



Remarks on Special Issue on Mechanical Engineering

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Scrap-and-build-type capital investment is inadequate for Japanese manufacturing industries because of the limited area of flat land. Instead, to extend the service life of production facilities, Japanese manufacturing industries have concentrated on the development and field practice of equipment maintenance technologies, whereby machines are operated in a manner required for minimizing degradation and damage and are serviced according to programs based on their conditions. Many of our readers may remember that some monuments of the Japanese industrial revolution in the Meiji Period (1868–1912), recently designated by UNESCO as world heritages, are still used commercially.

Many steelworks were built and inaugurated in Japan in the 1950s and expanded for product diversification and capacity increase in the 1960s. Since then, new engineering and maintenance technologies have been developed there to enable them to produce new products of increasingly higher quality at enhanced productivity and have been incorporated into their plants through equipment modifications or the installation of new units with improved functions.

Therefore, while blast furnaces, the symbol of the steel industry, for example, are relined in every 10 to 15 years outside Japan, they are relined in Japan at intervals often exceeding 20 years. In fact, the longest blast furnace campaign record of our company is no less than 27 years.

On the other hand, when we look at rolling mills, there are rail mills and pipe mills that have been functional for more than 80 years through repeated modernizing modifications. Among continuous hot strip mills in Japan, some have a cumulative production of over 200 million tons and others have more than 50 years of operation as the core production line of large steelworks. Thus, we think we could say that Japan is the country where iron- and steelmaking facilities operate longer service life than the world average; they are used not only for longer periods but also at higher efficiency and productivity than those in any other countries, while producing steel products of the finest quality. At the same time, auxiliary equipment and facility such as cranes, blowers, and raw material handling machines are also kept in the prime specification to support the main production facilities. They are continuously monitored with respect to degradation or failure and periodically serviced for repair or renewal. New technologies are being

born and fostered to detect their damage, change in strength, and others and to minimize their degradation.

In this issue of our technical report, we are pleased to bring to you the machine technology that are the maintenance technology for long period to adapting Nippon Steel & Sumitomo Metal Group holding and operating Plants & Facilities, and the numerical analysis derived from the above mechanical technology, furthermore the forming technology for steel material. The articles mainly deal with technologies applicable to the maintenance and management of general machinery such as equipment condition monitoring, analysis, and degradation suppression.

We would be more than happy if our esteemed readers find the technologies presented in this issue interesting: these include those that support the manufacture of steel products that you see around you in infrastructures, buildings, automobiles, home appliances, and many others.