

# FOREWORD

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Heightened concern about the safety and security of society in recent years has accelerated the trend toward higher strength in steel sheets and plates, for example, to improve fuel efficiency and ensure crashworthiness in automobiles and ships. In energy-related applications, in addition to higher strength, the use of heavier gauge materials is being promoted for severe service environments and higher efficiency in transportation. Accompanying these changes in steel materials, as a result, higher reliability is also required in welds.

In response to these environmental changes, JFE Group is actively engaged in research and development on welding technologies, as well as material development of final products, and has already implemented commercial operation of many practical technologies, including new joining technologies that satisfy both reliability and economy, robotic automation technologies, and inspection technologies that guarantee flawlessness.

This Special Issue, which is the first on welding technology since JFE was established in 2003, introduces a diverse range of high reliability welding technologies such as Intelligent Spot<sup>TM</sup> welding, Pulse Spot<sup>TM</sup> welding, and single-side welding for automotive steel sheets, low heat input submerged arc welding for steel pipes, spatter-less, deep penetration J-STAR<sup>TM</sup> welding for steel plates, and flash-butt welding for rails, among others. Mighty Seam<sup>TM</sup>, which is one of these technologies, is an integrated technology that synthetically combines materials, processes, welding, quality assurance, and performance evaluation technologies, and is a JFE Steel “Only One” technology that is unrivalled by any similar technology. Not limited to Mighty Seam<sup>TM</sup>, these welding technologies of JFE are original solutions that were achieved as a result of continuous research and development activities. Such technologies of JFE have earned a high evaluation from customers, and at the same time, have also won many technology prizes outside the company, including awards for visualization technology, nondestructive inspection technology, fatigue resistance improvement technology, and basic metallurgical researches.

The JFE Group is committed to contributing to society by continuing research and

development on new products, new processes, and also application evaluation technologies, which appear here, and supplying products that respond to the needs of customers as a set with solutions. To achieve this goal, we humbly ask for the further guidance and support of all those concerned.