Development of an abnormality sign detection system using AI and start of provision of an AI system construction service tailored to the equipment
– Early detection of inexperienced troubles and relearning of AI by customers –

Osaka Gas Co., Ltd. (Headquarters: Osaka City, Osaka Prefecture, President: Masataka Fujiwara) and Ube Information Systems, Inc. (Headquarters: Ube City, Yamaguchi Prefecture, President: Naohisa Tatsumi, hereinafter referred to as "UIS") have developed a system that uses artificial intelligence (hereinafter referred to as "AI") to detect abnormality signs at an early stage, that have not been experienced in the past. From April 1, 2022, UIS will start providing this AI system construction service tailored to the target equipment.

Osaka Gas Liquid Co., Ltd. (Headquarters: Osaka City, Osaka Prefecture, President: Shinichi Tada) has developed an initial cost free service for customers of industrial use that combines the installation and maintenance of "HYSERVE," equipment that produces high-purity hydrogen from city gas using high-performance catalyst technology. In April 2020, the AI system was introduced to detect signs of abnormalities in 14 units at eight locations. With this service, we aim to improve the maintenance level.

Until now, it has been common for AI to detect signs of similar problems by learning abnormality data at the time of trouble experienced in the past.

On the other hand, with this AI system, the AI learns normal operation data and detects abnormality signs when it deviates from it, so it can detect troubles it has never experienced before. It can also solve the problem of not being able to obtain sufficient abnormality data at a time of trouble.

This AI system monitors the status and trend of real-time operation data and notifies when an abnormality sign is detected, as well as early unusual movements (abnormality signs) that were difficult to detect with the conventional upper and lower limit alerts.[*1] This system enables these to be detected, thereby making it possible to avoid loss due to emergency stoppage of the equipment. In addition, by monitoring signs of abnormalities, it is possible to shift from conventional post-maintenance[*2] and time-based maintenance[*3] to planned status-based maintenance,[*4] which leads to more efficient maintenance work and reduction of maintenance costs.

Furthermore, in order to prevent equipment overhauls[*5] and deterioration of the accuracy of the AI model due to aging, system engineers were previously required to relearn the AI model using the latest data. With this AI system, customers will be able to relearn the model themselves, which will reduce costs and speed up system updates.

From April 1, 2022, UIS will start providing this AI system construction service "SAILESS" (tentative name). By building an AI system tailored to the target equipment, we believe that it can be applied to a wide variety of equipment. In particular, we expect that it will be applied to various machinery and reactors in the manufacturing industry.

The Daigas Group will continue to promote digital transformation through the use of digital technologies such as AI and data, with the aim of becoming a corporate group that powers continuous advancement in the lives and businesses of our customers

* 1: A mechanism to automatically send data when the data deviates from the preset upper and lower limit control values.
* 2: Maintenance performed after a machine or equipment breaks down or malfunctions.
* 3: Maintenance to replace parts that have passed a certain period of time by a process that is systematically performed before a problem occurs.
* 4: Maintenance to replace parts according to the progress of deterioration by a process that is systematically performed before a problem occurs.
* 5: Work to disassemble the device into parts, clean and reassemble it, and return it to the performance state when it was new.
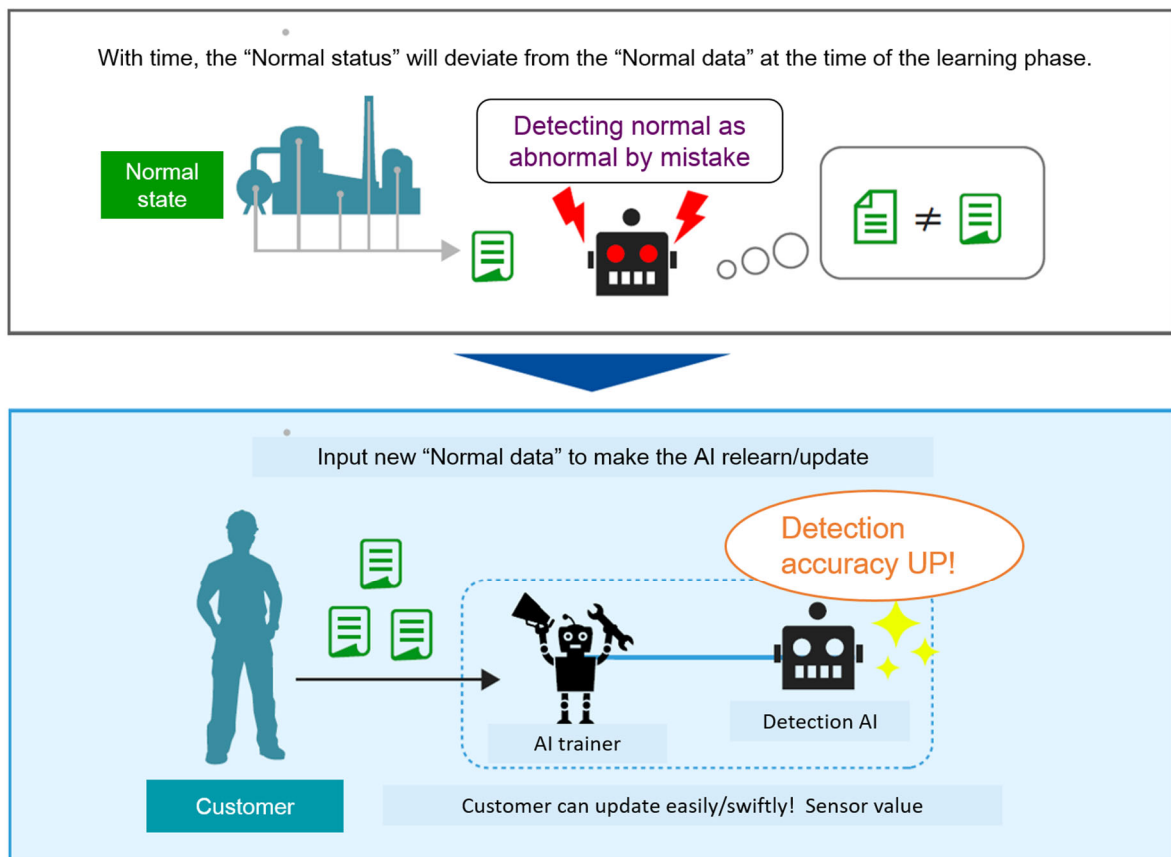
1. Image of abnormality sign detection

