



Lechler TwinAbsorb® FGD Technology

Lechler GmbH Company Back Ground:

Lechler is Europe's No. 1 and is also one of the leading nozzles and systems supplier worldwide founded in 1879. For over 135 years, we have pioneered numerous groundbreaking developments in the field of nozzle technology. We combine comprehensive nozzle engineering expertise with a deep understanding of application-specific requirements to create products that offer outstanding performance and reliability.



Headquarters Germany

As of today, Lechler GmbH located in Matzingen has employed over 330 employees and Lechler subsidiary and affiliates has employed more than 680 employees worldwide.



Manufacturing Company

- Lechler GmbH, Germany
- Lechler Ltd., UK
- Lechler Kft., Hungary
- Lechler Inc., USA
- Lechler Pvt.Ltd., India
- Lechler Nozzle System, China

Sales Company

- Lechler France S.A., France
- Lechler S.A/N.V., Belgium
- Lechler S.A., Spain
- Lechler Oy, Finland
- Lechler AB, Sweden
- Lechler Intl. Trad. Co. Ltd., China
- Lechler Spray Technology Sdn. Bhd, Malaysia

To meet customer's requirement in the optimal way, Lechler is organized in divisions, according to the main nozzle applications:

- **General Industry**
- **Metallurgical Industry**
- **Environmental Technologies**
- **Agriculture**

In each division there is a team of product and sales specialist with a perfect know-how, working close together with our customer to provide the best spray solution to their application.

Environmental Division is focusing in Gas Conditioning of Coal Power Plants (FGD), Waste Incineration Plants, Cement Industry and as well Droplet Separators.

Conventional FGD Nozzles:



Helix Nozzle



Axial Full Cone Nozzle



Vaneless Full / Hollow Cone Nozzle

Conventional nozzle is widely use in coal power plant scrubber for gas desulfurization.
Generally the benefits of conventional FGD nozzles are:

1. Compact
2. Create fine droplets
3. Even liquid distribution
4. High reliability and low maintenance



But somehow the nozzles facing clogging issue occasionally which will direct affecting flow pattern of the nozzle and reduce the efficiency of the gas desulfurization.



Lechler TwinAbsorb® Technology:

Twin-Absorb FGD nozzles is a Lechler designed nozzle with the objective to improve the efficiency of gas desulphurization process. With the improvement of desulphurization efficiency, this will lead to a lower amount of SO_x emission and indirectly reduce the operation cost of the coal power plant. At the same time, the unique design of Twin-Absorb FGD will recude the tendency of nozzle clogging issue which gradually reduce the desulphurization efficiency.

The secrete of Lechler TwinAbsorb® Nozzle were:

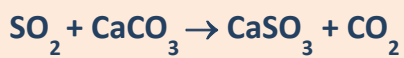
1. Secondary atomization technique.
2. Different rotation kept



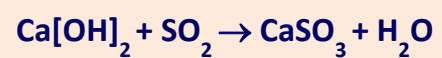
Secondary Atomization:

In FGD, chemical reaction take place at the surface of of the droplet. The reaction surface of the droplet is one of the most important factor to determine the efficiency of De-SOx capability. In generally, the chemical reaction in wet FGD as follow:

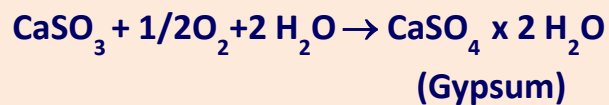
Limestone-Scrubbing (pH = 5,0 - 6,0)



