Safe and Efficient Plant Operation

with HanPHI®

at Korea Hydro & Nuclear Power (KHNP)

CASE STUDY

HanAra Software

Safety and Efficiency

Korea Hydro and Nuclear Power (KHNP) is the largest Korean electric power company, generating approximately 31.5% of the total generated electric power in Korea. KHNP operates 82 units that include nuclear, solar, hydro, geothermal, bio, and hydrogen power plants.

These plants combine for a **total production capacity of 27,857 megawatts** of power.

Challenges:

With growing public interest in plant activity and the increase in operational data available at these plants, the spotlight on plant safety has never been stronger. And these realities are exactly what led KHNP to heighten its focus on **ensuring the technical safety** of its facilities and how it managed data from its centralized control and monitoring center.

Due to limitations experienced from its previous system, KHNP required additional solutions to achieve its goal of **improving enterprise-wide plant operation**. These limitations created two primary obstacles for KHNP's fleet-wide operation.

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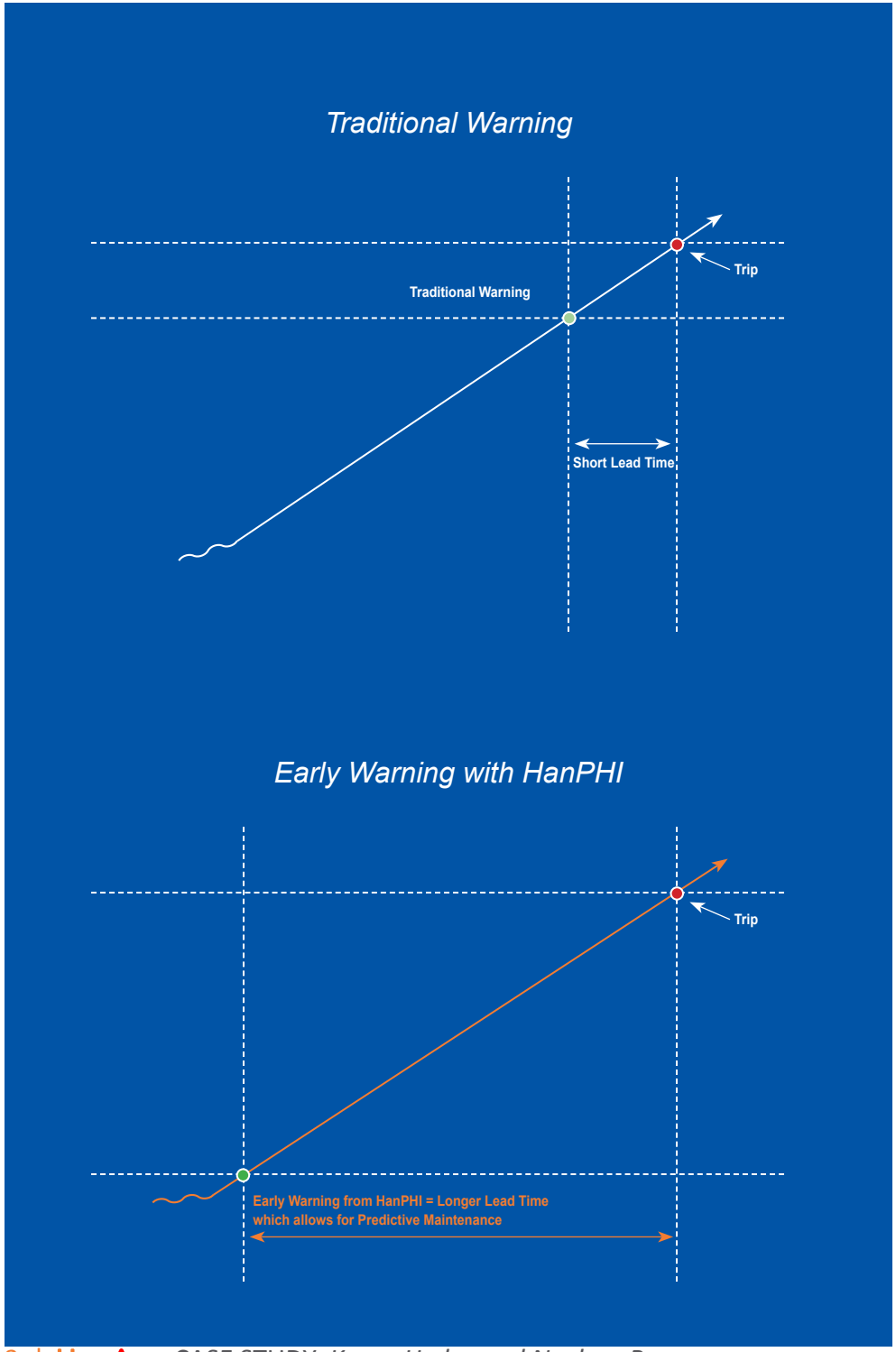


Primary Obstacles for KHNP

- **Short Lead Time**

  Every second of any power plant's operation is critical. Assets across the plant floor transmit vast amounts of data. Using this real-time data, traditional alarms alert plants when a value exceeds a high or low limit. These alarms alert a plant before equipment enters a critical state that can lead to destruction, part failure, or unplanned outages. Unfortunately, by waiting for alarms that are responding to existing conditions, plants are limited in the amount of lead time they have to plan and respond.

