HanAra

BREAK THROUGH THE LIMITATIONS

HanPHI

FAULT DETECTION & DIAGNOSTICS

IDENTIFY POTENTIAL AND HIDDEN FAILURES IN ADVANCE

HanPHI
PLANT HEALTH INDEX

ANOMALY DETECTION

ROOT-CAUSE ANALYSIS

PREDICTIVE MAINTENANCE

Learning historical
normal operation data

Early detection of
abnormalities

Quick Cause Tracking

Condition-based
maintenance planning

HanPHI®, our proven plant health index, helps you identify potential failures to reduce unexpected failures and unplanned maintenance activities. To provide meaningful intelligence, the solution uses:

- Unsupervised machine learning: never seen this failure before? Not a problem as HanPHI compares to your normal, expected operation. This allows you to identify previous and never-before-seen failures easily.
- Advanced pattern recognition: your equipment doesn't operate in a vacuum. Sensors, components, and equipment are related. Rather than relying on alarm setpoints, users have dynamic early warnings based on their current status.
- Your historical data: your plant, equipment, and operating environment are all unique. Base intelligence on your plant, not the ideal plant.

With HanPHI, organizations use real-time analysis to reduce time lost to the unknown. Early warnings alert you to problem areas when you need to know and enable more in-depth analysis for when your subject matter experts need to dig deeper.

HanPHI

PLANT-WIDE MONITORING

100% EQUIPMENT AGNOSTIC SO YOU CAN MONITOR YOUR ENTIRE PLANT REGARDLESS OF EQUIPMENT

HanPHI's plant health index provides a real-time health index from 0 to 100% for the plant, system, equipment, and all the way to the sensor level. The index provides an intuitive illustration of plant health status so that all types of users have a clear understanding of the current status of the plant and equipment.
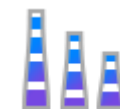
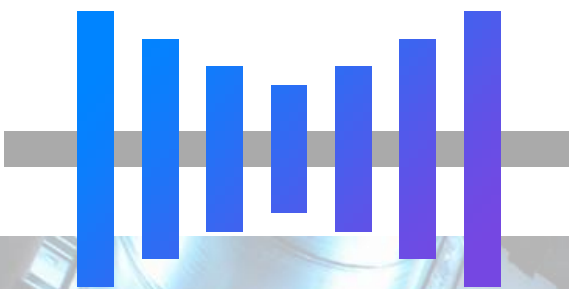| BOILER	PUMP	MOTOR	TURBINE
HEATER	CONDENSER	VALVE	EJECTOR
STACK	FAN	TANK	COOLER
CONVEYOR	FILTER	HEAT EXCHANGER	PIPE

HanPHI

TURBINE MONITORING

CRITICAL EQUIPMENT MONITORING 24/7

HanPHI's early detection provides early warnings for preventing and reducing equipment failure, including turbines. It provides indication of systems' abnormalities to avoid equipment failure through planned outages.
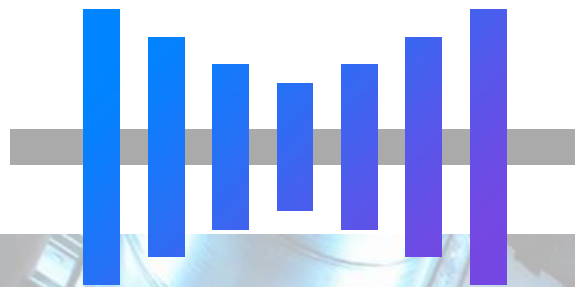
Type of Turbines Monitored:

- GE LM6000
- GE 7FA
- GE LM2500
- GE STF-D1050
- Siemens ENK 50/90/0
- Westinghouse
- And more
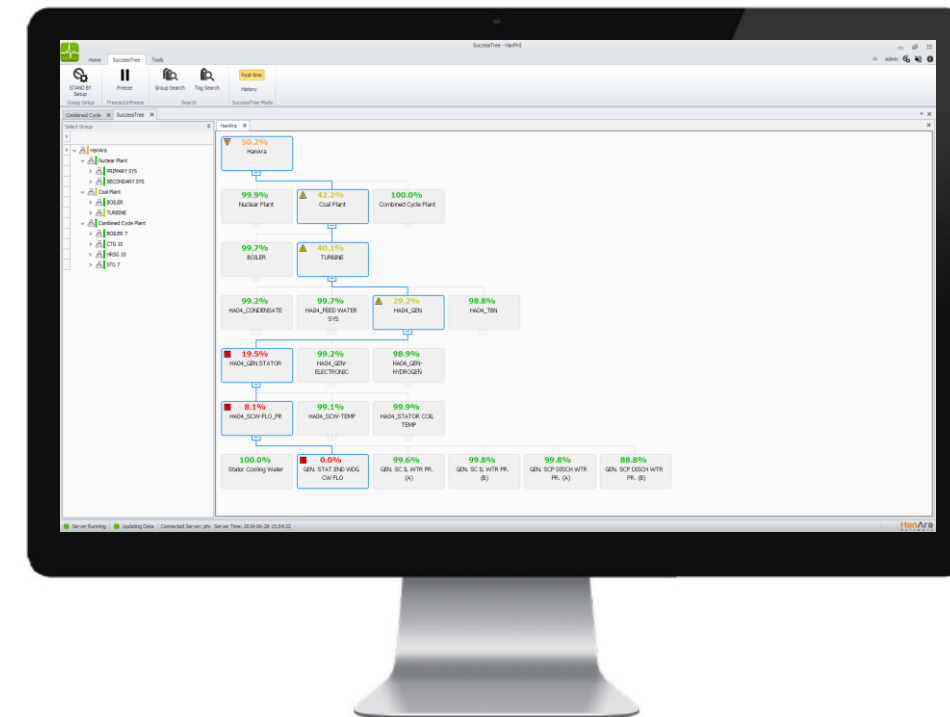
HanPHI