・UIS analyzes the characteristics of the normal manufacturing operation data of the target equipment, and makes AI learn to build the AI system tailored to the target equipment and deliver it to the customer.
・ This AI system (detection function) monitors the status and trend of real-time manufacturing operation data and notifies the user when an abnormality sign is detected.
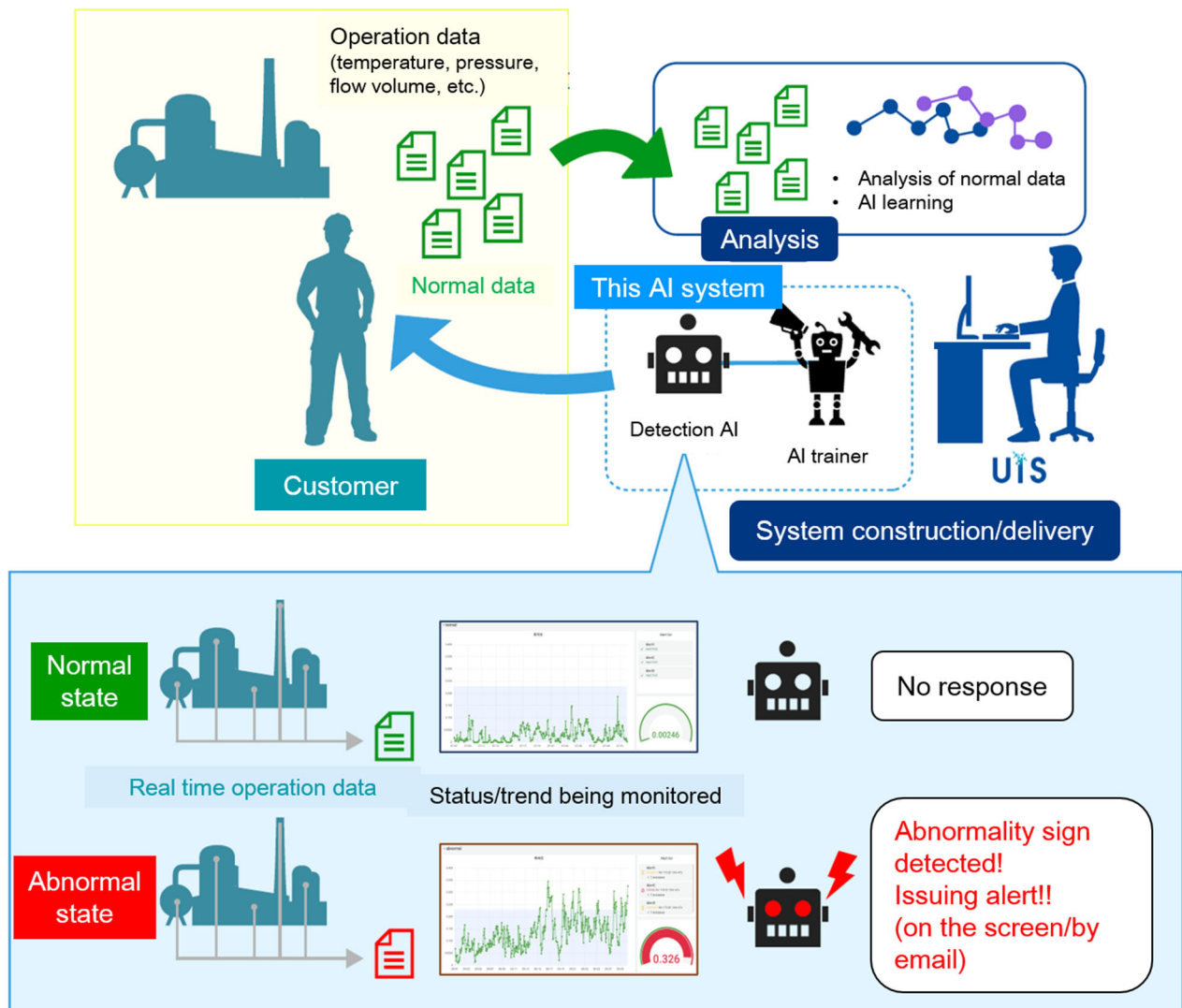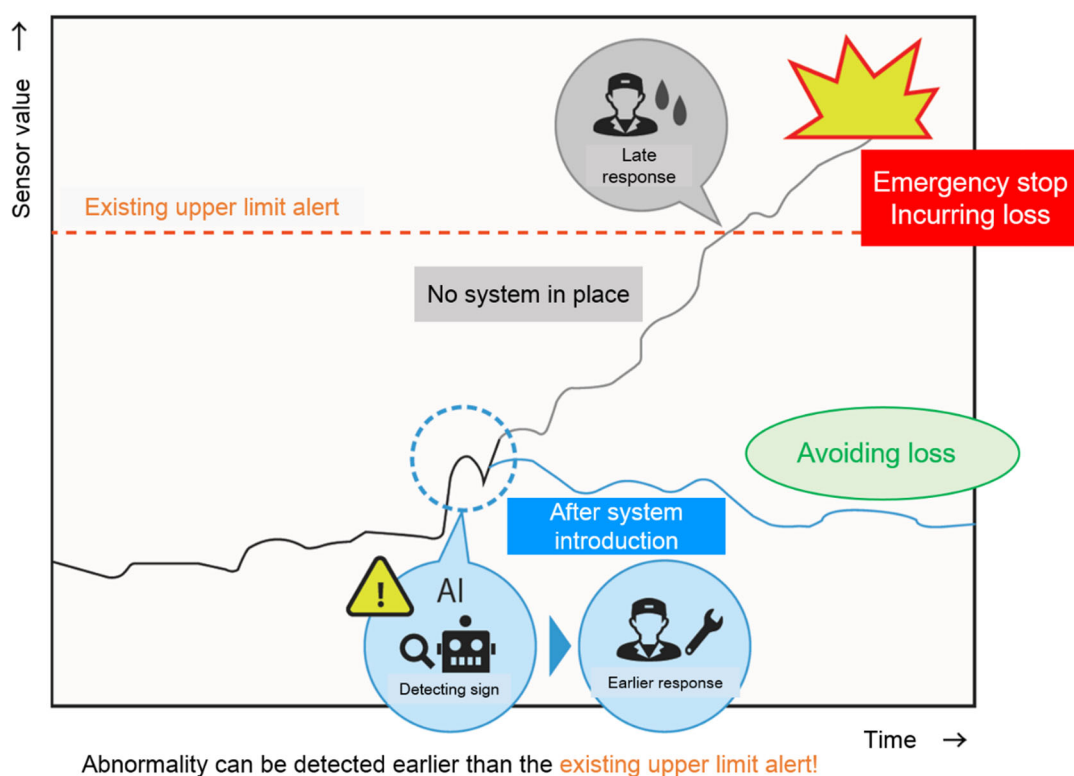
2. Image of relearning
・ Customers themselves input new normal manufacturing operation data into this AI system, make it relearn and update it.

