



OUTOTEC SLURRY SAMPLING SOLUTIONS

Outotec's wide range of slurry sampling solutions includes turnkey solutions for on-line analysis and metallurgical accounting. Sampling is a crucial part of improving process control in order to enable better recovery while reducing costs. Based on our decades of experience, we combine consulting, design, engineering, and support services to develop reliable sampling solutions optimized for your specific needs.

BENEFITS

- Improved process control and faster reaction to process changes
- Reduced assaying and sampling costs compared to manual processes
- Proven technologies for turnkey and custom-engineered projects
- Easy to scale up to a more advanced solution as needs change
- Optimized life cycle performance through tailored services solution



PROVEN TECHNOLOGIES FOR ENSURING CONSISTENT AND RELIABLE SAMPLING

Our complete solutions for slurry sampling support consistent, representative, and reliable sampling, providing the basis for improved process control and enabling faster reaction to process changes. As well as being faster and more cost-effective than manual sampling, an Outotec sampling system is always optimized for your specific needs and can easily be scaled up as your requirements change.

Sample representativity

Good sample representativity is critically important for your sampling process. Sample line routing, sizing, sampler location, and correctly installed sampling equipment all have an influence on representativity and reliability. All particles in a process flow must have the same probability of entering the sample to ensure that the sample is representative of the process stream.

Primary sampling

With one of the industry's widest ranges of primary samplers, we can design and deliver precisely tailored solutions. Our proven samplers are designed for durability and high availability, and in the case of demanding process applications they can be manufactured from special materials such as duplex stainless steel.

With a complete system design from Outotec, you can ensure that sample lines and equipment are positioned in exactly the right place in your process. Depending on the process conditions, the primary sample flow can be continuous, with or without periodic automatic flushing.

Secondary sampling

We can design a complete secondary sampling phase based on the unique requirements of your process to ensure reliable and representative samples for analysis in the laboratory or by automated analyzer equipment. Our samplers for secondary sampling can also be manufactured from special materials in the case of demanding process applications.

Controlled sampling

Outotec Courier analyzers include controlled-sampling functionality, avoiding the recirculation of the sample flow back into the process, which can impact process efficiency and productivity. We can supply the required remote-controlled sample valves and configure the sampling sequence according to the needs of your process. Continuous and controlled sample lines can be combined in the same analyzer system. For metallurgical sampling purposes we also offer the Outotec Sample Control Unit SCU-5600 to control primary and secondary sampler operation. The SCU-5600 does not require an Outotec Courier on-line analyzer to be installed.

Good sample representativity is influenced by sample line routing, sizing, sampler location, and correct installation.

PRIMARY SAMPLERS FOR PRESSURIZED PROCESS FLOWS

Outotec pressure-type samplers provide a continuous sample flow for online analysis to enable monitoring of changes in the properties of a process stream. The representative sample is taken from the well-mixed process flow, and in most cases, no extra pump is required to feed the sample to the analyzer or composite sampler.

PSA pressure pipe sampler

The vertically orientated PSA pressure pipe sampler, generally located immediately above a process pump, can be used in any process stream. It comes in sizes DN 100 (4") to DN 700 (28") for flow rates from 40 to 5,500 m³/hr.



PSA pressure pipe sampler



SPSA straight pressure pipe sampler

SPSA straight pressure pipe sampler

The Outotec SPSA straight pressure pipe sampler can be used in locations where it is inconvenient to use a PSA pressure pipe sampler in the vertical position. It is generally located immediately above a process pump and is available in two configurations: DN 100-700 (4"-28") and DN 800-1200 (32"-48"), for flow rates from 40 to 13,200 m³/h.

ASA sector sampler

The Outotec ASA sector sampler divides small pressure flows and is typically used in small concentrate flows. It is designed to take 25, 50, or 75% of the process flow and is available in sizes DN 50 (2") to DN 100 (4") for flow rates from 9 to 60 m³/hr.



