



DX銘柄2024
Digital Transformation



JFE

JFE Group

2024 DX REPORT

Contributing to society with the world's most
innovative technology



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DX銘柄2024
Digital Transformation

JFE Holdings named DX Stock 2024

JFE Holdings was one of 25 of roughly 3,800 listed companies, and the only company in the iron and steel industry, selected as a Digital Transformation Stock 2024 (DX Stock 2024) by the Ministry of Economy, Trade and Industry, the Tokyo Stock Exchange, and the Information-technology Promotion Agency, Japan. Since being named a Competitive IT Strategy Company under a predecessor program launched in 2015, the Company has been selected nine* times.

*JFE Holdings was named a Noteworthy DX Company in 2023.



Selection record	2015	2016	2017	2018	2019	2020	2021	2023	2024
DX銘柄 Digital Transformation	●	●	●	●	●	●	●		●
DX注目企業 Digital Transformation	(Program not in existence)							●	

* Names prior to 2020: Competitive IT Strategy Company and Noteworthy IT Strategy Company

Disclaimer

Current plans, strategies, beliefs, and other content described in this report that are not historical facts are forward-looking statements that may involve risks and uncertainties. Actual results, performance, or achievements could differ significantly from the anticipated outcomes presented in this report due to various factors, including changes in the global or domestic economy, as well as unanticipated trends in the industries to which JFE Group companies belong. Readers should understand that JFE Holdings cannot guarantee the certainty of such forward-looking statements.

Providing new value for a sustainable society as a top runner in DX promotion

This is the final year of the Seventh Medium-term Business Plan, formulated in fiscal 2021. To be essential to society's sustainable development and to create safe, comfortable lives for people everywhere, the JFE Group as a whole has implemented a digital transformation (DX) promotion strategy as one of our important management strategies to enhance corporate value. Under the Eighth Medium-term Business Plan, which will take effect from next fiscal year, we will further pursue DX as a core strategy for strengthening our business competitiveness.

The huge amounts of data and expertise accumulated over many years by our steel business, engineering business, and trading business are the JFE Group's greatest strength in DX promotion. These valuable assets, which other companies cannot easily replicate, are the source of our value creation to support society with a top level of technology globally. By integrating these intangible assets with leading technologies including artificial intelligence (AI), the Internet of Things (IoT), and data science, we are using our existing CPS*¹ and GRC*² digital platforms and core technologies to create a wide range of products.

Our DX-related business is growing every year.

We are also working Groupwide to address the risks of increasingly sophisticated cyberattacks and information leakage, primarily through JFE-SIRT*³, and established a new security-related company this fiscal year.

This report introduces the specifics of these measures. We hope that readers will find this information useful for providing a better understanding of the JFE Group's DX policies.



Toshihiro Tanaka

Senior Vice President
JFE Holdings, Inc.

*1 CPS: Cyber Physical System (please refer to the Steel Business on page 7)

*2 GRC: Global Remote Center (a remote monitoring center at JFE Engineering's Yokohama head office)

*3 JFE-SIRT: JFE Security Integration and Response Team (please refer to Security Management on page 17)

JFE Group's DX Strategy

Initiatives under the Seventh Medium-term Business Plan (FY2021–24)

- ▶ Aggressive DX to lead to improving earnings power, realizing growth strategy, and advancing business model
- ▶ DX investments : ¥120 billion over four years
⇒Fiscal 2021–23 results
83% of investments selected

Strategy for Each Business

JFE Steel

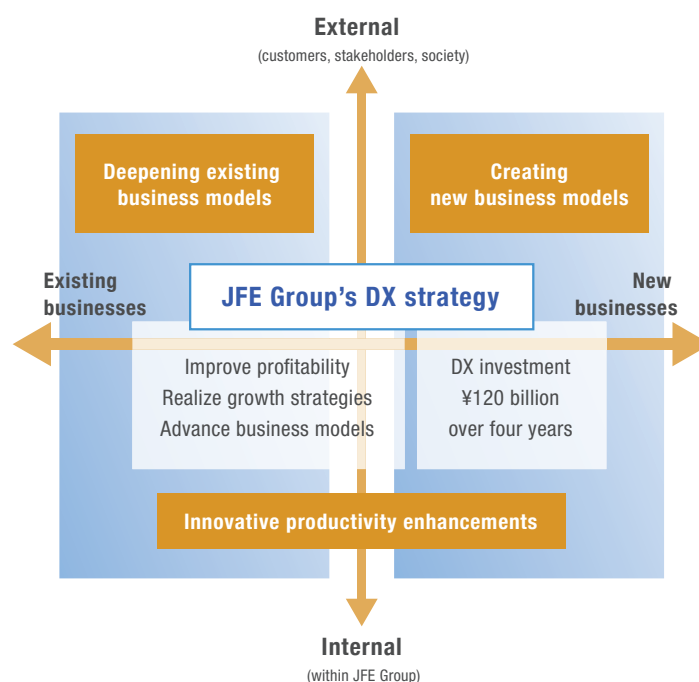
Establish competitive advantage through advanced use of data

JFE Engineering

Implement sweeping business reforms with further data utilization and provide digital services

JFE Shoji

Create businesses through external sales and intra-Group utilization of DX solutions



Source: Created by the Company based on "DX Stock Selection 2023 Report,"
Secretariat of DX Survey, Ministry of Economy, Trade and Industry

JFE Group's Initiatives Using DX to Address Social Issues

The JFE Group is using DX to resolve social issues in various ways by maximizing the Group's technological capabilities. The following section introduces some of the initiatives being carried out internally, including efforts to develop and secure DX human resources.



Addressing the challenge of the “2025 Digital Cliff”

Moving away from huge host computers

Necessity of upgrading systems at steelworks

Since the late 1960s, Japan's steel industry has been a leader in the industrial sector through the introduction of large, general-use computers (mainframes and host computers), beginning with the automation of administrative processing and expanding to the automation of factory operations, the quality enhancement of steel products, and increased efficiency in factory administration. The Internet did not exist at that time, and companies had to develop in-house many features including special structures and languages of computers and ways of linking equipment. As a result of rapid advances in computer technology, approaches like high-performance servers and, more recently, cloud computing have come to the forefront. Today, mainframe computers can be seen as a classic antiquated system.

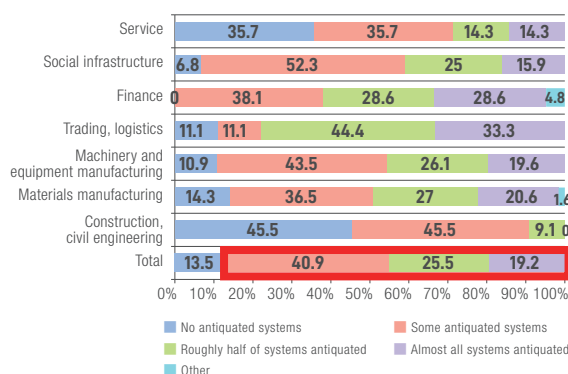
The Ministry of Economy, Trade and Industry published its “DX Report: Overcoming ‘2025 Digital Cliff’ Involving IT Systems and Full-fledged Development of Efforts for DX” in 2018. This report sounded an alarm, stating that roughly 80% of companies' computer systems were antiquated and that ignoring the problem would impede carrying out management and business strategies. The report said that for companies to grow, it would be imperative to review these antiquated systems, adopt the latest digital technologies, and effectively use the data they possessed.

JFE Steel was no exception to the ministry's claim. Various steelworks and their operations use one giant computer system. To avoid the 2025 Digital Cliff, we need to resolve to upgrade these systems.

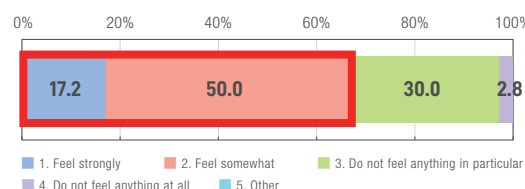
Progress on system upgrades at steelworks

JFE Steel is upgrading its mission-critical systems at all steelworks and manufacturing centers. The Kurashiki district's shaped steel area has been replacing its proprietary mainframe computer system in stages (since May 2023) with a system built with standard specifications. The conversion for shipping areas for steel sheets, electrical steel sheets, and all other products was completed in August 2024, marking the migration of more than half of the Kurashiki district's mission-critical system (approximately 50 million steps) to an open platform environment. A large, integrated steelworks like the Kurashiki district occupies a wide area with many types of integrated equipment for tasks

Roughly 80% of companies' computer systems antiquated



Antiquated systems appear to impede DX at roughly 70% of companies



Source: Created by JFE Steel and based on the Ministry of Economy, Trade and Industry's “DX Report: Overcoming ‘2025 Digital Cliff’ Involving IT Systems and Full-fledged Development of Efforts for DX”



Photograph taken at the West Japan Works (Kurashiki district) during the migration in August 2024

ranging from the receipt and storage of raw materials to manufacturing processes like ironmaking, steel manufacturing, and rolling, to the shipment of final products. Because some systems needed to be temporarily stopped for the migration to an open platform environment, the migration to the new environment had to be carried out within a limited time so that the manufacturing processes would not be halted for an extended period. The entire steelworks and all project members, including staff from JFE Systems, successfully migrated roughly 20 million steps during a planned plant idling of only 18 hours. The upgrade for the entire Kurashiki district continues, with the aim of completion by the end of fiscal 2024. Migrations have been finished at the Sendai Works and Chita Works, and are being carried out in parallel at other districts. We plan to complete the migration of the roughly 200 million steps for the mission-critical systems at all steelworks and manufacturing centers during fiscal 2025.

We are striving to further enhance corporate value by proactively utilizing our wealth of data assets by applying the latest data science and AI, aiming for innovative productivity increases and stable operations. We also intend to support many other companies dealing with the 2025 Digital Cliff national crisis by providing expertise to help resolve this social issue.



I have been working at steelworks for many years. I am embarrassed to say that before I started this job, I did not know that every steelworks operated with huge computer systems bigger than those at major banks and that the computers themselves were already outdated.

At the same time, we have spent many years feeding various types of manufacturing expertise into computers, including data for product quality improvement, automation in various areas, and improved efficiency. The expertise we have amassed is very important and needs to be passed on. We must also avoid having antiquated systems become an obstacle to innovation. These upgrades need to be successfully completed to pass on this globally advanced technology and make further progress.

