www.howden.com

Howden

Solutions for oil and gas and chemical industries

Revolving Around You™

In the oil and gas market where equipment availability and performance are essential, Howden customised solutions are the clear choice for air and gas handling.

For more than a century Howden has supplied air and gas handling equipment to every major oil and gas company in the world. From frozen sites in Siberia and the hottest nations of Africa, to offshore sites and remote desert fields, we work with customers wherever they are to deliver customised solutions.

Howden has an extensive portfolio of technologies available from simple equipment integrated by OEM to the most elaborate engineered turnkey solutions. We work alongside our customers in selecting the most accurate solutions in order to make their oil and gas projects become real.

Revolving Around You™

For more than 160 years, Howden has built a worldwide reputation for innovative air and gas handling technology, engineered to the highest quality.

Access to efficient and performing solutions

Howden pushes performance boundaries for each technology, giving access to custom solutions, created by highly experienced engineers for total peace of mind.

Our reputation as a first-class manufacturer for oil and gas applications, and trusted expert, is underpinned by our achievements and Howden's proven track record positions our brands and technologies as leading solutions all over the globe. We will work with you to deliver long-term value for your most demanding, process-critical requirements, offering solutions for every plant challenge.

Global presence

Over the years Howden has expanded its global presence in every region across the globe. Direct contacts with customers and site operators are developed worldwide by our local entities for the full lifecycle of equipment.

We are customer centric and keep on listening

We never stand still. Our long-term success is founded on understanding your requirements and short or long term challenges. As an inventor of different technology, we have been at the forefront of compressor innovation for over a century, and are constantly working on improving safety and performance, with our customers' needs front of mind.

Howden builds the largest screw and API618 reciprocating compressors in the market and has developed complex packages, configured packages and bare shaft solutions to cover every kind of customer requirement.

Custom design for ultra-safe, continuous operation

Precisely manufactured to match your operating and environmental conditions, Howden solutions enable constant peak performance.

As air and gas handling specialists, with vast knowledge of the applications we serve, our team of experts have a reputation for solving complex operational challenges and as a global organisation, we understand the needs of local and national regulations, collaborating alongside customers with safety at the core of everything we do.

Howden brands in oil and gas

Alphair | Austcold | Bryan Donkin | Burton Corblin | CKD | Covent Fans Inc. | Donkin | Exvel
Garden City | Howden | HV-Turbo | KK&K | Periflow | Roots Solyvent | Schiele | Thomassen | Turblex

The right technology for every challenge

		Reciprocating		Screw	Centrifugal			Roots	Fans			Heaters	Steam turbines
		Reciprocating piston compressors	Diaphragm compressors	Screw compressors	Turbo compressors and blowers	Turbo fans	Periflow®	Roots blowers	Process fans	Industrial ventilation fans	Cooling fans	Heaters	Steam turbines
Oil and gas upstream	Offshore platform and FPSO	●	●	●			●		●	●	●		
	FLNG			●			●			●			
	Onshore conventional and unconventional oil and gas production			●	●	●		●	●		●		
	Oil and gas processing/NGL Recovery	●		●	●			●	●		●		
	Central processing facility/GOSP	●		●						●	●		
Oil and gas midstream	LNG plant production and gas processing	●		●	●				●	●	●		
	Micro LNG plant			●	●					●	●		
	LNG and LPG terminal	●		●					●	●			●
	Product terminal and storage tank	●		●					●				
	Gas compression station			●							●		
	LNG, LPG, ships and carriers	●		●	●					●			●
Refinery	Crude distillation (CDU) Vacuum distillation (VDU)	●		●					●		●	●	
	Hydrotreating/HDS/HDT/Hydrocraking/Dewax	●							●		●	●	
	Catalytic reforming (CR/CCR)	●		●					●		●	●	
	Fluid catalytic cracking (FCC) Delayed coker unit (DCU)		●	●					●			●	
	Alkylation/Isomerization	●		●	●				●				
	Sulphur recovery unit (SRU)				●				●				
	LPG		●	●			●						
	H_2 plant and network (HGU)	●	●	●			●		●				

The right technology for every challenge

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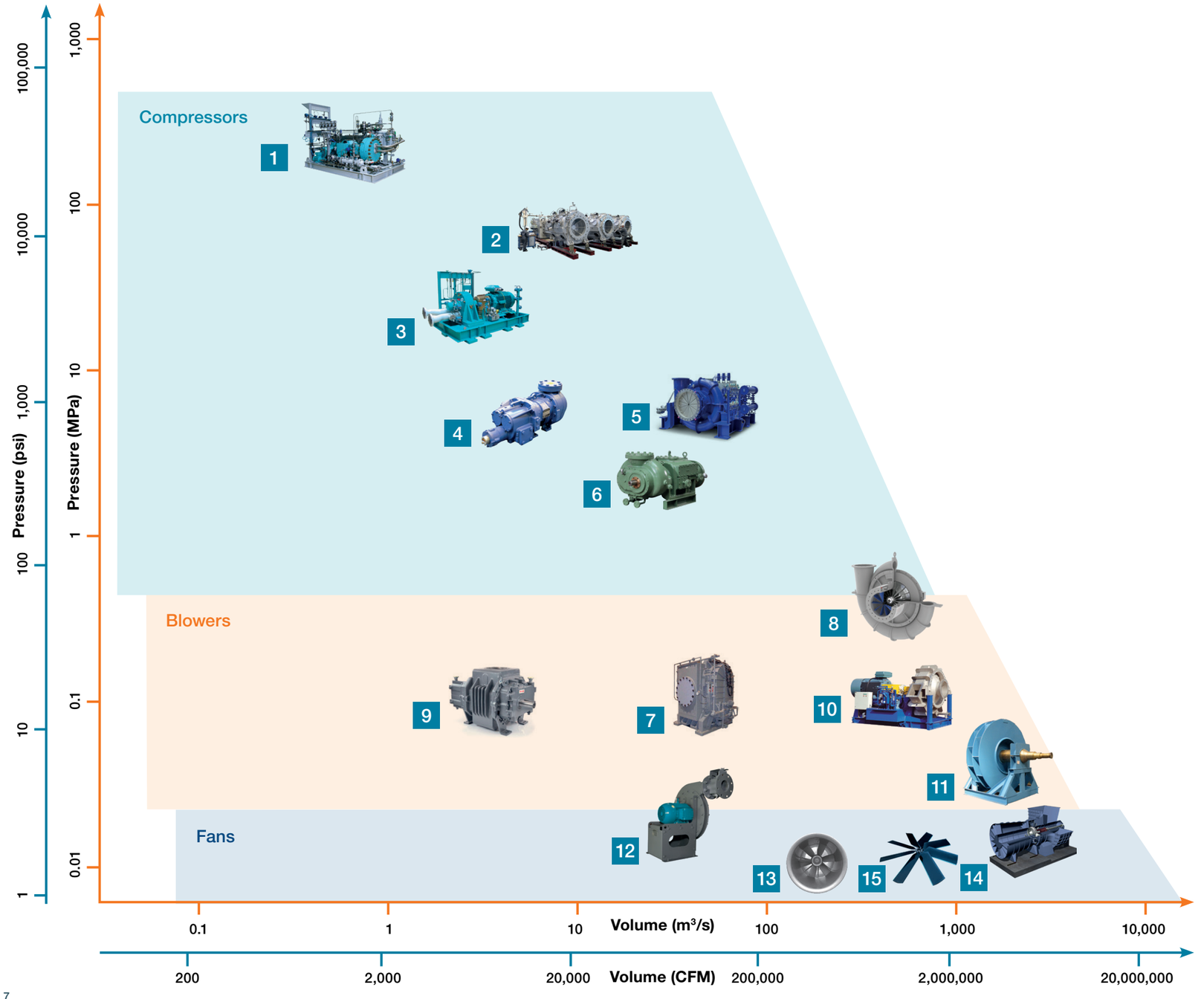
Petrochemical	GTL/CTL syngas synfuels	●		●	●				●	●	●		
	Etylene plant	●		●	●	●			●		●	●	
	PE/LDPE/LLDPE/HDPE/EO/EG/PE	●	●	●	●			●				●	
	PVC/VCM	●	●	●					●				
	PDH	●	●	●								●	
	Polypropylene PP	●	●	●	●			●			●		
	Polyurethane/PO/Acrylonytrile		●	●	●						●		
	Butadiene/SBR/Plastic/Rubber		●	●				●				●	
	PTA BDO		●	●	●			●			●		
	MMA	●	●	●	●		●						
	Methanol plant/Methyl chloryde	●		●	●				●			●	
	LAB/TDI/Toluene/Xylene/Paraxylene	●	●	●					●				
	Phenol/Acetone/Acrylic acid				●								
	MDI/ABS/Styrene monomer/MA	●		●	●							●	
	Boiler and reactor furnace								●			●	
Chemical	Fertilizer ammonia plant/Urea/ Nitrogeous fertilizer/Potash/Phosphate	●	●	●	●				●	●	●	●	
	Sulphur acid plant/Sulphur acid recovery (SAR)				●			●	●		●	●	
	Inorganic chemical/Fluor/Chlorine/Dye/Soda	●	●	●	●				●		●		
	Carbon black			●	●			●	●		●		
	Polysilicone	●	●		●			●					
	Pharmaceutical/Biotech plant/ Warehouse/Laboratories	●	●	●	●	●		●	●	●	●		
	Power to gas/Hydrogen electrolyser	●	●	●									
	Industrial gas production and handling $N_2/O_2/H_2$/He/Acetylene	●	●	●									
Utilities in chemical and oil and gas sites	Power house/ Gas turbine feed and cooling/ORC	●		●			●						●
	Ventilation/Aeration/HVAC/Fumes exhaust								●	●	●		
	Cooling Unit (Cooling tower, ACHE and ACC)										●		
	Conveyors and vacuum (Roots)				●			●					
	Refrigeration for warehouse and storage			●									
	Waste water treatment/ Effluent treatment				●	●		●					
	Mechanical drive for pumps, compresssors and ventilators												●
	Waste heat recovery unit (WHRU)		●	●					●				●
	Carbon capture storage (CCS)		●					●	●	●			
	Zero Liquid Discharge/ Water recovery, desalination and distillation				●	●		●					●

