MITSUBISHI ELECTRIC
Changes for the Better

Preventive Maintenance

Predictive Maintenance of Mixers
Zero infiltration of broken parts in food!

See inside for details!

In order to prevent parts of broken bearings infiltrating food, an issue that had occurred in the past, Company A was carrying out periodic inspections on its mixers. By introducing a predictive maintenance system, it was able to ascertain signs of faults from vibration data and prevent breakages. What is the secret to its success?

In order to prevent parts of broken bearings infiltrating food, an issue that had occurred in the past, the customer was completing periodic inspections and replacing parts once every six months, but it had no definite grounds for six months being an appropriate inspection period, and felt it may be wasting money on unnecessary part exchange and that there may be room for improving response to sudden breakdowns.

Rotating part

Food mixer

I wonder if the current inspection cycle is really appropriate...
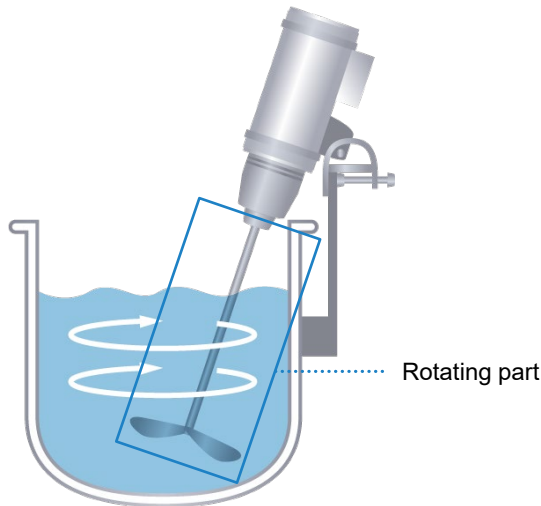
We change parts regularly but maybe we could actually get more use out of them...

It would be really bad if a sudden breakdown occurs and foreign matter infiltrates the food

What has improved

By introducing the "Rotary Machine Vibration Diagnosis System" the customer began predictive maintenance of mixers with rotating parts. In the year after introducing this system, the mixer was identified as being too unstable, therefore parts were replaced and repaired. Moving forward, the customer will continue to study the extent to which we can reduce inspection frequency.

Part infiltration prevention method

Before

Periodic inspection

(One every 6 months, spend 300-400 million yen on inspections and part replacement)

After

Predictive maintenance

(During the operation period of 1 year, detected one fault)
*Expect inspection frequency to be once every 9 months to 1 year

