BUSINESS SEGMENT OVERVIEW

INDUSTRY & INFRASTRUCTURE DOMAIN

While continuing to strengthen earning capabilities through the reorganization of small-to medium-sized businesses and PMI implementation for joint venture companies, we are focusing on further growth in core businesses and expanding engineering-related businesses.

S STRENGTHS

- Expertise cultivated in a wide range of product fields and effective utilization of resources within the domain
- **Metals machinery:** Full product lineup and global presence
- **Turbochargers:** Development of highly efficient products leveraging high-speed rotational technologies
- **Forklift trucks:** Third in the world by business scale
- **Air-conditioning and refrigeration:** Extensive product lineup and world-class environmental and energy-saving technologies
- **Chemical plants:** Engineering prowess based on technologies and expertise cultivated through the construction of various types of plants
- **Land transportation systems:** Overall system integration capabilities and optimized technology for a bogie design of rubber-wheel vehicles
- **Commercial ships:** Superiority over competitors in environmental and energy-saving technologies

W WEAK-NESSES

- Tendency to be affected by short-term economic fluctuations
- Redundancy in functions and bases after integration
- **Chemical plants:** Volatility in sales amount
- **Commercial ships:** Relatively weak cost competitiveness on repeated construction of ships with the same specifications

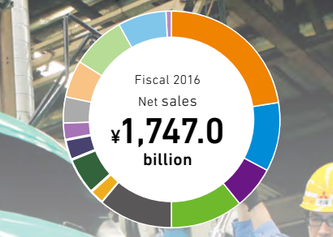
O OPPOR-TUNITIES

- **Turbochargers:** Growing trend toward downsized engines with turbochargers in response to environmental and fuel performance regulations
- **Material handling equipment:** Increasing market for logistics solutions with expansion of e-commerce business
- **Engines:** Growing power generation market in line with increases in demand for distributed power systems
- **Air-conditioning and refrigeration:** Rising awareness toward environmental protection
- **Chemical plants:** Growing capital investment for high-value-added natural gas in gas-producing countries
- **Land transportation systems:** Numerous infrastructure plans, including urban transport
- **Commercial ships:** Increasingly stringent environmental regulation of maritime transport

T THREATS

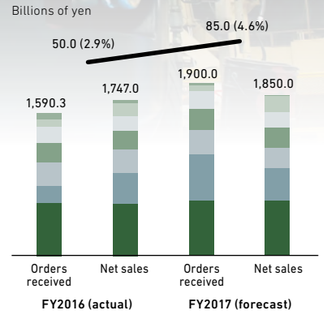
- Rise of manufacturers in emerging countries
- Sense of uncertainty in the global economy
- Ongoing commoditization
- **Metals machinery:** Global overcapacity forecasted to continue
- **Chemical plants:** Geopolitical risk in gas-producing countries
- **Land transportation systems:** Increasingly strong Chinese and big-three competitors
- **Commercial ships:** Increasingly severe competition in the gas carrier and ferry markets, as the gap between supply and demand for new ships persists

Net Sales by Core Business



Material handling equipment / Turbochargers / Engine and energy / Metals machinery / Air-conditioning and refrigeration / Automotive thermal systems / Mechatronics systems, Intelligent transport systems (ITS) / Industrial and precision instruments / Machine tools / Environmental systems / Land transportation systems / Chemical plants / Commercial ships / Others

Operating Performance



Mitsubishi Heavy Industries Forklift, Engine & Turbocharger Holdings, Ltd. (M-FET)*1 / Engineering*2 / Air conditioning and refrigeration, Automotive thermal systems / Metals machinery / Mechatronics systems, ITS, Industrial and precision instruments, Machine tools / Commercial ships / Others / Operating income (operating margin)

*1. Material handling equipment, Turbochargers, Engines
*2. Chemical plants, Land transportation systems, Environmental systems

