

EKATO Specialist Service to the Minerals Processing Industry

PUBLICATIONS

For users interested in more detailed information on mixing EKATO offers its 'Handbook of Mixing Technology' which among other important topics describes the fundamentals of mixing and many mechanical aspects. Various papers have been written, presented and published by EKATO, in particular for minerals processing:

- POX autoclaves –
New advances in impeller design for highly abrasive ores
- Innovation in agitation technology for autoclave applications
- Considerations and methodologies for the design of gassed agitated CSTR's
- Agitator start-up in settled bed conditions
- Systematic characterization of the mixing process for the BIOX® reactor
- Mechanical seals and seals supply systems for high pressure autoclave applications
- Increasing safety and reliability of autoclaves by a simplified risk analysis procedure of mechanical seals and supply systems



EKATO Specialist Service to the Minerals Processing Industry

■ EKATO, for over 75 years, has successfully designed and manufactured industrial agitators utilized in many global industrial markets. One of these global industry sectors is minerals processing where hydrometallurgical processes utilize agitation.

■ A significant contribution to our success and recognition in this demanding industry is 'added value'. EKATO's unique capabilities to conduct pilot scale tests with ore from your specific geological region in our Technical Center extends our engineering capabilities far beyond the normal industry limits of agitation and differentiates us from the traditional agitator manufacturers.

■ Technology development is the foundation of our reputation and reference of operational sites which employ process routes such as HPAL, POX, CIL / CIP, Bioleach, CN Detox, etc.



■ Thousands of customers have already found the benefits that optimization of their proprietary production processes delivers by conducting tests in our R&D facilities and implementing the recommendations.

CN Detox
Bioleach
POX
Feed Tanks
Atmospheric Leach
Sulphide Precipitation
Lime / Limestone Storage
Neutralization
HPAL
CIL / CIP
Manganese Removal
Aluminum Hydroxide

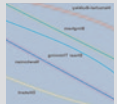
■ Where the specific detail of the application or the product data is unknown, for the owner and operator, it can be beneficial to back up the classical agitator design by testing in a controlled environment. The objective is 'optimized design with reduced risk'.

EKATO's primary Technical Center is located in Schopfheim, Germany, where more than 20 engineers are available to support you. In our state of the art facility testing is possible using your original products or representative model substances. The capabilities of the test equipment ranges between 500 ml up to 100 m³, although the typical test range against which reliable results can be achieved is between 50 liters and 1 m³.

A multitude of vessel arrangements and shapes including autoclave vessels are available or can be assembled for sizes which can be confidently used as the basis for scale-up.

Depending on the flow sheet requirements or specific mixing task many critical data points and values can be recorded during testing to determine the characteristics of the product ensuring a complete understanding of how the process will behave at full scale conditions, e.g.:

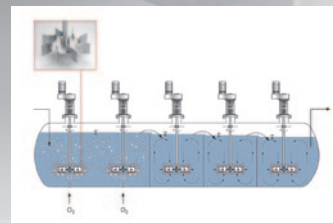
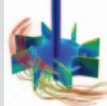
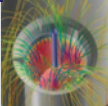
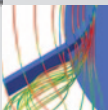
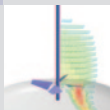
- mixing time
- mass transfer
- feed locations
- process simulation
- rheological properties
- particle size distribution
- solids settling curves
- flow velocities or pumping rates
- power numbers ungasged / gasged
- forces acting on impellers and shaft
- solids suspension homogeneity
- residence time distributions (solid / liquid)
- particle characterization by microscope
- surface phenomena, e.g. entrainment of powders into a liquid
- validation of CFD models



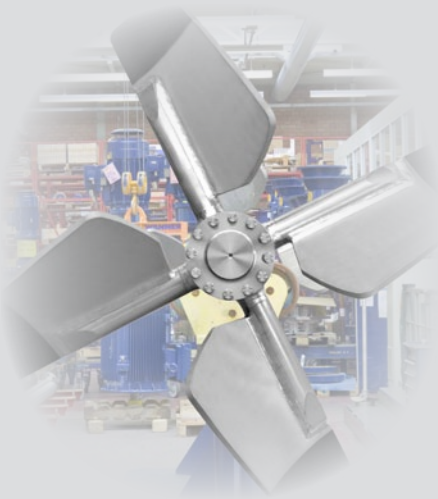
■ As an agitator manufacturer dedicated to process technology development through proven trials and results we have an extensive range of impellers available which are essential for successful applications.

