



# OUTOTEC COURIER 8 SL ON-LINE ANALYZER

The Outotec Courier 8 SL analyzer is designed for accurate, reliable on-line measurement of the elemental concentrations of plant feed, tailing, and concentrate slurries. Laser-induced Breakdown Spectroscopy (LIBS) technology is used to measure both light and heavy elements for monitoring and control in mineral processing plants, enabling optimization of concentrate impurity content while maintaining the best possible recovery.

## BENEFITS

- Accurate monitoring of changes in feed mineralogy
- Improved control over concentrate quality
- Improved recovery through early detection of process disruptions
- Reduced need for time-consuming and labor-intensive manual sampling
- More efficient use of energy and raw materials

# MAXIMIZE EFFICIENCY AND QUALITY

Outotec Courier 8 offers a wide range of benefits:

- Accurately monitor changes in ore type
- Control concentrate quality and minimize undesirable variations
- Reduce the cost of assaying and metallurgical sampling with automatic, consistent sampling and analysis around the clock
- Improve recovery levels with early detection and rapid resolution of process disruptions
- Benefit from real-time process monitoring and control enabled by frequent assays
- Speed up process development with results from process tests and changes available more quickly
- Easily upgrade and expand the system to meet changing plant requirements with the analyzer system's modular design

## APPLICATIONS

### Iron ore concentrators

Online measurement of Si, Al, S, C, Mg, Ca, and other light element concentrations in feed and concentrate streams. Supports optimal product quality without compromising recovery.

### Iron pellet plants

On-line measurement of Si, Ca, C, Al, and Mg before and after additive mixing.

### Ni flotation from serpentinized ores

On-line measurement of Mg and other light element concentrations in feed and concentrate streams. Optimal product quality without sacrificing recovery.

### Laterite Ni concentrators

On-line measurement of Si, Al, Fe, and other light element gangue minerals in feed and concentrate streams. Optimal product quality without sacrificing recovery.

### Zn and Pb concentrators

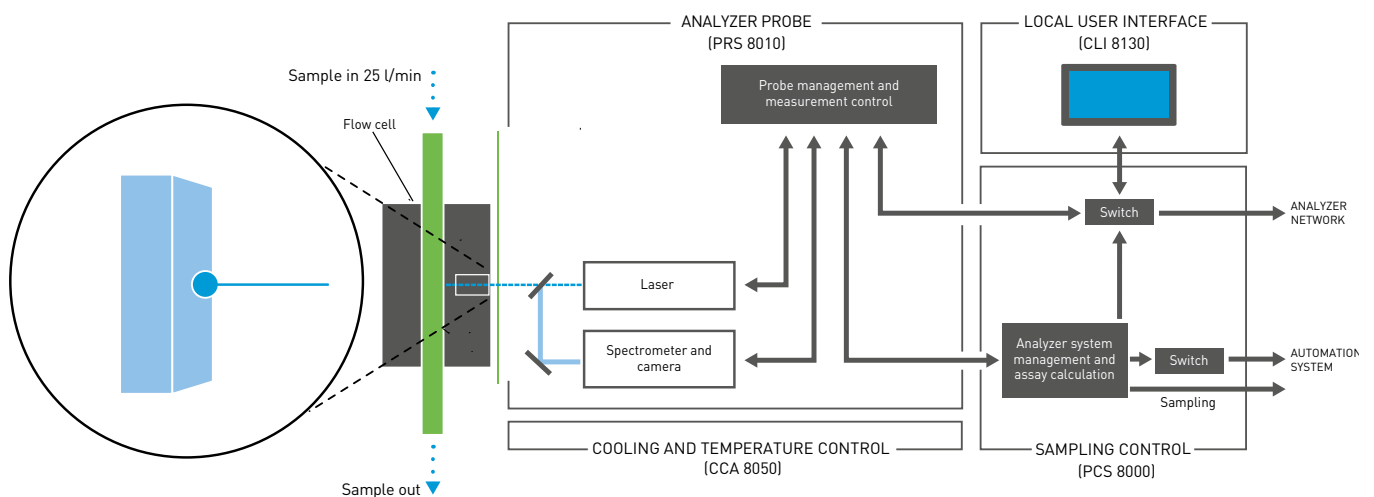
On-line measurement of Si, Mg, Al, and concentrations of other light element gangue minerals in feed and concentrate streams.

