HanPHI

Advanced Pattern Recognition Solution

HanAra
Software

DATA-DRIVEN SMART PLANT

Predict Failures in Advance!
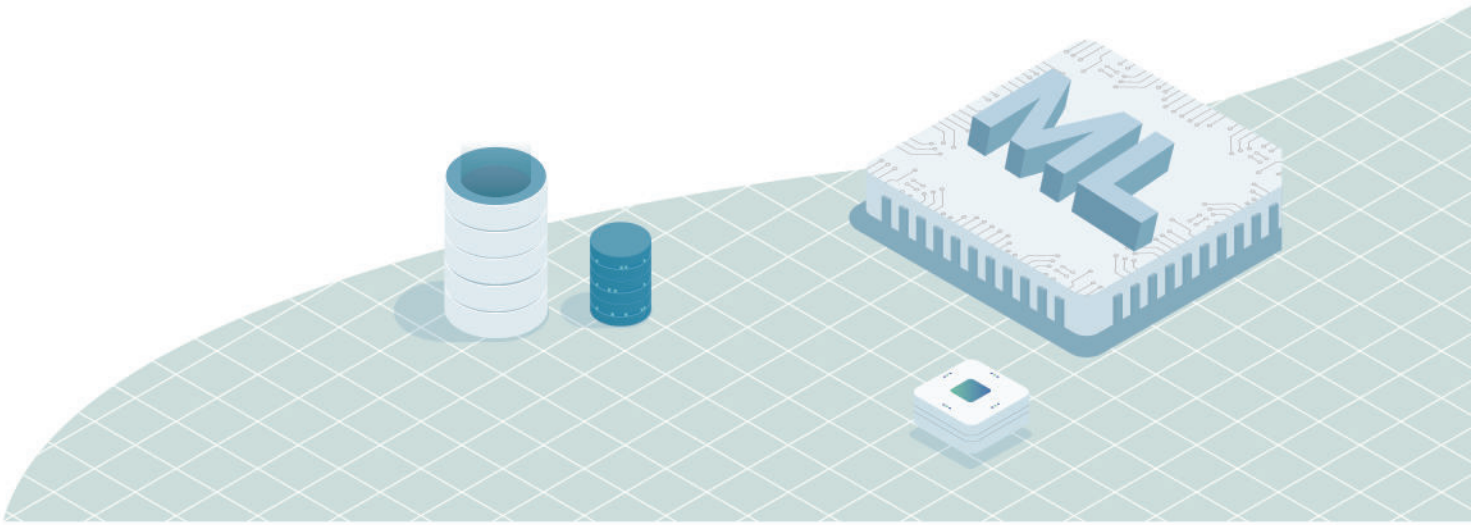
Product Info.

Advanced Pattern Recognition Solution, HanPHI

HanPHI is a predictive maintenance software that uses machine learning algorithms to warn you of potential and hidden failures before they turn into unscheduled downtime. Increase plant reliability and reduce maintenance costs by monitoring equipment anomalies in real time and detecting potential failures.

> **Q** What kind of failures does HanPHI find?
>
> **A** HanPHI uses pattern recognition and machine learning technology to identify in real time :
>
> ① Functional defects   ② Potential failures   ③ Hidden failures
>
> ④ Performance degradations   ⑤ Operational mistakes   ⑥ Sensor failures

Necessity

89% of equipment failures occur randomly regardless of the equipment's lifetime. Limited lead time and delayed responses result in unnecessary downtime and increased repair costs. Additionally, prioritizing maintenance on equipment that does not need it wastes time and resources. With an advanced pattern recognition solution, identify failures in advance and determine the root cause of issues, improving plant safety, reducing O&M costs, and increasing operational innovation.

\# DataPatternAnalysis   \# RootCauseAnalysis   \# CostReduction   \# PlantSafety

\# AssetPerformanceManagement   \# PredictiveMaintenance   \# DigitalPlant

Why HanPHI?

Real-Time Health Index

HanPHI provides a reliable and continuous heath status from 0 - 100% at the plant to sensor level. HanPHI calculates this intuitive health score by learning fault-free, normal equipment patterns and comparing real-time values to expected values to identify anomalies.

Fast Root-Cause Analysis

HanPHI's hierarchical representation from the plant to sensor level allows users with a single click to identify the source of a low health score. With the help of HanPHI's SuccessTree, users pinpoint anomalies quickly and easily.

Simplified Modeling

HanPHI uses machine learning technology, predictive algorithms, and historical operating data to develop its equipment models. By incorporating seasonal variations and operational modes, HanPHI provides accurate and consistent models that reflect current operations.

