Project Title: Minimizing Maintenance Delays by Integrating Aircraft Maintenance Routing and Maintenance Workforce Scheduling with the Consideration of Component Availability
研究項目: 研究透過綜合飛機路線與維修、調度維修人員和飛機部件庫存去減低飛機維修延誤
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Abstract

Aircraft maintenance routing problems (AMRPs) aim to determine a set of routes to cover an airline's flight network with the aim of maximizing aircraft utilization and flight schedule reliability. In particular, aircraft must strictly comply with aircraft regulations stipulated by the civil aviation department, among which the maximum flying hour is prioritized. Typically, aircraft must perform A-checks every 400–600 flying hours. However, because of the long duration required by the A-checks (2–4 weeks), the utilization of aircraft is low. As such, many airlines have re-packaged the conventional A-check into many shorter (small) checks and performed them between flights during the normal flight operations. Therefore, the on-time completion of checks performed at maintenance stations becomes critical, as the scheduled maintenance time allowed is much shorter as compared with that of the conventional approach. Therefore, a delay maintenance may easily disrupt the flight schedule. In our prior completed FDS project, we developed a machine learning algorithm to predict the maintenance time required for maintenance tasks and estimated the corresponding delay risk for AMRPs optimization. The results show that the flight schedule reliability increased. Moreover, while we were analyzing historical data pertaining to maintenance, we discovered frequent maintenance delays due to insufficient manpower in the maintenance station caused by mismatch between the aircraft maintenance demand and workforce schedule. Moreover, we discovered that the maintenance delays can be caused by the shortage of components required for replacement. However, in the existing studies, manpower availability, component availability, and workforce scheduling at maintenance stations are not considered in AMRPs. Therefore, we propose to investigate an integrated problem comprising AMRPs and workforce scheduling problems with the consideration of component replacement availability problems.