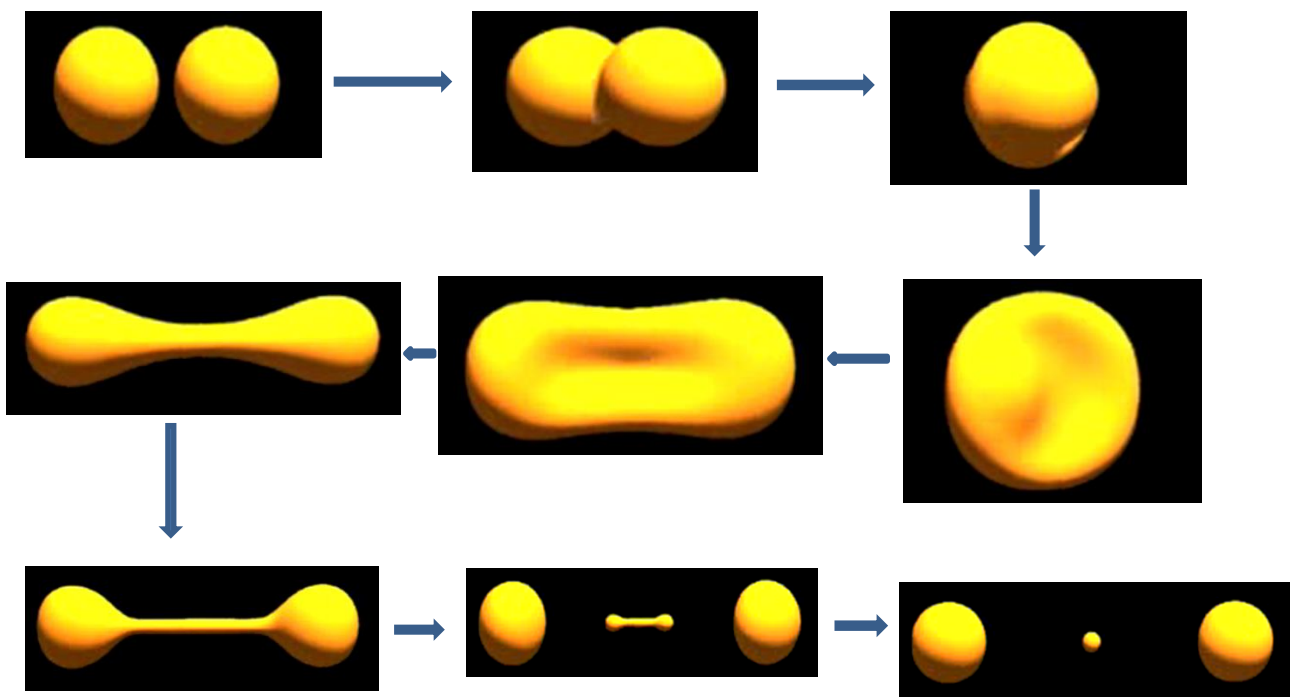
Lime-Scrubbing (< pH = 5,5)



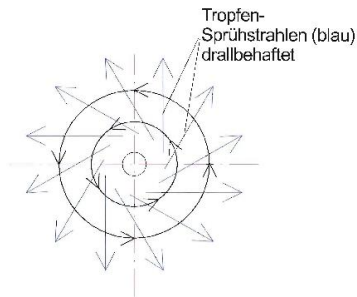
Oxidation Step (pH = 4,0 - 5,0)



The Second Atomization technical is a process of two droplet collide with each other and breaking the droplet apart, which lead to a smaller droplet size formation. With this technique, the same lime slurry injection volume will create a larger reaction surface with smaller droplet size. This smaller droplet size will create more reaction surface for chemical reaction to take place.

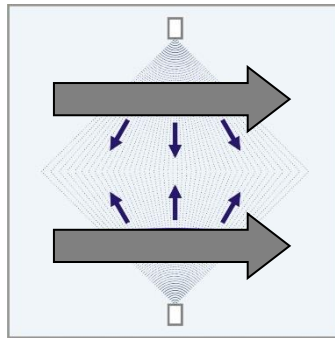


Different Rotation Kept:

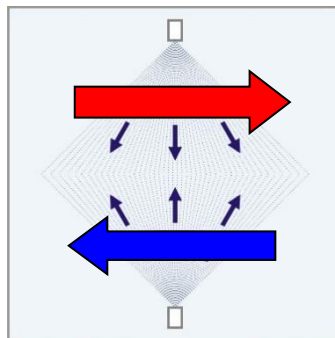


The liquid is fed tangentially into the spray nozzle to generate a swirling spray jet according to the Swirl Conservation Law.

