The waste is the limit

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1. Introduction of Steinert

Steinert is a family owned medium sized company with about 330 employees all over the world. Located since 130 years in Cologne we started to develop and manufacture lifting magnets which were used in the steel production as well as in the scrap business. Over the decades we developed several other technologies to separate ferrous and non-ferrous metals from material streams. We invented e.g. the eccentric pole system for eddy current separators and had a patent on this, before a lot of the competitors which denied this inventive step started to copy it.

Changing markets and market requirements let us transfer our knowledge about metal separation to general material sorting according the physical properties of the material itself. We started to manufacture sensor sorters in the mid 90`ies and covered also the primary resource sector with our experience.

Next to several subsidiaries all over the world, we included RTT-(Steinert) with its portfolio and technical knowledge in our company.

2. NIR technology

Regular NIR technology is based on the multiplexer technology. It has a moving mirror which reflexes the spectrum of the material on the belt below to the detection unit above. It is limited in the resolution, detection time and the belt coverage.

The HSI Technology has a very high spectral resolution of 256 measuring points as well as a high optical resolution of 320 measuring points over the whole belt width.

With this technology the whole belt width is scanned at once. The high resolution effects also the detection and differentiation of new composite materials which are introduced to the packaging market.

The spectral image of PVC and the image of material on the belt illustrates the difference of the regular NIR to the state of the art HSI technology. Each colored block provides the material information (NIR spectra) in this region
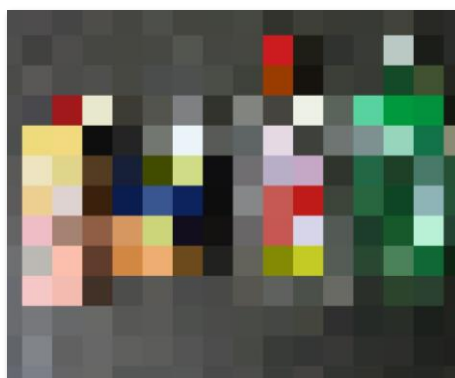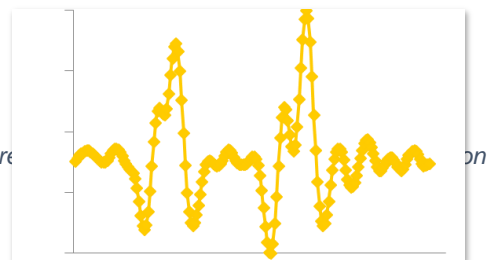

Figure 2: optical resolution in comparison

3. Adapting to actual market requirements and processing methods

Building a new sorting line in respect of all issues of material handling and its composition is an ideal situation. Existing treatment lines have to be extended by automatic sorting. Industrial waste, MSW or different bin collections are processed by one company. The input material of those lines is changing and varying.

The ideal situation of non-overlapping material is hard to achieve. In practice this is happening as well as labels on bottles are creating a confusing NIR image by using the regular NIR technology. The sorting of paper and cardboard in different qualities needs to consider the influence of humidity. The market price of sorted material is changing and depend on the purity of the material. The difference in recycling possibilities of PET bottles and PET trays need a differentiation of these.

These are just some examples for the necessity of a highly flexible and reliable sorting technology. By using the HSI technology this can be achieved due to the advantages explained above.

We use this technology to adapt, by using it as a modular system for different material conveying systems as well as in combination with our other sensor systems.
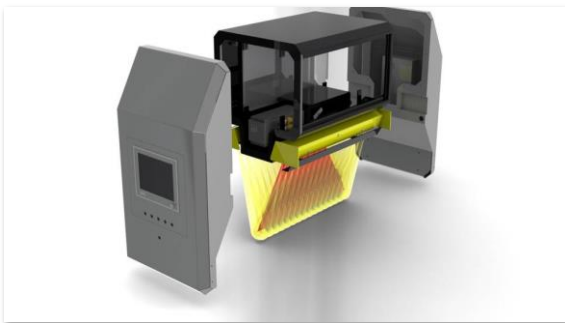

Figure 1: design of the Unisort bridge

Our development of sorting machinery for all kind of 3D plastics to a special sorting equipment for film or the Unisort Black Eye for the sorting of black plastics by type, show, that changing market requirements can be respected and influenced. The HSI technology is the base for all these inventions and is prepared for changing materials and legislation.

The same technology is for example used for the quality control of RDF. The moisture content and the colorific value tell the quality and composition of the produced RDF fractions.

Our equipment is installed in a lot of sorting plants all over the world and solves the tasks of our customers.

We are open to face the future targets in the sorting of all kinds of material. Every material is based on physics and therefore it is able to detect differences by using adequate technology.

References:

Internal researches RTT-Steinert (1995-2017), Köln, Zittau GERMANY

Sensor-based Sorting 2014, Heft 135 der Schriftenreihe der GDMB Gesellschaft der Metallurgen und Bergleute e.V., Scientific direction: Prof. Dr.-Ing Thomas Pretz and Prof. Dr.-Ing. Hermann Wotruba