

DeNOx Mixer

Sulzer Mixer-Injector for Selective Catalytic Reduction

Static Mixer in the SCR process

The Sulzer SMV Mixer in combination with the patented Sulzer Ammonia Injector represents a proven, highly efficient and reliable technology to distribute ammonia into flue gas in front of the SCR Reactor of coal or gas fired boiler applications.

The simultaneous mixing of ammonia and NO_x as well as equalizing of gas temperature gradients with the SMV Mixer creates almost ideal reaction conditions in the catalyst bed.

This is available for a minimum pressure drop of 1-2 mbar only, at no additional maintenance cost.

Advantages

Improved NO_x distribution due to continuous mixing action, leading to even distribution of the reactants in front of the catalyst.

Reduced temperature gradient in the flue gas provides equal reaction condition across the catalyst bed.

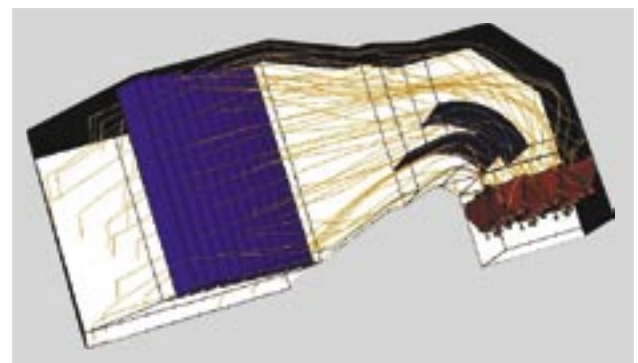
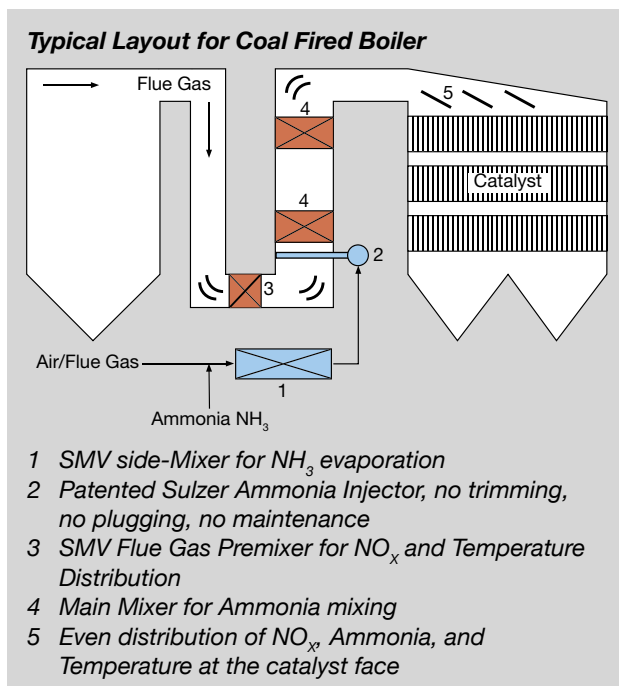
Uniform NH₃/NO_x concentration helps to achieve a high NO_x reduction rate at minimum ammonia slip.

Improved utilization leads to a longer life cycle of the catalyst.