Howden product range pressure/volume chart

Howden provides the industry's widest range of fans, compressors and blowers to help solve customers' toughest application engineering challenge.

Shaded areas denote the typical pressure/volume ranges of each product type. Placement of specific products within shaded areas are reflective of typical product application.



1 Diaphragm compressor:
Delivery pressure max 300 MPa (43,500 psi).
Flow max 1,200 m³/h (706 CFM).

2 Reciprocating compressor:
Delivery pressure max 60 MPa (8,700 psi).
Flow max 34,000 m³/h (20,000 CFM).

3 Peripheral compressor:
Delivery pressure max 35 MPa (5,075 psi).
Flow max 20,000 m³/h (11,800 CFM).

4 Oil injected screw compressor:
Delivery pressure max 7.5 MPa (1,087 psi).
Flow max 29,000 m³/h (17,000 CFM).

5 Centrifugal compressor:
Max 2.5 MPa (362 psi): flow max 180,000 m³/h (106,000 CFM).
Max 5 MPa (725 psi): flow max 72,000 m³/h (42,400 CFM).

6 Oil free screw compressor:
Delivery pressure max 4.5 MPa (652 psi).
Flow max 92,000 m³/h (54,000CFM).

7 Large Roots industrial blower:
Up to 1 barG (15 psiG) pressure increase. 2.4 bar (35 psi) max.
Down to 950 mbarG (28" HgG) vacuum.
Up to 119,000 m³/h (70,000 CFM).

8 Single stage turbo blower:
Delivery pressure max 0.3 MPa.
Flow max 720,000 m³/h (424,000 CFM).

9 Small Roots blower:
Up to 1 barG (15 psiG) increase.
Down to 950 mbarG (28" HgG) vacuum.
Flow up to 8,500 m³/h (5,000 CFM).

10 Turbo fan:
2:1 compression ratio for a single stage (1 bar 14.5psi standard air conditions). Multiple stages.
Flows up to 165 m³/s (350,000 CFM).

11 Heavy-duty centrifugal fan:
Low 700 m³/s (1,500,000 CFM). Max wheel dia 175 inches.
Max temperature 800°F (425°C) to 2000°F (1,100°C) for high temperature designs.

12 Low to medium duty centrifugal fan:
Flow 94 m³/s (200,000 CFM). Max temperature 1000°F (540°C).
Max wheel diametre 66 inches.

13 Axial fan:
Flow max 400 m³/s (850,000 CFM).

14 VP axial fan:
Flow max 2,600 m³/s (5,500,000 CFM).

15 Cooling fan:
Flow max 710 m³/s (1,505,000 CFM). 250Pa.

Engineering proven over decades of robust operation

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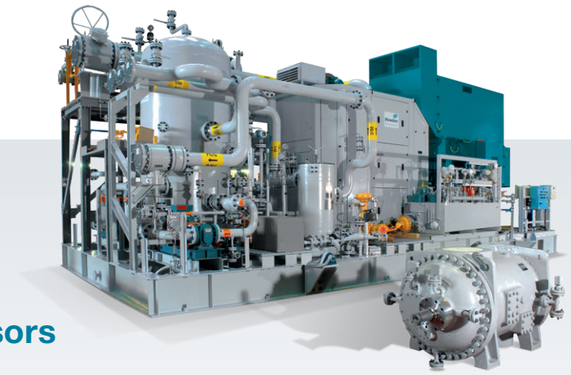


Screw compressors

API 619 and standard

Our world leading oil-injected and oil-free screw compressors, renowned for their robustness and reliability, are rugged and trusted.

We supply both standardised and customised API 619 packaged solutions for high-end utilisation, with minimal deviations. Oil-free packages, oil-injected packages and oil-injected bare shaft packages available to best meet your needs and application.

Why choose Howden?

- Reliable and proven products
- Extensive range
- Configured to match your needs
- 80 years of screw compressor expertise and application knowledge
- Economically and environmentally friendly solutions to reduce your CO_2 footprint
- Access to our very experienced technical applications team and regional sales support
- Extensive pre-contract support to ensure best compressor selection
- Product-neutral consultancy

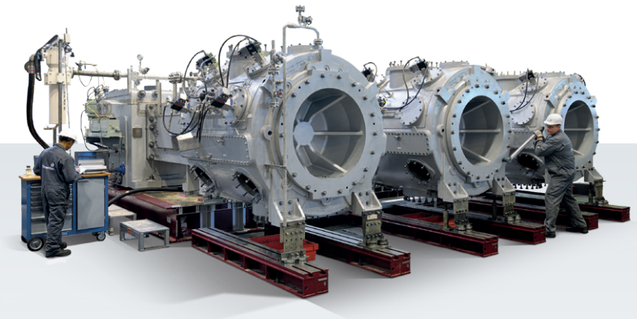
Roles in applications

- Process and PSA tail gas/Process cooling
- Off gas/Flash gas/Vent gas/ Vapour recovery/Flare gas
- Booster (Gas turbine feed, gas gathering, make and recycle)
- Refrigeration and heat pumps

Typical applications:

API and High specification systems for onshore and offshore oil and gas production sites, gas processing, refinery, and petrochemical processes

Key features	Benefits
A wide ranging incremental frame size product portfolio that includes API compliant options	Bespoke products “perfectly” tuned to your application
VI technology allows the performance of the compressor to be optimised for varying application conditions	Efficiency by design, including adjustable VI options
Global spares availability	Assurance that spares purchased from Howden are OEM quality
Casing material and bearing and sealing options allow for a wide range of gases and applications to be efficiently compressed	Flexible designs available to handle wide ranging system conditions
Double wall casing, ensuring robustness	Rigidity and reliability, reduced noise and thermal transfer
Oil-free design handles gases with liquids, particulate, polymer forming, and varying molecular weight	Handle complex process conditions and not susceptible to erosion
Oil injected range capabilities: 75 bar, min inlet -75°C, max flow 29,000 m^3/hr	Allows you to select a screw compressor in many applications



Reciprocating compressors

API 618

The series "C" and "P" reciprocating compressors present a comprehensive range of volumes and pressures.

