STEAG Energy Services LLC

Engineering and Consulting Services with a focus on the environment

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Catalyst Regeneration

STEAG's Selective Catalytic Reduction (SCR) catalyst regeneration process is a proven technology developed and perfected by STEAG since 1997. Catalytic activity is restored to the same level as when the catalyst was new while the SO_2/SO_3 conversion rate is reduced by means of STEAG's proprietary, patented Selective Impregnation® process.
STEAG owns and operates the world's largest and most advanced catalyst regeneration facility in Kings Mountain, North Carolina, since 2007.
SCR technology has been widely applied to most boiler firing configurations and a wide variety of industrial processes.
In particular, it is applied to units that use coal, oil, gas and biomass.
STEAG's scope of services for SCR catalyst regeneration includes the following:

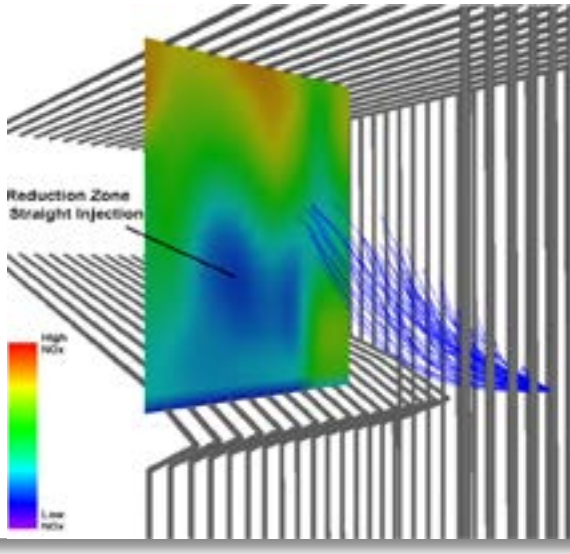
- Used, deactivated catalyst removal and shipment
- Removal of physical and chemical deactivation causes
- Restoration of catalytic activity by means of Selective Impregnation®
- Supply of used, regenerated catalyst
- SCR catalyst performance testing, chemical and physical analysis
- Engineering, design and supply of catalyst seals, lifting devices and installation material

STEAG's experience is supported by numerous patents covering STEAG's regeneration technology. It has regenerated any catalyst type (corrugated, honeycomb, plate) in the thousands of cubic meters as well as any size of standardized and non-standardized modules.

Catalyst regeneration provides many economic benefits:

- Simple technology – static system, no moving parts, widely available catalyst
- Very high nitrogen oxide (NO_x) removal efficiency
- Catalyst regeneration reduces initial capital as well as long term operating costs

Your success is our goal!



Catalyst Testing

One of the most critical components for successful Selective Catalytic Reduction (SCR) system management is regular SCR catalyst testing. Such catalyst testing should be conducted by an independent catalyst testing laboratory providing complete and impartial performance test data. STEAG operates a two-line full bench scale, semi and micro testing reactor in Kings Mountain, NC, as well as one full bench scale reactor in Herne, Germany.
Available testing services include:

- Bench scale reactor testing of full-size samples for activity (initial activitiy K_0, actual activity K_{act}), SO_2/SO_3 conversion rate and pressure drop.
- Semi- and micro-scale reactor testing for small size catalyst coupons
- XRF analysis for surface and bulk composition of catalyst's substrate
- BET analysis - physical absorption of gas
- SEM analysis - catalyst surface scan
- Bending and bonding tests

SCR Management

STEAG provides a fully integrated Selective Catalytic Reduction (SCR) management program with individual services being performed only on an as-needed basis, tailored to the requirements of the customer's SCR system. In close cooperation with the SCR operator it is decided what services should be performed at what point in time.
SCR reactor inspections should include:

- Inspection of SCR reactor and all associated equipment
- Catalyst sampling (at least one sample per layer)
- Evaluation of possible fly ash deposit locations
- Inspection of the gas inlet distribution system and rectifier
- Inspection of the flue gas and economizer bypasses, including bypass dampers and expansion joints
- Inspection of the AIG system, particularly the nozzles and tuning valves
- Inspection of key ancillary equipment, e.g. the fixed installed sampling grid downstream of the last catalyst layer, seal air system including dampers and expansion joints, etc.

NH_3 System Design

Operating efficiency of the ammonia storage and delivery system is an important part of any Selective Catalytic Reduction (SCR) system. The system should be designed from the operator's point of view for successful operation and maintenance.
STEAG can provide full turnkey solutions and has extensive operating knowledge and experience from its own facilities around the world.
In addition, STEAG has established a routine maintenance schedule and testing procedure for ammonia storage and supply systems including annual inspections, slip testing and Ammonia Injection Grid (AIG) Tuning to optimize the NH_3 system.

SNCR System Design

Selective Non-Catalytic Reduction (SNCR) is a proven technology for achieving cost-effective fossil fuel NO_x emission reductions. An SNCR operates through the selective chemical reaction between ammonia and nitrogen oxides (NO_x) within a well defined temperature range on a boiler or combustion device to reduce emissions. STEAG's process typically uses solutions of either ammonia or urea to achieve NO_x reductions ranging from 25 up to 50 percent.
SNCRs are simple to install, only requiring a short outage schedule and very low capital cost as compared to conventional SCR installations.

Unit Optimization

STEAG provides combustion and Selective Catalytic Reduction (SCR) optimization services using its own fleet operating knowledge. These include performance and emission testing services to solve boiler, SCR and Flue Gas Desulphurization (FGD) issues. To name a few, STEAG can test for:

- Profile furnace gas temperatures
- Coal pipe clean/dirty air velocities
- Coal flow distribution and fineness
- NO_x testing and combustion optimization (SCR and SNCR)
- Tune burners and Over-fire Air
- Boiler efficiency
- Gas temperature and velocity profile studies for SCR design
- SO_3 testing & measurement
- Mercury sampling

Mercury Control Technlogy

The coal-fired power generation fleet faces increasingly tighter U.S. emission regulations. STEAG's simple patented mercury removal technology provides a unique solution not only capturing greater than 90 percent of mercury from the flue gas, but also with the capability to consolidate the mercury waste material.
STEAG's control technology utilizes existing wet Flue Gas Desulphurization (FGD) scrubbers to enhance the control of mercury. Oxidized mercury dissolves into the scrubber slurry where it attaches to the injected Powdered Activated Carbon (PAC). The PAC binds the mercury and prevents reemission issues typically associated with wet scrubbers and ensures mercury free gypsum. Due to continuous flow recirculation of gas and slurry in the scrubber, STEAG's system requires less than 10 percent PAC injection compared to traditional Hg control methods.

LPA Screens

Large particle ash (LPA) can be formed during the combustion process and poses a serious threat to the Selective Catalytic Reduction (SCR) catalyst when carried over into the SCR reactor. LPA can cause flue gas maldistribution, ammonia slip, excessive pressure drop, catalyst erosion damage and loss of SCR performance through loss of available NO_x removal potential.
The LPA screens are typically installed at the boiler's economizer outlet utilizing the economizer hopper for continuous extraction of the captured LPA, and has minimal impact on pressure drop.
STEAG's LPA Screens are characterized by a:

- Patented pleated and hinged design
- Self-cleaning mechanism
- Modular design of inlays to allow for a variety of screen materials (coated and uncoated)

Our engineers will assist you from start to finish with design, CFD modeling, procurement, commissioning, training and maintenance.

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