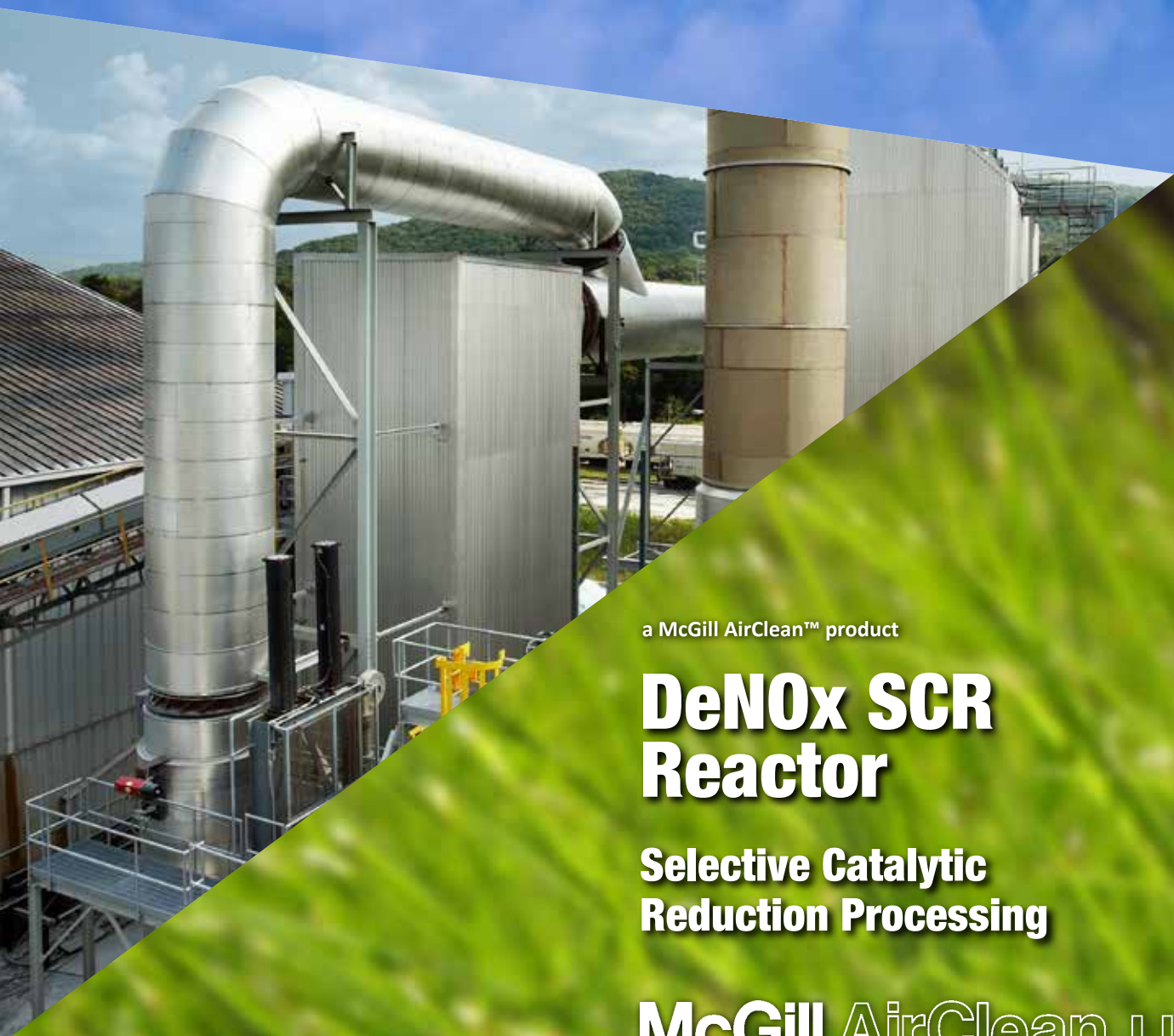


a McGill AirClean™ product

DeNOx SCR Reactor

Selective Catalytic Reduction Processing

McGill AirClean LLC

An enterprise of United McGill Corporation –
Family owned and operated since 1951

History and Capabilities

McGill AirClean has over 40 years of experience solving air pollution control problems for industries including:

- Glass
- Wood products
- Pulp and paper
- Automotive
- Petrochemical
- Waste
- Chemical
- Pharmaceutical
- Food
- Metals
- Electrical power and steam generation
- and many more.

