Howden
A Chart Industries Company

# Cooling system enhancement

## Efficiency improvements and noise reduction for process optimisation

Revolving Around You™

howden.com

# Howden products and expertise underpin industrial processes and power generation in virtually every part of the world, and the driving force behind Howden's success is Howden technology.

**Not only is this expertise continually being applied to new products, it is also being used to extend the active life of installed equipment in all kinds of situations, in countries throughout the globe.**

**Howden engineering can give existing plant new life and new reliability,and offers you the following advantages.**

- Fan performance data is verified on the world's most extensive cooling fan test facility
- Howden fan selection software accurately predicts performance improvements and noise reduction
- Howden offers a single source for design, supply, installation and guarantee
- Howden, a Chart Industries Company, is a uniquely global company with a worldwide service network at your disposal



**Because cooling system requirements change throughout the years, an older system may no longer match today's requirements in terms of capacity and/or noise. Where the production capacity has increased, or needs to be increased, the cooling system may form a bottleneck. Cooling system enhancement can add capacity to the existing equipment, and possibly reduce noise too. Alternatively, existing cooling capacity can be maintained at significantly lower noise levels.**

## Efficiency improvements

A cooling fan exchange is an effective method of increasing the capacity of your existing cooling system, and the return on investment can easily be evaluated.

**A fan exchange offers the following advantages over a system extension:**

- Capacity can be easily and quickly increased
- No extra space is required
- There is no need to shut down the complete cooling system, because of cell-by-cell replacement, continuous operation can be maintained
- It requires limited investment
- Staged implementation is possible, to test the results in practice before proceeding with a full-scale investment with a clear return

## Noise reduction

Noise reductions are sometimes needed to meet the requirements of local authorities. It may also be desirable to reduce noise creation in one place to make investments elsewhere on the factory site possible, especially for companies that are already operating at the maximum noise levels according their environmental permit.

To keep noise at an acceptable level, the use of low noise fans is generally a better solution than expensive sound attenuation equipment that enlarges the static pressure of your cooling system and increases its power consumption:

**Low noise fans:**

- Noise reductions of up to 20dB(A) can be achieved without any reduction in the cooling performance
- On some occasions, noise reduction can be combined with an increase in performance
- Noise is reduced at source through the use of super-low noise or ultra-low noise cooling fans

## Howden's services

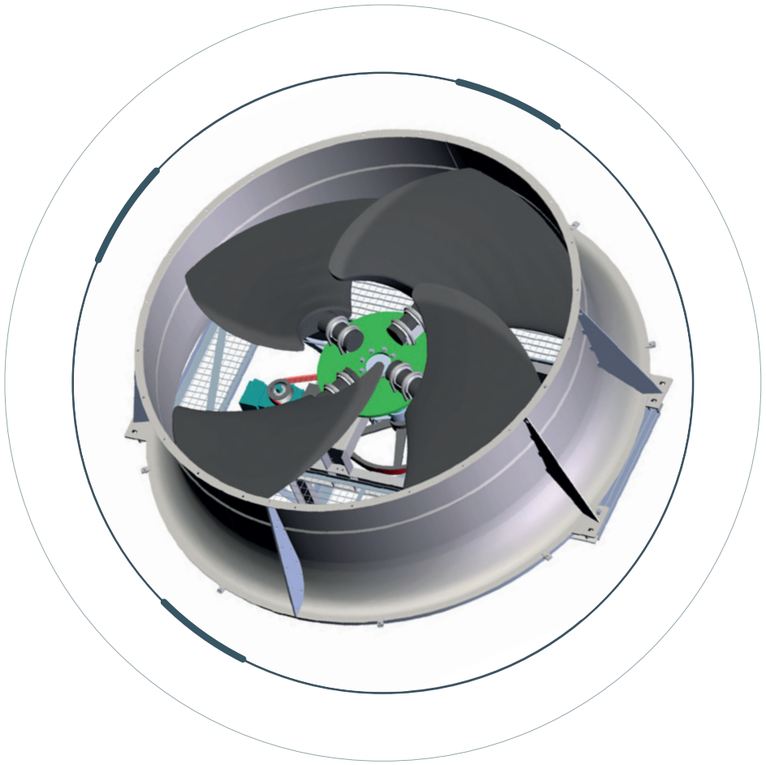
Initially, Howden can offer you a free consultation to assess the potential increase in performance and reduction in noise that could be achieved with a fan exchange. When the outcome looks positive, we recommend that more detailed research be carried out. Howden will undertake the complete package from first assessment, through thorough performance measurements, to erection and installation in the field and commissioning by experienced supervisors.

