THALES

Building a future we can all trust

Approach Spacing Tool (AST)

CONCEPT AND FEATURE OVERVIEW

Approach Spacing Tool – Overview

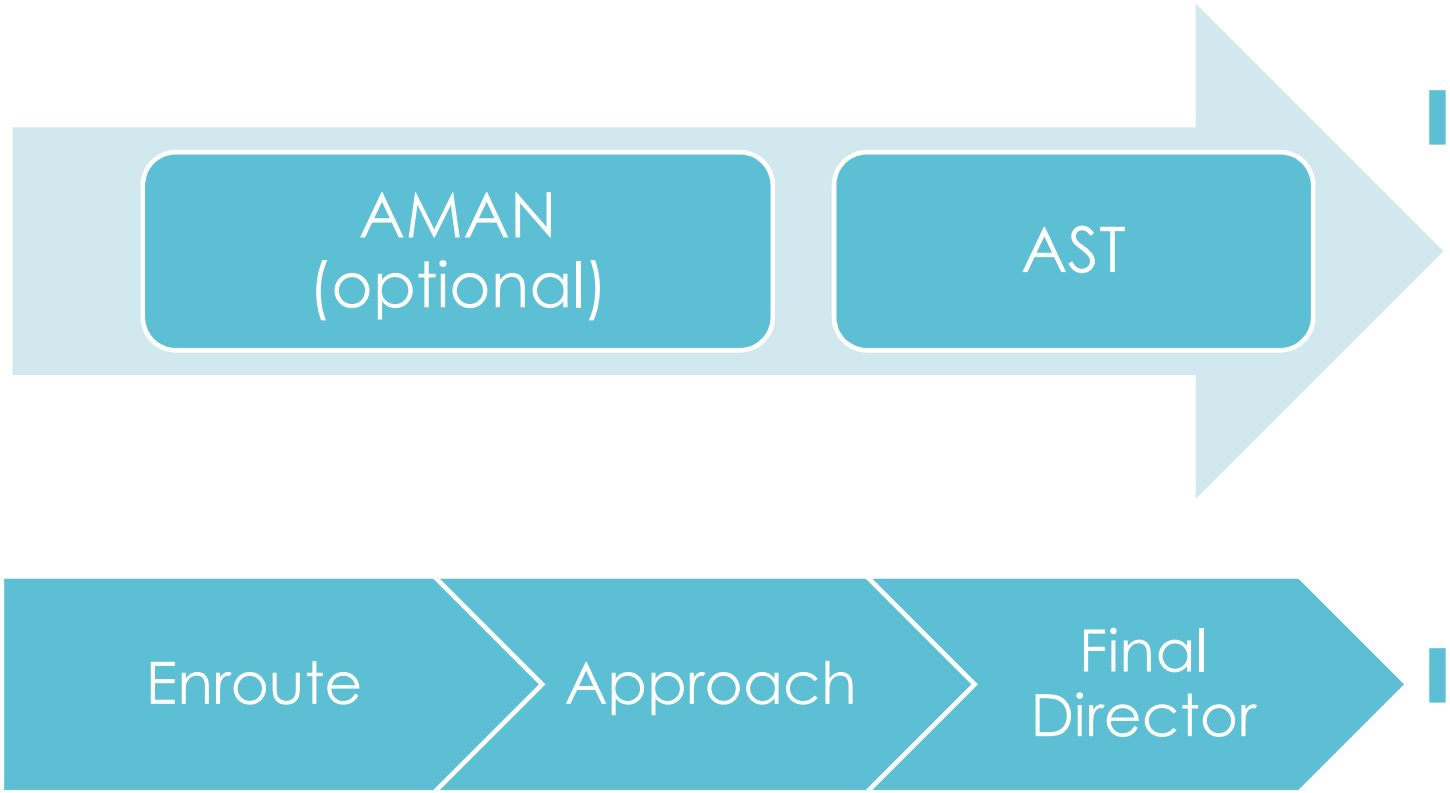
Purpose

- Decision support tool providing:
  - Guidance cues and warnings to the controller, facilitating safe delivery of flights to the threshold while minimising lost capacity
  - Automatic selection of required separation between aircraft (including application of RECAT)
  - Calculation of required positioning needed to meet optimised sequence (predictive)

Sophisticated algorithm using 4D trajectory prediction utilising:

- Detailed aircraft performance models
- Flight path to the runway
- High-frequency update of track position.
- High-resolution/update rate forecast wind model (where available)

Approach Spacing Tool (AST) – In Context



AMAN

- Provides preliminary sequence/spacing into the terminal airspace
- AST not dependent on AMAN
  (e.g. sequence provided from controller HMI)

Approach Spacing Tool (AST)

- Provides cues to delivery optimised spacing to runway threshold.

