CiSMA

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Circular Steel for Mass Market Applications

General Project overview

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DATE: 2025/04/02

Circular Steel for Mass Market Applications

Introducing scrap-based Electric Arc Furnace steel for a greener circular economy in mass-market sheet metal goods

42 months duration
01/10/2024 to 30/04/2028

Grant agreement ID:
101177798

Budget: € 4.380.528
100% funded by the EU

Coordinated by
Eurecat, RTO

12 partners from
5 different European countries

Funded by the European Union

The CISMA project has received funding from the European Union Horizon Europe Programme: project num 101177798. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Health and Digital Executive Agency (HADEA). Neither the European Union nor the granting authority can be held responsible for them.

Motivation and Objectives

CO_2 (BOF)
160 Mt/yr[a]

CO_2 (EAF)
15 Mt/yr[a]

BOF Steel: 86 Mt/yr[b]

EAF Steel: 66Mt/yr[b]

Iron Ore
80-90 Mt/yr

Coking Coal
30-35 Mt/yr

Iron Ore
150 Mt/yr[a]

Coking Coal
41 Mt/yr

Ferrous Scrap
80 Mt/yr[a]

Finished Steel
Netto:+13Mt/yr

Exp. 16Mt/yr[b]

Imp. 29Mt/yr[b]

Ferrous Scrap
Netto:-14Mt/yr

Imp. 5,5Mt/yr[b]

Exp. 19.5Mt/yr[b]

a) Greenhouse gas intensities (...). JRC Technical Report 2022
b) Steel Industry in Figures, Eurofer 2022

https://publications.jrc.ec.europa.eu/repository/handle/JRC129975

https://www.hellenicshippingnews.com/eus-iron-ore-imports-down-again-this-year/#:~:text=In%20the%2012%20months%20of,in%20the%20full%20year%202021.

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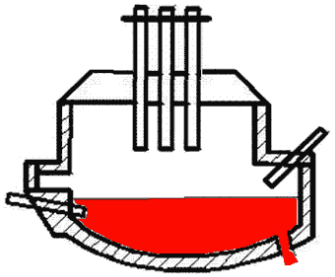
Motivation and Objectives



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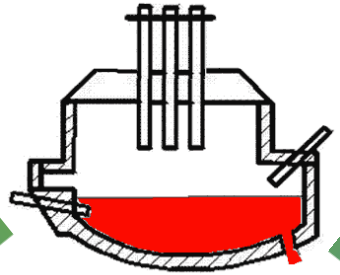
Motivation and Objectives



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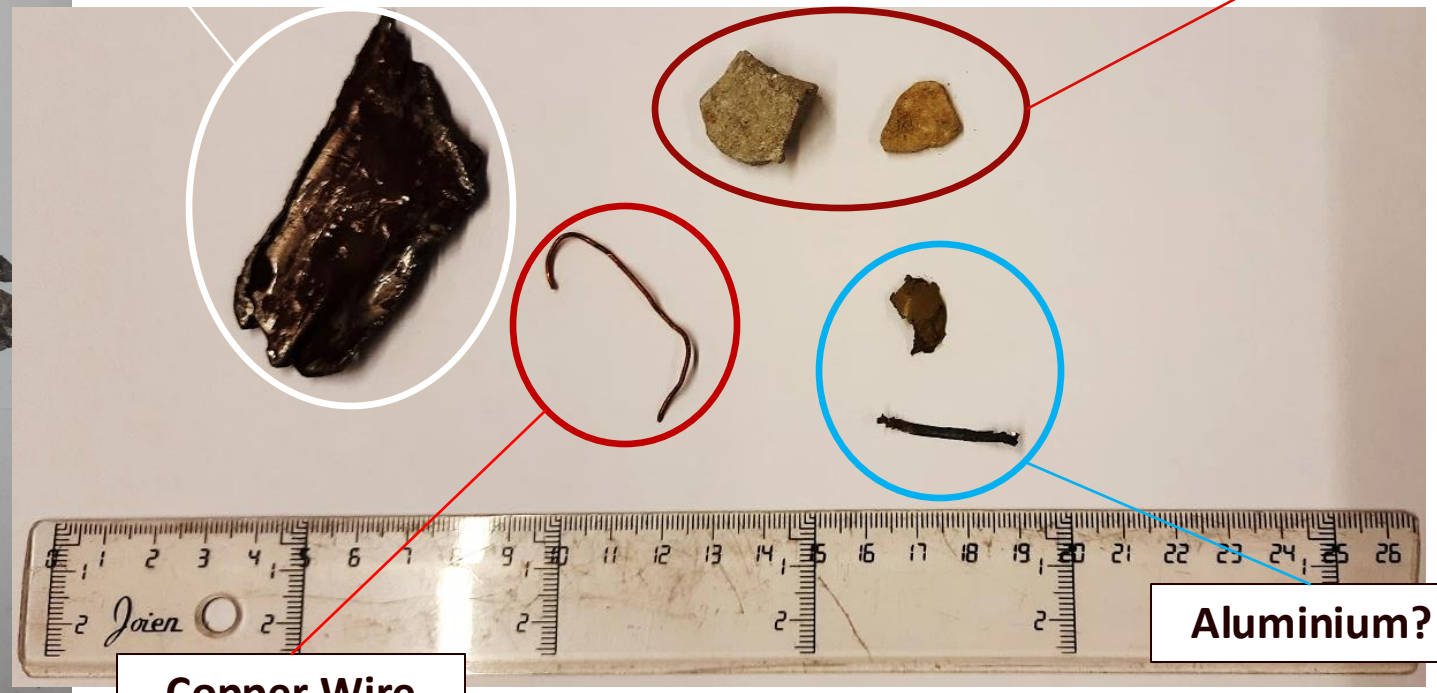
Motivation and Objectives

