KRUGER

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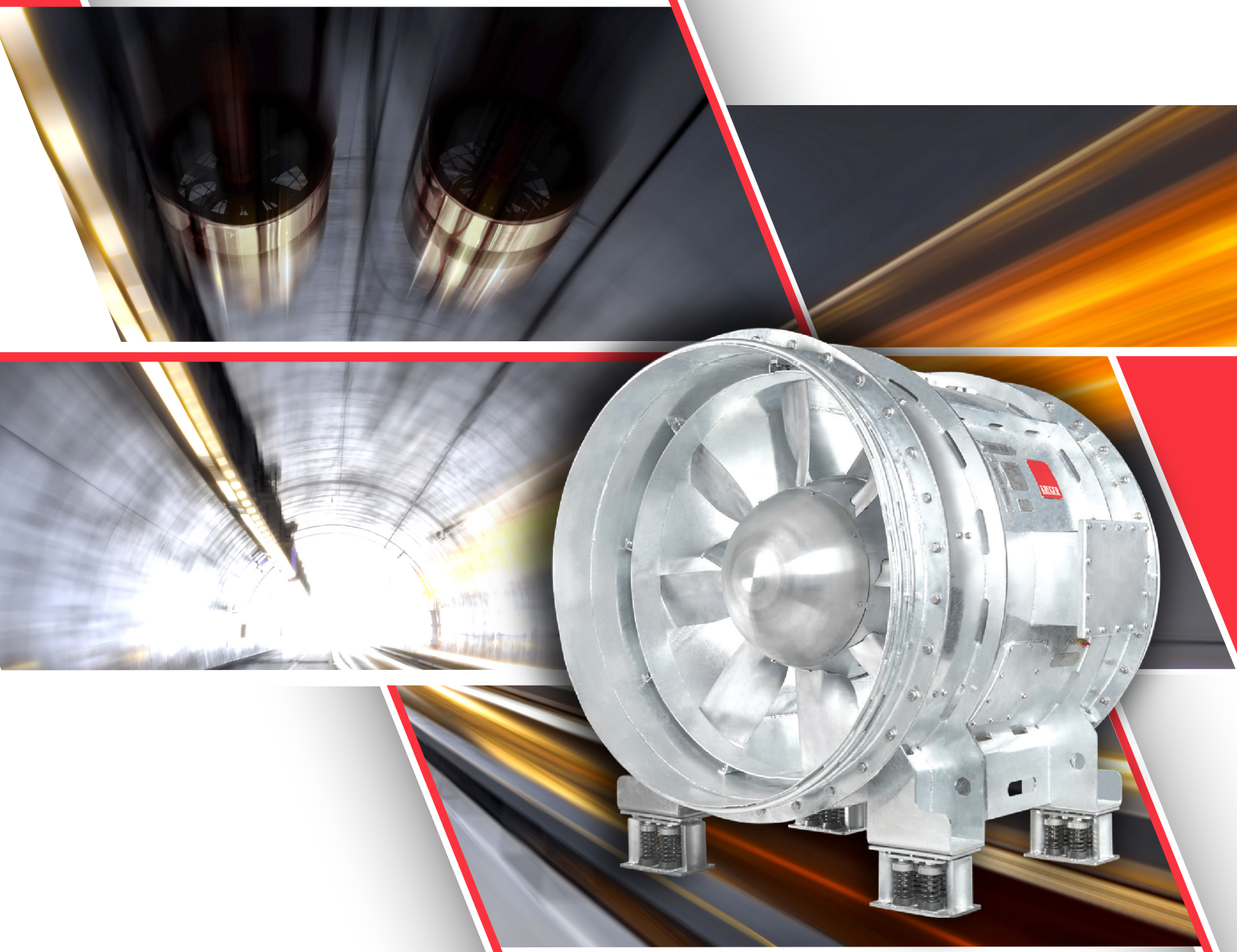
Tunnel Ventilation



www.krugerfan.com

Kruger Group

Established in Singapore since 1985, Kruger Ventilation Group is a full subsidiary company of Soler & Palau Ventilation Group, headquarter in Spain. Kruger is a leading supplier of energy efficient ventilation solutions for Residential and Commercial buildings, Industrial and Tunnel application. Currently, Kruger established 18 business units in Asia Pacific Region.