Operating Environment

Comprising 13 businesses, the Industry & Infrastructure domain is affected by a variety of global trends. The logistics industry is increasingly active worldwide due to such factors as the growing popularity of e-commerce. The global market for forklifts is expanding along with this trend, and the market for logistics solutions, such as unmanned and automated systems, is growing at a rapid pace. Along with substantial increases in awareness of environmental protection, the turbocharger market continues to expand as the percentage of passenger cars with turbocharged engines grows in response to increasingly stringent environmental regulations. The market for air conditioning and refrigeration that requires high environmental performance is also expected to continue expanding over the medium to long term. In chemical plants, as gas prices fall the need for high-value-added natural gas is increasing, leading to more business opportunities. In ITS, the Japanese market remains flat, while the overall global market is expanding, as road networks are progressing in Southeast Asia and other regions. In land transportation systems, a rising number of airport expansion projects is expected to push up demand for APMs*1. In commercial ships, while a persistent global oversupply continues, we anticipate movement in response to increasingly strict environmental regulations on ships.

*1. APM: Automated people mover

Directions for Fiscal 2017 and Focus Strategies for the Medium to Long Term

In fiscal 2017, we aim to meet our targets by expanding sales of material handling equipment and turbochargers, by securing profit through acceleration of PMI*2 at joint ventures, and through structural reforms in the commercial ship business. Over the medium to long term, we will promote increases in both sales and operating income, focusing on further growth in core businesses and expanding engineering-related businesses.

In turbochargers, to ensure continuous growth we will promote the development and introduction of products for diversified automotive powertrains—such as for electric vehicles (EVs), hybrid vehicles (HVs), and plug-in hybrid vehicles (PHVs)—and the establishment of a global supply structure capable of delivering 11 million units per year. In air conditioning and refrigeration, we will leverage our industry-leading product lineup and environmental and energy-saving technologies to expand the thermal solutions business, thereby promoting global expansion and reinforcing our services business. In ITS, we will sustain profitability in the Japanese market, where model changes are expected to spark demand. We also aim to cultivate new business based on an ongoing new project in Singapore for a next-generation electronic road pricing (ERP) system.

In the commercial ship business, we consolidated the business integration and engineering functions in July 2017. We are increasing our ability to build ships primarily involving outfitting work, developing energy-saving ships, and collaborating with other domains to step up initiatives in new fields. Furthermore, through alliances with other companies we intend to cultivate business in new areas, such as gas-powered ships, that leverage our technological expertise. In chemical plants, we will work to stabilize earnings by participating in the operation, maintenance, and after-sales service businesses, while also striving to expand orders in strategic regions. Taking advantage of our track record with large-scale CO_2 recovery plants featuring the highest processing capability in the world, we plan to make a full-scale entry into the CO_2-EOR*3 business. In land transportation systems, based on our strengths in system integration and AGT*4 systems, which are competitive and reliable, we will develop the total solution business in the area of urban transport, including O&M*5. In engineering-related businesses, including environmental systems, we will enhance our project management capabilities and quality, cost, delivery (QCD) control and pursue horizontal development into other businesses. Furthermore, we aim to create new businesses and cultivate new fields by managing resources and enhancing synergies among engineering-related businesses. Meanwhile, we are making steady progress on reorganizing small- and medium-sized businesses to strengthen business operations and aim to complete this process during fiscal 2017.

See the section below, entitled "Business Directions at Key Subsidiaries," regarding our business strategies for metals machinery and material handling equipment.

*2. PMI: Post-merger integration (the integration process following a corporate or business merger)
*3. EOR: Enhanced oil recovery
*4. AGT: Automated guideway transit
*5. O&M: Operation and maintenance

Business Directions at Key Subsidiaries: Primetals Technologies and M-FET

At Primetals Technologies, a joint venture with Siemens AG of Germany, we are seeing a gradual upturn in orders, but we still forecast global steel overcapacity and a tough market environment to persist. Under these conditions, we are promoting further PMI to secure earnings at the current scale of business. To date, we have pursued organizational reforms and workforce optimization. We will implement PMI by consolidating our current 40 worldwide locations to 26, setting new cost targets, and optimizing the design, procurement, and manufacturing processes. We also aim to bolster our market share by meeting customer needs and technology trends, pushing ourselves into a leading global position.

