



## For the Centennial Commemorative Issue of Shinnittetsu Giho

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### **1. Introduction**

*Thirty years have passed since the 70th Memorial Issue of Seitetsu Kenkyu—the predecessor of Shinnittetsu Giho—was published. In the past thirty years that followed the postwar period of rapid economic growth and the oil crises, the structure of Japan’s steel industry has markedly changed as the country has undergone unprecedented economic hardships—recession caused by the strong yen, collapse of the bubble economy, the Asian financial crisis, and the Lehman Shock.*

*In the past, our predecessors first learned steelmaking technology from the West and then evolved it and used it to solve various problems they were faced with and built the foundation for present-day Nippon Steel Corporation. Looking back at the history of technological development in our company, it may be said that the period from the birth of the state-owned steel works until around 1975 marked the history of introduction and reinforcement of equipment, and the period from 1975 until the present marks the history of development of new products and processes. Since its foundation, Shinnittetsu Giho (Nippon Steel Technical Report) has continued to play a part in the development of technology at our company.*

### **2. Birth of Shinnittetsu Giho**

*The origin of Shinnittetsu Giho lies in the “Seitetsu Kenkyukai Report” published in 1911, ten years after the birth of the state-owned Yawata Steel Works, by Seitetsu Kenkyukai (steelmaking study group), which has been formed within the works by volunteer engineers. A copy of the message of publication of the memorable first issue of Shinnittetsu Giho is posted at the end of this manuscript. The “Research Section” at the beginning of the text of the first issue contains an article describing how the engineers discussed the composition systems and heat treatment methods to achieve the prescribed strength and toughness of 2% nickel steel. Because the purpose of the early research reports was different from that of the present-day technical reports, it is meaningless to compare their level of technical*

*contents. Although 100 years have passed, we can vividly sense from their research report the passion of the engineers in those days who were eager to learn steelmaking technology from abroad and pursue the underlying principles and were striving to surpass their predecessors. The circumstances that led to the inauguration of Shinnittetsu Giho and the subsequent developments are described in detail elsewhere in this commemorative issue. The reader is requested to read them too.*

### **3. Period from the Birth of the State-owned Steel Works until Around 1975**

*The company's steelmaking technology dates back to the production of iron with a western-style blast furnace at Kamaishi, Iwate Prefecture, by Takato Ohshima on December 1, 1857. After that, in 1870, the new Meiji Government established the Ministry of Engineering with the aim of promoting the Japanese industry and set about nationalizing businesses such as mining, railway transportation, and shipbuilding. In 1875, construction of a state-owned steelworks at Kamaishi was started. Following the construction of two 25-ton blast furnaces of the British type and the accumulation of valuable experience in blast furnace operation, the state-owned Yawata Steel Works was born in 1901.*

*Modern industry in Japan grew rapidly in the wake of the first Sino-Japanese war, and accordingly, demand for steel sharply increased. However, domestic steel production was still so small that the vast majority of the expanding steel demand was met by imports. Under those conditions, the domestic steel production capacity, which was 90,000 tons in 1901 when the state-owned Yawata Steel Works first came into operation, was steadily increased by a series of expansion plans started in 1906. In 1929, the domestic steel production capacity exceeded one million tons for the first time. In 1934, when Japan Iron & Steel Co., Ltd. was born as a result of the consolidation of steelworks, it reached 1,440,000 tons.*

*In 1950, five years after the end of World War II, Japan Iron & Steel Co., Ltd. was divided into Yawata Iron & Steel Co., Ltd., Fuji Iron & Steel Co., Ltd., and several other units under the Elimination of Excessive Concentrations of Economic Power Law. That was the first step towards privatization of the steel companies. In the two decades that followed, Yawata Iron & Steel Co., Ltd. and Fuji Iron & Steel Co., Ltd., riding on the waves of postwar economic rehabilitation and rapid economic growth, underwent three consecutive equipment rationalization plans to emerge as world-class steelmakers. On March 31, 1970, Yawata Iron & Steel Co., Ltd. and Fuji Iron & Steel Co., Ltd. merged to form the present Nippon Steel Corporation.*

*It may be said that the technological developments in the thirty-year postwar period focused on the reinforcement of the manufacturing organization aimed at ensuring the stable supply of high-quality steel products. This is described in detail in the introduction "The progress of steelmaking technology at Nippon Steel Corporation and outlook for the future" in the 70th Memorial Issue of Seitetsu Kenkyu under the following three titles:*

- Reconstruction of steel by introduced technology*
- Establishment of technology for efficient production of steel by innovations on introduced technology*

- *Response to environmental change since the energy crisis*

#### **4. Period from 1975 to the Present**

*In the three decades since then, amid the drastic changes in the economic environment as referred to earlier, Nippon Steel Corporation has committed itself to the “development of new products” for customers in diverse fields and the “development of new processes” to manufacture those new products. In addition, the company has applied substantial resources to the “fundamental principles” required for the development of the above breakthrough technologies. Moreover, the company has made strenuous efforts regarding the “development of nonferrous, new function materials” other than steel and the “development of environmental and energy-related technologies”.*

