(Joint Release)

November 24, 2021

Japan Airlines Co., Ltd.

SECOM CO., LTD.

Asahi Technology Corporation

Red Dot Drone Japan Inc.

KADO Corporation

Demonstration Test was Held in Hyogo-prefecture with an Eye toward Drone Level4 Operation in Urban Areas.

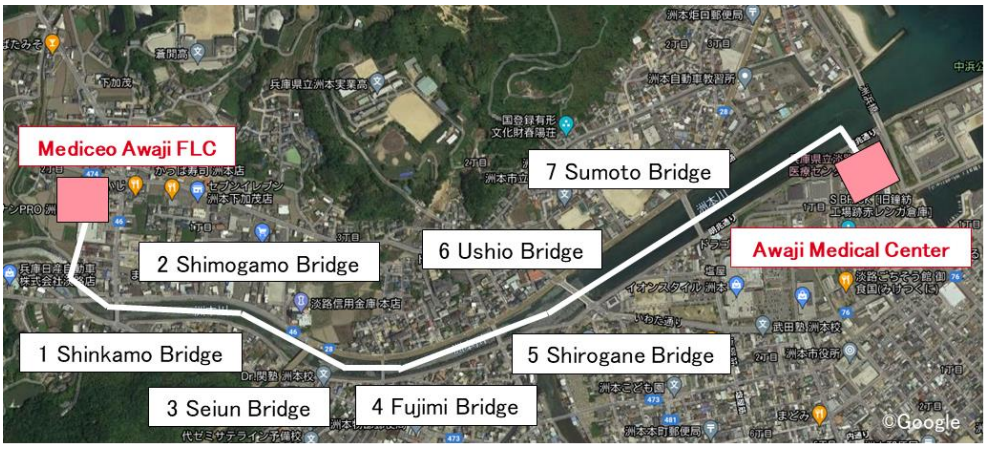
Japan Airlines Co., Ltd. (Head Office: Shinagawa-ku, Tokyo; President, Representative Director: Yuji Akasaka; hereinafter "JAL"), SECOM CO., LTD. (Headquarters: Shibuya-ku, Tokyo, President: Ichiro Ozeki, Representative Director; hereinafter "SECOM"), Asahi Technology Corporation (Headquarters: Himeji-shi, Hyogo-ken; Representative Director: Yasuyuki Yukinaga; hereinafter "Asahi Technology "), Red Dot Drone Japan Co., Ltd. (Headquarters: Singapore, Co-founder Nozomi Miura, "Red Dot Drone"), and KADO Co., Ltd. (Headquarters: Tatsuno-shi, Hyogo-ken; Yasunari Kuratani, President of Representative Director; hereinafter "KADO") conducted a successful demonstration test (Hereinafter, this demonstration) in Hyogo-Prefecture from October 27 and 28, 2021, covering four use cases: pharmaceuticals delivery, patrolling security, chimney inspection, and sports aerial photography.

This demonstration is part of the 2020 and 21 consignment business Program (*1) initiated by New Energy and Industrial Technology Development Organization (hereinafter, NEDO). With the aim of verifying the operation management system toward the realization of flights beyond visual line of sight in populated areas (hereinafter, Level 4 operation) in fiscal 2022, "KDDI Smart Drone" developed by KDDI Corporation was used to verify the flight status and flight plan status of multiple drones that flew simultaneously in various locations within the prefecture, as well as measures to avoid flight when another drone approaches. The realization of Level 4 operations is expected to expand the use of drones in new areas such as logistics in pharmaceuticals and elsewhere, security, inspection, aerial photography and disaster response.

The details of each company's implementation are as follows.

【JAL】

- Role：Transport in pharmaceuticals, construction of operations control and risk management systems
- Flight area：Sumoto City Mediceo Awaji Branch parking lot ⇔ Kenritsu Awaji Medical Center rooftop garden (about 5km round trip)
- Overview：Transport of model pharmaceuticals (ampoule) up to about 5 kg. **For the first time in Japan, we succeeded in flying over seven bridges in densely inhabited districts.**



<Drone flight routes over seven bridges>

Lightweight and high in transport value, pharmaceuticals are items that are expected to use drones for urban transportation. JAL conducted pharmaceuticals demonstration test deliveries from pharmaceutical wholesalers to hospitals using drones in Sumoto City, taking care to maintain quality and prevent loss pharmaceuticals based on the national guidelines for drone delivery to pharmaceuticals (* 2) (pharmaceuticals delivery by wholesaler).