Painted Steel (w/ brazings?)



Arids

Copper Wire

Aluminium?

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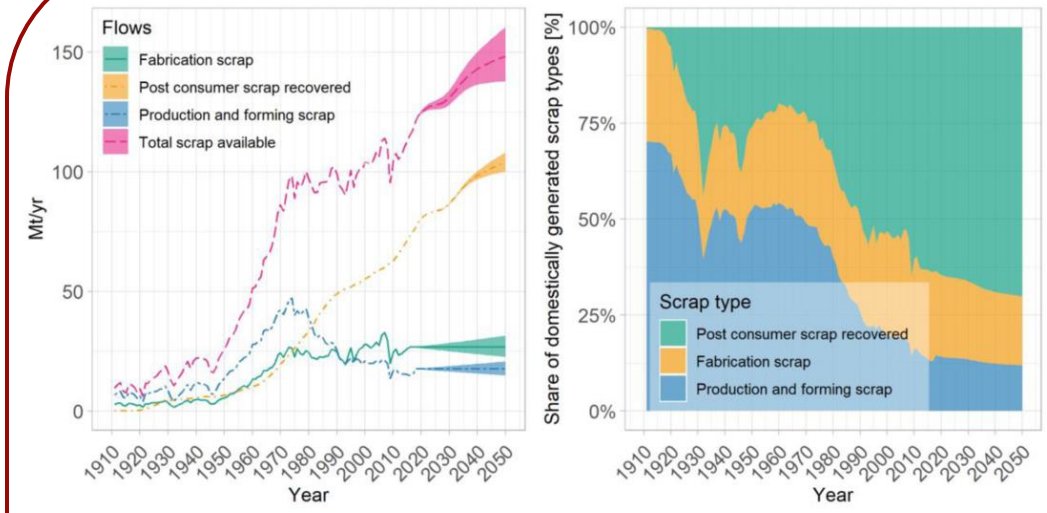
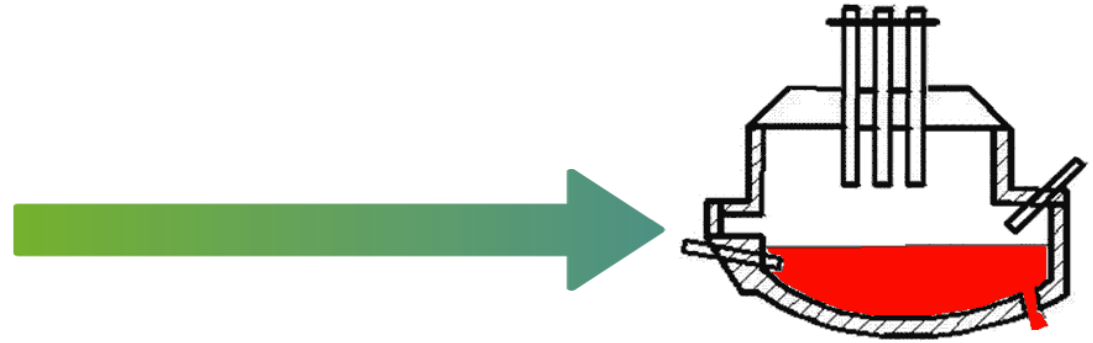
Motivation and Objectives

