

Gas Turbine Inlet Anti-Icing

powerfully efficient solutions



ATCO *Noise Management*

HIGGOTT-KANE Division

ATCO/Higgott-Kane model anti-icing system installed on a GE LM6000 turbine



Increased Revenue

Compared to glycol systems, ATCO/HK reduces intake pressure drop by approximately 1" wg.

FACT

1" wg reduction is equal to 0.355% **power output gain**

FACT

A 50 MW GT will yield an **additional** 177 kW of power

FACT

Over a 4 month period of use at \$0.10/kWh, revenue will increase **\$50,000.00**

Installation of the exhaust duct heat exchanger



Efficient Design Cost-Effective Results

Ice formation in the gas turbine (GT) inlet system can damage vital components such as gas turbine blades and filter elements, resulting in costly and time-consuming repairs. Under certain ambient conditions, combustion turbine intake icing can even occur at temperatures above freezing — ice crystals form at less than 40° F with greater than 64% R.H.

Fight the cold with the 'best-in-class' anti-icing system from ATCO Noise Management, Higgott-Kane Division.

Our anti-icing system recovers heat from the exhaust system and is uniquely designed to permit higher GT power output with low-cost operation and high-performance protection for any gas turbine model. Simple and proven reliable, the ATCO/Higgott-Kane anti-icing solution gives superior protection with low maintenance, no environmental cleanup, **and virtually zero pressure drop impact on engine performance.**

The ATCO/Higgott-Kane Advantage

At ATCO/Higgott-Kane, we understand the need for quality products and a healthy bottom line. Traditional anti-icing systems may provide effective protection, but at what price?

Glycol heat exchangers are expensive to operate and maintain, use an environmentally toxic chemical and the high intake pressure drop negatively impacts engine performance. Turbine bleed air systems require additional silencing measures and greatly degrade GT power output, resulting in decreased engine efficiency.

With an ATCO/Higgott-Kane anti-icing system, a healthy bottom line is part of the package.

| Anti-Icing System | Properties | Capital & Operating Cost |
|-------------------------------------|--|--------------------------|
| Intake Duct Heat Exchanger | High intake pressure drop Possible foreign object damage High cost glycol system No filter house protection | High |
| Engine Bleed Air | Reduced engine efficiency Increased fuel consumption Additional silencing required | High |
| Enclosure Ventilation Discharge Air | Additional electric heaters required Possible intake air contamination | Medium |
| ATCO/Higgott-Kane | Negligible pressure drop No reduction in engine efficiency Low cost operation & maintenance No environmental concerns with glycol No additional silencing required | Low |

We are part of the ATCO Group of Companies, an organization with \$7.7 billion in assets and over 7000 employees worldwide. Our Performance Guarantee, Errors and Omissions Insurance and Performance Bonding capability make ATCO/Higgott-Kane a **safe and reliable partner for all your GT anti-icing needs.**

Newest design anti-icing systems have been successfully in operation more than 30 months



Complete Inlet System Protection

Glycol heat exchangers are typically located downstream from the filter house, providing no protection at the filter house itself. Pulse filters must be installed to compensate. Our unique anti-icing system evenly distributes air across the filter house face to prevent ice from forming. This innovative design permits the use of less expensive barrier filters and provides **complete protection** for the **entire inlet system**.

Guaranteed Performance

We're so confident in our anti-icing solution we provide a **two year mechanical performance** guarantee on every anti-icing system installed, on any turbine model. It's that simple.

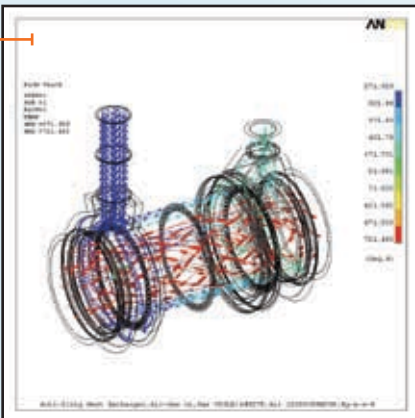


The ATCO/Higgott-Kane Anti-icing System

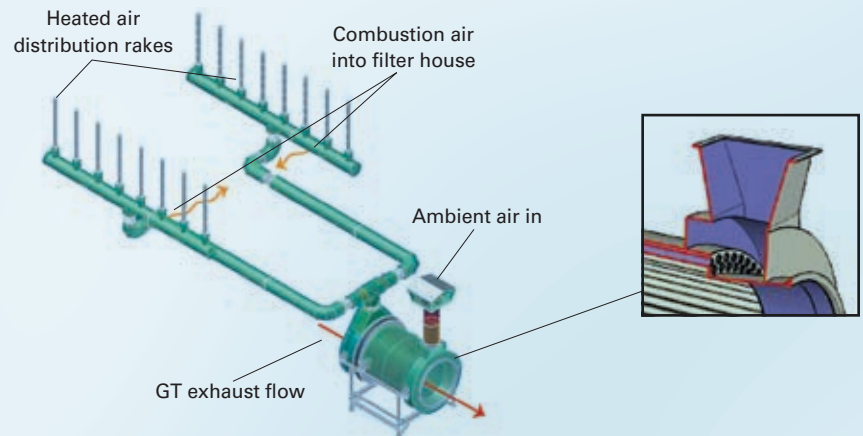
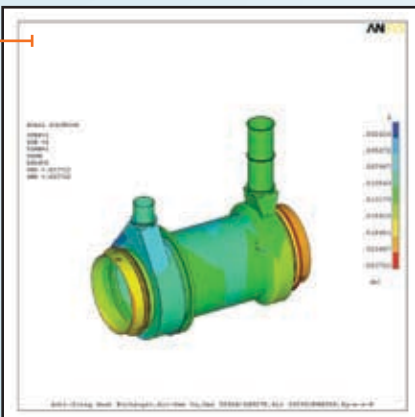
How it works

A blower forces ambient air into two offset arrays of circular tubes arranged parallel to and just inside the exhaust duct shell. The air flows through the heat exchanger counter to the exhaust gas path, warming as it travels. The heated air is then transported through circular ducting to distribution rakes at the filter house inlet, where it flows evenly across its face. This warm air is introduced upstream from the first stage of the inlet filter, raising the overall temperature of combustion airflow **out of ice formation conditions** and protecting the entire intake system with quiet, cost-effective, guaranteed results.

Completed heat exchanger CFD analysis



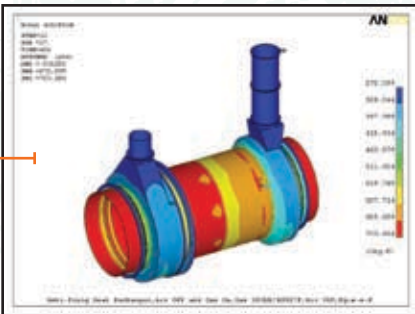
Completed heat exchanger FEA analysis



Proven Experience

The ATCO/Higgott-Kane anti-icing system design is based on hundreds of hours of CFD and FEA modeling and analysis. With more than **80 active units** in use and our **newest design in successful operation for more than 30 months**, our anti-icing system has proven to be an effective, low maintenance, low-cost operation and high performance solution to combustion turbine icing. The straightforward design is adaptable to any gas turbine application, and the simplicity of the system allows for activation at any time during operation—providing the protection you need where and when you need it.

With low-cost operation, no significant decrease in engine efficiency, no environmental impact and no icing concerns, there really is no better solution.



fight the cold



Call toll free 1-866-580-0600, or visit our website at www.higg-kane-atco.com today.

powerfully efficient solutions