GAS TURBINE EXAMPLE

CRITICAL SENSORS MONITORED FOR IMPROVED INSIGHTS AND REAL-TIME EARLY WARNINGS

MAIN SYSTEM	SUB-SYSTEM	EQUIPMENT	MODEL NAME	TAG NAME
GT	Turbine	Turbine	Gas Turbine	Gas Turbine Speed (RPM)
GT	Turbine	Turbine	Gas Turbine	Inlet Gas Temperature
GT	Turbine	Turbine	Gas Turbine	Inlet Gas Pressure
GT	Turbine	Turbine	Exhaust Gas	Exhaust Gas Temperature
GT	Turbine	Turbine	Exhaust Gas	Exhaust Gas Pressure
GT	Turbine	Turbine	Bearing Temperature	Turbine Journal Bearing Temperature
GT	Turbine	Turbine	Hydraulic Fluid	Hydraulic Fluid Pressure
GT	Turbine	Turbine	Hydraulic Fluid	Hydraulic Fluid Temperature
GT	Turbine	Turbine	Lube Oil	Bearing Lube Oil Drain Temperature
GT	Turbine	Turbine	Lube Oil	Bearing Lube Oil Drain Pressure
GT	Turbine	Turbine	Bearing & Position Vibration	Bearing Vibration
GT	Turbine	Turbine	Bearing & Position Vibration	Turbine Rotor Position

HanPHI

TURBINE CATCH

EARLY WARNING OF A TURBINE BEARING ISSUE SAVED $80,000+
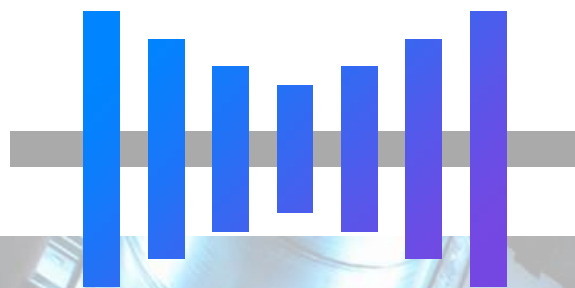
After an overhaul, HanPHI identified an issue on one of the turbine bearings. The vibration was 81.6 µm while HanPHI's empirical model expected 40.9 µm based on current plant condition. The site continued to monitor the vibration, but three weeks later HanPHI generated early warnings for increased bearing vibrations on this bearing and two additional bearings.

During this time, one of the turbine bearing's vibration gradually increased to as high as 131.8 µm and continued to fluctuate according to output. HanPHI expected the normal bearing vibration to be 102.1 µm.

After investigation, the site determined that there was an assembly problem and fixed the bearing setting. With HanPHI, the site not only resolved the vibration increase but had enough lead time to schedule and determine the necessary maintenance.

800-MW	8	250-MW	$80,758
THERMAL POWER PLANT UNIT	HOURS ELIMINATED TO STABILIZE	POTENTIAL REDUCTION IN OUTPUT	IN SAVED REVENUE

HanPHI
BY THE NUMBERS

1
SECOND
REAL-TIME
PROCESSING

100
MILLISECOND
MODEL REFRESH
RATE (1,000 TAGS)

10,000
TAGS PER
INDIVIDUAL
SERVER

32
SYSTEMS OR PIECES
OF EQUIPMENT PER
MODEL

200
MILLISECONDS
CLIENT
RESPONSE

HanPHI

PLANT HEALTH INDEX

MACHINE LEARNING

ADVANCED PATTERN RECOGNITION

YOUR DATA

| LEARN	MODEL	INDEX	EARLY WARNING	OPTIMIZE
Learn from historical fault-free data	Build models based on acquired intelligence	Index plant and equipment condition	Provide warnings in advance	Optimize plant with actionable intelligence

PRECISE

Advanced pattern recognition software with root-cause analysis and the tools you need, and nothing you don't need, to improve operations.

