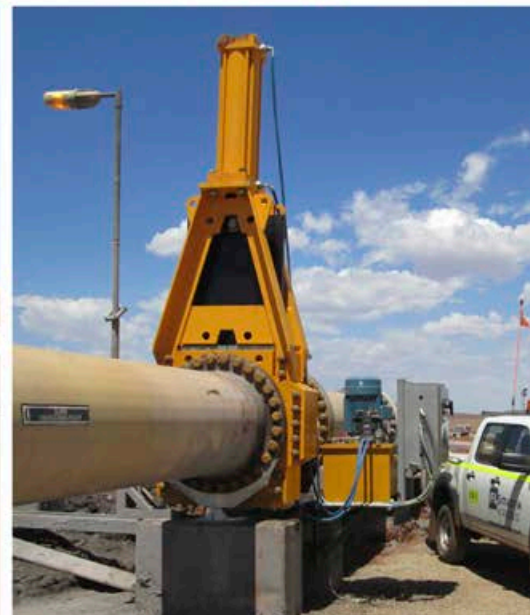


One Source

# FLSmidth KREBS® cyclones, pumps & valves



With KREBS separation systems  
it's easy to see what you've been missing

**FLSMIDTH**  
KREBS



# Excelling in separation solutions since 1952



## Mining markets

- \\ Aggregate & industrial minerals
- \\ Coal
- \\ Hardrock mining
- \\ Alumina

## Industrial markets

- \\ Automotive
- \\ Plastics Recycling
- \\ Industrial Wastewater
- \\ Potable Water
- \\ Municipal Wastewater
- \\ Chemical & Petrochemical
- \\ Food
- \\ Power / FGD
- \\ Dairy
- \\ Pulp & Paper
- \\ Coolant Cleaning & Parts Washing
- \\ Groundwater Remediation
- \\ Refining

FLSmidth Krebs is the world's leading manufacturer of hydrocyclone classification equipment and has been serving the process industries since 1952.

With over 60 years of successful involvement in separation, classification and dewatering equipment, FLSmidth Krebs has built an unsurpassed reputation for technical expertise, quality products, and customer service. Experience and knowledge gained through the successful completion of challenging worldwide projects has resulted in unique capabilities for problem solving in such diverse fields as aggregates, chemicals, alumina, hard rock mining, coal mining, oil and gas, pulp and paper, pollution control, power generation, water, and wastewater.

Krebs is committed to consistently striving to make product improvements that will better serve our current and future customer needs in all industries and various applications through the application of hydrocyclone and pumping technology.

### millMAX™ pumps

Adding a millMAX™ pump to your separation process will reduce your pumping costs. As the leader in cyclone technology, we make sure your pumping system optimizes your separation requirements.

Krebs millMAX severe duty slurry pumps have a unique design developed exclusively for grinding mill discharge duties and other abrasive slurries. FLSmidth Krebs offers wet end conversions of competitor's pumps or complete pump assemblies to meet customer requirements.

The millMAX pump features a patented on-line wear clearance adjustment, which minimizes cost-per-ton pumped compared to conventional hard metal and rubber lined pumps. This patented design feature ensures maximum wear life of the wet end components and optimum cyclone pressure throughout the life of the pump, by reducing attrition and internal recirculation in the pump.

The primary applications for the Krebs high chrome metal or rubber lined slurry pumps are mill discharge, crusher slurry, sand and aggregate or any coarse solids or other severe, abrasive slurries especially in copper, gold, lead-zinc, coal, or phosphate plants. The most dramatic savings will be in those applications, though savings will also be realized on fine solids, like iron ore or kaolin.

### Technequip™ valves

The Technequip™ knife gate valve is a true bi-directional slurry knife gate valve of open body design, will full port flow. Its massive replaceable rubber sleeves were designed to seal and withstand the harsh abrasive duty inherent in mining and milling facilities.

The Tech-Taylor valve is a 2-way, floating ball, check valve used to isolate duty and standby pumps in mineral processing circuits, requiring no external actuator to be interlocked with a pump motor starter. The Tech-Taylor valve is the best answer for pump isolation and operates in any orientation.

The T-1 Vacuum Breaker valve is a one-way free ball slurry check valve. It is mounted on the high points in a slurry line to break the vacuum created upon pump or power failure. It has been used since the 1970's and is particularly useful in cold climates where temperatures can cause tailings lines to become brittle and much more susceptible to fracture when exposed to vacuum.