*For example, in the field of automobiles, Nippon Steel Corporation has developed various types of high tensile strength steel and technologies for the application/processing of those steels in order to meet the apparently contradictory demands for the reduction of car body weight (to reduce CO<sub>2</sub> emissions, which are considered among the major causes of global warming) and the improvement of vehicular crashworthiness. In addition, in view of the expanding markets for hybrid cars and electric vehicles, the company has been developing high-performance electrical steel sheets for motors. In the field of energy, utilizing its controlled rolling and controlled cooling processes, the company has developed high-strength steel plates for line pipe, penstock, etc. that not only have high strength and high toughness but also have good weldability. It has also positively developed SiC for power devices, which are required for the efficient use of electrical energy. In addition to high tensile strength steel with good resistance to earthquake and corrosion for infrastructure as represented by high-rise buildings and long bridges, the company has developed a wide variety of products and application technologies to meet the diverse needs of its customers. To efficiently and economically manufacture all these high-performance products, the company has also made strenuous efforts to enhance efficiency and save labor and energy in its ironmaking, steelmaking, and rolling processes.*

*In this commemorative issue, the company’s activities are described under the following titles:*

- Chapter 1 : Seeking Functions and Applications of Steel*
- Chapter 2 : Mastering Steel Manufacturing Technologies*
- Chapter 3 : The Quest for Fundamental Principles*
- Chapter 4 : Mastering the Use of Various Materials*
- Chapter 5 : Mastering Environmental Technologies*

*Each chapter describes the relevant events of the past three decades and the prospects for the future.*

#### **5. Outlook for the Future**

*More than ten years have passed since the turn of the century. The pace of expansion of overseas markets has been remarkable, reflecting the rapid rise of many newly industrializing industries. Under such conditions, it will become increasingly difficult for*

us to secure the required natural resources and energy sources. In this context, I think that all employees engaged in technological development in diverse fields should brace themselves and press ahead with the development of new processes and other R&D activities that help secure natural resources and energy sources for the company to develop new products adapted to overseas markets and expand its overseas operating bases and thereby consolidate its position as a world-class materials manufacturer. On the other hand, contributing to recovery from the Great East Japan Earthquake that occurred last March is one of the most important tasks for the company. In this respect, we intend to concentrate on developing technologies that can help with the recovery in the short term as well as in the medium to long term. Concerning Shinnittetsu Giho, we would like to further enrich its contents and convey to the entire world the new technical aspects of technological developments, the results of research conducted to meet specific technical needs, and technical reports indicating the direction of technology in the near future. I look forward to continued cooperation from all our customers and business associates as well as the universities, government agencies, and all other persons concerned.

發 刊 辭

科學ノ進歩ハ凡百ノ事物ニ其ノ學理ヲ利用シ刺ス處ナク我製鐵事業ノ如キモ歐米先進國ニアリテハ多年ノ經驗ト最新科學ノ應用トニ依リテ其製品ノ精良善美ヲ極ムルノ域ニ進マルノ秋ニ方リ本邦ニ於ケル此事業ハ創設日猶淺ク上下共ニ經驗ヲ積ムコト未深カラサルガ爲メ製品ノ產額ニ於テモ又其品位ニ於テモ彼ニ比シ遜色アルヲ免レサルハ世ノ齊シク遺憾トスルトコロニシテ特ニ日常事業ニ從事セル吾曹ニ在リテハ切ニ此感ヲ深カラシムルモノアリ、サレバ外ハ益其範ヲ以米先進國ニ探リ内ハ當事者互ニ研鑽ヲ悉シテ長短相補ヒ有無相扶ケ以テ有終ノ美ヲ濟スハ目下ノ急務ニシテ事業ノ改良進歩ハ之ヲ措テ他ニ其手段ナキヲ信ス、抑製鐵業ノ其分掌スル處ハ實ニ幾多ノ職務ニ別タレタリト雖其厥絡終始一貫シテ彼是ノ關係尤緊密ナルヲ要シ各部ノ技能相共ニ並進順行スルニ非ラサレハ圓滿ナル發達ヲ期シ難キモノタルニ拘ラス從來吾曹ハ只管各自ノ管掌スル一局部ノ業務ニ就キ辛フシテ其面目ヲ備ヘン事ニ厥心スルノミニシテ未他ヲ顧ルノ邊アラザリシガ十年ノ星霜ハ幸ニシテ吾曹ニ多少ノ教訓ヲ與ヘ其間若干ノ自得スル處ナキニアラス將來漸ク庶幾ニ向フノ萌芽ヲ認ムルニ至レリ、今ヤ吾曹ハ此好機運ニ際會ス宜シク進ンデ眼界ヲ廣クシ上下協力一致シテ相互連絡研鑽ノ實ヲ舉クル事ヲ得バ庶幾クハ益事業ノ發達ヲ促シ以テ成功ノ光明ヲ仰クヲ得ンカ即吾曹同志ノ輩相謀リテ本會ヲ組織シ或ハ廣ク先輩諸賢ノ高論ヲ彙集シ或ハ普ク内外圖書ノ新説ヲ閱シ併セテ吾曹各自ノ經驗ヲ披瀝シ互ニ質疑應答ノ道ヲ啓キ以テ事業ノ研究資料ニ充ント欲シ茲ニ本冊子ヲ上梓シテ同好有志ノ士ニ頒タン事ヲ計レリ、吾曹素ヨリ學淺ク識足リサルモ、事業ノ發達ヲ希望シテ止サル一片ノ熱情ハ遂ニ自ラ播ラスシテ此企ヲ起スニ起レリ冀クハ大方諸君ノ好意アル贊助ニ頼リ以テ本會有終ノ發展ヲ遂ケンコトヲ期ス之ヲ發刊ノ辭トス

The "founding address" given at the beginning of the first issue