Our control solution targets the closed-circuit grinding process with a dedicated automation philosophy—helping your plant to achieve maximum process efficiency.

Key benefits

- Quick identification and correction of process upsets
  - Less process downtime
- Reduced variation in flotation particle size distribution
  - Improved mineral recovery
- Predictable cyclone maintenance schedule
  - Improved process stability—and wear monitoring
- Increased production capacity
  - Ability to run the plant closer to the cyclone design limits
Condition monitoring

Condition monitoring is the process of using sensors to observe parameters of critical machinery in order to identify significant changes that may indicate a developing problem. Our SmartCyclone™ is an automated solution for monitoring cyclone-related process upsets in closed-circuit grinding processes. By reducing cyclone-related process upsets and improving cyclone overflow particle size distribution, SmartCyclone™ helps to optimise the process. It also helps to predict and control cyclone maintenance schedules.

The complete SmartCyclone™ system is comprised of the following patented components:

- KREBS® Smartcyclone™
- Wear detection sensor technology
- Roping sensor technology
- Wireless control system
- ECS/ProcessExpert® process control software with optional Smart-Wear™ cyclone maintenance algorithm

The SmartCyclone system introduces electronic sensing and communications to KREBS hydrocyclone separator products and the encompassing process, creating what is called an "island of optimisation" for mineral processing and specialty markets.

Within the system, the SmartCyclone sensors report the functional state of the hydrocyclone by individually monitoring the slurry flow conditions for each cyclone.

The sensors also can report the wear status of the cyclone components, giving your operation greater control to plan ahead for purchasing parts and scheduling maintenance. Finally, the sensors can report when a cyclone, or the SmartCyclone system itself, is malfunctioning—such as when an individual cyclone experiences a condition called "roping," or a breakdown in the classification.

As part of the SmartCyclone solution, the ECS/ProcessExpert software is a modern, advanced process control system that is able to first stabilise and then optimise key minerals processes. It balances equipment loads, manages and corrects process disruptions, and optimises wear on the plant’s equipment. By dramatically reducing or eliminating manual involvement from your mill operators, ECS/ProcessExpert can consistently ensure optimum plant performance for maximum efficiency and higher profitability. In addition, the ECS/ProcessExpert solution will enable you to develop a uniform operation strategy for the best way to run your plant. An established strategy will greatly reduce the burden of training new operators.
New wireless technology
and automation package

The new, compact, wireless SmartCyclone™ sensor system eliminates
the need for individual node boxes, as well as the interconnecting
cables between the sensors and nodes and associated controllers.

Industry breakthrough
A single central wireless controller handles up to 16 sensors per unit. It provides real-time wireless detection and communication of roping and/or wear data, which is forwarded via Ethernet cable from the manifold controller(s) to the control room workstation.

The new wireless controller unit is a handheld device that can be removed from its docking/charging station to sync the individual sensors. The operator removes it from the dock, walks to a desired sensor, activates it with a magnet located within the device and sets the necessary operating parameters. After completing the process, the user places the controller unit back onto its docking station, where it can communicate live operating data to the control room.

More compact system:
- Elimates node boxes for each cyclone
- Utilises one central controller for up to 16 cyclones
- NEMA4X enclosure protects the controller within the dock

No cables or wires
- Controller’s wireless antenna communicates with sensors
- Eliminates cable trays for a more streamlined installation
- Elimination of cables allows easy cyclone removal for maintenance

SmartCyclone systems are offered in three different packages – basic, expert and advanced

<table>
<thead>
<tr>
<th>Sensor input</th>
<th>Control action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic package</strong></td>
<td></td>
</tr>
<tr>
<td>Roping detection</td>
<td>Alarm only</td>
</tr>
<tr>
<td>Wear detection</td>
<td></td>
</tr>
<tr>
<td>Cyclone on/off via valve position</td>
<td>Display only</td>
</tr>
<tr>
<td><strong>Expert package</strong></td>
<td></td>
</tr>
<tr>
<td>Complete basic package</td>
<td></td>
</tr>
<tr>
<td>Cyclone flow timer</td>
<td>Turns off/on cyclones (to address roping events and manage wear)</td>
</tr>
<tr>
<td><strong>Advanced Expert package</strong></td>
<td></td>
</tr>
<tr>
<td>Complete expert package</td>
<td></td>
</tr>
<tr>
<td>Particle size distribution/density</td>
<td>Increase/decrease water introduction, pump speed and/or number of operating cyclones</td>
</tr>
<tr>
<td>VFD amps</td>
<td>Optimise pump speed</td>
</tr>
<tr>
<td>Sump level</td>
<td>Optimise pump speed and water introduction</td>
</tr>
<tr>
<td>Feed pressure</td>
<td>Optimise pump speed and/or turn off/on cyclones</td>
</tr>
</tbody>
</table>
Using the SmartCyclone, plants can achieve maximum process efficiencies through quick upset condition identification and correction. The efficiencies permit the process to be operated closer to the limits of the cyclone manifold design, reduce process downtime and reduce flotation feed variation. All of these benefits lead to:

- Improved mineral recovery
- Stabilized cyclone operation
- Continuous wear monitoring and management
- Predictable cyclone circuit maintenance
- Increased production capacity
Configurable graphical user interface

This interface illustration shows 13 total cyclones, with 10 operating. Note the cyclone indicating roping conditions (value is in red) and another cyclone showing a wear value of 83.5% (also in red), having exceeded its designated wear limits. The operator can enter customised set-point fields on the user interface screens, and also monitor real-time trending of critical process parameters.
We deliver reliability and slurry to your process

Our knife gate slurry valves are designed for the most demanding high-pressure applications.

krebs@flsmidth.com

With KREBS® separation systems, it is easy to see what you have been missing

Achieve finer, sharper particle separations at high capacities.

www.flsmidth.com

Learn from our experts

Subscribe to our Discover Mining magazine on www.flsmidth.com
Bringing better solutions to light in the cement and mining industries

The future is full of possibilities and you are leading the way. But it's never a straight journey and it's easy to lose sight of true potential. With an ally by your side, who shares your ambitions and who sees your world from different angles, we will find the right way together.

For more than 135 years, we have challenged conventions and explored opportunities. Across more than 50 countries, we are 13,000 employees who combine our unique process knowledge on projects, products and services to drive success. We develop the most advanced technology in our industries and offer market-leading product and service ranges.

Rooted in Danish values, we activate our knowledge and experience to navigate your complexity and bring better solutions to light. So no matter where in the world you are, we are here to help you discover new ground and achieve sustainable productivity enhancement.

We are the market-leading supplier of engineering, equipment and service solutions to customers in the global mining and cement industries.

We discover potential.