Pro-9900 Expert Mode Prognosis Monitoring System (PMS) Operation Manual V2.0

Ver: V2.0 D/C: 11105

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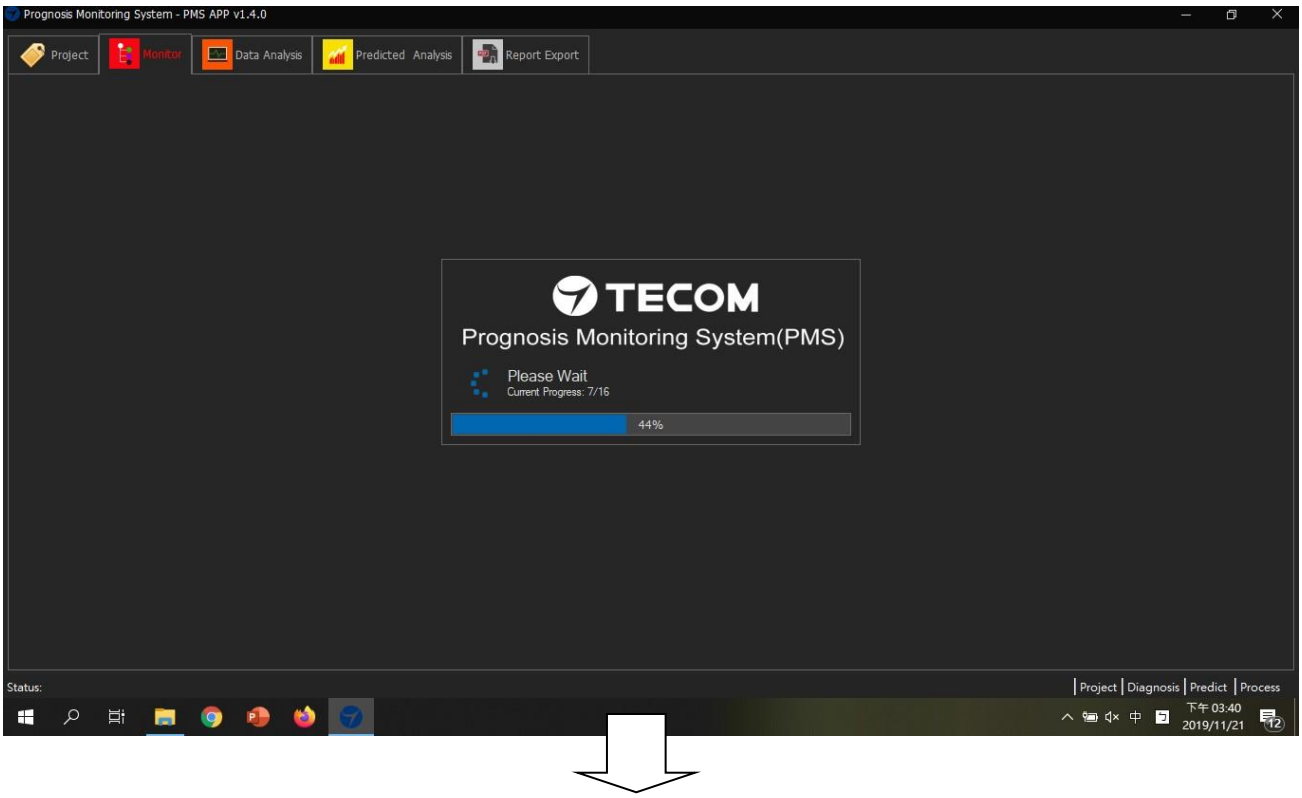
Get Started (Monitor)

