R&D, Intellectual Property Activities

—Technological Capabilities: The Management Resources Fueling Competitiveness

The EBARA Group is further refining the fundamental technologies it has developed to date while improving upon the core technologies that fuel competitiveness and incorporating these technologies into products. In this manner, we are creating an R&D organization that contributes to business development through a collaborative system utilizing sophisticated numerical analysis technologies and analytical techniques.

R&D Policy and Activities

In 2010, EBARA CORPORATION launched the Companywide R&D initiative known as Ebara Open Innovation (EOI). This initiative is based on the concept of pursuing technological innovation in an open manner through wide-ranging collaboration with research institutions in Japan and overseas. EOI has created a number of successes over the years.

If we are to collaborate with world-leading research institutions, it is crucial to ensure that the Company's core technologies are always on the cutting-edge of global technological innovation, and we must also have capable researchers that can perform on an equal footing with other globally active researchers. We established the Ebara Open Laboratory (EOL) to take another step forward in our global R&D activities. EOL provides systems for training researchers in-house. It also puts forth frameworks for pursuing further developments in technical fields, such as thermal and fluid mechanics, materials and structural mechanics, where EBARA has honed its expertise for more than a century, and quickly commercializing these developments in products.

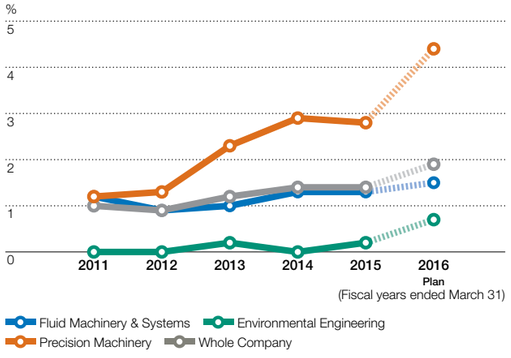
EOL was established in April 2014 to serve as a research organization into which R&D themes from throughout the Company could be flexibly introduced and in which personnel can participate in a similarly free manner. A corporate research organization, EOL comprises three research departments. However, this organization is not a physical laboratory possessing dedicated facilities to house these research departments. Rather, it is a virtual research organization, and the vast majority of its researchers advance R&D ventures while also handling work at other Group companies.

No one can predict how the technologies related to EBARA's business will have changed a decade from now. Nevertheless, we must adapt ourselves to reflect such technological change, and, for this reason, we believe it is essential that the R&D themes and organization of the EOL continue to evolve into the future. At the same time, we must further refine the fundamental technologies that serve as the Company's core competencies, and pass these technologies on to future generations of employees with an eye to EBARA's next 100 years.

Creating technological breakthroughs requires unwavering resolve. At EBARA, we are committed to developing a workplace environment that facilitates the growth of employees in order to support the pioneering spirit of our passionate researchers.

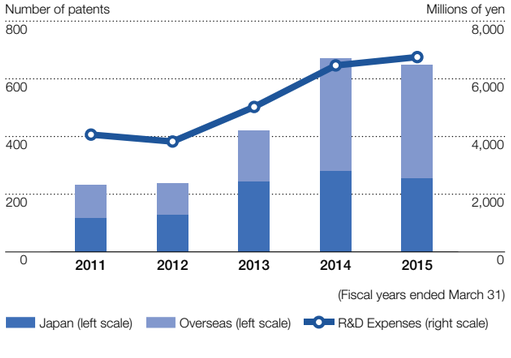
Ratio of R&D Expenses to Net Sales

We will continue to conduct appropriate R&D investments in accordance with E-Plan2016.



R&D Expenses and Patent and Utility Model Applications

Linking R&D strategies with patent strategies, we will strengthen business operations by swiftly transforming research successes into viable intellectual properties.



R&D Themes

The R&D themes targeted by EBARA can largely be separated into three categories. We flexibly change fields of focus based on internal and external circumstances to ensure that management resources are utilized efficiently.

1. Fundamental technology development: Research and development based on this theme is overseen by corporate R&D organizations. We are striving to make EBARA the world leader by developing and passing on the shared fundamental technologies and core technologies that fuel the Company's competitiveness and are incorporated into various products and systems.
2. Product and service development: Research and development based on this theme is overseen by Group companies and business segments. This theme encompasses R&D ventures for improving upon existing products and systems and related services, developing new products, catering to customer requests, and advancing development in peripheral fields.
3. New business creation: In the past, new business creation was conducted as a corporate project. We intend to introduce new business creation frameworks and resume activities in this area in the near future.

Examples of R&D Ventures

1. Wafer Drying Technologies (Low-k Films)

Analysis of mechanism behind watermark appearance after CMP cleaning process and development of countermeasures

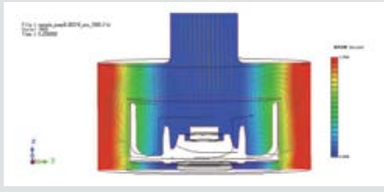
Droplet observation image (wafer edge)

Low flow speed

High flow speed

2. Non-Clogging Pump

Development of non-clogging pump by identifying the clogging mechanism of waste substance and water pumps

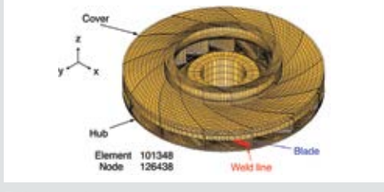


Vortex pump loss analysis

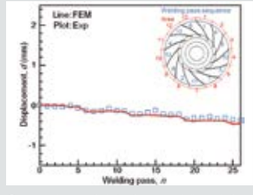
Cord entanglement test

3. Compressor Turbine Welding Deformation Analysis

Analytical clarification of welding deformation processes in compressor turbines to eliminate need for reworking



Finite element model



Comparison of data from welding deformation analyses and experiments