INSIGHTFUL

Knowing the health of your equipment puts you on the right path to evaluate, analyze, and correct equipment problems, saving you time, energy, and unnecessary risk.

SIMPLE

We make the complex simple so you can improve your reliability, availability, and maintainability now. Why wait?

Coal Plant
99.90%

ACHIEVE OPERATIONAL EXCELLENCE
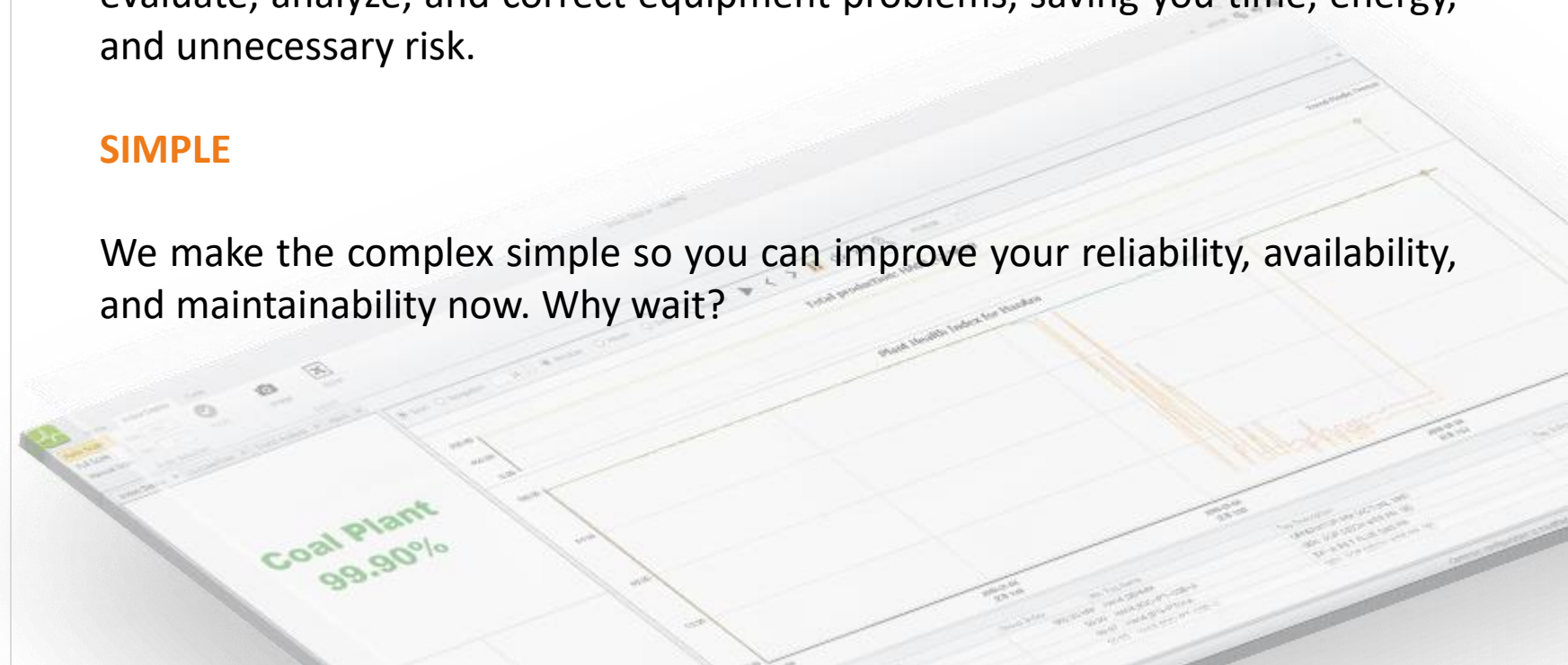
HanAra helps its customers achieve operational excellence by providing innovative technology backed by years of experience in machine learning, advanced pattern recognition, data management, predictive maintenance, and customer care. All combined to create software solutions that maximize operational returns and help organizations break through the limitations. HanAra software solutions help organizations move towards digitalization and viewing data as a corporate asset. By turning data into actionable intelligence, organizations reduce costs, improve efficiencies, and increase safety.

HanAra is the North American Headquarters of South Korean-based BNF Technology. Since 2000, BNF Technology has been developing intelligent software across multiple industries. By utilizing advancing technologies, BNF has assisted more than 250 facility units across two continents in optimizing operational management.

HanAra Software
Tel. +1.737.209.9220 Email. info@hanarasoft.com

www.hanarasoft.com