

## FOREWORD

Tadaaki Yanazawa  
Senior Managing Director  
General Superintendent, Mizushima Works



Since the end of the Second World War, the Japanese steel industry has consistently followed a progressive strategy in matters related to technology, first by introducing the most advanced techniques and equipment available at the time, and later through independent technological development. Likewise, Kawasaki Steel is pursuing a variety of activities aimed at making the company the world's strongest steel operation, and one essential requirement for achieving this goal, in addition to cost competitiveness, is to maintain a preeminent position in technology.

In November 1989, Kawasaki Steel became the first steelmaker in the world to market a newly developed product called fixed outer dimension H-shapes as a hot-rolled alternative to the conventional fixed inner dimension material. Supported by vigorous demand in the domestic construction industry, we have been able to expand production steadily, and for the first time in several years we have found ourselves with a real marketplace "hit." This new product was also awarded the Nikkei Award for Creative Excellence in Products and Services in 1989, and the 1990 Okochi Memorial Grand Technology Prize for new technology.

The history of steel structures in buildings and bridges dates from the 19th century, with the I-beam, produced by a grooved rolling method, as the main material for girders and columns. In 1901, the Diffedingen company in Luxembourg succeeded in producing H-shapes using the universal mill. H-shapes are superior to I-beams in offering a more efficient wide flange, and generally replaced the older material. In the United States, Bethlehem Steel and U.S. Steel (now USX) constructed plants for large H-shapes, which contributed immensely to the great era of skyscraper building, of which the Empire State Building (1931) is the most famous example.

Kawasaki Steel was the first steelmaker in Japan to introduce the universal mill, and succeeded in trial rolling H-shapes at Fukiai Works (now part of Hanshin Works) in 1961. Production expanded as the large H-shape plant went into operation in 1968 at Mizushima Works, followed by the Mizushima medium H-shape plant in 1971. New levels of production technology were achieved with the development of a technique for rolling multiple H-shape sizes from a single beam-blank size (JSTP AIDA Medal, 1979) and for rolling large H-shapes from slabs (The Okochi Memorial Technology Prize, 1982).

Nevertheless, the conventional rolled H-shape is inferior to built-up H-shapes manufactured by welding in several important respects, since welded H-shapes offer higher flange thickness to web thickness ratios, better dimensional accuracy, and uniform, or "fixed" outer dimensions in each size series. The newly developed hot-rolled fixed outer dimension H-shape, however, eliminates all these disadvantages at once, and is thus very much a customer-oriented product aimed at satisfying a wide range of user needs.

Fixed outer dimension H-shapes are produced by a comprehensive new technology which

incorporates a number of techniques developed specifically for this product, including a variable width roll, variable width guides, and special cooling techniques for the rolled material. Overall, the technology is the result of about ten years of technical research, for which all those involved deserve a sincere word of appreciation. The fixed outer dimension H-shape technology also has potential as the basis for a flexible manufacturing system for the shape mill, and I look forward to further efforts by shape steel engineers to this end.

Although this special issue focuses on only one area of technology developed by Kawasaki Steel Corporation, we hope that our readers will find it useful, and that you will grant us your continuing support and advice.