Rotary Machine Condition Monitoring Starter Kit

Hank Lin, Product Manager

ADLINK Measurement & Automation Product Segment

ADLINK

Building Forward Together

Rotary Machine Condition Monitoring Starter Kit

Starter Kit Contains:

- USB-2405 (24-bit 4-CH USB DSA)
- Phoenix GM Lite machine condition monitoring utility license (Microsoft® Windows based)
- Accelerometer (PCB 603C01)
- 10 ft cable for accelerometer
- Mounting magnet

Benefits

Reduces:

- Failure-related downtime
- Hazardous events and malfunction
- Excess maintenance costs

Starter Kit Value Proposition

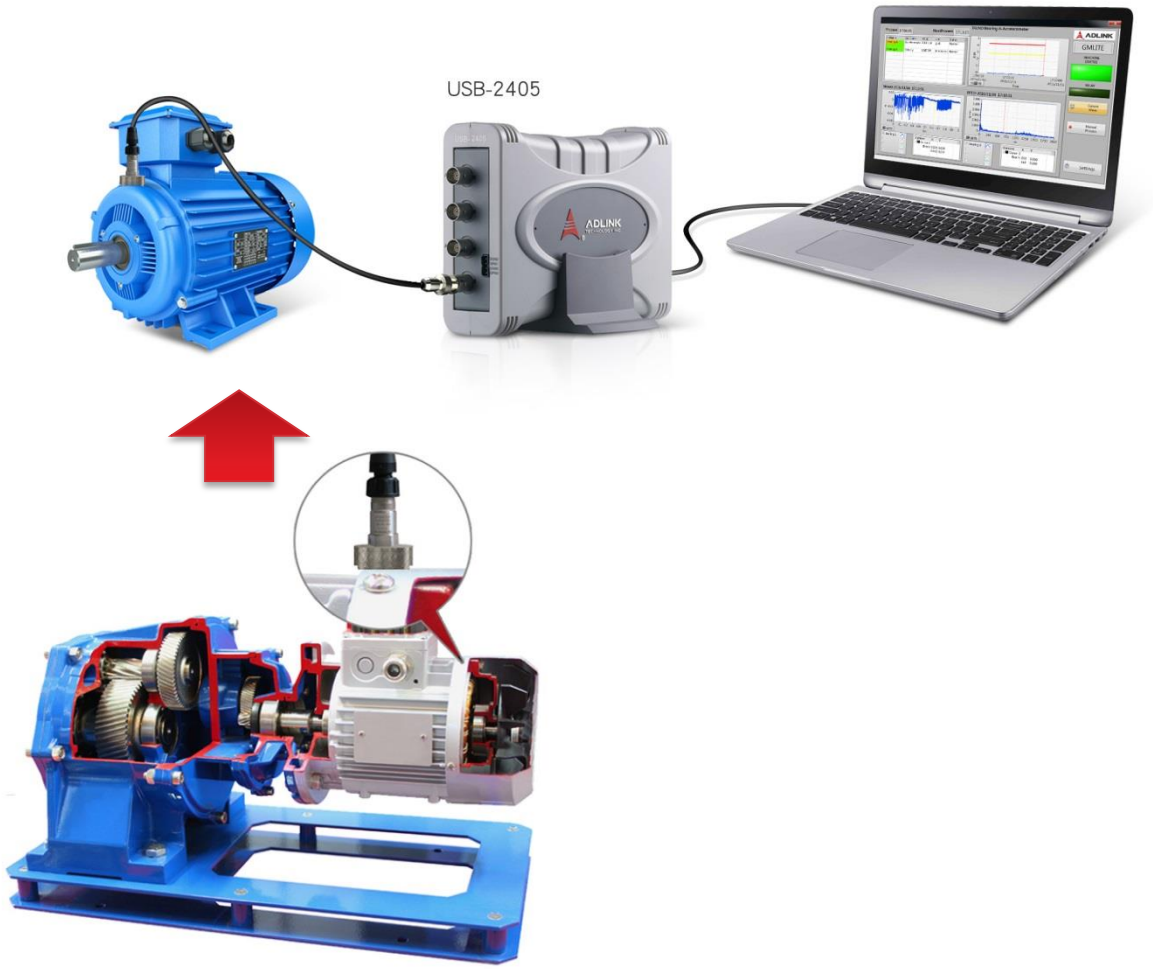
- All-in-one starter kit provides cost-effective solution
- Ready-to-go Kit immediately confirms solution POC
- Customers benefit from ADLINK and partners' technical expertise

