

USE CASE

Steel Mill Reduces Maintenance Costs by More than 50% After Adopting ADLINK's Machine Condition Monitoring Solution

The energy-intensive and capital-driven steel industry involves complex processes: starting from iron ore, and through continuous sintering, smelting, rolling, heat treatment, and mechanical processing, the final product is ultimately obtained. Steel production requires auxiliary machines such as dust removal fans, cooling water pumps, and lubricant pumps, all of which must continually operate throughout the entire steel production process. If a failure or warning occurs, the production line may be shut down to avoid work safety issues, possibly resulting in huge losses. Recently, ADLINK has cooperated with a major Taiwan steel plant to build a machine condition monitoring system, the MCM-204. In addition to making the production line safer and more stable, development and maintenance costs decreased by more than 50% compared with the original solution.



Challenges

The steel mill originally operated using a data acquisition (DAQ) card installed in a computer. The programmable logic controller (PLC) determined and acted on the RMS value (indicative value) of the machine operating condition and then transmitted it to the backend dashboard for maintenance personnel to monitor. This process involved the following activity:

- Vibration sensor receives motor vibration signals
- DAQ converts vibration signals into digital signals
- Computer converts digital signal to RMS value that can be read by PLC

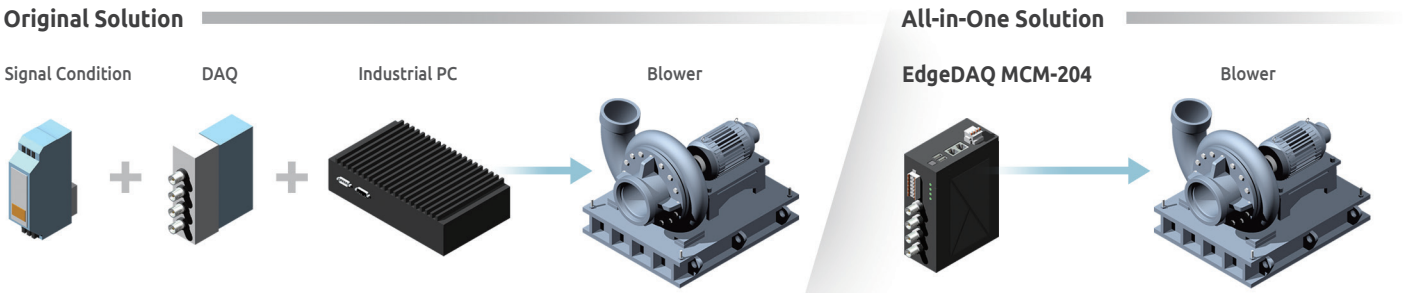
The Solution

In terms of production line operation, the computer was only hosting the DAQ card and converting the signal to RMS; that is, the ROI was very low. The ADLINK team assessed the overall situation and determined that the following conditions would need to be met to find a solution:

- **Due to the harsh environment of the steel plant, industrial-grade products are needed. Resistance to high temperatures and dust is essential.**
- **The existing electrical box has limited space, so the new system should have a compact design.**
- **The new system should be an independently operational DAQ platform capable of outputting RMS/MMS values without an additional computer module and be capable of real-time transmission of the values.**
- **In the event of any abnormality, the new system should be able to issue an immediate warning.**

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The upper part of the figure below ("Before") shows the steel plant's original solution. The computer architecture required a hardware configuration and programming element for obtaining and converting analog signals into RMS/MMS, which was time-consuming and labor-intensive. After switching to ADLINK's MCM-204 solution, only a single, standalone DAQ was needed to meet the functional requirements, and the hardware configuration was simplified into a compact device with a built-in, web-based configuration interface. Complex settings could be configured in minutes, saving effort, shortening online time, and reducing development costs.



Customer Benefits

Overall, after adopting ADLINK's machine condition monitoring solution, the steel plant achieved the following benefits:

- ***Benefit 1: Maintains a safe and reliable production line***

Stability is essential to production equipment, especially pumps and compressors, which have a direct impact on the operation of the production line. ADLINK's machine condition monitoring system ensures stable operation to prevent unexpected equipment failures that could result in production shutdowns and shipment delays, which could damage a business's reputation.

- ***Benefit 2: Significantly reduces maintenance costs***

ADLINK's MCM-204 solution uses a standalone DAQ platform. In addition to conforming to the existing limited space, the computer/DAQ architecture is combined as a single DAQ platform, reducing hardware development time by at least six months. Compared with the original solution, overall costs are reduced by at least 50%, and data can be checked at any time through the built-in web console, which further reduces development and maintenance costs. If the DAQ device behaves abnormally, it can be replaced within ten minutes and be easily reconfigured to resume normal operation, greatly reducing device downtime.