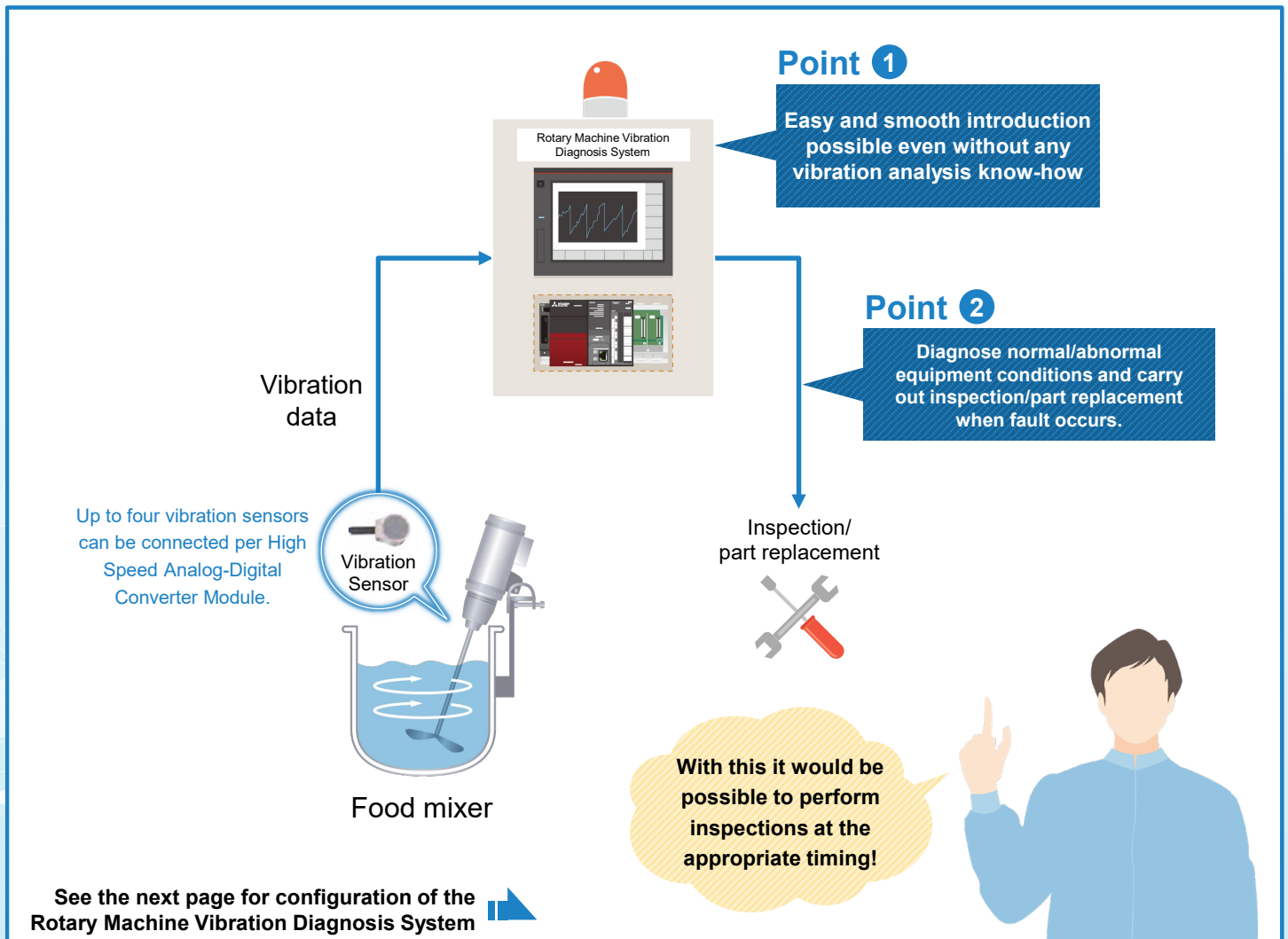**ZERO**
broken parts infiltration

Point 1 We provide a guaranteed control program and screen data, therefore customers can easily and smoothly introduce the system without vibration analysis know-how.

Point 2 Customers can diagnose normal/abnormal status of equipment with this package alone. By performing precise diagnosis, possible to check not only whether or not there is a fault, but also identify fault location.

Point 1

Rotary Machine Vibration Diagnosis System

Easy and smooth introduction possible even without any vibration analysis know-how

Point 2

Diagnose normal/abnormal equipment conditions and carry out inspection/part replacement when fault occurs.

Vibration data

Up to four vibration sensors can be connected per High Speed Analog-Digital Converter Module.

Vibration Sensor

Inspection/ part replacement

Food mixer

With this it would be possible to perform inspections at the appropriate timing!

See the next page for configuration of the Rotary Machine Vibration Diagnosis System

Return on investment (ROI)

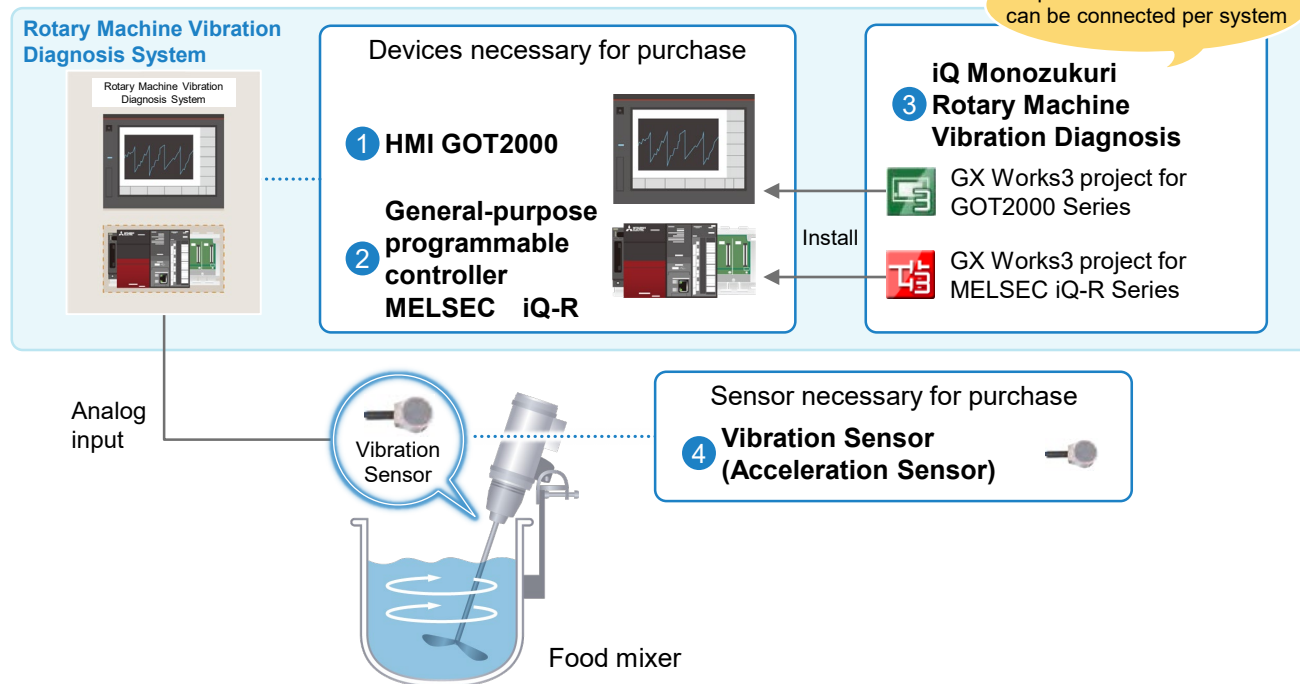| Cost	Construction period	Payout period
Approx. **3.1** million yen/system (including system configuration costs)	Approx. **6** months (**3** months until panel completion~start of operation)	**8** years **8** months/mixer Approx. **2** years **2** months／4 mixers