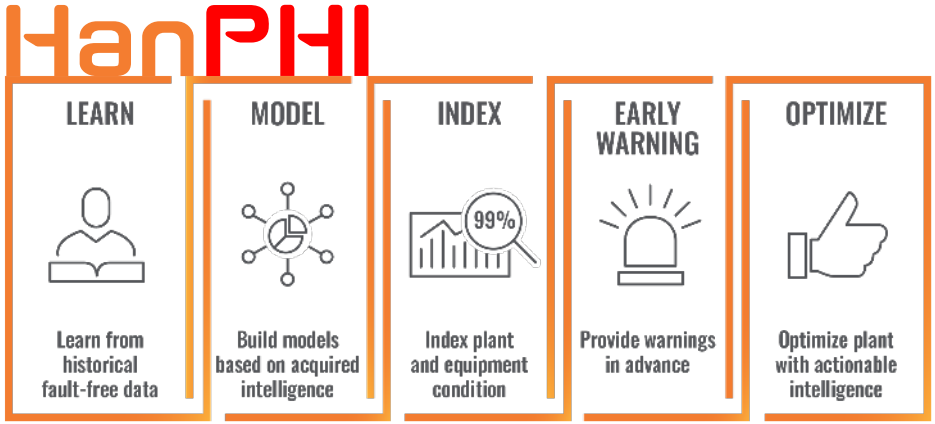
  To discover such issues sooner, the alarm set points can be adjusted, but for KHNP the alarms would then occur so frequently that the alams lost their meaning. KHNP needed smart early warnings that still provided enough lead time.

- **Data Infrastructure for Predictive Maintenance**

  KHNP understood the necessity of predictive maintenance as maintenance based solely on the age of the equipment ignores the fact that a majority of equipment failures are random. KHNP needed a proven early warning system that predicts plant condition, is able to interface with their plant monitoring system, and integrates with other existing systems. KHNP wanted to manage critical and operational equipment data through a predictive monitoring infrastructure, enabling enterprise level collaboration at their centralized center at headquarters.

Solution

In 2016, KHNP installed HanPHI in its centralized monitoring and diagnostics center, and then implemented HanPHI into its central monitoring at headquarters. HanPHI captures valuable information embedded in the ocean of plant data generated by KHNP's numerous plant locations. HanPHI predicts upcoming equipment failures based on dynamic analysis of expected and real-time values. HanPHI's innovative and patented intelligent predictive modeling technology enables the prediction of potential and hidden failures. Every day, KHNP leverages this powerful solution to achieve operational excellence. Understanding its value, KHNP added the installation of HanPHI into its plans for four new plants under construction in 2018.



Benefits

- **Increased Lead Time**

  With a clear view of impending equipment failure, KHNP can prepare well beforehand. With extended lead time, KHNP actively maintains valuable assets, eliminating failures that previously led to costly downtime. By analyzing the current operation status of the plants, HanPHI generates early warnings that KHNP uses to act or plan maintenance.

  HanPHI also monitors all the equipment in real time, constantly learning the normal patterns of individual equipment, and identifies even the slightest sign of impending failure in advance. Once HanPHI detects any sign of failure, KHNP uses the SuccessTree to view relevant equipment and perform root cause analysis. With this valuable information, KHNP utilizes predictive maintenance resolve issues days, or weeks, before the critical event.

- **Optimized Operation and Maintenance**

  With HanPHI, KHNP established their predictive maintenance process. The innovative central early warning system enables KHNP's headquarters to monitor all power units and provide operating and maintenance recommendations to their sites at the right time. Operators and management access an intuitive and clear overview of entire plant floors, including abnormal conditions. This enables optimal plant operation and maintenance, as well as operational excellence.

  In one instance, HanPHI helped prevent a potential failure at a 1,000-MW power plant by detecting a pressurizer safety system issue in advance. HanPHI generated an early alarm allowing an operator to perform valve gagging maintenance before a serious problem could occur.

About HanAra Software

HanAra Software connects deep industry knowledge with innovative technology to provide integrated data management and predictive maintenance solutions for process plant management. Through the implementation of HanAra solutions, plants enjoy results including reduced costs, increased efficiencies, and ultimately improved plant safety. HanAra Software combines solutions with training and care programs to support clients every step of the way.

HanAra Software is the United States headquarters of South Korean-based BNF Technology. BNF Technology is a professional software development company that provides optimized software solutions for operational management of process plants. Coal-fired, combined-cycle, seawater desalination, and petrochemical plants use our solutions. Since our founding in the year 2000, BNF Technology has provided various solutions to more than 150 units across two continents to help them achieve operational excellence.

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About Korea Hydro and Nuclear Power

Korea Hydro & Nuclear Power (KHNP) supplies electricity in South Korea "in a stable manner to enrich the lives of people and contribute to the growth of the national economy." KHNP generates electricity at its nuclear, hydro, solar, and wind sites, representing 31.5% of the total generated electric power in Korea. KHNP is in the process of constructing new plants both domestically and internationally and developing its renewable energy sources through partnerships with local governments.

Its 10,000+ employees continuously strive to demonstrate its core values through the day-to-day operations of power generation. KHNP focuses on Technology, Respect, Ultimate Safety, Social Responsibility, and Timeless Integrity to continue being the largest power generating company in South Korea.