

Ways to Use HanPHI®: Modeling

USE

The value of HanPHI is that it represents the current operating status of your equipment, systems, plant, and fleet. It uses advanced pattern recognition to compare real-time values to expected values and calculates an intuitive health index based on the deviation. The expected values come from your historical, fault-free normal operational data. This history knows all patterns, knows how the plant operates, and knows how the plant should be operating in different conditions.

Equipment has some degree of variability compared to its original specification sheets. Variations in environmental conditions, equipment interactions, and processes means that a one size fits all approach may not be the best option. By using the historical normal, fault-free data to create models, you have a better understanding of how your equipment operates in your environment and in your process.

New Data

What happens when the process changes or the piece of equipment changes its behavior? Does HanPHI no longer provide a good view into the current operating status? Not necessarily. If your

operating process occurred in the past, there is no issue. HanPHI is able to detect that you are running the equipment different and selects the proper pattern to compare it to. It's also smart enough to create a best-fit pattern if one does not exactly fit in the system.

If the operation process is completely new, then you would want to incorporate new data for HanPHI to learn. Examples of this are:

- You replaced a piece of equipment
- The equipment or operation behaviors significantly changed
- You significantly changed your process
- There was significant environmental changes

Updating Models

Does this mean you need to have a data scientist on staff to continuously update the models and add new data?

No. There are built-in tools to facilitate the updates. The first step is to open the model that needs to be updated in the Model Builder, for example boiler 7.

Due to the hierarchical structure, HanPHI groups related sensors, equipment, sub-systems, and systems together. What this means is that you can isolate the specific group to update, rather than having to rebuild all of HanPHI.

Once you know what group needs to be updated, you must add the new time durations to the model. HanPHI has historian features as it stores the real-time data coming into the system.

Model Builder (Boiler_R01)

Model: Boiler_R01
Model Type: Boiler
Duration: 2016/02/08 13:18:11 To 2016/03/03 16:30:36
Version: 11000101001
Last Updated: Model: 2016/03/22 09:54:33.220

ID	Tag Name	Description	Group	Red (%)	Yr	Unit	Limit
1	B7_AirHeater_Entering_Air_Temp_T0870	B7 AIR ENTERING AIR HEATER	1	0.28	-210.00	1200 CO	DESP
2	B7_AirHeater_Entering_Gas_Temp_A_T08712A	B7 GAS ENTERING AIR HTR A	1	0.28	-210.00	1200 CO	DESP
3	B7_AirHeater_Entering_Gas_Temp_B_T08713D	B7 GAS ENTERING AIR HTR B	1	0.28	-210.00	1200 CO	DESP
4	B7_AirHeater_Entering_Gas_Temp_C_T08713D	B7 GAS ENTERING AIR HTR C	1	0.28	-210.00	1200 CO	DESP
5	B7_AirHeater_Air_Gas_Leaving_Economizer_A	B7 Air gas leaving economizer A	11	0.27	-210.00	1200 CO	DESP
6	B7_AirHeater_Air_Gas_Leaving_Economizer_B	B7 Air gas leaving economizer B	11	0.27	-210.00	1200 CO	DESP
7	B7_AirHeater_Air_Gas_Out_Pressure_P08721	B7 AIR GAS OUT PRESS	30	1.43	0.00	30.03	INWAC
8	B7_AirHeater_Leaving_Air_Heater_A	B7 AIR LEAVING AIR HEATER A	1	0.28	-210.00	1200 CO	DESP
9	B7_AirHeater_Leaving_Air_Heater_B	B7 AIR LEAVING AIR HEATER B	1	0.28	-210.00	1200 CO	DESP
10	B7_AirHeater_Leaving_Air_Heater_C	B7 AIR LEAVING AIR HEATER C	1	0.28	-210.00	1200 CO	DESP
11	B7_AirHeater_Leaving_Gas_Temp_A_T08714A	B7 GAS LEAVING AIR HTR A	1	0.28	-210.00	1200 CO	DESP
12	B7_AirHeater_Leaving_Gas_Temp_B_T08714B	B7 GAS LEAVING AIR HTR B	1	0.28	-210.00	1200 CO	DESP

Model Groups

ID	Group Name	Tag List	Tag Count	Data Count	Comment
1	G1_09_00	1,2,3,4,8,9,10,11,12,13	10	11053	
2	G1_20_00	14,15	2	11898	
3	G1_29_00	15,16,17,18	4	2772	
4	G1_39_00	20,21,22,23,24,25,27	6	11912	
5	G1_49_00	30,31	2	10762	
6	G1_59_00	39,40,41,42,43,44	5	14573	
7	G2_08_00	17,18,19,20	4	11851	
8	G10_08_00	10,11,20,24,27	5	11770	
9	G15_01_00	16,17,18,19	4	11896	
10	G16_01_00	7,20	2	1061	
11	Group014	5,6	2	2051	

Select Model Durations

Samples
Number of Samples: 15000
Note: Get data if number of samples are changed.

Rule

Duration

No.	Start Time	End Time	Sample (%)
1	02/18/2016 12:48:14 PM	02/19/2016 04:20:07 AM	0.
2	02/19/2016 06:45:01 PM	02/22/2016 06:59:52 AM	0.
3	02/22/2016 07:12:14 AM	02/29/2016 09:47:47 AM	1.
4	02/29/2016 04:56:35 PM	03/01/2016 12:43:12 PM	0.
5	03/01/2016 02:20:53 PM	03/03/2016 08:43:05 AM	0.
6	03/03/2016 10:47:41 AM	03/04/2016 07:31:58 AM	0.
7	03/04/2016 11:37:17 AM	03/15/2016 03:43:09 PM	2.
8	03/15/2016 04:34:16 PM	03/18/2016 12:55:04 PM	0.
9	03/18/2016 01:01:28 PM	03/22/2016 09:25:03 AM	0.
10	03/22/2016 09:28:23 AM	03/23/2016 09:25:05 PM	0.
11	03/25/2016 01:25:03 AM	03/26/2016 11:32:52 AM	0.

Config Delete Auto Sample (%) Total Percent: 100.00

Total Duration(s): 176

OK Cancel

It does this to help you:

1. View the degradation of a health index over time and determine next steps
2. Compare past operation to current to determine differences and similarities
3. Serve as the historical memory of past issues
4. Easily update models with new time durations

If the tags already exist in the HanPHI database, you do not have to go to an outside source for the new data to add. You simply select the model durations to add.

Continued Maintenance

All software requires some degree of maintenance to ensure that it meets your current needs. Required work to keep the software updated and reflective should never outweigh the value. Nor should it require you to be beholden to a single company expert that if they leave, you are left with an ineffective and outdated software until you can hire a replacement.

With HanPHI, the built-in tools help ensure that if you change a piece of equipment or significantly change your process, HanPHI will still reflect the current operating status. By understanding the past behavior, HanPHI can alert you to potential and hidden failures so that you have more lead time to take action.

HanPHI

HanPHI, our patented intelligent software, learns, models, and analyzes data to provide actionable early warnings to operators, engineers, and managers before catastrophic failure occurs. By utilizing advanced machine learning to turn sensor data into a health index for predictive maintenance, guesswork is eliminated and your valuable assets are kept in optimal condition with impending failures identified days, weeks, or even months in advance.

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 the year 2000, BNF Technology has provided various solutions to more than 250 units across two continents to help them achieve operational excellence.