*Interpretation of payout period If we assume that, for each inspection, conventional part replacement cost was 350,000 yen and production loss was 200,000 yen for four hours, then over the course of six months, the costs incurred were 550,000 yen (350,000 yen + 200,000 yen) every six months, and 1.1 million yen (550,000 yen x 2) every year. Meanwhile, if we assume that the inspection cycle was once every nine months after the introduction of this system, then the cost will be 550,000 yen over 9 months, or approximately 740,000 yen (550,000 yen x 1.33 times) over one year. As such, if we calculate approximately 360,000 yen (1.1 million yen – 740,000 yen) over one year, and convert this to a monthly cost, the reduction will be approximately 30,000 yen (360,000 yen ÷ 12 months). Therefore, if the introduction expense is approximately 3.1 million yen, then the payout period will be 104 months (3.1 million yen ÷ 30,000 yen) = 8 years and 8 months. If we assume that an identical Rotary Machine Vibration Diagnosis System diagnosed four piece of equipment (4 vibration sensors), the payout period would be 2 years and 2 months (8 years and 8 months ÷4 units).

Overview of the Rotary Machine Vibration Diagnosis System

The Rotary Machine Vibration Diagnosis System introduced in this example comprises a general-purpose programmable controller, **MELSEC iQ-R,** and a **HMI GOT2000** easily integrated into a production line simply by connecting with vibration sensors fitted on existing equipment, then installing a control program and screen data.

Rotary Machine Vibration Diagnosis System

Devices necessary for purchase

1 HMI GOT2000

2 General-purpose programmable controller MELSEC iQ-R

3 iQ Monozukuri Rotary Machine Vibration Diagnosis

Up to 16 vibration sensors can be connected per system

GX Works3 project for GOT2000 Series

GX Works3 project for MELSEC iQ-R Series

Install

Analog input

Vibration Sensor

Sensor necessary for purchase

4 Vibration Sensor (Acceleration Sensor)

Food mixer

Equipment Configuration (example)

Please separately prepare cables for connection to devices other than the major devices listed below.

Type	Model	Overview	Standard price (yen)
1 HMI GOT2000			
GOT Main Unit	GT2712-STBA	12.1 inch SVGA [800×600] 65536 color	398,000
SD Memory Card	NZ1MEM-4GBSD	Must be installed in GOT when saving GOT capture images and Mahalanobis Taguchi diagnosis sample data groups.	50,000
2 General-purpose programmable controller MELSEC iQ-R			
Programmable Controller CPU	R16CPU	Firmware version "40" or later	380,000
Expansion SRAM Cassette	NZ2MC-4MBS	For programmable controller CPU（4MB）	80,000
Base Module	R33B	3 slots	20,000
Power Supply Module	R61P	Input: 100 to 240V AC Output: 5V 6.5A DC	20,000
High Speed Analog-Digital Converter Module	R60ADH4	Firmware version "04" or later 4 channels. Up to four vibration sensors can be connected.	105,000
SD Memory Card	NZ1MEM-4GBSD	Must be installed in a programmable controller CPU when saving vibration data to a CSV file	50,000
3 FA application package iQ Monozukuri Rotary Machine Vibration Diagnosis			
Rotary Machine Vibration Diagnosis	AP10-VID001AA-MA	Up to 16 vibration sensors can be connected per license	98,000
4 Vibration Sensor（Acceleration Sensor）			
Vibration Sensor（Acceleration Sensor） Other company's product】	-	For details, see "Technical News BCN-E2113-0033."	-

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