**APPROACH**

1. A literature analysis was conducted to analyse current taxi fuel consumption optimisation frameworks and it was found that they assumed a constant taxiing speed. Hence, highlighting the need to create a framework that takes accounts for various speed profiles.

2. AutoCAD was used to model Changi Airport’s Terminal 2 gates and Taxiways. Speed profiles were built for various aircraft in a framework that assumed two speeds (5 ms\(^{-1}\) or 10 ms\(^{-1}\)) and three acceleration rates (0.50 ms\(^{-2}\), 0.67 ms\(^{-2}\), or 1.00 ms\(^{-2}\)).

3. Using AutoCAD Scripts SPath and TLEN, optimal speed profiles were created by choosing the shortest distance path and by minimising the total cost obtained by assigning several fuel flow values to each acceleration value.

4. The conflicting profiles in a test set of 30 aircraft were determined. With the set of compiled cost and conflicting profiles, the model was written as a set partition problem and solved to give the optimal speed profiles for the 30 aircraft.

5. An alternative path approach which took the path with the least amount of turns was also constructed for analysis and comparison.

**RESULTS AND DISCUSSION**

Results showed that the first framework was able to correctly identify the optimal least cost speed profiles for any route, and would always assign the lowest possible acceleration value to aircraft, unless it was limited by the length of the runway. After factoring the alternative path into the framework, higher cost savings were achieved due to the decrease in the number of acceleration segments. Also, it was commonly observed that between the two path approaches, arrival aircraft chose the path with the least number of turns while departure aircraft chose the shortest distance path.

**OPTIMISATION OF FUEL CONSUMPTION IN AIRCRAFT GROUND MOVEMENT**

To minimise the fuel consumption of the aircraft during taxiing and to optimise the airport ground movement in terms of taxiing time.