CASE STUDY

Increase your pump's life through real-time monitoring

How an Omron K6CM motor monitoring device helped prevent pump damage from cavitation

This case study illustrates a common issue that many global manufacturers of consumer products face when trying to maximize the lifespan of their equipment. For predictive maintenance to be effective, it's essential to get a timely warning whenever problems arise, or else the maintenance efforts may come too late. Real-time monitoring can therefore make a huge difference in equipment lifespan and save significant amounts of money.

This case study looks at the implementation of a real-time monitoring system for a bottle washing machine's water pump.

The Customer Issue: pump cavitation

An Omron customer was having difficulties with the water pump on a bottle washing machine. When air bubbles were present inside the pump, their rupture would damage the pump's piston or screw. This reduced the lifespan of the piston and lowered the water pressure that the pump was outputting.

The root cause of this issue was pump cavitation. This refers to the formation of bubbles or cavities in areas of relatively low pressure around the impeller of a pump. Cavitation is a common issue that can severely impact a pump's longevity, since imploding bubbles tend to trigger intense shockwaves inside the pump that damage the impeller and the pump housing. This results in excessive vibration and causes the pump to use a disproportionate amount of energy.

If left unchecked, pump cavitation can greatly reduce the lifespan of the pump's internal components and potentially cause the whole pump to shut down unexpectedly. Fortunately, with advanced warning that cavitation is occurring, it's possible to adjust the application conditions to reduce or eliminate the formation of bubbles.

The application solution: a real-time monitoring system

In order to help our customer prevent costly pump damage by getting an early warning that cavitation or air lock was occurring, we implemented a real-time monitoring solution. We'd previously used the K6CM

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Business Need

An Omron customer was dealing with reduced longevity of the water pump on a bottle washing machine due to excessive vibration caused by cavitation.

Unique Solution

We set up a real-time monitoring system using an Omron K6CM motor monitoring device that would alert the customer when pump cavitation or air lock was occurring.

Customer Benefits

Our customer now receives immediate alerts whenever the pump starts cavitating and can take action in a timely manner to figure out what's causing the cavitation and schedule the necessary maintenance.

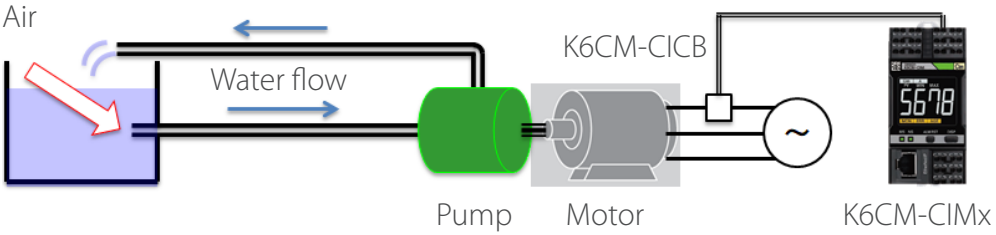
Motor Monitoring Device to help customers identify when pump cavitation or air lock occurred, and we knew that cavitation could be detected with either the vibration/temperature monitor or the current analysis technology. We chose the K6CM current analysis method, and we were able to detect a large amount of distortion in the single phase sine wave due to the presence of cavitation. The following diagram illustrates our findings.

The customer outcome: early warnings and better maintenance

Our customer has since enjoyed peace of mind with a monitoring solution that makes sure the bottle washing machine continues working with optimum water input. The K6CM provides immediate alerts whenever the pump starts cavitating, so the customer always knows when it's time to plan maintenance and figure out what is going on with the application.

Test model (Pump Air Lock Simulation)

3 phase AC200V /11kW motor with Inverter
Water pressure 10MPa Pump system



Test result

Normal mode : K6CM-CIM Degradation Level 20.4 (average)
Current Level 36.7A (average)
Water Pressure : 10MPa

*Air Lock mode : K6CM-CIM Degradation Level 74.7 (average)
Current Level 22.3A (average)
Water Pressure : 4MPa
*Pump system has abnormal noise and vibration

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For over 80 years, Omron has helped industrial businesses maximize potential by solving problems creatively. Currently headed by President Yoshihito Yamada, our company is 36,000 employees strong—providing products and services in more than 110 countries worldwide.

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