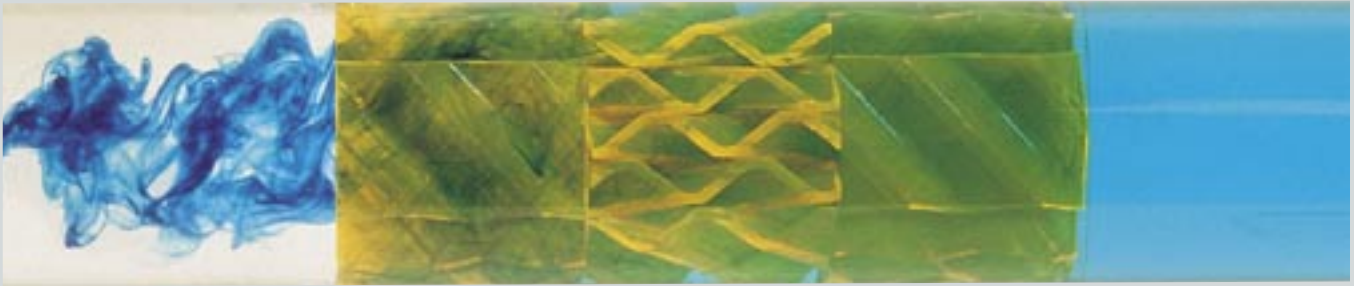
Low pressure drop in the flue gas compared to conventional injection grids (1-2 mbar, less than 1" WG).

Virtually no maintenance required for trimming of the AIG.

No evidence of corrosion or abrasion even for high temperature and high dust application so far.



Streak lines of ammonia injected in front of a SMV Mixer with extremely limited space available in front of the catalyst



Sulzer SMV Mixer for continuous in line mixing of additives. As shown, the mixer length required for a high degree of homogeneity is short.

CFD for effective and optimum design

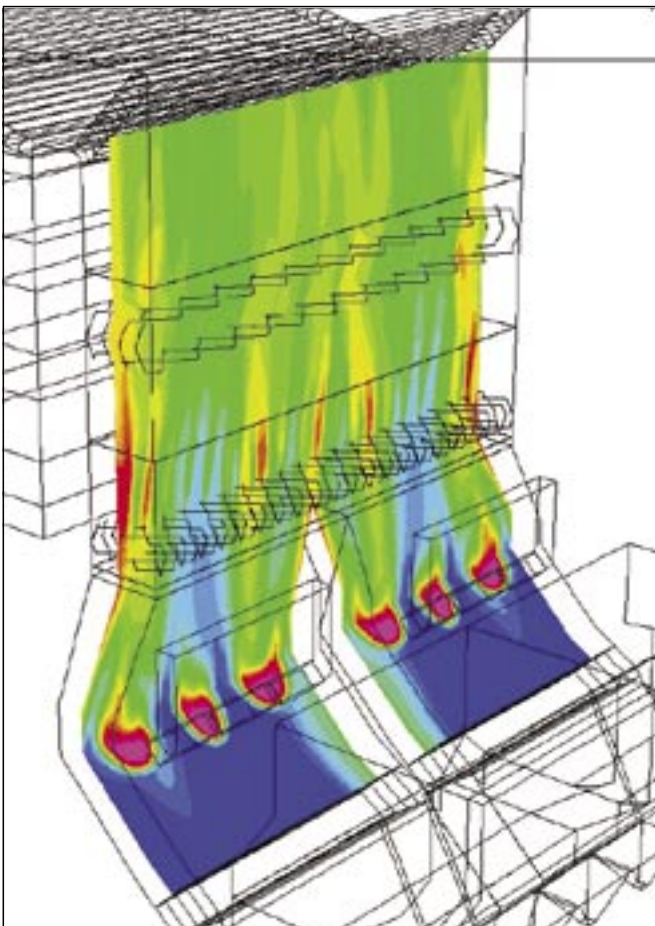
CFD represents an efficient and effective tool to optimize the design of the Mixer/Injector configuration as well as of the flow conditioning internals like guiding vanes.

CFD helps a lot to design and optimize a test model configuration.

Model mixing

Model mixing is used to tune the Mixer/Injector configuration and the flow conditioning internals.

Model mixing allows determining the basis for scale up and the guarantee values (typically NH_3 homogeneity, pressure drop, etc.), as well as dust deposition behaviour.



Temperature homogenization upstream of a flue gas heater



Model mixer set up with Sulzer SMV Mixer



SMV Mixer lifted to duct.

Typical results

of a coal fired power plant after installation of an SCR reactor equiped with a Sulzer SMV Mixer/Injector.