Highlights

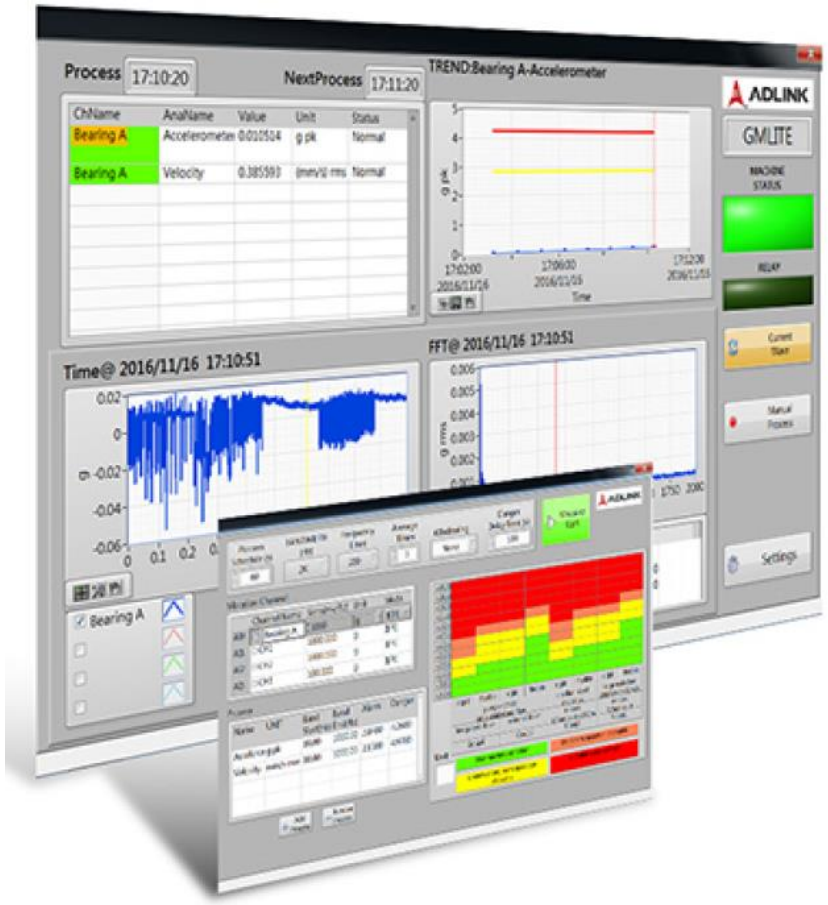
- Easily set up, ready-to-go starter kit for rotary machines
- USB-2405 24-bit 4-CH USB DAQ
  - USB bus power means no additional power supply is required
  - Built-in IEPE 2mA excitation current eliminates the need for supplementary signal conditioning devices to drive the accelerometer
- Phoenix GM Lite machine condition monitoring application:
  - No programming required.
  - Automatic OA (overall) calculation of displacement, velocity, and acceleration
  - Alert issued when pre-defined parameters are exceeded
  - Real-time display of acceleration waveform and FFT and recording raw data
- Quick attachment of accelerometer to the rotary device with integral magnetic mount means no adapter or additional fastening is required

Ready to acquire data immediately

- USB-2405 USB bus power requires no additional power supply
- Included accelerometer meets most requirements for machine vibration measurement, and connects directly to USB-2405, requiring no additional signal conditioning
- Integral accelerometer mounting magnet conveniently and instantly attaches to the device to be measured, with no need for adaptor or connector