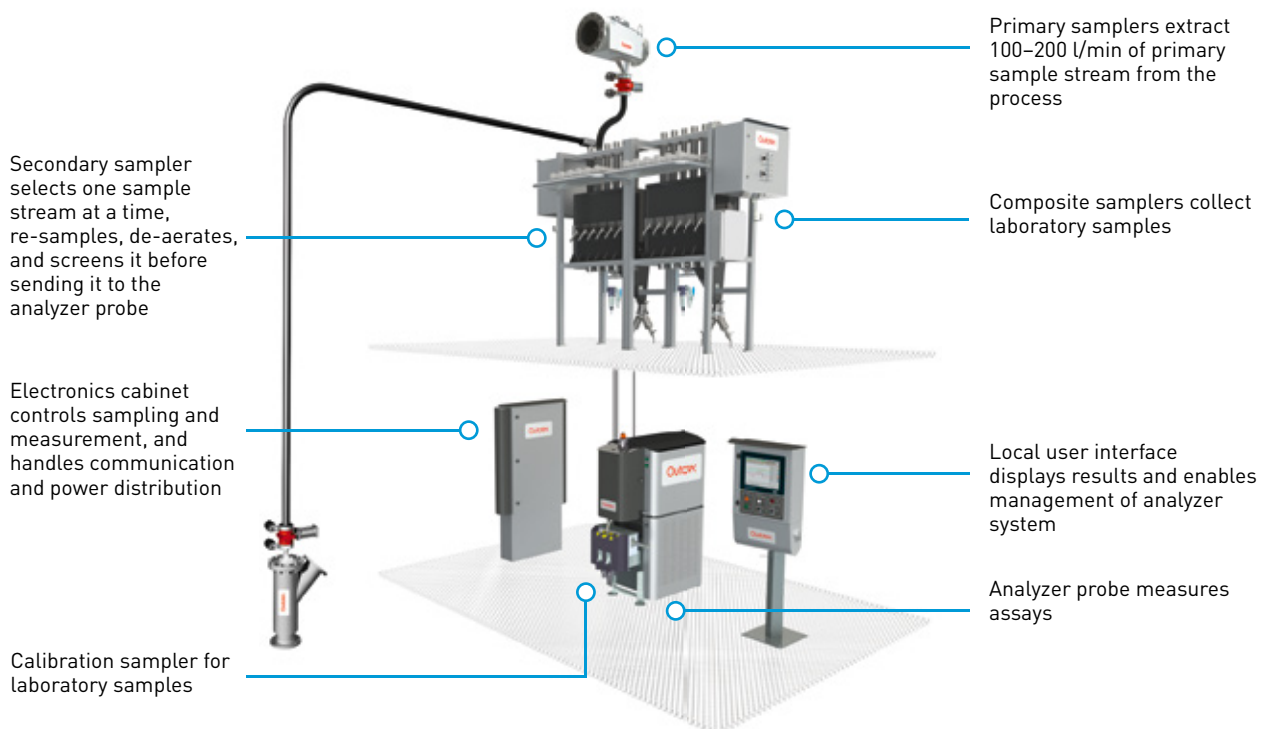
ASA sector sampler



SPA suction pipe sampler

SPA suction pipe sampler

The Outotec SPA DN 50 suction pipe sampler is used in the intermediate boxes of flotation cells or mixing tanks. The sampler is supplied with an installation flange in size DN 100 (4").



PRIMARY SAMPLERS FOR GRAVITY FLOW

Outotec gravity-type samplers can provide a continuous sample flow for online analysis that is proportional to changes in the properties of the process stream.

The Outotec sampler box design improves process flow mixing prior to sample cutting. With representative isokinetic sampling, high process flows produce large primary sample flows that require either many sampling steps or innovative sampling system designs.

A gravity flow sampler takes the representative sample from a vertically segregated process flow. The sample flow rate of single-stage samplers is directly proportional to the process flow for composite and accounting sampling. In the case of on-line analysis, single-stage samplers produce too high a sample flow-rate from a large process flow, so two-stage samplers are recommended.

