as these units are. Bearing life in excess of 100,000 hours can be achieved with proper periodic maintenance and inspection. Sizing the motor for 'closed damper' and 'low frequency start', controlled by inverter control, has enabled a 45kW motor to be used in place of a motor nearly twice as large as on previous plants.

Gas tight fans for nuclear decommissioning

As part of the decommissioning of one of Dounreay's most hazardous areas, the Fuel Cycle Area which includes fuel reprocessing plants, chemical works and waste and fuel stores, a new ventilation system was required to replace the original system which would be incapable of supporting the phased clean-out and demolition of the various plants.

The existing vent stack was replaced by a new system comprising two 30m high vent stacks 2m in diameter, each fed by 90kW and 132kW fans connected to the existing common ducts. The selection and design of the fans for this exhaust system were critical. Weighing 8.5 tonnes each, these were the largest nuclear specification gas-tight fans Halifax has built to date.

The fan impeller design was based upon Halifax's Beaufort fans, with backward inclined impellers. The exterior steelwork was shot blasted and painted with a high integrity offshore/chemical works 3-coat paint system. The fans were fitted with rotation sensors and vibration monitoring equipment along with gas-tight EPDM rubber flexible connections on the fan inlets and outlets and each unit was supported on anti-vibration mounts. Following fabrication, all four fans were pneumatically pressure tested in-house and witness run-tested prior to despatch to site.

Crack and crevice-free finishes for pharma plant

Halifax Fan, no stranger to the high-specification demands of the pharmaceutical industry, is recognized for the quality of its engineering and frequently called upon for bespoke solutions to demanding applications.

This industry has specific demands that few others have. Raw ingredient costs are unusually high and consequently downtime leading to lost batches of product is inordinately expensive so plant reliability must be of the highest order. The health and safety implications of cleanliness are crucial, so any risk of contamination must be virtually eliminated. In this custom design for a pharmaceutical client, the motor and bearing cartridge of a Halifax two-stage fan assembly were encased with a removable, polished, stainless steel shroud. This facilitated easy access and strip-down for frequent cleaning and maintenance. Stainless steel was used rather than a special paint finish as the best solution to eliminate any risk of contamination. By accepting the management of this project as a complete design, manufacture and test contract, Halifax freed-up the client to concentrate on other engineering matters on the new plant under construction.

Special bearings for biomass FD fans

Swedish biomass burning specialist TPS chose Halifax Fan Ltd of Brighouse as the supplier for the primary air fans and the high temperature secondary air and flue gas recirculation fans for six new 'BioSwirl' biomass burner systems on each of two boilers at Ferybridge 'C' power-station biomass fuel project.

Milled fuel is transported into the six 'BioSwirl' burners by blowers where it is suspended and effectively gasified with primary combustion air from a single 3.3kV 200kW high volume Halifax 'Beaufort' fan. The resulting gas, along with a pre-heated secondary air supply from two additional 3.3kV 400kW Mistral fans, combusts at the outlet from the burner then leads off as a clean, high temperature flame into the furnace itself, supplementing the combustion of coal in the furnace. A further 110kW 'Mistral' fan unit feeds low-oxygen flue gases back to the burner to 'trim' the combustion if temperatures in the Bioswirl rise too high. The secondary air supply fans handle air at temperatures up to 280°C and the flue gas recirculation fan operates at temperatures up to 130°C.

ATEX standard fans for oil industry

Hamworthy Combustion is a world leader in combustion engineering with a strong reputation in the Marine and Offshore market sectors and has chosen ATEX standard non-sparking fans designed, manufactured and tested by Halifax Fan for use on floating oil production, storage and offloading vessels (FPSOs).