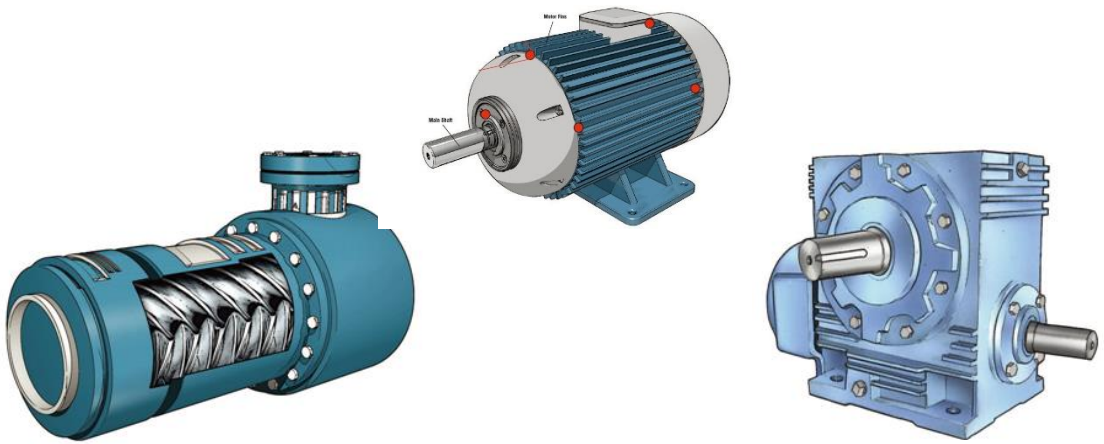
Ready to go, No programming required



- Phoenix GM Lite machine condition monitoring application:
  - No programming required.
  - Automatic OA (overall) calculation of displacement, velocity, and acceleration
  - Issues alert when pre-defined parameters are exceeded
  - Real-time display of acceleration waveform and FFT and recording raw data

24/7 online monitoring and failure prediction

- **Acquisition:** Collects operating status of machine from accelerometer(s) and USB-2405
- **Analysis:** Calculates different overall (OA) bandwidth and condition data, generating alerts when pre-defined alarm and condition parameters are exceeded
- **Recording:** Raw data displayed and stored



About Overall (OA) Vibration

- Overall vibration is an effective quantization of vibration energy within a frequency range, standardized by ISO 10816 recommending suitable OA parameters for different rotary machines

- $OA = \frac{\sqrt{A1^2 + A2^2 + \cdots + An^2}}{\sqrt{N_{BF}}}$

Vibration Velocity		Group 4 Integrated Driver		Group 3 Integrated Driver		Group 2 Motors 160 mm ≤ H < 315 mm		Group 1 Motors H ≤ 315 mm	
		pumps > 15 kW radial, axial mixed flow				medium sized machines 15 kW < P ≤ 300 kW		large machines 300 kW < P < 50 mW	
mm/s rms	inch/s rms	Rigid	Flexible	Rigid	Flexible	Rigid	Flexible	Rigid	Flexible
18	0.71				D				
11	0.43				C				
7.1	0.28								
4.5	0.18				B				
3.5	0.14								
2.8	0.11								
2.3	0.09								
1.4	0.06				A				
0.71	0.03								

