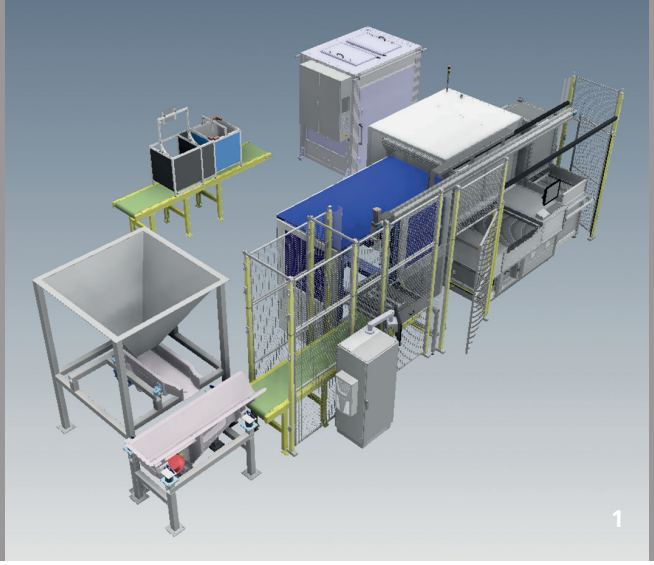

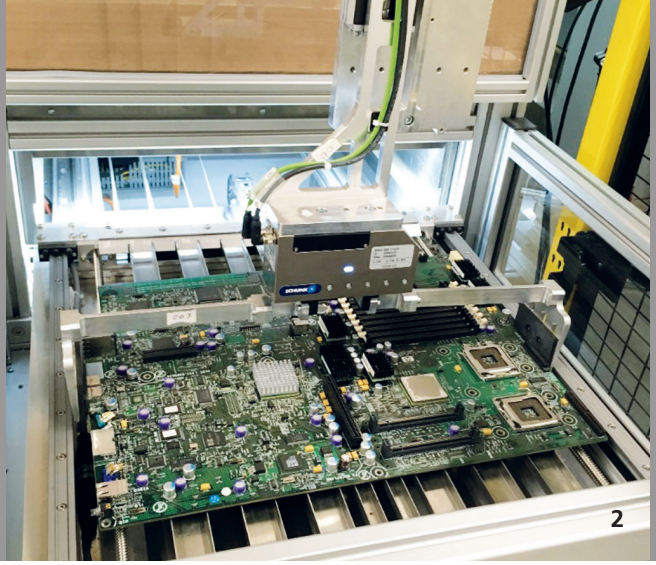

DEMONSTRATOR SYSTEM FOR LASER-BASED RECOGNITION OF ELECTRONIC COMPONENTS

Task

Modern electronic equipment contains a large number of different materials, only some of which can be recovered at the end of their useful life with current recycling methods. Other valuable technology raw materials can be recovered for the recycling sector, however, if they are separated into fractions having high concentrations.

Method

The ADIR consortium has developed an automated demonstration plant for selectively removing electronic components from old electronics. For such a plant to function, specific information is needed: which components are present in the electronic devices, where they are mounted and what they consist of. Image processing, 3D laser measurement and laser spectroscopy are used to collect this information, which is then stored in a database.

Results

An inspection system was set up and integrated into the demonstrator. It accepts electronic boards from pre-processing, takes high-resolution color images and then measures the 3D height structure on the board.

The results are compared with those of known circuit boards already stored in the database. The constituents of unknown components are identified by laser-induced breakdown spectrometry (LIBS) and the components, supported by image processing software, are evaluated to determine target fractions. In this way, a digital image of all processed circuit boards is created and can be used in the subsequent process step, in which laser desoldering removes and sorts the valuable components. The process has already been successfully tested in field trials in a recycling plant. Specialized metallurgical operations have extracted valuable materials such as tantalum as a secondary raw material from the enriched sorting fractions.

Applications

When information is lacking on the structure and material composition of old equipment, the high-quality recycling of raw materials faces an obstacle. Here, digitally networked optical metrology can close the gap and enable society to use resources efficient and economically.

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1 CAD drawing of the demonstration plant.
2 Automatic transfer of a circuit board to the inspection system.

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