Many companies and organizations have begun consulting with us. We hope to share the experience of our success so that society as a whole can avoid the 2025 Digital Cliff.



Keiichiro Nishi
Managing Executive Officer
General Manager,
Business Process Innovation Team

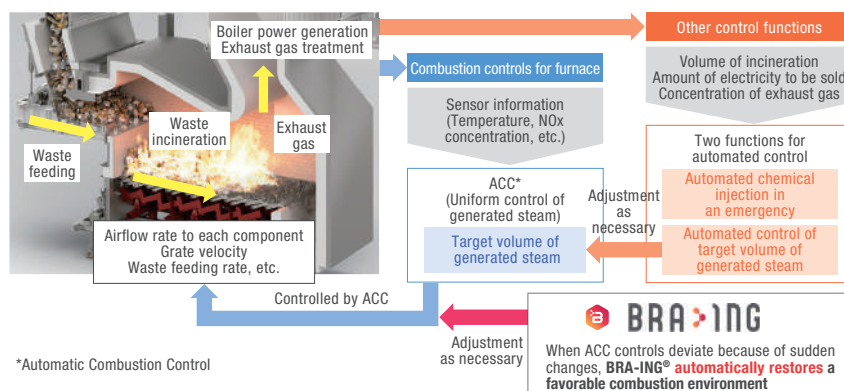


Responding to decrease in working-age population and reducing environmental impact

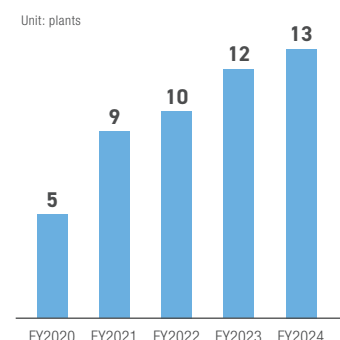
“BRA-ING®” AI system for automated operations of waste-to-energy plants

With the contraction of the working-age population due to the aging of society, the industrial plant sector is facing a serious shortage of plant operators. JFE Engineering is continuously developing technologies to fully automate waste-to-energy plants. As part of this development, along with the increased sophistication of the existing automatic combustion control (ACC) function, we have developed and are introducing the BRA-ING® automated operation AI system for incinerators. The stable combustion achieved with automated operation raises the energy recovery rate, reducing the wasting of resources while alleviating the environmental impact by cutting CO₂ and other exhaust gas emissions. This technology has been introduced at 13 waste-to-energy plants across Japan over the five years since 2020.

The introduction of digital technologies at infrastructure facilities will continue to contribute to resolving social issues including the decrease in the working-age population and environmental considerations.



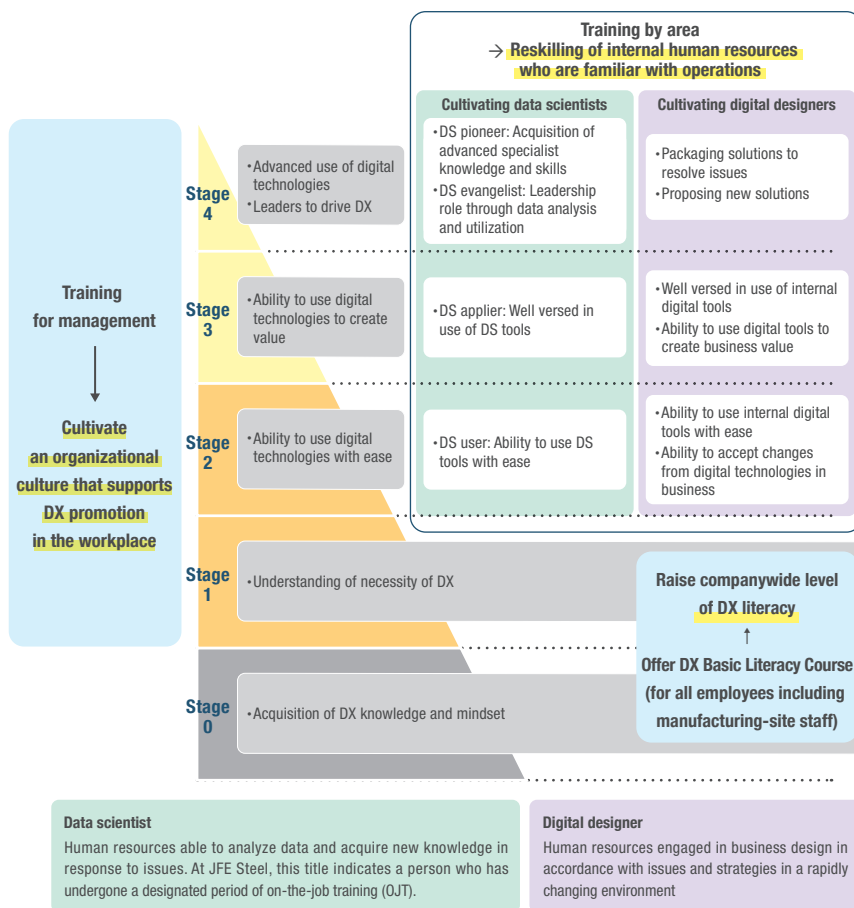
Number of BRA-ING® installations



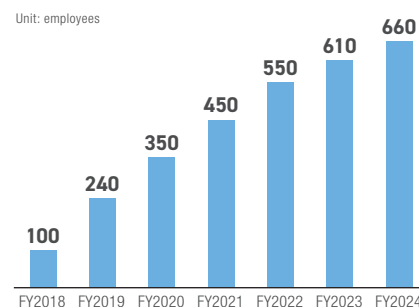


JFE Steel provides educational curricula to encourage all employees to take ownership of DX and actively participate. The DX Literacy Course raises the level of DX literacy among all employees, and training for management including officers aims to cultivate an organizational atmosphere that facilitates the pursuit of new challenges.

By the end of fiscal 2024, we plan to have developed more than 600 people in the data scientist category and more than 600 people in the digital designer category as core DX human resources.

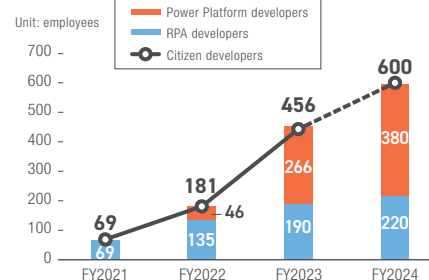


Number of data scientists trained



Number of citizen developers

Citizen development: Application development by operational division staff rather than IT specialist staff



DX achievements presentation

In addition to developing human resources, we hold a companywide DX achievements presentation to foster a culture in which all employees at all divisions pursue challenges. Replacing the presentation of data science dissertations that had taken place since 2019, this event was held for the 10th time in December 2024 with the scope of submissions expanded to employees in operational divisions at the head office and steelworks. The main location, the head office, was connected remotely to various steelworks and manufacturing centers via Teams, an internal network, and more than 700 people including the president and officers participated.

Ten presentations were made from manufacturing process areas and operational process areas, with an award given to the presentation recognized as particularly excellent from various considerations including logic, innovation, and potential.



JFE Engineering has designated the development and adoption of human resources and reformation of the organizational culture to create a foundation for DX promotion as important issues and is working to create an environment in which all employees proactively engage in DX. Specifically, we are implementing various measures based on three themes: “cultivating a mindset,” “developing human resources,” and “disseminating and sharing information.” The company also provides opportunities for employees to progress on their own initiative in a broad range of areas in addition to DX, including support for obtaining accreditations, e-learning, and various training courses.

	Objectives	Main measures
Cultivating a mindset	<ul style="list-style-type: none"> Understand the necessity of DX and take ownership of it Create motivation to implement reform on one's own 	<ul style="list-style-type: none"> Internal event “DX Day!!” CEO award
Developing human resources	<ul style="list-style-type: none"> Raise DX literacy among all employees Develop specialized skills and know-how for DX promotion 	<ul style="list-style-type: none"> DX literacy training Level-specific DX training Data scientist training AI/IoT Specialist Technology Group
Disseminating and sharing information	<ul style="list-style-type: none"> Share information across divisions Promote DX initiatives to students and potential employees 	<ul style="list-style-type: none"> DX Information Portal (internal) DX special website (external)

Internal event “DX Day!!”

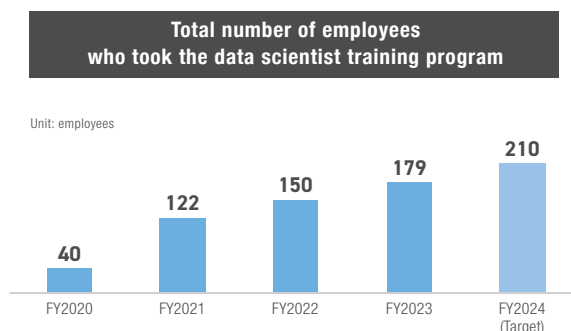
“DX Day!!” is held once a year to cultivate a mindset for companywide DX promotion and to raise the level of digital knowledge. The fiscal 2024 event was held over two days with roughly 3,000 participants including the CEO and executives. The event included the sharing of DX initiatives being carried out by internal divisions, hands-on digital technology and solutions experiences, presentations by experts, and seminars on using digital tools. Through these kinds of activities, we aim to have every employee feel a sense of ownership for DX and to cultivate an organizational culture in which employees will proactively address issues.



Data scientist training

Providing practical training, Pla'cello®—data analytics platform developed to effectively utilize data collected from plants—currently has more than 2,200 employee users.

We have also developed an internal data scientist training program with a curriculum comprising 17 classes over 120 hours to allow employees to acquire specialist data science knowledge. We aim to have a total of 210 employees take the course by the end of fiscal 2024.



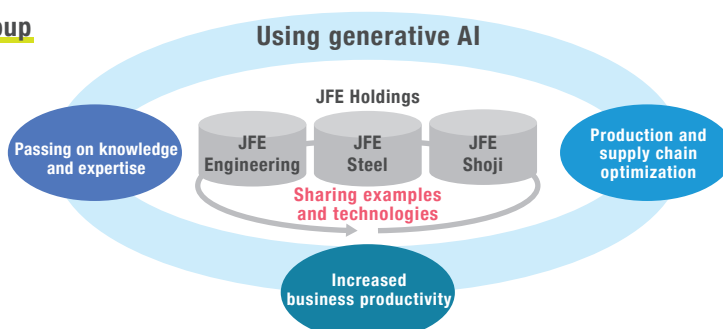
Generative AI

Promoting the use of generative AI in the JFE Group

The JFE Group is sharing examples of operational applications and technologies related to generative AI to promote its effective use.

