Murata's monozukuri (manufacturing)

Basic view

At Murata, we strive to strengthen each domain along the supply chain management (SCM) axis, where value is delivered from suppliers to customers through our business, and along the engineering chain management (ECM) axis, where products and related processes and equipment are developed. Additionally, by harnessing the strengths of these domains, we demonstrate our core competencies, "the power to give shape to needs" and "the power to deliver value."

- → Information
- → Things (materials, equipment, products, etc.)

Management systems for profit/loss, quality, human resources, etc.

SCM axis: The power to deliver value

Suppliers — Materials → Production management system ← Products — Customers

Process system

Business divisions — Product development, process development, and equipment development — Development department

ECM axis: The power to give shape to needs
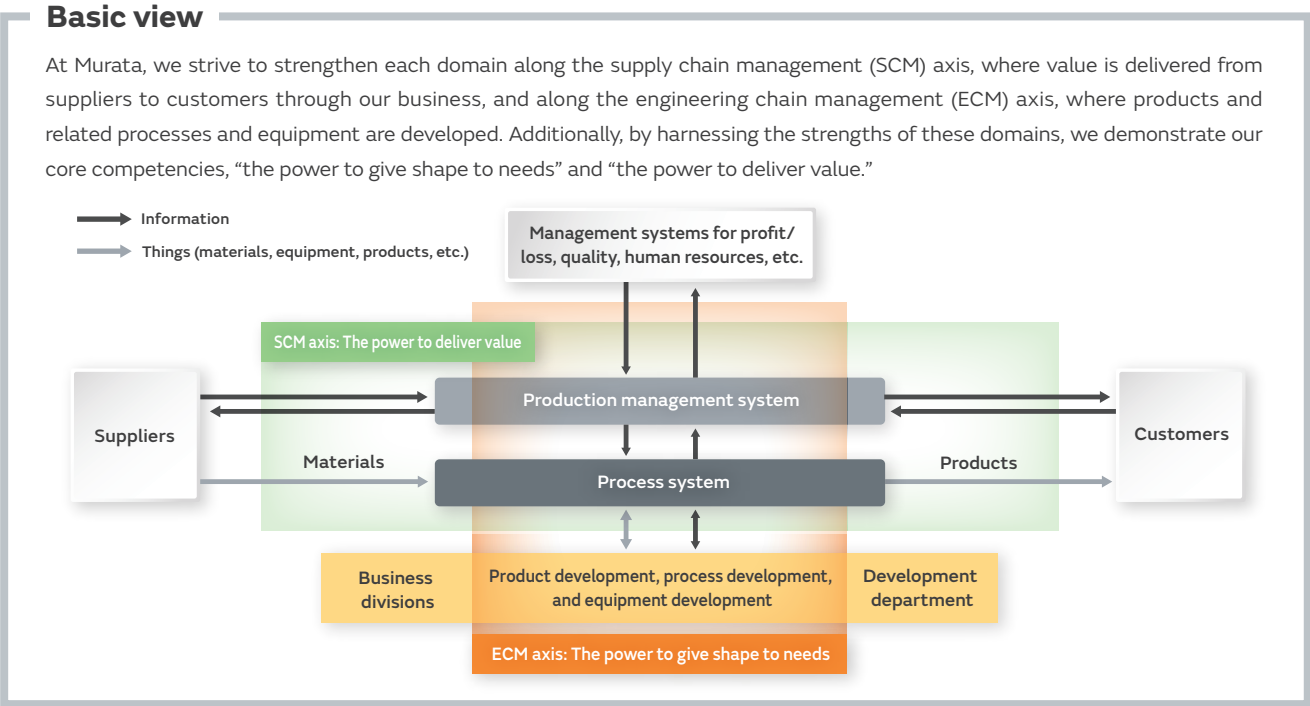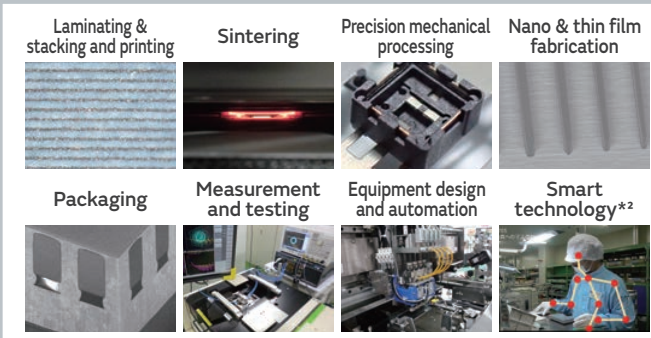
Production technologies that support the creation of new products and business

We focus on concurrent engineering*¹. The production engineering department which is responsible for the development of processes and equipment, collaborates from an early stage of the development of new products to develop, design, and manufacture unique in-house facilities that are economical, safe, and of high quality. We are also working on challenging development themes by strategically focusing on elemental technologies that will serve as our competitiveness in the future, with the addition of two new issue-solving perspectives: "environmental responsiveness," such as reducing CO_2 emissions and material consumption, and "vibrant worksites," such as improving worksite wellbeing.

