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YANAI ELECTRIC & MACHINERY Co., Ltd.

HITACHI
Inspire the Next

Achieving stable maintenance management of waterworks facilities by converting equipment information and operational knowhow into data

Waterworks facilities are a critical part of our daily lives and social infrastructure. The aging of engineers who maintain and manage these facilities presents an urgent need to pass on their skills.
YANAI ELECTRIC & MACHINERY Co., Ltd. has its headquarters in Oita City and is responsible for operating and maintaining social infrastructure and plants. Seeking to turn the knowhow of veteran engineers into data, it came across Hitachi Power Solutions "Knowledge Base Constructing Technology," which greatly advanced its efforts. While fulfilling its mission of contributing to the community, the company now aims to further perfect its system construction business so it can maintain and manage municipal waterworks projects over a wide area.

Challenges	Solutions
1 The need to pass on skills became more urgent with the aging of veteran engineers, but progress was slow.	We visualize the knowhow (known implicitly) of veteran engineers as knowledge (known explicitly), and construct a knowledge base system that anyone can utilize.
2 The older equipment and facilities became, the more things only the engineers who worked on them understood.	Knowledge is added and consolidated into the system as content, and linking it to centrally monitored information allows the responses for problems to be displayed on-screen.
3 Work came to be centered on specific engineers due to the specialization it required, creating a situation in which that person had to be available 24 hours a day, 365 days a year.	Realize an environment in which anyone can respond to problems by extracting necessary information from accumulated knowledge.

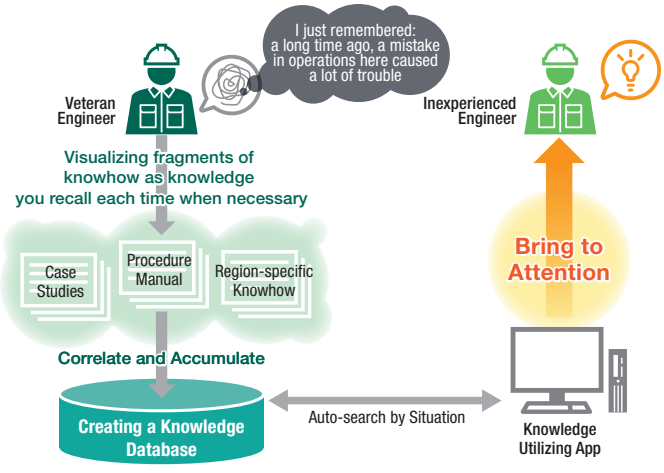
Project Background

Difficulties and breakthroughs in converting veteran engineer knowhow into data

YANAI ELECTRIC & MACHINERY is contracted by local governments to manage the operations and maintenance of water supply facilities. It manages about 300 facilities within the region so no water outages or leaks occur, but in many cases there is no manual, so that knowhow only exists in the heads of the engineers. Mr. Harada is in charge of sales related to maintenance management of waterworks at YANAI ELECTRIC & MACHINERY, and is president and CEO of Teal Facilities Co., Ltd. , a group company established for business development.
He explained, "As a city's veteran engineer was approaching the age of retirement, we were in the position of losing the ability to use his precious knowhow unless we got his skills passed down quickly. Knowhow unique to a region or facility is hard to get, even if you think to ask about it or have it written down in normal times. Instead, we had him teach us when a problem occurred, or notes were written in pencil on a control panel on-site. It was difficult to bring it together systematically, so we had a sense of urgency to get it done quickly."
And the depopulating of the region, which is happening in cities, towns and villages throughout the country, added to the sense of crisis.

President and CEO,
Teal Facilities Co., Ltd.
(A group company of
YANAI ELECTRIC & MACHINERY Co., Ltd.)
Mr. Masakazu Harada

Mr. Harada continued, "Although replacing decrepit pieces of equipment with new ones makes it much easier to operate and manage them, local governments cannot invest in equipment in areas with declining populations and low profitability. In short, given the premise of maintaining and using equipment over a long period of time, the knowhow on managing equipment accumulates in proportion to its age. It was an urgent issue to convert this knowhow into data and pass it on."
Faced with this problem of passing on technology, the water business promotion group of YANAI ELECTRIC & MACHINERY first met Hitachi Power Solutions at HANNOVER MESSE 2018. Mr. Harada said that upon hearing about Knowledge Base Constructing Technology at the booth, "I was excited about the possibilities. The goals and means of achieving them were clear and easy to take on. The idea of a knowledge base could relate to our problems and I readily saw how we could implement it."
That is how the project to transform their maintenance operations began.