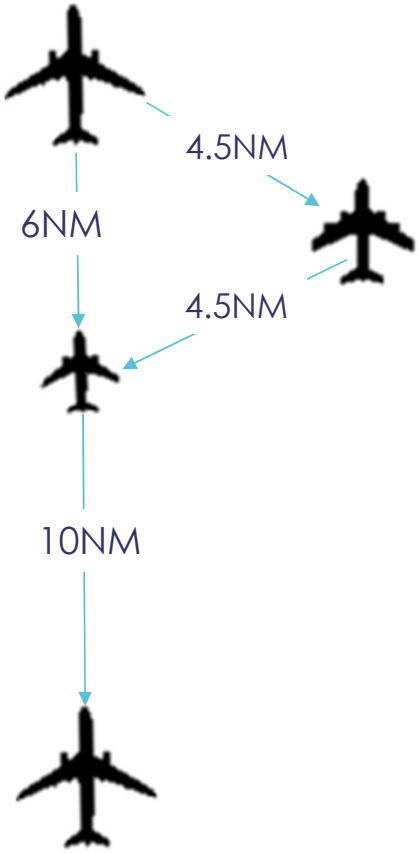
Approach Spacing Tool - Features (1/4)

Support separation values

- RECAT or,
- Minimum Radar Separation (MRS)
- Support for RECAT/MRS (in-trail/parallel) and discrete Dependent Parallel separation values

Spacing

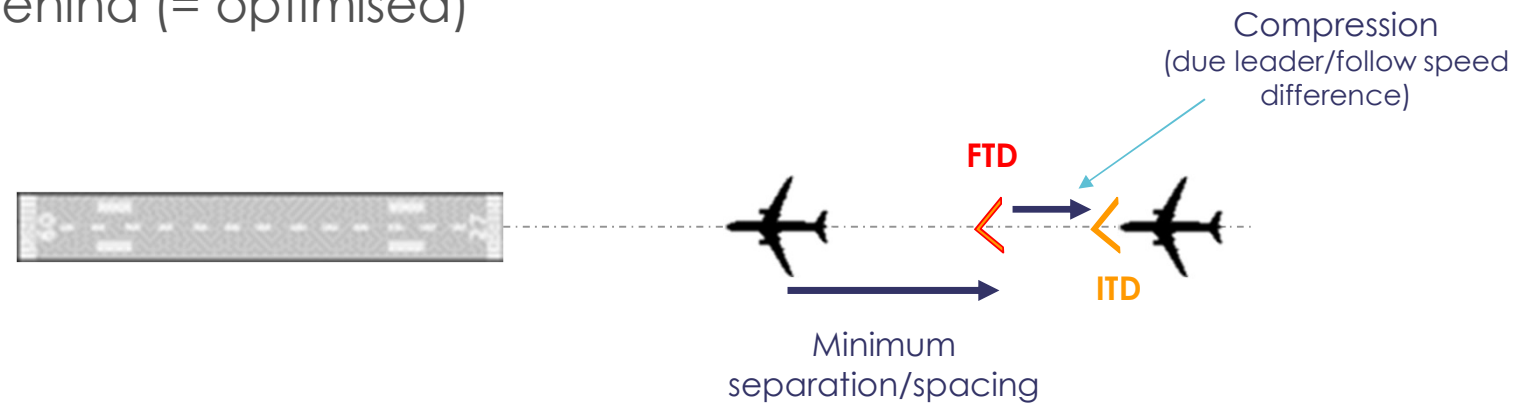
- Minimum separation or,
- Runway Occupancy Time (per aircraft)
- Specific delay behind landing aircraft
- Specific interval between all aircraft (per runway)



Approach Spacing Tool - Features (2/4)

Guidance Cues

- Initial Target Distance (ITD)
  - Ideal position for follower flight to meet spacing target
- Final Target Distance (FTD)
  - Minimum distance between a pair of flights
  - As lead aircraft lands the "target" is to have the follower this distance behind (= optimised)



Approach Spacing Tool - Features (2/4)

Example

- ITD role is to deliver follower flight to FTD as leader reaches threshold.