Our products include:

- Dry and wet electrostatic precipitators
- Fabric filters
- Regenerative thermal oxidizers
- Acid gas control systems
- DeNOx SCR reactors

The DeNOx Selective Catalytic Reduction (SCR) Process

The deNOx SCR process converts NOx emissions into diatomic nitrogen (N_2) and water (H_2O) vapor. That is accomplished by injecting ammonia (NH_3) or urea into the flue gas stream and then passing it through a catalyst bed. The following reactions take place:

$$4NO + 4NH_3 \rightarrow 4N_2 + 6H_2O$$

$$6NO_2 + 8NH_3 \rightarrow 7N_2 + 12H_2O$$

Our DeNOx Reactor Features

McGill AirClean's deNOx reactors feature a fully integrated system design that includes:

- Modular reactor housing
- Easy access to the catalyst
- Computational fluid dynamics (CFD) flow modeling
- Customized catalyst cleaning system
- Ammonia storage and injection systems
- Ammonia/flue gas mixing
- Catalyst life management
- PLC-based control system
- Supplemental temperature control (if needed)

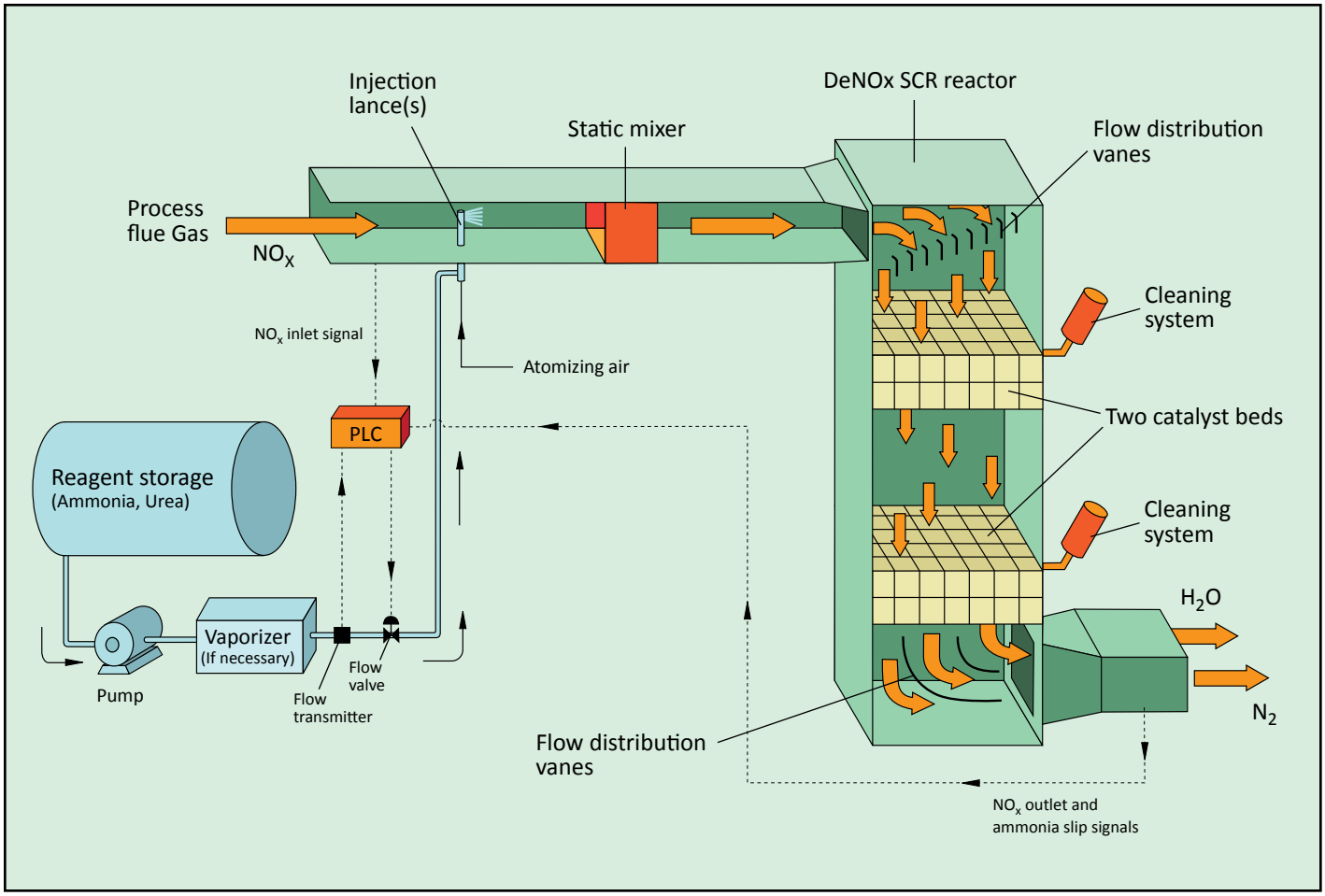
The Design Process and Considerations

Our sales and design engineers will review your process conditions to provide you with the best deNOx control system solution. That includes critical design analysis of the following:

- DeNOx removal efficiency
- Flue gas chemistry
- Operating temperature
- Catalyst selection
- Ammonia injection location
- CFD modeling and equipment layout

With our complete turnkey system capabilities we are able to offer a single-source performance guarantee and equipment warranty for all of our systems. In addition to designing and manufacturing our own equipment, we also provide all auxiliary equipment for your complete installed solution. We also have maintenance services that include off-site monitoring, inspection, repair, rebuilds, and replacement parts. Our product and service offering allows us to provide our customers with the best possible control technology in a cost-effective and turnkey manner.

