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Sensor solutions for online analysis of post-consumer scrap

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The PURESCRAP project develops sensor solutions for analysis of post-consumer scrap with the aim to enable increased use of low-quality scrap grades (post-consumer scrap) for the steel industry. Sensor stations are built for the two separate processing chains of heavy (cut) and shredded scrap. It includes sensors for chemical analysis, size metrics and object recognition. The sensor stations will be used both for better understanding of the scrap processing operation at the recycler as well as providing an accurate chemical analysis of individual scrap batches to be used by the steelworks.

Forecasts reveal that the crude steel demand will continue to rise and at the same time the availability of postconsumer scrap will increase even more. The uncertainty of the level of tramp elements in the scrap limits is use for steelmaking. If the composition of the scrap is known these tramp- or alloying elements in the scrap can instead be used as a resource and the total amount of scrap in the heat can be maximised.

In the PURESCRAP project, the sensor chain comprises a camera, LiDAR (Laser imaging, detection, and ranging), LIBS (laser-induced breakdown spectroscopy), and XRF (X-ray fluorescence). The sensors are coupled by a comprehensive information and communication technology (ICT) network. The combined methods are installed and tested at the Swedish recycling plant of Stena Recycling. The scrap, which is processed, is further sent to partners voestalpine and SSAB for melting and reference analysis of the chemical composition of the scrap. To validate the efficiency of the PURESCRAP sensor stations, limits for nonferrous tramp elements (e.g., Cu, Ni, Mo and Sn) have been specified.



Figure 1: PURESCRAP sensor stations

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