In order to reduce the risk to the ground and ensure the safe flight of drones in urban areas, it is assumed that the use of the route over rivers is effective in Level 4 operation that the government is aiming for. JAL secured safety measures based on the "Civil Aviation Bureau Standard Flight Manual" for drones, and conducted a remote operations control based on flight guidelines that were originally formulated based on the assumption of various risks associated with flight operations, such as entering and leaving routes over rivers and passing over bridges. JAL became the first company in Japan to successfully fly a drone over seven bridges in densely inhabited districts. This is expected to lead to the use of drones in other cities and regions with large rivers.

In addition, we simulated the appearance of a helicopter on the screen of operations control system and demonstrated a scenario in which a drone made an emergency landing, and verified safe operation functions and systems, including in the event of an irregularity accident.

The knowledge gained through this demonstration will be reflected in the guidelines to be announced in "Drones and Robots for Ecologically Sustainable Societies project" (* 3) by NEDO and further risk assessment and demonstration will lead to the establishment of a drone operations control system for the realization of Level 4 operation.

In the future, drones with a variety of objectives are expected to fly over limited low-altitude airspace. JAL will utilize aviation safety's know-how to contribute to the social implementation of the integrated operations infrastructure, aiming to support operations in which various types of air mobility can coexist and operate safely and efficiently in response to ever-changing conditions.

<Model pharmaceuticals (Ampoule) on board >

<Operation room>

【SECOM】

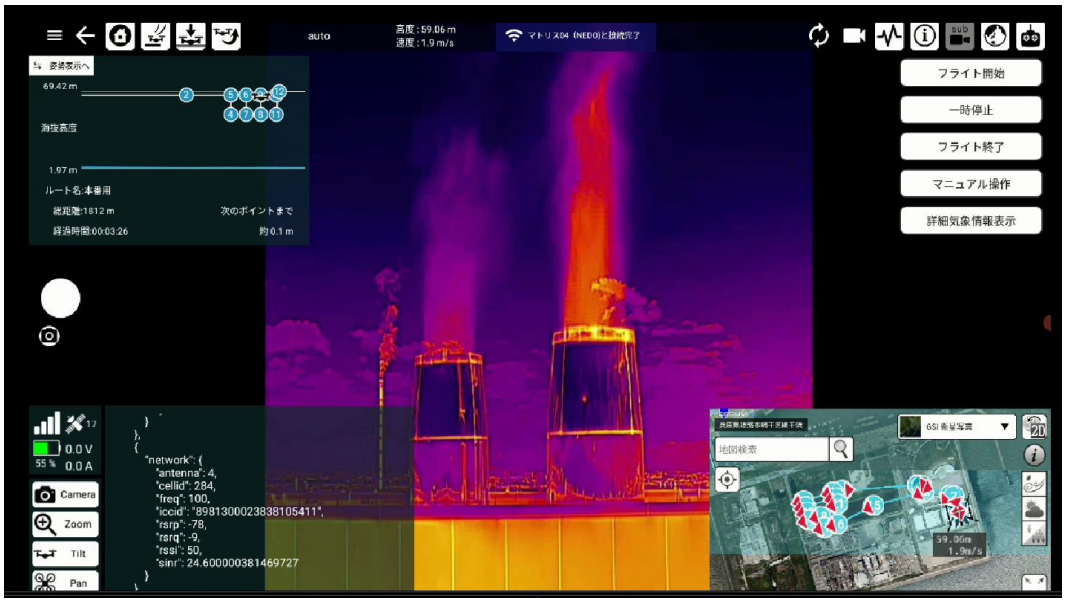
- Role : Patrolling security
- Flight area : Himeji City Aboshi Boat Park～Aboshi Nagisa Park (when suspicious persons follow: Hyogo West Sludge Center)
- Overview : Conducted patrols around Aboshi Boat Park and a series of security scenarios from following to returning when a suspicious person is found. In addition, the drone approached the inspection drone, and multiple avoidance actions such as emergency landing and climb were taken according to the priority set in advance.