In October 2017, Mitsubishi Heavy Industries Forklift, Engine & Turbocharger Holdings, Ltd. (M-FET) will undergo management integration with two M-FET group companies: Mitsubishi Nichiyu Forklift Co., Ltd., and UniCarriers Corporation. As a result, we plan to pursue PMI that will raise the operating margin in the material handling equipment business to 8% by fiscal 2019. Specifically, we are pursuing optimization of production bases by separating functions and consolidating redundant functions. As a result, we expect to boost productivity, reinforce the procurement system, and lower costs substantially. In addition, starting from the development structure at bases in Japan, North America, and Europe, we will pursue a regionally tailored multibrand strategy to expand our global scale.

BUSINESS SEGMENT OVERVIEW: INDUSTRY & INFRASTRUCTURE DOMAIN

Addressing Social Issues

Optimization Initiatives for Rapidly Changing On-Site Logistics

Social Issues

The rapid expansion of the e-commerce market, the proliferation of the Internet of Things (IoT) and artificial intelligence (AI), and falling childbirth and aging populations are resulting in a shortage of on-site personnel to perform forklift and order picking operations. Consequently, the social environment surrounding the logistics industry is undergoing profound change. Accordingly, global demand for optimization is growing at warehouses, factories, and other on-site logistics locations.

MHI Group's Solutions

MHI Group companies Mitsubishi Nichiyu Forklift Co., Ltd. and UniCarriers Corporation have unveiled a series of firsts, both in Japan and the world: Japan's first battery-powered forklift (1939), Japan's first engine-powered forklift (1949), and the world's first automated guided forklift (1971). In so doing, we have improved working environments and safety and responded to the social need for higher levels of efficiency and reduced labor. The automated guided forklift, in particular, has a raising/lowering function that enables automated loading at various heights in addition to automatic travel, contributing significantly to the automation of logistics locations.

For conventional automated guided forklifts, it was common to use electromagnetic signaling to guide travel paths. Now, MHI Group is accelerating the market introduction of a laser-guided automated guided forklift that does not rely on signal lines. Following introduction in Europe, which leads the market, we launched this forklift in Japan in April. The new forklift addresses some of the issues faced by conventional automated guided forklifts (the time and cost required to construct electromagnetic signal lines and the need to change complex routes). By leveraging the new forklift's advantages, we are working to optimize logistics sites.

Laser-guided automated guided forklift for the European market

Laser-guided automated guided forklift for the Japanese market

Rather than focusing just on forklifts, MHI Group aims to provide logistics solutions that improve customer operations and energy efficiency, reducing expenses and generating profits. In response to the need to automate forklifts and save labor, we are developing warehouse management systems that integrate the management of in-warehouse storage (automated warehouses) and material handling (laser-guided forklifts).

To meet demand for efficiency, safety, and peace of mind, we are pursuing various ways to achieve increases in safety by using IoT to gather and analyze big data on forklifts. We will also provide information aimed at better preventive maintenance and higher levels of safety. In addition, we intend to offer proposals on optimizing vehicle layouts and equalizing operations, which should help in conserving energy and extending battery life.

On October 1, 2017, Mitsubishi Nichiyu Forklift Co., Ltd. and UniCarriers Corporation will undergo management integration, forming Mitsubishi Logisnext Co., Ltd. Under the "Logisnext" name, signifying "Logistical Equipment & System Solutions Next," we aim to contribute to the future of global society as a next-generation logistics leader. Going forward, MHI Group will continue providing advanced logistics solutions that match the needs of customers in areas around the globe.

