

## VarioClean – heSNCR

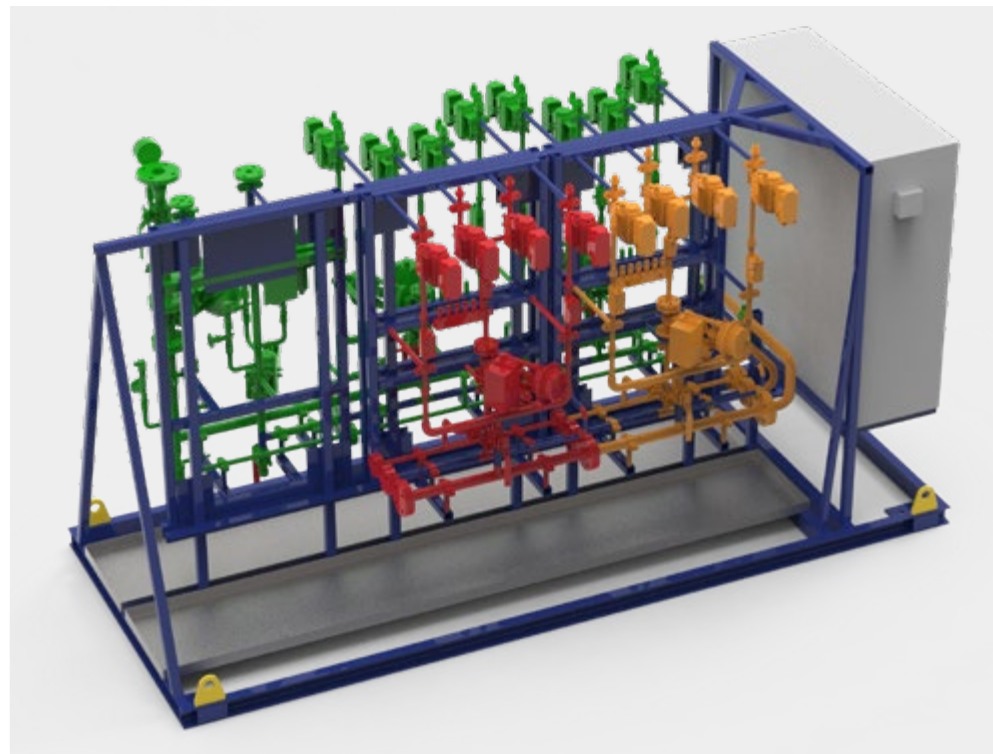
### The denitrification solution that grows with the requirements

In recent years, the requirements for reducing NO<sub>x</sub> emissions have been significantly increased in many countries. Meanwhile, primary measures are no longer sufficient, so that cement manufacturers have to decide how to comply with the current emission limits.

For this purpose, Lechler, in cooperation with STEAG Energy Services GmbH, has developed a sophisticated high-efficiency SNCR concept for cement plants that reliably complies with the respective applicable limits: *VarioClean* with “high efficiency SNCR (heSNCR)”.

The STEAG/Lechler high efficiency system is based on many years of experience with sophisticated SNCR systems in cement plants. We have more than 10 references in Germany with the rather challenging requirements of a NO<sub>x</sub> reduction of more than 85 % in combination with a NH<sub>3</sub> slip of max. 30 mg/Nm<sup>3</sup>. Furthermore, we have many references worldwide with installations in China where limits of 100 mg/Nm<sup>3</sup> could be achieved.

Depending on the individual requirements and the legal situation on site, the modular design of the *VarioClean* – heSNCR can be flexibly



adapted. Regardless of the number of lances selected, the base frame, inlet module and control cabinet are always of the same design. Each of the identically constructed injection modules supplies two lances. The required injection modules are implemented depending on the number of lances selected. Due to the modular design, further injection modules for

up to 10 lances can also be added at a later time, if the limit values should be changed in the future. The reagent quantity is controlled individually for each injection module. This ensures that the right amount of reducing agent is injected at the right time and in the right place. For optimum distribution and injection of the reagent, Lechler Laval nozzle lances are used to

accelerate the two-phase mixture to supersonic speed to ensure optimum penetration into the gas stream and optimum droplet size.

Our *VarioClean* – heSNCR system reliably meets current limits while minimizing reagent consumption and is also prepared for the future.

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Due to the distance between the injection lances and the emission measuring point, there are dead times of several minutes between the application of the reagent and its visible effects. In addition, different operating states of the cement kiln lead to different distributions of the resultant nitrogen oxides. A conventional PID control can only react to changes in emissions after the dead time; it is not at all suitable for taking different NOx distributions into account. Modern Advance Process Control (APC) modules offer superior control solutions here.

Based on relevant operating data of the cement plant over

a period of at least four weeks, predictive models are developed to estimate the NOx load and the required amount of ammonia to be introduced (feed-forward control). In a further step (exploration phase), the control system continuously varies the distribution of the reducing agent over the various injection points in order to determine the lances that are currently working best.

As a result, the system automatically adapts to the current operating conditions so that the specified limits are reliably met with minimum consumption of ammonia water.

### The main benefits of the STEAG/Lechler heSNCR are as follows

- Strict compliance with NOx- and NH<sub>3</sub>-emission limits
- Low operating and maintenance costs
- Practically maintenance-free
- Fully automated control modules using APC
  - Intelligent set-point control
  - Adaptive NOx prognosis
  - Optimum quantity of ammonia-water injection
  - Optimum ammonia-water distribution due to Adaptive Lance Select module (ALS)
  - Control of Lance operability
- Valve skirts completely durable tight therefore no additional ATEX requirements
- Pumps with frequency converters to provide constant outlet pressure and thus enlarged turn down ratios of the control valves
- Each pair of lances can be flushed and maintained individually while SNCR process is still running
- Individual flow detection of the lances so that clogging of lances can be detected online (Part of STEAG Monitoring System)



### Talk to us

Different systems require different strategies. The largest and most comprehensive solution is not always the best one. Let us discuss your requirements and work together to find the denitrification system that is a perfect fit today and will grow with increasing requirements tomorrow.