IMS SECOPTA

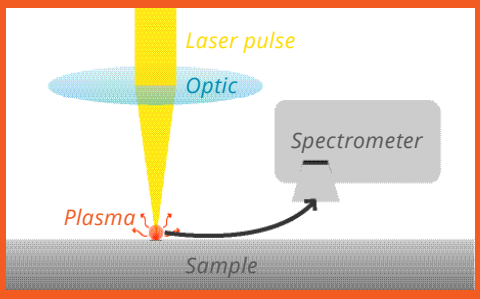
FiberLIBS *inline* PMI

Positive material identfication (PMI) at its best – 100 % automated inline PMI

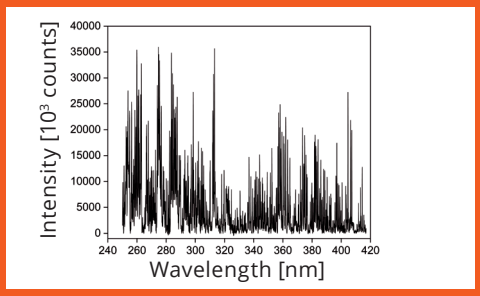
- Round bar, tube, billet and ingot
- Special, stainless as well as other high alloy steel
- Finishing line, NDT line, before reheating furnace

What is LIBS?

LIBS (laser-induced breakdown spectroscopy) is a real-time, non-destructive and contactless method to analyze the multi-element composition of materials.



The principle of LIBS



Exemplary steel spectrum

A laser beam is focused on the surface of a sample. The energy input leads to a sublimation and ablation of a small amount of material (µg) which is transformed into a plasma. The plasma emits characteristic light depending on the sample composition and is detected by a spectrometer.

For each measured position, the information of multiple elements is available immediately. Based on a calibration with matrix-matching reference samples, the detected emission intensities can be converted to quantitative values.

All elements can be analyzed simultaneously with one laser shot and without sample preparation for most of the applications.

Only an optical access to the sample is needed for the LIBS measurements. The topology of the sample does not impact the LIBS measurements as the sample shape can be considered using a laser distance sensor.

Maximum safety for mix-up detection without human factor

The universal PMI tool

Due to frequent material changes and constantly growing amount of material classes, the Positive Material Identification (PMI) becomes more and more important.

Unfortunately, todays PMI approaches face certain shortcomings. Some require maintenance-intensive sample preparation, some cannot detect light elements like carbon, some emit ionizing radiation or rely on a high amount of manual workforce due to the impossibility of automation.

The LIBS technology can overcome shortcomings of existing standard procedures. Today, the SECOPTA PMI sensor has been successfully implemented in multiple steel manufacturer's production facilities.

With LIBS based PMI sensors bars are identified in finishing lines and nondestructive testing lines, right before shipment. Mix-up checking of billets/ingots before placing them inside the reheating furnace is also successfully realized in the customer process.

The fully integrated sample preparation makes the difference for these applications. The surface preparation removes oil and dirt on bright bars as well as scale layers and decarbonized zones on billets.

With integrated fully automated sample preparation technique the depth can be adjusted from 3 µm up to 400 µm. SECOPTA LIBS systems are built for 24/7 industrial use and require only minimal user maintenance once a week.