Thomassen "C" series is one of the largest compressors in the world, offering heavy duty and high power units. Howden has more than 2 dozen references of operating reciprocating API618 compressors with more than 13MW of power, with the knowledge and expertise to handle and harness these powers in our compressors, having produced the first Thomassen compressor 100 years ago.

The Burton Corblin "P" series is for processes involving lower capacities. The fully integrated package we supply can incorporate control systems, regulation equipment and any other additional modules and utility packages required by the circumstances. The "P" series is delivered ready for installation and start-up.

Innovative solutions: Unique Free Floating Piston (FFP) reduces ring wear and greatly extends intervals between maintenance.

Why choose Howden?

- FFP innovative solutions
- Required performance at all times
- 3,000 references for H_2 and process gas

Roles in applications

- H_2 process gas make up, recycle, storage
- N_2 booster for blanketing
- Off gas, vapour and vent gas recovery
- Process gas boost

Typical applications:

Hydrogen and process gases compression for refineries secondary units, chemical and petrochemical processes, complemented by renewable energy applications and environmental solutions

Key features	Benefits
Power up to 33 MW	Connections limited to one equipment
Dry and lubricated compressor package	Easy installation
Rod load up to 1,800 kN	Compact machines
API 618 low rotation speed	Robust reliable and lasting equipment
Free Floating Piston (FFP) system	FFP reducing MTBM

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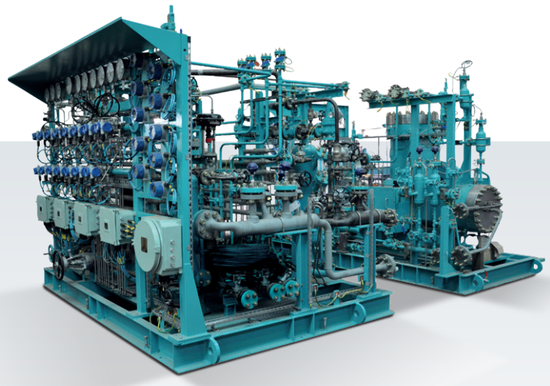


Diaphragm compressors

“Burton Corblin” Diaphragm Compressor solution is available as an API compliant design and the technology can reach high pressure of up to 3000 bar.

Howden Diaphragm compressors are selected for processes requiring full gas confinement, high pressures, and high quality gas preservation.

Diaphragm compression is the technology of choice in any situation where complete hermetic separation is required. Examples of this include the handling of rare, toxic, flammable and explosive gases and pure H_2.

High compression ratio and high-pressure capabilities have resulted in them being used for specialist applications in the chemical and industrial gases industries. Extraordinary compression ratios up to 20:1 in a single stage can be achieved.

Why choose Howden?

- Leading edge of diaphragm compressor innovation for almost a century
- Constantly improving safety and performance
- HIDS system provides real-time monitoring of head integrity
- Fail-safe stop procedure and containment of process gas in the event of a breach, providing absolute operational safety
- 4,500 compressors operated in oil and gas and chemical industries for more than a century

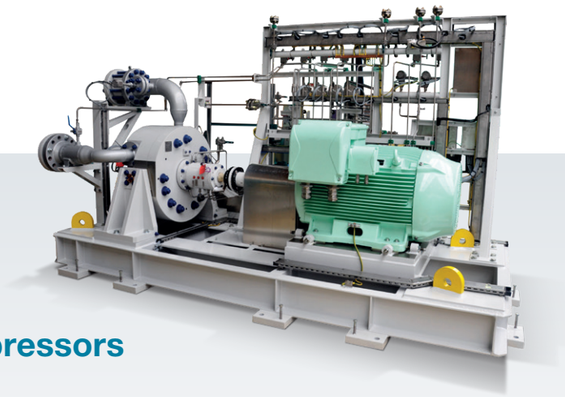
Roles in applications

- H_2 make up and recycle
- N_2 booster for blanketing
- Off gas/leak gas/vent gas recovery
- Complex process gas compression
- Clean gas processes

Typical applications:

H_2 and process gases for refineries, industrial gases, chemical, petrochemical processes, pilot tests

Key features	Benefits
Environmentally safe	Reliable and safe equipment, no migration of gas to the crankcase, no need for purging or ventilating
High compression ratio reduces number of stages	Compact units with small footprint, energy savings and lower maintenance costs
Skid mounted turn key package	No foundations required for ease of installation
Insulated compression chamber with static sealing	Full gas insulation prevents gas contamination, with gas containment preserving environment
Low to very high discharge pressure	Addresses a wide array of processes



Periflow® compressors

API compliant

Periflow® compressors are perfectly suited to industrial applications such as process gas recycling, pressure boosting, gas extraction and gas drying.

Their exceptional flow control and suitability for wet and particulate-laden gases makes them immensely versatile. With pressures up to 350 bar and flow ranging from 10 to 20,000 m3/hr Periflow® compressors are suitable for a very wide range of process gases, including those containing liquids or particles.

Fully compliant with API, area protection requirements and site specifications, Periflow® has consistently demonstrated it's worth in critical applications throughout the world.

The system is as simple in operation as it is in concept. This is because it requires no anti-surge systems, damping bottles, heat exchangers, vibration or stress monitoring, lubrication oil consoles or complex instrumentation, making it significantly smaller and lighter than comparable units.

Why choose Howden?

- Multiple Periflow® are run in process applications and offshore sites

Roles in applications

- Process gas recycle
- Gas booster
- Gas with particles handling
- Gas transfer and extraction

Typical applications:

Gas drying offshore applications, centrifugal packing leak recovery, downstream process gas, regeneration gas unit in LPG plant, gas turbine feed

Key features	Benefits
Light weight, small footprint and low vibration	As simple to install as a rotating pump, avoiding resonances and related fatigue of connections which is ideal for offshore
Variable speed	Flow is adjusted to the process, playing with direct drive speed
Design requires no complex anti-surge system	No complex instrumentation or monitoring needed
Low speed	Only annual inspection and maintenance breaks at five-year intervals required
Wet and dry seal options run from basic to high containment designs	As simple to install as a rotating pump
Roller bearing lubricated by a compact oil mist system	No lubrication oil monitoring console

Engineering proven over decades of robust operation

Howden incorporates many of the most celebrated names in fluid handling innovation and engineering. As manufacturers of the full set of compressors, steam turbines, fans and heaters, we can offer unbiased advice about matching product technologies to demands and duties.

Single stage turbo compressors

Our turbo compressors can be supplied with either an integrated or separate gearbox to suit your needs and application requirements.

Solutions are optionally available in a design compliant to Howden standard, API Std. 672 or API Std. 617.

Around the world, we have assembled a team of turbo machinery experts who are able to engineer a solution using any of our products. The modular approach and flexibility of our products ensure we deliver the ideal system.

Why choose Howden?

- Large portfolio for diverse applications
- More than 4,000 references worldwide
- High efficiency to reduce operation cost
- Key roles and applications

Roles in applications

- Combustion air for SRU
- SO_2 blowers for SAR
- Process gas compressors
- Gas recycle applications, MVR
- Air blowers for process and conveyors

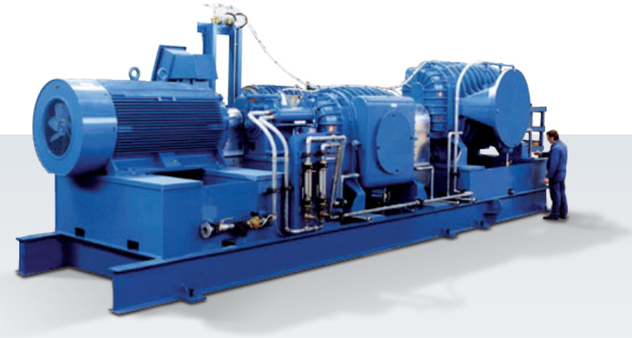
Typical applications:

SRU furnace blower, SAP, SAR, recycle gas handling, process gas and effluents recovery, MVR

Legacy brands:

- Howden
- KK&K
- Turblex
- Roots

Key features	Benefits
Power up to 15 MW	Heavy duty industrial design
API part 1, 2 and 3 design	Highest reliability
Package unit design	High efficiency and controls
Combination with steam turbine available	Low operating cost
Ready for Howden Uptime	Extended references



Roots blowers

Roots blowers are designed to be compact and sturdy and are engineered for continuous duty and maximum reliability.