A McGill deNOx reactor teamed with a McGill dry electrostatic precipitator for removing NOx and particulate emissions from the exhaust stream of a float glass furnace.

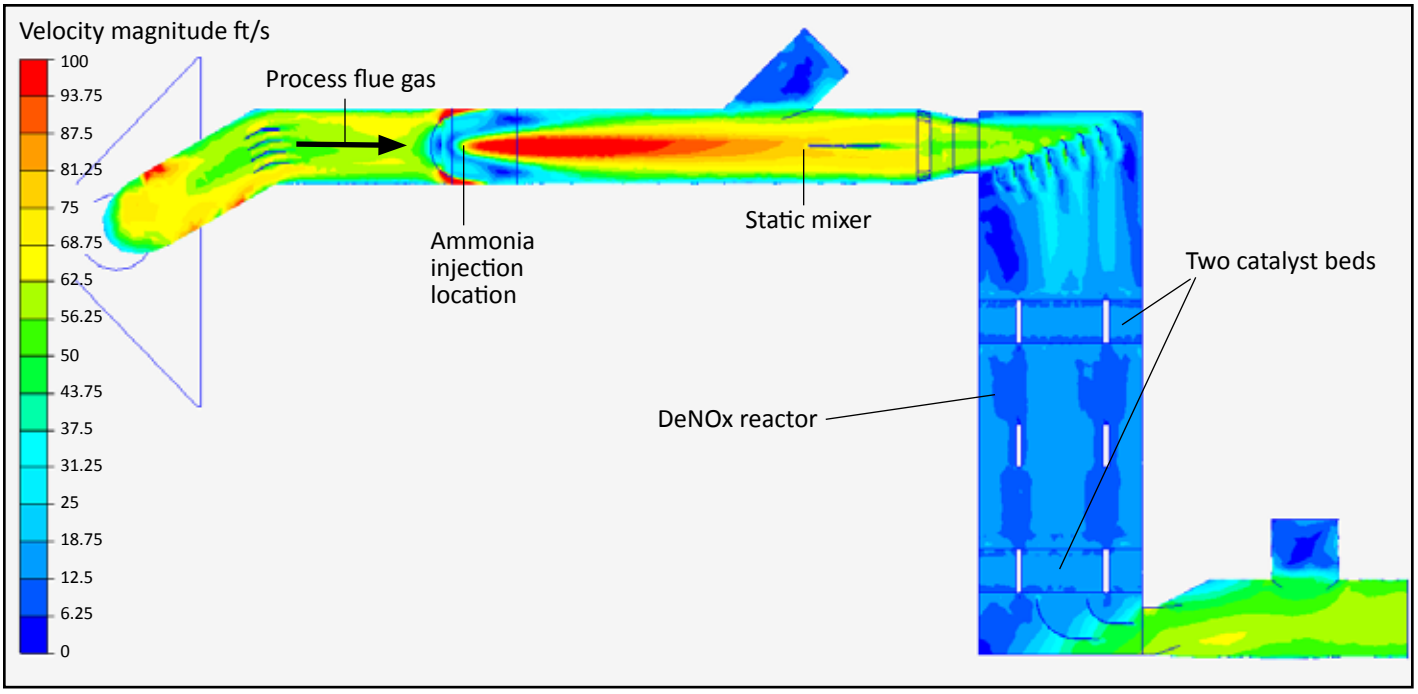


This simplified illustration depicts the basic design, flow pattern, and equipment used in a typical McGill deNOx reactor.

McGill's custom designed catalyst cleaning system reduces build-up and improves NOx reduction.

This inside view of a reactor chamber shows the top of a layer of catalyst elements in welded, carbon steel modules and a section of air knife used for cleaning.

The top transition with flow distribution vanes is lifted into place, completing the erection of this three-module deNox reactor. ***Inset:*** *The modular design of the McGill deNOx reactor facilitates installation.*



Computational fluid dynamics (CFD) modeling as shown in this diagram is a key element in the design of each McGill deNOX reactor.

The McGill deNOx reactor uses an injection lance that can either spray the reagent into the flue gas stream as a mist or inject it as a gas.

The reagent delivery system includes a storage tank, pumps, flow control valves, flow transmitter, and piping.

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