

White paper

Howden Tunnel Ventilation Solutions

Supporting operational excellence



Revolving Around You™

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Supporting operational excellence

The number of operational tunnels around the world continues to grow as infrastructure projects seek the most efficient routes through challenging geographies and congested metropolises alike.

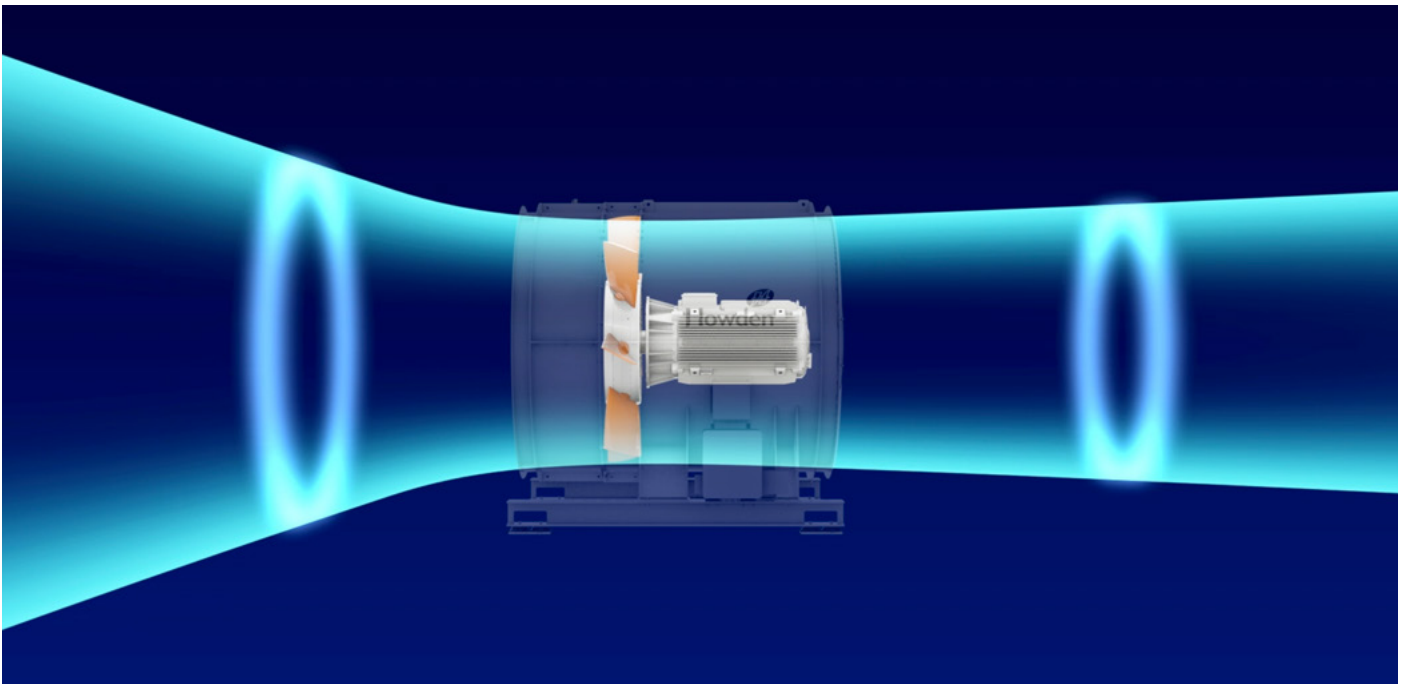
Once open with road vehicles, trains and metros running their lengths daily, the work of keeping these transport arteries running safely and efficiently begins.



Keeping the flow going

The ventilation system is the lifeblood of the daily operation of the tunnel, without it there can be no safe use of the space. In addition to this, any emergency requires the system to be able to react immediately to support safety and evacuation procedures. Reliability is therefore a key driver for any system, whether it is comprised of in-tunnel jet fans or a more complex system of ventilation stations, ducting and louvres.

The starting point for a reliable lifetime of service is selecting quality equipment designed for long-term continuous duty. Howden has been designing, manufacturing and installing tunnel ventilation fans for almost a century. Engineering excellence has been established as a key mantra and follows through R&D, design and manufacturing processes to deliver long reliable operational life. The typical life span of Howden tunnel ventilation fans is 20 years. That said there are many examples of fans running beyond this timeframe.