The fans range in power from 70kW to 315kW and from 685 to 1300 mm diameter and are mainly medium pressure, high volume, high efficiency models from Halifax's Beaufort range. These are often fitted with inlet vane control dampers to meet the wide operating conditions demanded from purge to minimum air flow at start-up. All are designed to a marine environment specification agreed between Halifax Fan and Hamworthy Combustion. It covers anti-corrosive construction necessitating the use of stainless steel for critical parts, special paint finish throughout and mechanical design features to benefit the end user in terms of long life and ease of maintenance. The fans are bespoke tailored to meet the specific demands of the final end user, the boiler fuel type and the intended geographic location of the FPSO.

The **shaft bearing** is the heart of every quality fan

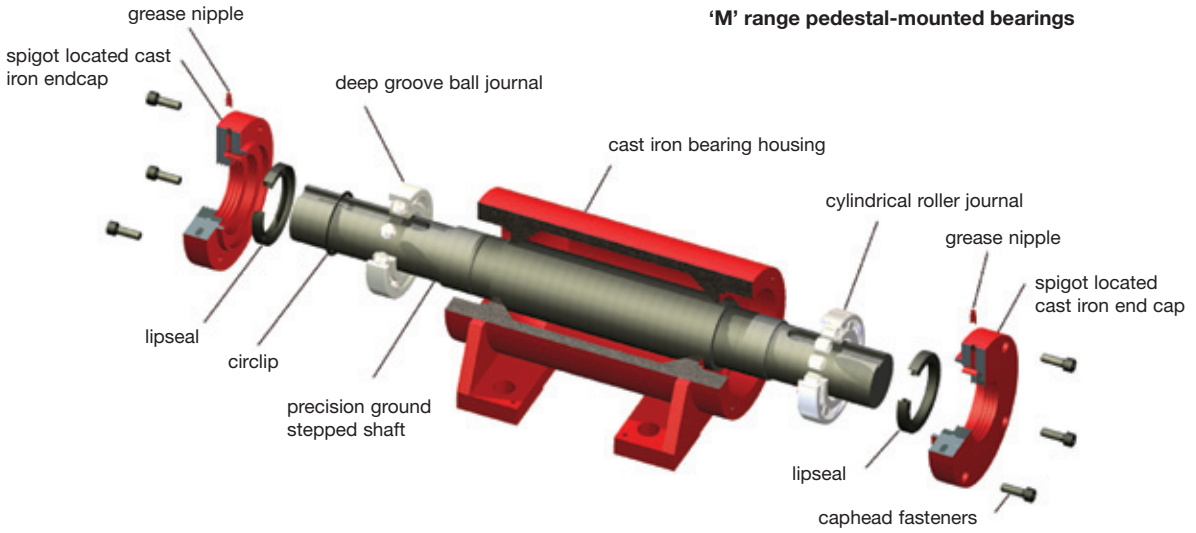
Bearing design is critical to fan reliability and longevity. For this reason Halifax Fan has designed its own unique bearings in-house, specifically to cope with the high axial and radial loads exerted by modern industrial fans. These designs have been well proven over hundreds of thousands if not millions of running hours in the most demanding conditions. Each unit is produced in our own factory and undergoes rigorous testing and inspection as part of the build process.

Bearings for belt driven fans comprise anti-friction, grease lubricated ball and roller journals pressed onto a precision ground shaft and mounted into a cast-iron housing. The non-drive end (NDE) bearing takes the high axial load generated by the fan impeller. The drive end (DE) bearing takes up the radial load imposed by the belt drive.

