

Data integration platform for highly efficient semiconductor production

Materiality3 Action Target2

Action Plan 3 Provide manufacturing and inspection solutions that enable highly efficient semiconductor production

Key words

Improvement and stabilization of industrial productivity

Advancement of digital society

Integration of customer data

SX/DX/GX

Seamlessly addressing semiconductor manufacturing challenges

Semiconductors are indispensable in our daily lives, as they are critical components in smartphones, PCs, home appliances, and automobiles as well as social infrastructure such as transportation and communications. To achieve a sustainable future, semiconductors are indispensable to support the digitalization of society, such as DX (digital transformation) to transform business by utilizing digital technology, and in GX (green transformation) to stem global climate change. As such, semiconductors are positioned as a key national strategy in many countries and regions, including Japan. In recent years, amid intensifying labor shortages in the manufacturing field, there is a growing demand for semiconductors that can process larger volumes of data at higher speeds, accelerate development, and reduce costs. This in turn has increased demand for their ability to address to various issues faced by manufacturing sites.

Hitachi High-Tech develops and provides digital solutions to improve its customers' productivity by using Observation, Measurement, and Analysis data obtained through such products as CD-SEMs using electron beam technology and wafer inspection systems using optical technology. We help our customers resolve issues in their semiconductor manufacturing processes and create new value.

Becoming a partner working closely with customers to improve productivity

Following the United States in 2023, Hitachi High-Tech established and started operation of new centers for co-creation with customers in Taiwan and South Korea. The establishment of these centers in the vicinity of customers not only enables quick issue resolution and value provision, but also reduces energy consumption and CO₂ emissions by reducing transportation and travel for development and evaluation.

The need for our Observation, Measurement, and Analysis technologies and knowledge is expanding in response to the increasing complexity of semiconductor manufacturing processes and the need to reduce greenhouse gas emissions and conserve resources. To address this need, in 2023 we began operating a digital platform called the Data Integration Platform, which seamlessly integrates and links data from Hitachi High-Tech's product groups, namely etching systems, CD-SEM*, optical inspection systems, and analysis to enable centralized management and utilization on a data integration platform.

The Data Integration Platform is currently in operation in the United States, Taiwan, and South Korea. We are striving to create and develop productivity improvement solutions seamlessly from development to mass production by integrating, linking, and visualizing various equipment data to the Data Integration Platform and implement and utilize analytical solutions.

Aiming to reduce development time by 50% and prototyping and mass production time by 80%

By utilizing the Data Integration Platform, we aim to reduce development time by 50% and prototyping and mass production time by 80% in FY2024, compared to the previous years. We are also developing solutions to optimize the platform structure and automate workflows to cope with the increasing volume of data. We will continue to promote the results of verification and improvement at our co-creation centers, and promote the introduction of the system in our customers' development and mass production lines.

In the future, we will also collaborate with our customers' various manufacturing, measurement, and inspection equipment, aiming to build a digital service ecosystem for the entire semiconductor manufacturing workflow, including processing, inspection, measurement, and analysis. Through such initiatives, Hitachi High-Tech will identify its customers' potential issues and promote sustainable semiconductor production, reduce environmental impact, and build secure networks.

* CD-SEM (Critical dimension-scanning electron microscope) is a type of scanning electron microscope (SEM). This equipment is especially specialized for dimensional measurement of fine patterns formed on wafers of semiconductors and the like and is mainly deployed in production lines for semiconductors and other electronic devices.

Providing seamless productivity improvement solutions from development to mass production

Development phase
Shorten development time for new products and processes

Tactical phase
Yield improvement of new products / processes

Mass production phase
Improve productivity of mass production line

Data analysis Data analytics

Data Integration Platform

Data collection

Equipment data

Measurement data

Inspection data

Analytics data

Etching equipment

CD-SEM

Optical inspection equipment

Analytical equipment

Conceptual diagram of data integration platform



Nanotechnology Innovation Center (Co-Creation Site)