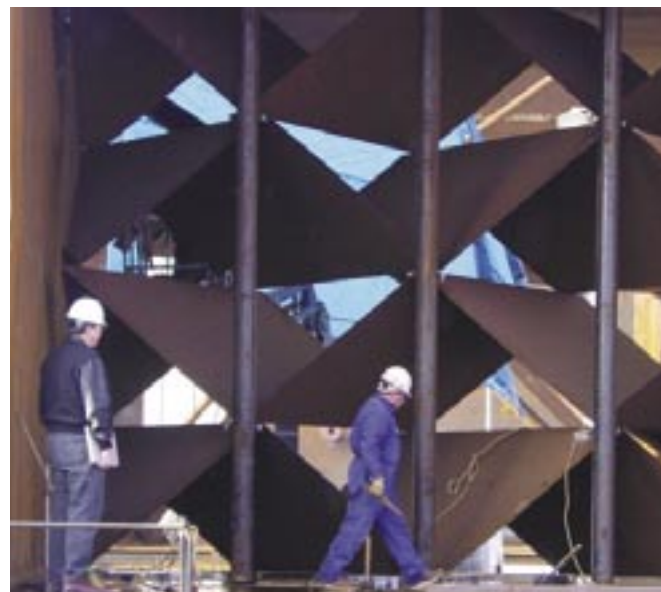
Process conditions after boiler			
V Flue gas	norm	=	1 800 000 Nm ³ /h
	min	=	600 000 Nm ³ /h
V Ammonia / V Flue gas		=	1 : 2500
NO _x content		=	900 mg/Nm ³
Flue gas Temperature		=	348°C
Reactor inlet after Sulzer SMV Mixer Typically guaranteed by Sulzer			
ΔT	max deviation	=	+/- 1°C max.
NH ₃ concentration	1σ	=	+/- 10%
	max	=	+/- 20%
velocity distribution	1σ	=	+/- 15%
	max	=	+/- 30%
Δp mixer		<	1.1 mbar
Reactor outlet			
Typically guaranteed by system or catalyst supplier			
Ammonia slip		<	1 ppm (vol)
NO _x content		<	190 mg/Nm ³
Δp duct+mixer/injector+catalyst		<	12 mbar

Installations

Sulzer has been designing and supplying SMV Mixers and Injectors for DeNO_x application for more than 25 years. With more than fifty installed mixers running to full satisfaction of the users, Sulzer has proven to be a most reliable supplier of Static Mixing Technology in this segment.



SMV Mixer with Ammonia Injector pipes ready for transport



Inspection on an SMV Mixer with Sulzer Ammonia Injector



Headquarters

Sulzer Chemtech Ltd
P.O. Box 65
CH-8404 Winterthur, Switzerland
Phone +41 (52) 262 67 20
Fax +41 (52) 262 00 69
E-mail chemtech@sulzer.com
Internet www.sulzerchemtech.com

North and South America

Sulzer Chemtech USA, Inc.
Mixing and Reaction Technology
4019 S. Jackson
OK 74107, Tulsa, USA
Phone +1 (918) 445-6634
Fax +1 (918) 445-6670

Asia, Pacific, Australia

Sulzer Chemtech Pte. Ltd.
11 Tuas Avenue 18
SGP-63 88 95 Singapore
Phone +65 6863 75 60
Fax +65 6861 15 16

Sulzer Chemtech Ltd, a member of the Sulzer Corporation, with headquarters in Winterthur, Switzerland, is active in the field of process engineering and employs some 1200 persons worldwide.

Sulzer Chemtech is represented in all important industrial countries and sets standards in the field of mass transfer with its advanced and economical solutions.

The activity program comprises:

- Process components such as trays, structured and random packings, internals for separation columns and reaction technology
- Engineering services for separation and reaction technology such as optimizing energy consumption, plant optimization studies, pre-engineering for governmental approval, basic engineering
- Separation and purification of organic chemicals by means of crystallization and membranes
- Mixing and reaction technology with static mixers

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