LSA launder box cutter sampler

The Outotec LSA launder box cutter sampler is typically used in cyclone overflow sampling points. It has an automatic flushing valve set for cutter and sample pipe cleaning and comes in sizes DN 150 (6") to DN 600 (24") for flow rates: min. 25 m³/h, max. 1000 m³/h.

LSA-NC launder box cutter sampler

The LSA-NC two-stage launder box sampler with nested cutter is used in large process flows under atmospheric pressure. The sampler is available in sizes DN 500 (20") to 1200 (48"), for flow rates from 800 to 11,400 m³/h. Outotec has international patent application PCT/FI2013/050894 for the LSA-NC launder box cutter sampler.

CPS two-stage sampler

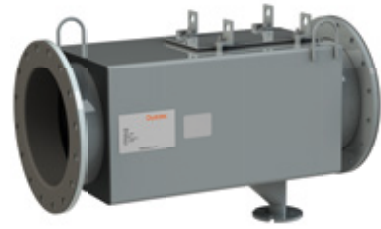
The CPS two-stage sampler is designed for well-mixed process flow in a launder or pipe at atmospheric pressure. The automatic flushing valve set is used to start the sample flow by siphon effect. The sampler is available in size 160 mm and holds a minimum flow rate of 500 m³/h.

SKA vertical cutter sampler

SKA vertical cutter sampler is for process flows under atmospheric pressure in a launder. If used in a rectangular launder, only a cutter needs to be inserted. The sampler is supplied with an installation flange in size DN 200 (8").

ASD adjustable sample divider

The ASD DN 50 adjustable sample divider is located on top of an Outotec PSI® 300/500 particle size analyzer or Outotec Courier® multiplexer, allowing a large primary sample flow to be used for slurry that settles easily.



LSA launder box cutter sampler



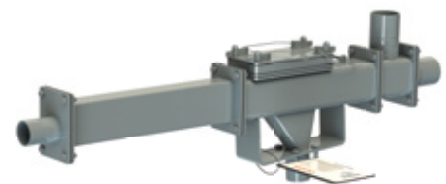
LSA-NC launder box cutter sampler



CPS two-stage sampler



SKA vertical cutter sampler



ASD adjustable sample divider

EQUIPMENT FOR METALLURGICAL ACCOUNT SAMPLING

Metallurgical accounting samples must represent the variations that occur in both process flow and solids content as well as meet the requirements for on-line analysis. We offer a range of specialist samplers designed specifically for metallurgical accounting purposes.

MSA multi-stage metallurgical accounting sampler

The Outotec MSA multi-stage metallurgical accounting sampler uses a combination of static multiple cutter stages – with the number of stages depending on the process flow – followed by a moving crosscut sampler stage, which produces the sample for the next stage. The MSA sampler can be configured to deliver a composite sample to a secondary sampler or a continuous flow for Outotec Courier and Outotec PSI analyzers. The MSA can also be used to perform analyzer-controlled sampling. The sampler is available in two models in each of the six sizes. The models hold a flow rate from 60 to 27,000 m³/h.

The final composite sample is taken from the primary sample flow by the secondary sampler in the Outotec Courier on-stream analyzer or an LMC (linear moving cutter) composite sampler. The composite sample can be filtered using an optional Outotec vacuum sample filter unit (VFU).

LMC linear moving cutter

The LMC linear moving cutter sampler is used in combination with the MSA multi-stage metallurgical accounting sampler for taking a composite sample or primary sample from small process streams; it can also be used as a secondary sampler with other samplers. The sampler is based on a moving cutter traveling across the stream, cutting a representative composite sample from the process flow. The LMC sampler is available in three models: LMC 80, LMC 100, and LMC 150, for process flow rates from 45 to 140 m³/h.

