

# Recent Progress and Future Trends in the Research and Development of Steel

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## 1. Introduction

NKK was founded in Kawasaki, the center of the Keihin industrial area, in 1912. Its technology development started when the first chief engineer, Kaichiro Imaizumi, and his team challenged the then-undeveloped methods of manufacturing seamless steel-pipes and finally succeeded in producing industrial steel-pipes domestically<sup>1)</sup>.

Kaichiro Imaizumi was appointed general manager of the newly-organized Technology Research Department of NKK in 1935. Later on, in 1948, the Technology Laboratory was founded, establishing NKK's research and development system. Since 1933, the Steel Division has appointed technical development managers by process and by product to shorten the time between development and commercialization.

Fig.1 shows the transition in the number of steel research engineers in the past five years; NKK has maintained the number of researchers despite the difficult times

## 2. Progress of steel producing technology

Fig.2 shows the zero-slag process<sup>2)</sup> for steelmaking. Conventional methods use silicon to make a large amount of slag for furnace dephosphorization. The zero slag steelmaking process is an epoch-making technology that minimizes the amount of silicon and reacts a minimum amount of lime with phosphorus oxides to accelerate the speed of dephosphorization. As a result, no slag is required for converter dephosphorization. To complete the process, the following technologies combined with advanced optimization technologies are needed: advanced processing technologies, such as low-silicon pig-making technology that effectively desiliconizes blast-furnace pig within ladles to produce a large volume of ultra-low-silicon pig in a short time.

1997      1998      1999      2000      2001



Fig.1 Transition in the number of steel research engineers





NKK's steel technologies have been spreading overseas as shown in **Fig.6**, and the globalization of customers will strengthen this trend. The Japanese steel industry as the world's production center will continue to evolve as a COE (Center of Excellence) for steel technologies. Engineers with a pioneering spirit to explore uncharted areas are called for, as the steel industry is still developing.

## References

**Fig.6** NKK's global technical supports