Staying in control

Tunnel conditions can change meaning that having the flexibility to respond is a real advantage for operators. This is delivered within the design of the fan package either through the positioning of the blades or type of drive. Flow control enablement by blade adjustment can be achieved for axial fans either at standstill or during operation depending on model selected. Using a Variable Speed Drive (VSD) also gives the ability to dynamically adjust flow and this applies to axial fans and jet fans.



A fix in time

As with all forms of mechanical equipment, for best results follow the service manual! Howden has expert engineers who specialise in operational and maintenance services supporting our ventilation equipment as well as fans supplied by other manufacturers to ensure reliable long-term performance.



As Howden fans are highly durable, there is minimal need for significant maintenance. However, one of the main elements to monitor is levels of corrosion. A good maintenance schedule can identify and deal with this and any other issues to ensure service length is maximised or even extended.

Aside from the fan, it is more likely that the electrical installation will need attention. The control package has an expected lifespan of 10-15 years so will therefore need to be addressed within the overall system lifespan for maximum service.

Services offered by Howden include standard inspections and repairs through to full refurbishments and performance upgrades.

Inspections are recommended for twice a year for axial fans and once a year for jet fans. This can be done by the operators own engineers or Howden personnel.

Repairs are only carried out as required. Again, Howden fans are extremely reliable with Mean Time Between Failure (MTBF) exceeding customer requirements. A common requirement is MTBF of 900,000 hours, but Howden statistics have shown fans reaching 2.6 million hours. Exceptional operational conditions can affect this.

When axial fans reach the end of their economic life they can still continue is service through refurbishment or if necessary also an upgrade. For jet fans, a full refurbishment is likely less economical than replacement with new fans.

Refurbishments can vary from standard procedures to address signs of corrosion, cleaning and repainting right up to impeller work, although this depends on blade condition. Rewinding of motors is also sometimes requested, again based on condition.

Retrofits and performance enhancements can involve deflectors to jet fans to increase effective thrust. Increasing thrust to existing jet fans gives operators a way to handle the demands of greater traffic flows while removing the need for more intensive replacement projects. Other fan improvements include the addition of guide vane casings to assist reverse operation.

Intelligent asset management

Digitalisation is improving the way many industries control and optimize their assets. This is also true in transportation tunnels and Howden is a leader in the field.

Fans are fitted with multiple sensors allowing the Howden Uptime platform to seamlessly integrate related performance data. The system combines active inputs, such as temperature, pressure and vibration, with reference parameters from manuals, specifications and maintenance reports.

This capability provides real value to operators as fan performance is viewed against a digital-twin and when the data is analysed, it provides a unique foundation for maintaining and enhancing operational excellence.

Issues can be identified and acted upon before they become an operational risk. Efficiencies can be optimised by making adjustments based on real-time data.

Necessary service interventions can also be made quicker and safer. Transport workers are able to remotely monitor the vibration and temperature of the fans in the tunnel, whilst maintaining the flow of traffic. This reduces the need for tunnel or lane closures as well as risk to workers.