Please refer to the following pages regarding initiatives being carried out at operating companies.

Page 10, Steel Business; Page 12, Engineering Business; Page 15, Trading Business



JFE Steel is proactively implementing various measures to transform existing businesses, make innovative improvements in productivity, and create new businesses, to establish a competitive advantage that maximizes the wealth of data we have collected over many years.

In April 2024, we launched the DX Strategy Headquarters, which integrates the information technology (IT) and operational technology (OT) fields to accelerate DX across the entire digital field.

We plan to complete mission-critical system upgrades at all steelworks and manufacturing centers by the end of fiscal 2025. We are building a cyber-physical systems (CPS) platform to efficiently promote CPS for manufacturing processes and develop applications for its use. Steady progress is also being made at the solutions business, including moving to the verification testing stage for blast furnace CPS.

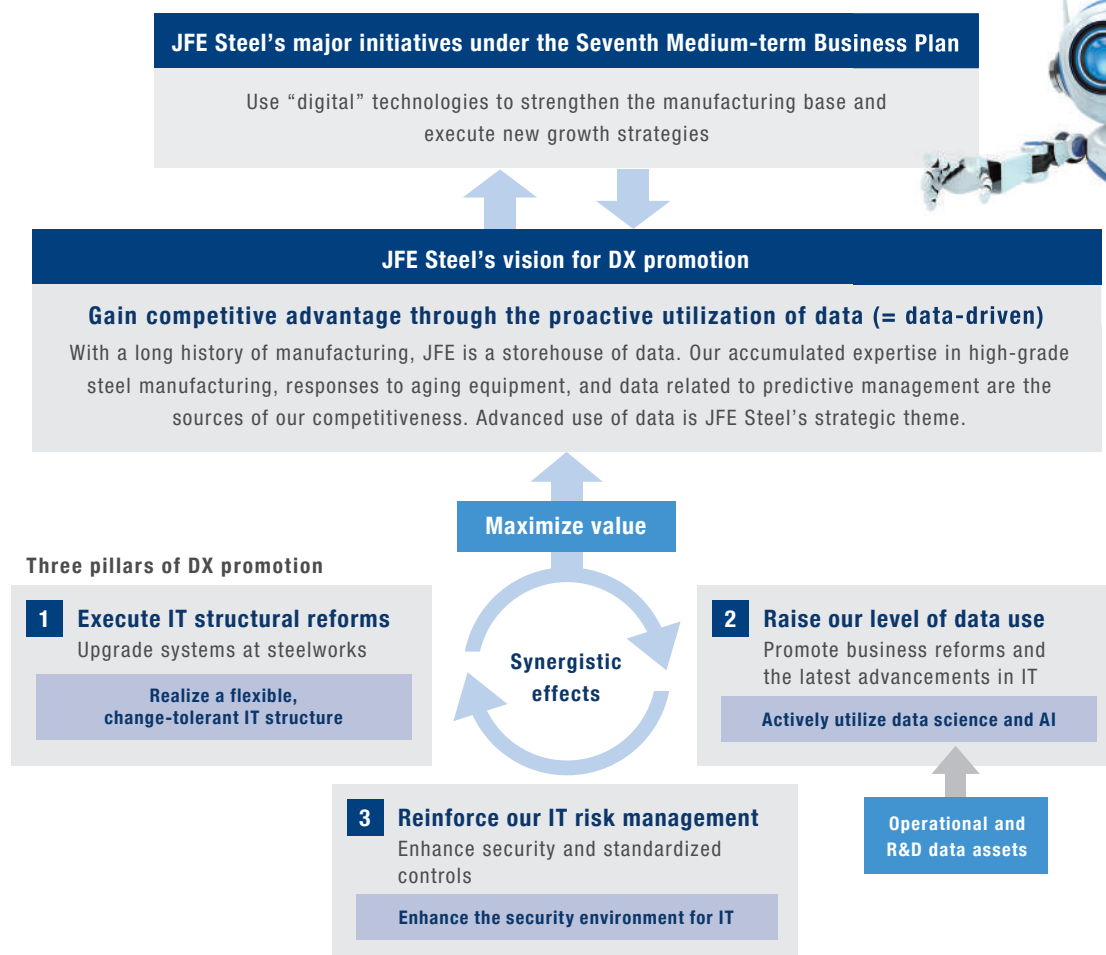
Under the Seventh Medium-term Business Plan, we have invested 115 billion yen in DX, aiming for a 30 billion yen improvement in earnings. Investment approval is on track relative to the plan, and we expect to achieve this improvement in earnings.



Akira Nitta
Senior Vice President
(General Manager of DX Strategy, in charge of cybersecurity department)

DX Strategy >>>

The main pillars of JFE Steel's DX are the introduction of technologies like the Internet of things (IoT), artificial intelligence (AI), and data science (DS) for gaining a competitive advantage by proactively utilizing data (= data-driven). Our accumulated expertise in high-grade steel manufacturing, responses to aging equipment, and data related to predictive management are the sources of our competitiveness, as we make advanced use of data—one of JFE Steel's important strategies. We are pursuing DX with three main areas of emphasis—"raise our level of data use" mentioned above, "execute IT structural reforms," and "reinforce our IT risk management."



Establishment of DX Strategy Headquarters

In April 2024, we established the DX Strategy Headquarters, comprising the Digital Transformation Planning Department, Digitalization Leading Department, Intelligent Technology Development Department, and Smart Factory Leading Department, to integrate the IT and OT fields and formulate a medium- to long-term strategy for the entire digital field, as a way to take an integrated approach to promoting technological development, Companywide development, construction, maintenance, and human resource development.

DX Strategy Headquarters 	Digital Transformation Planning Dept.	<ul style="list-style-type: none"> DX strategy planning and formulation DX budget acquisition, allocation, management DX-related product development and support for external sales
	Digitalization Leading Dept.	<ul style="list-style-type: none"> Planning and promotion of Companywide operational reforms Efficient implementation of core DX strategy Standardization of IT-related technologies
	Intelligent Technology Development Dept. (in cooperation with the CPS R&D Dept.)	<ul style="list-style-type: none"> Companywide development of cutting-edge intelligent technologies Agile development and improvement of models Standardization of intelligent technologies
	Smart Factory Leading Dept. Automation Engineering Sec., Iron & Steelmaking Sec., Rolling Sec.	<ul style="list-style-type: none"> Planning and promotion of Companywide conversion to smart factories Packaging of technologies and efficient implementation Standardization of smart factory technologies

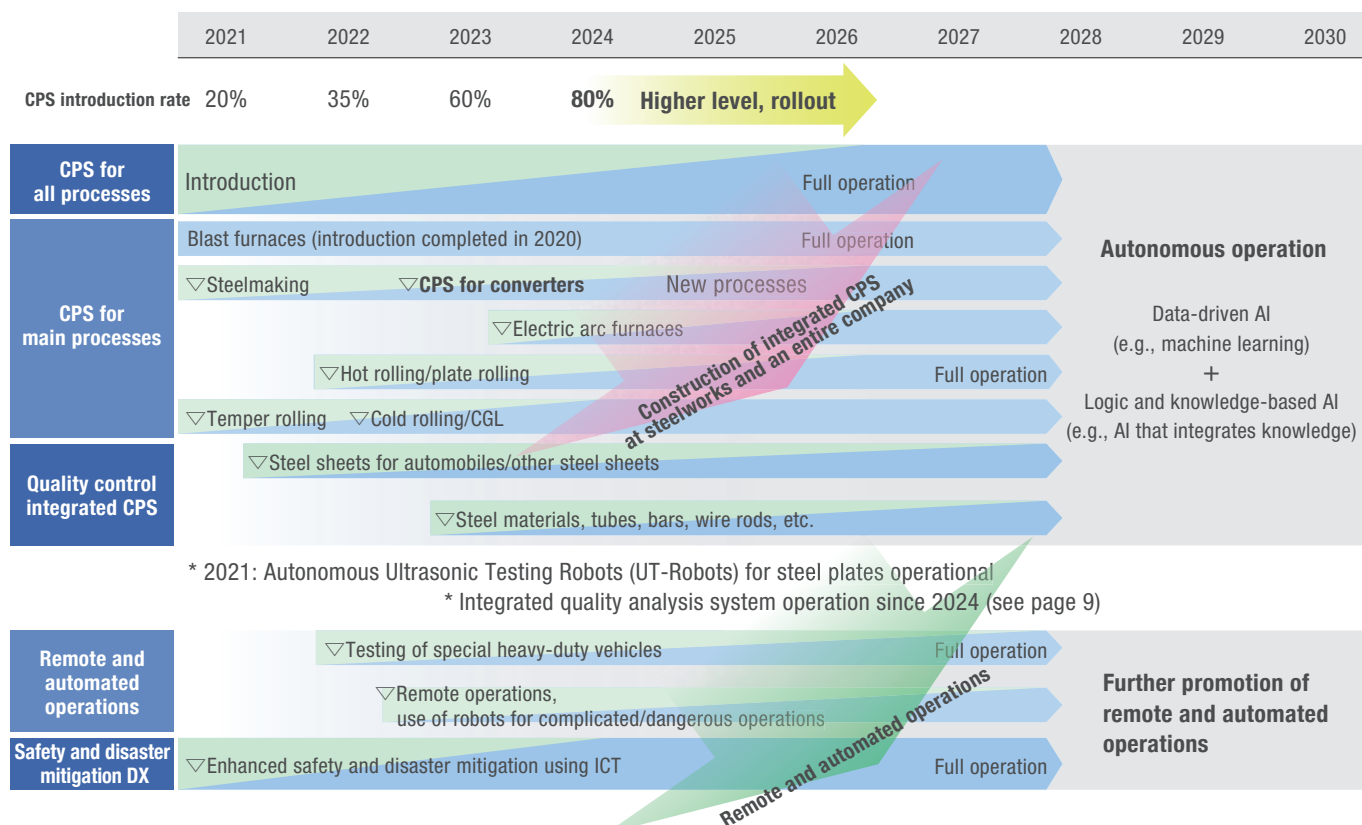
A DX achievements presentation is held (semiannually) and a (quarterly) Strategy Headquarters report and (monthly) DX NEWS LETTER are issued to share information within JFE Steel. We also offer DX literacy training and training for data scientists and “citizen developers.”