With our wealth of knowledge and know-how, Kruger believes in creating value for customers simply by understanding their needs and delivering expectations. We will be constantly seeking ways to continue providing our customers with good quality service and products. We recognize our customers' importance and their requirements as one of our key strategy to achieve better customer service. To propel this ambition further, Kruger Research team has been launched to engineer advanced fan systems to expand its range of ventilation systems to provide a wider selection. Our team of engineers is determined to research and develop the most effective solution to meet our customers' ventilation needs.



1985



Joined partnership with Krüger Holding AG Switzerland.

1998

Established the Kruger Ventilation company in Singapore.



2004



Established subsidiaries and manufacturing plants in 13 locations across Asia Pacific Region.

2005

Launch of Kruger Research Group with the first AMCA Certified Laboratory in Asia.

2009



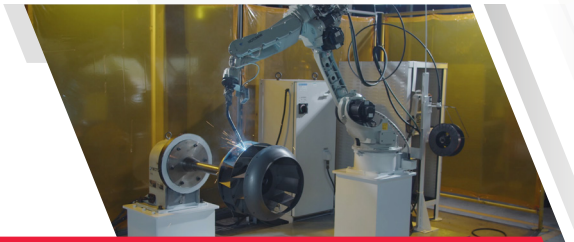
Soler & Palau Ventilation Group acquires Kruger Asia Holdings as a full subsidiary.

2015

Established new headquarters in Bangkok, with USD 50 million invested.



Manufacturing Technology



ROBOT WELDING

We do not stop until we master the technology of production processes to perfection.

Market strategy determine equipment and process flow to flexible production to meet high mixed low volume market pattern.

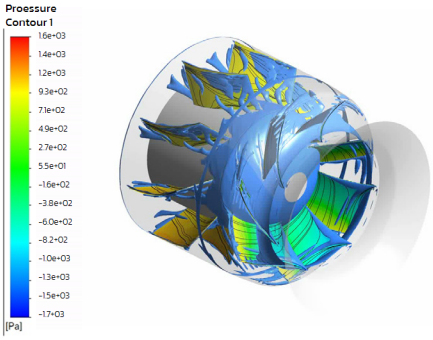
LASER PROCESSING MACHINE



Design & Development

Research is an important source of competitive advantage for Kruger. Researching, discovering, striving for excellence, in short, innovating, is what sets us apart from the competition and allows us to reach consumers. More than 75 engineers and technicians work to create products with the best possible features.





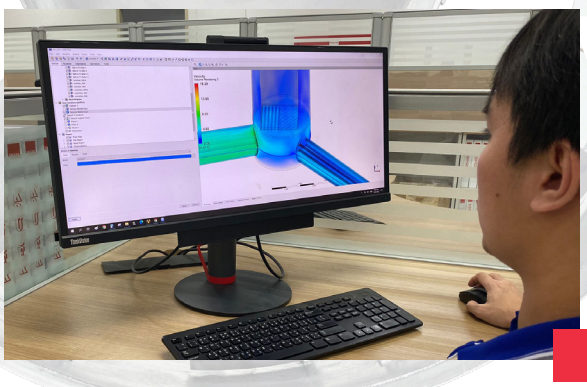
Our sophisticated software is a decisive factor in ensuring that we achieve the quality our customers demand, as it allows us to simulate how these units will behave from the very beginning of the design process, thus saving time and effort.

Quality Management System and Laboratory Certification

- Management System as per ISO 9001
- Environmental Management System as per BS EN ISO 14001
- Occupational Health and Safety Assessment Series 18001
- AMCA Accredited Laboratory being qualified to conduct tests in accordance with AMCA 210 and AMCA 300 standard.
- Laboratory Accreditation as per ISO 17025



Kruger Tunnel Ventilation Solutions

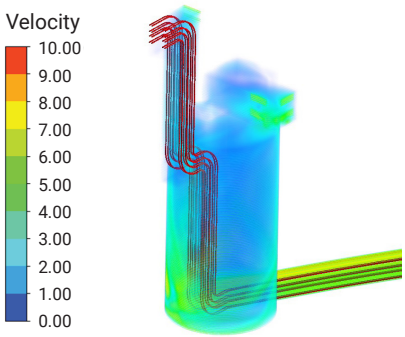


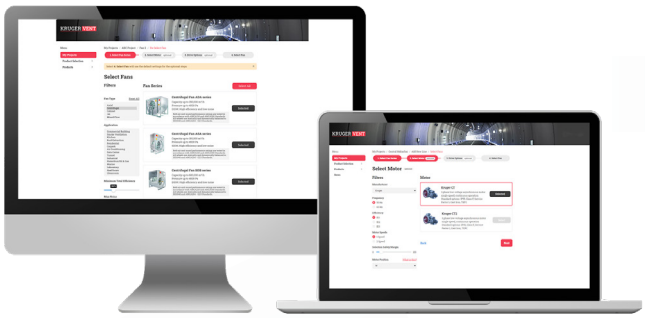
Design

CFD simulation, Fire Dynamic Simulation, and Finite Element Analysis to provide support during tunnel system design.

