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## **INVITED LECTURE**

# **MACHINE LEARNING APPLIED TO IMPROVING THE SCRAP RECYCLING AND MELTING PROCESS IN ALL TYPES OF FERROUS ALLOYS AND STEEL**

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### **Abstract**

*Reusing scrap in the foundry sector is critical to manufacturing metals with the quality the industry requires sustainably and efficiently. The state of the art of optimization systems for foundry raw materials is based on a characterization and classification of the different families of materials (scrap, internal returns, etc.), with the information provided by the supplier itself, in the best of cases verified with a more or less representative sample of the material received, which is melted and analyzed in small furnaces.*

*The reliability of the results given by the optimization system depends directly on the representativeness of this information. And this is where the problem arises: when the scrap is of good quality, the final results agree reasonably well with those expected; On the contrary, when the scrap is more heterogeneous or its logistical control is more complex, there is a significant risk of chemical deviations in the final metal that would mean the rejection of a substantial part of the molten castings, with the consequent negative impact on costs and productivity.*

*Consequently, low-quality scrap, which is very abundant and low-cost, is underutilized in favor of much more expensive virgin raw material and hardly sustainable production.*

**Keywords:** Machine learning, Scrap, Load optimization