

# Research & Development



We will contribute to enhancing the competitiveness of the MES Group's core products with technologies for design and manufacturing innovations.

Director and Managing Executive Officer  
General Manager of Research & Development Headquarters

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## Research and development

To achieve the MES Group 2025 Vision, we make development efforts aimed at enhancing product competitiveness and expanding our businesses in the domains of Environment & Energy, Marine Logistics & Transportation, and Social & Industrial Infrastructure.

### Initiatives in the Environment & Energy domain

In the field of ocean development and submersibles, we are developing a newly constructed floating production storage and offloading system (noah-FPSO) vessel for marine oil and gas, which will make it possible to respond to requests for delivery in a short turnaround period, and a dynamic positioning system (DPS) with redundancy that makes it possible to respond to various customer needs. As a result, we have obtained classification certificates. To meet the demand for fast, low-cost surveys of a wide seabed area, such as a preliminary survey for offshore oilfield development and a survey conducted before laying underwater communication cables for commercial use, we have launched a joint research project concerning ultra-wide area high-speed seabed mapping (Team KUROSHIO) in a team of eight organizations including the University of Tokyo. In addition, we are working on a survey technology using multiple small AUVs, which is aimed at the efficient investigation of seabed resources in a wide marine area, and a submarine methane hydrate production system, among others. In the field of renewable energy, we are developing facilities including floating and bottom-mounted offshore wind power generation facilities. In the field of environmental plants, we are developing fermentation technologies which are compatible with diverse materials for the purpose of expanding the scope of application of biogas power generation technologies.

### Initiatives in the Marine Logistics & Transportation domain

In the field of port cranes, we are developing remote/automatic operation of quay cranes and container yard cranes, a container terminal automation system, and other areas. In the field of merchant ships, we are developing new neo-series ships, or next-generation, environmentally friendly ships that



A joint research project concerning ultra-wide area high-speed seabed mapping (Team KUROSHIO)



Container terminal automation system

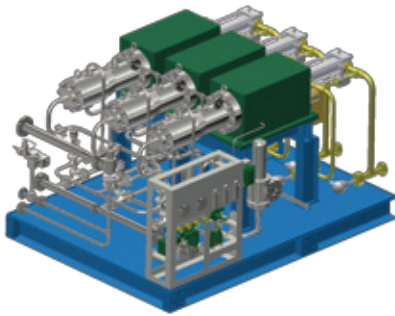
reduce CO<sub>2</sub> emissions. We are also developing a route recommendation system that considers weather and sea conditions and services including those of analyzing the propulsive performance of ships on commercial voyages, using ship-land communication technology. In addition, in the field of two-stroke marine diesel engines, we have completed the development of high-pressure EGR that meets the current IMO NO<sub>x</sub> (Nitrogen Oxides) Tier III regulation and dual fuel engines (ME-GI) for liquefied natural gas (LNG), ethane, and methanol, which comply with the sulfur oxide (SO<sub>x</sub>) regulations. We are now developing a dual fuel engine (ME-GI) for liquefied petroleum gas (LPG). We have also developed a high-pressure fuel pump to be used for the fuel gas supply system for ME-GI engines.

### Initiatives in the Social & Industrial Infrastructure domain

We are developing a radar inspection system for the maintenance of tunnels and roads, technologies for the large-scale maintenance and repair of bridges, and other related technologies. In the field of industrial machinery, we are developing a new co-generation system, which improves the energy efficiency of power generation facilities that use natural gas and complies with the standards for spreading and promoting distributed power supply. We also make use of IoT at our manufacturing sites to improve work efficiency and operate machine tools efficiently.

## Intellectual properties

The basics of initiatives for intellectual property lie in securing a competitive edge for our businesses through the acquisition of intellectual property rights and their application. The Intellectual Property Department and operational headquarters work together to promote the creation of intellectual property rights, such as inventions achieved through the development of products and technologies and trademarks attached to our products, and the acquisition of rights over the properties and their application. The Legal Department, Intellectual Property Department, and related departments also work together to handle contracts and disputes with other companies regarding intellectual properties. The intellectual property strategy cannot exist on its own, but must be implemented in an integrated manner with the business strategy and technological development strategy, forming a trinity of strategies. While we are apt to feel that the rights are acquired as a result of achievements in technological development, we must fully consider how to acquire, protect, and apply technologies when we start developing a business or product. At MES, we always try to formulate and implement intellectual property strategy in this way. In addition, in Japanese corporate society, where there is a tendency to avoid patent disputes, we have started to see a trend towards actively exercising intellectual property rights. This is believed to be the result of the great impact made by the progress of globalization. At the same time, however, it also reflects the fact that people are starting to have a greater awareness of how to apply these rights to gain profits. The importance of patent surveys and analysis, which aim to avoid infringing upon other companies' rights and exercise the intellectual property rights owned by MES, have been increasing, and we are taking measures to improve our capacity to conduct surveys.



High-pressure fuel pump to be used for the fuel gas supply system for ME-GI engines



Radar inspection system for road maintenance

