Mixing Solutions for Flue Gas Desulfurization
Chemineer is a leading supplier of mixing solutions and products for Flue Gas Desulfurization (FGD) systems throughout the world for over 60 years. By utilizing laboratory testing and industry-leading technology, Chemineer can design the ideal mixing system for your process. Chemineer distinguishes itself from the competition through the use of rugged agitators that are highly efficient and extremely reliable. Thousands of Chemineer agitators are currently operating in FGD service and many of these have been in service for decades. Chemineer’s experience in evaluating FGD applications and supplying equipment specifically engineered for harsh FGD service ensures efficient plant operation and long, reliable service with minimal maintenance.

**Reliable FGD Mixing Solutions**

[Diagram showing FGD Process Flow]

- **Raw Lime or Limestone**
- **Ball Mill Slurry (Limestone Only)**
- **Absorber/Reaction Tank**
- **Recirculation Tank**
- **Hydrocyclone**
- **Filter Feed Tank**
- **HT Mixer**
- **HTM Mixer**
- **Model 20 GT Mixer**
- **Prochem MD Mixer**

www.chemineer.com
Chemineer offers a wide variety of products suitable for FGD applications. Chemineer offers top-entry and side-entry agitators, as well as static mixers and various other products designed for FGD applications. All wetted components are available in a wide variety of steel and alloy materials and elastomeric coatings. Typical materials for FGD processes include stainless steel, high alloys, or rubber covered carbon steel. These materials ensure reliability and corrosion/erosion resistance in abrasive FGD applications.

### Top-Entry Agitators:

The HT, HTM and Model 20 GT are durable top-entry agitator drives that excel in FGD applications. These units come standard with a dry well shaft seal to prevent oil from leaking into the process. HT and HTM agitators are commonly used in absorber, make-up and treatment tanks.

**HT/HTM Agitator Features:**
- 1 to 1000 HP
- Helical and spiral bevel gearing
- High capacity bearings throughout the entire gearbox ensure high strength, high efficiency, low maintenance and smooth operation

**Model 20 GT Agitator Features:**
- Highly efficient all helical gearing
- Compact and rugged, designed and manufactured by Chemineer

The Model 20 GT is ideal for sump applications. The most common impellers used on the top-entry mixers are the high efficiency HE-3, XE-3 and SC-3 impellers. The HE-3, XE-3 and SC-3 impellers offer superb performance in solids suspension applications. High efficiency impellers produce an axial flow pattern that promotes solids suspension and significantly reduces the wear of the impeller due to abrasion better than a standard pitched bladed impeller.

### R&D Lab and Test Facility

The Chemineer Research and Development Laboratory has the capability to model any FGD mixing application, including top- and side-entry agitator orientations. Test capabilities include solids suspension, flow velocity, torque and power draw, re-suspension, and mass-transfer testing.

The Chemineer test facility features a wide variety of tank geometries and sizes available along with the full line of standard and custom impellers. Our test vessels range from 18 inches to 12 feet in diameter. Side-entering test vessels have the flexibility to model mass-transfer and oxidation air distribution systems as well as absorber recycle pump locations and flow rates. Our test vessels can be modified to duplicate your process and customers are always welcome to observe. Video recordings of lab tests are also available.

### Computational Fluid Mixing (CFM)

Chemineer can model the fluid flow in your tank through computational fluid mixing software. This highly visual analysis can provide theoretical representations of blending and motion, solids suspension, chemical reaction, and heat transfer process. CFM is useful for optimizing flow patterns in any application.

### Rugged Products for Demanding Applications

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### 3-D CFD Analysis

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Side-Entry Agitators:
Chemineer offers the same reliability and durability that top-entry agitators provide in side-entry designs. Available for side-entry applications are the Prochem MD belt driven or Chemineer HS gear driven models.

