

# Mixing Technology for Mining and Mineral Processing



**NOY**



# Reliability in Mining Applications

We are a global supplier of heavy duty products and services for the mining industry and a leading manufacturer for over 60 years. By utilizing industry leading process and mechanical design technology, as well as laboratory testing, we consistently designs optimal mixing systems for hydrometallurgical processes.

Our successful state of the art impeller technology and robust mechanical principles are integrated into the proprietary design software, AgSolver, that is used when designing mixing solutions.

AgSolver was created by, and is continually maintained and optimized by in house experts. This ensures our equipment achieves the process objectives and will withstand the rigorous conditions present in minerals processing environments.

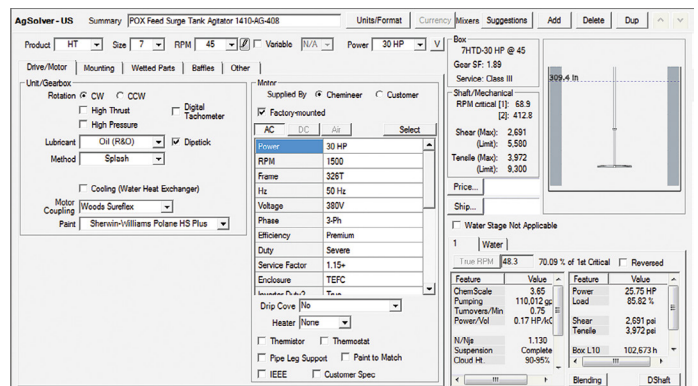
The dedication and focus provided by the Mixing Technologies team to the mining industry goes beyond original equipment supply. With manufacturing and aftermarket sales and service facilities around the world, we provide prompt customer focused service worldwide to meet the timely needs of the mining industry.



Our impeller technology can be used in a variety of applications



Mine processing infrastructure



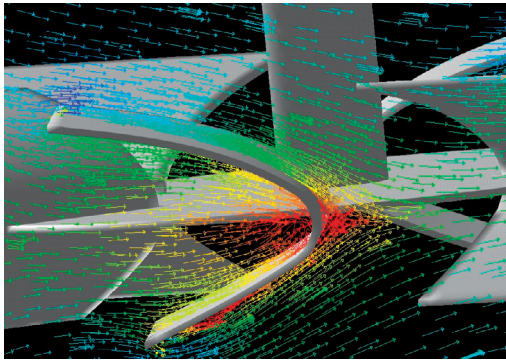
AgSolver software

# Process Technology

## Application Expertise

Flow controlled applications: Varying degrees of solids suspension and gas dispersion are required when using batch or continuous processes. The desired process results are achieved utilizing high efficiency, axial flow impellers. This technology provides low shear characteristics, critical in maintaining particle size for maximum recovery. Typical applications include leaching and adsorption circuits, slurry make down, pipeline slurry storage and tailings & wastewater disposal applications. Chemineer impellers provide efficiency and the ability to achieve optimal results.

**Autoclaves:** In conventional leaching circuits, when recovery drops below 80%, the ore is considered refractory in nature. Higher recovery requires a pretreatment process such as pressure oxidation (POX). POX applications involve gas-liquid-solids contacting in a high



*Example of  
CFD modeled  
flow fields*

temperature/pressure environment. We have the capability to provide optimal solutions that maximize uptime for effective processing of refractory ores.

**Solvent extraction:** Solvent extraction is usually a countercurrent, multi-stage contacting process used with processes such as heap leaching. Our mixer technology, pumper and auxiliary, is utilized in the mixer settler portion of the solvent extraction circuit.

## Process Design Considerations

Over the past 60 years, we have gained tremendous knowledge in the mining industry. Mixing solutions are designed with many variables taken into consideration.

- Agitators are engineered to keep pump suctions and overflow outlets clear, maximizing up time for target metal recovery and restart in high percent solids applications.
- Innovative impeller technology allows for favorable process results in any solids suspension, blending, or gas-liquid-solid contacting application due to the range of process specific impellers available.
- When gas injection for mass transfer is required, we utilize a shaft sparging system integral to the drive and wetted parts.

**CFD:** Process modeling is possible with Computational Fluid Dynamics (CFD). We can model the fluid flow in your tank through computational fluid dynamics software. This highly visual analysis can provide theoretical representations of blending and motion, solids suspension, chemical reaction, and heat transfer processes. CFD is useful for optimizing flow patterns in mining applications.

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# Aftermarket Parts and Services

The global NOV Aftermarket Parts and Services team offers customers immediate assistance to help achieve operating performance goals for agitation and mixing processes.

Our aftermarket group offers multiple options to get your process back up and running in the event of a breakdown. A network of highly trained field service technicians are ready to deploy to assist maintenance crews in repair, diagnostic, and/or maintenance work through our emergency service program. These professionals are available 24 hours a day.

Inside several NOV manufacturing facilities are service centers which are utilized for more extensive failure analysis, fast replacement parts assemblies, and the most reliable agitator repair service in the world. New and refurbished parts options are available to suit your business requirements to get equipment back into operation. All replacement parts are made to original equipment specifications to ensure maximum reliability of your mixing equipment.