All our blowers have a time tested lubrication system and an exclusive gearbox design that improves oil distribution to the timing gears and lengthens bearing life.

Thousands of these pieces of equipment are used for air supply, conveyors, vacuum, vapour handling integrating package or OEM systems.

Why choose Howden?

- Wide range of sizes and specifications
- No need of lubrication
- Cost effective design

Roles in applications

- Air supply
- Vacuum
- Vapour

Typical applications:

Air separation units, mechanical vapour recompression (MVR), conveyors, small scale SRU, and process air supply

Key features	Benefits
Acoustic enclosure is designed to provide up to 22 dBA free field attenuation	Ease of site integration, with low noise
Broad performance range of efficient and compact solutions	Easy to install, with small footprint
Access to air filter is convenient and designed to reduce pressure losses	Improves reliability and blower efficiency, protecting your investment
Air flow from front to rear	Designed for personnel safety and equipment reliability
Configured solutions off the shelf	Fast delivery
Efficient and reliable equipment	Low OPEX

COMPRESSION

Engineering proven over decades of robust operation

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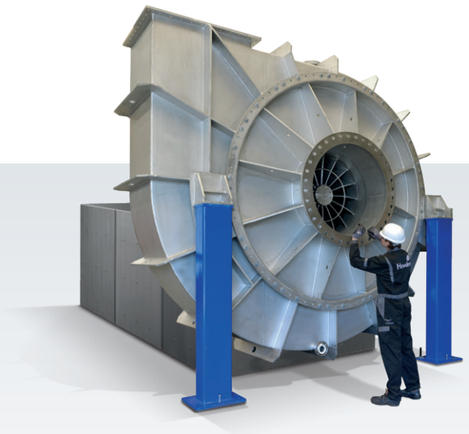


Process/high temperature fans

Process fans:
Howden specialises in heavy duty fans for a variety of high spec applications. Our oil and gas fans are API 673 and API 560 compliant and all fans are custom built to ensure maximum efficiency as well as compliance with complex applications and specifications.

Legacy brands:
Covent, e-Technopal, Howden core range, TLT, Fougal, Centripal, Rotorique, VR

Typical applications:

Boilers, ID/FD fans, incinerators, CCR blowers, process fans and carbon black

High temperature fans:
Howden also specialises in high temperature, centrifugal, backward inclined, paddle wheel, forward curved, and axial fans that can work for applications up to 2000°F including CCR in PCOG. These fans use exotic high temperature alloys like special grades of stainless steel, Hastelloy and Inconel.

Legacy brands:
Garden City Fan

Typical applications:

Furnaces air, CCR-PCOG, primary and secondary air fans and vapor recompression

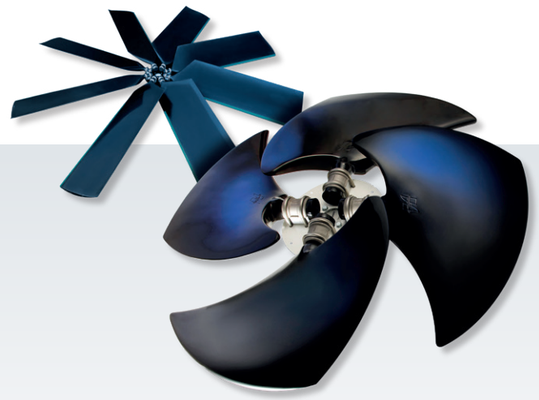
Why choose Howden?

- Full support in selecting a fan solution to fit your system
- Access to tailored response based on knowledge and engineering experience
- Extensive scope, depth and breadth of knowledge and experience
- Global footprint with local support, in order to meet local standards

Roles in applications

- Process air supply
- Boiler, ID/FD fans
- Incineration/calcination air/combustion
- Aeration/ventilation
- Exhaust, start up, unloading
- Vapour recompression
- Catalyst regeneration blowers
- Reformer and gas heaters fans
- Flue gas recirculation

Key features	Benefits
Airfoil, backward curved, backward inclined, radial, radial tipped	Optimised design for the duty of major applications
High temperatures up to 2000°F backward inclined, paddle wheel, forward curved, axial	Matches high end usage requirements
API 673, API 560, ATEX and customer spec	Reliable and available equipment
High grade material	Withstand aggressive fluid and erosive particles, aligned to specific requirements



Cooling fans

The processing and refining of fossil fuels uses a range of high temperature processes from gas cracking and oil distillation to additional thermal methods to obtain final products.

In many cases, equipment used within the value chain also generate high levels of heat such as compression within liquefaction or boosting for transportation. All such activities necessitate cooling systems as a result.

These cooling systems typically circulate water in order to transfer heat away from the process and incorporate cooling towers, air cooled condensers (ACC) or air cooled heat exchangers (ACHE) acting as condensers.

Howden's fans are used to ensure adequate volumes of air are passed through the cooling tower, ACC or ACHE. The fans are axial type and designed to meet not only the required flow, but critically operate within the specified noise level permitted on each site, an increasing factor in environmental considerations.

Howden's wide range of fans, from 1.2m to 15.2m in diameter, means that all levels of cooling system can be addressed. Our 3 models – D, E and SX – have varied profiles to enable customers to match or exceed the noise specification while maximising operating efficiency.

Why choose Howden?

- Over 50 years of experience in supplying high performance fans
- Market leading noise performance up to 20Dba lower than standard fans
- Global presence providing support from project initiation to installation and long term service

Roles in applications

- Air-cooled condensers
- Cooling towers
- Air-cooled heat exchangers

Typical applications:

Process cooling within refineries, petrochemical and LNG plants and cooling systems for process equipment

Key features	Benefits
Fiberglass Reinforced Plastic (FRP) blades	Outstanding fan durability with high efficiency
Wide range of fan diameters across 3 models and multiple variants	Able to meet required performance levels with the best efficiency and lowest noise
Standard operating range of –20°C to +65°C with engineered options for extreme conditions	Reliable performance in all external settings
Materials and coatings can be upgrade to meet additional client specifications	Flexible packages to meet the needs of special projects and operating conditions

Engineering proven over decades of robust operation

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Industrial and ventilation fans

Pre-configured fans (centrifugal) :
Howden specialises in centrifugal fans for a variety of industrial and high spec HVAC applications. Our fan blade options including airfoil, backward curved, backward inclined, radial and forward curved to offer an optimum solution for any given application.

Pre-configured fans (axial):
Howden also specialises in axial fans for a variety of industrial and high spec HVAC applications. The fans are available in a variety of standard sizes in order to offer customers with the optimum solution for their applications, and can be designed to operate at 500°F for 4 hours, for specific HVAC applications.

Legacy brands:
Donkin, Axipal® Bzi, American Fan, Varofoil, CFi, Solyvent, Centripal, Garden City Fan

Why choose Howden?

- Best fit solutions for configured or engineered fans
- Multiple design integration to system and sites
- Reputed fan brands for industrial processes and utilities

Roles in applications

- Clean air
- Particulate and material handling
- Roof ventilation
- Combustion
- Smoke exhaust
- Dust collection
- Vacuum cleaner systems

Typical applications:

Flue gas recirculation, ID FD fans, primary air fans, overfire, vapour recompression, dust collectors, HVAC, cooling towers, dryers, transit applications, PCOG, flares and material conveying

Key features	Benefits
Direct drive or belt drive	Easy integration to customer systems
Material options include carbon steel, stainless steel, aluminium, cast aluminium wheels and housings	Lightweight, corrosion and spark resistant
International and regional designs and production	Match regional standards of AMCA certified for air and sound performance
Continuously welded constructions	Durable equipment with low and high temperature application
Airfoil, backward curved, radial, paddle wheel	Optimised design for every duty and application

Turbo fans

Howden's ExVel® turbo fans are a unique centrifugal fan technology which provide compression ratios similar to centrifugal compressors, however at a substantially lower cost without compromising the high efficiency and reliability.

With a compression ratio from a single stage up to 1 bar (14.5 psi), ExVel® turbo fans can provide as much as 4 times that of a traditional centrifugal fan with a wide potential flow range. This allows for greater process production with both less and more efficient equipment, costing as much as half the cost of a centrifugal compressor.

