Fraunhofer

1 *blackValue is capable of sorting black plastics by type.*

Fraunhofer FHR
Fraunhofer IOSB
Fraunhofer IAIS

Fraunhofer Institute for High Frequency Physics and Radar Techniques FHR

Fraunhoferstr. 20
53343 Wachtberg
Germany

Contact
Dipl.-Ing. Dirk Nüßler
Phone +49 228 9435-550
Fax +49 228 9435-192
dirk.nuessler@fhr.fraunhofer.de

www.blackvalue.de

blackValue® – SORTING BLACK PLASTICS

The material recycling of plastics is only possible if the individual plastic types are separated according to type. The Fraunhofer institutes FHR, IAIS and IOSB are currently pooling their expertise to develop an innovative terahertz camera system, high-performance algorithms and a real-time capable sorter that is particularly suitable for black plastics.

Starting point

Modern electronic devices which are used in everyday life as well as in the office are often made of black plastics as black looks very noble and is easy to clean. For this reason, black plastics play an increasingly important role in recycling. It is essential that plastics are sorted according to type to ensure that the quality of the material is not reduced thus preventing the loss of secondary raw materials. The waste sorting process is, however, complicated by the large number of plastics as well as the different types of additives such as colorants, plasticizers, flame retardants or UV blockers.

As the tonnage price for plastic waste with a high degree of purity is significantly higher than the price for low purity waste, recyclers are now using technically sophisticated methods in an attempt to sort the plastic fragments according to type. The aim here is to recycle waste without downcycling. Sorting systems that are capable of identifying materials and are used in plastics recycling must therefore also be capable of correctly classifying material types and black plastics, regardless of the additives used. From a financial perspective, the economic potential of black plastics lies somewhere in the region of a billion euro. With blackValue®, we have come one step closer to realizing this potential.

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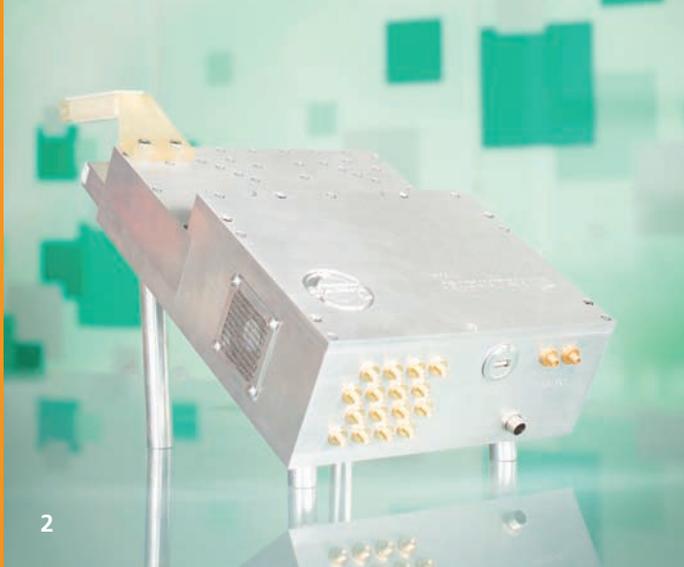
The problem

Existing optical sensor systems are not capable of distinguishing black plastics as the soot that is used to blacken plastics absorbs most of the electromagnetic radiation in the visible as well as in the infrared wavelength range. The recycling process is further complicated by the large number of plastics as well as the different types of additives such as colorants, plasticizers, flame retardants or UV blockers. Products that are produced from mixed recyclate have poorer material properties than products made from new plastics. End products of equal value are essential to achieve a closed recycling loop. Hence, there is still a gap in the recycling loop. blackValue® aims to close this gap. Moreover, the project foresees the integration of the solution into existing systems.

Our solution

Within the framework of the blackValue® project, we are developing a real-time capable sensor and evaluation system for the identification of materials in black plastics. To achieve this, we use the latest Fraunhofer technologies for efficient pattern recognition and terahertz sensors as well as our many years of experience in the development of sorting systems.

Our process is contact-free, non-destructive and non-hazardous for humans as terahertz radiation is of low energy and non-ionizing. The absorption behavior in the terahertz range allows the separation of recyclate and, in particular, black plastics according to type.

The combination of different sensor techniques allows complete material characterization using selected frequency bands in the low terahertz range and the acquired data can subsequently be evaluated using new analysis algorithms. This facilitates the utilization of a cost-effective, real-time capable multi-sensor suite.

Performance data

- High separating precision
- Sorting of plastics according to type (in particular, black plastics) or separation of foreign bodies (wood, glass, metal)
- Capacities of up to 5 tons per hour
- Upgradeability
- Cost-effective implementation
- Economic operation

What we offer

blackValue® is a Fraunhofer-internal R&D project which aims, in cooperation with industry, to develop a sorting system that is ready for series production. Thus, it will be possible to recycle black plastics on an industrial scale thanks to the clean separation of plastics according to type and increased economic efficiency. If you would also like to profit from our highly innovative Fraunhofer know-how, do not hesitate to contact us.

2 *The blackValue camera in its housing.*
3 *The system is tested in a sorter made by Fraunhofer IOSB.*