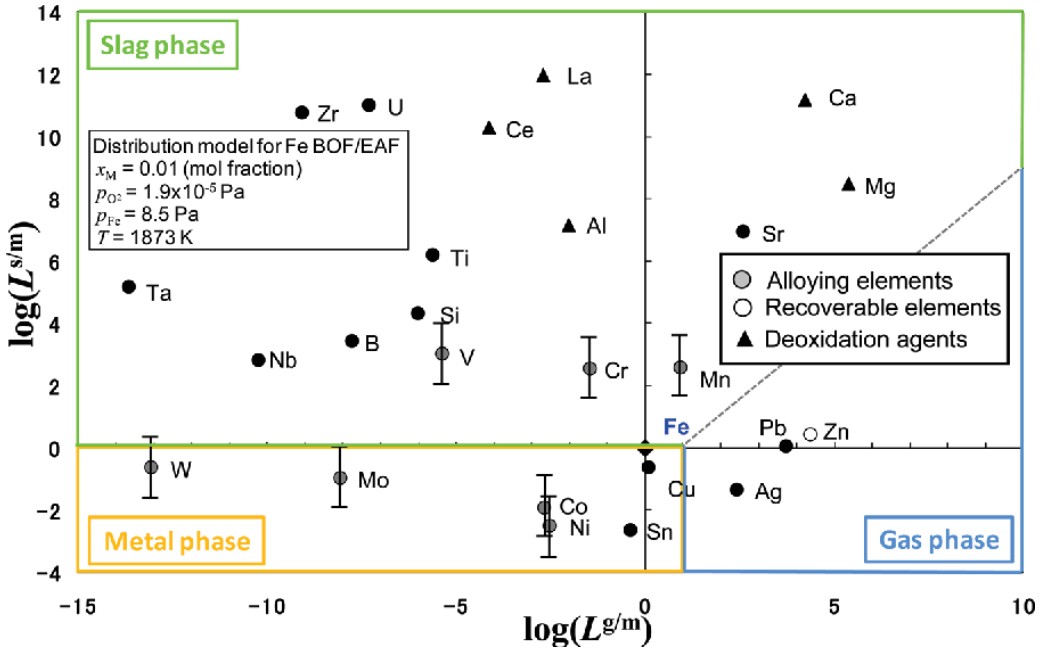


How will tramp elements affect future steel recycling in Europe? – A dynamic material flow model for steel in the EU-28 for the period 1910 to 2050

Sabine Dworak[a,b,*], Helmut Rechberger[b], Johann Fellner[a,b]

Resources, Conservation & Recycling 179 (2022) 106072





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Motivation and Objectives

Circular Steel for Mass Market Applications

Volvo Cars

Automotive

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Electrolux Professional

Industrial laundry

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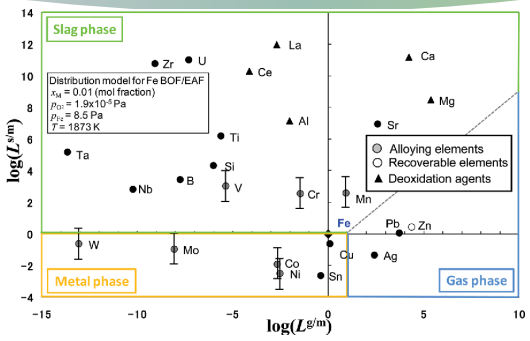
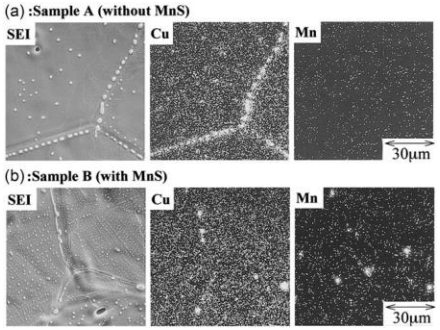
Motivation and Objectives

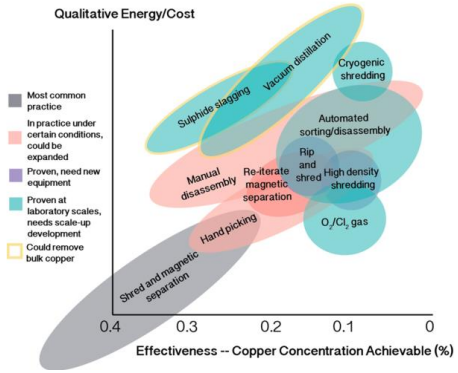
Circular Steel for Mass Market Applications: **Challenges**