**Our service includes:**

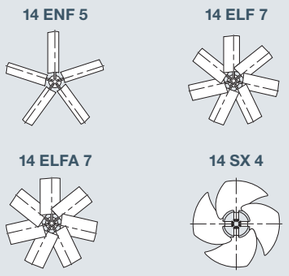
- An initial assessment of the possibilities
- Thorough performance analysis to confirm the initial findings
- A detailed report on the proposed equipment selection and projected fan performance enhancement
- Site measurements followed by a detailed engineering phase
- Project management to ensure that delivery is to specification and on time
- Installation and commissioning by experienced Howden supervisors
- Performance measurements to confirm the result

## Key features

- Fans are fitted with extra wide aerofoil blades (ELFA/DVF) to meet the strict parameters for super low-noise applications
- Fans have specially shaped aerofoil blades (SX) to meet the strict demands for ultra low-noise applications or bring a significant performance increase at normal noise levels
- The blades are made of Fibreglass Reinforced Polyester which offers easy assembly, superior damping and chemical resistance, and requires little maintenance
- Fans have a standard operating temperature range of -20°C up to +65°C
- The cooling fans are available in a standard diameter range from 711mm to 21,000mm (28” up to 68ft)
- Hub plates can be polyurethane or epoxy coated, with aluminium blade supports and stainless steel U-bolts, nuts and washers
- The cast iron coupling flange can be either polyurethane or epoxy coated



**Fan profiles**




**Noise reduction and capacity release**

| 14ft. fan types | Sound power levels based on 70m /sec and 110 Pa | | | Sound power levels based on 50% more air volume | | |
|---|---|---|---|---|---|---|
| | RPM | PWL | Reduction | RPM | PWL | Reduction |
| 14 ENF 5 | 198 | 96 dB(A) | – | 198 | 102 dB(A) | – |
| 14 ELF 7 | 152 | 90 dB(A) | 6 dB(A) | 199 | 96 dB(A) | – |
| 14 ELFA 7 | 134 | 87 dB(A) | 9 dB(A) | 185 | 93 dB(A) | 3 dB(A) |
| 14 SX 4 | 134 | 81 dB(A) | 15 dB(A) | 179 | 86 dB(A) | 10 dB(A) |



# Reference projects

**Howden has carried out several enhancement projects in co-operation with Shell Global Solutions. These have involved Shell’s own subsidiary industries as well as third parties, and cover the process and energy recovery industries. Projects have been undertaken in Shell refineries in several countries including The Netherlands, Germany, France, Sweden and South Africa.**

### Shell, The Netherlands
Efficiency improvements for Dutch refinery.

One of the largest Dutch refineries was experiencing a bottleneck in the process due to lack of cooling capacity. As a result production had to be decreased, with consequent financial losses. Any remedial action had to offer noise levels equal to or less than the current operating situation. Super low noise ELFA fans and ultra low noise SX fans have now been installed, resulting in a 280% airflow increase from 16.75m3/sec to 47.6m3/sec combined with a sound level decrease of 2dB(A). Since the enhancement, production no longer has to be decreased on days with high ambient temperatures.

### Shell, Germany
Noise reduction for German refinery.

Seventy of the cooling fans for the air coolers at this Shell refinery were replaced by ultra low noise SX fans, resulting in a noise reduction of up to 15dB(A).

**Additional project examples:**

### OMV, Austria.
Noise reduction for Austrian refinery.

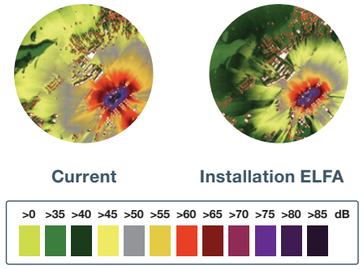
Being located in the densely populated city of Vienna, OMV’s refinery was required to either meet the new environmental noise legislation or relocate. Howden retrofitted the standard cooling fans with ultra low noise SX fans and reduced the noise production by 15dB(A) which brought it down to an acceptable sound level, at the nearest housing areas, of 39.2dB(A).

### E.ON, UK.
Efficiency and environmental improvements for British power plant.

The plant has hybrid cooling towers which were fitted with noise attenuation equipment because of environmental constraints. However, the noise dampers at the air outlet severely restricted the cooling performance. The attenuation equipment has now been taken out and the standard low noise fans replaced by ultra low noise SX fans, to stay within the limits set by the environmental agency. As a result, the generator efficiency increased significantly and the CO2 emission has been reduced by 7,500 tonnes per year. Furthermore, the incidence of low level plume fell from ±142 days to ± 6 days a year.

### Petroplus, Switzerland.
Noise reduction for Swiss refinery.

The cooling fans for the air coolers were replaced by super low noise ELFA fans, which resulted in a noise reduction of up to 20dB(A) and brought the sound levels at the nearby dwellings to an acceptable level.




### BP, Germany.
Noise reduction for German refinery.

To meet the government noise regulations, the refinery in Lingen hired a consultant to advise them about the most effective route to reducing the sound levels. As a result, a whole range of machinery is being replaced by the ‘quietest in class’ alternatives. Part of the process involved fitting their air coolers with SX fans which enabled them to reduce the noise dramatically and at the same time increase the airflow by 10%.

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