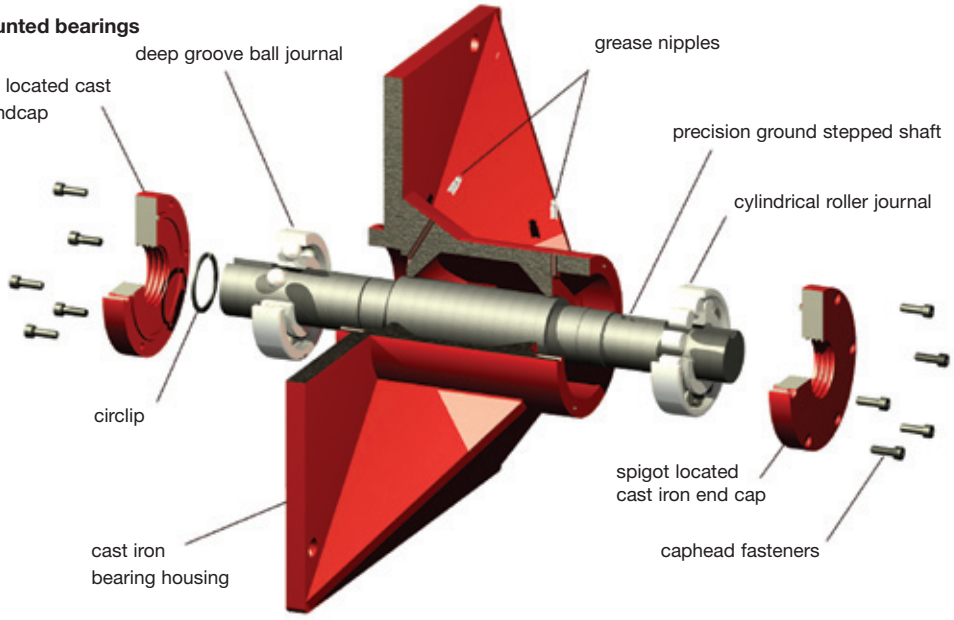
For in-line driven fans, a two-ball bearing arrangement is an alternative. The NDE bearing and wave washer arrangement allows for a degree of expansion. The DE bearing is fixed and handles the impeller axial load.

Halifax Fan can also offer a range of bearing options from Plummer block to Hydrodynamic oil lubricated solutions.

'M' range pedestal-mounted bearings



'V' range case-mounted bearings



Our aim -
a comprehensive package from start to finish

Halifax Fan is, in every sense of the word, an 'engineering' company and does not exist simply to supply fans 'off-the-shelf'. Our customers expect, and get, a comprehensive project engineering service that takes in everything from initial design of the complete fan package, be it electrically driven, turbine driven or even driven by petrol or diesel engines. Our single aim is to provide complete satisfaction on every contract from first discussions with the client/ user right through to completion of on-site commissioning.

Testing

Our quality accreditation to ISO9001:2008 requires testing of each of our ranges to BS848 Part 1 every three years as a minimum. Contract specific fan performance testing to BS standards is regularly conducted, in-house, upon customer demand. Testing includes noise, vibration, performance and functionality testing of the fans and any ancillary equipment such as dampers.

Scrubber fan system

46" paddle bladed impeller with 4 pole, 55kW motor. Fully welded stainless steel construction, complete with vessel, piping and starter controls

Petrochemical

28.5" backward inclined impeller, ATEX cat 2G internal, 3G external, fully welded stainless steel 316 construction c/w vibration sensors and BS848 tested to 7 bar internal pressure