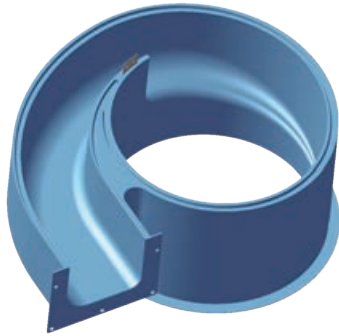


### gMAX® hydrocyclones

New era, new engineering, and a whole new performance standard for separation technology. The new gMAX line from FLSmidth Krebs, leading the industry since 1952.

#### Krebs gMAX Inlet

Optimum cyclone performance relies on minimizing turbulence while maximizing tangential velocity. The new gMAX cyclone focuses on these two important cyclone factors, significantly advancing cyclone performance. To achieve the two design criteria, the gMAX cyclone incorporates performance enhancing improvements to the inlet head, cylinder section, cones, and apex.



The Krebs gMAX inlet has improved upon the Krebs original involute style feed inlet that was the state of the art in hydrocyclones for over 40 years. The outer wall, ramp down involute design pre-classifies the feed solids prior to entering the main body of the cyclone. The upper part of the gMAX cyclone also includes an improved vortex finder and top cover plate liner design. These improvements to the inlet head result in less misplacement of coarse material to the overflow and dramatically increased wear life. The improved gMAX cyclone inlet, combined with premium ceramics in the lower parts of the cyclone, greatly increases the life of the cyclone, while reducing the number of times the cyclone needs to be taken out of service for various repairs.

Through the use of CFD analysis, Krebs has designed the gMAX cyclone with sharper upper cones followed by longer angled lower cones. This combination maximizes tangential velocity in the upper part of the cyclone. It then provides a long residence time in the critical separation zones in the lower part of the cyclone. This results in a substantially finer separation with fewer fines in the underflow.

#### SmartCyclone™ system

The SmartCyclone closed-grinding process optimization system introduces newly improved wireless electronic sensing and communications to Krebs cyclone separator products. This allows the cyclones to actively participate in plant control systems, plant alarm control systems, and in proactive maintenance planning.

With a SmartCyclone equipped plant, cyclone sensors can report the functional state of the cyclone by detecting “roping” underflow conditions from each cyclone individually. Other sensors can also report the amount of wear on cyclone liners, so that liner purchasing and relining operations can be planned in advance with greater control, with fewer unplanned outages. Finally, the sensors can report when a cyclone, the SmartCyclone system itself, is malfunctioning. Because multiple sensors can be mounted on each cyclone, the individual performance characteristics of each unit can be monitored and adjusted as necessary in real-time. Wireless underflow (splash skirt) sensor, hand-held wireless controller, and docking/charging station are shown below.



# Supported industries

## Mining

FLSmidth Krebs has installed over 150,000 hydrocyclones and over 12,000 pumps worldwide and has been awarded contracts by all of the large international mining companies. These customers include but not limited to; Alcoa, BHP-Billiton, Codelco, PT Freeport, Goldfields Ghana, Iluka Resources, KCGM, Newcrest Mining, Newmont Mining, Ok Tedi, Placer Dome/Pacific, Rio Tinto, and Xstrata. New cyclone designs and materials of construction have been developed to meet industry needs for devices that offer higher capacities, finer separations, and greater durability.

FLSmidth Krebs provides individual hydrocyclones as well as entire multi-unit hydrocyclone clusters that can be supplied with valves, piping, collectors, support structures, instrumentation, and other accessories.

## Industrial

Krebs hydrocyclones for solid/liquid separations are used in a broad spectrum of industrial applications including basic chemicals, pulp and paper, water and wastewater treatment, food and beverage processing, and power generation. In these applications, hydrocyclones either remove dense contaminants, classify by particle size, or dewater and thicken a slurry.

A unique type of hydrocyclone, the Krebs DeOiling hydrocyclone uses centrifugal force to physically separate immiscible liquids. Fluids containing oils and/or fats are fed tangentially into the DeOiling hydrocyclone. As the mixture flows through the unit, it accelerates sending the lighter oils or fats to the center for removal through the overflow. Cleaned water reports to the underflow.

