

CTO'S MESSAGE

Promoting Technology and Knowledge-Sharing among Business Areas and Making Product Diversity an MHI Strength

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Working to Make Product Diversity a Major Strength

In April 2016, MHI launched a "Shared Technology Framework" consolidating the Company's technologies as well as marketing, procurement and other functions. The Shared Technology Framework, which is overseen by the Chief Technology Officer (CTO), encompasses the Technology Strategy Office, Marketing & Innovation Headquarters, Value Chain Headquarters, ICT Solution Headquarters, and Research & Innovation Center. The new framework seeks to strengthen MHI's technological and marketing infrastructures, optimize the value chain across the Company (including in procurement), and reinforce the competitive strength of MHI's businesses in the medium-to-long term.

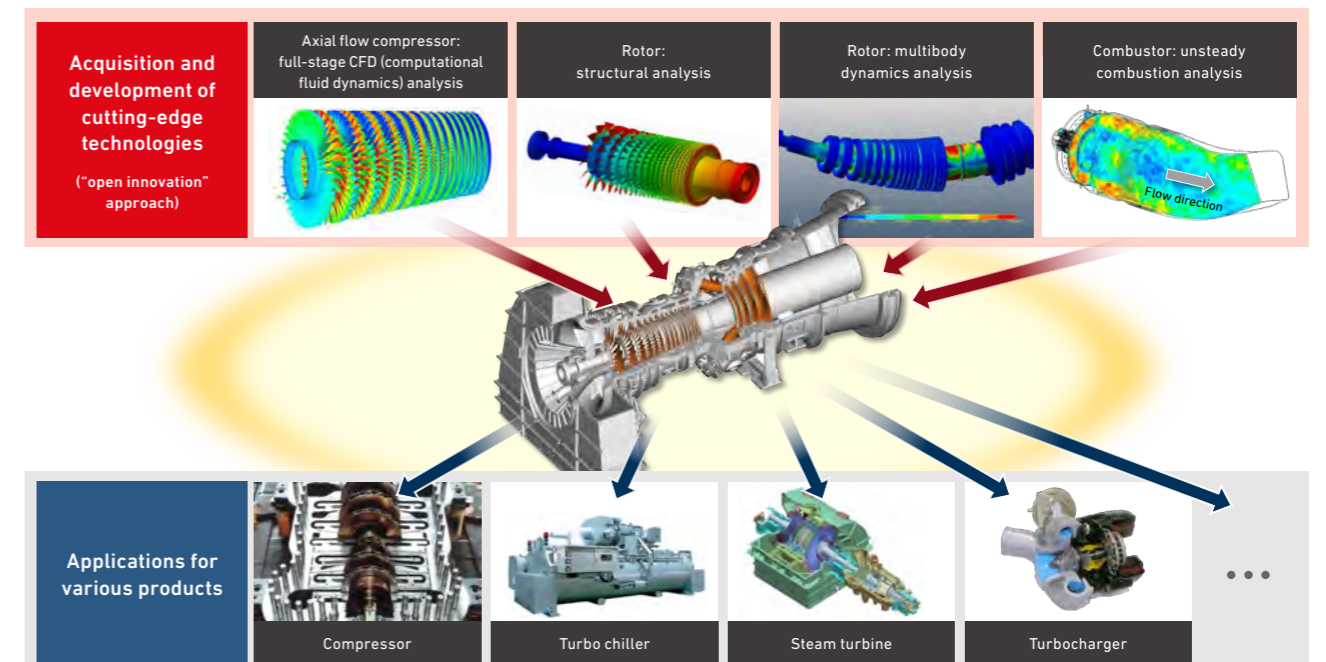
In fiscal 2016, we focused our efforts on bringing each of the components into alignment. We held discussions with all new framework members, debating how to improve the Companywide technology structure. From these discussions a number of common issues emerged which came to determine the overall mission, vision, and strategy for the new framework. We then addressed how these could be applied across all organizational units.

Already, synergies are beginning to emerge from this unification process. In the Marketing & Innovation Headquarters, for example, joint discussions between employees with backgrounds in marketing and R&D-focused engineers have led to a number of new solutions to meet society's needs. We have also been able to significantly improve and expedite the process of proposing new products and services to customers.

MHI is sometimes seen as a collection of small or medium-scale companies, with weak horizontal connections between businesses. In the days when the Japanese market was growing, this structure was acceptable. However, in the current environment, with a shrinking domestic market, there is a limit to how much can be achieved from a system of highly specialized knowledge of particular fields. It is therefore necessary to make active use of MHI's overall expertise and technologies in a holistic manner. In order to make this approach more effective, the cross-disciplinary business integration enabled by our Shared Technology Framework will be vital.