Additional on-site services

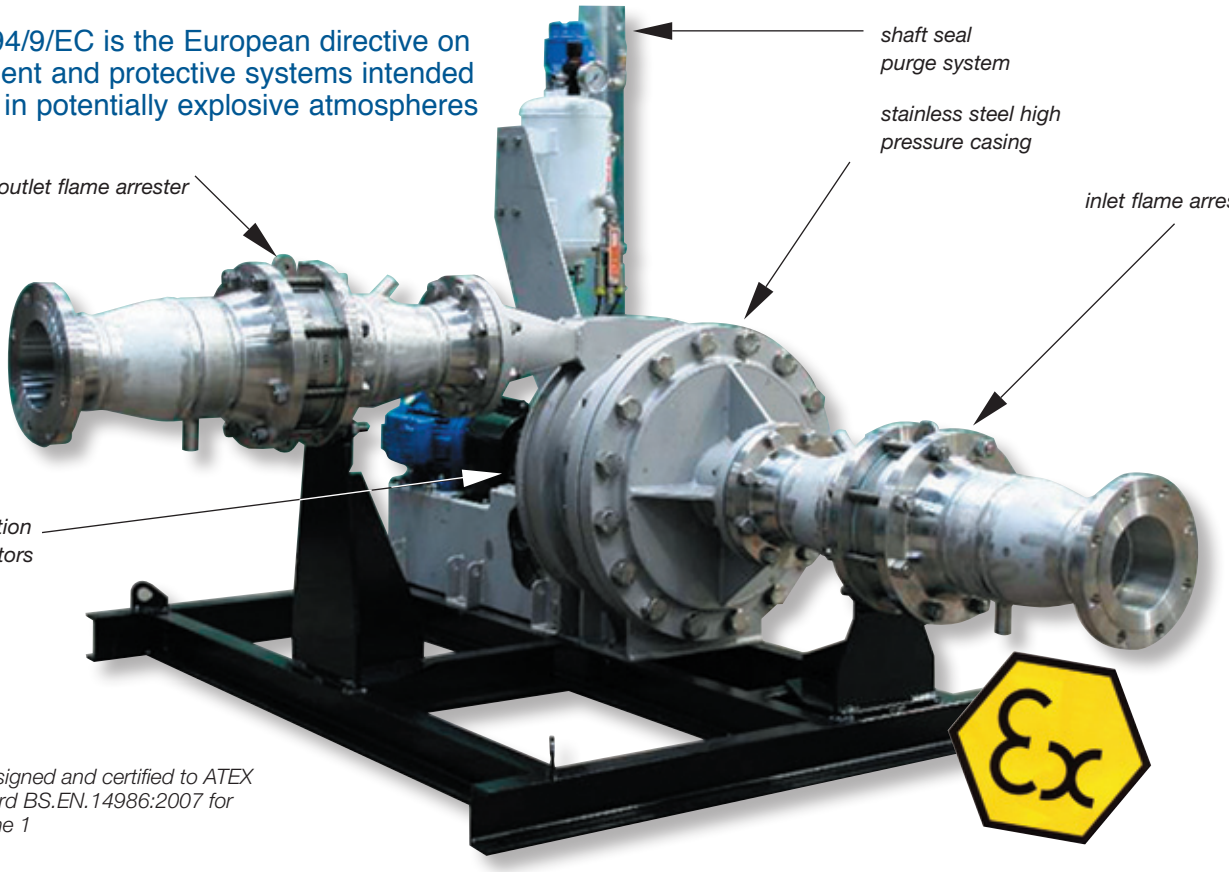
- Laser alignment
- Performance testing
- Repairs
- Consultation
- Noise survey
- Site balancing
- Troubleshooting

Chemical

72" backward inclined impeller with 250kW motor and steam turbine back-up. ATEX 3G internal/external with graphite seal and inlet vane control

ATEX fans

ATEX 94/9/EC is the European directive on equipment and protective systems intended for use in potentially explosive atmospheres



Blower designed and certified to ATEX fan standard BS.EN.14986:2007 for cat 2G zone 1

Commonly referred to as the ATEX Directive, it became British law in 1996. Manufacturers had an option in complying with the regulations from 23 March 1994 up until final transition period end date of 1st July 2003. The directive is now EU law and any equipment, electrical or mechanical, for installation within the EU member states must now comply.

Fans were identified as a major source of potential ignition and a CEN committee was set up to produce a standard specifically for the manufacture of fans for use in hazardous areas. Halifax Fan formed part of this advisory committee and was an instrumental part in its production. Only companies with recognised quality certification are allowed to produce fans for installations requiring ATEX certification. Not surprisingly, Halifax Fan has been producing fans to the ATEX requirements for Group II equipment with gas and dust hazards for some time now and is one of the leading manufacturers in Europe.

