MIDREX

Creating the
sustainable future
of iron and steel

ABOUT MIDREX

At Midrex, we believe two things to be true: our world needs steel, and the steel industry cannot survive unless we develop a way to produce high-grade steel while minimizing greenhouse gases.

Steel is used in every aspect of our lives. To make steel, you need iron. Our solution is the MIDREX® Direct Reduction Process, a method for producing direct reduced iron (DRI), a high-quality and sustainable metallic iron. By using hydrogen in place of natural gas or other hydrocarbon energy sources, the MIDREX Process can reduce CO_2 emissions to nearly zero.

Every day, our Midrex team is working to create a sustainable future for iron and steel by designing, building, and supporting MIDREX Plants around the world. Not only are these plants more energy efficient and sustainable, they're also the most profitable to own and operate.

Since 1969, when the first MIDREX Plant was started up, we have offered the best method for decarbonizing the iron and steel industry—direct reduction. Our growth has transformed ironmaking and has contributed to the electric arc furnace (EAF) moving into the highest-quality steel grades. And none of it would be possible without our people, who bring vision, compassion, and extraordinary expertise to this work every day. By recruiting and empowering the brightest minds in engineering, research and development, and business, we will continue to offer the most sustainable solutions to our global customers.

Our Services

Material evaluation and analysis | **Technology packages** | **Plant design and plant supply** | **Aftermarket (Midrex Global Solutions)** | **Feasibility studies**

THE MOST RELIABLE SOURCE OF IRONMAKING TECHNOLOGY

The MIDREX® Process has earned a reputation for excellence. Collectively, the achievements of Midrex teammates, MIDREX Plant operators, and Midrex strategic partners have established a standard of excellence that assures our customers of a long and productive life for their plants.

50+ YEARS OF COMMERCIAL OPERATION

20+ COUNTRIES WITH MIDREX® PLANTS

80% MIDREX PLANTS PRODUCE ABOUT 80% OF THE WORLD'S LOW CO_2 DRI

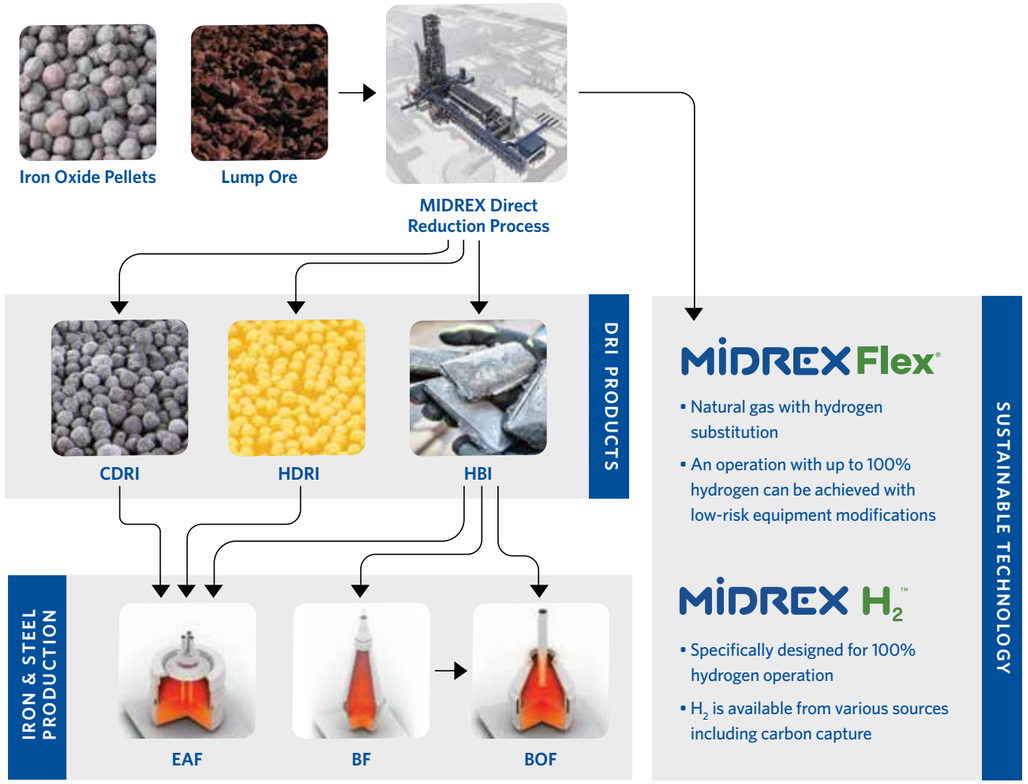
R&D
STATE-OF-THE-ART R&D CENTER

Charlotte,NC
HEADQUARTERS + GLOBAL OFFICES

Innovative and Sustainable Ironmaking Solutions

The ever-increasing call for the iron and steel industry to significantly reduce its carbon dioxide emissions is driving a surge in interest in direct reduction. The environmental benefit of natural gas-based DRI plants is well documented versus the coke-based production of metallic iron via the blast furnace. Now, the prospect of using 100% green hydrogen as the reducing gas for DRI production is regarded as the key to decarbonizing steelmaking.

