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Howden

The wastewater industry relies purely on performance

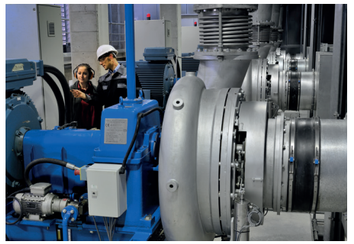
Aeration technology and control systems for wastewater plants

Revolving Around You™

In an industry where performance and reliability are essential, Howden's expertise and high efficiency compressors, blowers, and control systems are the clear choice.

Howden, founded in 1854, is a world leading supplier of compressors, fans and rotary regenerative heat exchangers for a large range of industrial applications. Whether pre-engineered or custom built for a specific application, our products are known throughout the world for their high levels of performance, reliability and innovation.

Revolving Around You™



Howden products are designed to deliver cost effective aeration solutions, optimizing plant operations and lowering the cycle costs.

Expertise built on experience

The modern wastewater treatment industry requires the movement of large volumes of air at low pressure and Howden compressors provide a reliable source of air for its key process. The compressors can account for over 50% of the power used in a treatment plant. Howden has been involved in wastewater treatment for many decades and has developed blower technology in line with the industry's growing demands and the very specific needs of water treatment plants.

Howden has been supplying blowers to wastewater treatment plants for over fifty years. By combining our high efficiency blowers and compressors with our sophisticated downstream control systems (BARS) developed especially for the water treatment market, we can offer the most advanced and efficient aeration systems available.

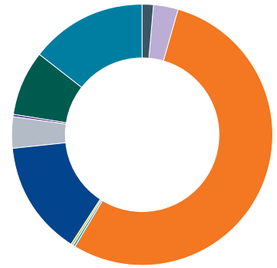
Our highly efficient compressor design, fitted with variable inlet guide vanes and variable vane diffuser system offers a unique high performance across the entire duty range.

We have an unrivalled SG compressor range covering ten frame sizes, with volumes from 4,000 to 140,000 m^3/h, with the option to install a unified control system that can optimize part-load operation.

Howden blowers and compressors provide air for key wastewater management processes.

Stand alone and bundled aeration systems.

To provide real-time monitoring of your process to keep your plant at peak performance.



Electricity requirements for activated sludge wastewater derived from the water environment energy conversation task force energy for conservation in wastewater treatment.

- **54.1%** Aeration control systems
- **3.2%** Clarification
- **1.4%** Grit
- **14.3%** Wastewater pumping
- **8.1%** Lighting and buildings
- **0.3%** Chlorination
- **3.9%** Belt press
- **14.2%** Anaerobic digestion
- **0.1%** Gravity thickening
- **0.5%** Return sludge pumping

Chart Source: "Water and Wastewater Energy Best Practice Guidebook", December 2006, provided by Focus on Energy, prepared by Science Applications Interface Corporation

The aeration power behind the treatment process

Howden is an invaluable source of application expertise as well as a supplier of complete, integrated air supply systems.

Minimizing energy consumption

The need to minimize energy consumption, whether for cost or environmental reasons, has become a factor of enormous significance, and the aeration system is responsible for by far the largest proportion of the energy consumption in any aerobic wastewater treatment plant. Howden turbo blowers can provide the lowest footprint and highest flow. The exceptional performance is based on a third generation high performance impeller that enables the blower to operate 8–10% below the surge line during normal running, giving an extremely high margin when compared to other blower products available today. The whole system is governed by a modern control system incorporating an easy-touse human-machine interface. Over the lifetime cost of the equipment, Howden offers the highest cost savings through a combination of energy efficiency and the reliability offered by our ‘built to last’ philosophy.

Predicting real performance

The understanding that no two plants will ever operate in exactly the same conditions, and our certainty that we can deliver efficiencies and energy savings, led us to the development our unique modelling software.

This compares different types of air supply technology within the precise parameters of the customer’s own plant. Alongside the volume and pressure of air required, there are many other factors which affect operation. We factor in the time the plant runs at full, high average, low average and minimum capacity, and add ambient conditions like relative humidity and temperature, and variables like energy availability and cost, using figures supplied by the customer.

Allowance can be made for energy price rises and maintenance over a 20-year operating period. The software is designed to precisely mirror genuine working duties and ambient conditions, and will analyse retrofits and upgrades as well as new installations. It gives an invaluable insight into savings over the equipment’s planned life.