### Sulfide gold concentrators

Measurement of S, As, and Fe in concentrate to optimize autoclave operation. Measurement of sulfides in flotation tailings to monitor recovery. Measurement of C to optimize carbonaceous matter removal.

### Phosphate concentrators

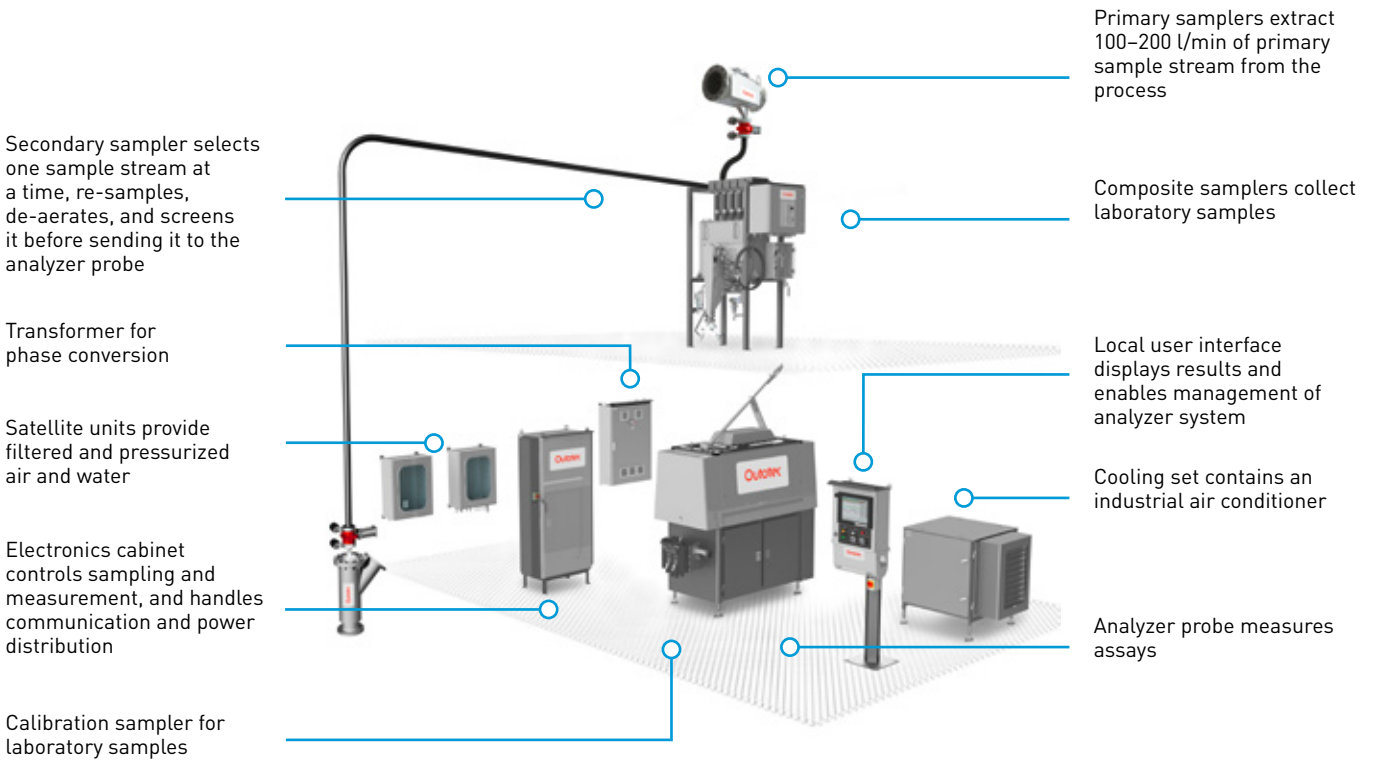
Final concentrate quality control: measurement of P content and Ca/P ratio. Flotation recovery optimization and reagent control: measurement of P in feed, concentrate, and tailings. Measurement of penalty elements (Mg and Si).