Introducing CPS for all processes and making operations remote

Technological development roadmap and current status

(forecast at the end of FY2024)

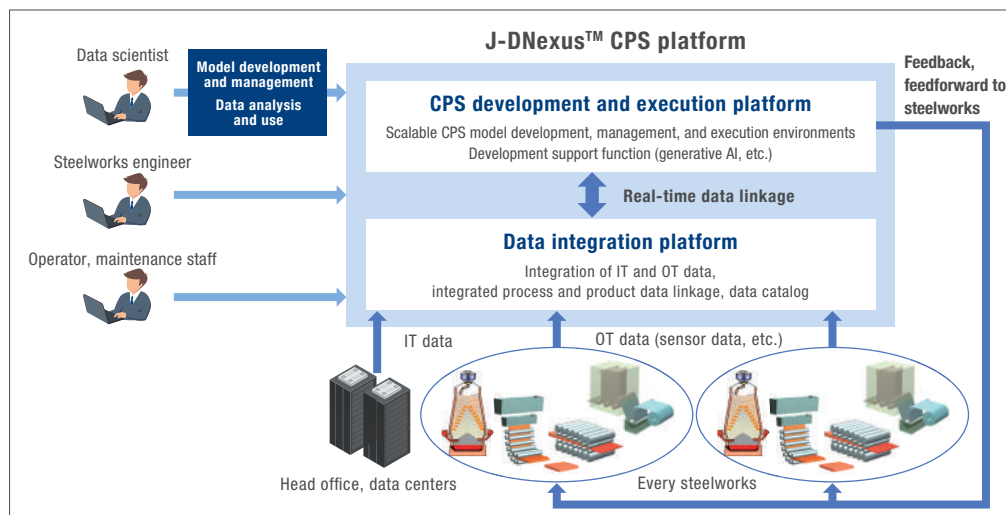
- ▶ **CPS introduced for all processes:** Operation of the J-astquad® integrated quality analysis system
- ▶ **Remote and automated operations:** Using robots for testing, cleaning, and grinding



J-DNexus™ CPS platform

Together with JFE Systems, JFE Steel has built and begun operating the J-DNexus™ platform, which integrates production results, product quality data, and other information from the IT field with sensor and other operational data from the OT field, allowing for centralized, cloud-based CPS development and execution. The platform makes it possible to introduce CPS for manufacturing processes that have greater accuracy and speed. Verification testing to date has confirmed that this will allow a reduction in the time required to build a CPS system roughly 30% compared with the previous method.

This data integration is the global steel industry's first use of the Cognite Data Fusion® platform of Norwegian company Cognite, which allows integration of IT data with OT data. Development support functions that include generative AI are also being prepared in the CPS development and execution platform.



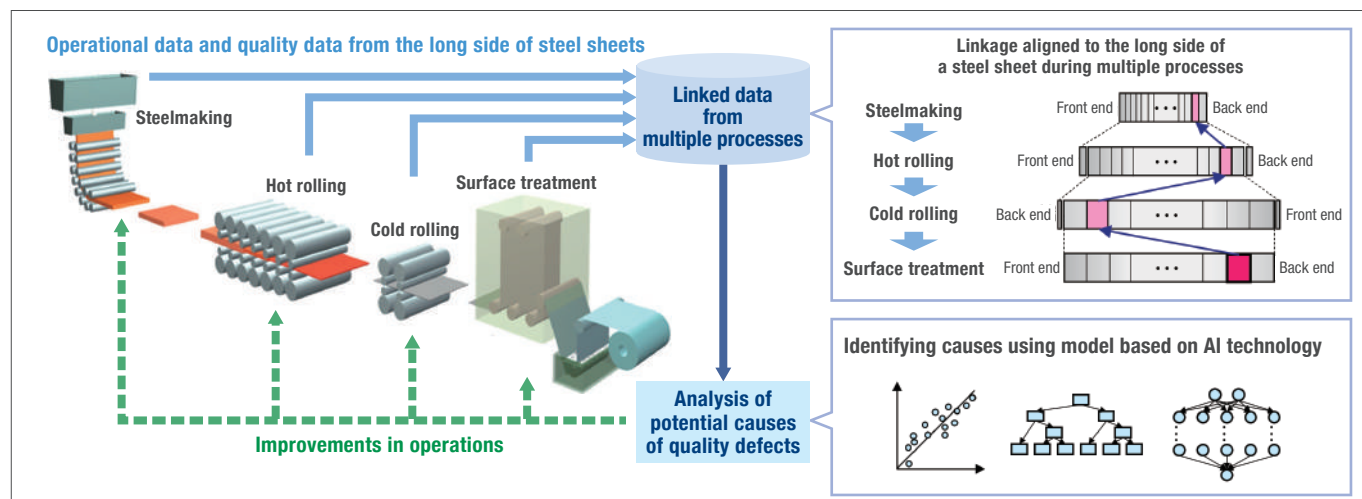
J-DNexus™ conceptual diagram

J-astquad® multiprocess integrated quality data analysis system

JFE Steel's DX strategy aims to use CPS to achieve intelligent steelworks at all its steelworks. One of the main achievements of this fiscal year has been the creation and implementation of the J-astquad® multiprocess integrated quality data analysis system as a framework for analyzing the effects of operations on the quality of automotive-use thin steel sheets by using operational data and quality data collected from manufacturing processes. This is a DX core technology for quality control operations in thin steel sheet manufacturing, with the aim of stable manufacturing of automotive-use thin steel sheets.

J-astquad® automatically collects a considerable amount of sensor data including operational data and quality data that fluctuates along the long side of steel sheets during multiple processes such as steelmaking, hot rolling, cold rolling, and surface treatment procedures. Factors including changes in the length of the sheet from rolling, reversals of the long side of the sheet during each process, and the treatment of the end where the sheet is cut off are taken into account. That data is then combined with data from the subdivided position of the long side of the steel sheet to create linked data from multiple processes, making it possible to analyze the cause of quality defects.

In the data analysis, the use of models based on AI technologies allows identification of potential operational conditions that may cause a quality defect. J-astquad® quickly carries out tasks ranging from collecting, linking, and analyzing large amounts of data to identifying possible causes of quality defects and improving operations, leading to a reduction in the rate at which quality defects occur.



J-astquad® multiprocess integrated quality data analysis system

Developing a solutions business

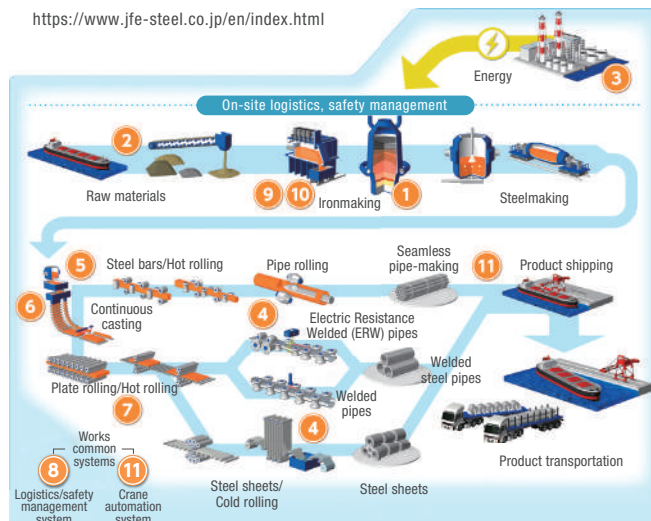
As part of our DX promotion, JFE Steel is developing the JFE Resolus™ business, which uses technologies developed in-house and our expertise in operational improvement to provide solutions to customers, with the aim of achieving innovative, highly productive, and stable operations.

We will look beyond the steel industry and proactively offer the product to customers in a wide range of manufacturing industries. By also proposing specially selected technologies developed by JFE Group companies, the Group as a whole is working closely together to provide customers optimal solution packages.

- | | |
|--|--|
| 1 Intelligent Blast Furnace Operation Support System | 7 Autonomous Ultrasonic Testing Robot (UT-Robot) for Inspecting Steel Plates |
| 2 Raw Material Related Technology | 8 Safety Monitoring System |
| 3 Energy Optimization Guidance System | 9 Self-Propelled Cleaning Robot for Harsh Conditions |
| 4 Deep Learning for Automatic Shape Control System | 10 Coke Particle Size Distribution Measurement System |
| 5 Breakout (BO) Prediction System | 11 Crane Automation System |
| 6 Breakout (BO) Detection System | |

Data science areas: Technology map

<https://www.jfe-steel.co.jp/en/index.html>

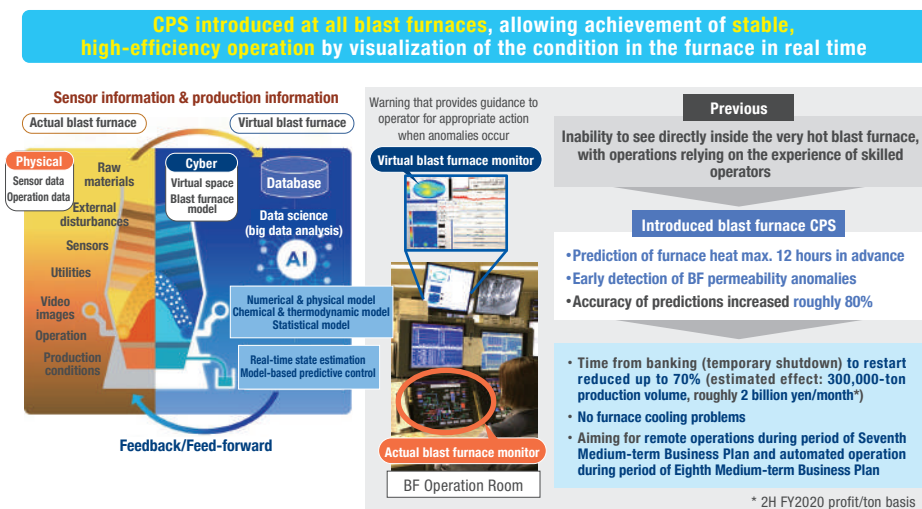


Start of demonstration testing of blast furnace CPS at JSW steelworks in India

JSW Steel Limited ("JSW") and JFE Steel have begun installing, testing, and operating a blast furnace cyber-physical system ("blast furnace CPS"), a cloud-based data science technology for blast furnaces, at the No. 4 blast furnace in the JSW Vijayanagar Works. This is a groundbreaking project that will use data science technologies in a cloud environment at a JSW steelworks, with issues like data security being resolved cooperatively by the two companies.