Computational Fluid Dynamics (CFD) Simulation

Provide cost and space effective solution by closely simulate actual tunnel condition and requirement using detail CFD simulation.



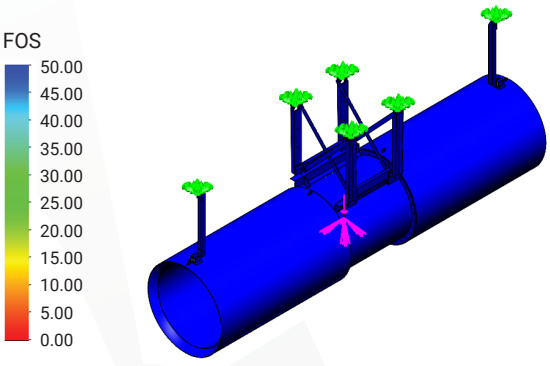


Product Selection

Kruger has the Tunnel Ventilation Product specialist to select fans and other products to ensure that customers will have the most suitable product for the requirement.

Customize to Spec

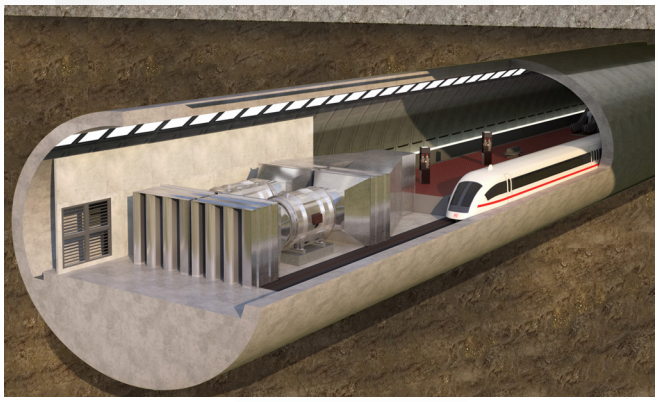
Kruger offers product customization to meet local regulation, geographical, climate, and other requirements for project from different countries around the world.



Complete Package

To eliminate the intricacy of installing and testing products from different manufacturers, we offer the complete package of Kruger Products which is the one-stop solution for the customer.

All products are designed and tested to be compatible with each other, enhancing system integrity.





Testing

Testing is the point where the products are put through their paces to ensure performance per specification. Kruger tunnel fans are rated and tested in our own AMCA Accredited Laboratory which is one of the largest in the world. Aerodynamic and Sound Performance of tunnel fans are tested and certified per AMCA 210 and AMCA 300.

Safety operations in fire is the most important criteria of our tunnel fans as it should always protect the safety of the users of the tunnel. Our products are tested and certified in accordance with EN12101-3 and we have our own high temperature test chamber to facilitate these witness test.

Besides that, Tri-axial strain gauge test, natural frequency test and overspeed test are some of the many tests that we can do to assure the quality of our products.

Commissioning

As the ventilation experts, we would offer our expertise supporting commissioning and testing on site to safeguard the performance of the products supplied to meet or exceeds the specified requirements.



Tunnel Ventilation Products

KTF Series

"Tunnel Axial Fan"

- Size: 1120 to 3150 mm diameter
- Air volume up to 250 cms
- Static pressure up to 5000 Pa
- Unidirectional and 100% Truly Reversible
- Casings are steel hot dip galvanized as per ASTM A123
- Blades are X-ray test as per ASTM E155
- Performance is tested as per AMCA 210 and 300
- High temperature certified by TUV SUD as per EN 12101





KJF Series

"Tunnel Jet Fan"

- Size: 560 to 1600 mm diameter
- Thrust Force up to 3000 N
- Thrust Efficiency up to 37 N/kW
- Unidirectional and 100% Truly Reversible
- Casings are steel hot dip galvanized as per ASTM A123
- Blades are X-ray test as per ASTM E155
- Performance is tested as per AMCA 250 and 300
- High temperature certified by TUV SUD as per EN 12101

MXA Series

"Mixed Flow Fan"

