

# RESEARCH AND DEVELOPMENT



Murooran Research Laboratory



Hiroshima Research Laboratory



Yokohama Research Laboratory

Research and development activities were almost entirely funded by the Company during fiscal 2015. Combined spending on research and development for the Steel and Energy Products Business and the Industrial Machinery Products Business amounted to ¥4,292 million (US\$38 million).

As a materials and mechatronics company, we strive to innovate products and production techniques while also engaging in diverse technical alliances and joint development to deploy new offerings as quickly as possible.

Our Research and Development Headquarters collaborates with business divisions and Group companies to 1) improve the capabilities, performance, and reliability of core products; 2) develop offerings in new business fields based on core and differentiated technologies; and 3) promote the development and commercialization of new products through synergies with Group companies.

The Research and Development Headquarters consist of the head office, and our research laboratories in Murooran, Hiroshima, and Yokohama.

## Basic Research and Development Policy

We develop new products and businesses by focusing on new energy and energy savings, information and telecommunications, nanotechnology and materials, and new production technologies, which relate directly to existing businesses. We have increased collaboration between the Research and Development Headquarters and business divisions, and aim to cultivate existing business by expanding and upgrading core technologies.

We engage in basic research for future technologies and contemporary social needs and in researching component technologies for existing products. We will build on these efforts to undertake R&D projects that create new products and businesses and pursue innovations for existing products.

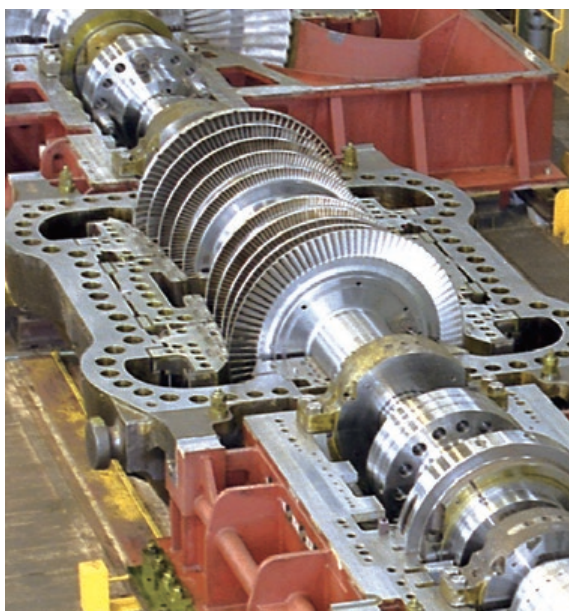
In Steel Products, we emphasize advances in energy and creating even more industry-leading offerings while commercializing new areas. The focuses in Machinery Products are to enhance plastics machinery, IT equipment, and other industrial machinery. We will allocate significant resources to such machinery by clarifying that our commercialization framework is open to mergers, acquisitions and alliances.

## Activities by Business Segment

### Steel and Energy Products Business

Product development centers on materials, notably for clad steel pipes for natural gas transportation, large steel castings, and forgings and high alloys for high-efficiency thermal power generation, forged steel products for advanced nuclear power plants, and high-performance nonferrous alloys, as well as manufacturing process technology development. We improve materials and component technologies for existing products. In the renewable arena, we develop material and component technologies to create lighter and more reliable pressure accumulators for hydrogen fueling stations. We create analytical technologies and enhance component technologies to improve the reliability of wind power plants.

Segment R&D spending totaled ¥1,356 million (US\$12 million) in fiscal 2015.



### Industrial Machinery Products Business

In this segment, our product development activities encompass developing advanced processing technologies for plastic molding machines, enhancing the performance of plastic extruders, developing advanced micro-nano melt transcription molding machines, enhancing the functions and performance of film molding machines, developing technologies to enhance the performance and lower the costs of magnesium alloy injection molding machines, developing dampers that comply with European specifications, and enhancing the efficiency and functions of compressors. Using the latest technologies and systems, we also develop laser annealing systems for thin-film transistor liquid crystal display (TFT LCD) production and devices for other laser applications, as well as chemical vapor deposition (CVD) and plasma devices.

R&D spending in this segment was ¥2,935 million (US\$26 million) in fiscal 2015.