Side-Entry Agitator Features:
- Retract mechanism and seal shut-off for easy maintenance without draining the contents of the tank or removing the drive
- Up to 300 HP
- Single cartridge, slurry-lubricated mechanical seal specifically designed for FGD slurry systems can handle up to 25% slurry without requiring a flush

Side-entry agitators for FGD utilize the high-efficiency Maxflo WSE impeller. This variable pitch, high-efficiency impeller minimizes abrasion wear and provides superior gas handling ability.

Seals:
All Chemineer agitators are available with single or double mechanical seals, stuffing boxes, lip seals, and many other options. All top-entry mechanical seal units are provided with a drop collar and easy seal replacement features. The seal cartridge can be removed as a unit without removing the drive, inherently simplifying maintenance and reducing downtime.

Static Mixers:
The Kenics High Efficiency Vortex Mixer (HEV) is the ideal device for the in-line blending applications that occur within FGD and NOx/SOx reduction processes for the following reasons:
- By generating controlled and predictable flow patterns within the turbulent process flow, the HEV achieves efficient and guaranteed mixing levels within short piping lengths.
- In addition to providing excellent mixing, the HEV converts the greatest percentage of its energy consumption into the mixing mechanism.
- Designed to provide the best possible mixing along with the lowest pressure drop of any static mixer design.
- The HEV mixing design is adaptable to circular, square and rectangular ducts contrary to many competitive designs.

Sample applications for the HEV static mixer include:
- **Flue gas recirculation** - Mixing of air and recirculated flue gas in order to provide a uniform feed to a furnace that results in a decreased and more consistent peak flame temperature.
- **SCR** - Even distribution of an injected ammonia stream into air prior to a catalyst bed. The mixing not only provides a uniform feed to the bed that can increase the catalyst life, but also reduces temperature gradients and improves the flow dynamics of the feed stream.
- **SNCR** - The mixer serves a similar purpose to the SCR example above, but is used for blending either ammonia or urea prior to a furnace.
Every Chemineer agitator selection is optimized for your specific FGD process. Equipment selections are optimized for long, reliable operation, reduced maintenance, low parasitic power consumption and optimal process performance.

Chemineer is the industry leader in blending, motion and solids suspension applications. The patented ChemScale® design procedure assures complete mixing of all process tanks, including those with high slurry concentrations or non-Newtonian characteristics.

Solids suspension design utilizes particle settling velocities based on actual solid particle size and densities. The procedure has been proven in all FGD installations, as well as many other slurry handling systems.

Optimized Design

Absorber Agitator Design

- All absorber applications are designed for complete, off-bottom suspension as a minimum requirement
- Many absorber applications are designed for higher levels of suspension to reduce and eliminate scaling on in-tank components
- Improved blending performance improves oxidation efficiency
- Air dispersion applications
  - Lance aeration systems rely on agitators to improve mass transfer. These applications utilize gear-driven Chemineer HS or belt-driven Prochem MD agitators for gas dispersion, blending and motion, and solids suspension.
- Grid or jet-sparged reaction tanks do not require additional power input to meet mass-transfer requirements
  - These applications utilize agitators for solids suspension and blending and motion only
  - Both side-entering HS and MD agitators and top-entering HT and HTM agitators may be used in these applications

Slurry Suspension Application Design - Lime, Limestone, and Gypsum Slurries

- Solids suspension design assures complete off-bottom suspension
- Selecting the proper ChemScale level eliminates dead zones
- Design procedures have been proven in both the laboratory and production scale
- When necessary impellers are designed for startup in settled solids
Chemineer Express offers an extensive aftermarket program designed to extend the service life of mixing equipment. Chemineer Express offers upgrades for any existing mixing process through advanced agitator design technology. Complete retrofit of wetted parts and sealing mechanisms offer reduced equipment downtime and improved process performance. Many replacement parts are stocked for quick turnaround and delivery to get your equipment running again as fast as possible.

Chemineer Express has developed an Emergency Service program that consists of a network of skilled in-field and in-plant aftermarket service professionals to respond to an emergency 24 hours a day. Chemineer knows how critical downtime can be to your operations. For after-hours emergencies, call 1-800-643-0641.