- Size: 560 to 2000 mm diameter
- Air volume up to 150 cms
- Fan Efficiency up to 80%
- Unidirectional design
- Casings are steel painted (hot dip as optional).
- Blades are X-ray test as per ASTM E155
- Performance is tested as per AMCA 210 and 300
- High temperature certified by TUV SUD as per EN 12101

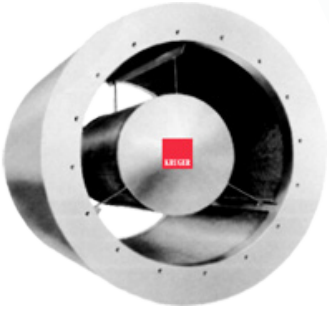


KRA Series

"Rectangular Sound Attenuator"

- Module 400-150 to 600-600
- Insertion loss up to 50 dB
- Performance is tested as per ISO 7235
- High temperature test as per EN 12101





KCA/KCP Series

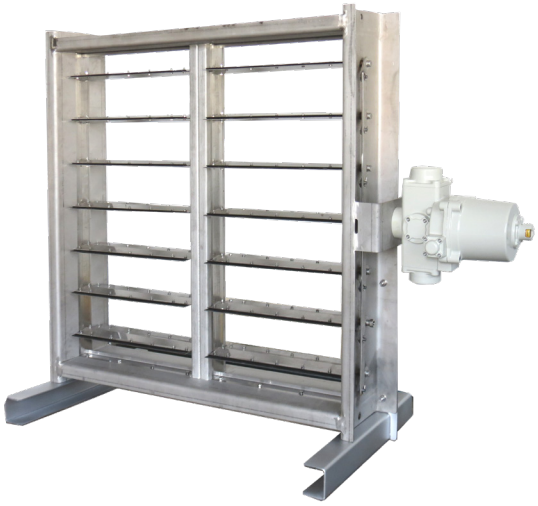
"Circular Sound Attenuator"

- Size from 315 to 2000
- Insertion loss up to 30 dB

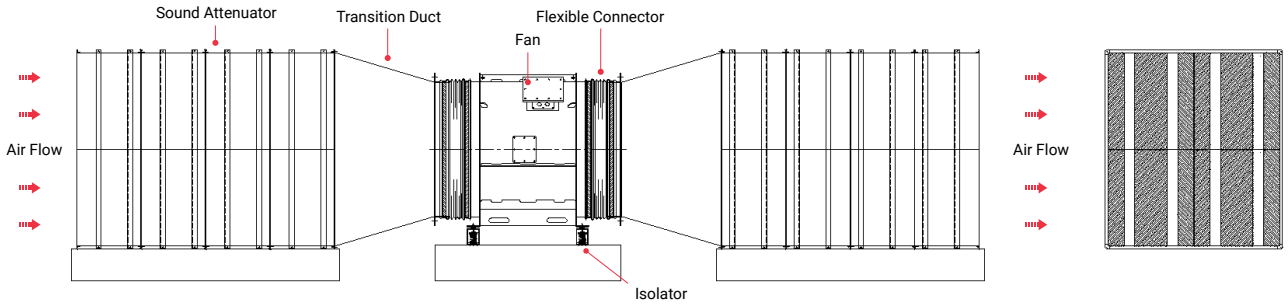
KMB Series

"Multi Blade Damper"

- High temperature operation at 250, 300 and 400 DegC for 2 Hours
- Max Pressure of 5000 Pa
- Fire rated 4 hours per BS476-20
- Leakage rating UL555S - Class 1
- Horizontal and vertical mounting
- Electric, pneumatic and electro-hydraulic Actuators
- Available in Galvanized steel, SS304 and SS316L



Accessories



A complete package of fan flexible connection, square to round transition section, motor starter/inverter drives, vibration and temperature monitoring, vibration isolators/seismic control are available to complete the package.

Metro / Mass Transit Tunnels

Millions of people use the mass transit system daily in underground tunnels daily in urbanize area. All of the heat generated in the tunnel by the train the onboard HVAC systems would have to have proper ventilated to ensure the safety and comfort of the occupants. More importantly the life safety of the occupants in a fire is of utmost importance to ensure safe escape and the possibility for fire fighters to control the fire.