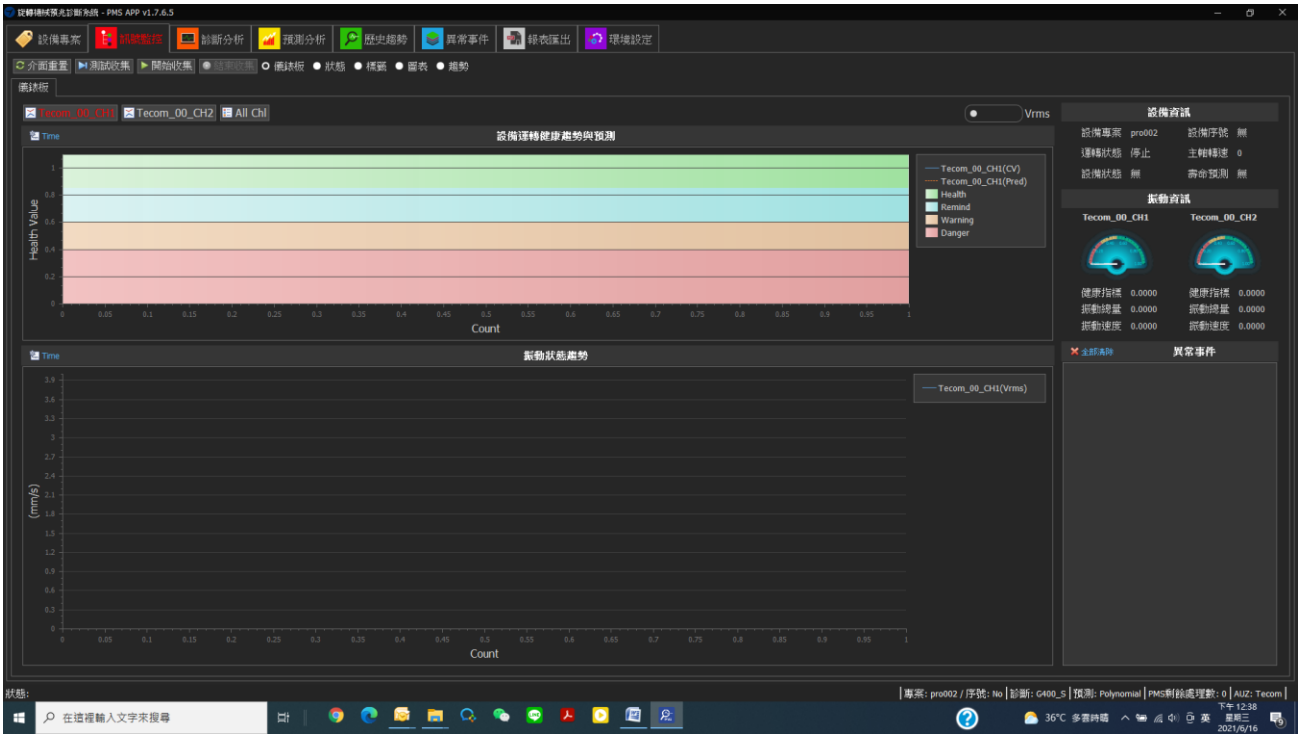
1 Launch PMS Application

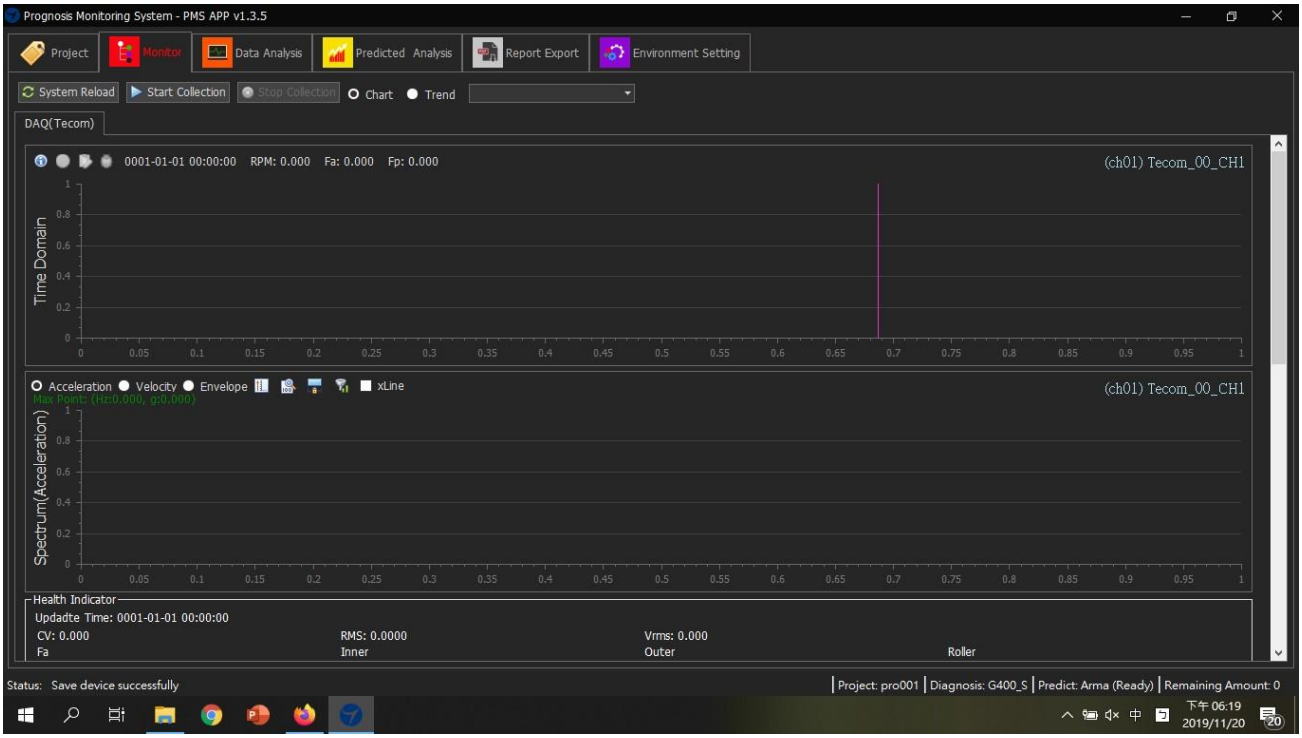
Tap the PMS App icon 

on Windows desktop if the application is not started yet.



After entering the homepage, the dashboard displays the health status of the current measurement equipment. The area is divided into three parts: "Equipment Operation Health Trend and Forecast", "Vibration Status Trend", and "Equipment Information and Vibration Information". This dashboard is mostly used when observing trend changes over a long period of time. It does not have a sub-diagnosis function. Please select the red "Graph" option to enter the measurement and diagnosis.





2 Start Monitoring

Tap the "Start Collection" button, real-time vibration value will be shown.

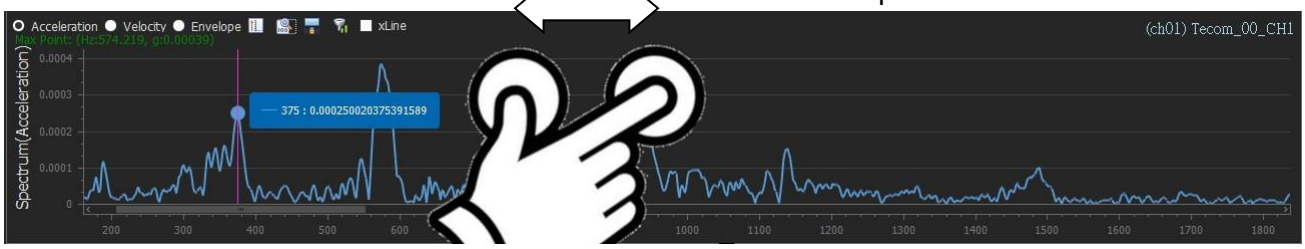
3 Examine the Monitor Information

Application start in "Chart" view which give you a live waveform of the measurement and a real-time frequency spectrum.

The following is brief description of the basic layout.

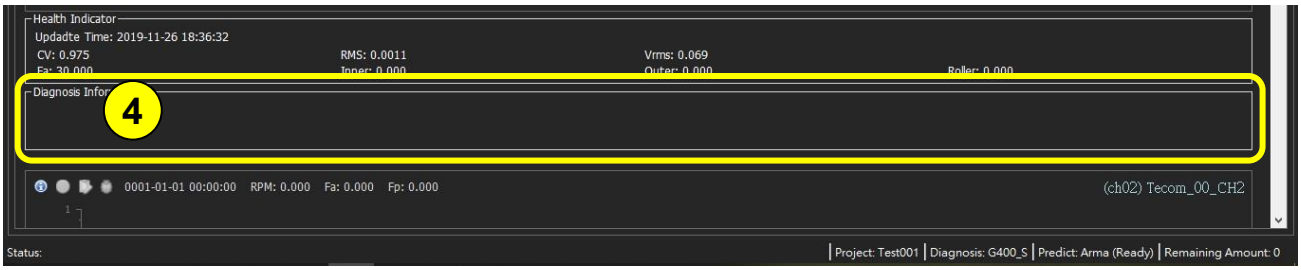
1 The real-time vibration measurement.

2 The frequency spectrum: A real-time frequency spectrum base on the measurement. You can zoom in the spectrum to examine spectrum detail.



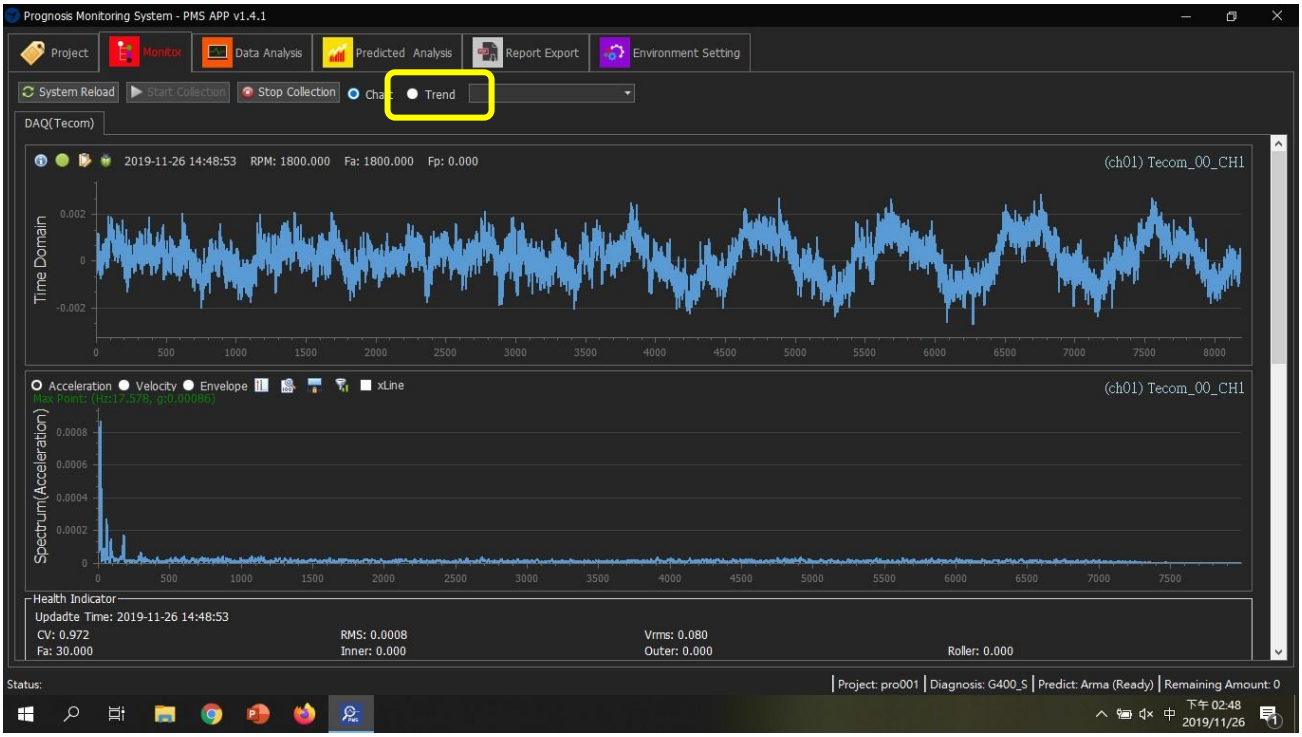
3 The health indicator: Several health indexes are listed here. The most important index is the CV (Confidence Value). CV is an overall health condition score base on ISO-10816. The value of CV ranging is from 0 to 1. CV = 1 means perfectly healthy.

Scroll down a little bit there is a diagnosis information under the health indicator.



4 The diagnosis information: PMS application will determine the potential problem of the target machine. The evaluation result will be shown in this area.

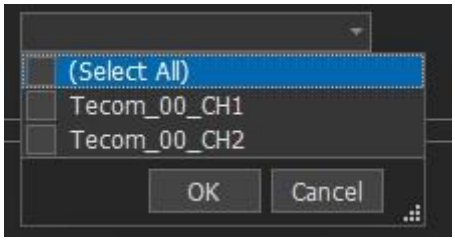
You can switch to the "Trend" view to examine the trend of key health indexes.



