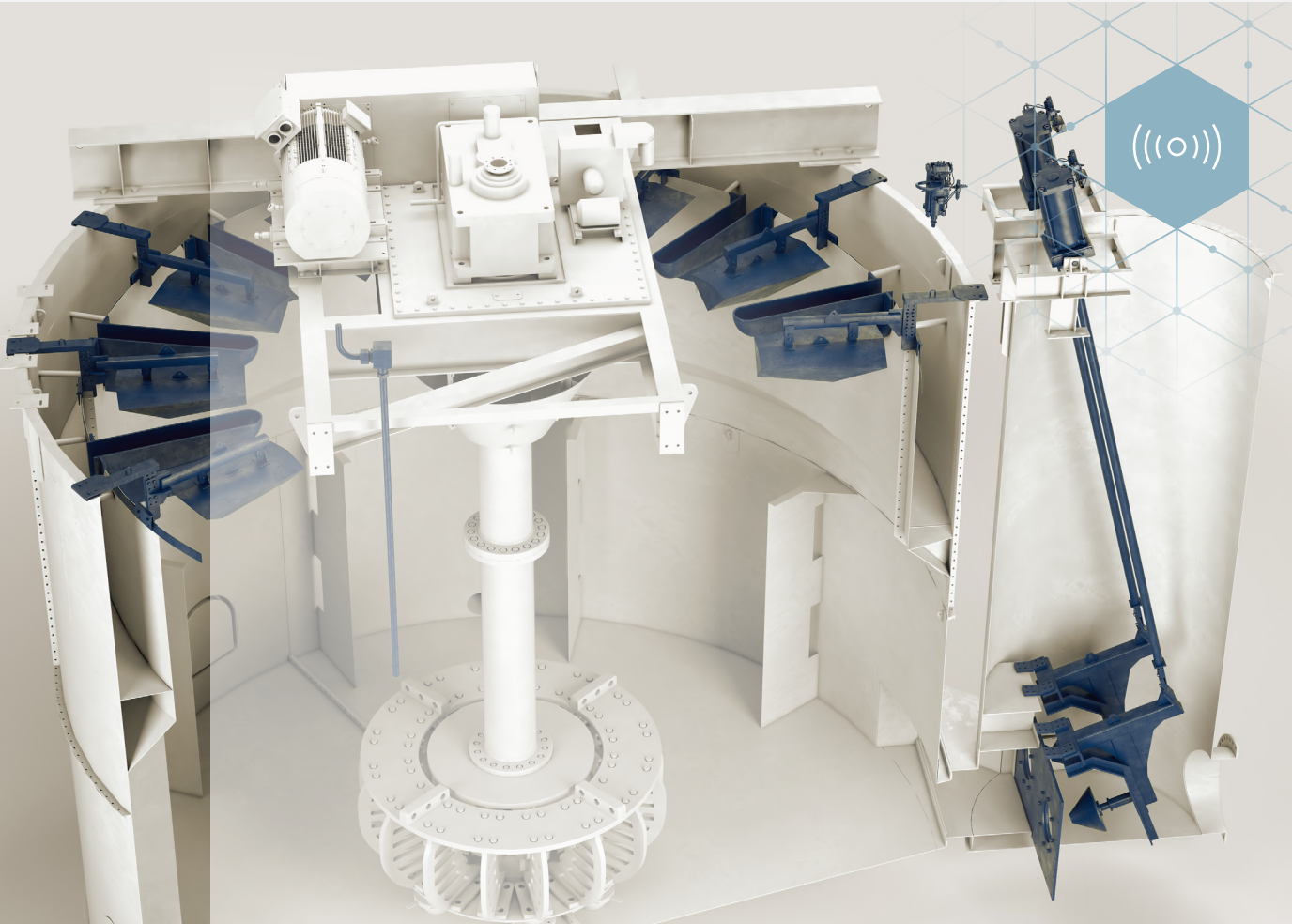


# Smart Flotation package: delivering high efficiency, recovery, and value





Flotation is a complex process, influenced by many variables that affect metallurgical performance. With 24/7 visibility and monitoring, your flotation circuit will be more adaptable, bringing maximum recovery and a healthier bottom line. Upgrade and connect your circuit with our advanced equipment, software and services – and enjoy a higher return on your investment.

