May 2025 Technical Information

Industrial Products

Connective Industries

#Co-creation and Open Innovation #Sustainability #Productivity Improvement #Generative AI #IoT/Data Utilization #Digital Solutions #Industrial Equipment

1. Completion of Connected Demonstration of High Voltage Inverter for Driving Ultra-large Crawler Cranes

Hitachi Industrial Products, Ltd. joined the ultra-large crawler crane electrification project of Tadano Ltd. to provide the HIVECTOL "HVI-E2 Series," one of the world's smallest high-voltage direct inverters. The HVI-E2 Series will be a key component for restricting CO_2 emissions.

Crawler cranes are moving vehicles used for heavy work. The ability to provide swift maintenance support is extremely important for the inverters that are mounted in crawler cranes, resulting in demand for technology that is not dependent on the dispatch of specialist maintenance staff.

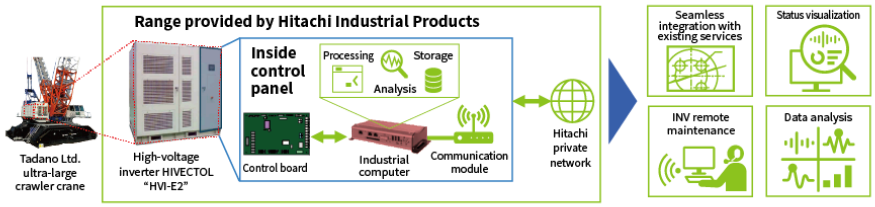
In response, Hitachi developed a storage and analysis function for the long-term operating data of inverters called the "Connected Function," and also a function that enables Hitachi to connect remotely to the customer's inverters to perform maintenance monitoring and operations.

In this demonstration, operational data was acquired and software was updated remotely, confirming that rapid maintenance and failure data analysis could be performed without needing to dispatch staff to the site.

In the future, Hitachi will seek to commercialize these functions, and by enhancing features such as the analysis of operating patterns under different loads, further expand load condition diagnostics and other functions to help solve customer problems.

(Hitachi Industrial Products, Ltd.)

[01] Overview of Connected Inverter System



INV: inverter

2. Launch of Workplace E-Powering Operations Utilizing Multi-port EV Chargers

The Tsuchiura Works of Hitachi Industrial Products, Ltd. has launched the operation of Workplace E-Powering (WEP) as an initiative to reduce CO_2 emissions through electric vehicle (EV) commuting. WEP encourages employees to adopt EVs by installing EV charging infrastructure at the workplace, facilitating adoption by employees who do not have EV charging facilities at home. This helps the company because the resulting reduction of CO2 emissions counts under Category 7 "Employee Commuting" of the Scope 3 standards when calculating the emissions reduced by businesses in their supply chain. When building the WEP facility where a large number of EVs will be parked for a relatively long time, the large-capacity multi-port EV charger of Hitachi Industrial Products was installed, and Hitachi also developed and deployed a multi-connector charging stand (25 kW) to effectively utilize this equipment. The charging stand has charging cables that can be connected to four EVs, and is capable of charging four EVs while automatically switching the charging target. When used in combination with the 20-port multi-port EV charger, an EV charging parking lot for up to 80 vehicles can be built.

[02] WEP Operations at Tsuchiura Works

While leveraging the technical and institutional know-how gained from this project, Hitachi plans to expand operations in the future both inside and outside the Group.

(Hitachi Industrial Products, Ltd.)

3. Delivery of Ventilation Equipment for Tsukiji-Toranomon Tunnel on Tokyo No. 2 Loop Road

Hitachi delivered a variety of equipment to the ventilation station of the Tsukiji-Toranomon Tunnel on the Tokyo No. 2 Loop Road, including two exhaust fans (variable blade axial flow fan) with a diameter of 3,000 mm, a set of electrostatic precipitators, tunnel internal jet fans, and a set of measurement equipment.

[03] Two Exhaust Fans (Variable Blade Axial Flow Fan) Installed at Tsukiji Ventilation Station

The Tsukiji-Toranomon Tunnel was partially opened in March 2014, and after the completion of the Tsukiji ventilation station all lanes were fully opened in December 2022. The Tsukiji-Toranomon tunnel cuts across the heart of Tokyo, an area home to a wide array of buildings, including public, medical, and commercial facilities. The purpose of installing the ventilation equipment was to protect the environment near the tunnel entrance. Information from inside the tunnel is constantly monitored by the measurement equipment, and centralized ventilation is performed at the Tsukiji ventilation station to prevent vehicle exhaust gas from escaping untreated outside the tunnel. The exhaust gas in the tunnel is purified by the electrostatic precipitators in the ventilation station and then travels through the exhaust fans before being discharged to the outside from the ventilation tower.