ISO 10816 Vibration Severity Chart

Where

OA=overall vibration spectrum

A_i=amplitude of each FFT line

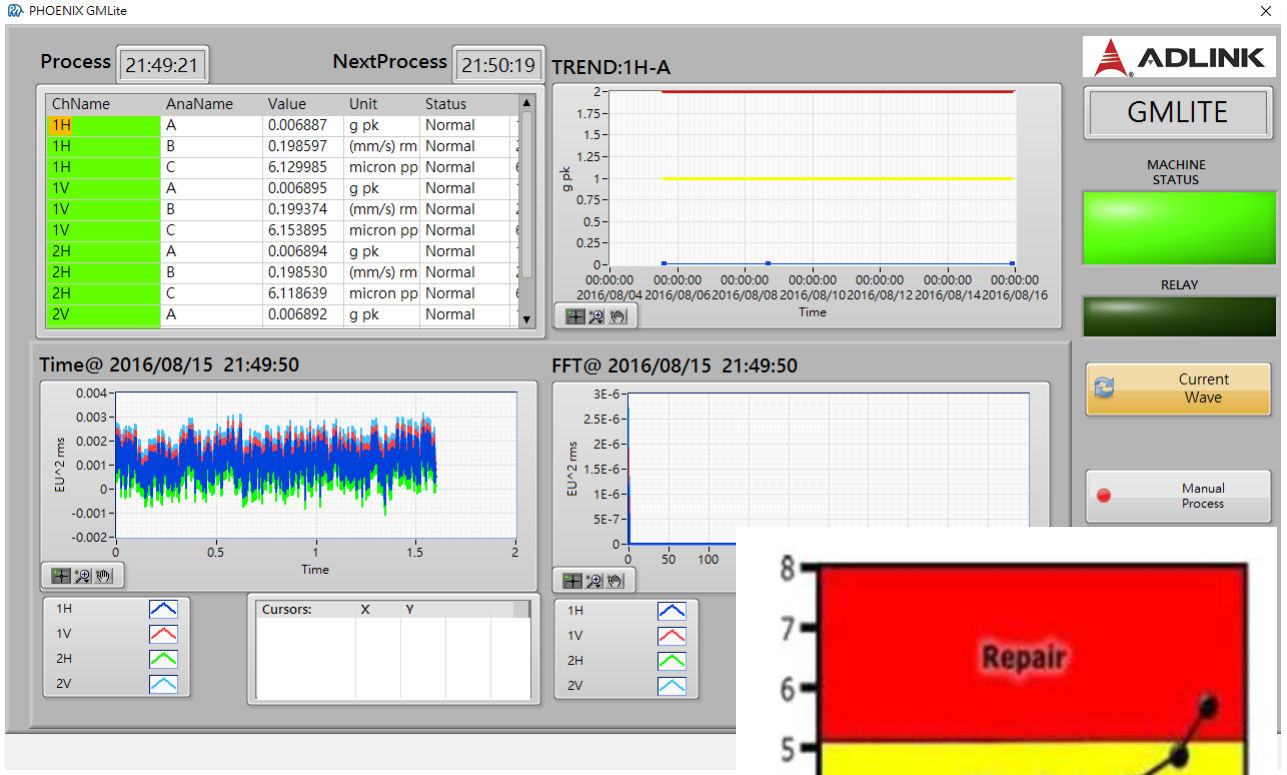
N_{BF}=Noise bandwidth for Window chosen