Our complete Smart Flotation upgrade package offers several enhancements for your operation that allow you to improve froth recovery – at a lower cost and reduced energy consumption.

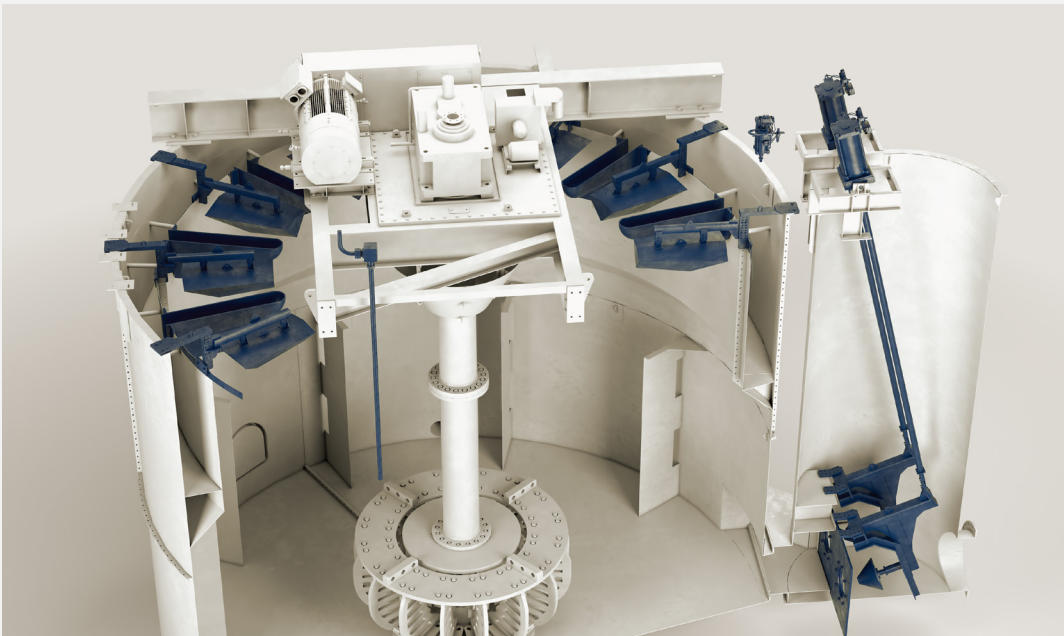
**With the flotation upgrade package, you gain:**

- Technology built into your flotation bank that will tell you how it's operating, so you know when to make adjustments for optimal performance
- Monitoring and reliability strategies that help you plan, adjust and act
- Lifecycle support to ensure high productivity with maximum peace of mind

Today's successful mines use more than reliable equipment, they leverage digital insights that guarantee efficiency. Our recent innovations in separation technology ensure maximum recovery of valuable minerals that would otherwise have been lost to tailings.

# Every upgrade option is designed to improve metallurgical performance

Emerging technologies allow you to optimise efficiency, extend equipment life and improve your practices. A complete upgrade package includes equipment/hardware, software and services – all provided by our network of specialists with in-depth experience and expertise in the industry.



- Equipment upgrade
- Digital enablement
- Condition monitoring
- Lifecycle services

## Smart Flotation package

### Key benefits

- Maximised recovery of valuable minerals
- Increased grade of product
- Predictive, preventive maintenance to avoid unplanned shutdowns
- Operational cost savings
- Increased availability and reliability
- Stress-free maintenance planning

## Hardware

- Level sensors
- Actuators
- Adjustable radial froth crowders
- Dart valves
- Froth camera
- LIDAR
- Samplers
- PERI™ Online Slurry Analysis System

## Software


- ECS™ Product Control Solution, Product control software
- ECS/ProcessExpert® Advanced Process Control
- SiteConnect™ Mobile Insights App
- PlantVision software for froth camera

## Lifecycle services

- Process optimisation and instrumentation upgrades
- Data interpretation & process support
- Total Cost of Ownership analysis
- PlantLine™ Service Agreement
- Online condition monitoring services
- Digital Checklist Tool

# Full flexibility to choose the right fit for your needs

Our Smart Flotation upgrade package features technologies that work together or that may be installed as separate components, based on your needs. With this flexibility, you can partner with your FLSmidth representative to find the package that works best for your operation.




