Airbus A320family FOPP Air Flow Deflector

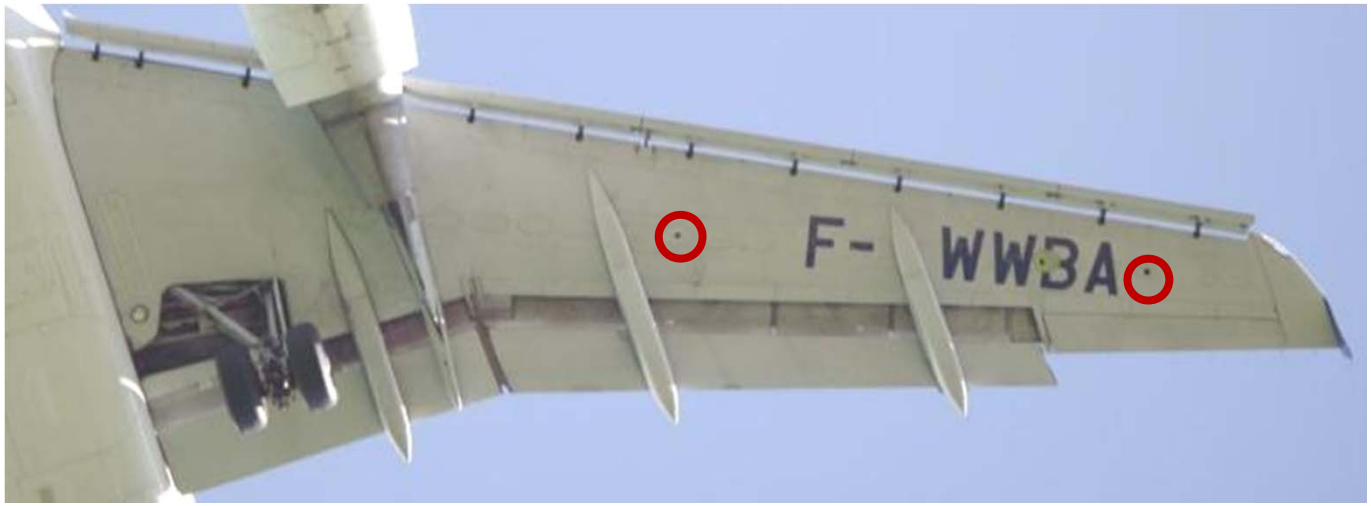
Noise reduction on approach

Presented by

AIRBUS

Current status

- Two tonal noise components are generated by the Fuel Over Pressure Protector (FOPP) cavities (“whistling noise”)



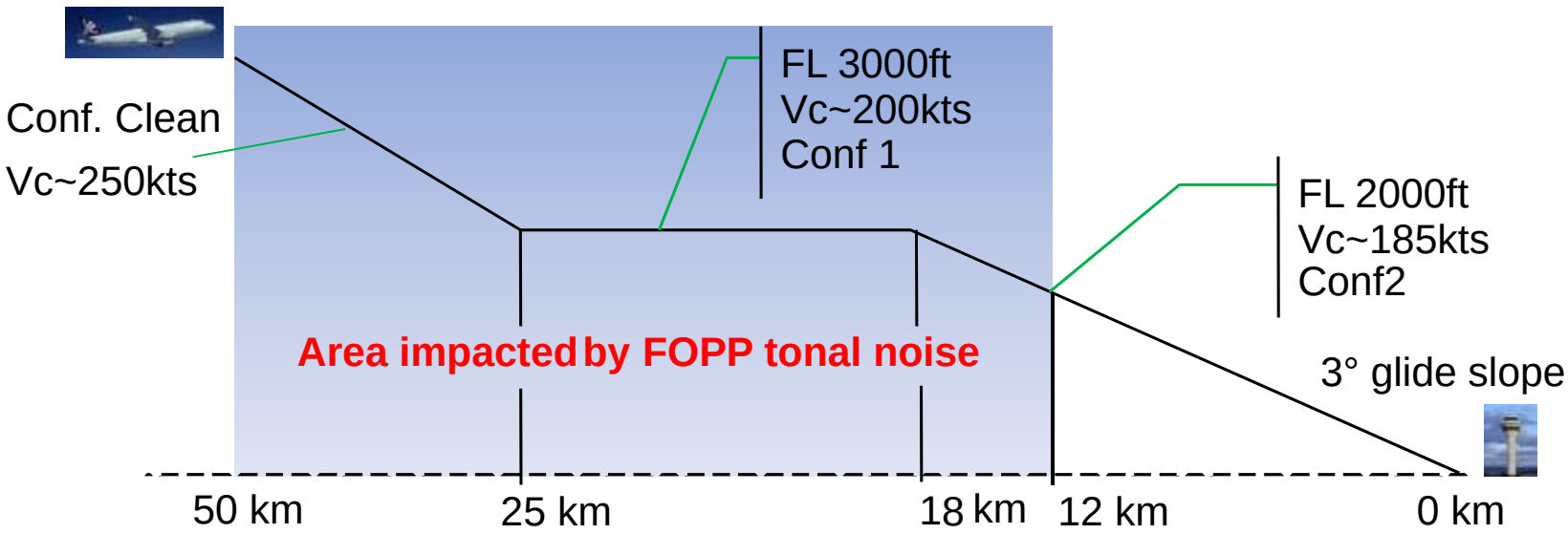
- Perceived on ground at 12 to 40 Km from runway on initial approach