Challenge 1: Metallurgy and Residual Elements

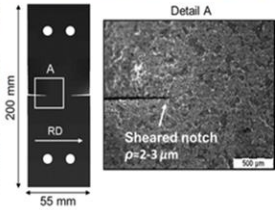


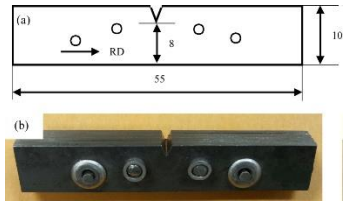


Challenge 2: Scrap as a Raw Material

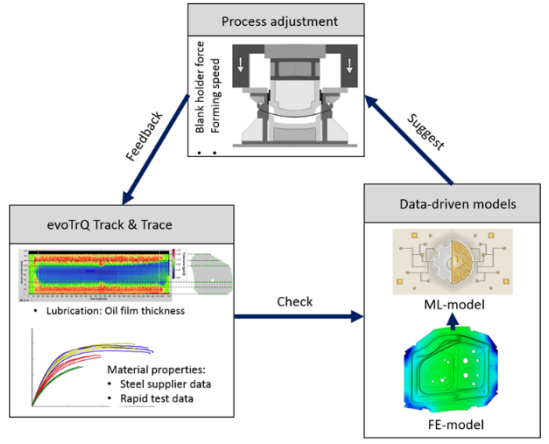


Challenge 3: Fast and Accurate Characterization





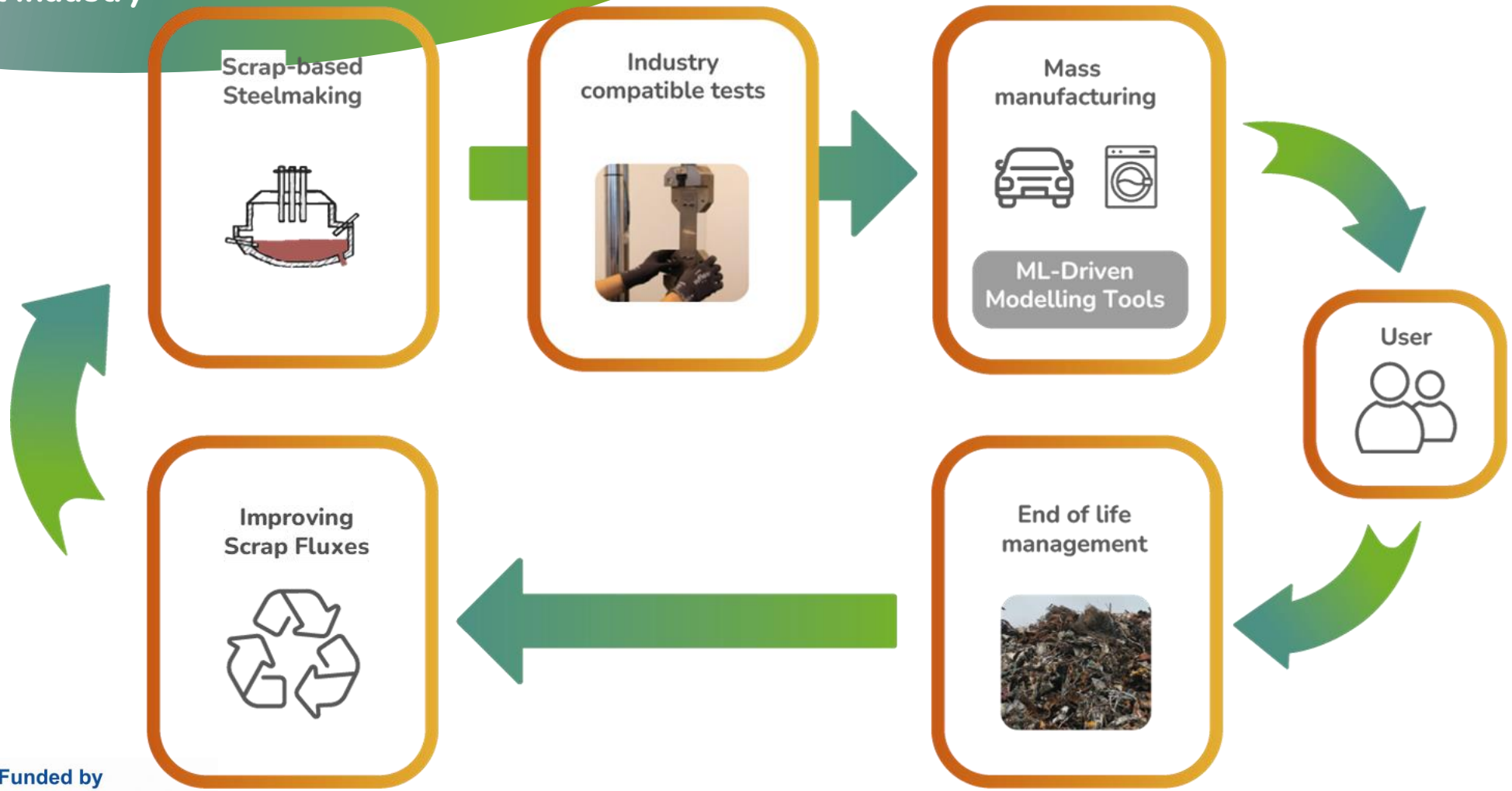
Challenge 4: Adapting the Industry



Active optimization of the metal forming process

CiSMA in a nutshell

Application of Circular Economy principles in the Steel industry



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Consortium

12 PARTNERS

5 EUROPEAN COUNTRIES

eurecat · aerobase · ALBA · Blekinge Tekniska Högskola BTH · CSIC · Electrolux Professional · ESTEP European Steel Technology Platform · RI.SE · TATA STEEL · LIÈGE université · voestalpine ONE STEP AHEAD. · VOLVO

2 STEELMAKERS

4 RESEARCH CENTERS

2 ACADEMIC INSTITUTIONS

1 INDUSTRIAL ASSOCIATION

2 END-USERS

1 SME

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Motivation and Objectives

Circular Steel for Mass Market Applications: **Challenges**

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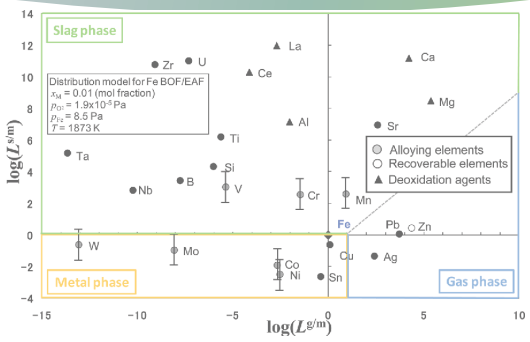