Producing such a wide array of products is sometimes seen as disadvantage. However, I believe the technology developed and experience gained from developing such products can be an inherent strength. This is particularly true for energy-related products such as gas turbines and defense and space related products, where the most advanced technologies are demanded. Such technological advances can frequently lead to the development of further new products and businesses in other fields. This also applies to procurement and marketing, where synergies can be achieved that would not be possible for manufacturers specializing in only one area. In this way, we intend to employ the cross-disciplinary developments of our Shared Technology Framework as the means to turn a "weakness" into a "strength."

Applications of Cutting-Edge Technologies to Diverse Products (Example: Gas Turbine)



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Dual Challenges: Being a Technology Leader While Applying Technological Base Groupwide

Under the Shared Technology Framework, we develop prototypes and also apply them across multiple businesses. We are not only accumulating knowledge of cutting-edge technologies like IoT and AI for individual businesses, but also working to leverage this expertise developing prototypes across the Group and in various markets.

One example is the project underway at the UK and Denmark factories of MHI Vestas Offshore Wind, a joint venture in offshore wind power systems with Vestas Wind Systems. Under this project, engineers from the Shared Technology Framework were dispatched to the JV's three plants. At each plant they diagnosed the manufacturing processes and then developed and introduced systems necessary for improving those processes. As a result, "takt time" (i.e. the production time required to meet ongoing customer demand) was reduced by more than 50% in some cases, thereby enabling a significant improvement in capacity without expanding facilities. This scheduling system was originally developed for production sites at MHI's factories in Japan. It evolved out of

small-scale production sites but has been successfully applied at various businesses, including in the production of wings for the Boeing 787. By building up a track record of this kind, we can improve the cohesive strength of MHI Group, and pursue further sharing of technical expertise and best practices.

In recent years, we have heard concerns about our technological strength, particularly in relation to various risk-bearing projects. While this does not apply to fields such as gas turbines, aircraft, space launch vehicles, and defense equipment, all of which require cutting-edge technologies, there is concern about areas where the domestic market is shrinking. In particular we are seeing a gradual decrease in personnel, including engineers, involved in these businesses. Responding to this across the entire Company is another important mission of the Shared Technology Framework. We intend to tackle this concern directly by significantly raising our technological capabilities.

Innovation Center (Tentative Name) Incorporating Outside Knowledge and Expertise

MHI's product development process requires a clear time-scale and key performance indicators (KPIs) to measure progress and success. However, this approach may be difficult to marry with the development of new products or businesses over a long time period. Today various domestic-focused business environments have reached maturity, making it difficult to foresee significant growth in future. In response, we believe it is necessary to make investments for the long term, which will break down our standard business operations in a positive sense. We have therefore decided to establish a new Innovation Center (tentative name).

Since we launched the Shared Technology Framework, we have focused on open innovation, increasing investment outlays, and enhancing our workforce. We have also increased the number of business partners we work with, especially overseas. The center will further develop these approaches, and will pursue the acquisition

of new knowledge and expertise through tie-ups with domestic and global partners that will lead to significant breakthroughs.

In order to elevate our research activities and create more opportunities, we plan to make the center a wholly owned corporate entity specializing in R&D. By giving a free hand to project managers hired from outside the Company, the new facility will be able to absorb the latest knowledge and ideas, and accelerate research and development of a common technological base and new products. While we are not currently considering any immediate large-scale investments, we have selected a number of targets that, if realized, have the potential to bring about significant changes. We are taking a long-term view and expect that innovations will emerge that could be game-changers for the market in the future.

Building a Technological Base to Respond to Society's Future Needs

At MHI, our culture has traditionally focused on understanding society's needs and then developing products in response, rather than the "top-down" approach of establishing a technological concept and pursuing development around it. The very foundation of MHI in shipbuilding came about from demand for ships to support the Company's other businesses. This then led to the development of engines, boilers, and power systems. However, if customers are to look to MHI to fulfill their emerging needs, we must continuously improve our technological capabilities to respond to their expectations.

One area in which society's needs are likely to increase in the years ahead is the oil and gas market. Today, the market is sluggish due to the fall in crude prices, but we are making proactive moves into areas where technologies and products we provide offer strong potential in the medium-to-long term. In the energy field, the use of renewable energy is expanding, and we believe it

has the potential to become a baseload power in the future. When that happens, the roles of thermal and nuclear energy will change substantially. Also, as demand for electricity strengthens, the proportionate share occupied by electricity as an energy source will further increase. In response to this, MHI will pursue research into systems for controlling the operability of thermal power plants, auxiliary services, and so on.

My role is to oversee the establishment of our technological base and the pursuit of new innovation. Even if outstanding product ideas are produced from within the various business segments, they cannot be fully realized without the necessary technological base and generation process for innovation. To enable new products, services, and businesses to flourish in the near future, we will contribute to the expansion and strengthening of our businesses with a long-term perspective.