ATEX is not only applicable to fans. Users of ATEX fans should also be aware of the implications in respect of their own installations. Our technical paper "Implications for Manufacturers" which was presented to the Institute of Mechanical Engineers in 2003 includes important information for fan users.

Please either contact us direct for your copy or log onto our website.

As part of the ATEX Directive we have a duty to liaise with our customers and obtain particular information to enable us to select fans of the correct category. To assist you with your enquiries and to help us formulate an appropriate proposal, we offer our "ATEX Fan Enquiry Form" for completion and submission.

The form can be downloaded from our website.

Zones and categories for gas and dust

Directive 94/9/EC	Directive 1999/92/EC
Group II fans classification	**Area classification gas, vapour, mist**
Category 1G	Zone 0
Category 2G	Zone 1
Category 3G	Zone 2
Directive 94/9/EC	**Directive 1999/92/EC**
Group II fans classification	**Area classification dust**
Category 1D	Zone 20
Category 2D	Zone 21
Category 3D	Zone 22

Energy efficient fans

The operational specification for a fan may require frequent output variation for production or seasonal reasons

It is common that the specified fan duty exceeds the needs of the actual operating conditions by a generous margin and subsequently requires some form of flow control.

Previously, when the output of a fan system had to be governed, it was most commonly done by inlet or outlet damper systems. Today, ac drive systems, offering all the simplicity, availability and reliability of the standard induction cage motor, have become highly cost effective. In such cases, variable speed drives have a highly beneficial role to play in controlling centrifugal fans. This is confirmed by the upswing in their adoption over the last 10 years or so, particularly for energy saving reasons. These can usually be reasonably accurately quantified at the time of selection.

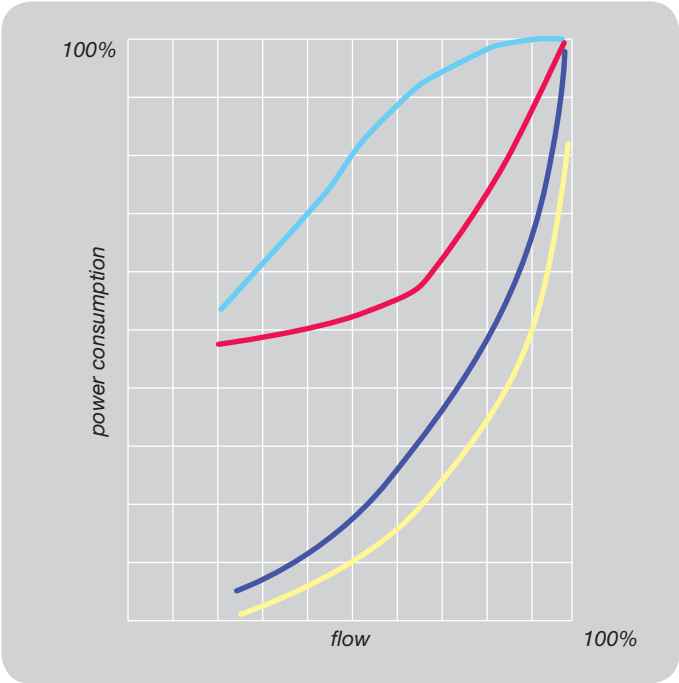
Calculations are usually based upon the fan affinity laws. However these 'laws' apply only to a fan when operating on a fixed system. It is unusual that a fan is left running at excess capacity; more often the flow is adjusted by the users to suit their requirements, usually by damper control. The graph below illustrates the difference in power characteristics between damper, inlet vane and variable speed control, in this case clearly indicating the higher efficiency of variable speed control.

Care should be exercised in some instances. Where a high pressure needs to be maintained but flow controlled, an IVC damper comes into its own.

'Variable speed control of fans can in many applications give huge energy savings.'