### Basic

- Level sensor
- Actuator
- Dart valve
- Adjustable radial froth crowders




### Quality Control

- Sampler
- Analyser




### Control and connect

- Cloud connection
- ECS™ Product Control
- SiteConnect™ app




### Asset health

- Online condition monitoring services



### Advanced instrumentation

- Froth camera
- LIDAR



### Asset optimisation

- ECS/ProcessExpert®
- Total Cost of Ownership (TCO) analysis



# A recovery system that eliminates guesswork and provides control

Control is the name of the game with Smart Flotation. Our latest flotation technology is proven to allow quicker reactions for flow and slurry density changes, greatly improving the performance of your flotation cells.

As the amount and type of froth changes from cell to cell, your recovery systems must be able to adapt to variable froth conditions, otherwise valuable materials end up being lost to tailings.

Take your flotation cell to the next level with actuators, level sensors and dart valves that are designed to provide improved recovery and grade. These technologies enable you to better control the froth phase, which, in turn, improves flotation cell performance and helps you save overall costs.

## Level sensors and actuators



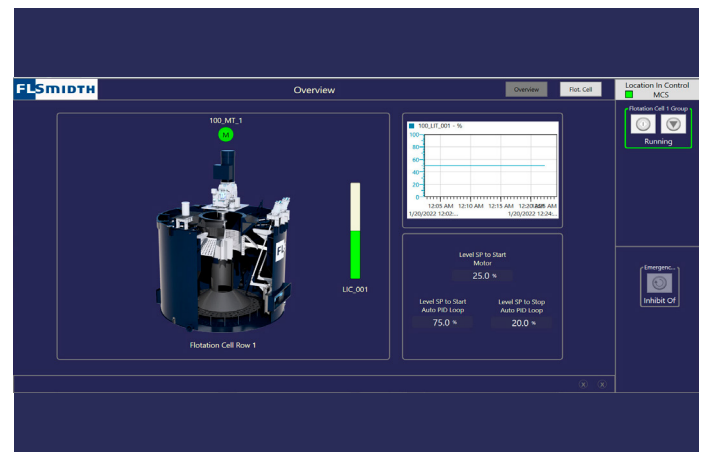
A level sensor with a robust design and no moving parts accurately senses the depth and level of slurry within the cell. Our level sensor is one of the most accurate available today



Our standard offering includes FESTO™ actuators, which receive data from the level sensor and adjust the dart valve position to maintain slurry levels. All actions taken by the control system are based on these measurements, so accuracy is imperative for optimal performance.

## Dart valves

We offer three types of dart valves: cylindrical outside boxes, hinged, and vertical in tank. Our hinged dart valves are designed to have a lower resistance coefficient and provide linear response. The cylindrical outside boxes dart valves give you the option to implement bypasses.



## Dart Sense Control

The key feature of flotation product control (via ECS™ Product Control) is the DART Sense control block, which ensures stable operation of the flotation dart valves. It allows the operator to toggle between different control strategies, providing better accuracy, improved valve wear life and optimal cell levels. It can be used as standalone or interfaced with our Advanced Process Control system, ECS/ProcessExpert®.

# Better froth control and intelligent analysis maximise performance

Reliable equipment and instruments, paired with state-of-art software, are the keys to achieving better recovery and improved grade.

## Radial froth crowders

Radial froth crowders reduce top-of-froth surface area and facilitate movement to the nearest radial launders, reducing the froth's travel distance within the cell.

Froth crowder installation does not require cutting or welding, and it can be done during scheduled maintenance. Typical installation time is approximately eight hours, which not only makes this feature low-risk, but is also highly beneficial in terms of recovery and downtime. The expected improvement in recovery is 1-3%.



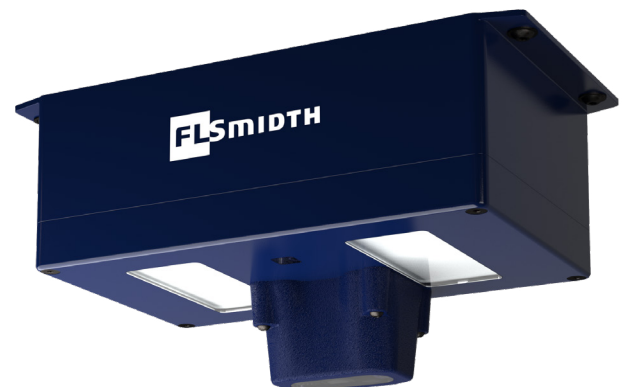
## Froth camera with LIDAR option

Our newest technology represents the next leap forward in mineral processing vision systems. Our froth cameras measure the froth's velocity and stability, and they can also infer the froth grade with the help of Deep Neural Network (DNN) technology and object detection.

