
Departure Flow Manager for Bangkok TMA

For the past five years, Bangkok FIR has experienced an average traffic growth of 13% per year, with roughly 70% percent of all flights arriving or departing from Bangkok. As demands began to reach runway capacity at Suvarnanabumi International Airport, in 2012, the Thai Government established Don Mueang as a hub for low-cost carriers, non-connecting domestic and charter flights. The overall traffic growth combined with policy for dual-airport operations has led to staggering increase in flight volume operating within the Bangkok Terminal Control Area (TMA). While Don Mueang has relieved the runway saturation issue previously experienced at Suvarnabhumi, a new problem arises as congestion has been transferred to the TMA and surrounding en-route sectors.

The configuration two closely-spaced aerodromes coupled with various airspace restrictions added to the complexity of air traffic handling which often resulted in inefficient climbing trajectories for departing traffic. The problem is especially magnified during peak traffic periods, where additional step climbs and ground delays are necessary means to keep adequate separation between aircraft. In addition to workload burden to air traffic controllers, such unmanaged departure traffic sometimes leads to further airborne delay, as well as undesirable departing profiles, which ultimately translates into inefficient consumption of fuel for take-off operations.

To cope with this situation, in 2014, AEROTHAI initiated the Departure Flow Management Project, with air traffic controllers working closely with the research and development team to design and develop a planning tool to enable better management of departing traffic. For the initial stage of implementation, a simple version of Departure Manager with basic sequencing algorithm is used as the ATM decision support tool – an interim solution until the complete Departure Manager can be put in place.

The planning tool for departure schedules has been used at both Suvarnabhumi and Don Mueang International Airports, two major neighboring airports with shared airspace. Integrating flight departure plans from both airports, the tool predicts a point where congestion, additional delays or aircraft vectoring to maintain separation, is expected to occur. When the number of departure flights traveling into the same sector or a merging point reaches an established threshold, the sequencing tool generates take-off sequence in order to appropriately spread out departing traffic flow. The Target Take-Off times, calculated based on configuration and constraints in the TMA and certain en-route airspace sectors, are suggested to air traffic controllers to relay to each departing aircraft in order to ensure smooth and efficient departure traffic flow. Due to limitation on integration between flight information system and the sequencing tool, the use of Departure Flow Management procedure is, at this time, limited to peak hours of operations where benefits are optimal.

Although some improvements and fine-tuning are still expected in the future, the initial results of the implementation trial currently being carried out indicate promising outlooks. At Suvarnabhumi International Airport, where Gate Hold procedures are already in place, Target Start-Up Times can be easily calculated, enabling further planning and management of aircraft since engine startup. With fewer aircraft introduced and handled, the initiative is projected to serve the main objectives of workload alleviation and safety enhancement. Additionally, the decrease in both taxi times as well as congestion in TMA sectors also translates into environmental benefits of fuel savings and emission reduction during taxi-out and take-off.