Proven efficiency

Howden high efficiency blower and compressor systems have been thoroughly researched and tested to provide flexibility and control even when plant conditions require greatly reduced capacity. Our figures relate directly to the working efficiency of our aeration systems once installed and running. They will be reflected in genuine energy savings.

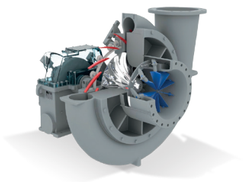
All solutions, whether using rotary lobe blower (positive displacement), multi stage centrifugal blower or turbo blower technology, are designed to work at peak efficiency when they are running at full capacity.

When the capacity drops to normal operating levels, however, the efficiency may fall away dramatically. Of the three technologies single stage centrifigul are the most efficient, approaching 87% efficiency at full capacity.

Howden compressors, with their inlet guide vanes, variable vaned diffusers and enhanced impeller design, have a clearly measurable advantage in maintaining excellent performance in the full operating range of 45-100% capacity. Howden compressors excel where plant conditions dictate that blowers operate away from the design point, giving significant operational benefits.

SG blowers

Integral gear compressor



IGC blowers

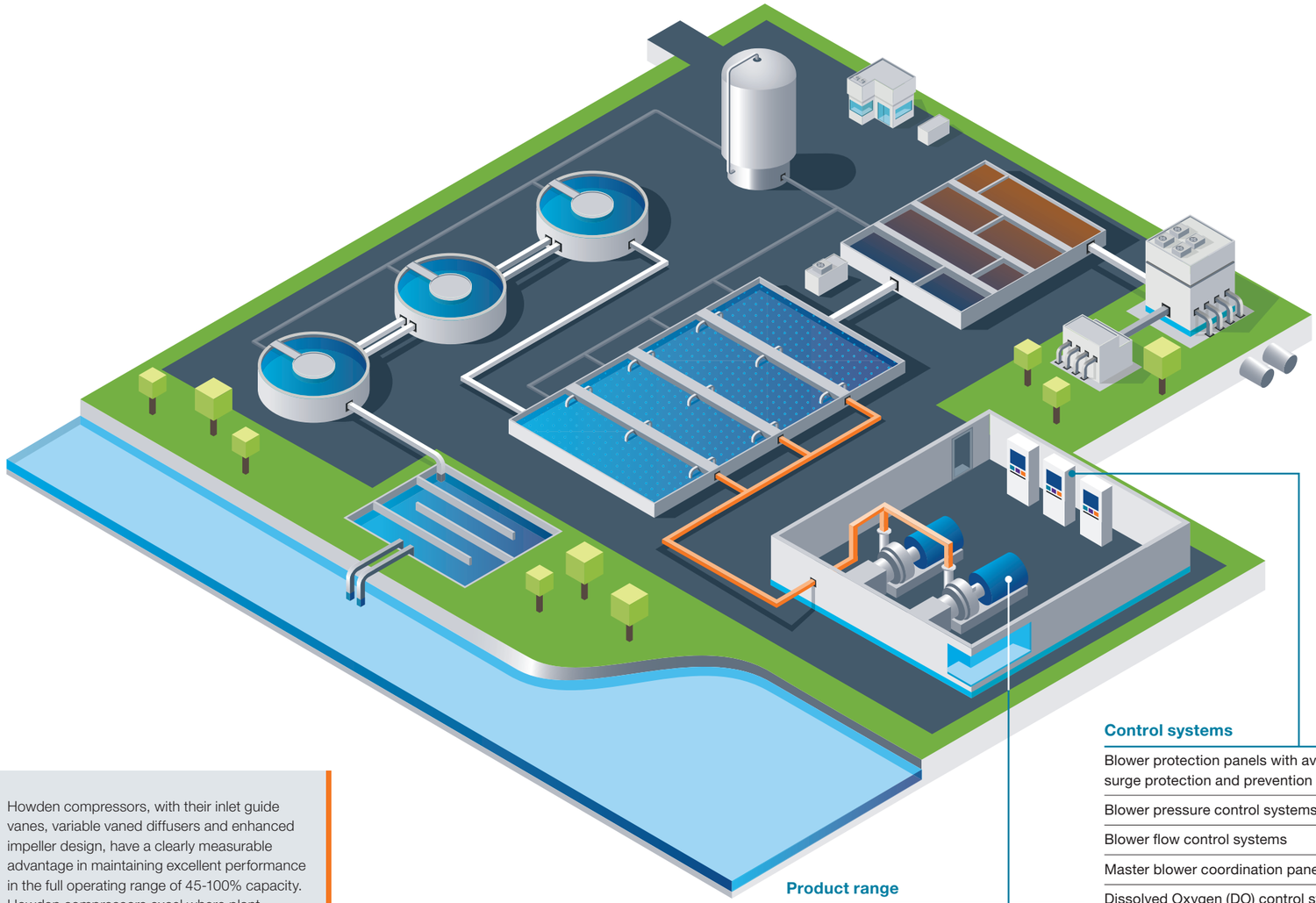
Roots® integral gear compressor

OIB blowers

Roots® overhung inboard bearing compressor

Rotary blowers

Roots® positive displacement blower



Product range

- SG compressors
- IGC compressors
- OIB compressors
- PD rotary blowers

Control systems

- Blower protection panels with available surge protection and prevention
- Blower pressure control systems
- Blower flow control systems
- Master blower coordination panels
- Dissolved Oxygen (DO) control systems
- Ammonia and nitrate control loops
- Most Open Valve (MOV) control systems
- Proportional basin flow control systems to maximize blower operating ranges.

Exceptional technology with exceptional performance and control

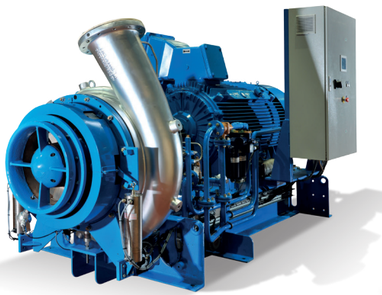
Over the life of the plant, Howden blowers and compressors are by far the most cost effective technology available. Their capital cost will quickly be offset by lower energy expenditure, typically as early as the first 12 to 36 months of operation, leaving decades for the savings to grow.