The following is a brief description of the Trend view

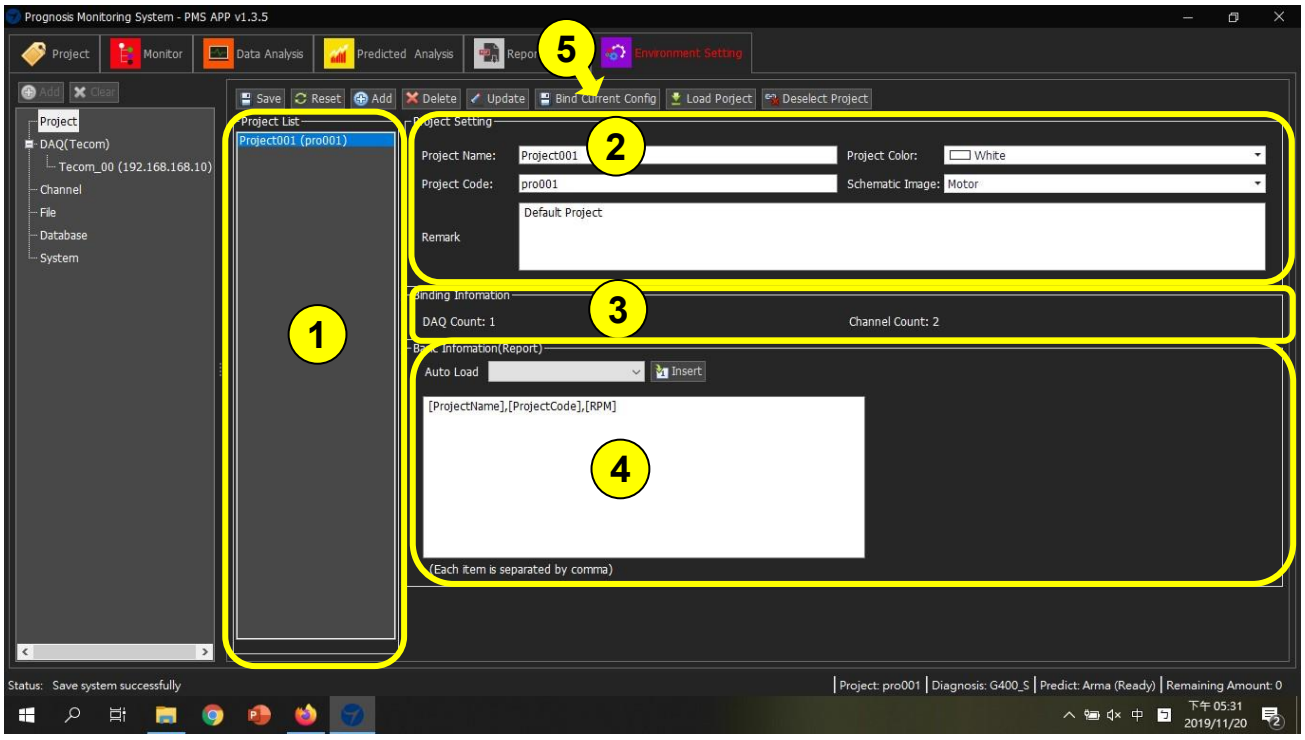
5 The health index trend of the latest 100 measurements.

6 By default, both channels will be shown; you can choose to show one of the channels or all channels. This filter also applies to Chart view.



Environment Setting

1. Project



1 A list of existing projects

2 The project setting:

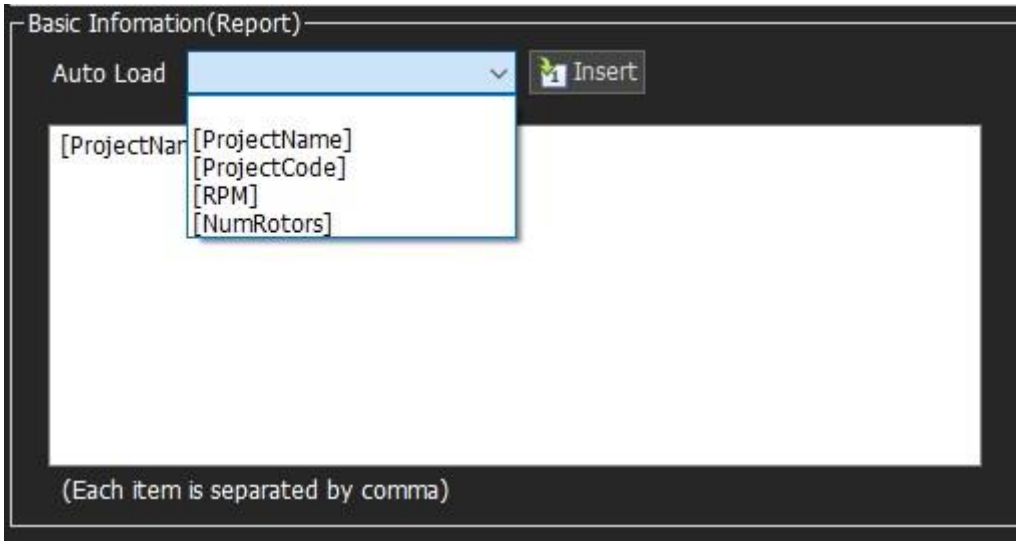
Project Name, project Code and Remark will be shown on the project page, the Project color is actually the font color of those description. The Schematic Image is the project icon.

Project Name, project Code will also be used on diagnosis report. Refer to the Report Export chapter.

3 Binding Information: Number of DAQ and channels.

4 Basic Information:

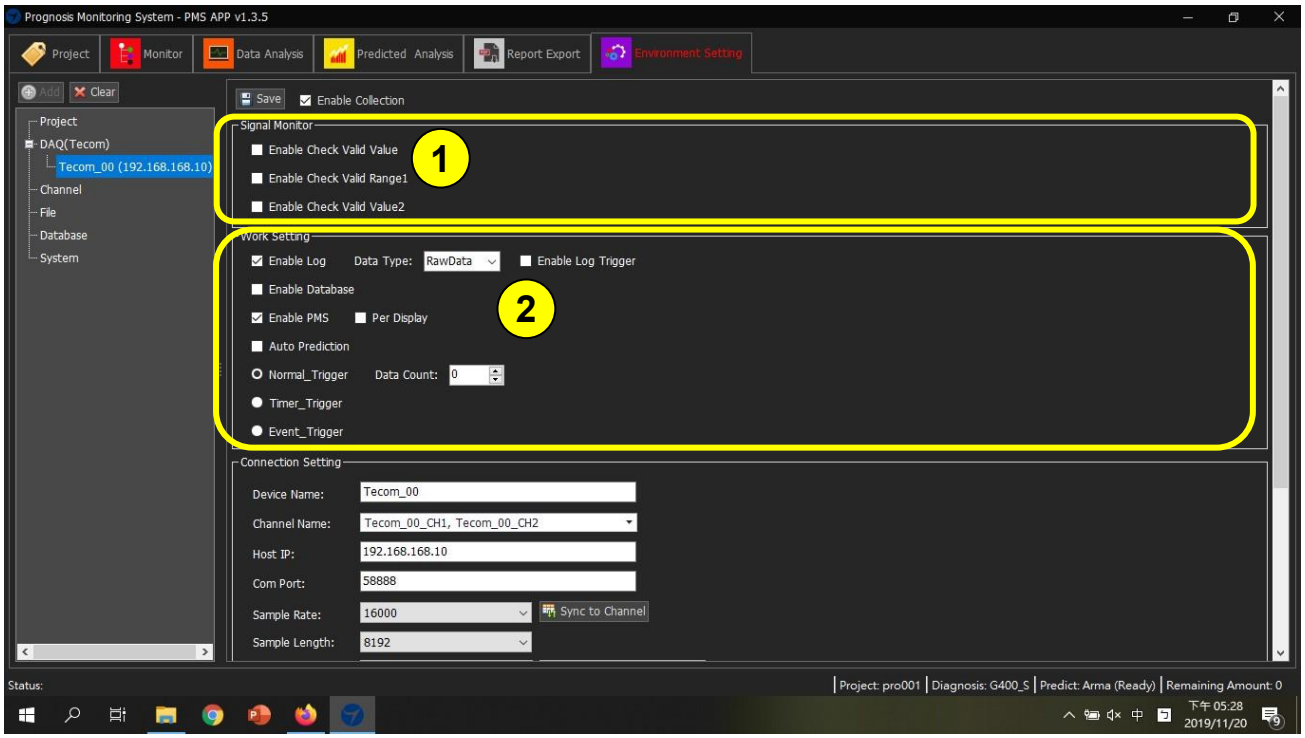
Some basic information you want to put on the diagnosis report. Refer to the Report Export chapter. There is several build-in project information can be added:



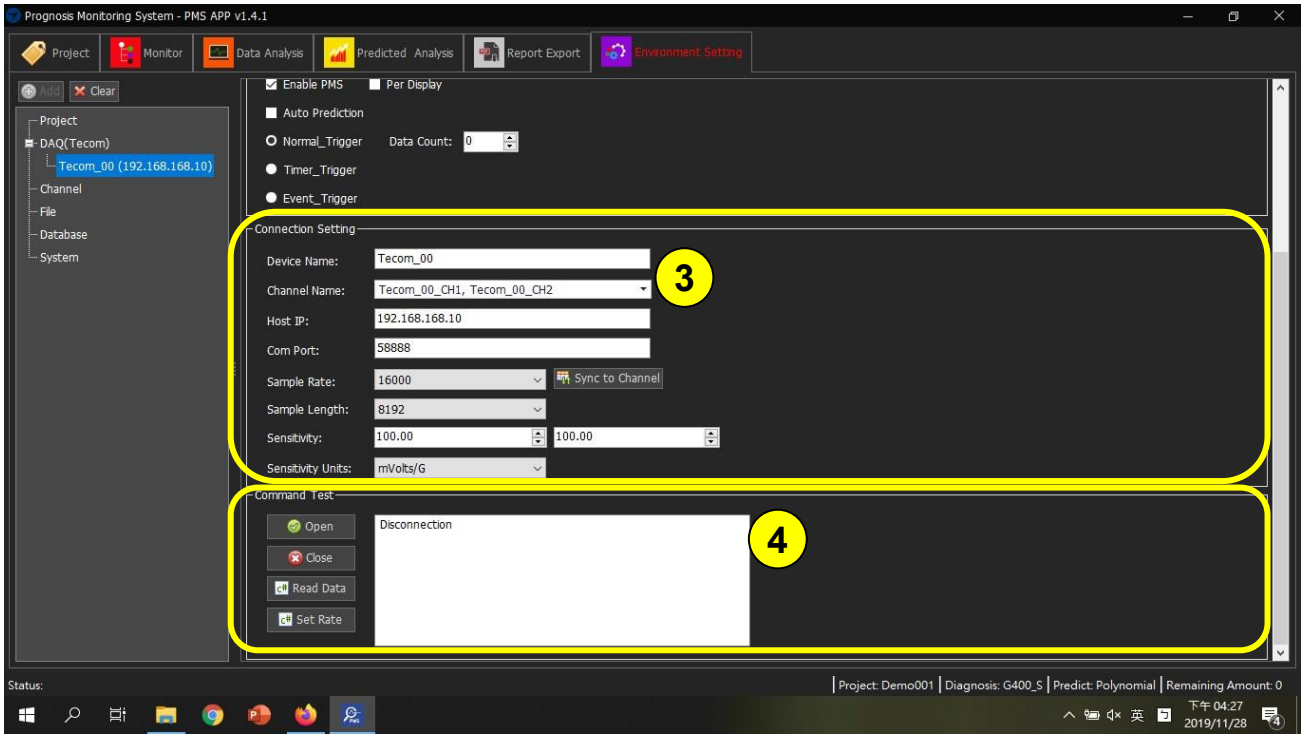
You can also add additional information in this area to further describe the device. Be sure to add a comma "," as new line.

5 Be sure to tap on the Binding Current Config button to save the channel settings to this project.

2. DAQ(Tecom)



Scroll down!



1 Signal Monitor:

Field	Description
Enable Check Valid Value	Filtering data collection base on the setting. Usually, set the Min Valid Value, the value will be collected only when the vibration is larger than the minimum value. You can specify to use the raw value or RMS.
Enable Check Valid Range1	Reserved
Enable Check Valid Value2	Reserved

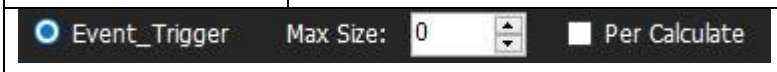
2 Work Setting:

Field	Description
Enable Log	Enable store measurement in file.
Data Type	Data format of the stored data, usually RawData is selected.
Enable Database	Make sure it is database is disabled
Enable Log Trigger	Reserved
Enable PMS	Make sure this one is enabled.
Per Display	

Auto Prediction	Interval: Prediction interval Max Size: Maximum data counts for prediction Min Size: Minimum data counts for prediction Predicted Rate (%): Predicted ratio base on the actual data count of the prediction. For example, if the actual data count in this interval is 10,000 and the predicted rate set to 20% then the prediction is targeting at 12,000.

Normal_Trigger	Trigger the diagnosis when data collected reach the data count.

Timer_Trigger	Trigger the diagnosis periodically and with minimum required data count. Per Calculate: Force to do diagnosis per sample.



Event Trigger	Reserved

3 Connection Setting:

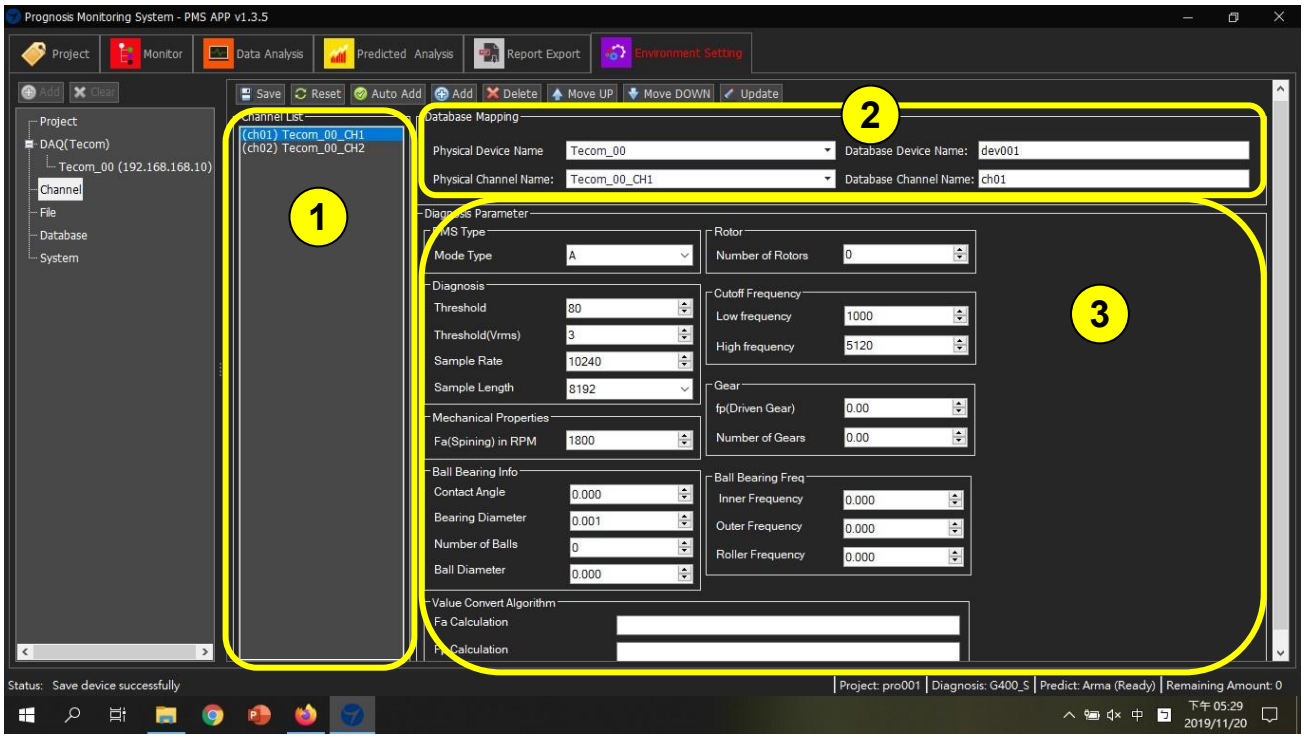
Field	Description
Device Name	The name of the DAQ
Channel Name	Channel selection
Host IP	IP address of the DAQ for communication.
Com Port	Port number for communication

Sample Rate	Sample rate, valid values are 16000 and 32000.
Sample Length	Sample Length
Sensitivity	Make sure it is set to the same value of your sensor sensitivity
Sensitivity Units	Keep it as mVolts/G

4 Command Test:

Field	Description
Open	Open connection with DAQ
Close	Close connection with DAQ
Read Data	Send a single request to DAQ for testing the communication.
Set Rate	Send a "Set Rate" command to DAQ for testing the communication.