In the future, Hitachi Industrial Products will continue to supply tunnel ventilation equipment that takes into account the safety and comfort of automobile travel while also considering the environment around tunnel entrances.

(Hitachi Industrial Products, Ltd.)

4. Equipment for Improving Compressor Performance at Braskem S.A.

Hitachi Industrial Products, Ltd. received an order for a modification project to strengthen the processing capacity of existing compressors at Braskem S.A., a Brazilian company. This was a part of Braskem's plan to increase production capacity at their green ethylene plant* by about 30%. Hitachi's proposal contributed greatly to the 5Rs (Repair, Reuse, Rebuilt, Remanufacturing, Recycle). Most of the existing compressor parts and auxiliary equipment were reused, and Hitachi only delivered newly manufactured parts for the internal compressor parts that were modified. The modified internal compressor parts were replaced at the customer's plant, and now commercial operations have started.

Through this modification project, the environmental impact has been reduced, while also cutting costs, increasing plant productivity, and helping the customer to achieve business targets. By providing this kind of solution in addition to products and services, Hitachi will continue to contribute in the future to achieving a sustainable society and increasing social, environmental, and economic value.

(Hitachi Industrial Products, Ltd.)

(Start of commercial operation: April 2023)

［04］ Modified Internal Compressor Parts: Compressor Inner Case (left) and Compressor Rotor (right)

* A plant that produces ethylene using ethanol derived from sugarcane as its raw material, which is more environmentally friendly than the naphtha that is used as the raw material in the conventional production method.

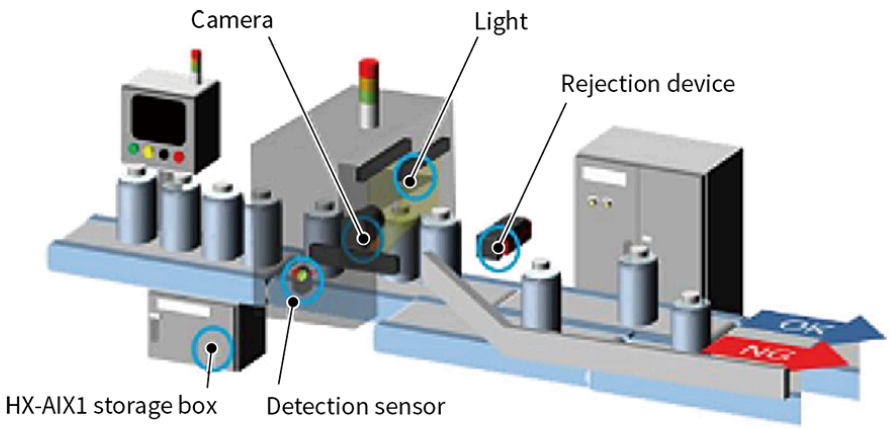
5. Deployment of Edge AI Machine Vision at Production Lines

In general, the learning and inference of artificial intelligence (AI) requires both normal and abnormal data. However, Hitachi's Edge AI Machine Vision automatic inspection device leverages AI and uses a proprietary AI diagnosis algorithm to enable learning using only normal component data, without needing abnormal component data. The device also contains the hardware and software required for AI learning and inference processes, and it does not require complex work for setting conditions for each individual product or setting a special system for importing image data for AI learning. As a result, seamless onsite learning and real-time inference can be executed using this single device.

In production lines that have deployed Edge AI Machine Vision, the correct distribution obtained from inference after learning is set as the thresholds between normal and abnormal components after consultations with the customer. These thresholds can be adjusted by customers themselves in accordance with operational standards. Inspection targets can also be changed, added, or deleted by customers themselves from a tablet used for setting and operation. In the future, Hitachi will continue to meet the needs of society by applying Edge AI Machine Vision to production lines to increase the productivity of frontline workers.

(Hitachi Industrial Equipment Systems Co., Ltd.)