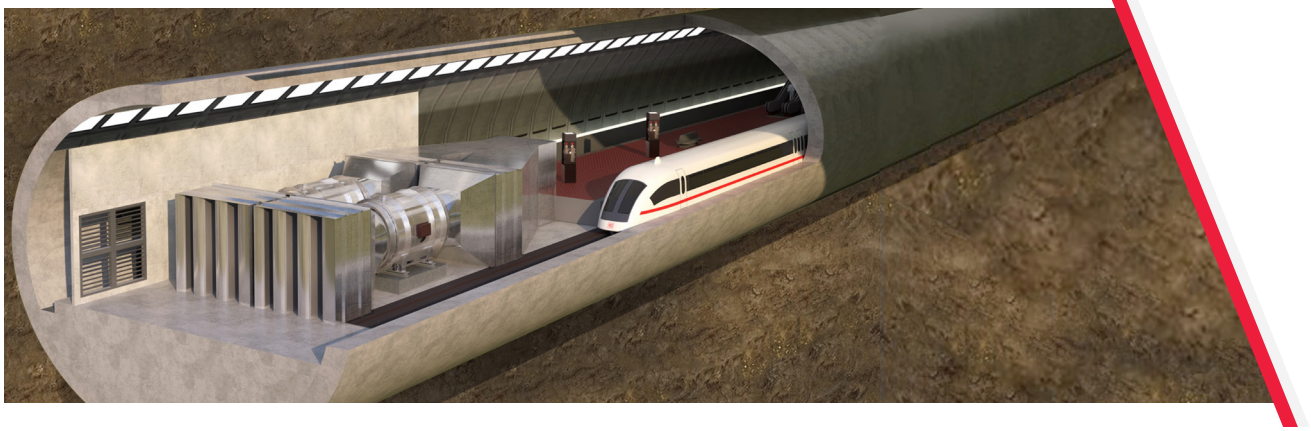
Kruger tunnel ventilation fans are capable at meeting the needs of tunnel ventilation where 100% reversible fans are a commonly required and certified in accordance with EN12101-3 for 400ºC for 2 hours.

Kruger offers complete ventilation system which consists of dampers, sound attenuators and also monitoring systems in addition to the ventilation fans.



