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Innovative Breakthrough in Localized Airport Simulation Technology Enhancing Airport Operations Management in Taiwan

To improve airport airside operational effectiveness and decision-making capabilities in engineering responses, the Institute of Transportation, MOTC (henceforth the IOT) has collaborated with the NCKU Research and Development Foundation to research and develop the localized airport simulation technology, resulting in the creation of the Airport Airside Simulation and Analysis System (henceforth This Software). This Software can be used as an airport operation decision-making analysis tool by the Taoyuan International Airport Corporation, the Civil Aviation Administration, MOTC, and other relevant units, thereby improving airport airside management and plan assessment while also lowering related costs and increasing airport operation efficiency.

This Software's system functions include airport airside scenario management, flight management, project management, simulation assessments, and so on. Users can

freely create airport airside scenario configurations, parameter values, number of airport takeoffs and landings, takeoff and landing intervals, and airport airside operational scenario settings, such as takeoff, landing, and gliding, as well as practical operations, such as traction and ground parking. Furthermore, in response to situations involving climate and engineering change, plan assessment and selection have been carried out. Several actual case analyses and verifications at Taoyuan International Airport were completed during the development process. Additionally, user feedback and comments were gathered through trials conducted by airport-related agencies (institutions) and as of October 2024, the Civil Aviation Administration, MOTC, and Taoyuan International Airport each completed one education training session. In addition to the personnel from the aforementioned units, personnel from the Air Navigation and Weather Services, Taipei International Airport, Kaohsiung International Airport, and Taichung International Airport were invited to participate in order to strengthen future practical applications.

Previously, airport simulation analyses conducted in response to the operational needs of Taiwan's airports were delegated to foreign teams as projects, which were not tailored to meet operational demands (such as the impact assessment of routine scene maintenance) or lay groundwork capabilities for Taiwan's airport airside simulation and analysis capabilities. This Software is built on the foundation of IOT system simulation technology from 2017 to 2018, and 2021 to 2022. It, along with aviation and airport operations, waiting theory, mathematical planning and scheduling, and other models, has compelled the development of airport

airside capacity assessment and core analysis technology. It has been developed into a comprehensive software with human-machine interface affinity intended to monitor airport airside capacity, the benefits and drawbacks of airport airside configuration plans in everyday situations, as well as interference situations. This helps to clarify bottlenecks and delays caused by various situations and scene configurations. As a result, airline operating costs can be reduced while passenger wait times are reduced, improving airport efficiency and competitiveness.

The IOT has long been dedicated to piloting the research and localization of airport operation and management technologies. It will continue to develop, expand, and deepen its existing technological capabilities which include air traffic regulation, aviation control and coordination simulation, departure and arrival management, simulation of other activity patterns, and strategic recommendation capabilities. In the long run, the focus will be on expanding the scope of the application to include ground duties and landside range. It is hoped that this software will serve as a localized standard analysis tool for civil airports in Taiwan.

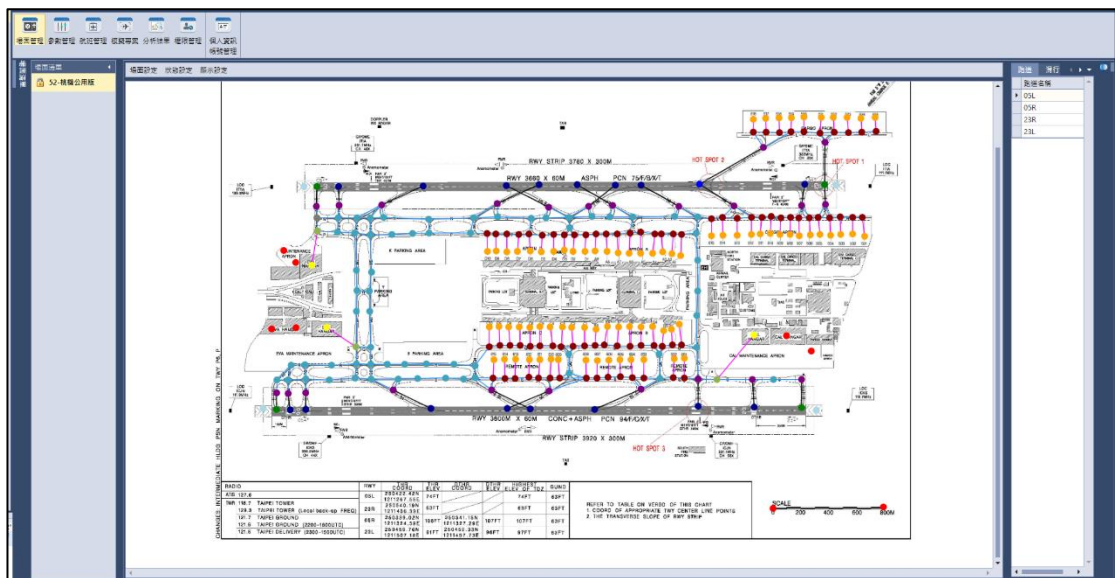


Figure 1 Diagram of the scenario editing function using this software

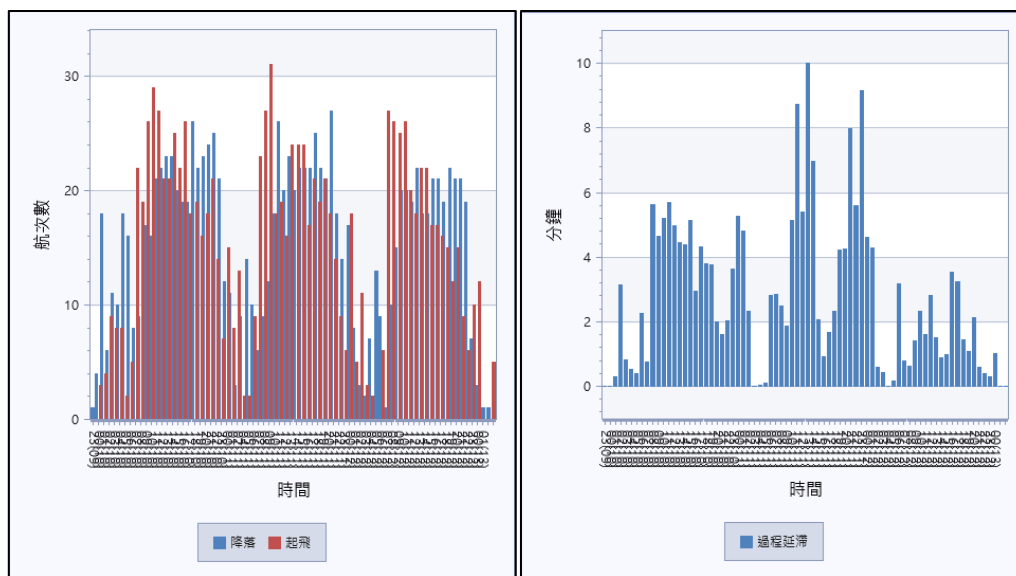


Figure 2 Diagram of the simulation analysis results using this software