Phoenix GM Lite

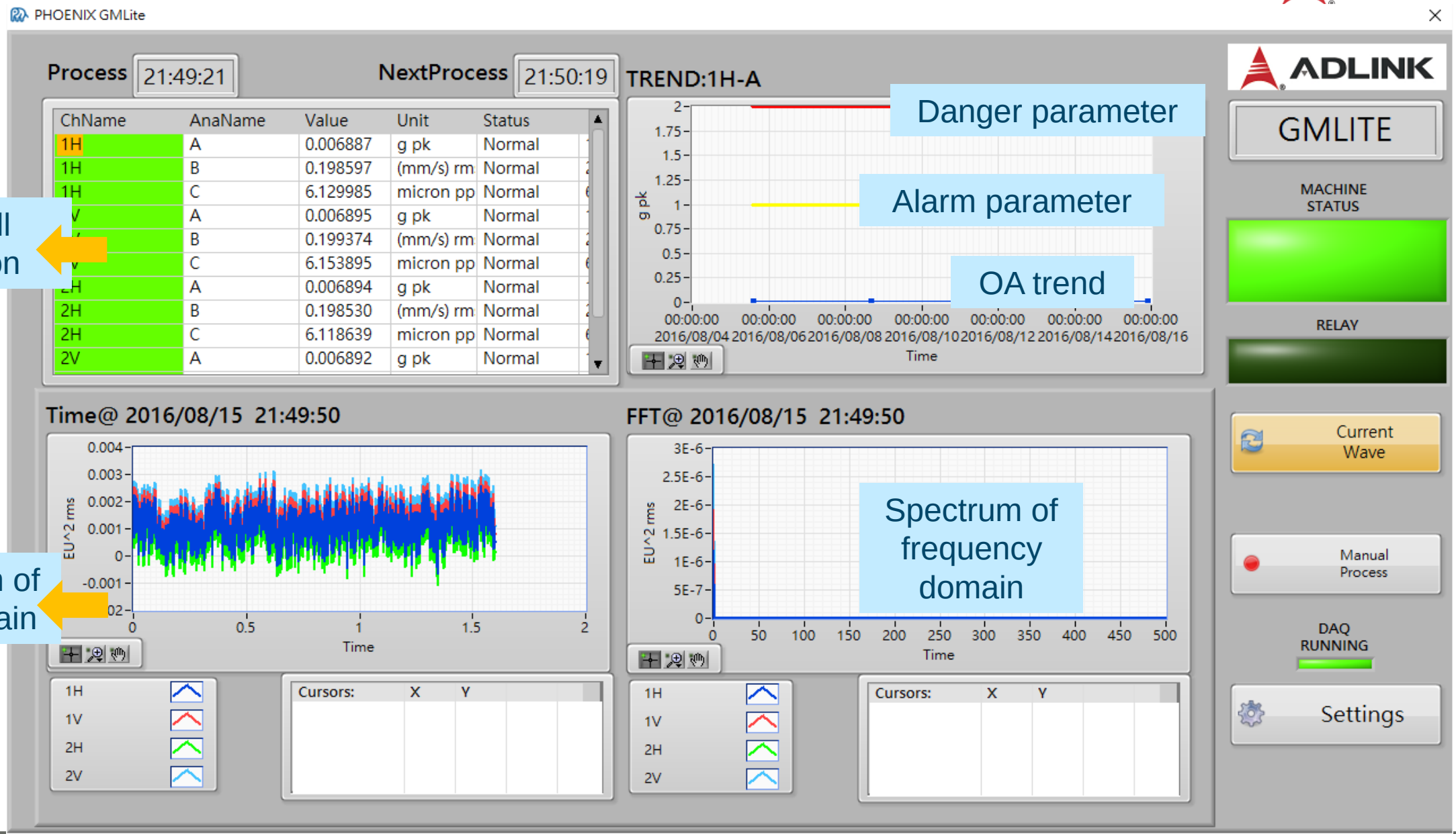
Efficient Machine Condition Monitoring

Features：

- 4CH simultaneous sampling at pre-defined intervals (min. 60 seconds)
- Automatic OA (overall) calculation of displacement, velocity, and acceleration
- Real-time display of acceleration waveform and FFT
- Threshold settings for conditions user-defined or by default with ISO 10816 machinery vibration standards
- Trend display and report generation
- Efficient raw data storage:
  - Below alarm level ➔ recording OA only
  - Exceeding alarm level➔ recording raw data for further analysis