- ***Benefit 3: Ensures worker safety***

The monitoring mechanism can determine the status of dust removal fans, cooling water pumps, lubricant pumps, compressors, and other machines. It provides real-time monitoring and reduces the probability of worker accidents.

The steel plant's machine condition monitoring system needed to be installed at 200 monitoring points at various locations. The MCM-204's standalone design is easily integrated on-site to perform data filtering, greatly reducing the bandwidth required for data transmission and effectively helping manufacturing industry and mechanical equipment suppliers reduce the total cost of ownership by 70%, improving the overall rate of return.

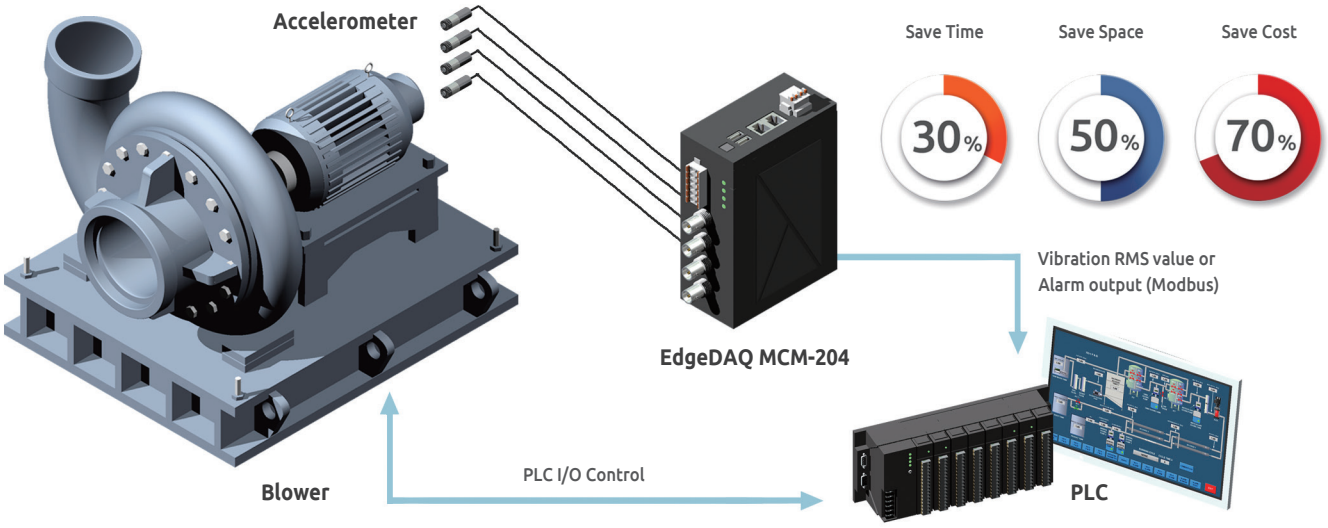
The MCM-204 has two built-in Ethernet ports, supports daisy-chaining, and collects and filters data, which it can send back to the PLC or back-end server in real time. The device also supports edge computing, which can be used to monitor vibration-related indicators such as voltage, FFT, and RMS. The MCM-204 is also suitable for 24-hour vibration monitoring of rotating machinery and equipment.

In addition, the MCM-204 supports a variety of data types and interfaces. Through its built-in web console, the MCM-204 provides real-time, uninterrupted remote system management and firmware/algorithm updates, which is ideal for remote real-time monitoring, analysis, and control. To achieve a decentralized architecture, ADLINK's MCM-204 provides an exclusive "custom analysis algorithm" import mechanism, allowing users to safely migrate proprietary algorithms for industrial applications to the MCM-204. In the steel industry, the warning value for self-configured motor vibration is put in, and when the equipment behaves abnormally, a warning can be issued immediately.

Conclusion

With more than 20 years of experience in industrial automation, ADLINK provides comprehensive solutions, from front-end sensors to top cloud management platforms. ADLINK's MCM-204 machine condition monitoring system is extremely stable, greatly simplifies the deployment process, and goes online quickly. In addition to the iron and steel industry, the MCM-204 is ideal for semiconductor, display panel, pulp and paper, and other large-scale manufacturing industries. With the MCM-204, factory managers cab leverage real-time machine condition monitoring to maintain the health of their production equipment and take their first steps toward smart transformation.

Architecture Diagram



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