



news release

ArcelorMittal commissions Midrex to design demonstration plant for hydrogen steel production in Hamburg

Hamburg, 16 September 2019 – ArcelorMittal announced today that it has commissioned technology provider Midrex Technologies to design a demonstration plant at its Hamburg site to produce steel with hydrogen. Both companies have now signed a Framework Collaboration Agreement (FCA) to cooperate on several projects, ranging from research and development to the implementation of new technologies. The FCA will be governed by a number of Project Development Agreements, incorporating the expertise of Midrex and ArcelorMittal. The first Project Development Agreement is to demonstrate in Hamburg the large-scale production and use of Direct Reduced Iron (DRI) made with 100% hydrogen as the reductant.

In the coming years, the demonstration plant will produce about 100,000 tons of direct reduced iron per year - initially with grey hydrogen sourced from natural gas. Conversion to green hydrogen from renewable energy sources will take place once available in sufficient quantities and at an economical cost. Energy for hydrogen production could come from wind farms off the coast of Northern Germany. The plant will be the world's first direct reduction plant on an industrial scale, powered by hydrogen.

"We are working with a world class provider, Midrex Technologies, to learn how you can produce virgin iron for steelmaking at a large scale by only using hydrogen. This project combined with our ongoing projects on the use of non-fossil carbon and on carbon capture and use is key to become carbon neutral in Europe in 2050. Large scale demonstrations are critical to show our ambition. However it will depend on the political conditions, how fast transformation will take place", comments Carl de Maré, Vice President at ArcelorMittal and responsible for technology strategy.

ArcelorMittal Hamburg already produces steel using DRI technology. During the process, iron oxide pellets are reduced to metallic iron, the raw material for high quality steel, by extracting oxygen using natural gas. "Our site is the most energy-efficient production plant at ArcelorMittal", says Dr



Uwe Braun, CEO at ArcelorMittal Hamburg, adding that the existing Midrex plant in Hamburg is also the plant with the lowest CO₂-emissions for high quality steel production in Europe. "With the new, hydrogen-based DRI plant we are now planning, we will raise steel production to a completely new level, as part of our Europe-wide ambition to be carbon neutral by 2050", Dr Braun concludes.

"This commercial scale project will show the path for hydrogen based iron and steel making", commented Stephen C. Montague, President & CEO of Midrex Technologies Inc. "We are excited to work with ArcelorMittal as pioneers for using renewable energy in our industry."

Media contacts

ArcelorMittal: Arne Langner, +49 30 75445 556, arne.langner@arcelormittal.com

Midrex Technologies: Lauren Lorraine, +1 704 378-3308, llorraine@midrex.com

About ArcelorMittal

With a production volume of about 8 million tons of crude steel, ArcelorMittal is one of the largest steel producers in Germany. The automotive, construction and packaging industries are among our customers as well as the household goods sector. The company operates four major production sites in Germany. These include two integrated flat steel mills in Bremen and Eisenhüttenstadt as well as two long steel mills in Hamburg and Duisburg. ArcelorMittal also has a strong distribution network in Germany and has seven tailoring service centers and 16 distribution centers. ArcelorMittal employs more than 9,000 people in Germany. <https://germany.arcelormittal.com/>

ArcelorMittal is the world's leading steel and mining company, with a presence in 60 countries and an industrial footprint in 18 countries. Guided by a philosophy to produce safe, sustainable steel, we are the leading supplier of quality steel in the major global steel markets including automotive, construction, household appliances and packaging, with world-class research and development and outstanding distribution networks. Through our core values of sustainability, quality and leadership, we operate responsibly with respect to the health, safety and wellbeing of our employees, contractors and the communities in which we operate. For us, steel is the fabric of life, as it is at the heart of the modern world from railways to cars and washing machines. We are actively researching and producing steel-based technologies and solutions that make many of the products and components people use in their everyday lives more energy efficient. We are one of the world's five largest producers of iron ore and metallurgical coal and our mining business is an essential part of our growth strategy. With a geographically diversified portfolio of iron ore and coal assets, we are strategically positioned to serve our network of steel plants and the external global market. While our steel operations are important customers, our supply to the external market is increasing as we grow.

In 2018, ArcelorMittal had revenues of \$76 billion and crude steel production of 92.5 million metric tonnes, while own iron ore production reached 58.5 million metric tonnes. ArcelorMittal is listed on the stock exchanges of New York (MT), Amsterdam (MT), Paris (MT), Luxembourg (MT) and on the Spanish stock exchanges of Barcelona, Bilbao, Madrid and Valencia (MTS). <https://corporate.arcelormittal.com/>

Midrex Technologies, Inc.

Midrex is the world leader for direct reduction ironmaking technology and aftermarket solutions for the steel industry. As the technology provider of the MIDREX® Process for 50+ years, Midrex designs Direct Reduced Iron (DRI) plants, providing engineering, proprietary equipment, and project development services. The MIDREX® Process is unsurpassed in the industry in terms of production and process flexibility to meet the constantly evolving nature of steelmakers and ore-based metallurgical providers. Midrex Technologies, Inc. is located in Charlotte, North Carolina, USA. It operates a center of excellence for ferrous and non-ferrous reduction technology development in nearby Pineville, NC. For more information, please visit www.midrex.com

Photos



At the signing ceremony in Hamburg: Vincent Chevrier, Todd Astoria and KC Woody from Midrex with Dominique Vacher, Dr Uwe Braun and Matthias Schad from ArcelorMittal (from left to right)



The existing Midrex plant at the Hamburg production site is the one with the lowest CO₂-emissions for high quality steel production in Europe. It processes about 980,000 tons of iron ore pellets a year, making it an iron sponge, which is 95 percent metallic iron. Photos: ArcelorMittal