ExVel® turbo fans are gas tight designs as standard and are fabricated from a variety of steels and alloys in order for them to be optimised for challenging petrochemical, chemical, oil and gas applications which may present wet, corrosive, and even hazardous gas compositions.

Why choose Howden?

- Exceptional performance and value compared to other fan/compressor options
- Extensive installation and application experience
- Proven track record of reliability

Roles in applications

- Process gas boosting
- Corrosive and aggressive gases
- Vacuum

Typical applications:

- Mechanical Vapor Recompression (MVR)
- Zero liquid discharge (ZLD)
- Steam Assisted Gravity Drainage (SAGD)
- Wide array of applications for air and process gas applications in oil and gas production, petrochemical, chemical and refinery applications

Key features	Benefits
API 673 and associated API standards, PIP Standards, PED and ATEX Standards	Howden knowledge and experience in meeting specific oil and gas, petrochemical, and chemical industry demands
High compression ratio at high flows and efficiencies	Significantly lower CAPEX, smaller/less equipment, low OPEX
Materials of construction meet many challenging process gases and environments	Optimised machine design which maximises value for the user relative to reliability, CAPEX, OPEX, and lifetime cost
Packaged skid, control, and sound attenuation options	Wide range of options to optimise the value, automation, ease of use, and maximise safety

Engineering proven over decades of robust operation

Howden incorporates many of the most celebrated names in fluid handling innovation and engineering. As manufacturers of the full set of compressors, steam turbines, fans and heaters, we can offer unbiased advice about matching product technologies to demands and duties.

Air preheaters

Howden's API560 compliant heaters use a range of highly engineered elements to maximise the heat transfer potential in all operating conditions, whilst continuing to perform regardless of fouling caused by 'dirty' fuels.

Fired heaters can be used for multiple processes within downstream oil and gas processing facilities such as hydrocrackers, distillation units, reformers and superheaters and increased efficiency of 10-15% can be gained by preheating combustion air.

Howden's regenerative air preheaters extract waste heat from the exhaust gas, as it leaves the furnace or boiler, transferring this energy to the inlet air used to provide the oxygen to fire the fuel. As the preheater slowly rotates at around 1-2 rpm, thin metal heat transfer elements absorb heat from the hot gas stream and transfer it to the incoming cold air stream.

Why choose Howden?

- High quality manufacturing to the highest levels of excellence with state of the art equipment
- Strict quality controls accredited to international standards
- High performance designs to achieve maximum efficiency
- Long reliable operational life through our focus on engineering excellence
- Broader supply and simplified sourcing with a full turnkey service offering to fit project needs
- Responsive global support with over 50 operational sites providing global sales and service cover

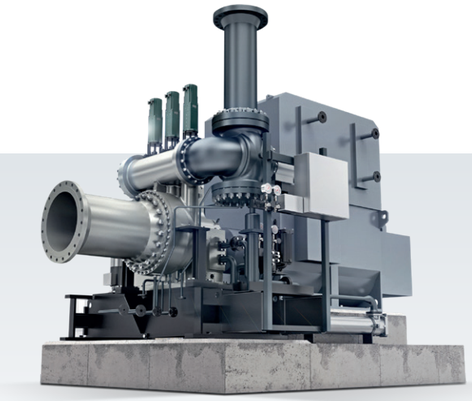
Roles in applications

- Boiler combustion air preheating
- Furnace combustion air preheating

Typical applications:

Air preheating within fired equipment (furnaces and boilers)

Key features	Benefits
Engineered elements with high thermal efficiency	Maximised recovered energy and cost savings with lower CO_2 emissions
Specially designed and coated elements to reduce fouling	Reliable continuous performance even when using 'dirty' fuels
Compact low footprint design relative to recuperative alternatives	Reduced installation requirements and ability to fit more space constrained sites
Very low rotational speed	Low wear levels minimising maintenance
Compact design and high thermal efficiency	Substantial gains over recuperative technologies



Steam turbines

Howden turbines operate as mechanical drives running process pumps and compressors, as well as being part of a Genset generating both power and heat for your internal and external use.

With both applications you are able to improve the overall efficiency of your processes.

Steam Turbines are designed to turn energy from fluid onto the rotor, and our products are considered the most economical and flexible turbines available.

Why choose Howden?

- 100 years of experience and a fleet of more than 20,000 installed turbines
- Reputation for quality
- Perfectly suitable for packing companies/EPC who complete the unit for their customers

Roles in applications

- Compressor and pump mechanical drive
- Steam turbine for power generation
- Waste heat recovery
- Gas expansion
- ORC (Organic Rankine Cycle)

Key features	Benefits
Back pressure or condensing type	Cover all water-steam cycle operation modes
Package unit design can be highly customised	Spec compliance and customisation
Oil unit integrated in base frame	Small footprint, compact design easy to integrate to sites
Nozzle group control valves available	Higher efficiency in part load operation
Quick-start without pre-heating	Responsive, turbine full load with fast ramp-up curve
Meet requirements of API 611/612	Robust design and compliance
ATEX version available	Suitable for all hazardous areas

Oil and gas industry challenges

We are air and gas handling specialists with extensive knowledge and experience of the applications we serve with a reputation for solving complex operational challenges. As a global organisation, we understand the needs of local and national regulations and our teams working continuously with oil and gas industry players, to constantly evolve and improve technology performance.

Oil and gas production

Oil and gas exploration and production mostly takes place in remote and isolated locations with extreme climate conditions. Howden design and build reliable equipment for FPSO, FLNG, Platforms and oil and gas fields.

We handle codes and standards such as ISO, API, ASME, BS, and TEMA amongst others and the ready to install, low vibration, low noise, compact design nature of Howden systems ensures seamless integration into sites.

Gas processing

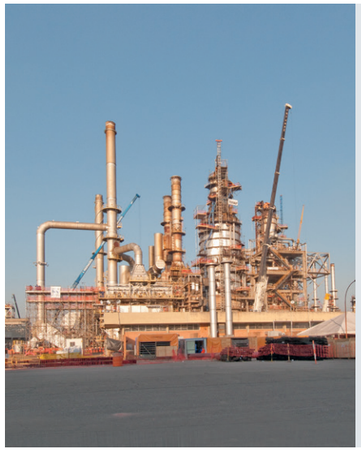
Gas processing plants collect continuously compressed wellhead gas where the gas is dehydrated, sweetened and fractionated. Howden equipment can withstand high temperatures, and the handling of both dirty and aggressive gases.

We build robust, reliable equipment to ensure non-stop, trouble-free operation in plants mostly located next to remote production sites.

Midstream

Liquid gas transport and storage often relates to vapour handling.
Vapour recovery is necessary and tanks can be refrigerated to limit vaporisation.

Equipment operates continuously with MTBM extended to the maximum.
With Howden, the design can be adapted to the variation of flow and pressures of the gas terminal.



Refinery

Refinery is a demanding environment for equipment with toxic, aggressive and flammable fluids being handled in processes at high pressures, high temperatures and with changing operating conditions.

Reliability, the environment, and safety put the refinery sector equipment construction codes and rules at a high level, which are often complemented by customer specifications and local regulation.

Howden design and supply equipment for almost all of the different refinery units across the world. Our packages meet the stringent criteria of API and are approved for use in hazardous areas, meeting all local and international regulations and guidelines.

Petrochemical

Important variations of operating conditions are met in petrochemical applications from different gas compositions to licensing constraints, making our ability to custom design for specific needs and site conditions enormously valuable.

Our packaged solution designs match customer specifications across every detail, and are developed to meet all local and international regulations and guidelines including those of NACE, ATEX, EC Marking, ASME, API, GOST, KHK, SQI and KGGS.

Chemical

Process gas handling in the chemical industry demands the highest levels of purity.

Our experience across a wide variety of gas mixtures, including extremely corrosive compositions, enables us to select the construction materials that will provide the most durable and safe long-term service for each individual application.

Tailored solutions

We are customer centric.

Our team of experts provide high value support for technology and equipment selection ensuring you benefit from fully engineered, pre-configured or integrated solutions tailored to your needs.

