



Daikin Device (Suzhou) Co., Ltd.



Key implementation services
 Factory IoT visualization solution

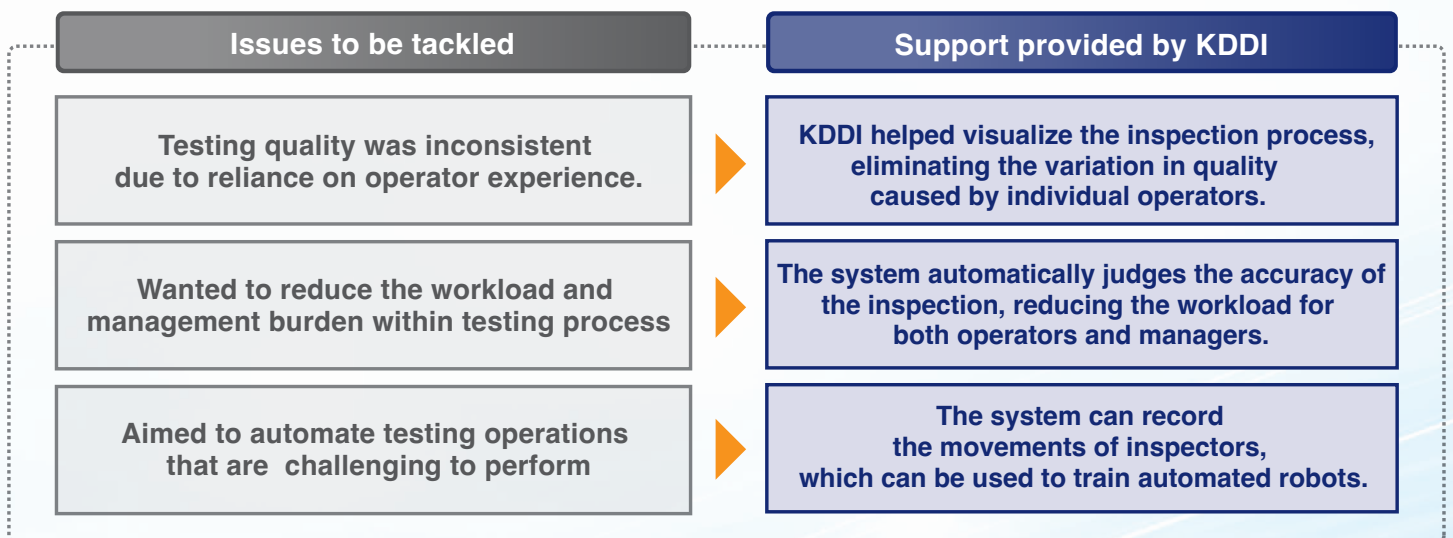
Industry
 Manufacturing

Number of employees
 2,484
 (as of end of March 2023)

Visualization of human movements to achieve improved work quality The evolving Smart Factory is transforming the future of manufacturing.

Daikin Device (Suzhou) Co., Ltd., a group company of Daikin Industries, Ltd., produces compressors and control printed circuit boards for air conditioners. In the face of growing difficulties to secure human resources in China, the company is promoting the standardization and automation of manufacturing operations in order to further improve product quality. As part of these efforts, the company decided to implement major improvements in compressor airtightness testing, which had previously relied on the skill level of operators. In addition to adopting a new testing method, a motion monitoring system that visualizes the movements of the testers was developed with the cooperation of KDDI Shanghai. By using the system to determine whether the testing is being performed correctly, the company has standardized the testing process. In addition, by utilizing motion data for robot learning, the company has opened up the path to automating difficult testing tasks.

Customer's challenge Standardizing Inspection Work and Achieving Automation with Robots



Why KDDI Shanghai was selected

- KDDI Shanghai developed a high-precision system that utilizes motion capture to accurately visualize human movement.
- By leveraging cutting-edge technology and proposing improvement methods both theoretically and proactively to meet required accuracy, KDDI Shanghai enabled us to achieve practical standards.

Post-implementation effects

Voice1 Development of a motion monitoring system that will lead to full automation in the future

The introduction of a new testing method using a detection gun was a major factor in improving inspection work quality. As the testing method relies on human skill to move the detection gun along the compressor joint at a specific speed and interval, a system to objectively determine whether the test was performed correctly was essential. After consulting with several companies regarding system development, we were presented with a motion monitoring system proposal from KDDI Shanghai, utilizing motion capture technology. Given its strong potential to meet our accuracy requirements, we engaged KDDI Shanghai in the collaboration. The development of the system was extremely difficult, but after several months of trial and error, a system that could capture the trajectory of the detection gun in millimeter increments and determine testing accuracy was successfully developed. In addition, the motion data obtained from this system can be used for robot learning, marking a significant step towards the full automation of testing performed by robots.



