Smart Sensors plus OEMs equals a PHM Paradigm Shift...

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Smart Manufacturing PHM Panel Discussion
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Leveraging Disruptive MEMS Technology...

Solid state MEMS accelerometers are ‘game changing’ as performance achieves parity with PZT...

21kHz MEMS Accelerometers introduced April 2017

Triaxial low power, low noise MEMS Accelerometers introduced May 2017
MEMS Accelerometer Spectral Response
(Innovation Award winner, Sensors Expo, San Jose, June 2017)

- Noise density over frequency
- Low noise across the baseband
- 1/f corner 0.1Hz
- 11kHz tone
Low Power Electronics Enables Wireless

- Single supply signal conditioning electronics
  - Reduce industrial voltages
  - Easier to interface

- Extends battery life

- Smaller form factors
  - Dominated by battery size, antenna

MEMS performance now on par with Piezo

Legacy ➔ MEMS technology
Embedded Smart Sensors
Enabled by Solid State Electronics

- Statistics
- CI’s
- Spectral content
- Alarms
### CBM Instrumented Industrial Component Pipeline...
#### OEM Capture of CBM Value with Embedded Vibration Sensors

<table>
<thead>
<tr>
<th>Sensor Value</th>
<th>Machine Characterization / R&amp;D</th>
<th>Prototypes</th>
<th>Pilot</th>
<th>Go-to-Market</th>
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</thead>
<tbody>
<tr>
<td>Note: Images are for demonstration purposes, not necessarily representative of actual OEM Programs</td>
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CBM/ PdM Modalities
OEMs Begin Contribution...

Amount of Data / Modeling / Characterization (was Accelerometer Resolution / Frequency)

CONDITION MONITORING

DIAGNOSIS

PROGNOSTICS or PREDICTIVE MAINTENANCE
Thank you.

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