3. Channel



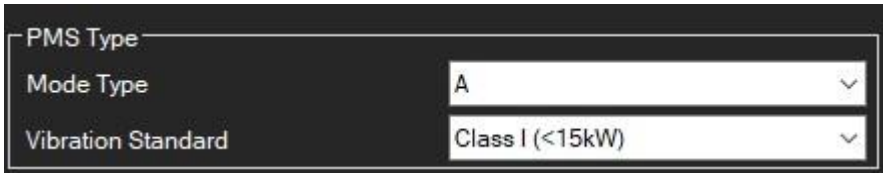
1 Channel List: List of existing channels.

2 Database Mapping:

Field	Description
Physical Device Name	Path name for the CV log file and raw data file.
Physical Channel Name	Path name for the channel specific CV log file and raw data file.
Database Device Name	Reserved
Database Channel Name	Reserved

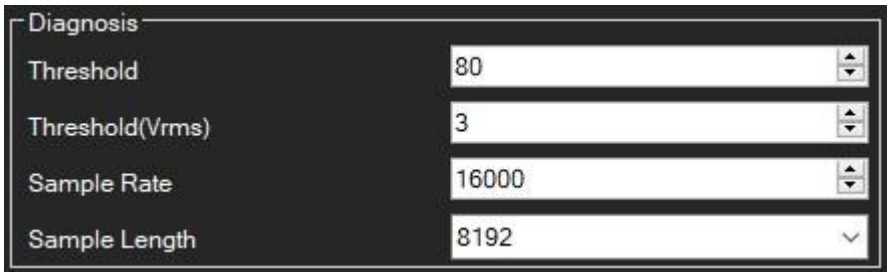
3 Diagnosis Parameter:

- PMS Type:



Field	Description
PMS Type	Reserved
Vibration Standard	Select base on the rated power.

- Diagnosis

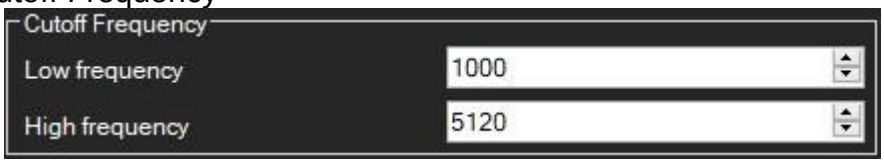


Field	Description
Threshold	There are 17 known defects. The application will calculate the confidence level of each defects. Only when the confident level > Threshold will be shown in the diagnosis information field.
Threshold (Vrms)	Diagnosis process will be activated only when the Vrms > Vrms Threshold.
Sample Rate	Keep it the same as DAQ setting
Sample Length	Keep it the same as DAQ setting

- Mechanical Properties

Field	Description
Fa (Spinning) in RPM	Motor spinning speed in RPM

- Cutoff Frequency

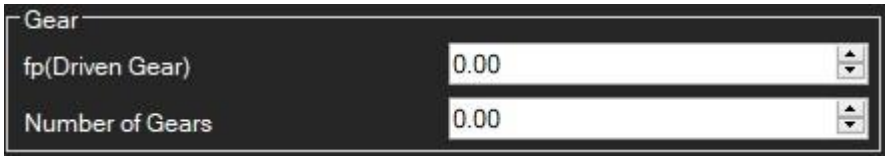


Field	Description
Low frequency	Ignore frequency lower than low frequency
High frequency	Ignore frequency higher than high frequency

- Rotor

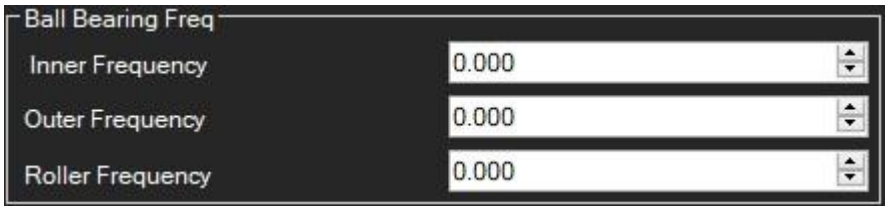
Field	Description
Number of Rotors	Number of rotor bars in a motor

- Gear



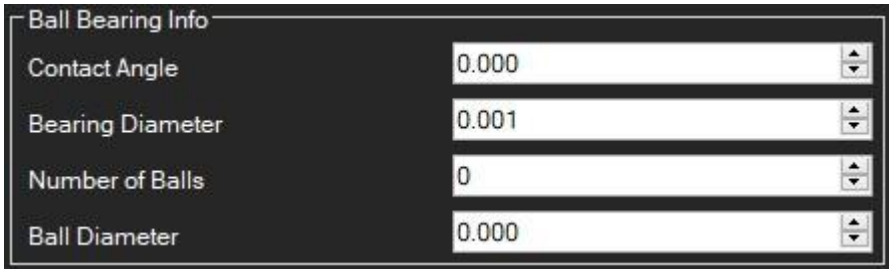
Field	Description
Fp(Driven Gear)	The output speed of a gear box
Number of Gears	The number of teeth of first driven gear.

- Ball Bearing Freq



Field	Description
Inner Frequency	Ball Pass Frequency of Inner Ring
Outer Frequency	Ball Pass Frequency of Outer Ring
Roller Frequency	Ball Spin Frequency

- Ball Bearing Info



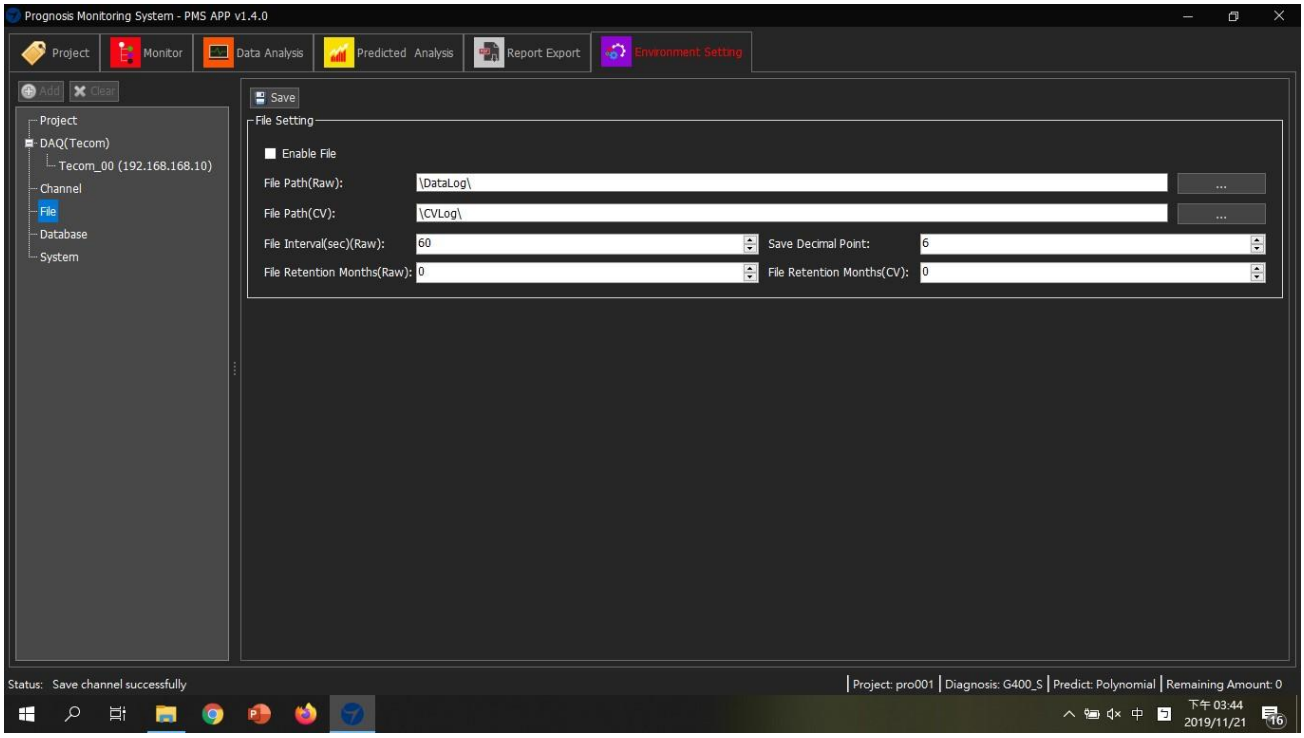
Field	Description
Contact Angle	Contact Angle
Bearing Diameter	The theoretical median diameter of a bearing, which passes through the center of the balls.
Number of Balls	Number of balls
Ball Diameter	Diameter of balls

- Value Convert Algorithm

Reserved engineering interface.