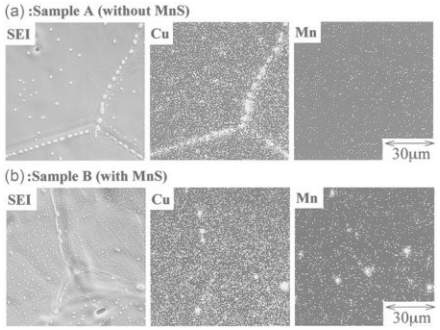

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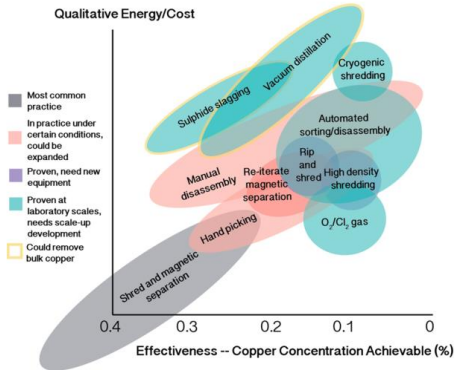

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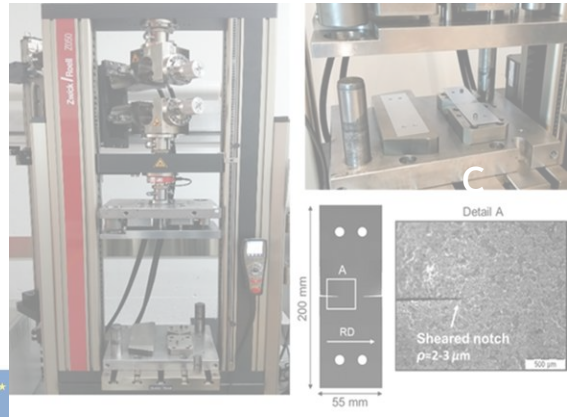
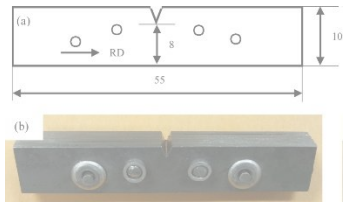
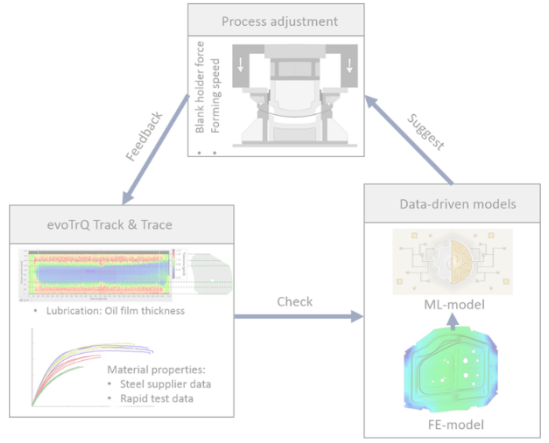