A blast furnace CPS makes it possible to visualize the inside of a blast furnace and make estimations, detect anomalies,

control the hot metal temperature, and make gas-channeling predictions. In addition to preventing major problems inside the blast furnace, CPS achieves highly efficient, stable operation and contributes to reducing CO₂ emissions. Using the successes we have achieved applying blast furnace CPS at our own steelworks, we are building this system for JSW, a leader in the proactive introduction and construction of cutting-edge technologies, as the first model to be provided overseas.

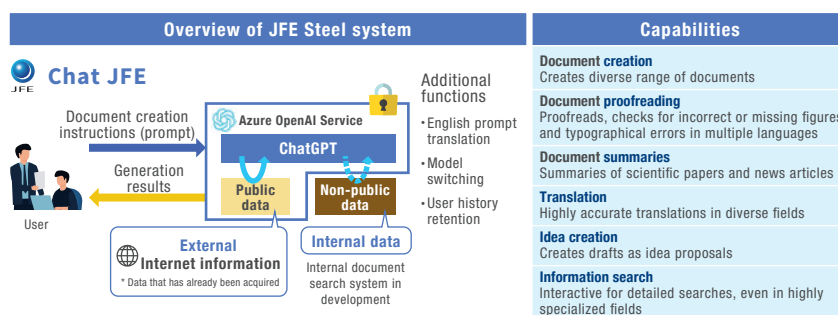


Innovative increases in productivity using generative AI

JFE Steel is applying generative AI in operations to increase innovative productivity.

We have been building our proprietary Chat JFE generative AI service, based on Microsoft's Azure OpenAI service since fiscal 2023, together with security measures and user guidelines, and have achieved an environment in which all employees are able to use the service.

More than 2,000 employees currently use this service. We are developing measures, including through the introduction of other tools, to help employees become more familiar with generative AI. Going forward, we will use Chat JFE's generative AI as a foundation to build an internal document search system to effectively use the data and expertise that we have accumulated through our businesses to date.



DX is an important growth engine for the innovation and acceleration of JFE Engineering's business. By introducing digital technologies including AI and IoT, we are boosting business productivity while using our data from many years of infrastructure construction and operations to transform the engineering business model through more advanced decision-making.

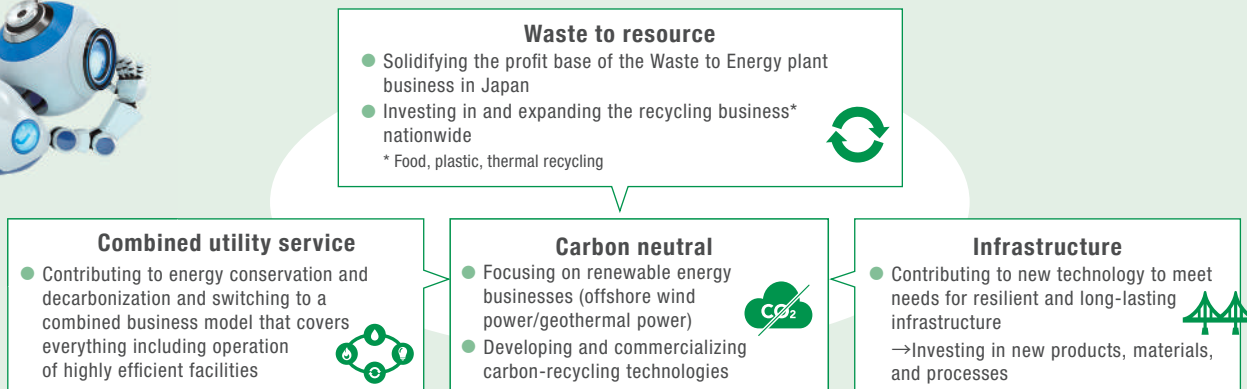
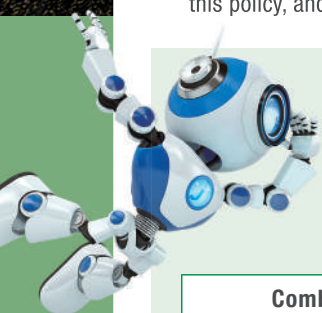
The strength of "people" is indispensable for DX to succeed. We are providing training that promotes self-growth by raising all employees' digital literacy and ability to identify issues, while aiming for a continuously innovative corporate climate that creates workplaces where employees can make maximum use of their abilities.



Tateki Koyama
Managing Director
(Senior Managing Director of
DX Headquarters Sector)

DX Strategy and Policy >>>

The Seventh Medium-term Business Plan designates four priority areas: Waste to resource; Combined utility service; Infrastructure; and Carbon neutral, and a policy for business expansion. We believe that digital transformation is essential for the achievement of this policy, and have positioned DX as an important initiative to support all business areas.

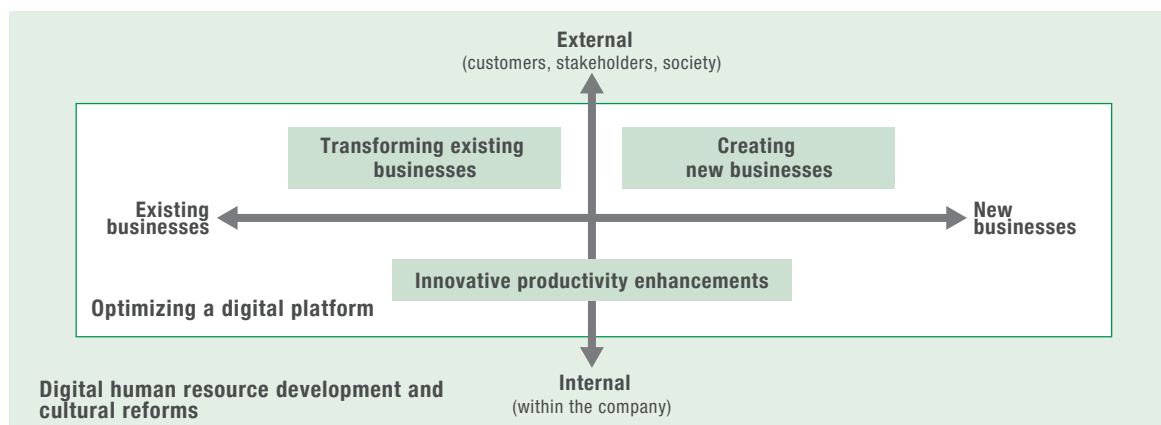


DX

Accelerating achievement of SDGs with DX



To accelerate these initiatives, we established a DX Headquarters in fiscal 2022. The DX Headquarters comprises IT engineers who build and maintain the internal IT environment and provide cloud platforms, data scientists who analyze data, control system engineers who implement data-collecting functions and new functions using AI in our products at plants, and DX promoters who work together with business divisions to push DX themes forward. We are working toward the "transformation of existing businesses," "creation of new businesses," and "innovative productivity enhancements," while emphasizing "digital human resource development and cultural reforms" and "optimizing a digital platform" to create an environment for DX promotion.



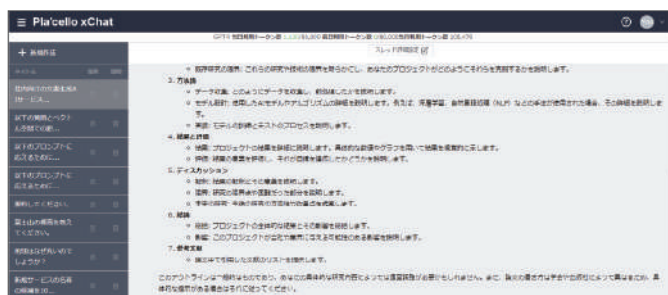
Using generative AI for innovative improvements in productivity

JFE Engineering has been utilizing generative AI since the release of Pla'cello xChat®, text generative AI service for internal use, in September 2023. Regarding generative AI as a key technology for improvement in business operations, we have established an internal working group engaged in the following three activities for practical use of generative AI:

- Providing an environment for safe and easy use of generative AI**
 We have internally developed and provide Pla'cello xChat® and APIs for development of internal systems. With Microsoft's Azure OpenAI and Amazon Web Services' Amazon Bedrock, all employees can easily use generative AI to create documents without worrying about leaks of confidential information or personal data. Additionally, the usage guidelines inform users of important considerations when using generative AI to prevent the infringement of intellectual property rights and the generation of false information.
- Technical exploration to leverage generative AI for improvement of business operations**
 We are working to improve business operations using generative AI while incorporating user requests. We aim at establishing technologies for using generative AI in a variety of domains, such as developing chatbots to respond to inquiries about internal information including company policies and regulations.
- Promotion of daily use of generative AI in business operations through introduction of its useful tips**
 We are promoting the daily use of generative AI by showcasing use cases on the dedicated portal site and holding workshops including hands-on training for business divisions and branch offices. As of December 2024, over 1,600 employees—approximately 45% of all employees—were regularly using Pla'cello xChat® in daily work.

The scope of application in actual business operations is expanding. By combining generative AI with conventional OCR* technologies to **extract data from documents such as quotations and specifications, we successfully reduced the workload for comparing documents by 70%.** We also expect more effective utilization of underutilized documents including equipment specification sheets and manuals. Going forward, we aim to expand these benefits by linking to Pla'cello®, internal data analysis platform, and implementing multimodal capabilities that include images and videos.

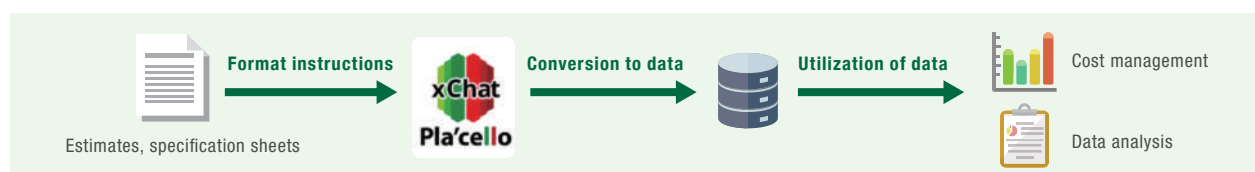
* OCR (Optical Character Recognition): Technology that recognizes text portions of image data and converts it to text data



Screenshot of Pla'cello xChat®



Workshop at a branch



AI-OCR extracts data from estimates and specification sheets.