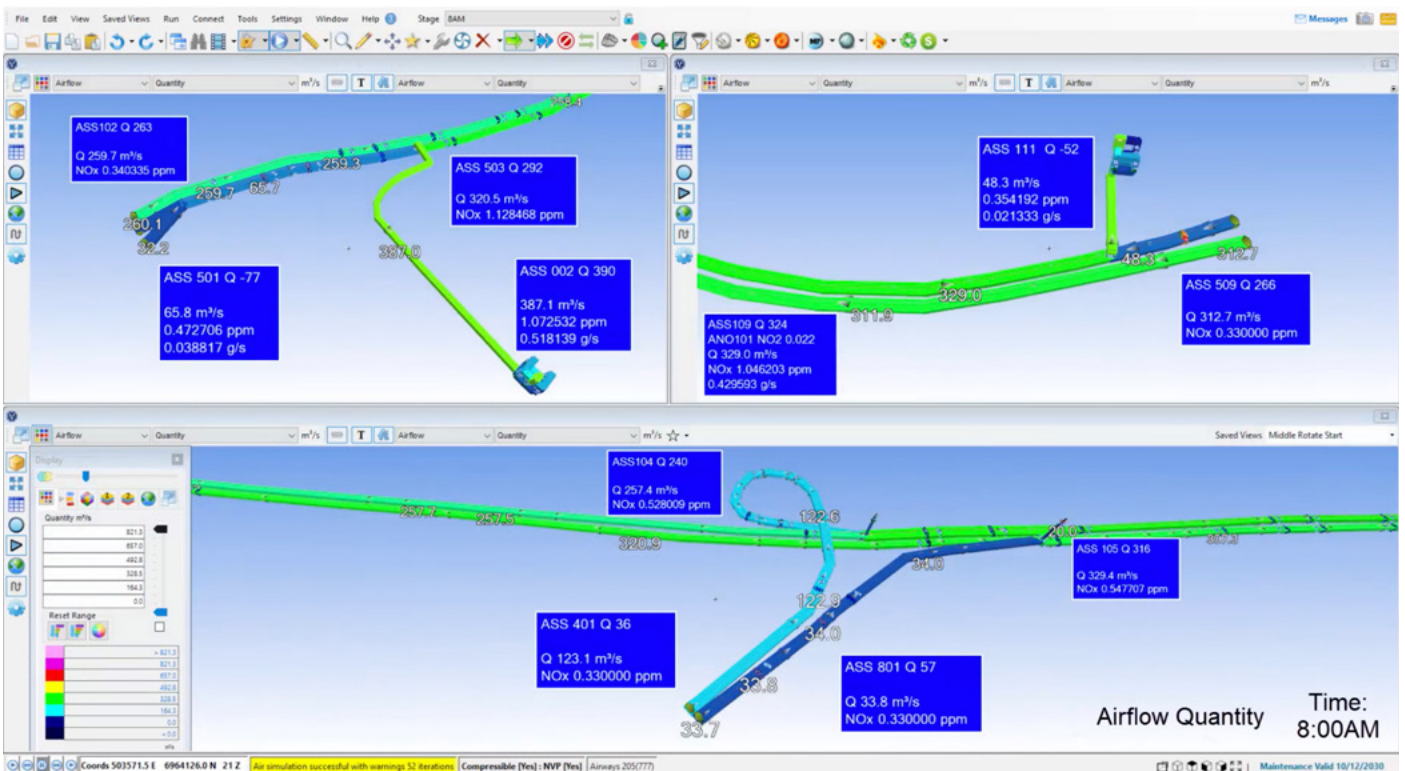
Insight for optimised operation

There is an ever-increasing need to maintain tunnel operations at the most optimal level. This is to maximise efficiency as well as stay up to date with evolving vehicle types, traffic volumes, and conditions. Ventsim™ Tunnel DESIGN is a software tool that can be used to record an accurate view of existing tunnel ventilation systems and allow operators to both benchmark performance and consider future scenarios.

The first step is building a model of the tunnel using Ventsim. This is achieved using maps or scanned information for more precise airway sizing. As Ventsim is used as a ventilation system design tool, the existing ventilation system can be modelled with all equipment fully represented including actual fan performance data to give the operator an accurate view.

From this point on the model is able to give insight into every scenario that the operator wants to assess. At a base level this could simply be informing the operator of how the system performs against expectations using actual data from traffic and emissions.

Beyond this, the operator can look at the impact of increased traffic or variations of vehicular profiles based on future predictions. The ultimate aim is to operate the ventilation system at the optimal level to maintain safety, while also being at its most efficient, which results in energy savings. Consistent monitoring of conditions and referencing to the model can keep the system performance at its highest level.



About Howden

Howden has a global reach, able to respond in region to the operational needs of tunnel ventilation systems.

Howden's design expertise has been proven from thousands of tunnel fan installations over almost a century of tunnel industry involvement. Continuous development from a focused Research and Development centre brings the latest fan enhancements, while regional manufacturing and assembly provide the basis for swift and economic supply.

Ongoing service is flexible to the needs of customers, ranging from standard fan maintenance to full system service including silencers, dampers, ducting and more.

From initial enquiries to technical consultations, Howden supports tunnel operator engineers as they strive for optimised operations. Let Howden deliver you industry-leading performance you can rely on.

For more information visit www.howden.com





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