



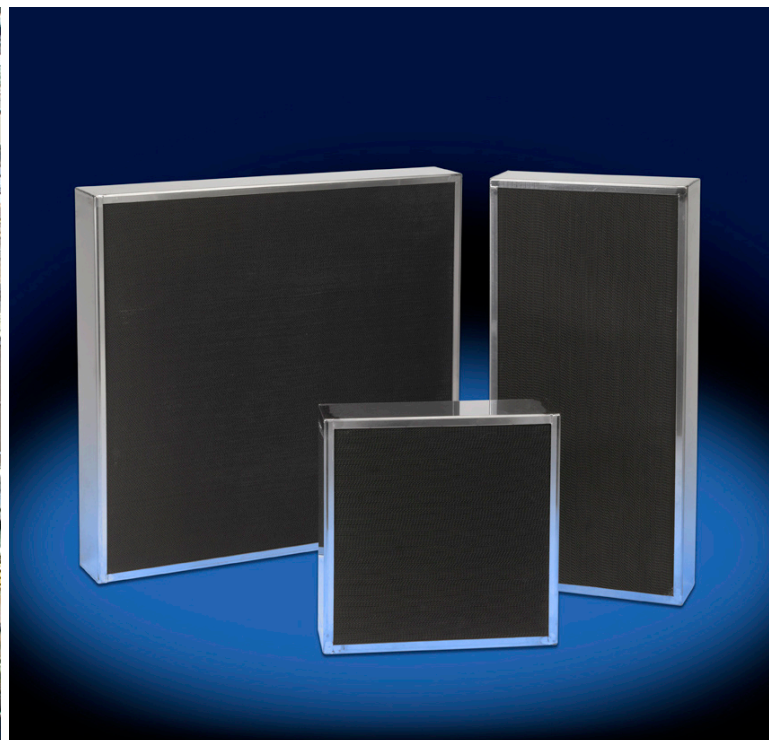
Johnson Matthey

JOHNSON MATTHEY STATIONARY EMISSIONS CONTROL



SCR + CO

*High-Efficiency Emissions
Control Systems for
Gas Turbines*





Trust Johnson Matthey with Your Emission Control System

Power producers today need highly reliable and efficient emission control systems for their gas turbines.

With over 40 years of experience, over 78,000 MW of installed capacity, and in excess of \$15 billion in revenues, no other company offers the capabilities of Johnson Matthey.

We combine our world leading catalysts with our optimized system design to offer you the most efficient, complete emission control system available today.

High Efficiency NOx / CO Control

Johnson Matthey designs our systems to give you the lowest installed cost, the fastest start-up, and the lowest parasitic power of any system available today.

ISO 9001: 2008 Certified

Johnson Matthey's turbine group is ISO 9001 Certified. Our quality procedures and approach reflect our commitment to excellence.

Lowest Commissioned Costs

Johnson Matthey engineers its systems to have the lowest commissioned cost. We do this through careful engineering choices that optimize the system for emission and operational requirements in combination with a mechanical design that allows for quick installation and commissioning of the system. The result is a system that has the lowest installed and commissioned cost.

Fastest Start-Up Time

Our systems are designed to be operated in a quick start-up mode that can save valuable minutes during turbine start-up. In this way, ammonia can be made available as soon as the catalyst reaches its minimum operating temperature, which allows NOx reduction to begin minutes sooner than with standard NH₃ systems.

Lowest Parasitic Power

Our Recirculated Hot Flue Gas system can reduce the parasitic power of the emission control system by up to 50%, compared to an electrically heated system. In addition, our hot flue gas systems offer a fast response to turbine load changes, which maintains NOx compliance and lowers NH₃ slip. Our proprietary approach to hot flue gas ammonia vaporization sets the industry standard for lowest parasitic power and reliability.



Highlights of the Johnson Matthey SCR/CO System

- Panel, Semi-Modular, and Modular designs for easy assembly / shipping
- Balancing Valves for system optimization
- Internally insulated reactors and stacks with stainless steel liner plate
- Feed forward / feed back system for tight control of NOx and NH₃ Slip
- Optional PLC or DCS based control system
- Electrically heated or recirculated flue gas based ammonia vaporizer, both designed for rapid response to turbine load changes

Pratt & Whitney FT4 Combined Cycle Turbine with Johnson Matthey's SCR/CO System.

Key Features of the Johnson Matthey SCR NOx Control Systems

LINER SYSTEM



Johnson Matthey's liner system uses solid stainless steel liner plates

Our liner system is specifically designed to withstand the high turbidity and temperature fluctuations of multiple turbine start-ups, while securely retaining the internal insulation and providing sound attenuation for years of service.

BALANCING VALVES



Johnson Matthey incorporates balancing valves as part of our ammonia injection system.