4. File

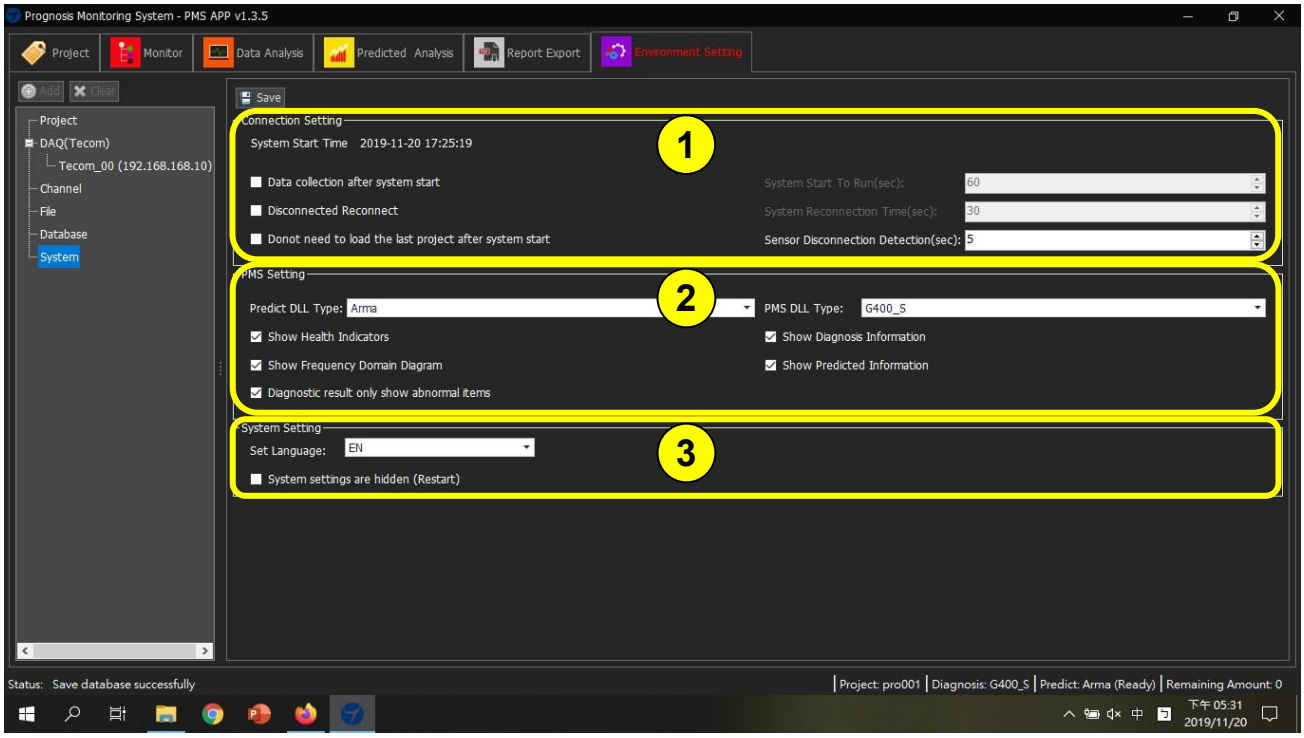
Manage the measured data.



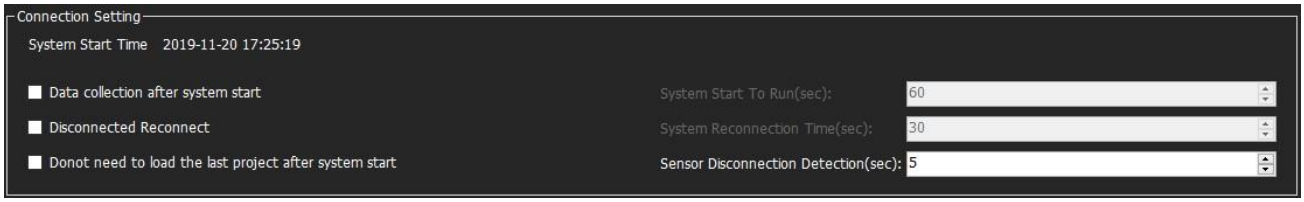
Field	Description
Enable File	Enable/Disable store measured data
File Path (Raw)	The file path for storing the raw data.
File Path (CV)	The file path for storing the CV value.
File Interval (sec)(Raw)	Specify the time interval of a single raw data file.
Save Decimal Point:	Floating point precision of the data value.
File Retention Months (Raw)	Keep only specific months of raw data. 0 means no limit.
File Retention Months (CV)	Keep only specific months of CV log. 0 means no limit.

5. Database (Reserved)

6. System



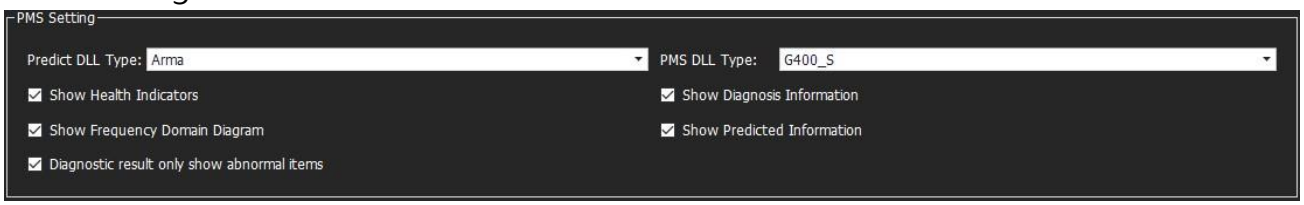
1 Connection Setting:



Field	Description
Data collection after system start	Start collecting data after system start.
System Start To Run(sec)	Waiting Time before start collecting data after system start.
Disconnected Reconnect	Reconnect to DAQ automatically if disconnected.
System Reconnection Time (sec)	Waiting time before reconnect to DAQ after disconnected.

Do not need to load the last project after system start	Do not load last project instead, the default project will be loaded.
Sensor Disconnection Detection (sec)	Timeout for sensor disconnect detection.

2 PMS Setting:



Field	Description
Predict DLL Type	Select the prediction algorithm, Polynomial or Arma.
PMS DLL Type	Do not change this setting.
Show Health Indicators	Show or hide the health indicators.
Show Diagnosis Information	Show or hide the diagnosis information.
Show Frequency Domain Diagram	Show or hide the real-time frequency spectrum.
Show Predicted Information	Show or hide the predicted information.
Diagnostic result only show abnormal items	Enable: If the diagnosis result is normal, nothing will be shown in the diagnosis information field. Disable: Diagnosis result always shown.

