



PROJECT PROGRESS

CFD simulations of the melting furnace and development of a digital twin at ASAS

RETROFEED is a European-funded project that aims to boost the use of increasingly variable, bio-based and circular feedstock in process industries by retrofitting core equipment and implementing an advanced monitoring and control system. One of the Resource and Energy Intensive Industries (REII) sectors is aluminum. For that industry, the objectives are to increase the amount of scrap aluminium in the melting furnace to save resources and energy and decrease CO₂emission.

The retrofitting solutions in this demo site are focused on the design of a new burner head, oxygen injector system and development of a Digital Twin (DT) which will be integrated into the Decision Support System (DSS), allowing the user for the process optimisation. In fact, the activities described in the last submitted deliverable have been:

- Numerical investigation of the current performance of ASAS melting furnace.
- Simulate furnace operation at different operational conditions.
- Test different burner heads to optimise their design.
- CFD simulations of the new oxygen injector system.
- Development of Digital Twin of the process with selected burner head.
- Experimental investigation and model development of dross formation which can be applied as part of DT.



Figure.1 Temperature and oxygen profile for one burner

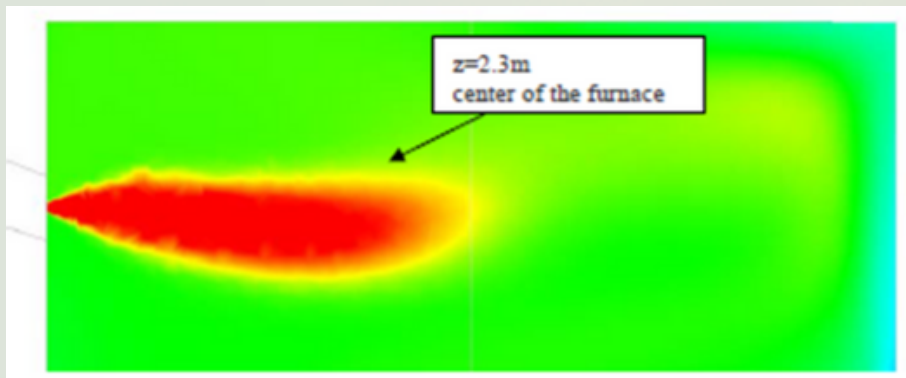


Figure.2 Contours of mole fraction of O₂



Figure.3 Apparatus for cross formation tests

Besides, all the above aims must simultaneously fulfil the limits and constraints such as limits of NO_x emissions, uniform oxygen concentration within the furnace, elimination of incomplete combustion and hot spots, increase the scraps share in feedstock without decreasing of Al quality and improving overall process efficiency.

Therefore, because of this deliverable, a Digital Twin has been provided by IEN that allows quick testing of different operational scenarios and virtual prototyping of the new solutions. This DT of the melting furnace will be integrated in the Decision Support System (DSS) of the project in the next months.