SSA stand-alone composite sampler

The SSA 50 stand-alone composite sampler is used for taking a composite sample from the primary sample flow or from small process flows. The sampler can be used as a composite sampler for pressure and gravity flow samplers, and is available in single-stream and three-stream versions. The sampler has a process connection inlet size DN 50 and outlet size DN 65. It holds a process flow rate from 6 to 18 m³/h.

VFU vacuum sample filter unit

The VFU (vacuum filter unit) is for dewatering slurry composite samples, usually fed from a sampler, multiplexer, or analyzer. It is automatic and operates independently of the connected sampling equipment. The filtering system is available in 1, 3, 6, or 12 table pots.



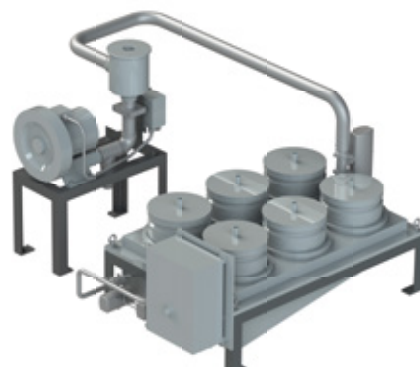
MSA multi-stage metallurgical account sampler



LMC linear moving cutter



SSA stand-alone composite sampler



VFU vacuum sample filter unit



OUTOTEC SERVICES – BOOST YOUR PERFORMANCE AND PRODUCTIVITY

As your service partner, Outotec is firmly committed to understanding your business needs. We collaborate with you to develop a safe, sustainable, and reliable service solution based on our deep process knowledge, leading technologies, and operation and maintenance expertise. Our tailored service solution will help you achieve a step change in business performance throughout your plant's entire life cycle.

Benefits

- Improved health and safety
- Decreased operating cost
- Improved equipment and process efficiency
- Improved environmental efficiency
- Improved capital efficiency

Full Service Portfolio

- Advisory Services
- Maintenance Services
- Operations Services
- Remote Services
- Spare and Wear Parts
- Training Services
- Upgrades

A service partner with exactly the right scope for your business needs

Our extensive service portfolio and customized solutions cover all phases of your plant's life cycle, and our service scope is always tailored to meet your unique business challenges.

Your service solution will be delivered with mutually agreed targets and shared responsibilities to meet your long-term goals. We can build solutions for individual projects or based on broader service agreements.

Our service scope is always based on your business needs, with mutually agreed targets and shared responsibilities.



A HOLISTIC APPROACH TO IMPROVING PERFORMANCE AND PRODUCTIVITY

We combine the right services into a customized solution that meets your precise requirements and asset needs. By assessing, designing, delivering, and verifying, we ensure the solution has maximum impact on your performance and productivity.

Assess

The process begins with collaborative work and benchmarking to provide a clear picture of your business and operational challenges, using our comprehensive range of Advisory Services. Our services range from plant and equipment inspections and assessments to process audits and research and test services. These provide valuable information to help identify areas in which improvements would generate substantial increases in safety, reliability, availability, or productivity.

Design

Based on the assessment results, we design precisely the right service solution to suit your operational and plant needs. Whether you are aiming to improve efficiency through modernization, minimize production losses during shutdown projects, or optimize the availability and productivity of operations and maintenance, our service solution will help you achieve a step change in performance.

Deliver

Our experienced teams follow established processes that enable a holistic delivery approach to your service solution, ensuring safe, efficient, and reliable implementation with minimum disruption to your operations. Through close collaboration with you, we integrate all the necessary elements required for a successful solution delivery that will generate high-quality results in the shortest time possible.

Verify

Results are closely monitored and analyzed by our experts to verify that the desired new performance level has been achieved. We focus on continuous improvement and on maximizing the positive impact on your bottom line.

Outotec provides leading technologies and services for the sustainable use of Earth's natural resources. As the global leader in minerals and metals processing technology, we have developed many breakthrough technologies over the decades for our customers in metals and mining industry. We also provide innovative solutions for industrial water treatment, the utilization of alternative energy sources and the chemical industry. Outotec shares are listed on NASDAQ OMX Helsinki. www.outotec.com