Winner of 42nd Information Technology Award (transformation category)



JFE Engineering was selected as a recipient of a Fiscal 2024 (42nd) Information Technology Award (transformation category) by the Japan Institute of Information Technology.

We were recognized for our various initiatives toward institutionalized reformation, including business transformation, increased efficiency in operations, and creation of an IT/DX platform, initiatives that have continued to steadily produce results.



JFE Engineering dedicated DX website



We have set up an official dedicated website to introduce DX initiatives. Please visit the site, which includes a message from the CEO and introductions to our DX strategy, solutions, and latest initiatives.



The site can be accessed via the URL below or QR code.

<https://www.jfe-eng.co.jp/dx/en/>

Initiatives to transform existing businesses

Using DX to improve efficiency in design operations for overseas bridge construction

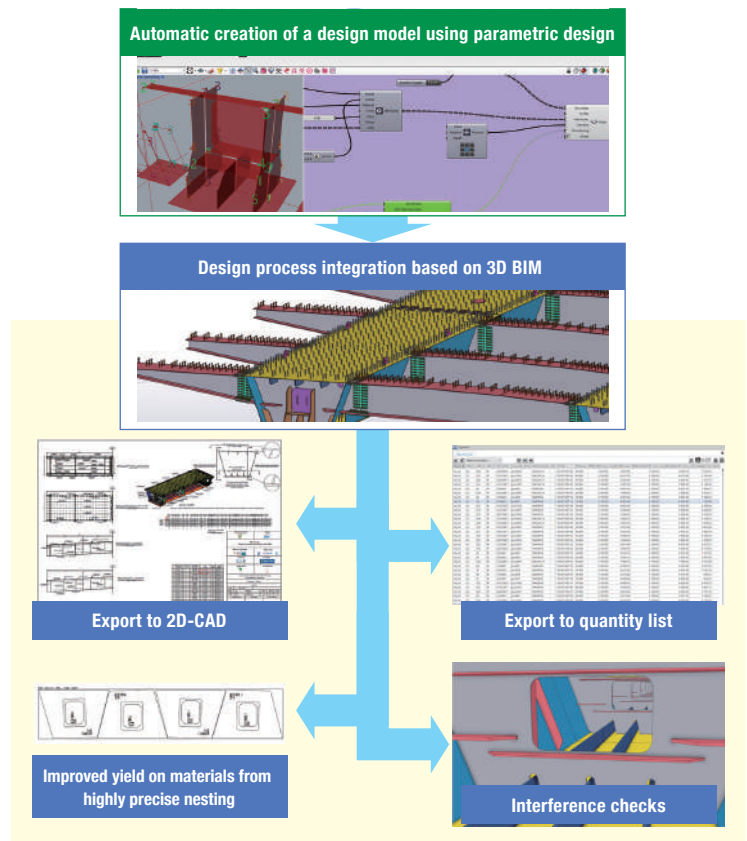
JFE Engineering is promoting DX in a design process using BIM*¹ with the aims of increasing efficiency in design operations in projects and strengthening our international competitiveness.

Using a three-dimensional model creation tool's no-code programming function, we have achieved a parametric design*² method with a BIM system in overseas bridge construction. Applying this technology in overseas bridge construction projects makes it possible to put design information previously managed in duplicate in two-dimensional diagrams and the three-dimensional models by BIM into a single BIM system, significantly increasing operational efficiency. In addition, using the data of accurate parts and material shapes taken from BIM to order materials has improved the yield on materials to 89% from 85% and reduced both costs and CO₂ emissions.

Going forward, we aim to develop this technology for other processes beyond the design area and use BIM across the entire project life cycle to achieve more creative and efficient operational processes.

*¹ BIM (Building Information Modeling): A method of centrally managing a structure's shape and attributes in a three-dimensional model for use in design, installation, and operation

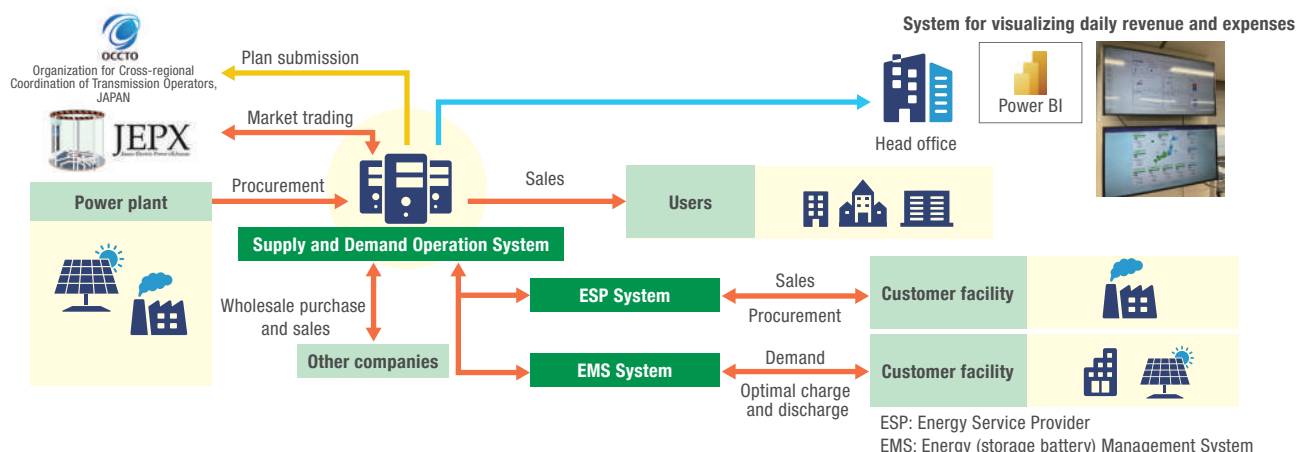
*² Parametric design: A design method that automatically creates shapes by defining dimensions as variables in 3D-CAD



Energy management systems in the electric power business

JFE Engineering has developed and operates a system in which electric power generated at renewable energy power plants built by the company or procured from other companies is provided to retail customers. The Supply and Demand Operation System automatically creates and provides plans to maximize profit by taking into account the balance between customers' electricity demand and supply. The ESP System minimizes electricity generation and procurement costs in an integrated, multi-site energy network service that provides electricity and heat (steam and hot water) to customers' multiple plant locations. The EMS System controls the charging and discharging of electricity to and from a storage battery within the customer's plant to offset spikes in usage during peak hours and predicts solar power generation volumes to optimize charge and discharge plans for storage batteries installed in solar systems. By maximizing usage of digital technologies, we are refining these systems and linking their operation both to use energy more efficiently and to strengthen business competitiveness.

We are also building an environment that makes it possible to calculate revenue and expenses from transaction data collected by the Supply and Demand Operation System and to confirm on a dashboard daily revenue and expenses at the retail electricity business. Displaying this data on large monitors in the head office will raise awareness of profitability among all employees and maximize business performance.

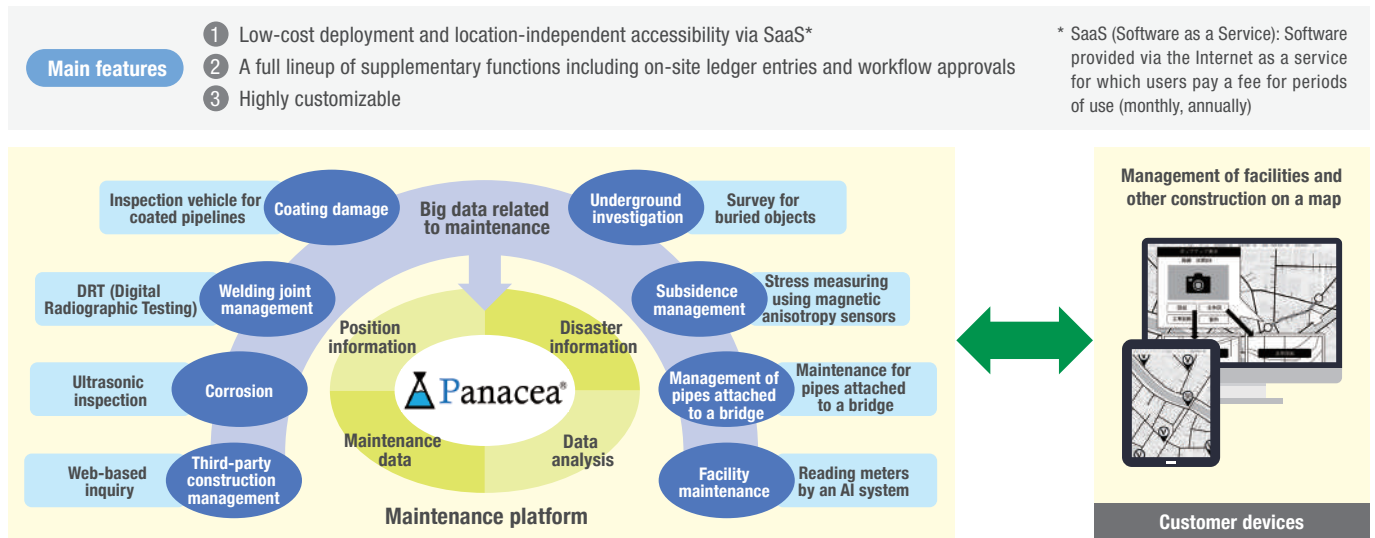


Creating new businesses

Expanding scope of pipeline maintenance management using Panacea® pipeline and facility maintenance and inspection system

Pipelines buried under public roads are distributed over a wide area, and their maintenance involves a huge amount of information. Maintenance was previously managed with paper documents, but papers could become scattered or lost and needed information could not quickly be retrieved.

JFE Engineering is addressing this issue by providing the Panacea® mapping system with location and maintenance information to pipeline operators. The system is a cloud service for the efficient maintenance of facilities like gas pipelines and water pipelines. Interfacing with a map allows the positional relationship between facilities and related information to be understood visually, documents accessed quickly, and the affected area of a disaster identified. The system contributes to improving operational efficiency and facility maintenance for infrastructure operators.