This allows you to train your froth camera on your flotation cell making it possible to identify virtually any object. In addition to traditional measurements, such as froth velocity and stability, it provides froth grade detection by measuring the froth velocity, bubble size, colour spectrums and mass pull rate.

DNN allows it to classify the froth (such as barren, pulping, etc.), automatically discrediting images with direct sunlight to eliminate false grade classifications.

LIDAR is an add-on to the froth cameras that detect the froth height above and below the lip. The technology uses eye-safe laser beams to create a 3D representation of the surveyed environment. Froth height measurement are crucial estimating the mass pull rate and volumetric pull rate.



# Fast, accurate slurry sampling and analysis

Mineral processing operations increasingly rely on accurate performance analysis to provide insights for process control. Our experts will design and implement the ideal slurry sampling solution for your flotation circuit, enabling you to enhance every aspect, from process control to output quality optimisation.

## Sampling your slurry - project solution

With our complete flowsheet expertise, we consider all important slurry aspects, such as material type, pipe routing, pump requirements, slurry flow and sampler location. When you partner with an FLSmidth specialist, it ensures your sampling systems will be positioned in exactly the right places within your process to bring you the accurate results you need. We offer the strength of a global knowledge bank, combined with the support of a one-on-one relationship.



Sampling for metallurgical accounting requires a high level of accuracy and must be truly representative. We have found the ideal solution is to have multi-stage (usually two or three) sampling installations at key locations, using linear or rotary primary sample cutters. In tandem with the composite samples produced for metallurgical accounting, these crosscut, fully representative samples can also be customised to provide continuous flow to online analysers such as slurry X-ray fluorescence (XRF) analysers.

## Online analyser samplers

For online analysis, we understand your focus is typically on process trends rather than exact analytical value. In response, we offer sampling solutions that are more practical to implement: simple, fixed cutters for gravity flows or pressure pipe samplers for pumped slurry streams. With turbulent, well-mixed slurry flows at the sampling point, a fixed cutter solution such as a shark fin sampler or pressure pipe sampler can provide suitable material for online analysis.

## PERI™ Online Slurry Analysis System

We know quality slurry analysis is a cornerstone requirement for mineral processing plants. You need a slurry sampling system that is not only accurate but can be easily configured to suit your operations. Our PERI™ Online Slurry Analysis System is a technologically advanced, customisable solution for your plant.

The system utilises a solid-state, room-temperature Energy Dispersive X-ray Fluorescence (EDXRF) detector to provide accurate, reliable and cost-effective information for plant control. The unit does not necessitate liquid nitrogen for detector cooling. It incorporates a low-power X-ray tube, requiring no radioisotopes.





# State-of-the art software and digital solutions

Digital technologies deliver greater insights and control in all areas, enabling you to maximise your returns in a safer, more sustainable manner. Our technology advancements will allow for quicker reactions to flow and slurry density changes, greatly improving the performance of your flotation machines.

## What does 'digitally enabled' mean for your circuit?

It means you have the option to connect your flotation cells to our digital ecosystem, giving you the benefits of both our technologies and our experience. We offer a range of software and services geared towards maintaining your asset health and optimising performance. Many of these services can be carried out remotely, saving you both time and money.

## Control and connect

Our control system software, ECS™ Product Control, gives you a 24/7 view of performance metrics, enabling you to increase reliability.

By tracking and trending operating parameters, you can continually adjust and optimise your circuit's performance for maximum return with minimum waste. Our control system offers built-in trending, historical data, alarms and events, all stored locally. The KPI (key performance indicator) dashboard is clear and easy to interpret, enabling you to visualise performance levels at any given moment with the simple touch of a button.

## Key benefits

- Increase throughput without compromising performance (1~3%)
- Increase mineral recovery (0.5~2%)
- Reduce reagent usage

## Expert optimisation

Our ECS/ProcessExpert® advanced process control solution takes the data and insights gained from the froth camera and other instruments, and combines it with artificial intelligence (AI) technologies, model predictive control (MPC) and fuzzy logic to proactively optimise your flotation circuit.