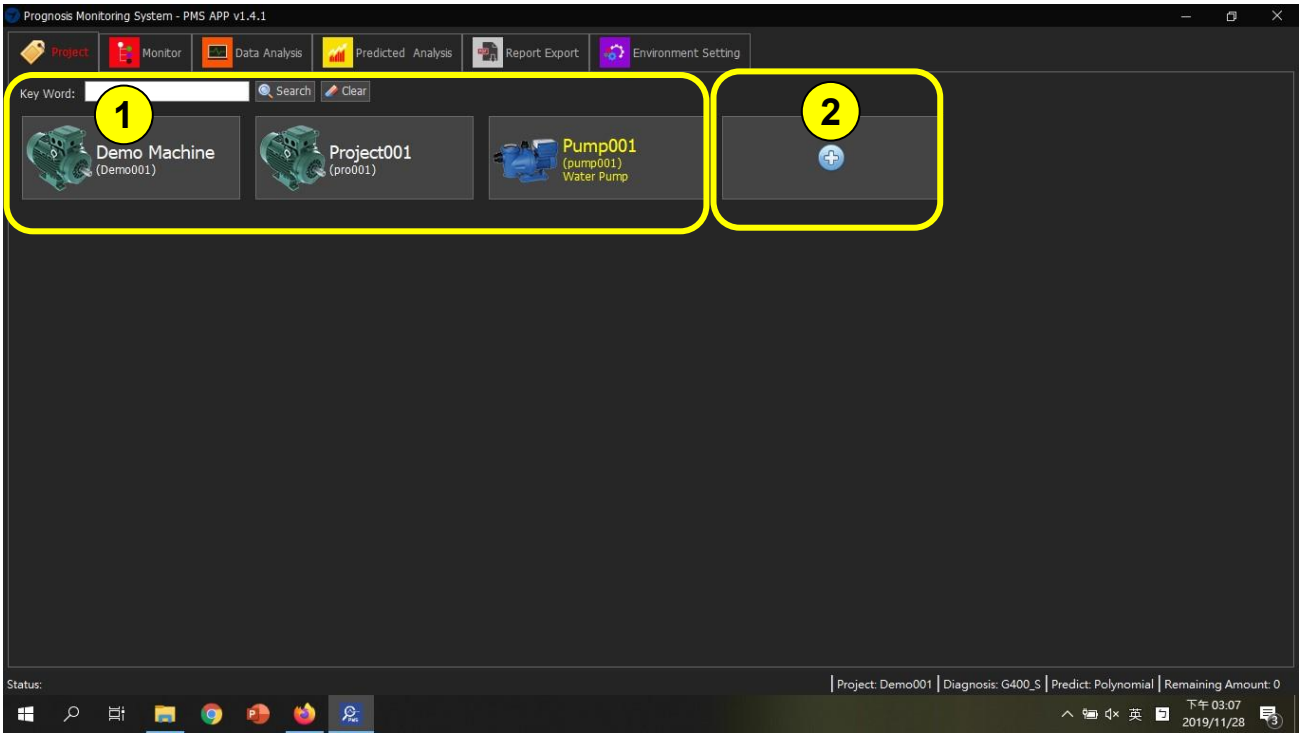
3 System Setting:

Field	Description
Set Language	Select the interface language
System settings are hidden (Restart)	Hide the system setting (Not recommended). Restart PMS Application is required.

Project

The diagnosis of a machine highly depends on the mechanical and electric characteristics. For example, the rated power and speed are critical for a typical motor diagnosis. For bearing, there are much more bearing related information is required for bearing system diagnosis. A project is a collection of these information for a specific machine.

You can find existing projects in Project page.



1 You can tap on an existing project to load the settings.

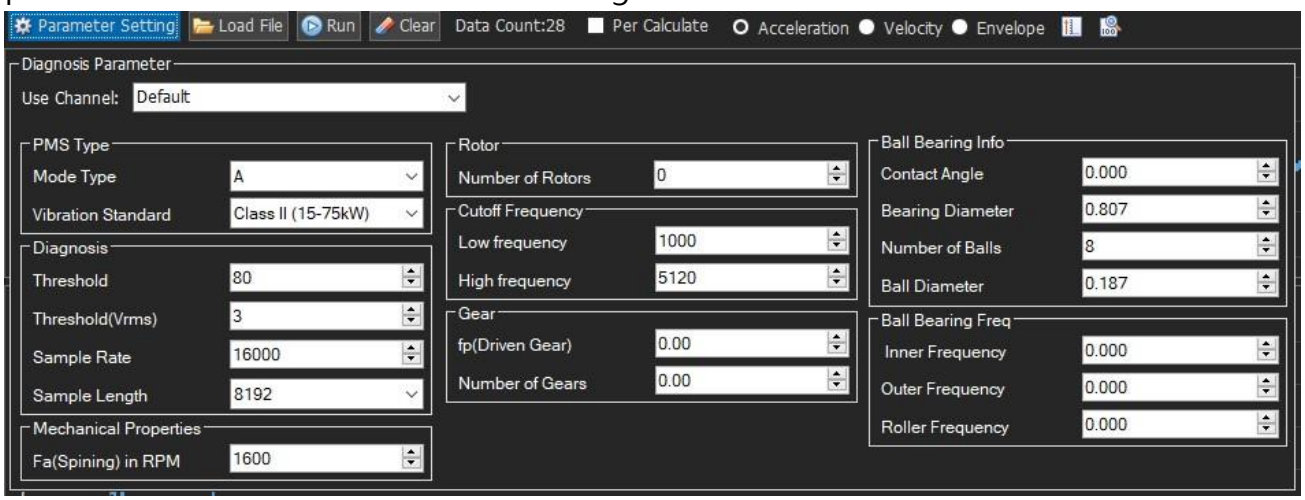
2 If you need to create a new project (New Device), tap on the + icon. It will lead you to the Environment Setting/Project page to create a new one. Refer to Environment Setting Project section for the project creating and setting detail.

Data Analysis

Load stored data and do an off line analysis and diagnosis.

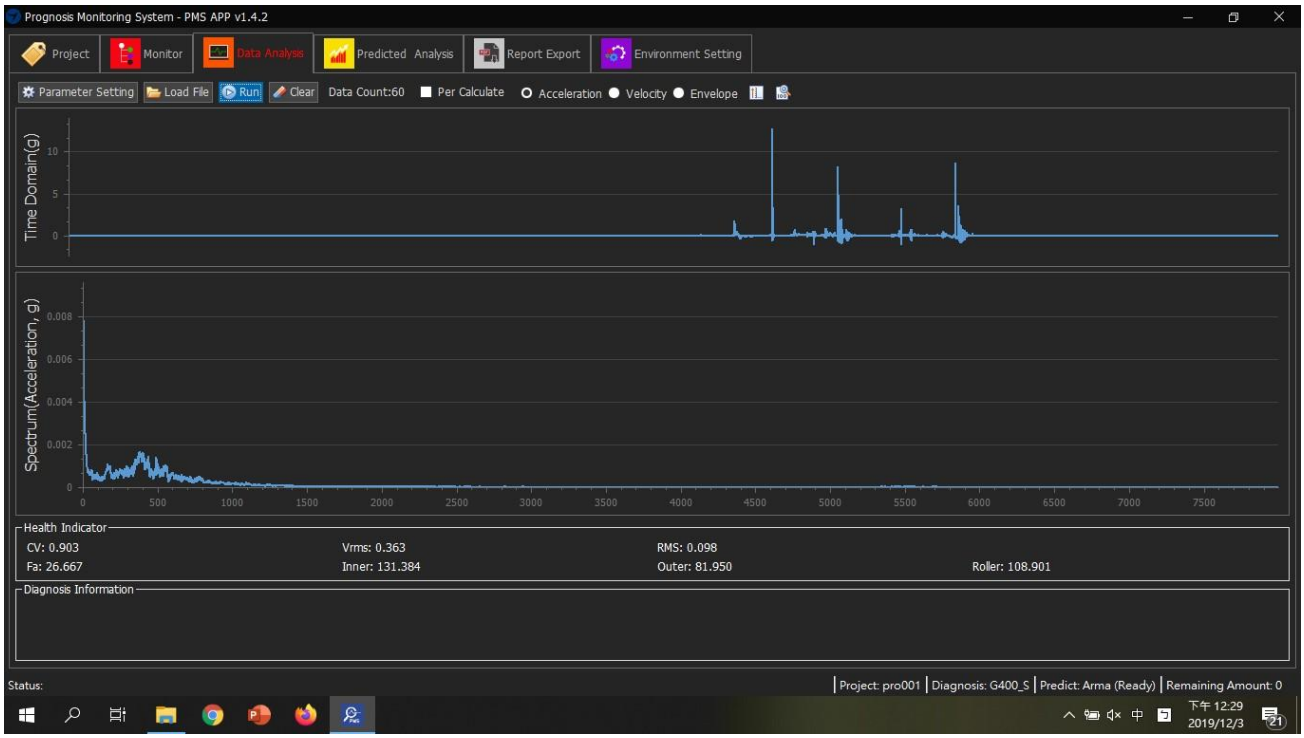
1 Tap on load file to load the raw data from existing file.

2 Tap on Parameter Setting to examine the diagnosis parameters. Be sure the parameters are correct otherwise the diagnosis result will be incorrect.

