

HOT TRANSPORT VESSEL (HTV) SYSTEM

BENEFITS OF CHARGING HOT DRI (HDRI)

MIDREX

Designed for Today,
Engineered for Tomorrow™

THE MIDREX SHAFT FURNACE DISCHARGES DRI HOTTER THAN COMPETING TECHNOLOGIES, ENABLING HIGHER TEMPERATURE PRODUCT TO BE DELIVERED TO THE MELTSHOP.

There are two main benefits of charging hot DRI (HDRI) to the EAF: lower specific electricity consumption and increased productivity. The energy savings occur because less energy is required in the EAF to heat the DRI to melting temperature, resulting in a shorter overall melting cycle.

The rule-of-thumb is that electricity consumption can be reduced about 20 kWh/t liquid steel for each 100° C increase in DRI charging temperature. Thus, the savings when charging at more than 600° C can be 120 kWh/t or more. An additional benefit of electricity savings is a reduction in electrode consumption.

The increased productivity from HDRI charging is significant. Use of HDRI reduces the tap-to-tap time, resulting in a productivity increase of up to 20% versus charging DRI at ambient temperature.

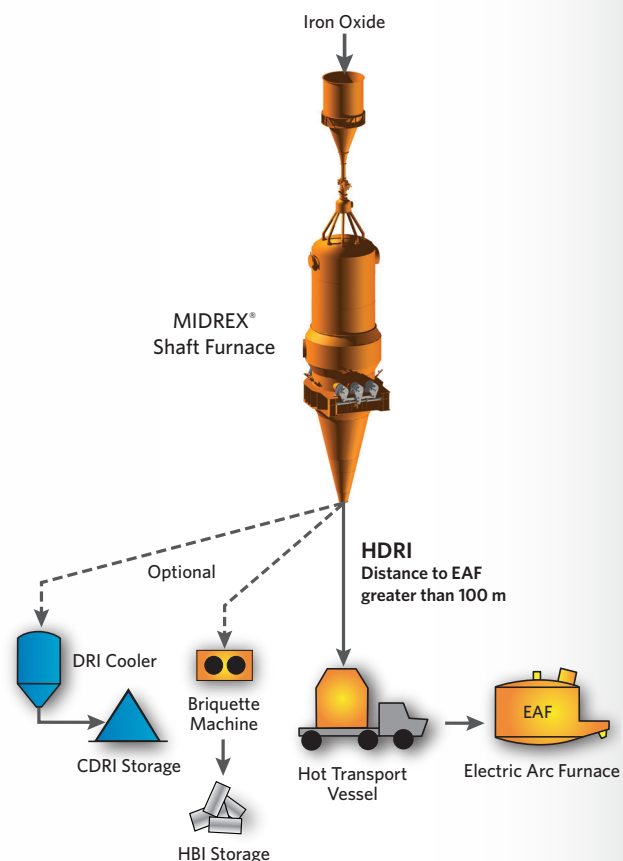
There are environmental benefits of HDRI charging as well. Retaining the sensible heat in the DRI rather than cooling prior to furnace discharge lowers overall emissions in two ways. First, lower electricity demand reduces power plant emissions per ton of steel produced. Second, in mills depending on charge carbon, reduced energy requirements in the EAF result in less CO₂ emissions.

HOT TRANSPORT VESSEL

HOT TRANSPORT VESSEL FOR HOT CHARGING DRI

MIDREX® Hot Discharge Plants can be equipped with a hot transport vessel (HTV) system to minimize temperature loss and to prevent re-oxidation of HDRI while being transferred to an EAF meltshop over distances greater than 100 meters.

The vessels typically have a capacity of 45-90 metric tons and are moved to the meltshop on specially designed vehicles. They operate under inert conditions throughout the entire fill - transport - discharge cycle to minimize loss of metallization.



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LION DRI

The Lion Group chose to equip its newest MIDREX® Plant in Banting, Malaysia, with a hot transport vessel (HTV) system for transferring HDRI to its three EAFs. The plant, rated at 1.54 million metric tons per year, was started up in June 2008 and is the second use of HTV with a MIDREX® Shaft Furnace (the first was Essar Steel in Hazira, India).



Hot Transport Vessel at LION

KEY FEATURES

The MIDREX® Plant can produce up to 1.54 million metric tons per year of high quality DRI that can be discharged in two forms separately or in combination:

1. HDRI for transporting and direct charging to EAF meltshops
2. Hot briquetted iron (HBI) for internal use or merchant sale

Production of HBI allows continuous operation of the MIDREX® Plant when other site operations do not need to consume all of the plant's capacity. The HBI can be stored or exported ... the latter providing an additional income stream.



LION's MIDREX Plant in Banting, Malaysia

OPERATING RESULTS AT LION DRI

The use of an HTV system by Lion DRI to transport HDRI to its EAF meltshops has produced the following results:

- Operating costs reduced \$5-10/metric ton liquid steel
- Minimal temperature loss in HDRI from reduction furnace to EAF (demonstrated at 650° C into the EAF)
- Negligible carbon loss in HDRI from reduction furnace to EAF
- Productivity increase of 20% in EAF
- Power savings of approximately 40 kWh/ton (with 30-35% charge of HDRI)
- Improvement in tap-to-tap time
- Reduction in copper content in the final steel product versus scrap
- Reduction in nitrogen content in the liquid steel

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