- Noticeable in low high-lift configuration with landing gear up, between 180 and 240 knots

Approach trajectory affected

- Overall aircraft noise levels in far approach can be significantly affected
- Noise certification of the aircraft is not affected

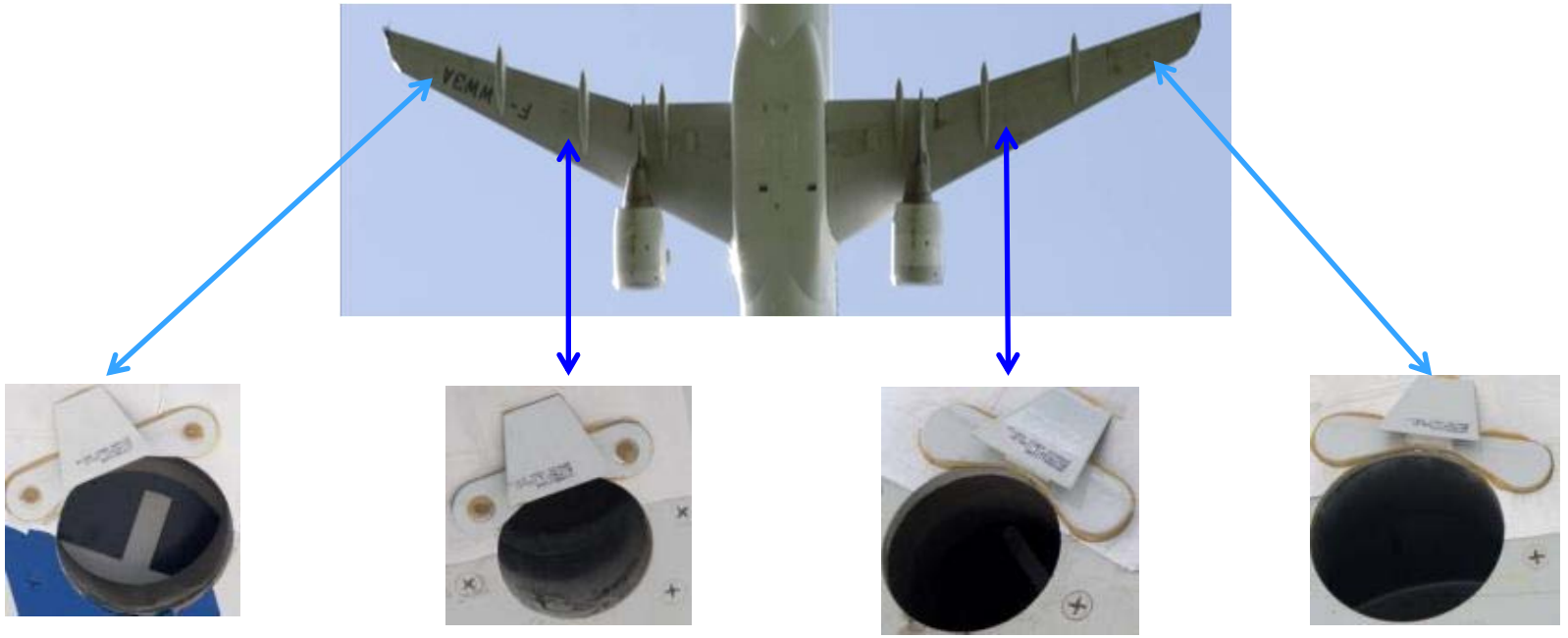
Typical trajectory for A320 MLW 58.2T



Note : Vc = calibrated airspeed

The solution – Air flow deflectors

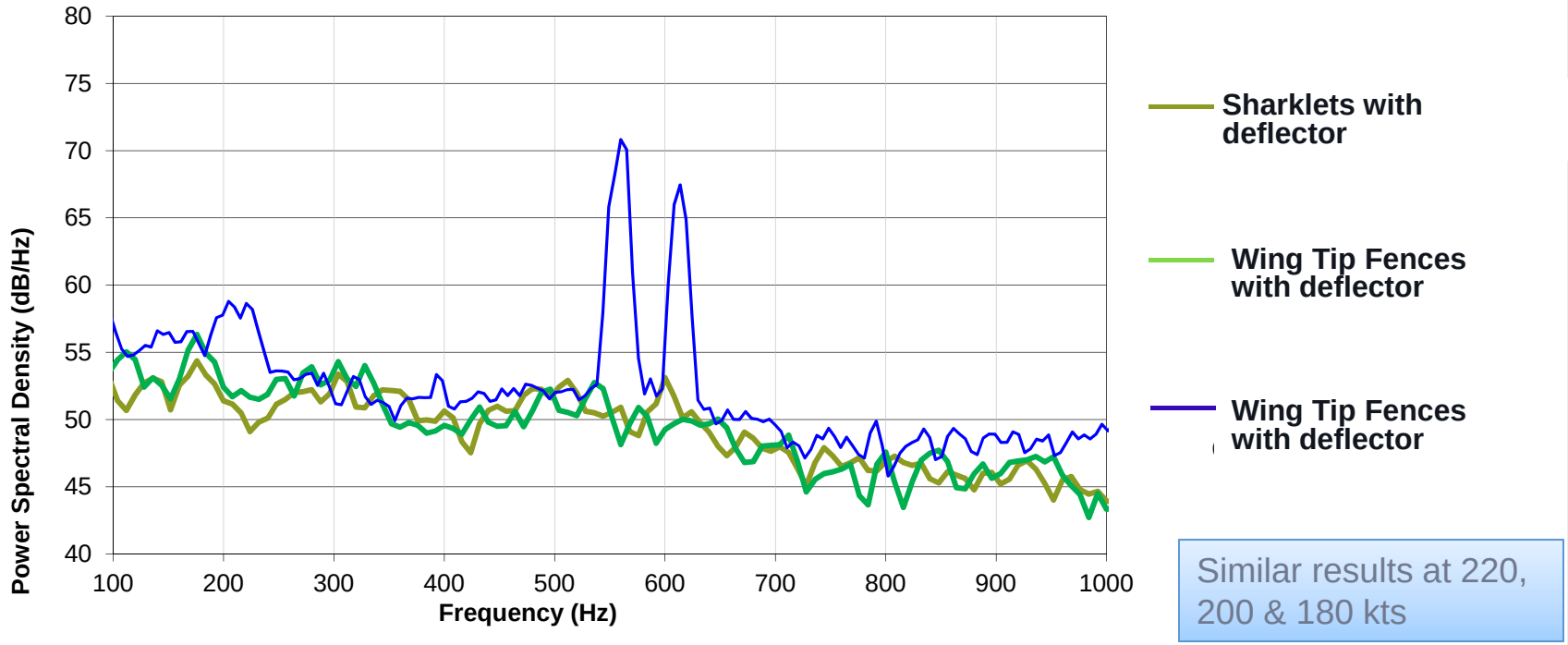
Flow deflectors installed forward of the cavities to suppress tonal noise