Taking into consideration varying project complexity, from operating conditions and code to the applicable specification, our turnkey service removes obstacles and delays from identifying the need for specific equipment to having the complete package fully operational and integrated into your processes and control mechanisms.

To optimise the design at the earliest stage, every project begins with a meticulous feasibility analysis, carried out by our team of highly qualified and experienced engineers and endorsed by reference lists citing similar applications and technologies.

Together with an in-depth understanding of your specific processes, the most cost-effective solutions are then developed.

We use computer-modelling techniques to simulate the operating conditions, taking into account the exact fluid composition, pressures and temperatures used in your processes. From this data, we define the package design and equipment specification best suited to your individual needs.

Full scale project management

Howden provides an extensive range of services including planning and scheduling of resources; engineering, design and drafting; procurement and subcontracting; manufacture and supply of equipment or rework of existing equipment; and site management of installation and commissioning. Every part of the package can be selected or adapted to deliver the specified performance and our experienced engineers ensure that every unit is safely and properly installed and commissioned, before confirming that it delivers the expected performance and fully meets its specification.

The skid-mounted unit includes all necessary pipework, motor and instrumentation, ready for rapid connection on-site.

Solutions for OEM and packagers

Howden supports and provides a selection of tools for bare shaft rotary compressors and cooling fan tools to our partners.

Typical bare shaft applications include: oil-injected screw compressor refrigeration and gas compression applications, roots for air blower applications, cooling fans for CT, ACC and ACHE, axial and centrifugal fans.

Configured solutions

Howden's configured package is a standardised equipment package solution, designed and built to the highest standards of precision engineering and quality control. By standardising the design, faster lead times can be achieved, without compromising the integrity or performance of the equipment.

Being the OEM of the configured package, Howden has complete responsibility for all package aspects, providing customers with total peace of mind that, should any issues arise, Howden will provide a solution.

References | Case studies

Our case studies highlight our customer-centric approach, from customers looking to improve efficiency, perform an environmental upgrade to comply with changing regulations or reduce maintenance costs. Howden engineers will work with you to design the optimum solution for your plant or process.

FPSO: Gas drying compact compression systems

Periflow® compressors ideally integrate gas-drying units to regenerate molecular sieve beds.

The challenge

Regeneration compressors operate in FPSO ships gas drying units. The fleet covers the offshore fields located more than 200km from coasts.

Each FPSO has a production capacity of 150,000 barrels and can compress up to 6 million cubic meters of natural gas per day. Gas collected from the fields is treated and dried before liquefaction, transportation or reinjection takes place. Operations are conducted in order to avoid corrosion and hydrates formation in process pipes and equipment.

Periflow® compressors are used in dehydration units for the regeneration of reactor molecular sieves and the compressors' variable speed delivers constant gas flow and pressure for a regeneration process preserving desiccant.

FPSO require reliable, compact equipment with a small footprint, simple integration, has low to no vibration, and can run for long periods without needing maintenance. Due to operating in different fields with different gas compositions and flows, the equipment used must be able to adjust to these fields and be compatible with the identified running conditions.

The solution

Periflow® compressors ideally integrate the gas-drying units to regenerate molecular sieve beds through adsorption. Howden solutions are designed for the optimal handling of various gas mixtures from different wells. FPSO treat various gas mixtures from one field to another.

The compressors are designed and tested for ease of installation and to ensure the ship structure is not affected with any pulsations or vibrations.

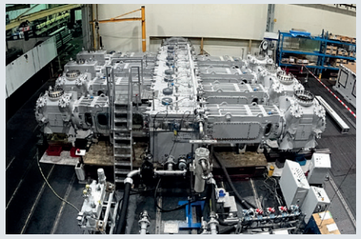
FPSO equipment is covered by both Marine DNV rules and oil and gas API and ATEX specifications and it is therefore crucial that every piece of equipment complies with all safety rules and specifications including those for equipment operated in hazardous areas. The compressors are located externally and are designed to ensure the material and protection can withstand marine environment constraints.

The outcome

Periflow® compressors have operated in FPSOs for several years and Howden has also delivered similar onshore gas drying solutions with reciprocating piston and Periflow® technologies.

KNPC Refinery: H_2 compression for clean fuels processes

The world's biggest reciprocating compressor.



The challenge

KNPC Clean Fuels Project plans the retirement of the processing facilities at Shuaiba Refinery, and a major upgrade and expansion of the MAA and MAB refineries. This will integrate KNPC's refining system into one refining complex with full conversion operation, the highest light ends product yield and nil fuel oil production.

High-pressure hydrogen supply for secondary units is critical and reliability is an absolute prerequisite for a project where system downtime can cost millions of dollars.

The compressors receive hydrogen from the world's largest hydrogen production facility as well as recovered hydrogen from the production units.

The solution

For the modernised refinery complex Howden Thomassen Compressors has been awarded by the engineering firm Fluor to build the largest API reciprocating compressors ever constructed for the oil, gas, refining and petrochemical industries. The final decision to proceed with six compressors, with eight cylinders, was based on striving to achieve the highest efficiency and greatest flexibility in regulating capacity.

For these compressors, specific attention was placed on the preliminary phase, investigating aspects such as torsional vibrations and pulsations. This enabled Howden, in collaboration with Fluor, to identify the critical issues early on and come up with concrete solutions, guaranteeing the reliability of the compression system.

This preliminary thoroughness and collaboration with Fluor meant we could make robust choices concerning the design in order to create a flexible but easily adjustable capacity for each of the different compressors.

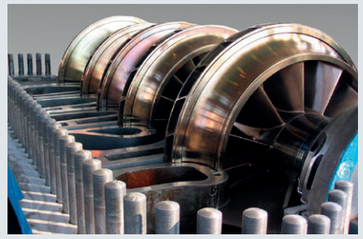
The outcome

The compressors are operating and ensure the continuous delivery of the necessary H_2 needs of KNPC refineries.

The first Thomassen C-85 reciprocating compressor with eight cylinders and a capacity of 16.6 MW was delivered within the challenging one-year deadline. The building of these compressors is a key milestone representing a new generation of compressors that not only comply, but exceed the current API 618 specifications and Shell DEPs.

Centrifugal compressor rerating in Petrochemical

Efficiency and sustainability resulted from Howden's services with power consumption cost reducing yearly by 7% at the customer site.



The challenge

Berre Petrochemical Cluster is one of the largest petrochemical complexes in the south of France, with 470 Kton of ethylene a year. After 35 years of operation, the customer was facing polymerisation in their charge gas centrifugal compressors. Deposits resulted in the narrowing of the 'gas path', which negatively affected both mass flow and efficiency.

Plant efficiency was gradually reducing between the 6-year turnaround schedules.

The solution

The customer contacted Howden to find a solution for the polymerisation on one hand and to maintain mass flow and efficiency during the MTBM on the other. Based on this request engineers from Howden performed an engineering study, resulting in the selection of an anti-fouling coating complemented by a rerate to reduce the power consumption of the centrifugal compressors.

The outcome

Despite having a tight schedule to provide the service, Howden was able to deliver the newly designed diaphragms and existing rotors after adding coating to the plant two months before turnaround.

After adding the anti-fouling coating and rerated compressor internals, a performance test showed an efficiency improvement and power consumption reduction of 7%. This reduction finally lead to a faster return-on-investment in comparison to 'just' an anti-fouling coating on the existing compressor internals.

References | Case studies

Our case studies highlight our customer-centric approach, from customers looking to improve efficiency, perform an environmental upgrade to comply with changing regulations or reduce maintenance costs. Howden engineers will work with you to design the optimum solution for your plant or process.

Refinery packaged heater replacement

Sarnia refinery and petrochemical complex - gas cracker air preheater replacement.

The challenge

As an integrated refining and petrochemical facility, Sarnia has a number of production critical heaters. One of these was a gas cracker which incorporated an air preheater for increased performance.

The air preheater was almost 30 years old and due to its poor condition required replacement. The operator was keen to minimise the impact on the rest of the plant and keep the downtime as short as possible, whilst taking advantage of any potential performance level improvements.

The solution

Howden was able to respond to these challenges using our state-of-the-art regenerative heaters and global technical network to ensure a smooth transition.