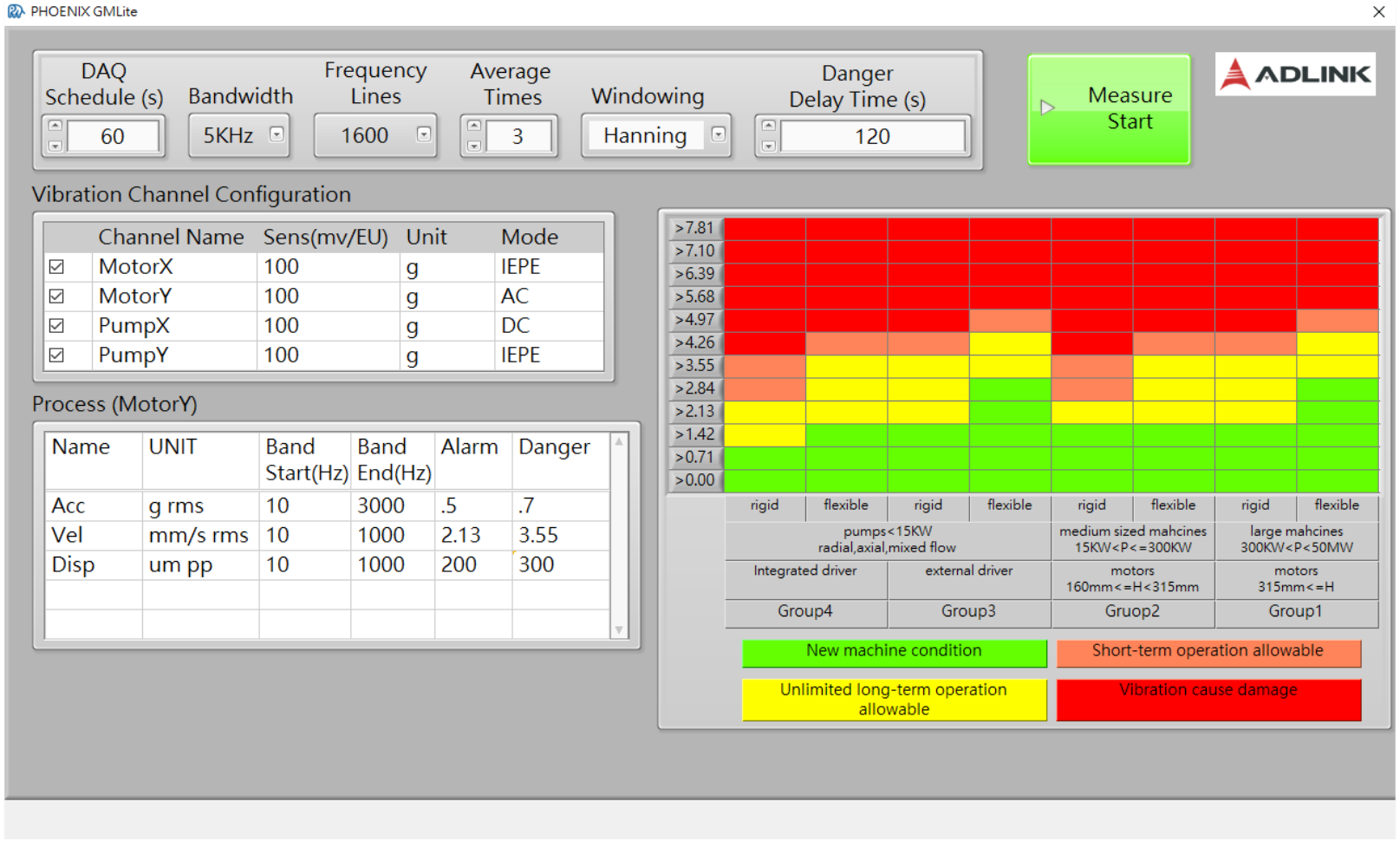
Phoenix GM Lite Front Panel



Overall vibration

Waveform of time domain

Phoenix GM Lite Configuration Panel



Rotary Machine Condition Monitoring

Phoenix GM Lite can be hosted on MXE-200 Gateway or notebook

Rotary Machine Examples

Motor

Pump

Blower

Gear/Bearing

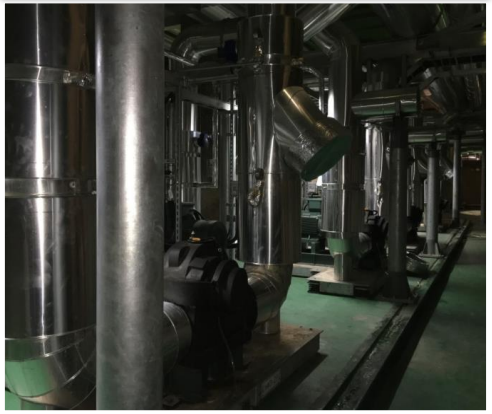
Roller/Conveyer

Target Customers & Application Examples

Exhaust fans of semiconductor factory

Reactor of petrochemical factory

Compressor of petrochemical factory



Chiller

- Manufacturers and users of rotary machines
- Tooling machine makers and users
- Manufacturers and administrators of facility assets
- Automation manufacturers and users