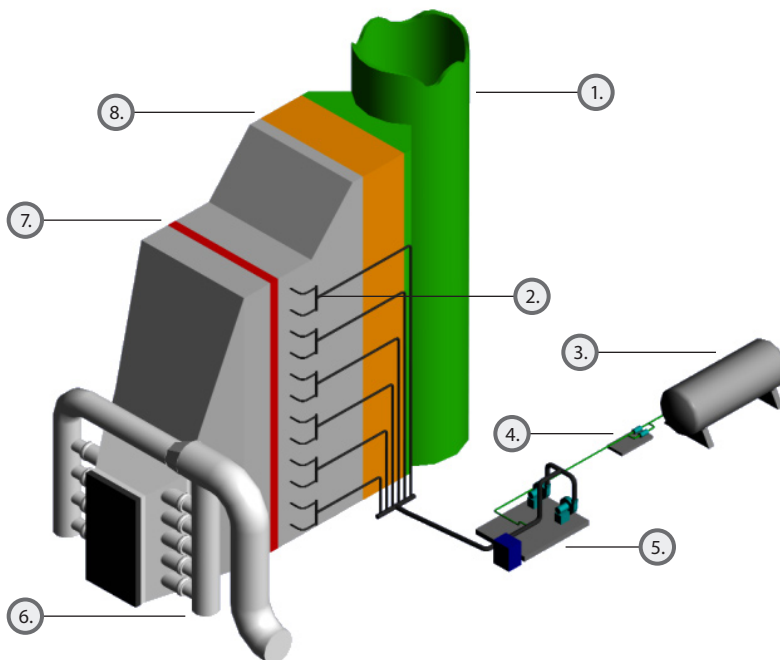
With balancing valves, we can quickly tune the system at start-up for minor differences in the turbine flow field. Once set, these valves help assure years of service for your catalyst.

RECIRCULATED FLUE GAS



Johnson Matthey provides an option for using recirculated flue gas to reduce the parasitic power of your SCR system

Our recirculated flue gas systems not only offer you a way to reduce parasitic power consumption, but they respond quickly to turbine load changes and start-up quickly.



SCR System Components

1. Stack
2. Ammonia Injection Grid
3. Ammonia Storage Tank
4. Ammonia Pump Skid
5. Ammonia Vaporization Skid
6. Quench Air Injection
7. CO Reactor
8. SCR Reactor

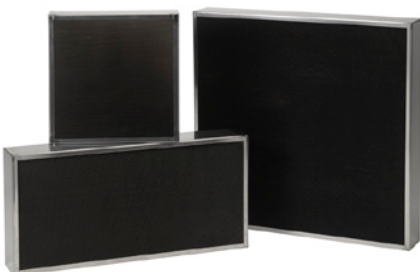


Two GE Frame 7 turbines with Johnson Matthey SCR/CO Catalyst systems.

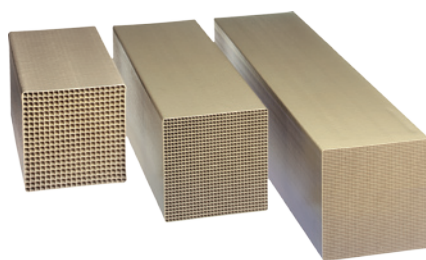
Johnson Matthey Catalysts

Founded in 1817, we are the global leader in environmental catalyst technology with more than 40 years of experience in environmental emissions control catalysts for mobile and stationary sources. Beginning with our introduction of oxidation catalyst for gas turbines in the 1970's, Johnson Matthey has pioneered catalytic based emission control solutions and systems for decades.

Our **Oxidation Catalysts** are formulated with Platinum Group Metals (PGM's) to achieve maximum conversion of pollutants at gas turbine temperatures, whether in simple cycle or combined cycle mode. Our high activity catalyst plus flow through metal monolith design delivers the smallest catalyst package and lowest back pressure in the industry.



Our **Selective Catalytic Reduction (SCR) Catalysts** are used in hundreds of installations worldwide. We offer extruded honeycomb vanadia-titania SCR catalyst in various cell densities and lengths. We also offer coated SCR catalysts and plate type SCR catalysts in various formations. The extremely high specific surface area of our SINOx honeycomb catalysts ensures a low catalyst volume and therefore a compact design for the SCR installation.



Johnson Matthey SINOx[®] honeycomb catalysts (above) and oxidation catalysts (left).

Systems Available For:

- Frame and Aeroderivative turbines
- Side and Axial Flow
- Dry and Wet Low NOx systems
- Anhydrous & Aqueous NH₃ Systems
 - Electrically Heated
 - Recirculated Hot Flue Gas
- Natural gas, diesel, and co-firing applications
- NOx and CO reduction systems
 - NOx > 95%, < 2 ppm
 - CO > 95% < 2 ppm
- Ammonia Slip < 5 ppm

Johnson Matthey—A Snapshot

- 9000 Employees
- \$15 Billion in Revenues
- Global Presence in over 30 countries
- Manufacturing facilities in 16 countries
- Technology Centers in six countries



Johnson Matthey Stationary Emissions Control

31 Journey Suite 250
 Aliso Viejo, CA 92656, USA
 TEL: +1 800-800-3950
 TEL: +1 949-297-5200
 FAX: +1 949-297-5210
 E-MAIL: info@jmsec.com
www.jmsec.com

ISO 9001:2008 Certified

SCR+CO