Challenge 4: Adapting the Industry



Active optimization of the metal forming process

Robotic sorting

PRESENTER NAME: Robert Baudinet
EMAIL: robert@matvision.eu
DATE: 2025/04/02

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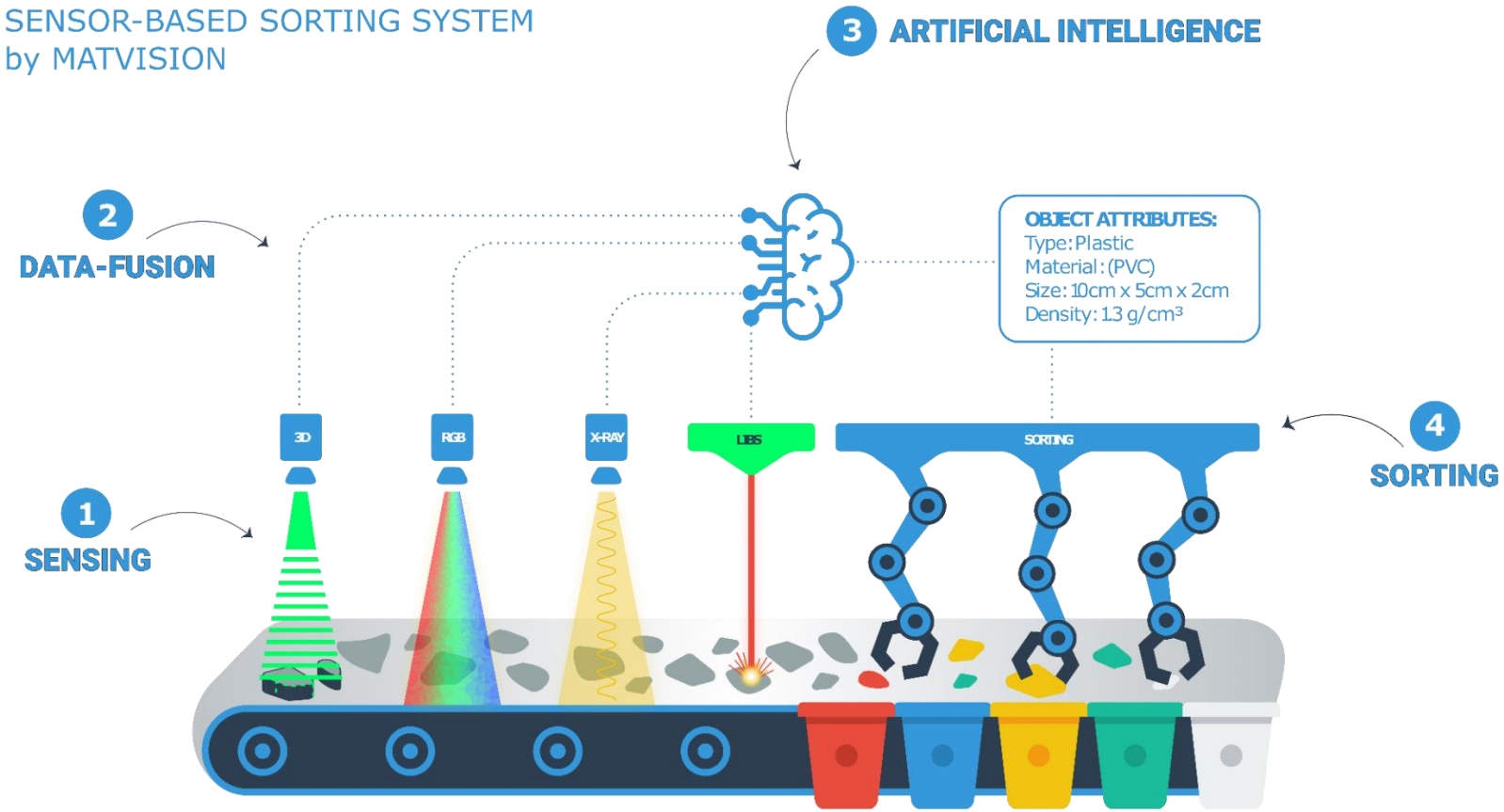
ULiège robotic sorting line



- Allows to assess which subset of sensors suit best a **specific case-study**
- Multi-output sorting with delta-robots => **Number of sorted classes is flexible**
- Up to 20 classes sorted in one pass

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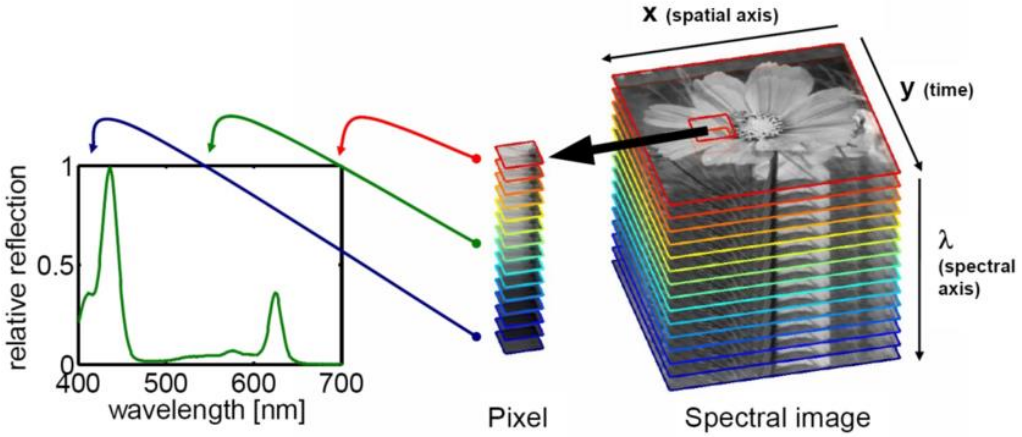
ULiège robotic sorting line

Differentiating your materials by

- **Shape**: 3D Camera to detect the pieces and measure their volume
- **Color**:
  - IRGB Camera
  - VNIR
  - SWIR (used for plastic differentiation)
- **Density**
  - Transmitted XRay to see through metals
  - TeraHertz (soon) to see through plastics
- **Elementary** for alloy differentiation and pollutant detection
  - LIBS to measure under painting layers and coatings
  - XRF (soon) for elementary measurements
- **Induction:** Induction sensors to differentiate metallic materials from plastics, wood, rubber,...



