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Primetals Technologies develops break-through technology for carbon-free, hydrogen-based direct reduction for iron ore fines

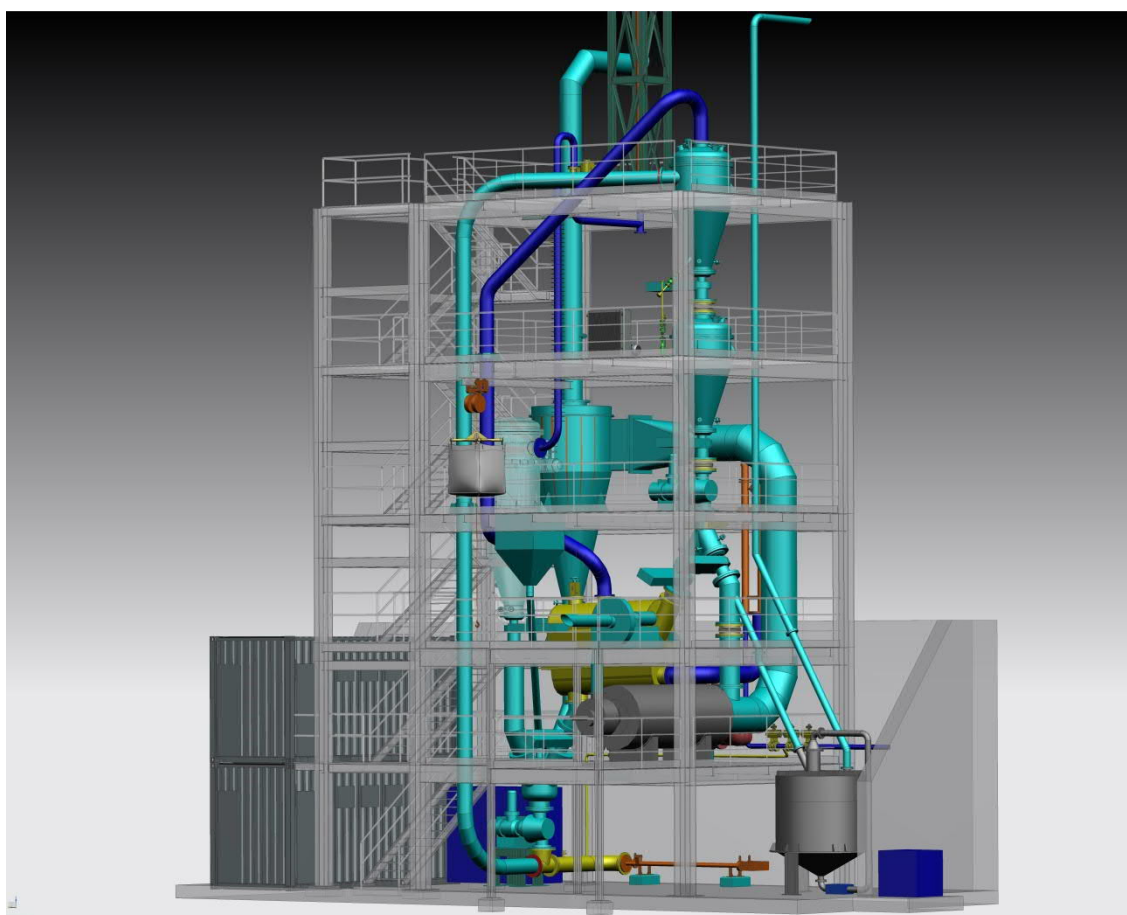
- **Only process worldwide directly using iron ore concentrate fines from ore beneficiation with particle sizes of 100% smaller than 0.15 mm**
- **Low CO₂ footprint due to usage of H₂ as reduction agent**
- **Lower Opex and Capex Cost due to no agglomeration step required**
- **Modular plant design to match varying capacity. Minimum rated capacity of 250,000 tons per year**
- **Pilot plant will be set up at voestalpine Stahl Donawitz GmbH, Austria in partnership with voestalpine**

Primetals Technologies has developed the world's first direct reduction process for iron ore concentrates from ore beneficiation not requiring any preprocessing like sintering or pelletizing. Primetals can resort to the comprehensive experience from the earlier Finmet development and plant installations. The new technology can be applied to all types of beneficiated ore and particle sizes of 100% smaller than 0.15 mm. As primary reduction agent, the new process uses H₂ from renewable energy or alternatively H₂ rich gases from conventional steam reformers or H₂ rich waste gases. This results in a low or even a zero CO₂ footprint. The direct reduction plant comes in a modular design with a rated capacity of 250,000 tons per year and module, making it available for all sizes of steel plants. A pilot plant for testing purposes will be set up at voestalpine Stahl Donawitz, Austria and is due to be commissioned in the second quarter of 2020.

The use of DRI/HBI is expected to continue to grow due to the need to reduce greenhouse gas emissions and the growing number of electric arc furnaces in service worldwide. Currently, all available technologies require agglomeration, like pelletizing to produce DRI or HBI. An additional challenge steel producers face, is the reduced quality of iron ore, resulting in the need to beneficiate the iron ores. In

order to progress to a CO₂-free steel production, a process using mainly H₂ is most desirable. The solution developed by Primetals Technologies takes care of all the above considerations.

The pilot plant will consist of three parts: a preheating-oxidation unit, a gas treatment plant and the actual reduction unit. In the preheating-oxidation unit, fine ore concentrate is heated to approx. 900 °C and fed to the reduction unit. The reduction gas H₂ is supplied over the fence from a gas supplier. A waste heat recovery system from the off-gas ensures optimal energy use and a dry dedusting system takes care of dust emissions from the processes involved. The hot direct reduced iron (HDRI) leaves the reduction unit at a temperature of approx. 600 °C, which can be subsequently used in an electric arc furnace or to produce Hot Briquetted Iron. The aim of the pilot plant is to verify the break-through process and to serve as a testing facility to provide the data basis for setting up an industrial scale size plant at a later date.



Computer-generated image of a direct reduction plant for iron ore fines developed by Primetals Technologies together with voestalpine Stahl Donawitz. The DR process is CO₂-free and H₂-based. A pilot plant for testing purposes will be set up at voestalpine Stahl Donawitz, Austria.

This press release and a **press picture** is available at www.primetals.com/press/

Primetals Technologies, Limited
A joint venture of Siemens, Mitsubishi Heavy Industries and Partners
Communications
Head: Gerlinde Djumljija

Chiswick Park, Building 11, 566 Chiswick High Road
W4 5YS London
United Kingdom

Contact for journalists:

Dr. Rainer Schulze: rainer.schulze@primetals.com

Tel: +49 9131 9886-417

Follow us on Twitter at: twitter.com/primetals

Primetals Technologies, Limited, headquartered in Frimley, Camberley, United Kingdom, is a worldwide leading engineering, plant-building and lifecycle partner for the metals industry. The company offers a complete technology, product and service portfolio that includes the integrated electrics, automation and environmental solutions. This covers every step of the iron and steel production chain that extends from the raw materials to the finished product – in addition to the latest rolling solutions for the nonferrous metals sector. Primetals Technologies is a joint venture of Mitsubishi Heavy Industries (MHI) and Siemens. Mitsubishi-Hitachi Metals Machinery (MHMM) - an MHI consolidated group company with equity participation by Hitachi, Ltd. and IHI Corporation - holds a 51% stake and Siemens a 49% stake in the company. The company employs around 7,000 employees worldwide. Further information is available on the Internet at www.primetals.com.