Field service technicians are available in non-emergency situations to provide analysis of your existing equipment. Complete retrofit of wetted parts and sealing mechanisms

offer increased equipment uptime and improved process performance.

For after-hours emergencies, call +1-937-926-1724.



*Our team provides a quick response time on repaired or replacement parts to increase uptime*



# Products for Mineral Processing

- **GT/HT** feature rich agitators for long, maintenance free operation
- **MR** agitators when heavy duty, parallel shaft gear drives are required
- **VM** top entry belt drive agitators for applications requiring high output
- **Heat exchangers** used in explosives production for cooling (stabilizing) ammonia nitrate to keep micro beads in suspension
- **Static mixers** for continuous processing
- **Mechanical seals** for closed tank applications
- **MD** side entry belt drive agitators used for large vessels
- **Impellers** that can handle any minerals processing application



Model 20 GT



MR



VM



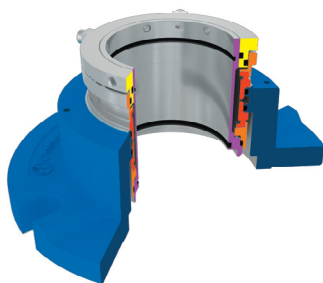
HT



KM



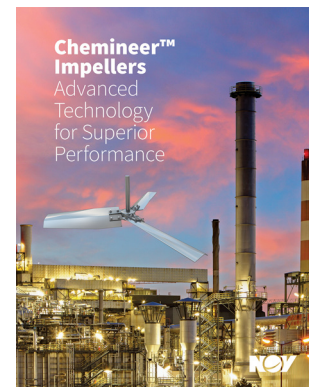
Heat Exchanger



Double Mechanical  
ChemSeal



MD



Impeller Bulletin

# Reliability in Mineral Processing

## Mechanical Design

We provide heavy duty top, side and bottom entering rotating agitators specific to achieving required process results.

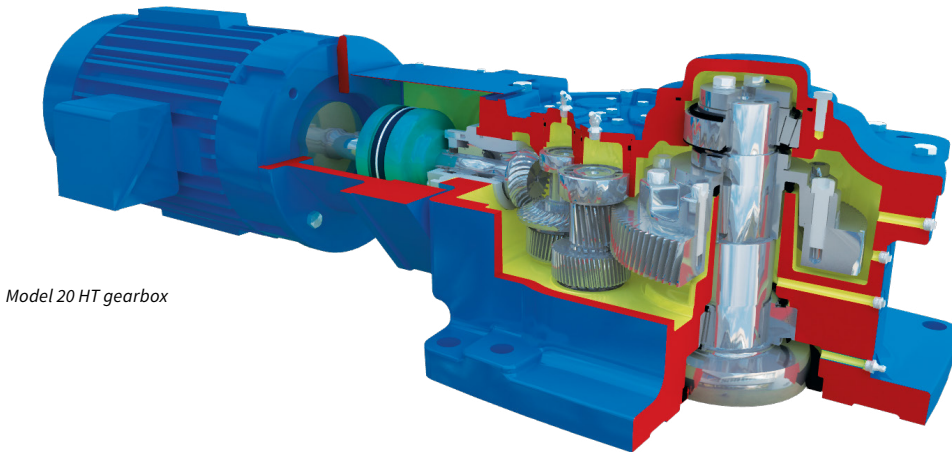
Mechanical integrity is multifaceted and can be complicated with excessive hydraulic forces, solids loading, gas injection or proximity to tank internals. Our designs go

beyond torque transmission alone and are prepared for upset conditions including power outages with resuspension of settled solids. Our mixer gear drives are specifically designed for fluid mixing service.

Chemineer agitators' robust gear and belt drives, large in-tank shaft diameters, and thick bladed impellers are guaranteed to last.

Manufacturing capabilities:

- Gear drives built in house
- Unlimited sizes for shafts and impellers
- Custom designs to your specifications
- Strict quality standards and tolerances
- Round the clock production



Model 20 HT gearbox

## Lab Testing

The Dayton facility's Research and Development Laboratory has the capability to model any mining mixing application, including top and side entry agitator orientations. Test capabilities include solids suspension, flow velocity, torque and power draw, resuspension, and mass transfer testing. Actual ore samples or representative solids for scale up purposes can be tested.

The Dayton test facility features a wide variety of tank geometries and sizes available along with a full line of standard and custom impellers. Our test vessels range from 18 inches to 12 feet in diameter and can be modified to duplicate your process. Video recordings of lab tests are available and customers are always welcome to observe.



Installed Chemineer HT agitator

# Chemineer

Chemineer is a leading provider of process solutions for the oil and gas industry.

Our products and services are designed to improve the efficiency and safety of your operations.

For more information, please contact your local Chemineer representative.

Visit our website at [www.nov.com](http://www.nov.com) for more details.

Chemineer is committed to providing the highest quality products and services.

Our dedication to customer service is our top priority.

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