ECS/ProcessExpert® optimises the level and air-flow targets using the mass pull rate distribution and camera signals. Mass pull rate control is based on the analyser values, downstream constraints and other plant targets. This allows you to perfectly stabilise flotation cell level control, reducing variability in the cell and maximising recovery at the desired grade.

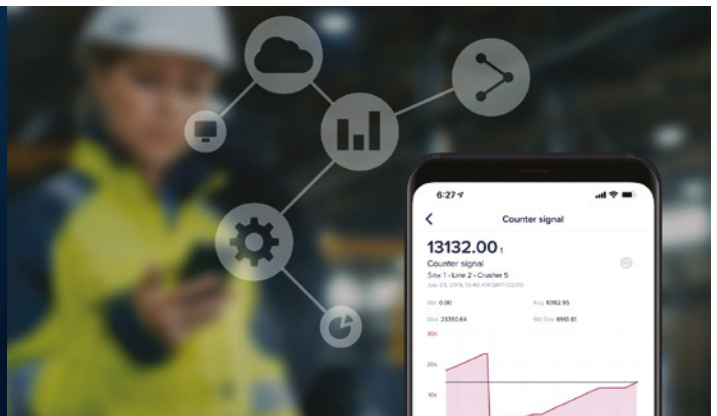


## SiteConnect™ Mobile Insights App

Want to know whats going on when you're not on site?

Stay connected with our SiteConnect app for iOS and Android. View your asset performance and health data, no matter where you are, so that you can make the best decisions for your plant and equipment, promptly and with confidence

- Improved visibility of plant and equipment performance
- Optimised asset management
- Quicker response to unplanned events





# Our experts keep you running at peak performance

Achieve your recovery goals with our supporting services. When you partner with us to monitor and maintain your circuit, you can be sure it will continually operate at its best. We identify potential problems, determine their root cause and develop ideal solutions.

## Online Condition Monitoring Services for flotation

With this services, sensors 'read' your equipment and send data about its health to our cloud-based monitoring system. But it's what we do with the information that's important. In our Global Remote Service Centre, our experts analyse, filter and interpret your data, combining our experience and understanding of data crunching, AI and machine learning to add context to those numbers.

Online Condition Monitoring is a crucial service for identifying early symptoms that cannot be detected by regular onsite preventive maintenance. Rather, it complements that onsite maintenance and helps you plan your next equipment overhaul, while optimising production and costs.

### Key benefits

- Minimise unplanned stoppages and secondary damage to equipment
- Increase equipment lifetime, reliability and performance
- Lower your OPEX
- Achieve more sustainable operations
- Order spare parts based on tracked conditions and trends

## Digital Checklist Tool

The Digital Checklist Tool is an mobile app that provides onsite technicians with predefined inspection checklists. Based on the unique knowhow and experience of our service engineers, we customise inspection checklists for your assets, and provide you with inspection reports giving you the information you need to increase efficiency and improve maintenance and shutdown planning.



## PlantLine™ Service Agreement

Our PlantLine™ Service Agreement offers peace of mind that your digital tools and software are fully supported. This agreement will save you valuable time and resources, while you make the most of your equipment.

Our service agreement for your process and quality control systems provides:

- A service team of specialists with 24/7 support
- A team of dedicated PlantLine™ Service Agreement managers
- Prioritised support from research and development
- Secure communication technology
- Incident tracing

## Total Cost of Ownership (TCO) Tool

Our TCO Tool is a predictive software package we use to increase your site productivity and extend your equipment life. It allows us to collaborate with you to maximise your operational and maintenance requirements.

Using equipment operating parameters, the TCO Tool enables us to predict when your equipment will need spare parts and service. This ensures you have the right parts and resources available when you need them, optimising your operational costs and net working capital. Built with a preventive maintenance methodology backbone, it can also greatly reduce the risk of safety incidents.

The TCO tool will help you:

- Improve your equipment availability
- Optimise your inventory levels and replacement periods
- Reduce the risk of unexpected stops
- Improve your OPEX forecast
- Reduce safety risks with planned maintenance



FLSMIDTH

# Mission Zero



TOWARDS ZERO EMISSIONS IN MINING



Zero water  
waste



Zero  
emissions



Zero energy  
waste

Contact us



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