THE FLOW OF DRI PRODUCTS



Production Performance	More than one billion tons of DRI produced since 1979; plants typically exceed rated annual capacity, depending on market conditions
Plant Reliability	Excellent construction-to-start-up schedules OPERATING HOURS X HOURLY CAPACITY = ANNUAL PRODUCTION = **PROFITS**
Process Flexibility	Designed to the specific requirements of each client; broad range of plant designs, feed materials, energy sources, reducing gases, and discharge options.

Support for the Life of Your Plant

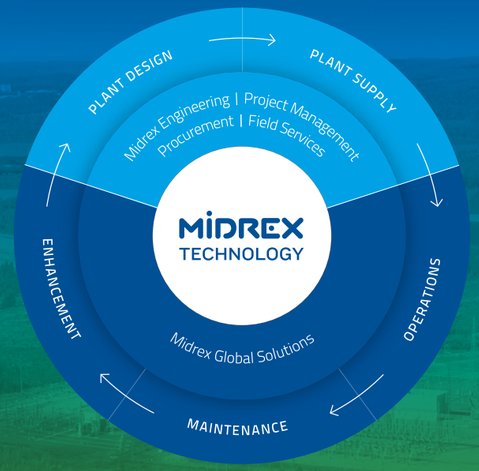
A successful plant start-up is the midpoint in a client relationship that begins with our sales engineers helping to develop the plant specifications and continues through assistance with financing arrangements for all or a portion of the project. Our skilled and highly experienced field personnel are involved on-site during construction, commissioning, and start-up. When the plant begins normal operations, our Technical Services Group provides support according to the unique Midrex two-way technology transfer approach, and we have a dedicated aftermarket group that includes engineers and process professionals who have decades of experience working in MIDREX Plants.

STRATEGIC ALLIANCES FOR ENHANCED PLANT PERFORMANCE

We maintain strategic alliances and working relationships with prominent engineering, construction, and equipment supply firms worldwide that enhance and complement our capabilities. This allows us to deliver plants and equipment that start up quickly, routinely exceed performance ratings, and perform reliably year after year.

All designs and engineering meet the strict requirements of our ISO 9001:2015 Quality Management System.

MIDREX PLANT LIFE CYCLE



MIDREX

From Ingenious Idea to Industry Icon

The Midrex story is one of innovations, improvements, and notable milestones. What began as a "what if..." R&D idea is today the world's most widely used, productive technology for the direct reduction of iron.

1974. Midrex Corporation established in Charlotte, North Carolina, USA

1984. Sabah Gas Industries *(now Antara Steel Mills)* starts up in Malaysia — First MIDREX hot briquetted iron (HBI) plant

1990. Start-up of OPCO *(now FMO Planta de Briquetas)* in Venezuela — First MEGAMOD® and use of steam reformer

10 million tons per year

1990. First 1 million t/y MIDREX Plant (Ferrominera Orinoco — FMO)

1990. First dual discharge MIDREX Plants — CDRI & HDRI (Essar Steel I and II, now ArcelorMittal Nippon Steel I and II)

1990. First hot transport of HDRI by insulated containers (Essar Steel I and II, now ArcelorMittal Nippon Steel I and II)

2010. First MIDREX HOTLINK® Plant for direct charging HDRI into EAF — Jindal Shadeed, Sohar, Oman

MIDREX Flex®

2023. thyssenkrupp Steel project awarded

OFF AND RUNNING | CROSSING CONTINENTS | LEADING THE DRI MARKET | CONTINUED GROWTH | SETTING WORLD RECORDS | NONSTOP INNOVATION | SUSTAINABLE FUTURE

1960 | **1970** | **1980** | **1990** | **2000** | **2010** | **2020**

1966. Donald Beggs of the Surface Combustion Corp. conceives the idea for the MIDREX Direct Reduction Process

1969. Prototype plant built in Portland, Oregon, USA *(150,000 t/y x 2)*

1971. First commercial-scale plants — Georgetown SC, USA and Hamburg, West Germany *(400,000 t/y each)*

50% of world's DRI

1979. MIDREX Plants producing more than 50% of world's DRI supply

1983. Kobe Steel, Ltd. acquires Midrex Corporation

KOBELCO KOBE STEEL GROUP

60% of world's DRI

1987. MIDREX Plants producing nearly 60% of world's annual DRI supply *(and every year since)*

1994. First use of oxygen injection in a MIDREX Plant at Acindar in Argentina

20 million tons per year

1996. MIDREX Plants produce more than 20 million t/y of DRI

1999. Saldanha Steel starts up world's first COREX®/MIDREX Plant

2007. First hot transport of HDRI by insulated conveyor — Hadeed E, Al Jubail, Saudi Arabia

2007. First MIDREX Combination Plants (simultaneous discharge) — Qatar Steel 2, Mesaieed, Qatar (CDRI & HBI) and Hadeed E, Al Jubail, Saudi Arabia (HDRI/CDRI)

2015. Start-up of first MIDREX MxCol® Plant to use coal gasification technology to make reducing gas — Jindal Steel & Power, Angul, India

2018 and 2021 World's largest capacity single module DRI plants started up — Tosyali Algerie and Algerian-Qatari Steel, respectively

1 billion tons cumulative

2018. MIDREX® Plants exceed 1 billion tons of DRI cumulative (since 1971)

2022. MIDREX H_2 selected by Stegra, formerly known as H2 Green Steel, for world's first commercial-scale green steel plant

MIDREX H_2™

LEARN MORE ONLINE AT
WWW.MIDREX.COM

MIDREX

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