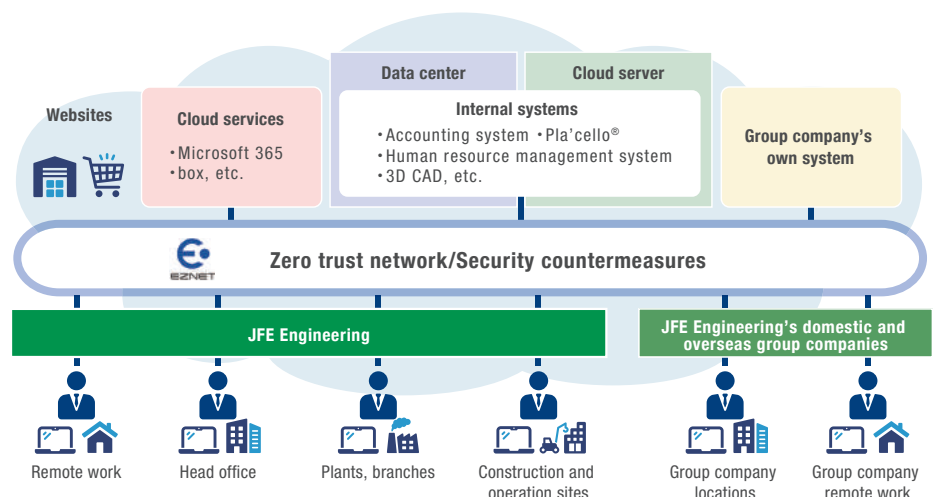
Building a digital environment

Zero trust security initiatives

In response to increasingly diversified work styles including remote work, JFE Engineering is striving to build an information and communications technology (ICT) environment that allows employees to work securely anytime and anywhere. As part of this effort, in fiscal 2023, we became the first JFE Group company to introduce zero trust security, a security approach that takes measures without automatically trusting all network accesses, both internal and external. This initiative has achieved the following three benefits:

- 1 Enhanced functionality and convenience when employees use ICT systems and networks
- 2 Ability to install new systems and add business locations to the network quickly to increase agility in business development
- 3 Minimized risks with upgraded network security design

Introduction at major locations in Japan was completed in fiscal 2024, making it possible to centrally manage information including telecommunications content from every location and mobile client connection information. This arrangement expedites the analysis of causes when a failure occurs, greatly increasing maintenance efficiency. In addition, with the migration from previous remote access environments that had a high risk of being breached, we have achieved a lighter workload during emergencies and stronger security. We intend to roll this out successively at locations and Group companies in Japan and overseas.



The JFE Shoji Group has engaged in various initiatives aimed at promoting Digital Transformation (DX) under the Seventh Medium-term Business Plan (Fiscal 2021–24).

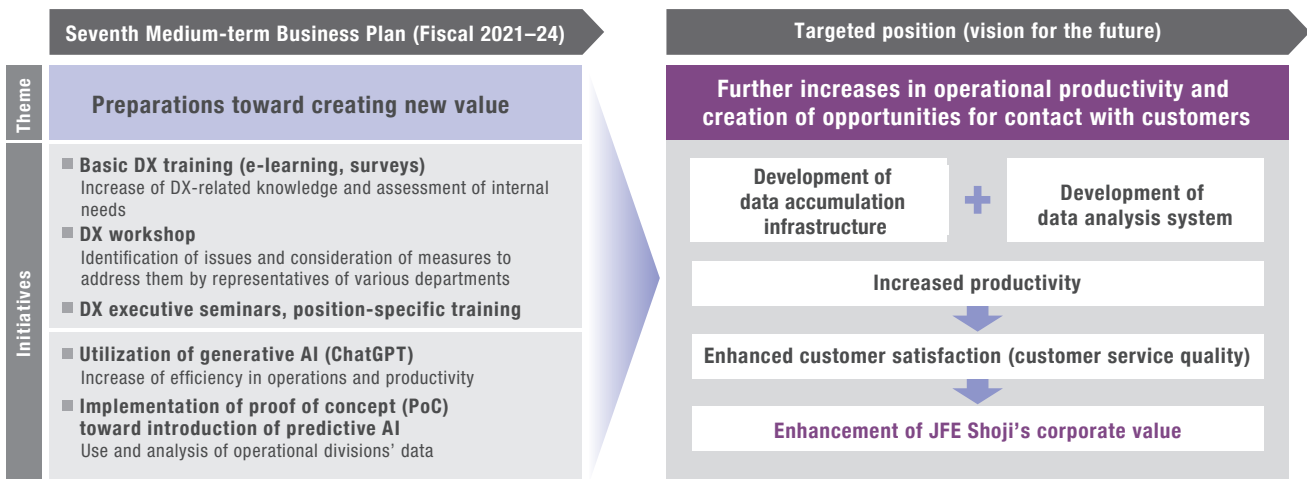
We have conducted “DX executive seminars,” “DX workshop,” and “position-specific training” to enhance digital literacy for all employees and the management team. In addition, since generative AI became more accessible for business use cases with advancements of large language models (LLM), JFE Shoji started to utilize a generative AI service (ChatGPT) in fiscal 2024 to increase efficiency in internal operations and to provide more opportunities for employees to leverage cutting-edge digital technologies.

Going forward, we will build a data accumulation infrastructure to collect various internal and external data. By effectively utilizing data, we are building a foundation for further productivity improvements and aiming to enhance corporate value while improving customer satisfaction.



Takanori Adachi
Managing Executive Officer
(In charge of Information
Technology Planning Department)

DX Strategy >>>



>>> Initiatives toward utilization of generative AI

JFE Shoji began trial utilization of ChatGPT internally from fiscal 2023. During the final phase of the trial activity, participants of 14 departments held discussions by sharing effective use cases and tips on how to use ChatGPT in cross-departmental meetings.

In fiscal 2024, we formulated guidelines based on the insights and findings gained from the meeting, disseminated them companywide, and commenced full-scale utilization.

Meeting to share effective use cases and formulation of guidelines

Meeting to share effective use cases

Representatives of trial participants shared useful examples.



Categorization of useful examples (excerpt from guidelines)

Useful examples presented at the meeting were divided into five categories, and their use cases were promoted.

	Usage categories	Representative examples
1	Drafting and editing of sentences (correction, proofreading, rephrasing, summary)	<ul style="list-style-type: none"> • Composition of emails to local employees at overseas locations • Summary of dedicated overseas websites and email creation • Comparison of quotations
2	Grasping the overview of desired information	<ul style="list-style-type: none"> • In addition to looking up technical terms that arise in meetings, simultaneous gathering of related information
3	Idea creation, consultation, receipt of advice	<ul style="list-style-type: none"> • Drafting of ideas with GPT to use them for brainstorming • Consolidation of survey results (categorization, trend analysis, etc.)
4	Translation	<ul style="list-style-type: none"> • Translation of technical journals for specialists
5	Operation of IT tools and programming	<ul style="list-style-type: none"> • Investigation of complicated Excel functions

Furthermore, department representatives were appointed to expand more effective use of ChatGPT, and the creation of templates for instructions (prompts) tailored to their respective organizations has been started in each department with their lead. As a result, internal use of ChatGPT is spreading companywide, and we will continue to promote the use of internal data and enhance efficiency in operations.

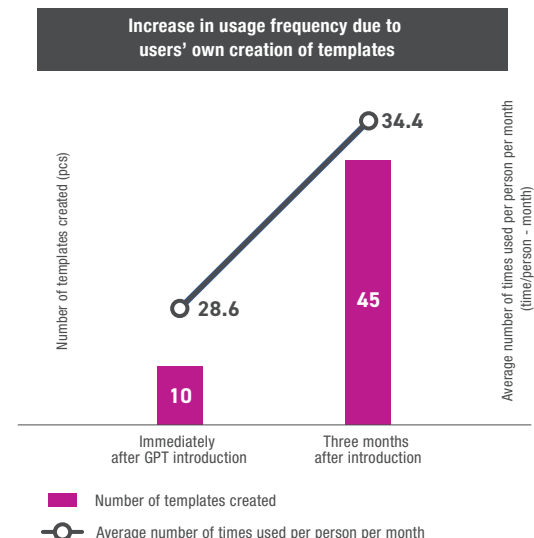
Example of template

Situation:	Summarizing and sharing of production information from suppliers and customers internally
# Role	You are an employee in charge of sales for a steel trading company.
# Objective	To compile information on suppliers and customers and share it internally, leading to sales activities
# Instruction	<ul style="list-style-type: none"> Summarize the “#production information” stated below. After summarizing, provide 10 expected scenarios focusing on increases and decreases of production volume.
# Format	<ul style="list-style-type: none"> To display the summary in tabular format capable of explaining production increases and decreases To create two summaries—a Japanese version and an English version—so that the information can be shared with local employees at overseas locations
# Production information	----- Paste production information received from suppliers and customers here -----

Advantages in use of template functions

Sharing examples of effective usage Anyone can retrieve and refer to templates created by other employees when using ChatGPT.	Standardizing prompt-writing skills Making superior prompt text into templates enables anyone to obtain quality responses.	Reduction of labor time and efforts for prompt-writing A prompt can be created with the push of a button, and it reduces workload.
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Usage status of generative AI



Worksite DX using camera images at JFE Shoji Electronics

With “safety” as the keyword, JFE Shoji Electronics has started to offer a “Safety AI System” and “Safety AI cameras to be mounted on heavy machinery.” Those cameras can support supervisors in detecting workers’ entry into dangerous areas and human existence in the roller section of machinery, and to monitor workers’ activities at manufacturing worksites. JFE Shoji Electronics is also providing high-performance network cameras (secured-type, smartphone-type) that make it possible to improve operations such as reduction of worksite patrols and identification of causes of problems using recorded images.

