

Efficient Plant Operation with HanPHI at KOEN

Korea South-East Power

Korea South-East Power Company (KOEN) is a major power generation company, providing approximately 10,000 megawatts of electricity at its 12 plants. KOEN generates electricity for metropolitan areas and southern Korea. KOEN generates approximately 10% of South Korea's annual net electricity.

Since installing HanPHI in 2012, KOEN has proactively managed its plants. With HanPHI, KOEN has increased its annual electricity output and the lifecycle of its assets and decreased its maintenance cost, repair time, fuel usage, and unscheduled downtime.

Challenges

Power plants manage assets through regular maintenance, repair, and replacement of equipment and systems. However, equipment failure is highly unpredictable when using traditional alarm systems, and often results in catastrophic damages to both the equipment and workers.

When unscheduled downtime occurs, it takes significant financial and human resources to repair or replace the equipment. On average, power plants experience two to three unscheduled downtimes annually, representing a cost of \$50,000 plus.

1. Limited Insight of Current Plant Operation

Detecting abnormal equipment behavior based on the threshold of actual values fails to reflect context information. In order to produce meaningful intelligence, KOEN needed to learn the operating environment and characteristics of equipment prior to configuring normal parameters for each piece of equipment. With intelligence based on the current plant operation, KOEN could predict impending failures and secure sufficient lead time for maintenance.

2. Random Failures

A process plant constantly runs thousands of pieces of rotating and non-rotating equipment. This equipment operates systematically to produce output. In order to maintain the desired level of output, KOEN must maintain its equipment, but maintenance based solely on the age of the equipment ignores the fact that a majority of equipment failures are random. This means that a majority of failures cannot benefit from a limit on operating age. A failure does not have a timeline as it can happen any time, so KOEN needed a solution to enable predictive maintenance.

3. Short Lead Time

Every second of a 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, this limits the lead time a plant has to plan and act. KOEN needed early warnings that enabled them to have enough lead time.

HanPHI

In 2012, KOEN installed HanPHI to proactively manage its plants. HanPHI captures valuable information embedded in the ocean of KOEN's plant data. HanPHI predicts upcoming equipment failures based on dynamic evaluations of expected values and real-time values. HanPHI's innovative and patented intelligent predictive modeling technology enables the prediction of potential and hidden failures. Every day, KOEN leverages this powerful solution to achieve operational excellence.

Benefits

1. Increased Lead Time

With a clear view of impending equipment failure, KOEN prepares for critical failures beforehand. KOEN actively maintains assets with extended lead time, eliminating failures that previously led to costly downtimes. HanPHI monitors all equipment in real time, constantly learning the normal patterns of individual equipment. HanPHI continuously monitors the plants and identifies even the slightest sign of impending failure in advance. Once HanPHI detects any sign of failure, it provides a clear view of relevant equipment through the SuccessTree. With this valuable information, KOEN utilizes predictive maintenance days or weeks before the critical event.

2. Operation and Maintenance Cost Savings

The innovative central early warning system enables KOEN's headquarters to monitor all power units and provide operating and maintenance recommendations to their sites at the right time.

Since KOEN implemented HanPHI, KOEN saved approximately \$700,00 during the first three months of operation by preventing equipment failure and providing necessary maintenance on time. After two years and three months of operation, KOEN saw a savings of approximately \$4 million in operational and maintenance costs.

3. Actionable Intelligence

With HanPHI, KOEN realized the benefits of predictive maintenance. Management accesses an intuitive and clear overview of entire plant floors, enabling optimal plant operation and maintenance, and more importantly, enabling operational excellence. With actionable intelligence, KOEN experiences asset-protection improvements, increased availability, cost reductions, and extended equipment lifespans.

Challenges

- Limited use of the current plant operation and plant variability when predicting failures in advance
- Frequency of failures that cannot benefit from a limit on the operating age of equipment
- Traditional alarms did not secure adequate lead time to plan and implement the necessary maintenance

HanPHI

- Collects normal, fault-free data to create unique patterns
- Identifies small deviations in equipment and operation behavior that are precursors to potential and/or hidden failures
- Displays information in an intuitive hierarchical order to help focus the user on the root cause sensor variable
- Generates an early warning when HanPHI detects an anomaly

Benefits

- Increased lead time to plan and execute the necessary maintenance
- Prevent unplanned outages and shutdowns by monitoring real-time operations
- Reduce operation and maintenance costs by utilizing preventative maintenance and reducing reactive maintenance
- Utilize actionable intelligence for the decision-making process