A small portion of the sample is heated into hot plasma in the analyzer's flow cell by a short laser pulse. The light spectrum emitted by the atoms and ions in the cooling incandescent plasma is measured after a short delay. The concentrations of the elements in the sample are calculated from averaged spectra using calibration equations based on laboratory assays of calibration samples.

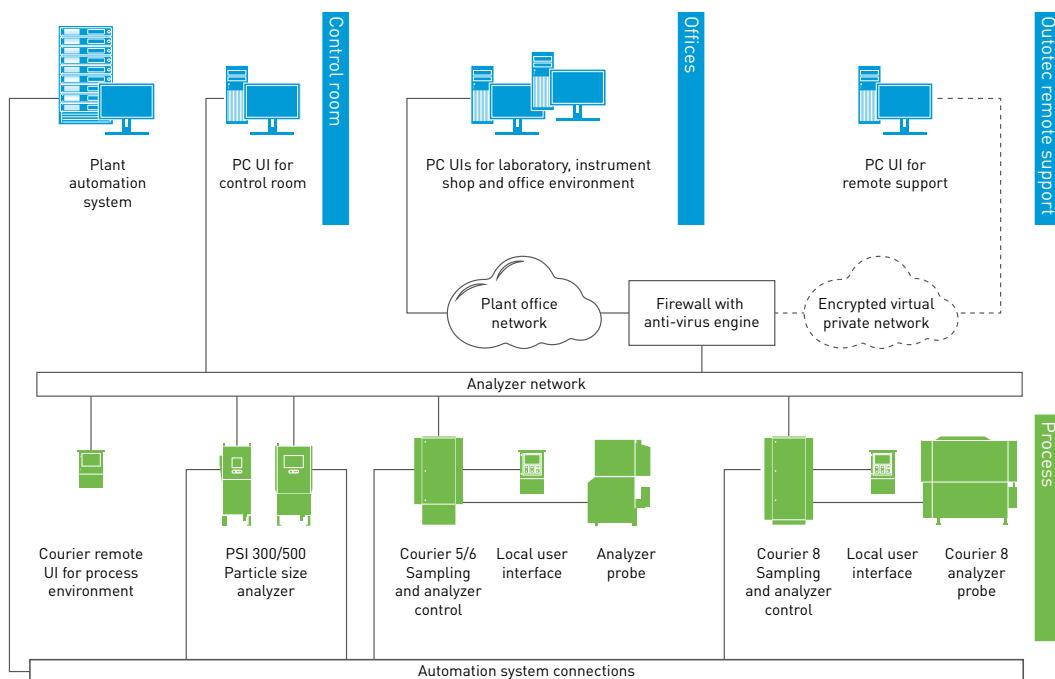
# OUTOTEC COURIER 8 SL ON-LINE SLURRY ANALYZER SYSTEM

An Outotec Courier 8 SL on-line slurry analyzer system with primary samplers can measure samples from up to 12 streams.