With time, the "Normal status" will deviate from the "Normal data" at the time of the learning phase.

Normal state

Detecting normal as abnormal by mistake

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Input new "Normal data" to make the AI relearn/update

Detection accuracy UP!

AI trainer

Detection AI

Customer

Customer can update easily/swiftly! Sensor value

3. Benefits of introduction
(1) Avoiding loss by early detection of abnormality signs
・ Abnormality is detected earlier than the existing upper and lower limit alerts. Avoid emergency stops and prevent losses

Sensor value →

Late response

Existing upper limit alert

Emergency stop
Incurring loss

No system in place

Avoiding loss

After system introduction

AI

Detecting sign

Earlier response

Time →

Abnormality can be detected earlier than the existing upper limit alert!

(2) Reduction of maintenance costs by monitoring signs of abnormalities
・ By monitoring the degree of abnormality (equipment status) calculated from manufacturing operation data, it is possible to shift from post-maintenance / time-based maintenance to planned status-based maintenance, contributing to the improvement of maintenance work and reduction of maintenance costs.
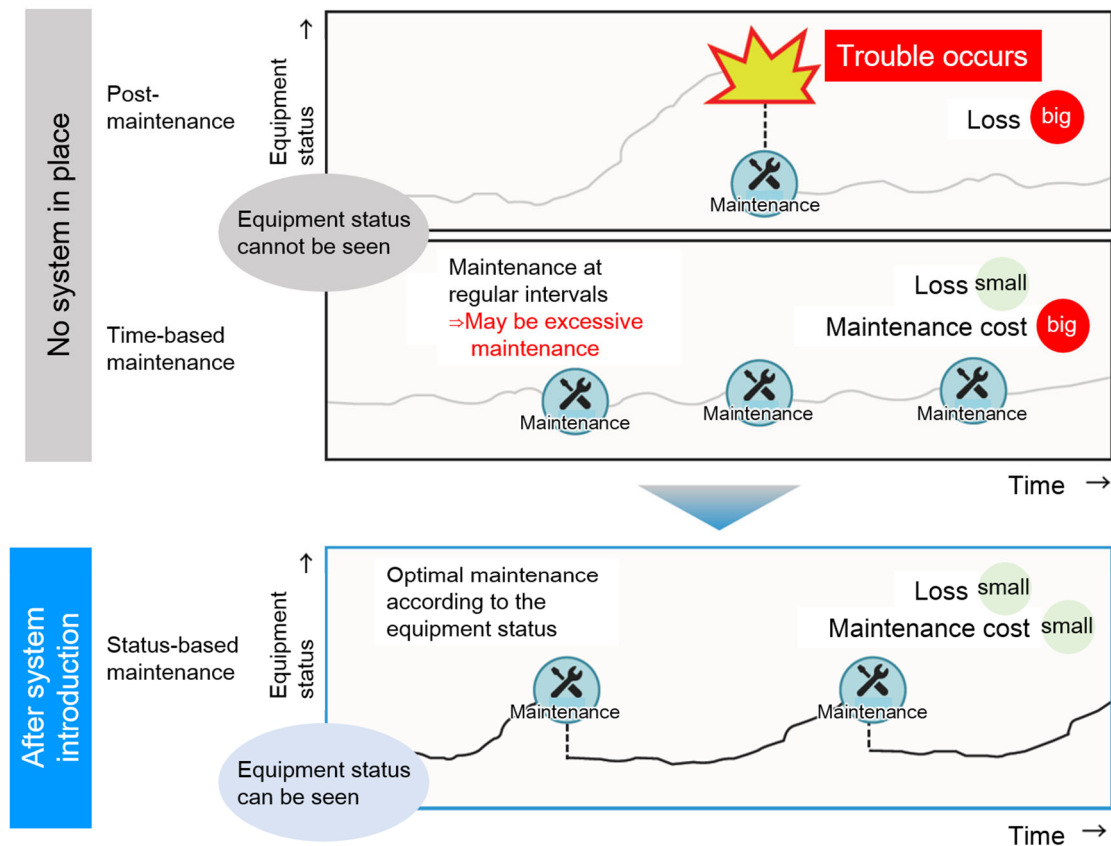
4. Company profile
<Ube Information Systems, Inc.>

Company name	Ube Information Systems, Inc.
Head office address	Ube Kosan Building, 8-1 Aioicho, Ube City, Yamaguchi
Representative	Naohisa Tatsumi, President and Representative Director
Founded	September 16, 1983
Shareholder composition	OGIS-RI Co.,Ltd. (51%), Ube Industries, Ltd. (49%)
Main business	Software contract development, image processing, system products, CAE, information processing services, etc.

<Osaka Gas>

Company name	Osaka Gas Co., Ltd.
Head office address	4-1-2 Hiranomachi, Chuo-ku, Osaka
Representative	Masataka Fujiwara, President and Representative Director
Founded	April 10, 1897
Main business	Manufacture, supply and sale of city gas; generation and sale of electricity, etc.

<Osaka Gas Liquid Co., Ltd.>

Company name	Osaka Gas Liquid Co., Ltd.
Head office address	5th Floor, Sumitomo Building No.3, 4-7-19, Kitahama, Chuo-ku, Osaka City, Osaka
Representative	Shinichi Tada, President and Representative Director
Founded	July 1, 1991
Shareholder composition	Osaka Gas Co., Ltd. (100%)
Main business	Production and sale of industrial gas; utilization of cryogenic energy of liquefied natural gas, etc.