Kyowa Kako Co., Ltd.

Introduction of Monitoring System to Composting Plant

Objective of the project

At the composting plant operated by Davao Thermo Biotech Corp. (DTBC) in Davao City, the Philippines, monitoring of fermentation conditions and plant maintenance have been conducted manually, imposing a significant burden on on-site workers.
The objective of this project is to introduce a maintenance monitoring system utilizing IoT sensors to the DTBC composting plant to enable remote measurement and monitoring, thereby reducing the workload for site workers. Furthermore, this system makes it possible for both the Philippine and Japanese sides to respond quickly when issues arise on site.

Cooperation with local companies/governments

- Local Partner: Davao Thermo Biotech Corporation (DTBC)
- Details of Partnership/Cooperation: The monitoring system was introduced to the DTBC's Composting Plant.

KYOWA KAKO CO., LTD. ⇄ Davao Thermo Biotech Corporation

Targeted economic/social issues

In the Philippines, the volume of waste is increasing in tandem with economic growth, and inadequate waste segregation and collection have become a significant issue. This has resulted in worsening environmental pollution, including air, soil, and water contamination. Except for medical waste, incineration is generally restricted, and landfill is the primary disposal method. However, the landfill capacity is reaching its limit. In the Metro Manila area, the tragic collapse of the Payatas landfill (also known as Smokey Mountain) in 2000 resulted in numerous fatalities. Consequently, waste disposal has since been relocated to the Rizal Sanitary Landfill, which is further from the city, leading to increased transportation costs and prompting exploration of alternative methods of waste disposal.
According to the National Solid Waste Management Commission of the Republic of the Philippines, organic waste accounted for 52% of all waste as of 2015, and the demand for composting facilities is increasing due to the growing need to convert organic waste into resources in the country.
As an approach to address this challenge, DTBC entered into a licensing agreement with our company in 2017 for the use of hyperthermophilic aerobic composting technology and has since been operating a composting facility in Davao City to transform organic waste into sanitary safe fertilizer.
While the demand for composting continues to grow in the country, there is a concern that in the future there will be a shortage of skilled engineers with sufficient knowledge and capability to maintain and manage such facilities appropriately.

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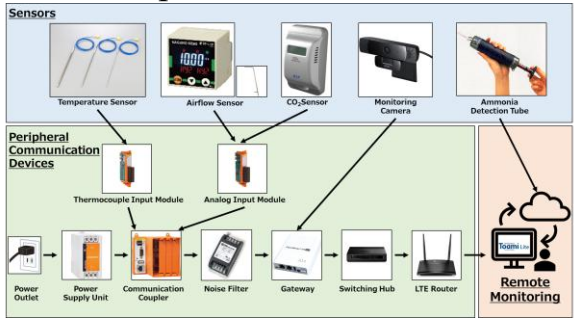
Demonstration period

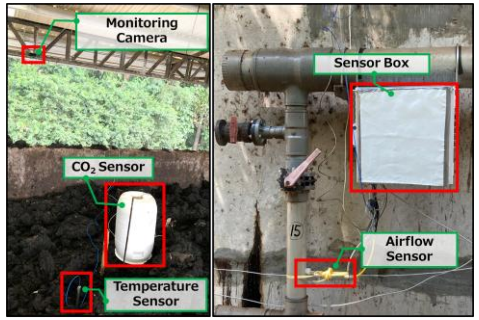
March 2024 – April 2025

Details of demonstration

As part of the development of the monitoring system, sensors and devices suitable for use at the DTBC composting plant were selected and fabricated. A dashboard for data management and visualization was also developed. The five measurement items in this monitoring system are: (1) temperature, (2) air flow, (3) CO_2 concentration, (4) compartment check with monitoring camera, (5) ammonia odor. Upon completion of development, the sensor boxes were shipped to the DTBC plant. On-site adjustments and installation of the sensors and related equipment were conducted, establishing a fully operational monitoring environment. When communication network issues or sensor malfunctions occurred during monitoring, we promptly analyzed the data logs and took appropriate measures, including software and program modifications, as well as repairs to hardware and sensors.



Monitoring System Configuration



Installed sensors

Project outcome/ future plans

The monitoring system has enabled remote measurement and observation of the composting process at the DTBC Plant. Previously, temperature was measured manually by workers using alcohol thermometers, a process that consumed an entire day. With the new system, permanent sensors now allow continuous temperature monitoring, significantly reducing workload. Regarding the airflow sensor, airflow was previously adjusted based on the valve opening and managed using the on-site staff's experience and intuition. However, with the introduction of the new system, it has become possible to monitor and adjust both wind speed and airflow using numerical values, increasing the potential for improved composting processes. Data can now be accessed from both Japan and DTBC's headquarters in Davao City, enabling swift and coordinated responses on both sides when issues arise. Going forward, further upgrades to the monitoring system are planned, including the wireless transmission and miniaturization of sensors. We aim to build an even more efficient and user-friendly system.

In the future, the widespread adoption of composting plants equipped with monitoring systems will make it possible to address the challenges associated with the composting of organic waste in the Philippines.

Monitoring System Dashboard