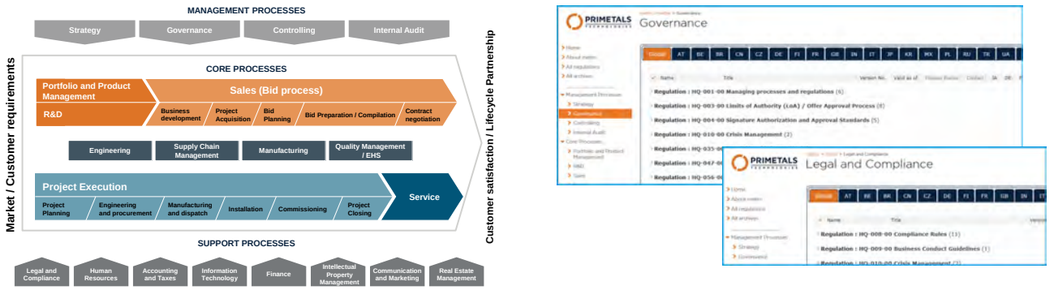
Initiatives in This Domain Related to Material ESG Issues

Material issue 1: An optimal governance structure based on our corporate culture

Governance at Primetals Technologies, Where People of Different Nationalities and Cultures Work Together (Establishment and Promulgation of Global Guidelines for Business Processes)

Primetals Technologies (PT) was established in January 2015 as a joint venture between Mitsubishi-Hitachi Metals Machinery, Inc., and Siemens VAI Metals Technologies GmbH, the metals machinery division of Siemens AG of Germany. Headquartered in London, PT is one of the largest global group companies in the MHI Group. Worldwide, PT employs around 7,000 people in more than 20 countries. PT promotes organizational governance across numerous countries and differing cultures and aims to integrate diverse cultures into one corporate culture. As one such initiative, PT has created certain Global Guidelines, which stipulate the standard of each business process common to all PT Group companies around the world. The Global Guidelines are implemented in each country. If necessary the Global Guidelines may be complemented by local guidelines to cover special regional requirements. To increase awareness of and support for the guidelines among all PT staff, PT has set up the "METRIS" system on its intranet. This system enables all PT staff to easily access global and local guidelines for their regions and fosters a clear understanding of each business process, encouraging systematization and regularization. At the same time, METRIS provides the necessary information in relation to actions required in order to execute the guidelines. By publicizing and providing this information on its intranet through METRIS, PT is making apparent its intent to promulgate the guidelines and promote the global standardization of processes.

In relation to compliance, the company has set up a structured organization to ensure that PT staff follow company guidelines. Working under global leadership, locally responsible staff operate directly under compliance leaders for each region, so that compliance checks and reports can operate systematically and at a global level without concern for national borders and time differences, as well as to promote paperless operations.



Example of a METRIS screen. From the left, the screen shows the overall structure and enables access to individual process guidelines (global and local).

R&D Case Study

Development of a Marine SOx Scrubber in Response to Increasingly Stringent Regulations on Sulfur Oxide Emissions

MHI's Ship & Ocean Division and Mitsubishi Hitachi Power Systems, Ltd. (MHPS) have jointly developed a Large-scale Rectangular Marine Scrubber that efficiently removes sulfur oxides (SOx) from the exhaust gases emitted by marine diesel engines. The scrubber was developed based on MHPS's comprehensive flue-gas treatment technologies cultivated through desulfurization systems for thermal power plants, leveraging MHI's expertise in marine engineering. The adoption of a rectangular box-shape configuration—a world first—offers outstanding ease of installation in small spaces and superlative emissions treatment for high-output engines used on large-scale container ships. The new scrubber was developed in response to stringent new SOx emissions regulations in all oceans that come into effect globally in 2020. It is able to purify exhaust gas emitted from inexpensive heavy fuel oil to a level equivalent to more expensive low-sulfur fuels, and has been designed to allow easy installation on existing ships. Aiming to begin delivering the scrubber in 2020, both companies will seek certification from selected countries while conducting extensive tests on ships. Sales offerings will focus on installations for both newly commissioned ships and ships already in service, including ships constructed by MHI as well as other shipyards.