Applying our specially-designed simulation software the operating conditions in the refinery were modelled, enabling the ideal choice of heater element profiles for the thermal and pressure drop required. In the hot and intermediate layers we used HS20 elements, to give maximum efficiency in the gas-burning system, and we installed HC Elements™ in the cold layer for their exceptional cleanability.

The outcome

The heater was pre-assembled in our factory which meant that once on site, the installation work was a straightforward two-phase project.

Firstly, the baskets and rotor seals were installed in the air heater, then the complete unit was installed and coupled up to the existing foundations and ductwork.

Within a few months of Howden replacing the unit, the plant personnel evaluated the new air preheater very positively. They reported significant improvements in furnace operation and the performance of both the forced draft fan and the induced draft fan.

24/7 compressor monitoring and analysis

Delivering smart and predictive maintenance strategies at Gunvor Petroleum with Howden Uptime.

The challenge

The reciprocating compressors at Gunvor Petroleum play an important role in the refinery process, operating 24/7. However, Gunvor lacked insight in the maintenance and performance of these compressors.

They were looking for a solution that provided them with guidance and advice rather than more unactionable data. Driven by previous operational issues, Gunvor wanted to explore options that prevented unplanned downtime, through the performance management of the compressors, and optimised maintenance intervals.

Compressors operating 24/7 in critical processes required an advanced monitoring solution to track performance and trends and enable predictive and prescriptive maintenance and performance.

The solution

Howden has the technical information and know-how of reciprocating compressors that are operated in the field. Our engineers understand the parameters, which are essential to predicting optimum compressor performance, and how to optimise operation based on process conditions.

Gunvor Petroleum successfully installed Howden Uptime to gather, interpret and analyse their compressor data. Howden Uptime's sensors and communications module can be installed without any modifications to the existing plant infrastructure. No interfaces between the plant's DCS, or any other site systems, are needed – the only requirement is a power supply.

The outcome

Since installing Howden Uptime, Gunvor has experienced the benefits of this digital solution. There have been several occasions where the insight provided has prevented unplanned downtime of the equipment and they have been able to confidently and safely shift from a time based maintenance approach to condition based, reducing costs.

FPSO: Duty standby permeate gas compression system and duty flash gas compression system

FPSO operating in North Sea waters southeast of Aberdeen.

The challenge

The FPSO would be operating in North Sea waters which is a notoriously harsh environment, 170km southeast of Aberdeen. The FPSO would be 1 of 3 vessels operating in the development yielding a production capacity of 60,000 bopd and a storage capacity of 650,000 bbl. The gas compression capacity of 156 MMSCFD is made up of a mixture of Export, Flash, Permeate and Booster gas compositions with multiple case and flow requirements for each.

FPSO operation requires robust, extended maintenance intervals and reliable gas compression systems to ensure optimised operational performance. Due to the compact design of FPSO's, footprint maximisation is critical and therefore innovative design solutions need to be developed to reduce the impact on footprint while maintaining the high quality of operation, reliability and availability. The added challenge of DNV, API and ATEX specifications also has to be catered for to ensure quality, specification and safety requirements are met. Due to the harsh operating environment, consideration also had to be given to material types and as a result Duplex SS, 316SS and CS had to be incorporated into the designs.

Oil injected screw compressors can be used in Flash, Permeate and Booster gas applications, depending on the duty requirements and due to the multiple case and flow requirements the compressors provide a very reliable and compact solution with integrated turndown capability.

The solution

Howden has over 160 years of innovative design experience and in the 1930's were the first company to commercially develop screw compressor technology. Howden oil injected screw compressors were chosen as the technology to provide the solution for the Permeate Gas and Flash Gas compressor systems for the FPSO with a combined flow capacity requirement of approximately 10 MMSCFD and operating at multiple cases with differing flow requirements.

With an integrated capacity control feature the Howden oil injected screw is able to meet the flow capacity turndown requirements over multiple cases therefore negating the requirement of increased capital cost for VFD's. Also, Howden were able to meet the demands of the heavy hydrocarbon gas compound by ensuring the oil supply was designed specifically for the gas compound being compressed. The compressor system design provided the lowest possible oil carry over volume.

The outcome

Five oil-injected screw compressors were installed and have been operating efficiently since 2017. The Howden Uptime product optimised the operational efficiencies by providing and enabling prescriptive decision making and the Howden team ensured footprint and weight constraints were met through the innovative design and manufacturing.

References | Case studies

Our case studies highlight our customer-centric approach, from customers looking to improve efficiency, perform an environmental upgrade to comply with changing regulations or reduce maintenance costs. Howden engineers will work with you to design the optimum solution for your plant or process.

Petrochemical process gas: Circulation gas compressor in Caprolactam production unit

40 years old turbo compressor replacement.

The challenge

One of the world's leading producers of Caprolactam approached Howden for a replacement of a 40 years old turbo compressor in their production process.

The clients schedule foresaw the installation of the compressor in the operating plant, connection of the piping and switching over from the operating compressor to the new compressor during an overhaul. Building with the existing piping and the extremely limited space for lifting the compressor on the installation concrete were the main challenges for the design of the compressor.

The solution

Howden designed the compressor with minimised footprint and the additional possibility for dismantling several parts.

In close collaboration with the client, Howden considered all the challenges of transporting the compressor and installing it in limited space while still maintaining API requirements.

The outcome

Technical preparation with the customer, pre-contract support and contract management resulted in smooth replacement with minimal site downtime.

Two megawatt pump drive turbine, for ethane cracker plant in Baytown, Gulf of Mexico

Steam turbine mechanical drive.

The challenge

Operations have commenced for the new 1.5 million ton-per-year ethane cracker at the company's integrated Baytown chemical and refining complex.

The new cracker, using low-cost US natural gas, will provide ethylene feedstock to the nearby Mont Belvieu site. As one of the largest polyethylene plants in the world, costing several billion US dollars, there will be a manufacturing capacity of approximately 1.3 million tons per year.

The solution

The plants are being built by several companies and Howden was involved in providing equipment for the olefin recovery plants in Baytown. Howden was selected to deliver a MONO steam turbine with an output of around 2 megawatts to drive a boiler feed water pump. It was designed, constructed and tested to take into account the extremely high customer oil and gas specific requirements.

The outcome

Howden steam turbines are selected to drive critical process equipment in major oil and gas sites due to their robustness and reliability. Howden supply mechanical drives for many sorts of equipment when API 611 designs are mandatory specification, in the petrochemical, refinery and oil and gas applications.

Howden steam turbines are designed to efficiently generate power out of steam, and our products are considered the most economical and flexible turbines available.

High purity compression for Petrochemical processes

Pure and safe Hydrogen compression with diaphragm compressor technology.

The challenge

H_2 gas containment and purity preservation is critical for a number of chemical and petrochemical processes. Quality of the final product must be secure during manufacturing process, transportation and storage with no contamination from outside, whilst also ensure the prevention of any toxic or hazardous leaks to the site.

The solution

In many instances, the diaphragm compressor technology is used to boost and manage pure hydrogen to support a wide variety of processes and tests.

This is due to a largely proven, highly reliable technology and its capability to fully contain all gases during the compression process, for example, extensively supporting the production of Purified Terephthalic Acid (PTA).

Major production sites of PTA integrate the technology for the hydrogenation reactor feed with pure H_2 at high pressure around 10 to 20 Mpa. The full insulation of the compression chamber, ensured by static sealing, preserve hydrogen gas purity. Diaphragm compressors are packaged and configured to suit customers' requirements always starting with safety at the core.

The outcome

End users and engineering companies select Howden for equipping a large quantity of PTA sites around the world and the diaphragm compressors operate continuously in hazardous areas.

Howden also provide other PTA compressor applications such as nitrogen compressors, centrifugal compressors and packing seal compressor. Chemical and industrial gas companies widely use the diaphragm technology for transport and storage of their high quality product at high pressure.

Cooling fans in LNG plants and export terminal

The Golden Pass LNG plant is a $10 billion project set to make the existing terminal in Sabine Pass, Texas, a premier LNG exporter.

The challenge

The Golden Pass LNG plant operates 3 liquefaction trains to provide an annual output of 16 million metric tons of LNG. The liquefaction process requires substantial amounts of cooling and additionally the onsite power plant also necessitate cooling.