Keita Kagiya
Deputy Section Manager
Technology Section
Technology Department

Voice2 Monitors detection gun trajectory and eliminates variations in testing operations

As the motion monitoring system automatically determines testing accuracy, compared to the conventional method in which operators made subjective judgments, this new system has reduced variations in testing operations. Results are displayed on a monitor on the spot, and if a problem is identified the corresponding point is indicated, meaning that only that specific point needs to be retested, eliminating the need to start from scratch. Our technical staff sometimes have a hard time grasping the operational aspects of what is a very sophisticated system, but KDDI Shanghai is very helpful in providing detailed support.



Ye Qian
Technology Section
Technology Department

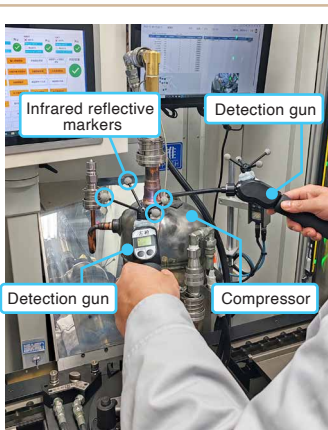
Voice3 Tester workload and management burden also greatly reduced

The new testing method and motion monitoring system have also reduced operator workload. Whereas in the past testing was performed by moving a heavy compressor by hand, now testing can be performed by simply operating the detection gun, with the system providing support so that even physically weak operators can perform testing with confidence. This system has also reduced manpower by enabling a single operator to perform testing that used to be performed by four operators. In addition, training of new operators has become easier, and the ability to look back on past testing operations by saving motion data and video footage has reduced management workload.



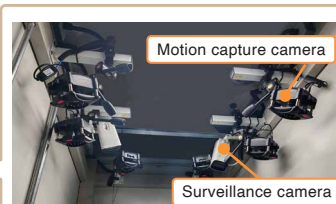
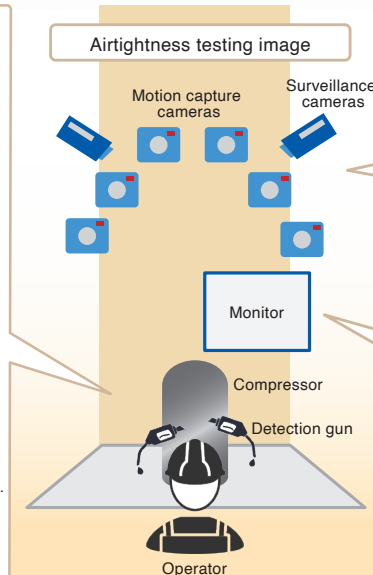
Hui Wang
Manufacturing Section Chief
Manufacturing Section 2
Manufacturing Department

Airtightness testing method for compressors at Daikin Device (Suzhou) Co., Ltd.



Leakage is detected by placing the tip of the detection gun close to the compressor joint and testing at a specific distance and speed.

- The trajectories of four infrared reflective markers attached to the detection gun are captured with high accuracy by a motion capture camera.



- Six motion capture cameras capture detection gun movement.
- Two surveillance cameras record testing operations.



- Real-time determination of whether the detection gun has been accurately operated.
- Displays points that have not been correctly tested.

[Message from the project leaders]



Qifeng Zhang (left)
Suzhou Branch
KDDI Shanghai Corporation
Nan Li (right)
Digital Transformation Division
Suzhou Branch
KDDI Shanghai Corporation

Factories have many management challenges. Advancements in technology are enabling us to address issues that were previously technically impossible to solve. As a group of information and communication technology (ICT) and digital transformation (DX) professionals, we have a global presence spanning over 100 locations and are driving factory DX projects that utilize cutting-edge technologies all around the world. We have many experienced engineers, so please feel free to consult with us at KDDI about your challenges.

Customer profile

Company name Daikin Device (Suzhou) Co., Ltd.
Head office location Suzhou Industry Park, Suzhou City, Jiangsu Province, People's Republic of China

Business activities

The company was established in 2003 as a global supply base for key devices used in air conditioners. High quality is achieved through integrated production of key components of air conditioners, namely compressors and control printed circuit boards, with products supplied to manufacturing bases in China, Japan, and other countries.

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