

Feature- I : Natural Resources and Energy

Materials and Processes to Meet the Issues on Natural Resources and Energy

Issues having to do with the natural resources and energy of Japan and the rest of the world are dramatically changing, owing to the economic growth of emerging countries and the recent development of new sources of energy such as shale gas and renewable energy. The Kobe Steel Group, a unified business entity dealing in materials, machinery, plant engineering, power generation, and so on, is developing advanced technologies to provide the materials and processes that meet the requirements for natural resources and energy.

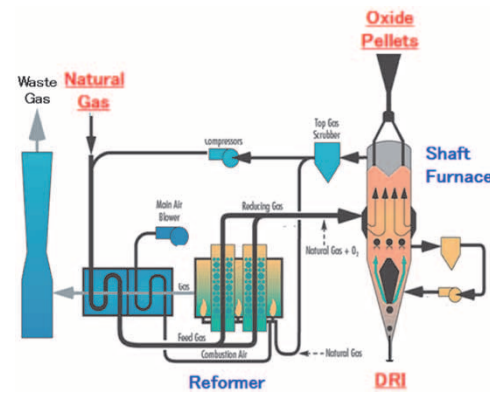


Fig.1 MIDREX® process flow sheet

Fig.1 shows the MIDREX® Process flow. Natural gas is used to reduce iron ore in this MIDREX Process, and the top gas from the shaft furnace is reused to produce CO and H₂ from natural gas. The top gas, after having the dust removed and being cooled down by the top gas scrubber, is mixed with natural gas, where it is then pressured by a compressor and heated and fed into the reformer. Using Ni catalysts in reformer tubes, the mixed gas is then reformed to produce CO and H₂. With the diversity of the MIDREX Process for reformed gas, the use of coal gasification and coke oven gas is being promoted and will expand business opportunities for this process, with the first plant starting up in India in 2014.

Feature- II : MONODZUKURI (Art of Design and Manufacturing)

State of the art Technologies for Supporting "MONODZUKURI" in Kobe Steel

In recent years, the importance of the "MONODZUKURI" (art of design and manufacturing) in manufacturing industries is going up to the subject in a newspaper and a business magazine. In our group companies, we are improving our service, products and technology, as for global manufacturing company of material producer and machine maker in order to obtain the trust of our customers. We recognize that the source of competitive capability is continuous and technical evolution of "MONODZUKURI" power. In this special number, we introduce a part of our capability for new and updated development of technology, regarding "MONODZUKURI" in our group companies.

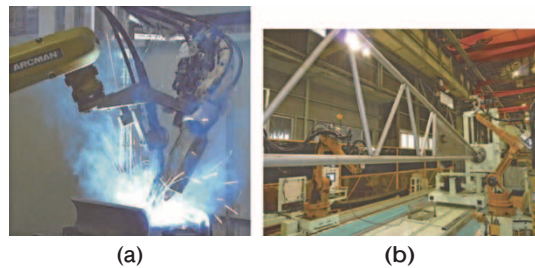


Fig.2 (a) Example of welding tracking using range sensor
(b) Appearance of top and bottom boom automatic welding system

Fig.2 (a) shows an example of welding tracking using a range sensor. In a harsh environment that produces spatters and fumes, such as those shown in photo (a), with ingenuity in image processing, it is possible to detect the welding line, and we are able to weld the tracking line. Fig.2 (b) shows an automatic welding system, in operation, for top and bottom booms. This system creates teaching data with a high degree of perfection and the know-how of skilled welders. It also supports weld line detection, which is difficult when using the upper and lower boom. We have achieved welding stability and high quality.

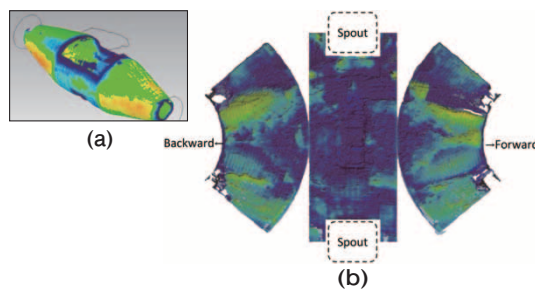


Fig.3 (a) Measuring method and results of brick thickness of torpedo ladle
(b) Developed figure based on measurement results

Fig.3 (a) shows the distance between the refractory surface and outer shell surface of a torpedo ladle and Fig.3 (b) is the developed figure showing the results of brick thickness measurement. It is important to maintain the brick thickness in order to prevent the leakage of molten metal from vessels and also to reduce the refractory cost. Thanks to this detailed result, the life of the torpedo ladle refractory has been prolonged by appropriate repair, and the use of the torpedo ladle refractory has been reduced.

<Cover photos>

The cover photo in the upper left shows the latest MIDREX® process plant. The plant was built in Bahrain, in the Middle East, by Kobe Steel and its subsidiary company MIDREX Technologies; it started up in 2013. This plant uses natural gas to produce DRI (direct-reduced iron) from iron ore pellets. The DRI is transferred to a melt shop at a high temperature and utilized as the raw iron for steelmaking. The cover photos in four circles in the lower right show the business items featuring "MONODZUKURI (Art of Design and Manufacturing) powers" in four business sections of Kobe Steel.

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