Approach Spacing Tool – Features (4/4)

Spacing modes

- Distance Based Separation (DBS)
  - Conventional application
  - Existing standards (e.g. Radar, RECAT etc)

Distance Based Separation (DBS)

- Time Based Separation (TBS)
  - Separation standards need to be based on analysis of large dataset
  - Safety case
  - Values determined/set by ANSP
  - May require real-time environmental data

Time Based Separation (TBS)

Approach Spacing Tool - Warnings

Catch-up

- Guidance cue will be infringed within a look-ahead time

Infringement

- Guidance cue has been infringed.

Sequence

- The sequence computed by AST is incompatible with the controller defined landing order.

Speed

- A flight is not conforming to the mandated speed profile for the arrival/approach path

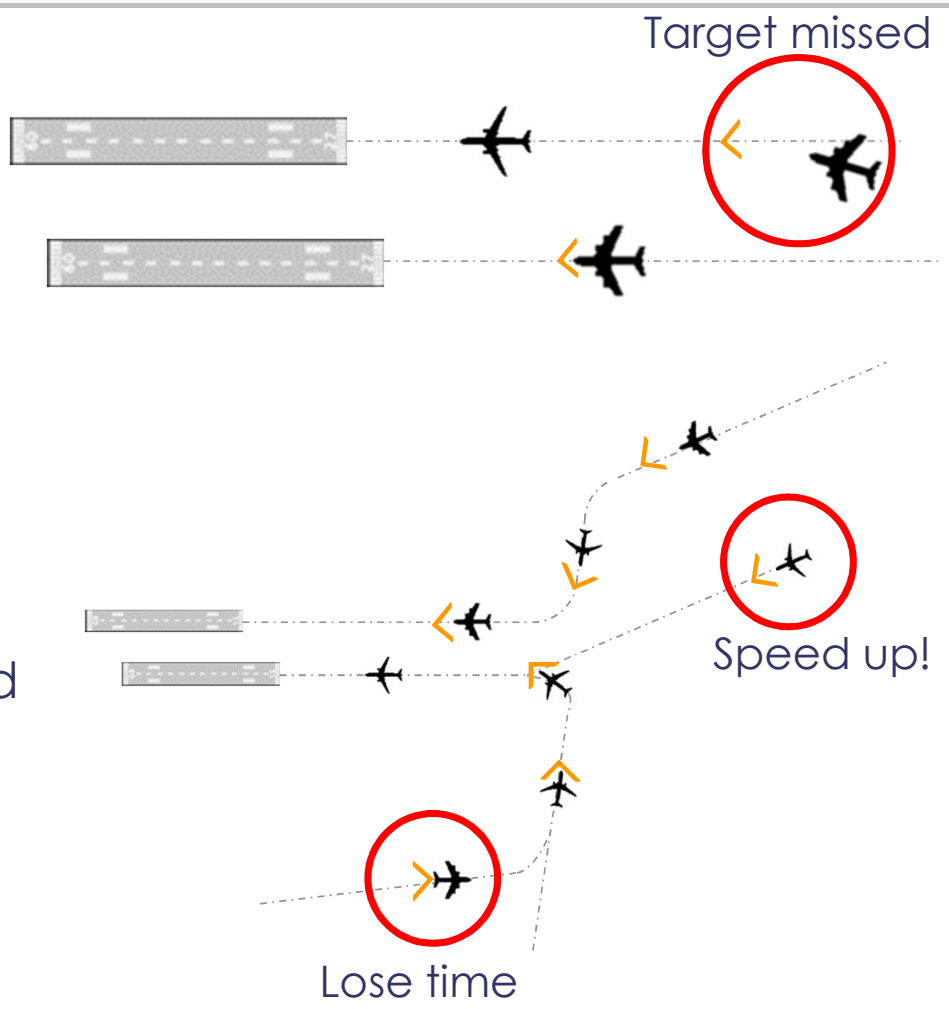
Approach Spacing Tool - Implementations

Final Approach

- Perform optimisation actions on final approach (e.g. 15NM to touchdown)
- Aircraft may not be able to meet target (due to remaining time to run)

Extended Final Approach (TMA)

- Earlier intervention
- Requires predictable track miles to threshold
- Reduces likelihood of not meeting target
- Contextual indication of ahead/behind target



Conclusion

- In order to increase runway throughput, better ATC tools are required, including an integrated approach spacing tool
- The Approach Spacing tool can take advantage of new standards to provide the minimum safe separation on final
- This component will become a key part of a wider range of tools, procedures and practices targeting improve runway efficiency.
- A range of implementation strategies are possible

VIDEO PRESENTATION