



## PILOT PLANT FOR LASER-ASSISTED SORTING OF SPECIAL ALLOYS

### Task

Metals are valuable raw materials, some of which are crucial to industrial supply chains. They can be recycled without loss of quality, provided they are available in unmixed fractions. However, scrap metal may not be sorted manually without limitations. For this reason, a fully automated sorting process for special alloys was developed and validated in practice.

### Method

Fraunhofer ILT has developed a process for laser spectroscopic, non-contact and rapid multi-element analysis (LIBS) of parts on a moving conveyor belt, a process that can identify the alloy class of scrap metal pieces. The patented approach ensures that even complex-shaped and contaminated parts are analyzed correctly. After a part has been analyzed, a delta robot grabs it and – depending on the chemical composition identified – directs it to the assigned sorting fraction. The geometric information for laser analysis and robotic discharge is captured by a laser light-sectioning sensor and calculated from the 3D images with automated image processing.

### Results

Together with its project partners, Fraunhofer ILT has set up a pilot plant and put it into operation at an industrial recycling facility. This has since been used for sorting scrap metal pieces on an industrial scale. High-speed steels, titanium alloys and hard metals can be sorted into a total of up to 21 sorting fractions thanks to modern classification processes. The intelligent combination of image processing and laser spectroscopy also makes it possible to detect and correctly sort composite materials, for example an HSS drill bit with a steel shank.

### Applications

The process established here can also be transferred to other areas of recycling and material testing. Using resources efficiently and sustainably requires sorted recycling in all areas and precise knowledge of the material streams involved. By automatically acquiring and evaluating measurement data on chemical composition and geometry, this process shows how future technologies, in this case intelligent data processing, can significantly expand the application potential of laser-based sorting.

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1 Pure grade titanium scrap.

2 3D detection of parts on a conveyor belt.