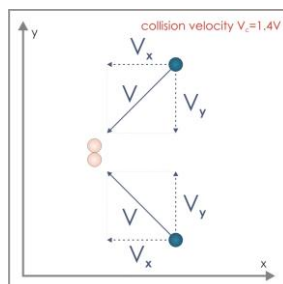
In standard technology, the spray cones meet in co-current.



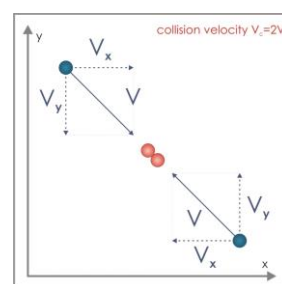
With TwinAbsorb® technologies, Lechler has designed the spray cones to meet in counter-current.



TwinAbsorb® effect create a much higher collision velocity resulting a much larger surface of the droplet spray over where the separation takes place.



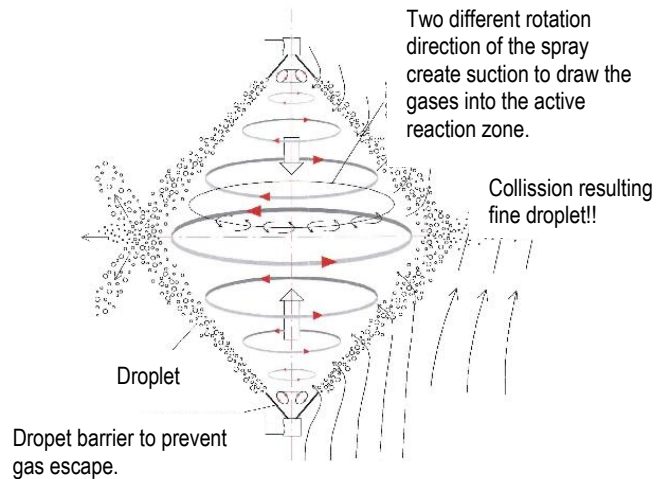
Standard Technology



TwinAbsorb® Technology

TwinAbsorb® FGD swirl the injected liquid to form rotational current.

The rotational current with high turbulence create "suction" effect drawing surrounding flue gas into spray cone or reaction zone.





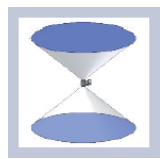

Photos Above: An experiment was carried out in open area to test the ability of rotational liquid current in creating "suction" effect to draw the gas in surrounding area into spray cone zone.

Summary:

Lechler's TwinAbsorb® FGD nozzles has been proven in many coal power plant worldwide. Result achieved after converting from standard FGD into Lechler's TwinAbsorb® include:

- i. Highly improved desulfurization
- ii. High reduction of pump energy consumption
- iii. Fuel by hard-coal with high sulphur content is possible
- iv. Fuel by Petrolcoke is possible after the retrofit

Types of TwinAbsorb® FGD:

TwinAbsorb® - EV Equilateral Full Cone Nozzle	TwinAbsorb® - EH Equilateral Hollow Cone Nozzle	TwinAbsorb® - V Bi-Direction Full Cone Nozzle	TwinAbsorb® - H Bi-Direction Hollow Cone Nozzle
			

TwinAbsorb® - EV Equilateral Full Cone Nozzle

Advantages:

- Provides smaller Sauter diameter (SMD d_{32}) caused by dual cones.
- Particularly advantageous not only for high flow rates per nozzle.
- Improved mass transfer caused by increased specific surface area.
- Supports an even gas distribution over the scrubber cross-section.
- Rotation impact onto the gas flow is compensated within the nozzle.
- Better coverage of scrubber wall section.
- Reduced slurry loss at the scrubber wall in comparison to hollow cone nozzle.
- Reduced stress at scrubber wall in comparison to hollow cone nozzle.
- Reduced torque onto the pipe branches.
- Keep the advantages of Lechler tangential flow full cone nozzle:
 - Completely self draining
 - Large free passages
 - Non-clogging design



The proven equilateral Full Cone Nozzle
TwinAbsorb®-EV generates two full cones by
using one single supply.



