



## IDENTIFICATION TESTING OF SCALED ROLLING BILLETS

### Task

Even in highly automated production processes, there is always a risk of mixing up different materials. For this reason, during the processing of steel ingots, several hundred different grades are handled and when they are fed into the beginning of the rolling mill, they are usually controlled manually. Hence, a mix-up cannot be completely ruled out. If this happens, significant economic losses can result, ranging from damage to the production line to subsequent losses at customers. In order to recognize such mix-ups before processing begins, all the ingots used need to be checked in terms of their chemical composition.

### Method

Laser-induced breakdown spectroscopy (LIBS) has proven itself for the quantitative analysis of metals and identification testing of semi-finished products under industrial conditions. The challenges in this project are the variety of materials and primary scale layer of the rolling billets, the latter of which differs in the chemical composition from the bulk material. With a laser pulse sequence optimized to removal, the base material to be analyzed can be exposed locally and, in a further step – also with a laser – be directly analyzed chemically in the production line. A functional sample has been built for semi-automatic measurement of rolling billets on a roller conveyor.

1 *Rolling billet on the conveyor  
during the laser measurement.*

### Result

In production environment, a testing period of less than 50 s has been reached with the functional sample. On several hundred low to high alloy rolling billets, the measured concentrations of more than 14 elements were compared with the nominal contents, and a good agreement was shown. The system can detect a change in the grades of the material, thus excluding particularly critical mix-ups with high certainty. Improvements for the detection of further elements are planned.

### Applications

The primary area where this process can be applied is the analysis of scaled metal ingots and other scaled intermediate products in the metalworking industry. Another area of application where ablation and analysis are combined is the measurement of depth profiles down to a depth of several millimeters.

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