FAQ

[Question] How can I get Phoenix GM Lite?
[Answer] The GM Lite can be downloaded from ADLINK's website, by searching for "rotary machine condition monitoring starter kit".

[Question] Can we run GM Lite software alone (without USB-2405)?
[Answer] No, you have to run it with USB-2405, which acts as the hardware keypro of the GM Lite application.

[Question] How can I activate GM Lite?
[Answer] Follow the Quick Start Guide included in the package to get the license file of GM Lite and copy the license to the folder.

[Question] How do I mount the accelerometer on the machine to be monitored?
[Answer] The integral mounting magnet lets you mount the accelerometer directly on the machine.

[Question] Where is a suitable location to mount the accelerometer ?
[Answer] Close to the rotating shaft.

FAQ

[Question] What's the accuracy of failure prediction for GM Lite?

[Answer] While overall vibration measurement is effective, definition of suitable parameters for different machines is critical. To increase the accuracy of failure prediction, collecting data for a complete cycle (from optimum to fail) is required. It is ideal to collect data from the first installation or immediately following annual maintenance to failure to define acceptable alarm and condition parameters. If desired, GM Lite's built-in ISO 10816 machine vibration standards for default settings can be used, with no need for user preset.

[Question] Can GM Lite identify malfunctioning or inoperative parts or components?

[Answer] Although GM Lite measures overall vibration (OA) as a quantization, for defining health status of machines, it is not designed to identify parts or components which may be causing the unacceptable measurement results. When overall vibration exceeds acceptable limits, the user should contact the vendor for further instructions.

FAQ

[Question] Is it possible to acquire library or source code for GM Lite?

[Answer] No, library or source code for GM Lite are not available.

[Question] Can GM Lite's trend chart, OA calculation result, and raw data be linked with customer database or data center for centralized monitoring and integration ?

[Answer] No. GM Lite is a standalone application and cannot link with other databases. Users can receive trends and results via interface, or generate reports in Excel or TXT format. Linking or integration with customer databases will be a customized project with NRE required.

Appendix: USB-2405 Specifications

Channel No.	4
Mode	Diff/P-Diff
Resolution	24
Max. Sampling rate	128 kS/s
Input coupling	AC/DC
AC cut-off Freq.	0.4Hz (-3dB)
	2.4Hz (-0.1dB)
Dynamic range	100 dB
THD	-94 dB
THD+N	-91 dB
Input Range	±10V
IEPE excitation current	0 or 2mA
IEPE compliance	24V
Over-Voltage protection	±60V
Trigger source	Analog (any AI), digital
Trigger mode	Post, delay, middle, gated, pre-trigger, re-trigger
Auto-calibration	YES

Appendix: PCB 603C01 Accelerometer Specifications

Performance	
Sensitivity (±10 %)	100 mV/g
Measurement Range	±50 g
Frequency Range (±3 dB)	0.5 to 10,000 Hz
Resonant Frequency	1500 kcpm
Broadband Resolution (1 to 10000 Hz)	350 µg
Non-Linearity	±1 %
Transverse Sensitivity	≤7 %
Environmental	
Overload Limit (Shock)	5000 g pk
Temperature Range	-65 to +250 °F
Enclosure Rating	IP68
Electrical	
Excitation Voltage	18 to 28 VDC
Constant Current Excitation	2 to 20 mA
Output Impedance	<150 Ohm
Output Bias Voltage	8 to 12 VDC
Physical	
Size - Hex	11/16 in
Size - Height	1.65 in
Weight	1.8 oz


ADLINK
TECHNOLOGY INC.