Fact Sheet

Enhancing Steel Industry Efficiency through Scrap Optimisation Technologies in the ALCHIMIA Project

Moving towards a low-carbon process industry needs a transformation of iron and steel production. Achieving CO2-free steelmaking is not reliant on a singular solution; instead, it demands a diverse range of technological possibilities that can be implemented individually or in tandem, depending on specific local conditions.

Utilising steel scrap represents a viable approach to reduce carbon-dioxide emissions

By melting steel scrap at the end of its lifespan, new crude steel can be produced with adjusted chemical composition to meet specific product requirements.

Steel scrap undergoes thorough separation and sorting, enabling its utilisation for various steel grades.

Electric steelmaking uses electrical energy to melt charges of up to 100% scrap, thus enabling a circular economy approach while also allowing the use of renewable energy.

Compared to steel production from iron-ore, use of steel scrap reduces CO2 emissions by 1.5 tonnes per tonne of steel, conserves 1.4 tonnes of iron ore, 740 kg of coal, and 120 kg of limestone.

There are some disadvantages in using steel scrap for steelmaking. In ALCHIMIA project we develop tools which address these challenges in steel production

1. Impurities in steel scrap, like copper and other metals, can compromise the quality of crude steel, requiring extra processing or downgrading.
2. Varying composition of steel scrap makes it hard to maintain consistent properties in the produced steel, complicating manufacturing.
3. Fluctuating availability of top-grade steel scrap disrupts supply chains and can raise additional costs for steel manufacturers.

This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 101070046.

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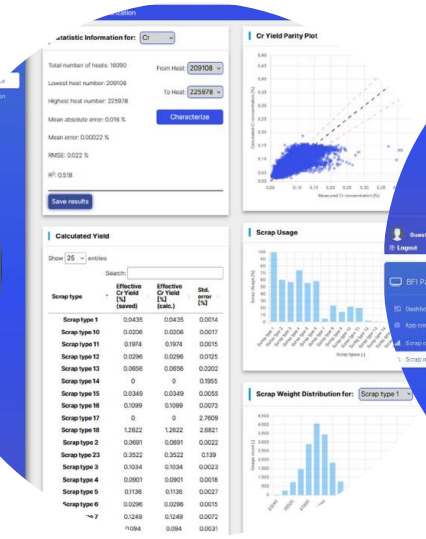
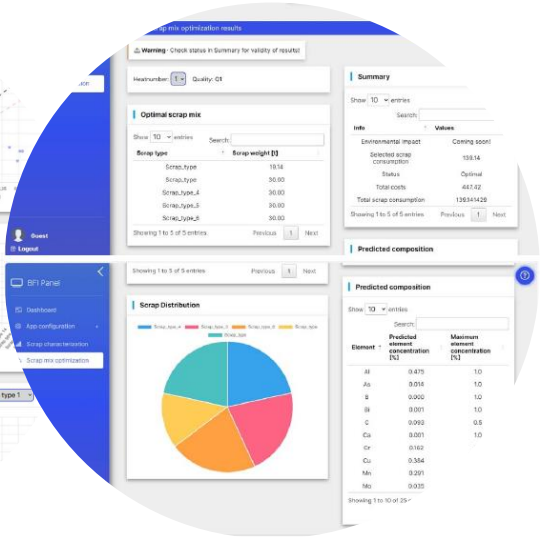
Scrap Advisory Tools developed in the ALCHIMIA Project

- Using historical data from steelmaking plants, the Scrap characterisation tool developed in ALCHIMIA provides essential information and key performance indicators, such as meltdown energy requirements, effective metallic yield, and elemental yield for each scrap type in use.
- A Scrap mix optimiser tool determines the most cost-effective scrap mix for each specified quality, considering the relevant alloying and tramp elements. It calculates the optimal mix, factoring in purchase and processing costs, availability, and elemental composition restrictions. This enables the use of higher percentages of low-quality scrap, thereby reducing costs.

Scrap characterisation for effective metallic yield



Scrap characterisation for effective elemental yield



Scrap mix optimisation

Advantages

- Optimal resource utilisation
- Cost efficiency
- Quality control
- Process improvement
- Inventory management
- Reduced carbon footprint

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