Source: Compiled from mid-air photographs taken by the Geographical Survey Institute

〈 Flight route of security drone〉

【Asahi Technology】

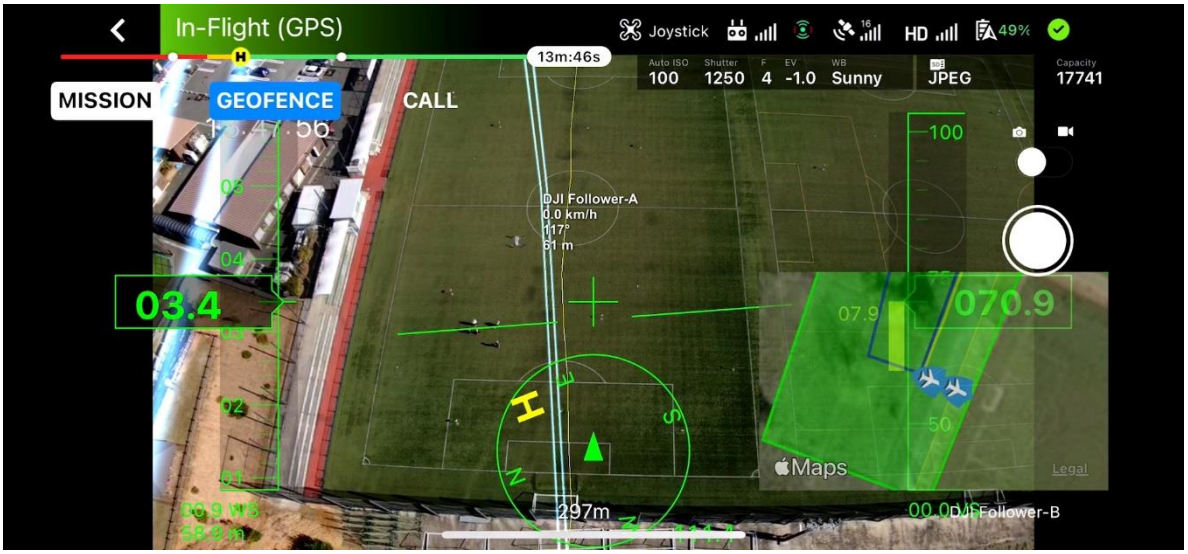
- Role：Chimney inspection
- Flight area：Himeji City Eco Park Aboshi～Hyogo West Sludge Center
- Overview：Inspections were conducted at the Eco Park Aboshi and the Hyogo Nishi Sludge Center in areas that are difficult to access, such as chimneys. In addition, the drone approached the security drone, and multiple avoidance actions such as emergency landing and climb were taken according to the priority set in advance.



〈 GCS screen of Asahi Technology〉

【Red Dot Drone】

- Role：Sports aerial photography
- Flight area：Kamigori Town, Daisel Harima Mitsuto 1st and 2nd soccer fields,
- Overview：The pilot took aerial photographs of the soccer field from a remote location. Between the soccer field and the pilot's base, where radio waves usually do not reach, aerial work was done by remote control of the drone using telephone lines. We believe that these technologies are essential for creating a sustainable business model by minimizing personnel expense in the actual place toward Level 4 operation in the future. In this demonstration, it was verified that aerial photography could be performed without dispatching pilots to the actual place, and the safety problems associated with remote control and the validity of the solution were verified.



< Red Dot Drone GCS Screen >

【KADO】

- Role：Logistics drone demonstration support
- Overview：Supporting demonstrations and providing transport boxes for drones in logistics use cases.

< Drone equipped with transport box provided by KADO>

By using the results of this demonstration to build a safe and efficient operations control drone system for Level 4 operations, we will create a prosperous and sustainable society in which many drones with various roles play active roles.

(*1)In FY 2020, a pilot demonstration was conducted in Harima Science Park City, Hyogo Prefecture.
Reference： Press Release dated March 25, 2021 “Successful simultaneous operation of multiple drones with missions of logistics, security, inspection and aerial photography in the same area” https://www.jal.com/ja/press/backnumber/areanews/attaches/pdf/osa_210325.pdf
(*2)Created by the Cabinet Secretariat, the Ministry of Health, Labour and Welfare and the Ministry of Land, Infrastructure, Transport and Tourism in June 2021 Reference: https://www.mlit.go.jp/common/001411070.pdf
(*3)Projects implemented by NEDO from FY 2017 to FY 2021 Reference: https://nedo-dress.jp/en/