Accurate Early Warnings

HanPHI provides early warnings of potential and hidden failures, functional defects, performance degradations, and operational mistakes. Rather than relying on setpoint alarms, HanPHI generates dynamic early warnings so you have more lead time to plan and act.

Enhanced Cybersecurity

HanPHI supports physical unidirectional communication for network security. It uses encryption algorithms such as SSL, HTTPS, WPA, WPA2, WPA-2PSK, and AES.

Plant and Fleet-Wide Monitoring

Regardless of the equipment type, data type, or age of the asset, HanPHI provides an intuitive health index so you know the current operating status. Whether it is for a single system or an entire fleet, HanPHI provides actionable intelligence 24/7.

HanPHI

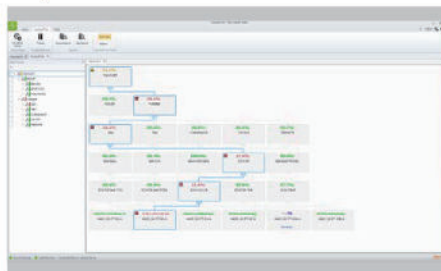Advanced Pattern Recognition Solution

HanPHI is a predictive maintenance solution that identifies potential plant and equipment failures in advance.

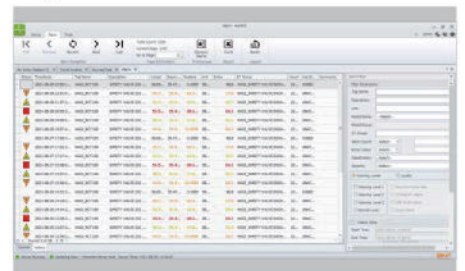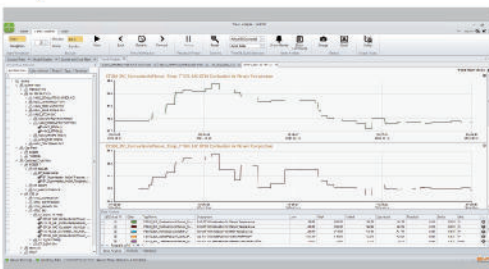## Features

1 Real-Time Facility Health Index

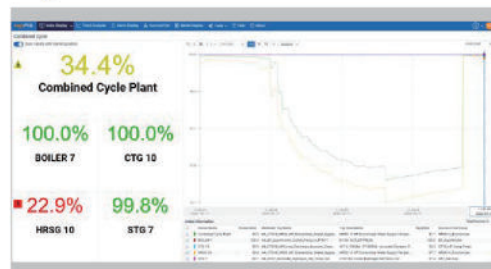**2** Root-Cause Tracking of Equipment Anomalies

3 Early Warning Notifications and Management

4 Instantaneous Anomaly Detection by Trend Analysis

5 Plant Data Monitoring Through the Web

System Architecture

		HanPHI Index	HanPHI Insight	HanPHI Alarm	Success Tree	HanPHI Trend
O&M	**HanPHI Client**	· Intuitive Plant/Equipment Health Status Monitoring	· Web-based Plant/Equipment Anomaly Monitoring	· Real-time/Past Early Warning Analysis · Manage Alarm Frequency by Risk Level	· Real-time Root-cause Analysis · Hierarchical View of Overall Plant to Individual Sensors	· Trend Analysis · Comparison of Expected Value Versus Real-time Value

HanPHI Server

Integrated server
Collect & Archive
Plant Real-time Data

Historical Data → **Training Dataset**

↓

ML Algorithm

↓

Real-time Data → **HanPHI Model** → **Predicted Values**

Interface

OPC UA/DA, IEC61850 & 60870 -101&103&104, Modbus, BACnet, C-NET, DNP3.0 MQTT

Control

PLC   SCADA   DCS

Sensor

Machinery(Sensor & Field Instrument)

Orange Area BNF Technology's Business Area

HanPHI Process

Historical, Fault-Free Normal Operational Data → Group Selection with Advanced Pattern Recognition(APR) → Pattern Learning with Machine Learning Technology → HanPHI Predictive Model Creation → Real-Time and Expected Model Data Comparison → Health Index Calculation

HanAra
Software

References

PETROCHEMICAL INDUSTRIES COMPANY K.S.C.
A Subsidiary of Kuwait Petroleum Corporation

TENAGA NASIONAL

KNPC

LCRA
ENERGY · WATER · COMMUNITY SERVICES

TEXAS
The University of Texas at Austin

SK chemicals

KHNP
KOREA HYDRO & NUCLEAR POWER CO., LTD

KOREA ELECTRIC POWER CORPORATION
KOREA ELECTRIC POWER RESEARCH INSTITUTE

Youngam Wind Power Co., Ltd.

KOEN KOREA SOUTH-EAST POWER CO.

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