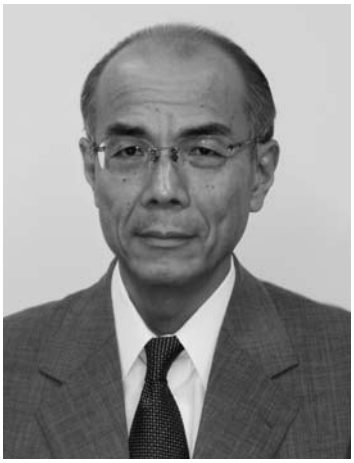
FOREWORD



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The year 2008 marked the "150th anniversary of the birth of modern iron manufacturing" in Japan. In other words, one and a half centuries have now passed since the first modern western-style blast furnace was constructed and began producing pig iron in this country.

The appearance of the blast furnace, which produces iron by a continuous process using iron ore as the raw material, replacing Japan's traditional "tatara" blowing process, was an epoch-making event. Since then, the role of the ironmaking process in the steel works in supplying molten iron with stable quantity/quality to the downstream process remains unchanged even today.

On the other hand, the ironmaking process is both the largest energy consumer and the largest energy supplier in the steel works. Since an early date, steel makers have made great changes in blast furnace operating practice in response to changes in the world economic environment. For example, from Japan's high growth era in the 1960s until the 1970s, operation was oriented toward a low reducing agent rate (RAR) in order to expand output and reduce cost, and many blast furnaces challenged the operating record for low RAR by injecting heavy oil. Following the two Oil Crises of the 1970s, there was a change to oil-free, all-coal operation, and the blast furnace was expected to perform an energy conversion function by converting inexpensive coal to high value, easily-used gas energy. During this period, high gas-generation operation was performed by pulverized coal injection (PCI) at rates exceeding 200 kg/t-pig iron.

Since the beginning of the 21st century, the steel industry has undergone the largest and most rapid environmental changes in its history. In particular, these include the need to reduce CO_2 emissions in response to global environmental problems and rapidly rising iron ore and coal prices.

Today, the highest priority issue for the ironmaking process is the development of a low RAR operating technology for the blast furnace with the aim of preventing a further worsening of global warming. Diverse technical development efforts are being made for this

purpose, including improvement of raw material quality and adjustment by burden distribution in order to increase reduction efficiency and maintain permeability in the blast furnace, injecting of waste plastic, which is a carbon neutral material, metallic charging, natural gas injection and others. In addition, research and development of an "innovative iron making process," which controls the in-furnace reaction itself, is also underway.

Recently, the price of coal tripled in a single year, and at the same time, the price of iron ore rose by 70%. Amid the progressive oligopolization of resource companies and rapidly increasing steel production in China, India, and elsewhere, there is also a tendency toward declining quality/depletion of raw material resources as such. In order to secure stable supplies of raw materials and fuels and maintain stable iron production, it will be necessary to develop technologies which make the best possible use of low grade raw materials. Therefore, technologies for using low grade raw materials in the existing sintering and cokemaking processes, as well as in new processes, are now under development.

This edition of JFE Technical Report is the first Special Issue on Ironmaking Technology since the establishment of JFE Steel in 2003. As "Short-Term Revamping Technology for Large Blast Furnace" were reported previously, this issue will focus on other new ironmaking process technologies.

Under our Corporate Vision of "contributing to society with the world's most innovative technology," the JFE Group is committed to making the greatest possible efforts in technical development, including countermeasures for global environmental problems, effective utilization of resources, and related issues. We sincerely request your guidance and encouragement in meeting these challenges.