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Optimizing Decarbonization Processes: From Iron Ore to Steel

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As part of the decarbonization process in the steelmaking industry, the direct reduction of iron ores, the use of green hydrogen as an energy source and/or the application of carbon capture technologies are crucial for achieving carbon neutrality. The study will underscore the importance of laboratory material testing and process simulation tools in determining the optimal and most feasible routes for various energy mixes and raw materials. Additionally, in light of the rising demand for DR-grade pellets, a significant gap is emerging between future DR-grade raw material demand and cost-efficient material supply.

An optimized plant concept necessitates a comprehensive review of the entire production route, from the iron ore mine to crude steel. This includes key stages such as beneficiation, pelletizing, direct reduction, and steelmaking (EAF / Smelter+BOF), as well as the possibilities for process integration, e.g. between pelletizing and direct reduction plant. It also provides the necessary information to determine whether the EAF or Smelter+BOF is the optimal steelmaking technology based on raw materials available. Primetals has developed simulation tools to provide essential data for consumption figures, economic validation, influences on product quality and CO2 intensity.

By utilizing simulation tools, laboratory tests such as pellet pot tests, reduction tests, melting tests and extensive process know-how, it is possible to optimize the entire production chain from the mine to steelmaking.

Primary authors: Mr BAUMGARTNER, Hans-Jörg (Primetals Technologies Linz GmbH); Dr DAGHAGHELEH, Oday (Primetals Technologies Linz GmbH); Dr WEISS, Bernd (Primetals Technologies Linz GmbH); Mr VOR-ABERGER, Bernhard (Primetals Technologies Linz GmbH); Mr MILLNER, Robert (Primetals Technologies Linz GmbH); Mr PETZOLD, Lukas (Primetals Technologies Linz GmbH)

Presenter: Mr PETZOLD, Lukas (Primetals Technologies Linz GmbH)

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