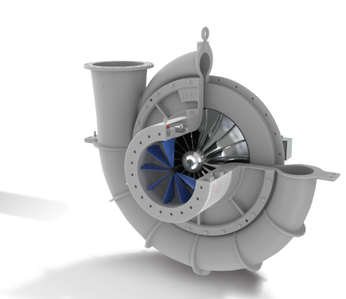
Responsive integrated technology

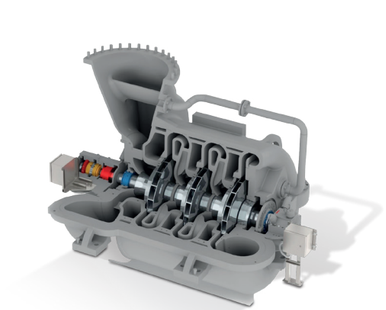
Howden compressors technology has an installed base numbering over one thousand two hundred units worldwide. These machines typically run for decades without any intervention except minimal planned maintenance. Their robust success is a testimony to the quality of their engineering, and their track record is a provable fact.

Howden offers a choice of 15 frame sizes with a capacity flow of up to 80,000 CFM (130,000 m^3/hr), covering the most extensive duty range on the market. With the widest volume and pressure range available, Howden can supply a product to meet any demand our clients have – and with achievable efficiency levels exceeding 87%, Howden is the natural choice for water treatment plants.

Our compressors are designed to provide plant operators with efficiency across the actual operating range. Exceptional turndown capability is built in as standard to ensure that when plants are operating at low load, the efficiency of the aeration system is unaffected. Howden products will maintain effectiveness through the full flow range, including the key 60-80% window and dropping to as low as 40% capacity when required.







Our products

SG turbo blower range

Howden's SG blowers are available in a choice of 15 frame sizes with a capacity flow of up to 130,000 m^3/hr (80,000 CFM), covering the most extensive duty range on the market. With the widest volume and pressure range available, Howden can supply a product to meet any demand our clients have – and with achievable efficiency levels exceeding 87%.

SG blowers maintain effectiveness through the full flow range, including the key 60-80% window and dropping to as low as 40% capacity when required.

Single stage centrifugal compressors

Howden's OIB single-stage centrifugal compressors feature an overhung impeller design, suitable for a wide range of options. In addition, OIB compressors are suitable for a variety of constant speed or variable speed drivers including electric motors and steam turbines.