Charles Halstead,
Group Technical Director

Where a new fan is being selected, there are clear advantages to working with the fan manufacturer, who is fully familiar with the fan characteristics and is ideally placed to advise on the selection of the right drive to suit the fan application. Halifax Fan is able to conduct in-house testing of the complete drive-motor-fan assembly as part of the overall contract, rather than deal with split responsibility once the equipment is installed on site.



Energy comparison graph

- *damper/valves control*
- *inlet guide vanes*
- *frequency converter*
- *fan shaft power*

Fan affinity laws for constant fan size and gas density

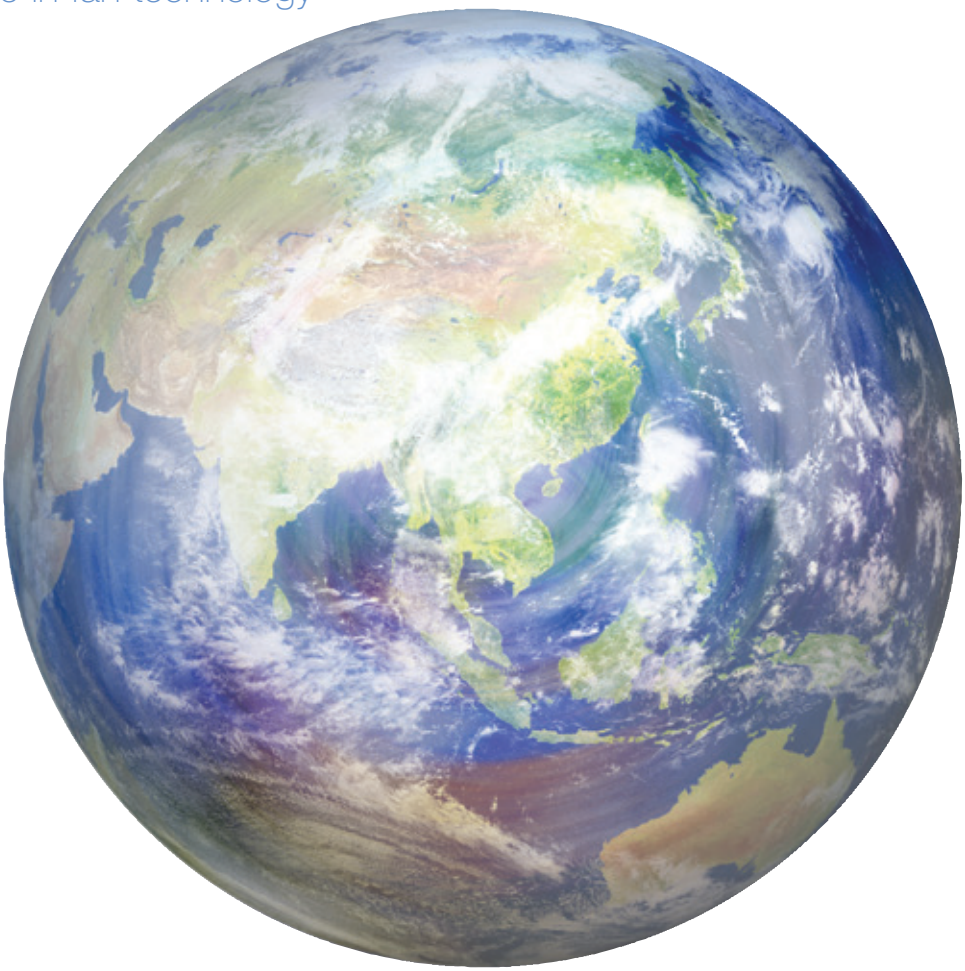
Volume	∝	speed
Pressure	∝	speed^2
Power	∝	speed^3
Noise	∝	speed^5

Benefits of VSD operation

- Energy efficient
- Soft-starting
- Reduced noise levels
- Finer process control
- Reduced maintenance
- Improved power factor
- Reduced max demand

halifax fan

a global force in fan technology



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