Kruger's

Complete Package





KTF Series



KJF Series



MXA Series



KRA Series



KMB Series

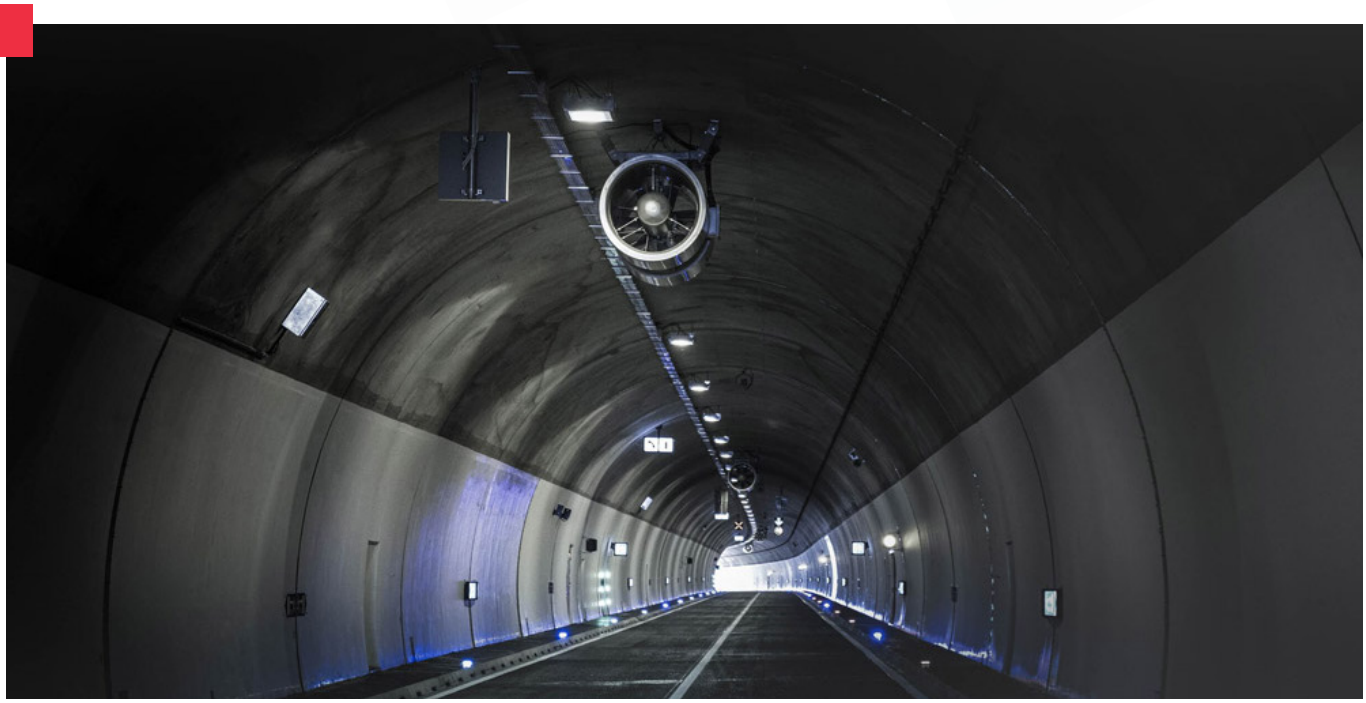
Road Tunnels

Ventilation in road tunnels is important to remove the heat and emissions from the vehicle and aid in the safe escape of the occupants in case of a fire by smoke control.

Tunnel jet fans are installed along the tunnels where high velocity air induces the air through the tunnel working with the tunnel axial fan that will extract polluted air out of the tunnel to be treated before discharging it into the atmosphere.

In case of a fire, these tunnel jet fans and tunnel axial fans will control the smoke generated by the fire to ensure that occupants can escape and emergency support personals can attend to the fire.

Kruger Tunnel Jet Fans and Tunnel Fans are capable of 100% reversible or unidirectional operation to support the designers in managing the ventilation needs to alternate a supply fan into an exhaust fan to provide effective ventilation as required. Kruger offers complete ventilation system which consists of dampers, sound attenuators and also monitoring systems in addition to the ventilation fans.



KRUGER PRODUCTS



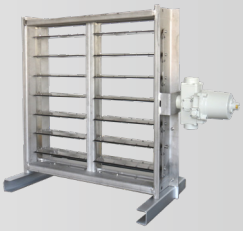
KTF Series



KRA Series



KJF Series



KMB Series

Tunnel Construction

Dust, heat and hazardous gasses require good control with a tunnel construction ventilation. During excavation, heavy equipment emission and heat as well as air for the construction workers are vital to ensure a safe working environment and also comfort levels of the workers.

Kruger offers a complete tunnel ventilation package of fan, fan starter controls and ducts on the ventilation needs of tunnel constructions.



KRUGER PRODUCTS



KTC Series



KRA Series



KCA/KCP Series

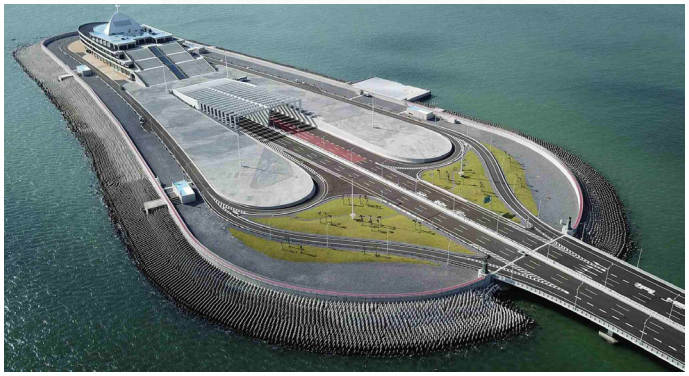
Project References

Road Tunnel

Hong Kong-Zhuhai-Macau Bridge Undersea Tunnel

Hong Kong-Zhuhai-Macau Bridge tunnel system is a series of three bridges and an undersea tunnel that spans across 55km. Costing USD 18.8 billion, is one of the monumental engineering projects in the world. The 6.7km section undersea tunnel is constructed by immersed tube in between 2 artificial man-made tunnels. The project was completed in 2018 and begin operation in 2018.

Kruger supplied the complete tunnel ventilation system consisting 16 units of the tunnel fans (3150mm diameter and 1Mega Watt), 200 units of tunnel jet fans (1250mm diameter and 45kW), sound attenuators, dampers, fan support, seismic restrain, vibration isolators and all necessary monitoring and controls.







Metro Tunnel

MRT Kuala Lumpur







At 153.2 KM in length over 97 stations, the KL MRT is the heart of the mass rapid transit of greater Kuala Lumpur. The project costs USD 10 billion and would serve a daily ridership of more than 2 million passengers. The first phase of transit network was completed in and begin operation in the same year.

Kruger supplied the complete tunnel ventilation system consisting 48 units of the tunnel ventilation and jet fans (up to 2000mm diameter and 250kW), sound attenuators, fan transition, vibration isolators and all necessary monitoring and controls.

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LEA164.E0 May 2023

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