Multi-stage centrifugal compressors

Howden's horizontally split multi-stage compressors provide efficient and reliable operations while offering easy access for maintenance. A choice of impeller materials along with a variety of sealing arrangements allows these designs to apply to air or process gas applications. The multi-stage design offers low tip speeds extending blower life and offering low total cost of ownership.

Roots® PD blowers

Howden Roots is the longest continuously-run manufacturer of rotary positive displacement blowers. It is widely known that Roots® blowers are the first of its kind invented in 1854 by the Roots brothers. Howden offer rotary bi-lobe or tri-lobe blower designs that are reliable, sturdy and heavy duty, including noise and pulsation reduction (WHISPAIR) and integral discharge jet plenum for dry operation in high vacuum levels.

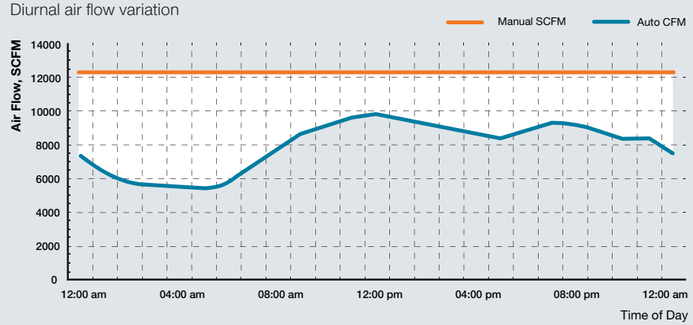
Effective control systems

Howden aeration controls are an energy efficient way to optimize the performance of your aeration process through automated direct flow control, Most-Open-Valve (MOV) technology and our proprietary control algorithms as compared to pressure control systems. Direct flow control with MOV logic will minimize the required system pressure thus, lowering the pressure and power demanded of the aeration compressor as compared to a constant pressure system.

Howden aeration controls provide an effective means for determining precise aeration requirements demanded by your wastewater treatment system, reducung air and power demands of the aeration blowers.

Manual vs. automatic flow control

Diurnal air flow variation

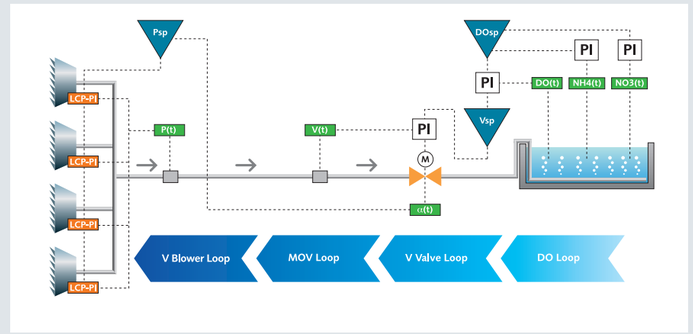


Manual flow control is set to provide adequate aeration at expected peak load. Since the plant rarely sees the projected peak load, power can be wasted by excess aeration a majority of the time as illustrated by this graph.

BioActive Response System (BARS)

Howden's BioActive Response System combines the energy efficient AIM system with a downstream air distribution system in which four control loops interact in real time to produce the minimum air flow required to efficiently treat the water in the aeration tanks. By constantly maintaining the lowest possible main header air pressure (MOV control), BARS prevents unnecessary energy consumption and reduces running costs.

The first control loop sets the dissolved oxygen level set-point based on readings of the ammonium and nitrate levels in the water. The second loop uses the dissolved oxygen level deviation from the DOL set-point as basis for setting the air flow set-point of the air control valves. The third loop sets the main header pressure (or airflow setpoint) based on readings of the most open control valve position and finally the fourth loop controls the air flow discharged from the on-line blowers.



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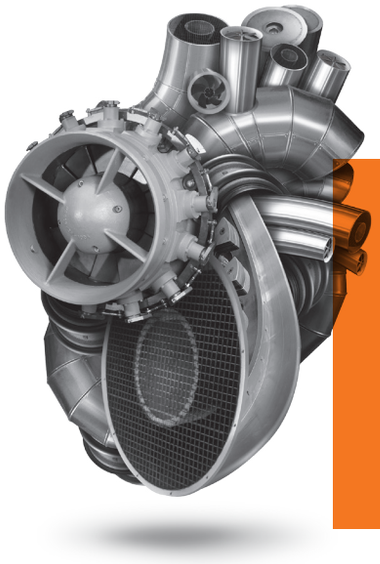

At the heart of your operations

Howden people live to improve our products and services and for over 160 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

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