AN INTEGRATED SURFACE TRAFFIC PLANNING APPROACH FOR COMBINED ARRIVAL-DEPARTURE MANAGEMENT AND RUNWAY OPTIMIZATION

Objective
- The project seeks to develop models and algorithms that integrate and simultaneously optimize arrival and departure flight sequences in conjunction with ground/surface movement at Singapore’s Changi Airport.

Key Findings
- A 0-1 mixed-integer programming model that optimizes the static aircraft sequencing problem over a single runway by taking into account the TMA configuration has been developed.
- All practical constraints, including early landings, constrained position shifting, and wide time-windows have been accounted for in the model, with the objective of minimizing the total delay.
- A novel data-splitting algorithm for runway optimization is postulated for the static aircraft sequencing and scheduling problem under a mixed-mode, single runway operating scenario.
- Preliminary findings show that the developed approach can lead to significantly reduced delays.
- Computational results show that the overall time taken to solve large-scale (realistic) instances can be reduced significantly, while achieving the optimal solution in nearly all of the instances.

Publications