As a result, the site incorporates a large number of coolers and condensers.

Environmental interests around the site are very important with the operator particularly concerned that the noise levels are kept within stringent boundaries.

The solution

Howden was able to utilise our in-depth technical knowledge to propose multiple variants able to meet the design specification.

The successful OEM required noise tests to enable performance comparisons. Howden was able to leverage our global network to attend the test in Korea and provide support to the OEM, as well as explain the performance of the fan to EPC technical managers. This involved representatives from Howden's centre of excellence in the Netherlands and from our businesses in China, Korea and Japan.

The outcome

The end-result was a contract comprising more than 600 axial cooling fans once the project is complete. The fans selected are the SX model, which provide the ultra-low noise critical to minimising the impact of the LNG operation within the local environment.

Life time performance management

Howden aftermarket services consistently minimise costs and downtime whilst improving the performance of your operations.

Collaborating with Howden is key to continuous, efficient equipment performance with minimum downtime over its lifetime. We provide a multi-platform aftercare service built on three key requirements for maximising performance and longevity.

Our maintenance philosophy is a combination of genuine OEM spare parts, ongoing maintenance by experts, and periodic improvements and upgrades that will keep your equipment in the best condition.

Trust Howden to deliver on all three.

Genuine OEM spare parts

Spare parts are vital assets for maintaining productivity. The knowledge that spare parts will always be available is of paramount importance in making a decision to invest capital and time in new equipment.

Howden supplies genuine OEM spare parts that are made to the same high performance standards and specification as our products. This means that each part will fit perfectly and maintain the high quality standards your process equipment needs to operate reliably and efficiently.

To ensure that replacement parts are accurate in every respect, they are produced using the original production drawing and specifications, whilst incorporating the latest technological developments. They are also covered by full warranties.

Because Howden equipment is subject to continual improvement, however, we may recommend an upgraded replacement in order to improve reliability or efficiency.

Onsite and remote technical support

With Howden's presence near you, we ensure quick response in delivering support for needs like start-up installation and commissioning, on-site maintenance, troubleshooting, performance audit and training.

We can work alongside your own personnel, training your staff and building a partnership that lasts throughout the lifetime of the equipment. Alternatively, we can mobilise a team to support your needs from start to finish.

Performance upgrades and retrofit

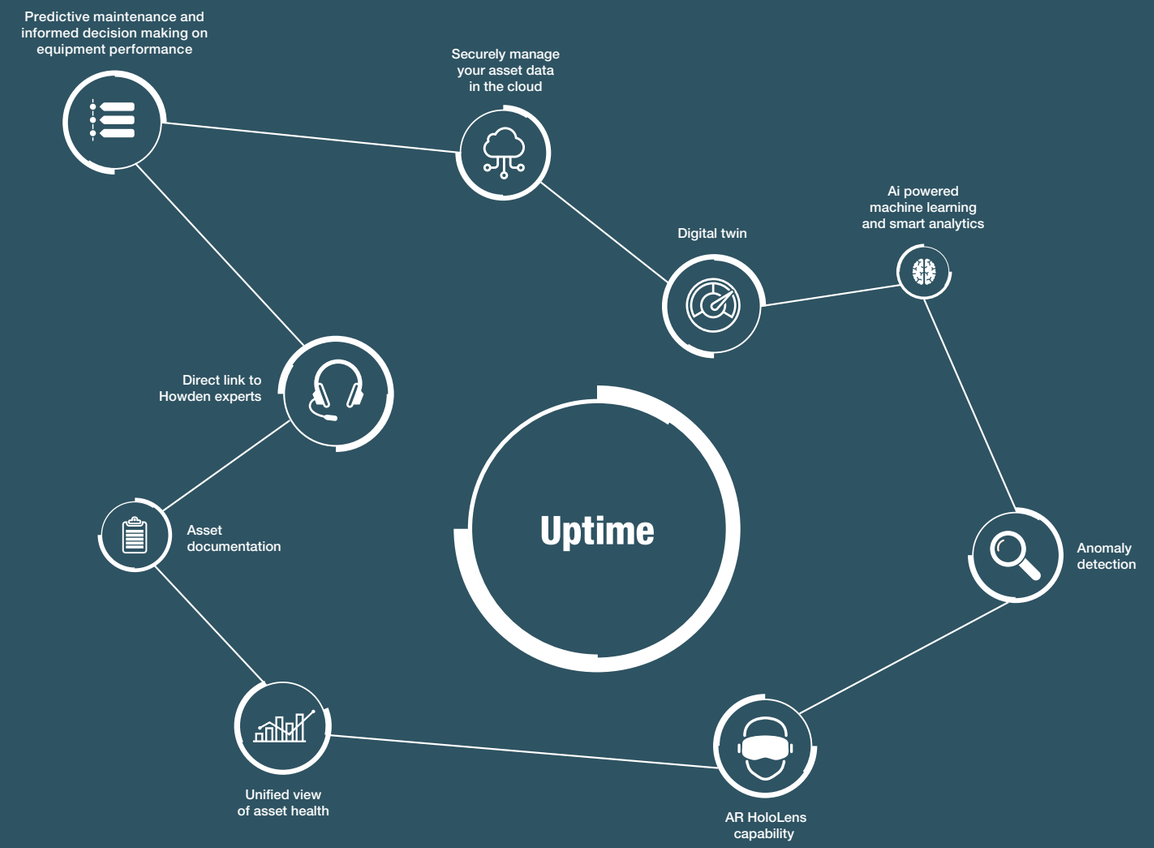
Our performance upgrade offerings help you keep pace with changing process needs like increasing capacity, reducing emissions, and improving energy consumption. Our wide range of upgrade and retrofit solutions ensure that your rotating equipment features the latest technology and continues to meet changing requirements while enhancing its useful life.

That is how we deliver the best possible results, every time.

Our success in constantly meeting, and usually exceeding, the expectations of our customers and is firmly founded on communication and flexibility. We talk through every job need thoroughly, in advance, to make sure we know exactly what is required.

Howden Uptime

Increasing the reliability and availability of process critical assets.



Howden Uptime is a unique digital solution that gathers the physical sensor data from any kind of rotating equipment, and analyses how it operates and responds to the environment.

This solution is designed to provide invaluable insight into asset performance that can increase the availability of the equipment, while significantly reducing costs.

Extend maintenance intervals

The continuous operation of rotating equipment is essential for the overall plant performance. The Howden Uptime solution enables smart and predictive maintenance scheduling to allow you to safely extend maintenance intervals with peace of mind that the equipment will continue to operate efficiently.

Avoid unplanned downtime

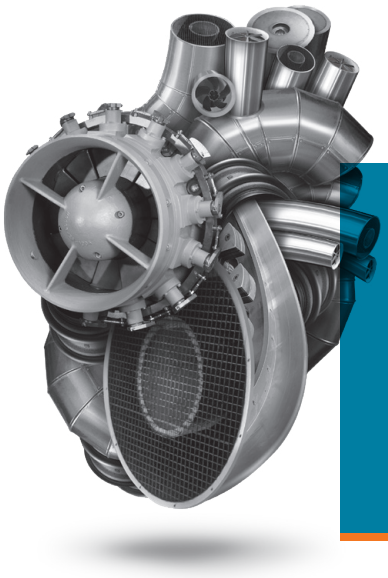
We understand that downtime of your critical assets can be costly and disruptive. That is why we have developed a data driven solution that will alert you of any unusual activity and provide prescriptive advice on what action is required before a breakdown occurs.

Expert advice close at hand

Howden Uptime provides a real-time view of the critical data for your equipment, through intuitive and customisable dashboards. Our data driven solution enhances our aftermarket services by bringing you closer to the Howden experts and providing you with instant access to your equipment documentation and service history.

Secure data solutions

The Howden Uptime solution has highly robust and verified security in place to safely manage the transmission of data at every stage in the data journey.



At the heart of your operations

Howden people live to improve our products and services and for over 165 years our world has revolved around our customers. This dedication means our air and gas handling equipment adds maximum value to your operations. We have innovation in our hearts and every day we focus on providing you with the best solutions for your vital operations.

Howden

Email: www.howden.cloud/PCOGcontact
Web: www.howden.cloud/PCOGpage

Revolving Around You™