Safety AI System and safety AI cameras to be mounted on heavy machinery

Features	
Safety AI System <ul style="list-style-type: none"> Low-cost, easy-to-install system Packaged with originally developed software for use with trained AI-loaded cameras Easy to use, available for designating dangerous areas in advance, sending alarm from signal lights, and stopping operations of equipment Available for recording, reviewing, and analyzing images in combination with VMS* <p>* VMS: Video Management System/Software</p>	
Safety AI cameras to be mounted on heavy machinery “EagleEyell” “OmniEye”	<div> EagleEyell </div> <div> OmniEye </div>

Low-bandwidth, low-latency, high-resolution network cameras

Features	
Secured-type cloud camera <ul style="list-style-type: none"> Easy installation using 4G LTE carrier network Low bandwidth, low latency (within 0.5 seconds), high resolution achieved with proprietary compression technology 	<p>System composition Low latency (within approx. 0.8 seconds)</p> <p>[Applications] Equipment inspection, confirmation of malfunctions at worksites, operational support by skilled technician for remote locations, on-site inspection, safety patrol, etc.</p>
Smartphone-type camera “LINKEYES” <ul style="list-style-type: none"> Available for real-time and mutual transmission of images and sounds with originally developed compression technology Available for remote confirmation, sharing with supervisor, instructions to worksite, and image recording by workers taking this camera to worksite Light weight, durability, high waterproof, and chemical resistance High connectivity with proprietary technology Available for voice sharing 	

Security Management



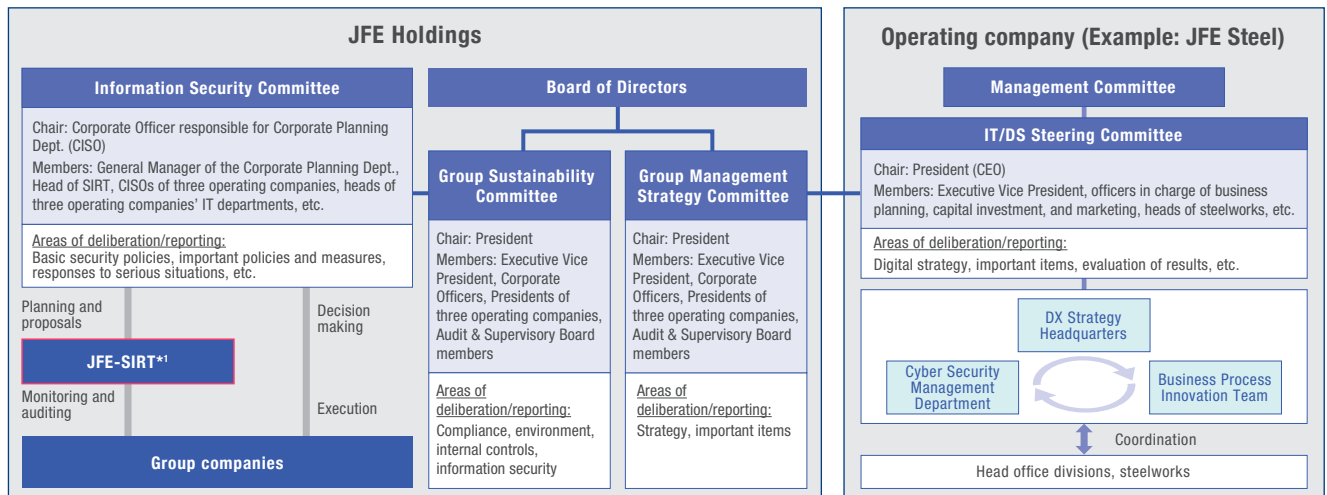
The JFE Group, which views security as an important activity that goes hand in hand with DX promotion, is working to strengthen security Groupwide in the face of increasingly serious and sophisticated threats. With regulations for security management shared across the Group, we are strengthening our security under a uniform policy. In addition to all Group companies implementing shared IT measures, we are working to raise the level of security management Groupwide through regular information security audits and other measures.

JFE Cyber Security & Solutions, LTD. was established under the umbrella of JFE Steel in April 2024. In addition to strengthening our security monitoring structure, the company hires and trains security experts to further enhance security across the entire supply chain for all the JFE Group's roughly 300 companies.

Security management

■ JFE Group's digital governance and cybersecurity framework

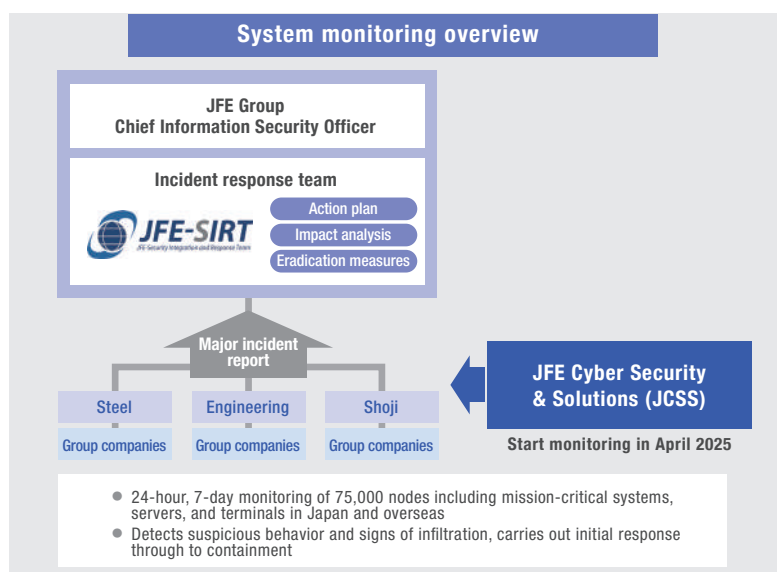
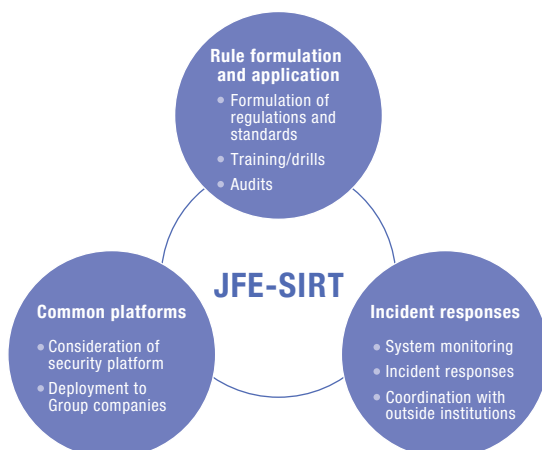
A Group digital governance structure and security structure are part of our corporate governance framework.



*1 JFE-SIRT: A CSIRT*2 responsible for responding to incidents of information security, as well as planning, proposing, and promoting Groupwide measures, auditing Group companies, and reviewing security policy

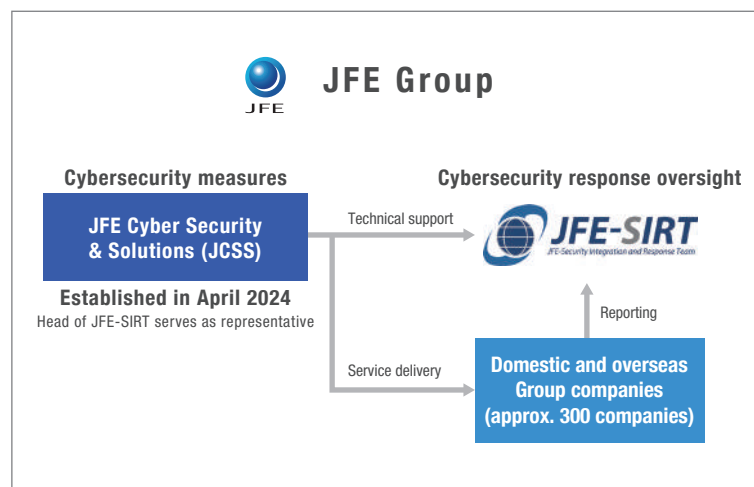
*2 CSIRT: Computer Security Incident Response Team. A general term for a group that responds to internal computer security-related incidents

■ Cybersecurity monitoring initiatives



■ Establishment of JFE Cyber Security & Solutions, LTD.

As the JFE Group's specialist security company, JFE Cyber Security & Solutions (JCSS) is working to strengthen security at Group companies in Japan and overseas.



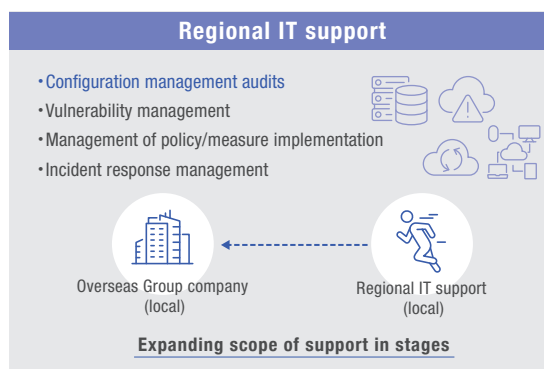
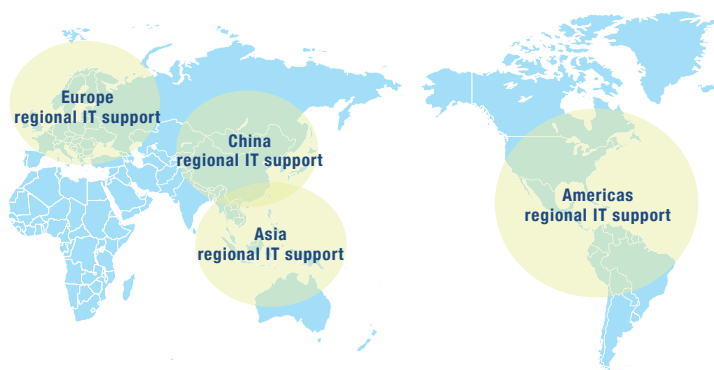
With society today facing increased cyberattacks, JCSS believes enhancing the entire Group's cybersecurity is essential. To fulfill this responsibility, JCSS operates in a broad range of topics and technological areas, including the following:

- Security monitoring (SOC*³ function)
- Vulnerability assessment
- Support for secure development and testing
- Technical/product evaluation, etc.

*3 SOC: Abbreviation for Security Operation Center. General term for the team and facilities that monitor and manage the organization's security

■ Strengthening the global structure

To strengthen security at overseas Group companies, Asia regional IT support began operating in fiscal 2023, and regional IT support is expanding the scope in stages.



JFE Group Declaration of Cybersecurity Management

The JFE Group has formulated the JFE Group Declaration of Cybersecurity Management, based on the Declaration of Cyber Security Management, issued by the Japan Business Federation (Keidanren).

In light of the increasing seriousness and sophistication of cyberattacks, management is using this declaration to take the lead in further strengthening the JFE Group's cybersecurity response.

- 1 Recognize cybersecurity as a management issue
- 2 Determine management policies and declare intentions
- 3 Build internal and external systems and implement security measures
- 4 Encourage widespread use of cybersafe products, systems, and services
- 5 Help build safe and secure ecosystems



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