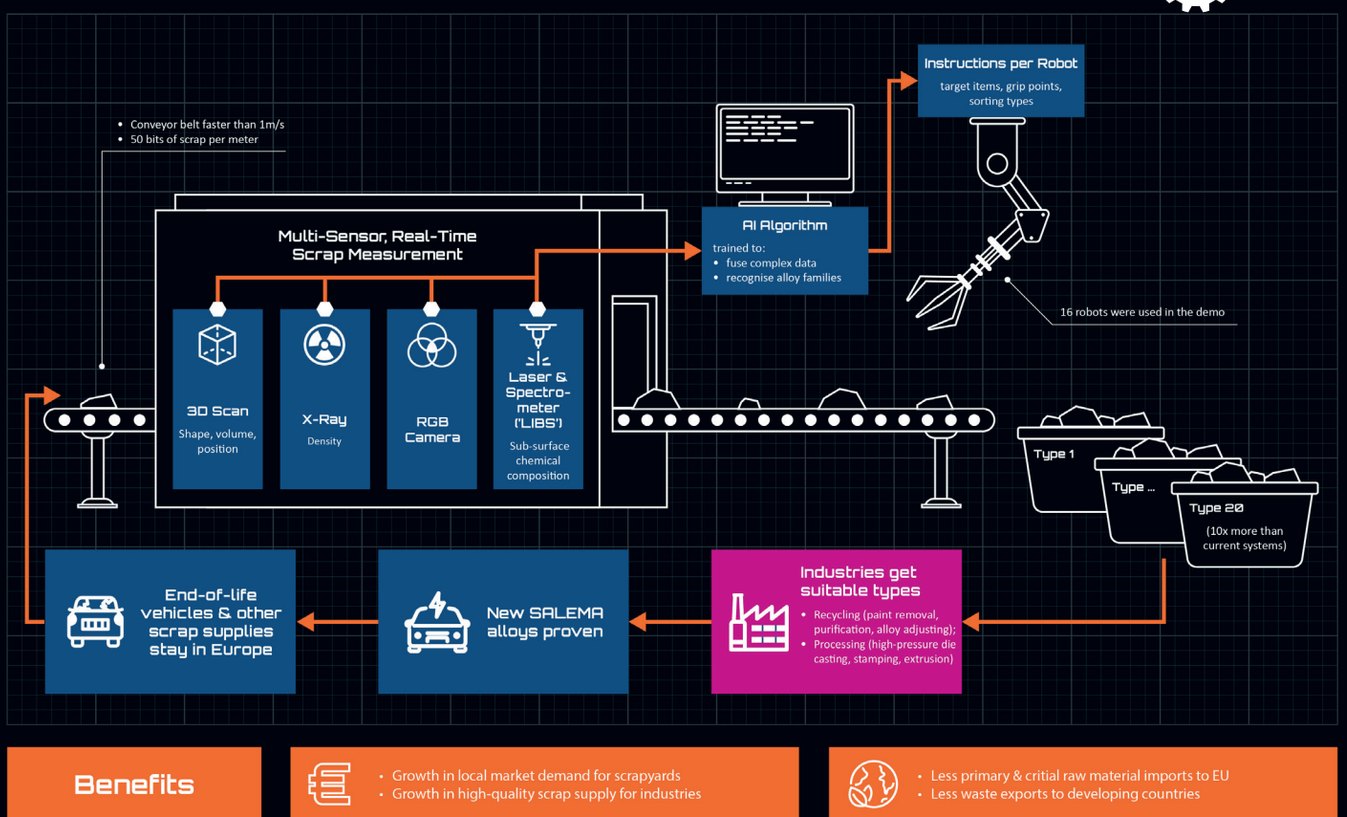

SALEMA improves recycling for sustainable, high-performance aluminium

The EU-funded SALEMA project brought together partners from across the aluminium value chain. Research, recycling and automotive industry partners developed new scrap sorting technology to boost end-of-life aluminium scrap recovery, adapted industrial methods to effectively recycle it in alloys that meet automotive manufacturing and performance needs, and proved:

- **the multi-sensor, robotic sorting system with LIBS (laser-induced breakdown spectroscopy) and a novel artificial intelligence (AI) algorithm can select multiple types of scrap in a single pass and provide aluminium cast and wrought feedstock for smelting;**
- **LIBS can penetrate coatings and analyse composition of post-consumer scrap;**
- **the algorithm can be trained to recognise other alloy families and materials;**
- **recovered scrap can be pre-heated to effectively remove coatings and enable successful recycling in industrial processes.**

By boosting aluminium scrap recycling to meet local industry needs, SALEMA helps reduce the environmental impacts of critical raw material extraction and transport.

To read more about SALEMA's alloys, their design, results, benefits and the relevant contact partners, turn the page or visit the SALEMA website.

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MULTI-SENSOR, MULTI-OUTPUT SCRAP SORTING

CHALLENGE Bring scrap metal sorting back into EU (previously exported to Asia) & supply EU smelters; demonstrate multi-sensor, multi-output sorting technology & added value for scrapyards & industry partners

APPROACH Improve on existing multi-sensor robotic sorting system ('MULTIPICK') & optimise ability to select various aluminium alloy families. Add LIBS (laser-induced breakdown spectrometry) to detect & analyse sub-coating chemical composition of scrap. Apply Deep Learning artificial intelligence (AI) to rapidly process LIBS & other sensors' data & provide robot scrap pickers with individual instructions on gripping & sorting target items on a conveyor belt.

STEPS Defined operational parameters of LIBS (scrap surface condition, laser angle & shooting points) for aluminium scrap. Integrated LIBS into semi-industrial prototype, fusing data with 3D, RGB, X-ray sensors. Developed novel AI algorithm to process & generate robot instructions. Defined optimal sorting thresholds for different Zorba (Al-rich scrap) supplies. Extracted 4 qualities of Al scrap from shredded end-of-life-vehicle Zorba as supply for SALEMA partners' activities.

SHOWED Successful real-time targeting & separation of target aluminium alloys in scrap.

BENEFITS Expand (local) markets for recyclers. Reduced waste export, critical raw material import & environmental impact.

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PREPARATIONS FOR INDUSTRIAL SMELTING

STEPS Aluminium alloy producer partners used specialist expertise & research to define pre-treatment required to prepare recovered end-of-life scrap for high-quality aluminium smelting, for use in high-pressure die casting, extrusion & stamping processes.

Used designed SALEMA alloy 'recipes' *('SALEMA designs new, sustainable, high-performance aluminium alloys' factsheet)* & recovered scrap feed-stock to create & test structural car parts *('SALEMA alloys meet industry needs' factsheet).*

ASSESSED The level of contamination in SALEMA scrap consignments, evaluated by metallic yield – the portion of useable metal after scrap melting.

OUTCOME Use of a multi-chamber furnace to pre-heat scrap before it enters the melting phase.

SHOWED Pre-heating removes organic material (e.g. dirt / coatings): coatings burn, providing energy in the furnace. Also reduces oxides / other contamination, improving melting efficiency.

BENEFITS High metallic yield, reduced dross formation, reduced energy consumption during melting. Maximises efficiency & profitability of the remelting process.

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