［05］ Edge AI Machine Vision Deployed at Production Line



6. Online Continuous Monitoring Solution for Distribution Transformers

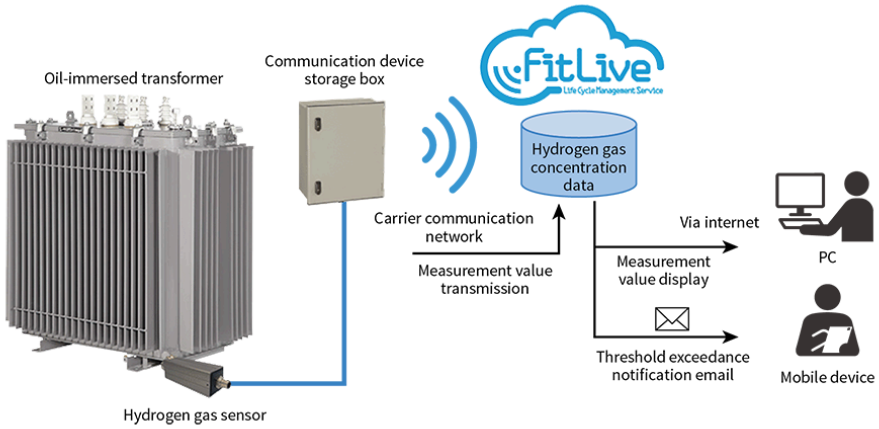
Power receiving and transforming equipment is vital infrastructure in the supply of power that is essential for business and our everyday lives, and this equipment requires a stable power supply. Hitachi Industrial Equipment Systems Co., Ltd. will start to provide solutions for the continuous monitoring of the internal conditions of oil-immersed transformers, which is one of the most important devices among power receiving and transforming equipment.

Preventive maintenance of oil-immersed transformers typically uses analysis of gas in the oil, which is performed by collecting insulating oil while operations are stopped. As a result, this tends to be performed infrequently. Aging oil-immersed transformers can be damaged depending on their conditions of use, and abnormalities may not be found depending on the inspection interval. This may lead not only to accidents or blackouts, but also to the risk of equipment damage and financial losses.

In response, Hitachi developed a technology that uses sensors to monitor in real time changes in the concentration of hydrogen gas that occur in the initial stages of internal abnormalities, which enables abnormalities to be detected at an early stage. The measurement data is managed though an equipment monitoring service called "FitLive," which enables both customers and manufacturers to check conditions, resulting in rapid inspection or update suggestions that increase reliability and reduce maintenance costs.

(Hitachi Industrial Equipment Systems Co., Ltd.)

［06］Example of System Configuration for Online Continuous Monitoring Solution



7. Smart Maintenance Service for Power Distribution Equipment Maintenance Work

Hitachi has started to provide a "Smart Maintenance Service" that uses remote monitoring to save labor and increase efficiency in inspection and maintenance work for power distribution equipment when providing electricity to factories, buildings, or other facilities. Recent years have seen an increase in power demand due to the proliferation of EVs and the growth of data centers built to power the expansion of generative AI, among other reasons. But this has led to the challenge of labor shortages, as it becomes difficult to find staff for the periodic inspection of power distribution equipment or maintenance staff for maintenance work.

The Smart Maintenance Service of Hitachi Industrial Equipment Systems Co., Ltd. conducts continuous monitoring of equipment using insulation monitoring and sensors for temperature, humidity, and other conditions. It also uses the platform of FitLive, the proprietary equipment monitoring service of Hitachi Industrial Equipment Systems, to check operation conditions in real time. For example, continuous measurement of insulation deterioration trends can be used instead of checking insulation resistance values, helping to lengthen the interval required between insulation resistance measurement tests. A lineup of two types is provided to respond to diverse customer needs. The package type provides a kit of the devices required for monitoring, which makes deployment work easy, while the order-made type provides customization options.

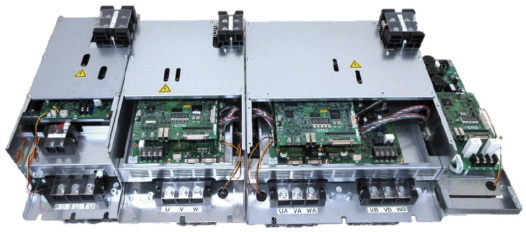
(Hitachi Industrial Equipment Systems Co., Ltd.)

［07］Package Type Provides Kit of Devices Required for Monitoring

8. New Model AC Servo AD7-MEGA Series

The alternating current (AC) servo AD7-MEGA series consists of new model servo amplifiers that meet even higher performance and more diverse market needs in applications such as machine tools, industrial robots, and semiconductor manufacturing equipment. This new series provides products in the 200 V class and a range of 2 kW up to 45 kW. The main features are as follows.

