Background

Tata Steel, a global leader in steel production, is committed to sustainability through advanced scrap recycling processes. Recycling reduces the demand for virgin materials, minimizes environmental impact, and supports a circular economy. The primary goal is to produce high-purity processed ferrous scrap, which serves as a critical feedstock for steel production and must meet stringent quality standards for operations in downstream processes like blast furnaces. One critical challenge in the recycling process is the presence of zinc and zinc-coated scrap. Zinc contamination poses significant operational challenges in blast furnaces. Due to its low melting point, zinc vaporizes during smelting and later solidifies as sludge. This sludge, when reused in sinter making, reintroduces zinc into the blast furnace, causing operational inefficiencies and complicating the recycling loop. Currently, only a small batch of finished goods is tested for zinc using handheld XRF guns, leaving room for improvement in detecting zinc at earlier stages of the recycling process.

What we're looking for

We are looking for innovative solutions to optimize the identification, sorting, and quality control of scrap materials in the steel recycling process. This includes implementing real-time, automated systems to detect zinc-coated scrap in incoming materials before processing and to identify zinc content in finished goods after production. A fully automated system is needed to integrate this inspection process into the production line. This system should perform comprehensive and real-time testing at two critical stages: detecting zinc-coated scrap in incoming materials before it enters the recycling to prevent contamination, and identifying zinc content in all finished goods after production, thereby enhancing product quality and compliance with material specifications.

Solutions of interest include:

- High-speed imaging coupled with vision analytics for material categorization
- Inline, real-time automated zinc detection systems

Our must-have requirements are:

- Easy to plugin with minimal changes to the existing setup
- Ready to implement solutions
- Easy to maintain

Our nice-to-have's are:

- Scalable solutions

What's out of scope:

- Replacement of existing setup
- Technologies that interfere with the operability and productivity of the existing equipment

Acceptable technology readiness levels (TRL): Levels 5-9

1. Basic principles observed
2. Concept development
3. Experimental proof of concept
4. Validated in lab conditions
5. Validated in relevant environment
6. Demonstrated in relevant environment
7. Regulatory approval
8. Product in production
9. Product in market

What we can offer you

Eligible partnership models:

Supply/purchase
Licensing
Co-development

Benefits:

Services Agreement

Tata Steel would fund the implementation, with the amount of funding to be discussed after the techno-commercial finalization of the proposal, subject to a tentative budget of up to $100,000.

Expertise

Partner will be assigned a representative from Tata Steel. They will assist the partner during the project as required.

Tools and Technologies

Partners will be allowed to do local customization of instruments. They can access our lab facilities.

Data

After NDA is signed we can share required data.

Facilities and Services

Partner will be invited to concerned plant or facility for survey and on site understanding of the challenge (video call may also be explored). Required help will be given from Tata Steel to the selected partner.

Reviewers

Shikha Suman

Area Manager Program Management

Please contact the University of South Florida Technology Transfer office representative for submission – Roisin McNally at rmcnally@usf.edu