High efficient use of atomised slurry.

TwinAbsorb® - EH Equilateral Hollow Cone Nozzle

Advantages:

- Provides smaller Sauter diameter (SMD d_{32}) caused by dual cones.
- Particularly advantageous not only for high flow rates per nozzle.
- Extra overlapping area for highly intensive secondary atomization.
- High efficient generation of new stimulated reaction surface without additional energy input.
- Increased turbulence within the drop achieves reactivity of reaction surface.
- Improves mass transfer caused by increased specific surface area.
- Rotation impact onto the gas flow compensated within the nozzle.
- Better coverage of scrubber cross-section.
- Reduced torque onto pipe branches.
- Keep the advantages of Lechler tangential flow full cone nozzle:
 - Completely self draining
 - Large free passages
 - Non-clogging design



The proven equilateral Hollow Cone Nozzle
TwinAbsorb®-EH generates two hollow cones
by using one single supply.



Increased secondary atomization and offer extra overlapping area.

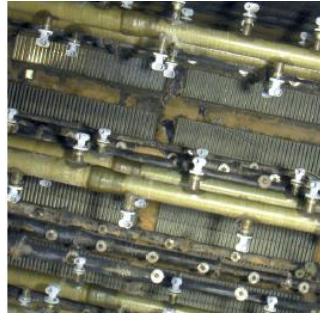
TwinAbsorb® - V Bi-direction Full Cone Nozzle

Advantages:

- Improved mass transfer caused by higher relative velocity of liquid to flue gas.
- Rotation impact onto the gas flow is compensated within the nozzle.
- Increased turbulence within the drop for highly active reaction surface.
- Increased residual time of drops during the process.
- Duplication of hydraulic spray level in comparison to single spray nozzle.
- Reduced pressure loss in case of counter current gas flow.
- Reduced slurry loss at the scrubber wall in comparison to hollow cone nozzle.
- Better coverage of scrubber wall section.
- Provides smaller Sauter diameter (SMD d_{32}) caused by dual cones.
- Particularly advantageous not only for high flow rates per nozzle.
- Reduced stress at scrubber wall in comparison to hollow cone nozzle.
- Reduced torque onto the pipe branches.
- Keep the advantages of Lechler tangential flow full cone nozzle:
 - Completely self draining
 - Large free passages
 - Non-clogging design



The proven bi-direction Full Cone Nozzle TwinAbsorb®-V generates two counter rotating full cones.



The nozzles is customized according to state of art technologies follows the technical demands.

TwinAbsorb® - H **Bi-direction Full Cone Nozzle**

Advantages:

- Improved mass transfer caused by higher relative velocity of liquid to flue gas.
- Rotation impact onto the gas flow is compensated within the nozzle.
- Intensive secondary atomization results in an increased surface for faster mass transfer.
- Increased turbulence within the drop for highly active reaction surface.
- Supports an even gas distribution over the scrubber cross-section.
- Duplication of hydraulic spray level in comparison to single spray nozzle.
- Reduced pressure loss in case of counter current gas flow.
- Provides smaller Sauter diameter (SMD d_{32}) caused by dual cones.
- Reduced torque onto the pipe branches.
- Keep the advantages of Lechler tangential flow full cone nozzle:
 - Completely self draining
 - Large free passages
 - Non-clogging design



The proven bi-direction Hollow Cone Nozzle
TwinAbsorb®-H generates two counter rotating
hollow cones.



TwinAbsorb was customized configure according to state of art technologies follow the technical demand

For further information, please contact:

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