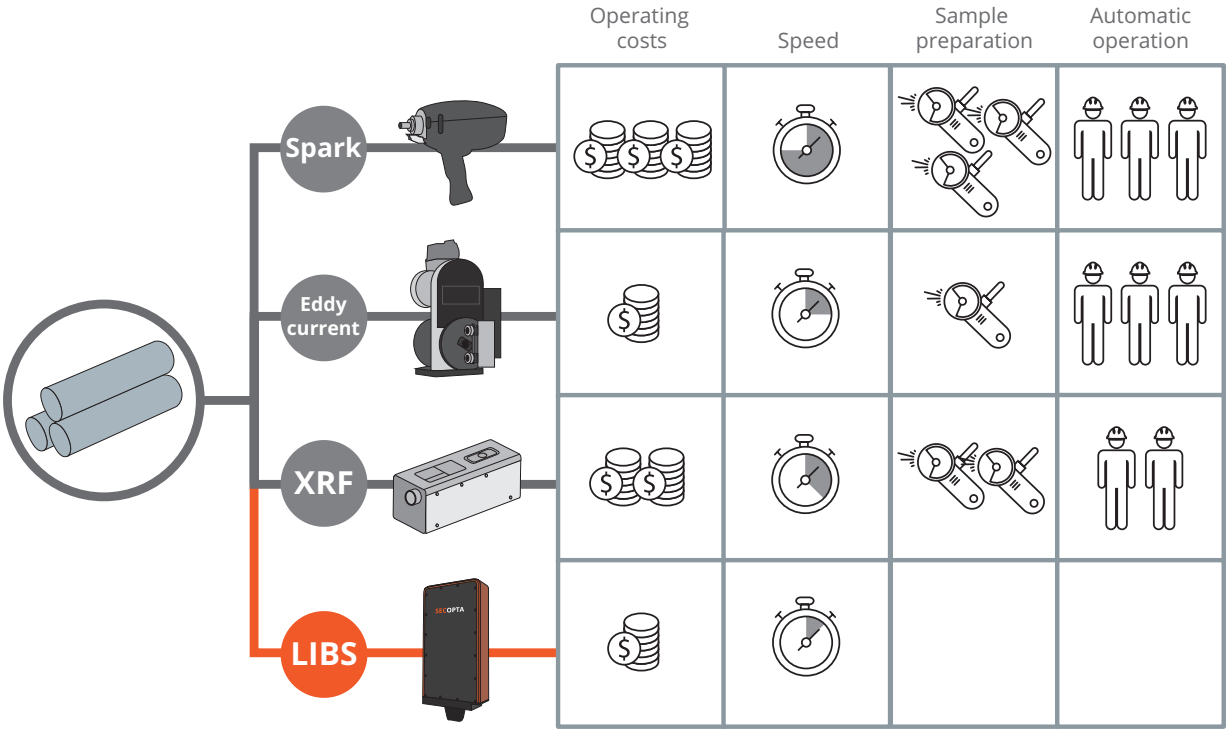
The FiberLIBS *inline* PMI in your process

The FiberLIBS *inline* PMI can analyze longitudinally passing material (up to 2 m/sec) as well as stationary material. The front page shows the measuring head for longitudinally passing material, which can be placed e.g. within the final inspection line. For the inspection of stationary material, the measuring head can be placed e.g. in the area before the reheating furnace charging.

The system can be equipped with a thick surface layer preparation option, which comes into play for layer thicknesses exceeding 3-5 µm.

For easy integration of the sensor into existing systems, an laser safety housing and CE declaration is provided. With direct connection to the level 2 communication, the system runs fully automated and the analysis values as well as the OK and Not OK signals are transmitted automatically.

Among other things, the high repetition rate of the laser as well as the contactless measurement make the LIBS analysis very long-term stable. This can be proven with the measuring device monitoring in the easy-to-use SECOPTA software package.



Comparing todays standard PMI approaches and the LIBS

Your advantages with the FiberLIBS *inline* PMI

- With fully integrated sample preparation
- Analysis within seconds
- Compatible with Manufacturing Execution Systems (MES)
- Based on heat/melt shop values
- Removing human influenced error
- Software package with versatile functionality

Technical specifications FiberLIBS *inline* PMI

Control unit dimension (W x L x H)	600 mm x 850 mm x 1750 mm
Measuring head dimension (W x L x H)	Without scale layer: 270 mm x 550 mm x 120 mm With scale layer: 310 mm x 560 mm x 740 mm
Weight (control unit)	150 kg
Weight (measuring head)	115 kg
Cable length	2,8 m (2,5 m for C analysis)
Laser class	4 (Laser class 1 possible)
Protection class	IP 56
Temperature range	+5 °C to +40 °C
Purging gas	Compressed air
Communication interface	Profinet, Ethernet/IP, EtherCat, Modbus TCP, TCP/IP, UDP, OPC UA, SQL (other industrial protocols and field-bus system possible on request)
Detectable elements	Mn, Si, V, C, Mo, Ni, Ti, Al and many others
Certificates	EG (CE certification possible)
Detection rate	98 % (according to produced alloys up to 99,3 % and more)

Available soft- and hardware options	
Carbon analysis	Enhance the low-alloy steel analysis → For a better acceptance of LIBS
Remote service	The fastest option to bring your system back on track
Module spare parts	On-site quick-change modules → Reduce down time to a minimum
Laser safe housing	For minimum effort on customer side → Turnkey solution available
CE Certification	Easy implementation of the sensor into existing production lines
Measuring device monitoring	Monitoring of sensor and process stability → For audits and certification processes

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Discover more!