Hitachi Power Solutions Co., Ltd.

Project Outcomes

Constructing a knowledge base changed how people work

Phase 1 of constructing the knowledge base was creating a "vessel" for storing knowledge, while Phase 2 entailed making it possible to retrieve the accumulated knowledge automatically. Together with Mr. Harada, Mr. Shimada who was in charge of the technical aspects of the project explained the process.

"In Phase 1, we visualized the information we obtained via frequent site visits and the knowhow we garnered from interviews as knowledge, which we then incorporated as content. In Phase 2, we introduced an application that links this content with information on problems, and then displays knowledge on how to respond to the problems. One engineer who provided many kinds of knowhow gave us the feedback, 'This will also help new engineers work more smoothly.'"

Although knowledge on how to respond to problems is displayed on the computer screen each time a problem occurs, Mr. Harada noted, "We took this opportunity to review deployment to reduce the number of dispatches as much as possible by prioritizing the response to alarms based on severity." They also wanted to change the working methods of engineers who support the infrastructure of waterworks facilities.

"The maintenance and management of waterworks infrastructure produced certain 'star' engineers so specialized that 'only that person can handle it.' Since they could be called out 24 hours a day, 365 days a year, whenever a problem occurs, they never get a real break. Going forward, we have to avoid creating the need for such 'star' specialists. We think a system with a knowledge base at its foundation, which lets anyone respond, can also contribute to the well-being and quality of life for everyone," said Mr. Harada. One result was that engineer overtime could be reduced to approximately 1/8 of what it was prior to introducing the system. What's more, Mr. Harada and Mr. Shimada are leading the push to automate processes to make work easier, and make it more efficient to use the knowledge base as a hub, using "no-code*" tools for developing IoT apps.

*No-code is a method of creating applications without programming, or coding.

Water Business Promotions Group,
Social Solutions Dept.,
YANAI ELECTRIC & MACHINERY Co., Ltd.

Mr. Seiya Shimada

Future Plans

Automation of maintenance management to accompany progress in expanding areas of waterworks business

The Ministry of Health, Labour and Welfare is promoting broad-area collaboration beyond the borders of municipal areas in order to solve issues municipalities face with their waterworks. Mr. Harada said, "As we look ahead to broad-area facility maintenance management, the knowledge base will be our strength and we intend to enrich the content to another level."

The next step to deal with is collecting data on equipment and making predictions. Mr. Harada continued, "We are working with Hitachi Power Solutions on the introduction of the equipment diagnostic system C^3-Edge and the predictive diagnostics system HiPAMPS. We collect data on equipment and determine what kind of maintenance can be performed in response to what symptoms to prevent breakdowns, as well as how to operate equipment to make it last longer. We will move forward step-by-step in automating areas that until now have been handled by people using their own wisdom. Automation is also becoming necessary in expanding the areas of waterworks business."

They are also looking to expand business further from a maintenance perspective. "Since we are involved in water infrastructure, we see other infrastructure that isn't being maintained. I think they are parts of deteriorating infrastructure we can inspect and thus protect the community, such as bridges that carry water pipes, small tunnels, and so on. The knowledge base will definitely be useful at such times," said Mr. Harada.

Hitachi Power Solutions applies its technology-backed proposal capabilities to provide what operators want, so they can move forward with momentum into the next step in the infrastructure maintenance business.

■ User's Profile

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Founded: September 1947 (Established: March 1961)
Capital: 26.1 million yen
Business: Sales of equipment for industry, building facilities, information, and residential facilities and electrical construction materials; installation of electrical, plumbing, communications, and mechanical fixtures; construction of water supply and sewage systems, and maintenance-management/repairs of air-conditioning equipment, electrical equipment, etc.

Renovation of office design to stimulate communication and supporting creative endeavors. Introduced an open-plan workplace that allows staff to choose where to work suit the type of work involved.

Teal Facilities Co., Ltd.

2-7-1 Benten, Oita-shi, Oita,
870-0017 Japan

Established: October 2021
Capital: 5 million yen
Business: Maintenance, management, and operation of water infrastructure

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