



PILOT PLANT FOR LASER-ASSISTED SORTING OF SPECIAL ALLOYS

Task

Among all raw materials, metals are among those that can be recycled with practically no loss of quality, provided they are collected separately and at a high degree of purity. Moreover, some metals have a high material value or are considered to be critical for production supply in Europe. Manually sorting scrap metals is only possible to a limited extent, however, since there are a great variety of metal alloys used in technical applications; these individual metals often cannot be distinguished by the naked eye. Here, Fraunhofer ILT and its partners are introducing a fully automatic sorting process for a large number of alloys of special metals into practical use for the first time.

Method

Fraunhofer ILT has developed a method that performs direct laser spectroscopic analysis of scrap parts on a conveyor belt. Here, laser-induced breakdown spectrometry (LIBS) is used to analyze the composition of the alloy components for each scrap piece and to determine the corresponding sorting class. The multi-element analysis with LIBS allows users to detect a large number of alloys. To make use of this potential, the concept foresees using a robot to sort the metals automatically, which, in contrast to classical sorting methods, is not limited to a small, fixed number of sorting fractions.

Results

Together with project partners, Fraunhofer ILT has set up and commissioned a pilot plant in an industrial recycling company to sort special alloys such as high-speed steels or hard metals fully automatically. The LIBS analysis is supported by an integrated laser cleaning system as the surfaces of the metal parts are frequently contaminated. Using laser-based image recognition, the system can identify the individual pieces of scrap and determine suitable measuring positions. In combination with the LIBS results, the detected geometry information is used to control the gripping and ejection of the parts by the robot.

Applications

The process demonstrated here can be transferred to other areas of metal recycling of piece goods. By combining geometry measurement and fast chemical analysis, the research group is also opening up new potential for future automated applications in inline process control.

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2 Laser analysis of an HSS drill.
3 Robot handling for sorting,
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