*1 A method in the product development process used to streamline development by simultaneously carrying out multiple tasks
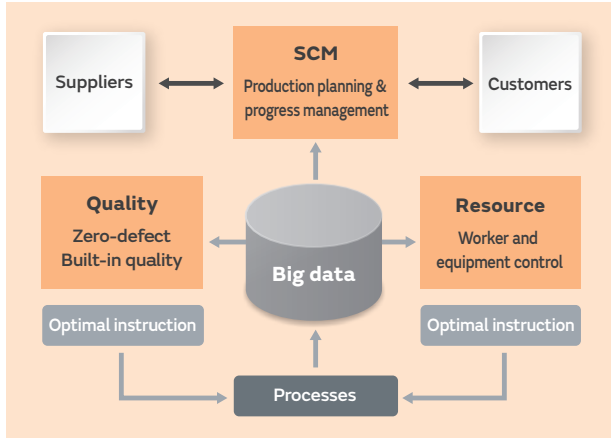
Production technology domains

- Laminating & stacking and printing
- Sintering
- Precision mechanical processing
- Nano & thin film fabrication
- Packaging
- Measurement and testing
- Equipment design and automation
- Smart technology*²

*2 Technology that solves manufacturing issues such as improving productivity and quality by utilizing technologies such as robots and AI

Management systems and management technology that meet customer requirements

We develop and operate our own production management systems. The functions of our production management systems are threefold: SCM for forming production plans based on the order information received and connecting them to delivery date response and material orders to suppliers; Quality for setting production conditions and controlling quality to perform actual production based on a production plan; and Resource for monitoring the operation status of resources such as workers and equipment and issuing instructions such as increases/decreases and the order of production. We will use these functions to meet the increasingly advanced and diversified demands from our customers.

- Suppliers
- SCM — Production planning & progress management
- Customers
- Quality — Zero-defect Built-in quality
- Big data
- Resource — Worker and equipment control
- Optimal instruction
- Optimal instruction
- Processes

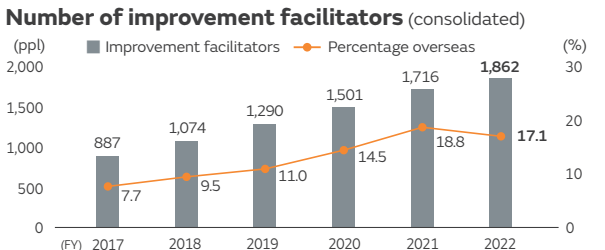## Strategies for strengthening monozukuri capabilities

To maintain and enhance our competitiveness by steadily capturing the demand for electronic components, which continues to grow in line with the expanding electronics domain, we will determine the issues to expect from both the short-term (current situation) and medium- to long-term perspectives and collaborate with our global manufacturing sites, thereby bolstering our monozukuri capabilities.

Human resources who support the monozukuri site

The foundation for excellent monozukuri is human resources. Murata places emphasis on training for improvement facilitators, with a focus on manufacturing supervisors and workers who are active at the frontline of the manufacturing site, to help them improve their workplace through improvement technologies that support our competitiveness in monozukuri. Through continuous training at production sites in Japan and overseas, the total number of improvement facilitators reached 1,862 as of the end of March 2023.

In Murata's equipment-oriented processes, maintenance technicians are also important on-site personnel who support monozukuri. Maintenance skills, which take time to master, are standardized as formal knowledge. This knowledge is passed on at "engineering training gym" that we have set up at our major production sites in Japan and overseas to develop and raise the level of these skills.

Number of improvement facilitators (consolidated)

(ppl) ■ Improvement facilitators —●— Percentage overseas (%)

(FY)	2017	2018	2019	2020	2021	2022
Improvement facilitators	887	1,074	1,290	1,501	1,716	1,862
Percentage overseas	7.7	9.5	11.0	14.5	18.8	17.1

Global human resources development for monozukuri

While Murata's ratio of sales outside Japan to net sales exceeds 90%, its overseas production ratio is approximately 35%. With Japan's working-age population declining into the future, we will accelerate our efforts to strengthen our monozukuri capabilities overseas so as to develop our business globally and continue to provide competitive products. To this end, we have established regional human resource development organizations in Greater China and Southeast Asia, the regions with many manufacturing sites, to drive their autonomous development. Working in collaboration with domestic organization, we have established human resource development programs in areas of manufacturing supervision, equipment maintenance, industrial engineering, and production management to promote the development of human resources for monozukuri.

- ASEAN organization for human resources development
- Greater China organization for human resources development
- Human resources development & exchange
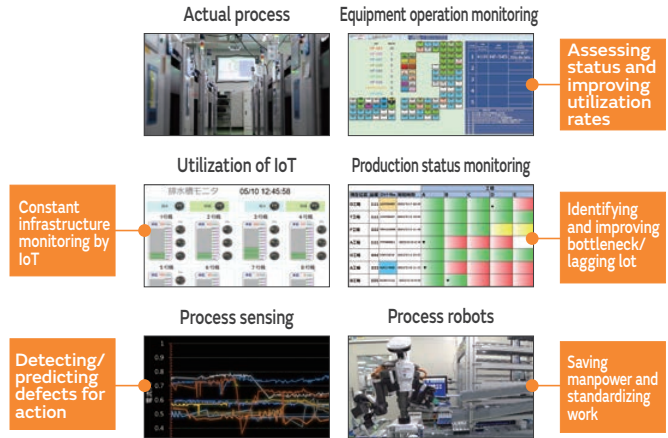- Domestic organization for human resources development

Transformation of the monozukuri utilizing digital technology

We are working to utilize digital systems to create smart factories. Our aim is to respond to challenges of securing human resource recruitment and negotiating complex logistics, as well as increasingly sophisticated needs of customers, further improved quality, new product creation, and productivity enhancement.

To overcome challenges at production sites, we endeavor to innovate operational procedures and system designs, utilizing the latest AI- or robot-powered technologies, as well as our own products and know-how, including sensors and IoT solutions.

For details of the efforts to create smart factories underway at manufacturing sites, please see here. ▶

Examples of digital applications in the monozukuri domains

- Actual process
- Equipment operation monitoring — Assessing status and improving utilization rates
- Utilization of IoT — Constant infrastructure monitoring by IoT
- Production status monitoring — Identifying and improving bottleneck/lagging lot
- Process sensing — Detecting/predicting defects for action
- Process robots — Saving manpower and standardizing work