

Semiconductor dry pump monitoring solution boosts productivity and efficiency

Application Story

Uniquely developed by ADLINK and Prowave, this completely new approach addresses limitations of legacy methods



The demand for new technology

To improve overall production efficiency, advanced semiconductor manufacturing processes are increasingly demanding optoelectronic panels and highly accurate, reliable equipment. This is driven by the need for higher yields and performance monitoring of new and key equipment such as dry vacuum pumps.

A new dry pump monitoring solution developed by ADLINK Technology and Prowave Electronics was uniquely built by combining the know-how, strengths and capabilities of two leaders in their fields. This solution is the first of its kind, offering the most comprehensive and detailed monitoring service. It can help you build a non-stop wafer production line, minimizing interruptions and maximizing manufacturing yield by:

- enabling production floor staff to monitor pumps efficiently and in real-time.
- supporting easy operational analysis of intelligent data by IT teams.

Solving legacy pain points

Dry vacuum pumps fall into two main categories – claw type or screw type. With either of these pumps, there are three major pain points when using the traditional, vibration monitoring method.

High frequency vibration: The performance indexes generally used include pressure, flow, temperature, current and vibration. However, vibration generates high-frequency signals which are difficult to monitor and capture via the basic sensors.

Quantity and diversity: Manually monitoring a large number of pumps over an extensive manufacturing facility requires excessive manpower. In addition, there are many differxent models of pump commonly in use and each model requires a customised monitoring and management program.

Labour intensive processing: The data collected is often complex and mostly raw data. To provide any useful key indicators, it requires time-consuming, labour intensive processing which ultimately has a negative impact on production.

The new combined soft and hardware solution delivers a highly flexible, efficient and definitive monitoring approach; making it easy to manage and predictively maintain all types of dry pumps and on a large scale.

Increased yield from first of a kind solution

ADLINK and Prowave have used their combined expertise to develop a monitoring solution to suit all dry pumps. The semiconductor manufacturing industry already boasts an impressive yield rate of over 90%, making it difficult to increase by a percentage point. However, after testing, the new solution has been proven to add another 1% to the yield.

Prowave leveraged its experience in analysis and the results of thousands of equipment problems encountered over many

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years to develop diagnosis techniques for the solution. The company creates customised algorithms which are integrated into the ADLINK smart DAQ device.

Pumps are constantly monitored and their status easily checked via a central computer screen. Two percentages display the current and predicted health – a lower predicted percentage indicates the pump may have potential issues. Most pump problems can be identified using four common indexes: balance, looseness, and any peculiarities in the motor or pump which directs maintenance towards the exact area needing repair – for example, loose rotary bearings or unbalanced motor shaft.

These health and early indicators support predictive and preventative maintenance by flagging any areas needing attention before they escalate, cause unexpected failures and disrupt the production line.

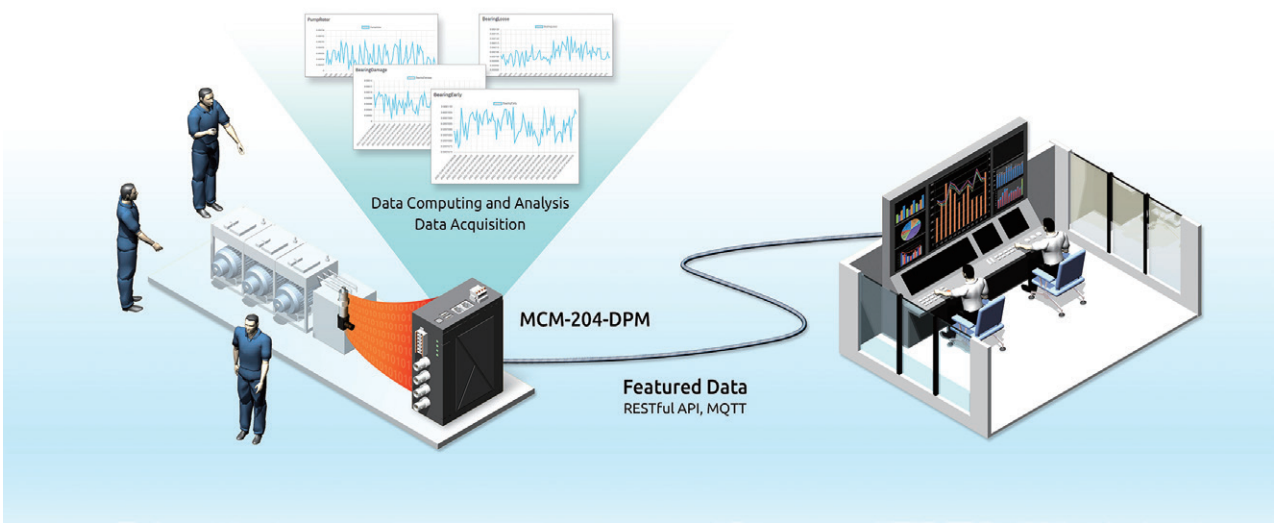
Impressive benefits

This solution offers a comprehensive range of benefits over legacy monitoring including:

- ARM-based edge computing device enables 24/7 real-time data analysis to Increase productivity and operational efficiency
- Two mainstream (claw or screw) dry vacuum pump monitoring algorithms for plug and play without further program development.
- Efficiently capture vibration signal and process raw data to featured data for predictive maintenance
- Optimized for configuration with most dry vacuum pumps, simultaneously supports input from up to four sensors and monitors two pumps.
- Supports four key indicators of dry pump to efficiently check which prevents from shutdown without warning
- Remotely manage all dry pumps, easy to upgrade and maintenance

Huge potential for application development

The co-operation of the two companies has established a model using edge computing with monitoring algorithms. This platform has the potential to be multi-dimensional and could be adapted for a broad range of applications related to rotating machinery. Discussions with customers have also underlined the demand for energy monitoring - a solution to provide insights into current consumption and how to move forward towards energy transformation.



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