1 <b>H</b> Hydrogen																	2 <b>He</b> Helium																														
3 <b>Li</b> Lithium	4 <b>Be</b> Beryllium											5 <b>B</b> Boron	6 <b>C</b> Carbon	7 <b>N</b> Nitrogen	8 <b>O</b> Oxygen	9 <b>F</b> Fluorine	10 <b>Ne</b> Neon																														
11 <b>Na</b> Sodium	12 <b>Mg</b> Magnesium											13 <b>Al</b> Aluminum	14 <b>Si</b> Silicon	15 <b>P</b> Phosphorus	16 <b>S</b> Sulfur	17 <b>Cl</b> Chlorine	18 <b>Ar</b> Argon																														
19 <b>K</b> Potassium	20 <b>Ca</b> Calcium	21 <b>Sc</b> Scandium	22 <b>Ti</b> Titanium	23 <b>V</b> Vanadium	24 <b>Cr</b> Chromium	25 <b>Mn</b> Manganese	26 <b>Fe</b> Iron	27 <b>Co</b> Cobalt	28 <b>Ni</b> Nickel	29 <b>Cu</b> Copper	30 <b>Zn</b> Zinc	31 <b>Ga</b> Gallium	32 <b>Ge</b> Germanium	33 <b>As</b> Arsenic	34 <b>Se</b> Selenium	35 <b>Br</b> Bromine	36 <b>Kr</b> Krypton																														
37 <b>Rb</b> Rubidium	38 <b>Sr</b> Strontium	39 <b>Y</b> Yttrium	40 <b>Zr</b> Zirconium	41 <b>Nb</b> Niobium	42 <b>Mo</b> Molybdenum	43 <b>Tc</b> Technetium	44 <b>Ru</b> Ruthenium	45 <b>Rh</b> Rhodium	46 <b>Pd</b> Palladium	47 <b>Ag</b> Silver	48 <b>Cd</b> Cadmium	49 <b>In</b> Indium	50 <b>Sn</b> Tin	51 <b>Sb</b> Antimony	52 <b>Te</b> Tellurium	53 <b>I</b> Iodine	54 <b>Xe</b> Xenon																														
55 <b>Cs</b> Cesium	56 <b>Ba</b> Barium	57-71	72 <b>Hf</b> Hafnium	73 <b>Ta</b> Tantalum	74 <b>W</b> Tungsten	75 <b>Re</b> Rhenium	76 <b>Os</b> Osmium	77 <b>Ir</b> Iridium	78 <b>Pt</b> Platinum	79 <b>Au</b> Gold	80 <b>Hg</b> Mercury	81 <b>Tl</b> Thallium	82 <b>Pb</b> Lead	83 <b>Bi</b> Bismuth	84 <b>Po</b> Polonium	85 <b>At</b> Astatine	86 <b>Rn</b> Radon																														
87 <b>Fr</b> Francium	88 <b>Ra</b> Radium	89-103	104 <b>Rf</b> Rutherfordium	105 <b>Db</b> Dubnium	106 <b>Sg</b> Seaborgium	107 <b>Bh</b> Bohrium	108 <b>Hs</b> Hassium	109 <b>Mt</b> Meitnerium	110 <b>Ds</b> Darmstadtium	111 <b>Rg</b> Roentgenium	112 <b>Cn</b> Copernicium	113 <b>Uut</b> Ununtrium	114 <b>Fl</b> Flerovium	115 <b>Uup</b> Ununpentium	116 <b>Lv</b> Livermorium	117 <b>Uus</b> Ununseptium	118 <b>Uuo</b> Ununoctium																														
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Almost all naturally occurring elements can be measured using laser-induced breakdown spectroscopy (LIBS) technology. Analyzer performance will depend on the elements being measured, the solids content of the slurry, and the particle size.



Courier analyzer network. The possibility to combine XRF and LIBS analyzers in the same network ensures that you get the best performance from both technologies for monitoring and control.

## TECHNICAL DATA

SPECIFICATIONS	
Number of sample lines	1–12
Primary sample flowrate	100–200 l/min, max range 70–300 l/min
Maximum sample solids content	Sample has to flow
Sample temperature	5–50 °C
Elemental range	Lithium and heavier
Number of simultaneous assays	Max 12 (20 internally)
Measurement time	60–300 sec/sample line
Plant DCS connections	Modbus TCP (slave), Modbus RTU (master or slave)
Remote service connection	Internet through VPN firewall
Typical analyzer system weight without primary samplers	2,000 kg
Typical shipping weight	2,500 kg

UTILITIES	
Analyzer unit- three phase AC	400 VAC–20 A 460 VAC–17 A
Integrated UPS	1000 VA/5 min
Water consumption	30 l/min, 2–3.5 bar
Water temperature	Max +40 °C
Oil-free instrument air	70 NL/min, 4–6 bar

ENVIRONMENT	
Classification	IP 56
Operating temperature	+2...+50 °C
Storage temperature	-25...+60 °C
Installation altitude	Up to 4,000 m
Corrosion	AISI 316 / 304
Moisture	Up to 85%, non condensing

STANDARDS	
European Union, CE marked	2006/42/EC Machinery directive 2014/35/EU Low voltage directive 2004/108/EC EMC directive EN 60825-1:2007 Safety of laser products
Laser	Class 4 internally, class 1 externally

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](http://www.outotec.com)