VALUE CREATION CASE Study 2

Vacuum Capacitors Supporting Semiconductor Manufacturing

A value creation story of fusing tradition and innovation in proprietary technology

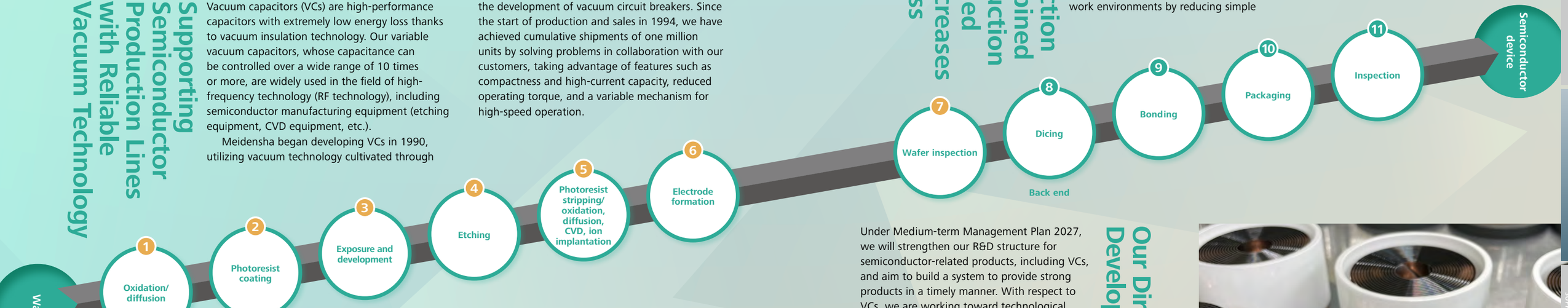
Related Material Issues

- Realization of a carbon-neutral society
- Realization of a safe, secure, and convenient society

Supporting Semiconductor Production Lines with Reliable Vacuum Technology

Vacuum capacitors (VCs) are high-performance capacitors with extremely low energy loss thanks to vacuum insulation technology. Our variable vacuum capacitors, whose capacitance can be controlled over a wide range of 10 times or more, are widely used in the field of high-frequency technology (RF technology), including semiconductor manufacturing equipment (etching equipment, CVD equipment, etc.).

Meidensha began developing VCs in 1990, utilizing vacuum technology cultivated through the development of vacuum circuit breakers. Since the start of production and sales in 1994, we have achieved cumulative shipments of one million units by solving problems in collaboration with our customers, taking advantage of features such as compactness and high-current capacity, reduced operating torque, and a variable mechanism for high-speed operation.



Semiconductor manufacturing process

Impact of the Spread of AI on Vacuum Capacitor Demand

The rapid spread of generative AI and other technologies has led to a significant increase in demand for graphics processing units (GPUs), which combined with an increase in demand for semiconductor memory, has led to greater demand for semiconductor manufacturing equipment. In addition, as manufacturers produce semiconductors with finer patterns and more layers, VCs required for plasma process control must be both smaller and more powerful. Going forward, we expect demand to continue growing along with technological advances in semiconductor manufacturing equipment.

Greater Production Capacity, Combined with Loss Reduction from Streamlined Production, Increases Competitiveness

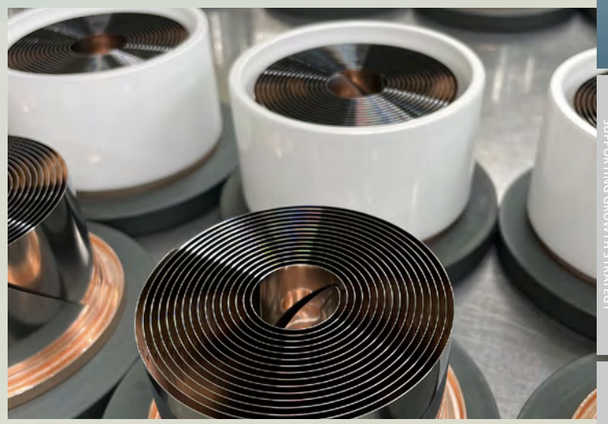
In our growth strategies in Medium-term Management Plan 2027, we will aggressively invest in facilities and equipment to meet the growing demand for VCs.

To strengthen our competitiveness, we will expand our production capacity to 1.3 times the current level by enhancing our facilities and expanding our manufacturing areas. In addition, we will promote digitization and automation to save labor, and create comfortable work environments by reducing simple tasks, and securing human resources. Using mechanization and automation to eliminate elements of instability from manual labor will lead to stabilization of manufacturing quality and higher product performance.

Furthermore, we will establish a quality system preferred by our customers by improving product reliability and reducing risk as a result of stronger in-process inspections and an established traceability system.

Our Direction for Future Development

Under Medium-term Management Plan 2027, we will strengthen our R&D structure for semiconductor-related products, including VCs, and aim to build a system to provide strong products in a timely manner. With respect to VCs, we are working toward technological innovation in materials, structures, and manufacturing methods and the creation of new concept products in order to achieve further miniaturization and higher performance. In addition, we will contribute to technological innovation in semiconductors by strengthening our product capabilities. This will be done by establishing technical bases that can engage with customers' production and development processes to ensure rapid and appropriate product deployment.



Newly commercialized stainless steel spiral electrode for high withstand voltage

Major Meidensha Products Used in Each Process

Vacuum Capacitors (VC)

4 5 6

Incorporated into high-frequency power supplies for plasma generation for semiconductor manufacturing equipment (etching/CVD equipment, etc.).

Pulse Power Supplies

3

A device that outputs instantaneous high power for periods as short as microseconds or nanoseconds. Such devices are used for pumping excimer lasers, which provide the light source for lithography equipment.

Pure Ozone Generators

1 4 5

Equipment that liquefies and accumulates ozone and continuously supplies high-purity ozone gas. Utilizing pure ozone and ethylene technology, it enables ashing (resist stripping) and other processes after high-dose ion implantation.

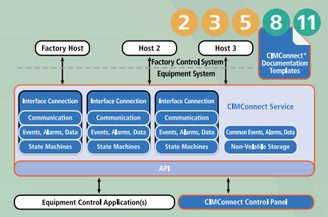
Industrial Switching Hubs

1 ~ 11

Switching hubs specialized for industrial applications. These offer a wide operating temperature range of -20 to 55°C, optimized for implementation in equipment and facilities.

Host Communication Systems

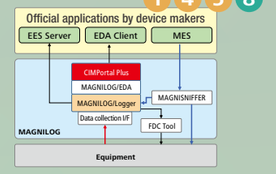
2 3 5 8 11



Communication software embedded in semiconductor manufacturing equipment. Special communication based on industry standards with the semiconductor factory host automates semiconductor production lines.

Data Logger Systems

1 4 5 8



Software that collects various sensor and event information regarding semiconductor manufacturing equipment. These solutions help to generate input data for equipment health checks, utilization rate checks, and error determination systems. It can also be applied to the EDA industry standard.

Industrial Controllers

1 2 3 5 9

Compact industrial PCs designed for equipment embedding. New models have been developed over multiple generations using the latest CPUs and operating systems. External dimensions have been maintained over several generations, and these controllers are in use in several semiconductor manufacturing devices.

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