[08] New Model Servo Amplifier AD7-MEGA Series



(1) Provides the EtherCAT* open network as standard, which enables high-speed synchronous control, and increases communication cycle speeds*) to deliver more precise operations.

(2) Provides universal contact input and analog voltage input as standard to enable the connection and use of external sensor input and other resources.

(3) Expands the encoders available for communication to enable combination with a wide range of motors.

(4) Improves the operation software to shorten equipment setup times*).

(5) Improves the STO (Safe Torque Off) functionality [changed compliance from EN (European Norm) / ISO 13849-1 Cat. 3 PL d, EN 61800-5-2 SIL 2 (STO) to EN / ISO 13849-1 Cat. 3 PL e, EN 61800-5-2 SIL 3 (STO)].

(Hitachi Industrial Equipment Systems Co., Ltd.)

(Start date for receiving orders: July 2024)

* See the list of “Trademarks”.

*) Compared to current model of Hitachi Industrial Equipment Systems.

9. Regulated Organic Solvent-free Ink for Industrial Inkjet Printers Made from Natural Raw Materials

Hitachi's Gravis UX2 Series industrial inkjet printers provide a diverse lineup of inks with different properties such as high adhesion or fast drying to suit various print objects or applications. In recent years, regulations for the safety of chemical substances and reducing their environmental impact have been strengthened worldwide in order to improve work safety and prevent damage to user health, and in consideration of the global environment. In this context, Hitachi Industrial Equipment Systems Co., Ltd. developed an ink that responded to market demand for minimized use of substances regulated under the Ordinance on Prevention of Organic Solvent Poisoning (Organic Solvent Ordinance).

[09] 4158K Regulated Organic Solvent-free Ink (left) and Gravis UX2 Series (right)

The 4158K regulated organic solvent-free ink launched in December 2023 features the use of natural raw materials, and it does not contain the solvents that are regulated under the Organic Solvent Ordinance. Furthermore, the ink has been highly praised for its high functionality, including a long service life of 2,400 continuous hours, low solvent volatility [2.0 ml/h (20°C)], high adhesion performance on the normally difficult to adhere materials of polypropylene and polyethylene, and resistance to disinfectant ethanol.

(Hitachi Industrial Equipment Systems Co., Ltd.)

10. Waste Heat Recovery Unit for Oil-lubricated Air Compressors

In the past, most heat generated by air compressors during operation was released to the atmosphere, and it was difficult to make effective use of this waste heat.

In July 2023, Hitachi Industrial Equipment Systems Co., Ltd. launched a waste heat recovery unit for oil-lubricated air compressors that can be connected to Hitachi's HISCREW NEXT II series and G Series 55-75 kW oil-lubricated screw air compressors. This product can be used to combat rising energy costs and help achieve carbon neutrality. The main features are as follows.

(1) Recovers heat from the hot lubricating oil of the compressor to supply hot water up to 70°C*1.

(2) Enables close-fitting installation on the left side of the compressor to respond to demand for installation in a small space.

(3) Includes a water supply failure detector inside the unit to enable continuous supply of compressed air even if the water is cut off.

In the future, Hitachi plans to expand the series to other models.

(Hitachi Industrial Equipment Systems Co., Ltd.)

*1 Depends on certain conditions, such as use of a circulation heating system.

［10］ Waste Heat Recovery Unit (left) and Oil-lubricated Air Compressor (right)

11. "R Series" Oil-free Reciprocating Compressors

Air compressors are a vital component in the energy supply of factory equipment, and they are said to consume about 20% of the total power at a factory. Stable operation and energy saving for air compressors have become pressing concerns in factory management, especially during the peak summer months as the power used by the air conditioning rises in tandem with the temperature. Labor shortages for equipment management has also increased in recent years, resulting in demand for labor savings and increasing awareness of the Internet of Things (IoT) as a possible remedy.

In response to these needs, Hitachi launched the Oil-free BEBICON R Series (1.5, 2.2, 3.7 kW). The most notable feature of this series is its support for high ambient temperatures. By installing the newly developed heat shielded piston, the maximum installation temperature has been raised from 40°C for the previous model to 50°C for the new tank mounted type.

From the perspective of energy saving and IoT utilization as well, the adoption of a new control method reduces power consumption by up to 15% in the package type, and the workload for managing equipment is reduced by transmitting and sharing operation information to the cloud server via a smart device app.

(Hitachi Industrial Equipment Systems Co., Ltd.)

［11］ Oil-free BEBICON R Series: Tank Mounted Type (left) and Package Type (right)

Hitachi Review

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