For more information on Krebs cyclones, desanding and deoiling vessels, and close packed systems for industrial applications visit our website [www.flsmidthkrebs.com](http://www.flsmidthkrebs.com)





# Products & services



## Products

FLSmidth Krebs' primary focus is on the proper design, selection and application of hydrocyclones and slurry pumps. Krebs gMAX hydrocyclones and CycloClean (DeOiling) Systems are a step above. Installed in either in-line or radial manifolds, or in compact vessels, FLSmidth Krebs delivers innovative hydrocyclone solutions for your solids separation and oil recovery needs. Combined with unparalleled application experience, Krebs provides a performance edge that's hard to beat.

In addition to the most complete hydrocyclone offering available, FLSmidth Krebs offers a broad range of complimentary products.

These products support and enhance hydrocyclone operation and include hydrocyclone manifolds and vessels that uniformly distribute the feed to each hydrocyclone and collect the overflow and underflow products from the hydrocyclones. Krebs hydrocyclone manifolds allow for ease of installation, maintenance and retrofit.

FLSmidth Krebs supplies a complete line of millMAX, gravelMAX, and slurryMAX, severe-duty slurry pumps to meet any slurry pumping requirements.

FLSmidth Krebs also offers Technequip™ Valves, the highest quality replacement parts and hydrocyclone accessories such as Krebs CycloWash, CycloStack, and SmartCyclone technology. Finally FLSmidth Krebs provides high quality spiral concentrators.

## Testing services

After thousands of installations, our experienced engineers are frequently able to specify the proper hydrocyclone configuration without testing. When testing is required our hydrocyclone test laboratory in Tucson, Arizona is available for verification of our equipment, components, and slurry materials under simulated operating conditions.

Testing is also regularly conducted at field locations as required. Individual hydrocyclones, test skids or pilot plants can be furnished and staffed for on-site customer evaluation. Please keep in mind that we cannot work on hazardous materials.

For more details on our test laboratory, please contact FLSmidth Krebs. 520-744-8200

## Research and development

Since its inception, FLSmidth Krebs has maintained an ongoing program designed to find new products, new materials and better ways to meet the requirements of a broad range of applications. In recent years extensive research and field testing has yielded important advances in product design, as well as a range of special alloys, elastomers and ceramics designed to promote longer wear life for cyclone parts and linings.

To achieve maximum cyclone wear life, materials of construction must be provided that will resist the destructive actions of abrasion, corrosion, temperature and pressure. FLSmidth Krebs research and development programs have yielded a range of high-performance materials that have contributed to Krebs reputation for producing the longest lasting, most efficient cyclone in the industry.

Advances in materials technology include Krebs resilient BPC rubber compound, and special silicon carbide and alumina ceramic metals for use as highly abrasion-resistant cyclone liners.

## Remanufacturing

Cyclones that are well maintained will pay you dividends. Worn cyclone liners result in poor cyclone performance and can cause housing damage. When your liners start to wear, send your Krebs cyclones to one of our manufacturing facilities. We'll remove the old liners, clean refurbish and install new genuine Krebs liners and repaint the housings - all for one competitive price.

We make sure that your new liners are of the highest quality and that they are installed per factory specifications with the cyclone returned to like-new condition. The resulting long wear life ensures high process efficiency by maintaining the proper internal cyclone geometry and reducing system downtime for unscheduled maintenance.



## Customer service

At FLSmidth Krebs we are committed to delivering the highest quality equipment backed by the highest level of technical service and support. We are committed to our research and development programs and continually improve our products to ensure the highest quality products are delivered.

FLSmidth Krebs takes pride in the service and support offered to our customers in technical assistance, parts inventory and product quality. FLSmidth Krebs has over 60 years' experience in processing, separation and classification applications. We have an extensive inventory that is maintained to provide prompt shipments of spare parts -- often within 24 hours.

In addition to our Tucson, Arizona warehouse we also have complete parts warehouses in Alabama, Canada, Kentucky, Nevada, and West Virginia. FLSmidth Krebs' Guaranteed Fit on all liners and housings and our Guaranteed Quality of all materials benefits maintenance and operational aspects by improving hydrocyclone efficiency and lowering product wear.

For more information on our products and brochure literature visit us at [www.flsmidthkrebs.com](http://www.flsmidthkrebs.com)



# FLSmidth KREBS® cyclones, pumps & valves



## World-class Service

The Krebs' customer service philosophy is to consistently exceed the expectations of our customers when it comes to providing technical support, processing orders and maintaining parts availability. Starting with the sales process, and extending throughout the life of the supplied process solution, we strive to provide an unmatched, world-class customer experience.

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