→ **Customizable sensor combination** adapted to **your problem**

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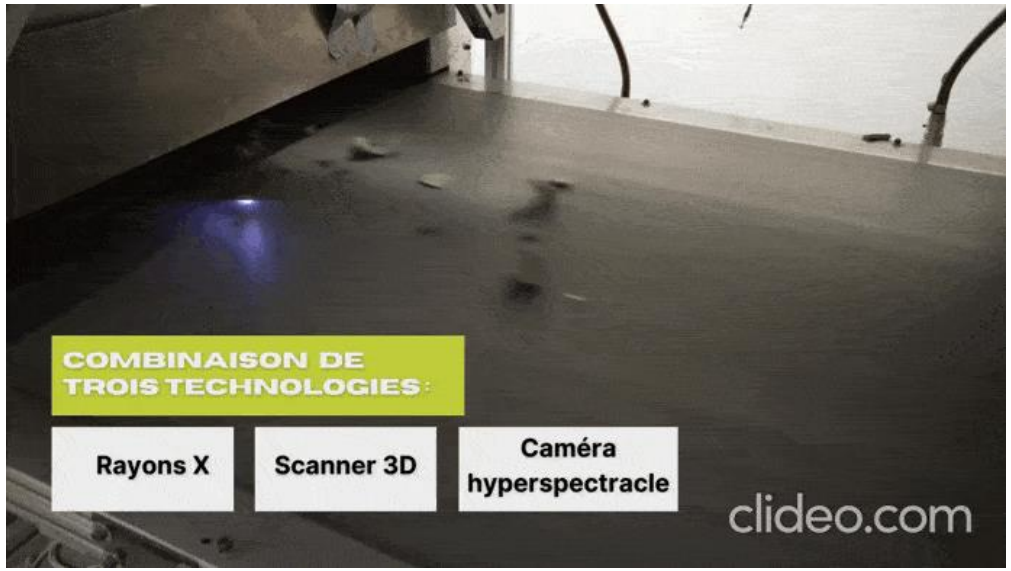
ULiège robotic sorting line



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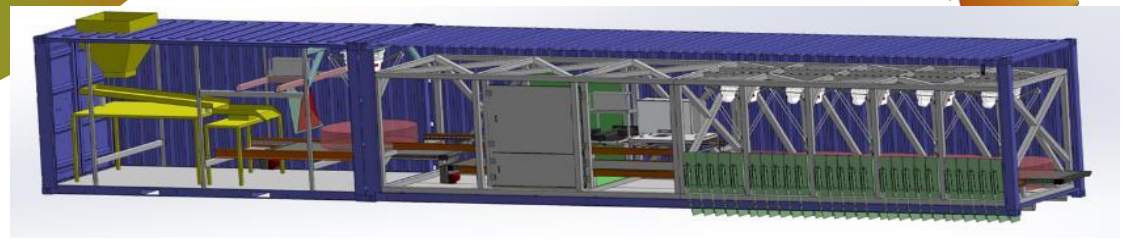
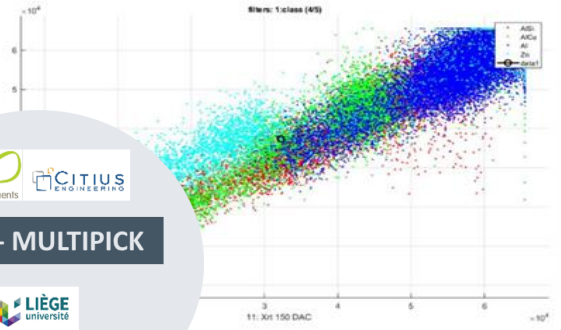
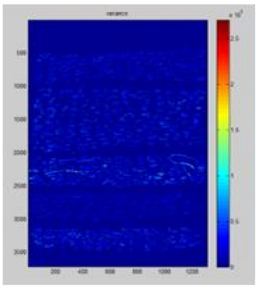
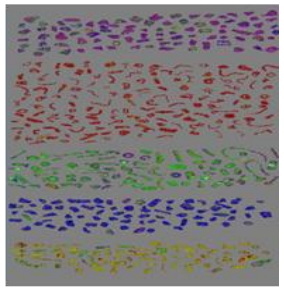
ULiège robotic sorting line





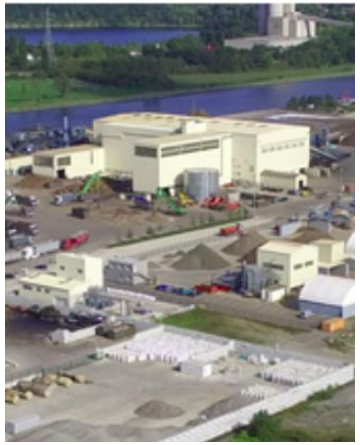


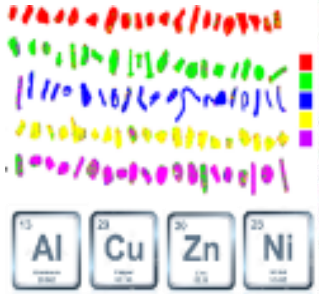


comet traitements · CITIUS ENGINEERING

PICKIT - MULTIPICK

LIÈGE université · Reverse Metallurgy





PICKIT – MULTIPICK: first industrial line sorting 10 000 t/year of Zorba @ Comet Traitements in Obourg (Belgium)

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How to separate non-ferrous metals

How to separate **non-ferrous metals** (Cu, Al, Zn, brass,…) from shredded cars?