In the event that creativity and innovation is required to fulfill the process requirements of the application our technical staff has the capability to develop new impeller types.

Depending on the application, from our extensive knowledge and operational experience for standard suspending tasks the hydrofoil type EKATO VISCOPROP is the impeller of choice, or in processes where a gas phase is added to the slurry the widefoil type EKATO ISOJET-B would offer significant advantages.



■ For HPAL or POX autoclave applications the EKATO EPAL or EPOX-R impellers are designed to fulfill very specific mixing tasks while considering the full scale operation costs. Many other impeller types are available, including complex draft tube designs, where the EDTC impeller offers advantages compared to standard designs.



■ ADDITIONAL ENGINEERING SERVICES

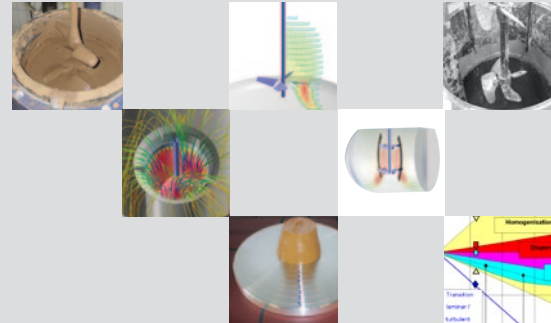
Include technical reviews of equipment or operations which influence the process performance. Often overlooked, interrelations such as the vessel geometry or feed / discharge locations have a significant impact on the process itself or mechanical design of the equipment.

Deliverables and expectations are tailored to suit client needs and requirements determined by the scope of the project. Results of the testing or engineering study will be summarized in a technical report illustrating the options for the operator to secure market driven competitive advantages. Clients are welcome to witness the testing activities, or tests can be recorded digitally and supplied on a DVD.

■ TESTING / ENGINEERING STUDIES

Making use of the resources in the well equipped Technical Center and its experienced minerals processing engineers dedicated to the industry, EKATO has the competence to support end-users or engineering companies. This service extends to the design of new or improvement of existing processes to achieve optimum efficiency, cost efficiency or increased reliability. Engineering studies range from a basic one day test to an extensive research project.

Depending on the nature of the testing program original concentrate samples can be utilized. If samples are not available most product characteristics and mixing tasks can be simulated by model substances. Both methods allow for an accurate and safe full scale design.



■ CONSULTING ON SITE

Our capabilities are not limited to the Technical Center. Consultancy services or test programs can be provided on site. A review of equipment or an audit of operations focusing exclusively on enhancements to agitation technology leads to a comprehensive report and recommendations to any modifications.

In addition to already mentioned services, EKATO can provide a wide range of additional services and know-how, such as:

- design of gas sparger types and feed locations
- feed pipe dimensions and locations, as e.g. slurry and sulphuric acid feed pipes in HPAL applications
- discharge locations, dimensions of dip or riser pipes
- CFD (Computational Fluid Dynamics) and FEA (Finite Element Analysis) simulations
- mechanical calculations as the determination of forces acting on vessel internals
- increase life-time of equipment by reducing abrasion or application of coatings
- restart strategies or consulting for processes operated at high solids concentrations
- optimized draft tube geometries to reduce pressure drops and therefore required power inputs
- increase life-time of the mechanical seals by revamping with mechanical seals from EKATO ESD
- thermographic measurements
- training at your office or plant site

