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Recent research, planned equipment upgrades and future work at the pilot EAF at RWTH Aachen University

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Several European steelmakers currently plan to transform integrated steel mills based on the BF-BOF route towards the DRI/HBI-EAF/ESF routes of steelmaking. This planned transformation goes hand in hand with the need to optimise the new process routes in order to produce the same high-quality products on these different and, for the steelworks concerned, new process routes.

The optimization of the EAF process in general is furthermore driven by increasing demands on sustainability and efficiency of the melting process. Alternative fuels, input materials like DRI or recycled materials as well as comprehensive process monitoring and control strategies are aiming to minimize the ecological footprint and increasing the circularity of EAF steelmaking. On the other hand, due to the extreme environment within the EAF, continuous measurement is quite difficult or even impossible for many relevant process parameters.

The application of pilot-scale testing can provide valuable inside through a more controlled or simply cheaper investigation of new equipment concepts, input materials or operating strategies. The 250 kg pilot-scale EAF at RWTH Aachen University was previously for example applied to investigate the use of biomass and agglomerated steelmaking residues in EAF steelmaking. Recently, the furnace was employed to test the substitution of natural gas by hydrogen in downscaled EAF burners with a main focus on hydrogen pickup of the steel melt.

To address the needs of future research work regarding the sustainable production of iron and steel, the furnace in the near future will be upgraded to improve general availability but also to add new equipment for continuous feeding of materials into the furnace during operation and improved sample taking. Furthermore, the furnace infrastructure like water cooling circuits and off gas treatment will be updated and improved as well as equiped with additional measurement points.

The uprades of the pilot EAF will open new possibilities for future research at RWTH Aachen University. It will be possible to investigate not only the scrap-based EAF steelmaking like before but also DRI/HBI-based steelmaking with continuous feeding of material. Furthermore, the furnace then can also be operated in a smelter/OSBF mode and will be equiped to handle reducing atmosphere and the related off gases which might also occur during carburisation trials when melting hydrogen reduced DRI/HBI either in EAF or OSBF mode.

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