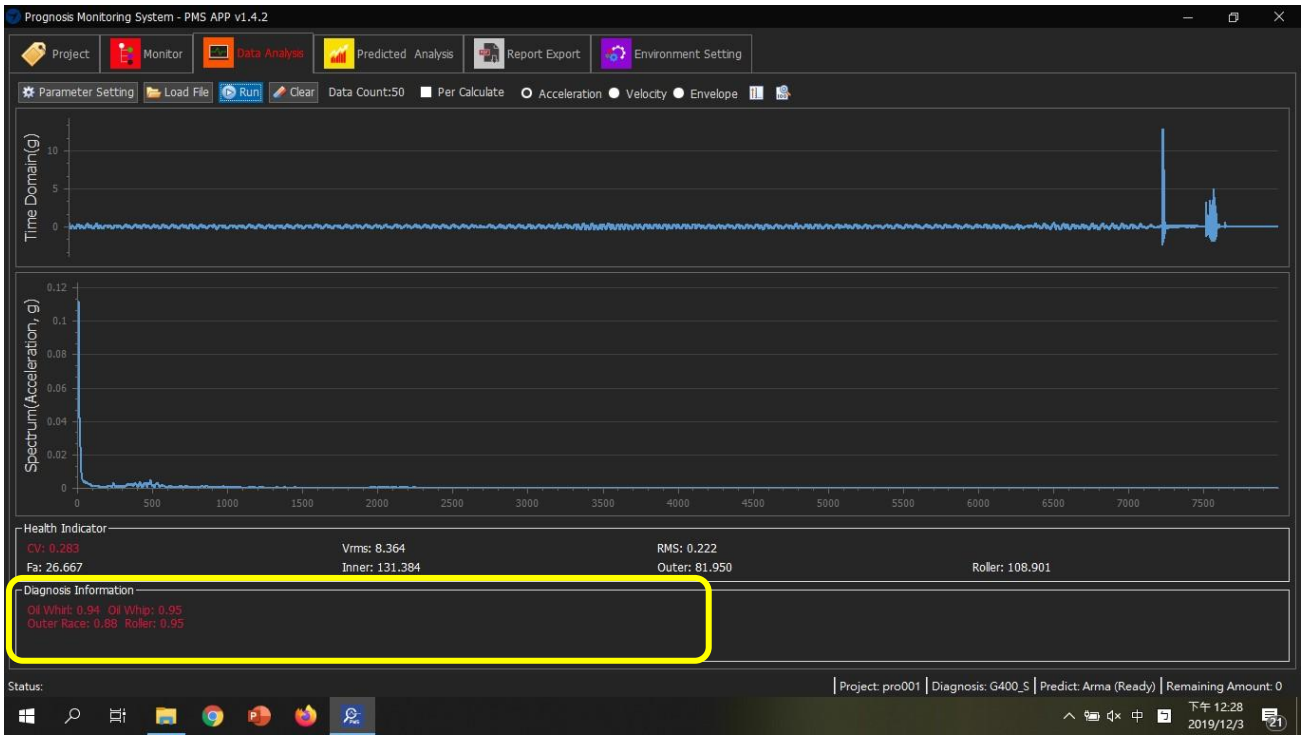


Tap on Parameter Setting again to hide the parameter setting window.

3 Tap on Run to start diagnosis process. If everything is fine, the diagnosis result looks like the following:



If anything goes wrong, the suspect problems will be shown in Diagnosis Information field.



Predicted Analysis

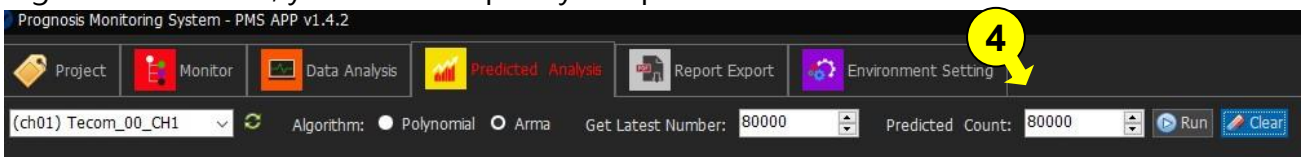
Base on the stored data to do a trend prediction of health index.

1 Select channel first.

2 Select the prediction algorithm. (Polynomial or Arma) This value has to be exactly the same as the Environment Setting\System\PMS Setting\Predict DLL Type.

3 Set the number of samples that will be used for prediction.

4 Set the value of defect if the prediction algorithm is Polynomial. If the prediction algorithm is Arma, you have to specify the predicted count as shown below:



The predicted count is the number of diagnosis. For example, if the diagnosis interval is 1 minute and the predicted count is 80,000 as shown above, the prediction will show you the trend of health index 80,000 minutes from now.

5 Tap on Run to start prediction.

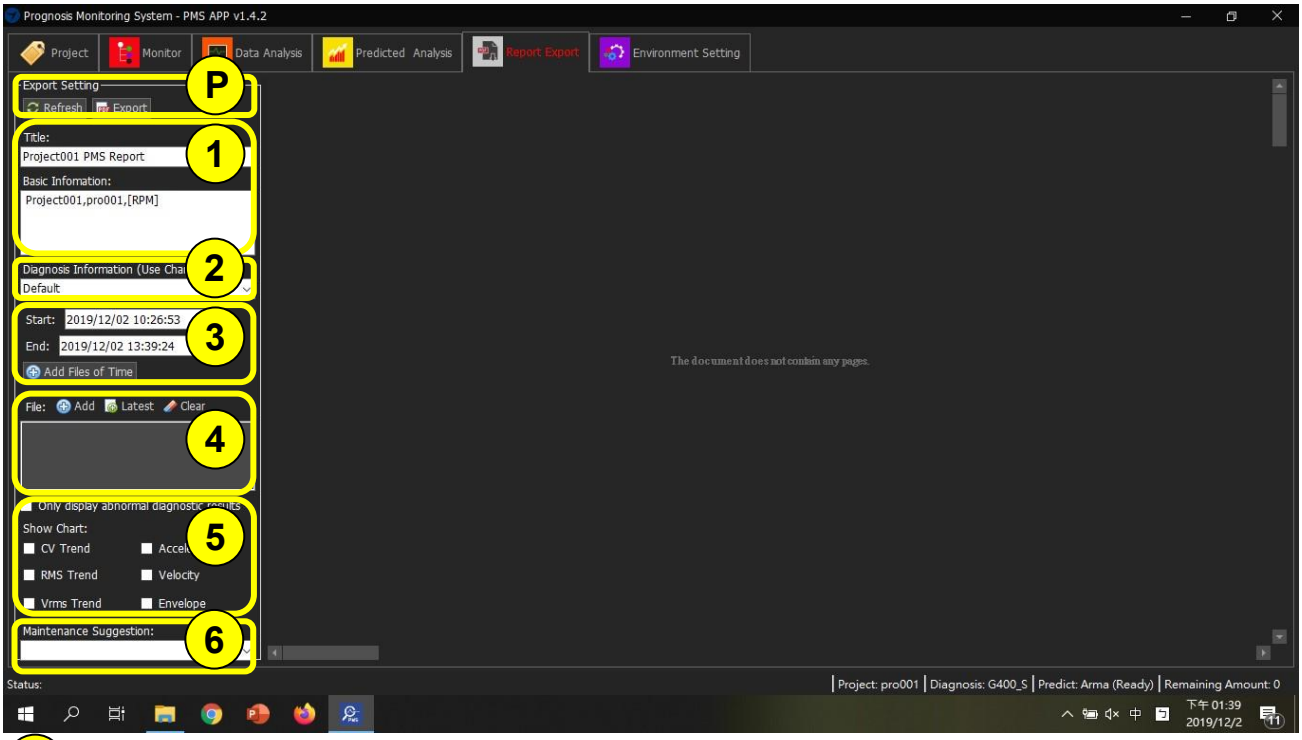
The following is a predicted result using Polynomial algorithm.

The following is a predicted result using Arma Algorithm.

Note: To enable Arma algorithm, MATLAB Runtime 9.6 R2019a is required.

Report Export

Generate and export a report.



1 Some basic information for the report.

2 Select a channel.

3 Specify the time range of data, application will look for the stored data base on the channel specified and the time range. The data files added will be shown in the file list in 4.

4 A list of data files for generating the report. You can add data files in a range of time described in 3 or add a single file to the file list.

5 Options for the report

Field	Description
Only display abnormal diagnosis result	If the diagnosis result is normal, no diagnosis information will be shown in Diagnosis Information field.

CV Trend	Show/Hide CV trend
RMS Trend	Show/Hide RMS trend
Vrms Trend	Show/Hide Vrms trend
Acceleration	Show/Hide Acceleration spectrum
Velocity	Show/Hide Velocity spectrum
Envelop	Show/Hide Envelop spectrum

6 Maintenance Suggestion: A suggestion for current diagnosis result. You can select from the drop menu or input manually.

7 Use Refresh to generate a report and use Export to export the report as a PDF file.

The following is a typical example.