→ Multi sensor & multi output sorting demonstrator developed by an academia/industry consortium

- Aluminium alloys
- Stainless steel
- Plastic recycling
- Battery recycling
- …

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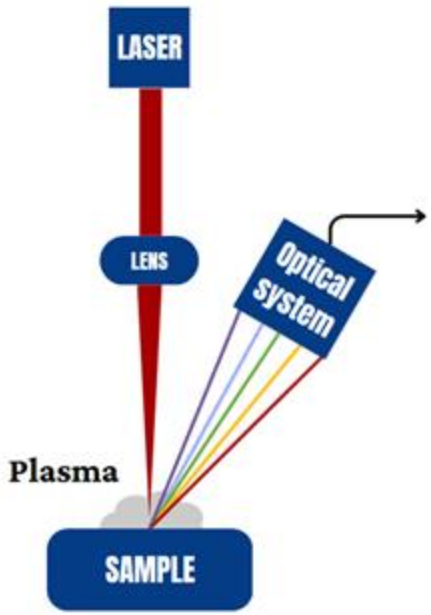

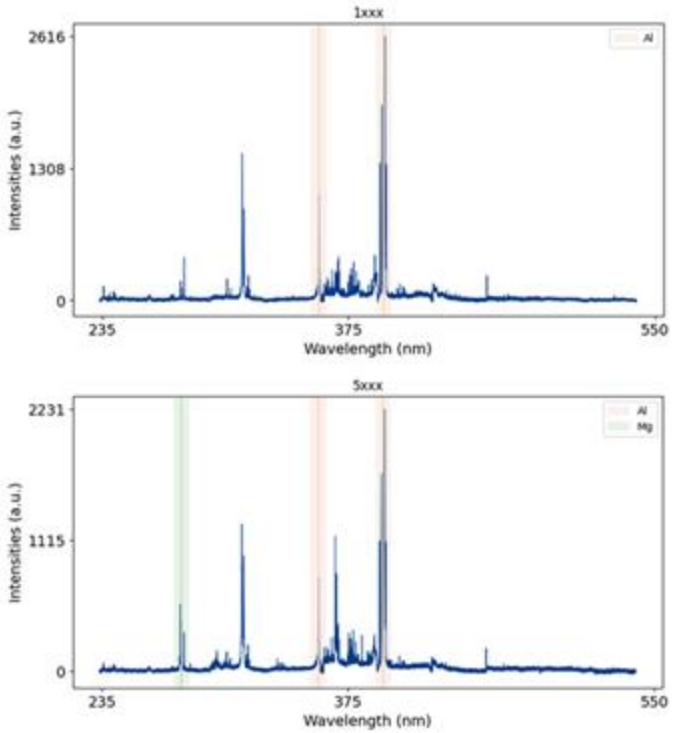

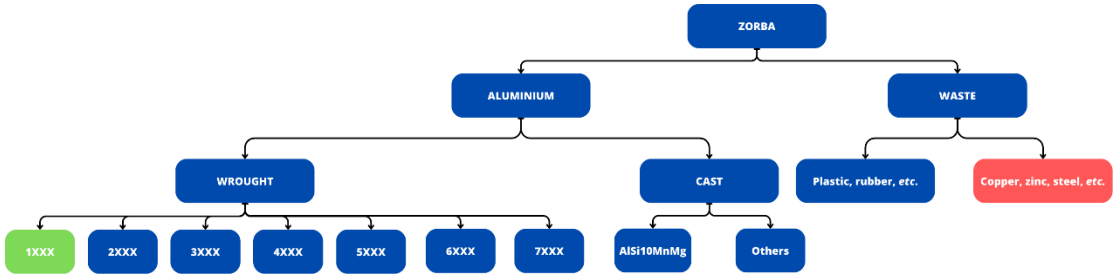

Libs analysis:

- Sample surface is excited **by a laser**
- Plasma is created
- When cooling down, **the plasma emits light**
- This light contains **peaks characteristic of elements present**
- **Optics collect light** and transmit it to a spectrometer

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Robotic sorting in the CISMA project

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Robotic sorting in the CISMA project

The aim of work package is to:

- **Analyze and move beyond the current limitations of working with scrap as a raw material**,
- Deal with **undesired residues and alloying elements**

It translates into the following specific objectives:

- Analyze current fluxes of scrap (internal to the steelmakers and commercial/public market)
- Propose and test strategies to improve the quality of post-consumer scrap: using the robotic sorting line

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Robotic sorting in the CISMA project

Common robotic sorting problems (*e.g.* Aluminium sorting)

- 60% of the stream could be considered as waste when targeting specific alloys (*e.g.* 5xxx, 6xxx)
- The target classes are removed from the belt during the sorting
- Quality is more important than the throughput

VS

CISMA robotic challenges

- Less than 2% of the stream could be considered as waste
- Negative sorting: The target classes stay on the belt
- High throughput is crucial

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EMAIL: robert@matvision.eu
DATE: 2025/04/02

CiSMA

Circular Steel for Mass Market Applications

Coordinators information

Eurecat Technology Center

Begoña Casas
Project Coordinator

Jaume Pujante
Project Technical Coordinator

info@cisma-project.eu

Thank you!

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A project coordinated by:

eurecat