Note : Illustration from flight test installation (final version will have screw fixations)

Deflector efficiency - far field noise flight tests

Far field average Sound Power Spectral Density across 40-140° angle of emission - TAS 240 Knots



Similar results at 220, 200 & 180 kts

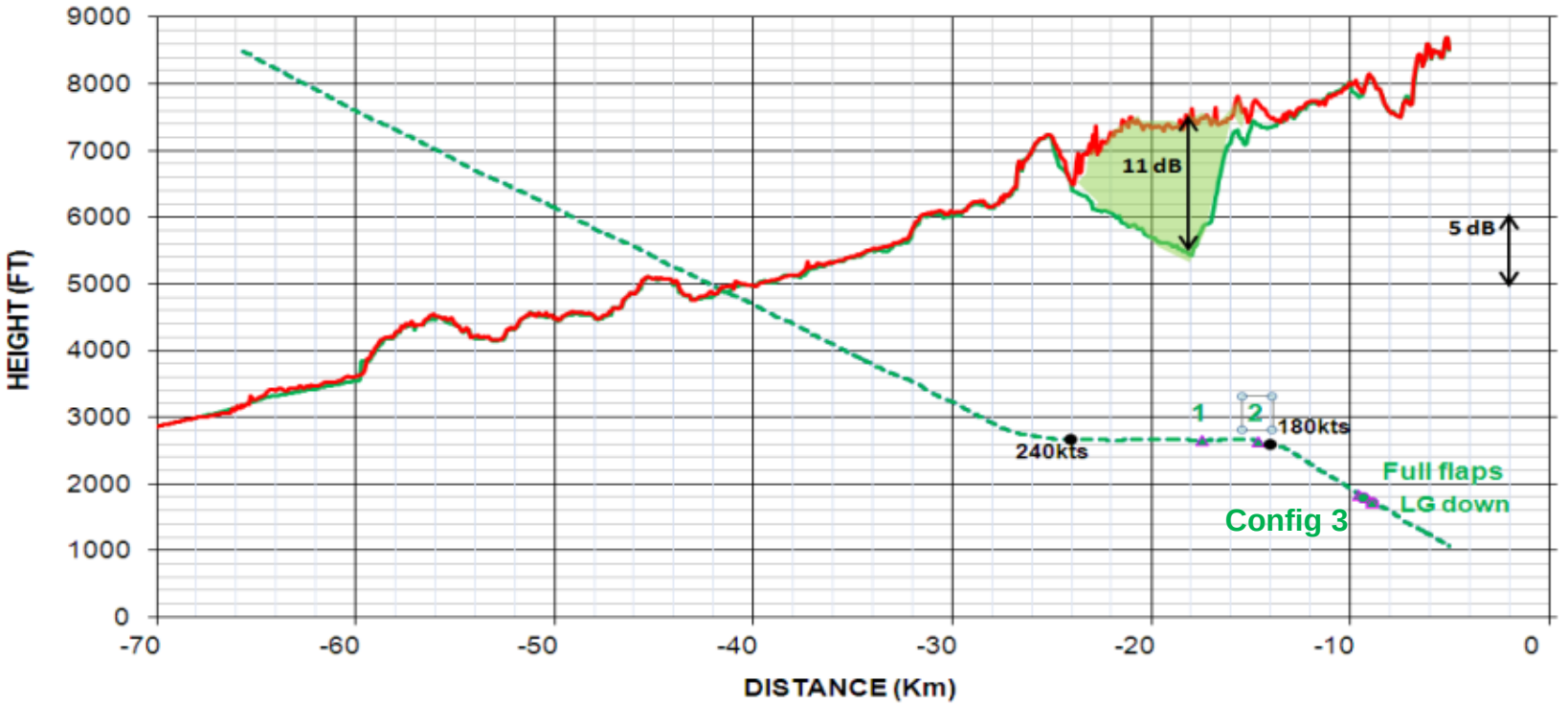
Notes : *NCFT: Noise Certification Flight Test*
Wing Tip Fences are baseline configuration for A320 family
Similar results are obtained at 220, 200 and 180 knots

Flow deflectors for the A320 Family - test data

A320-231 - Impact of Flow Deflectors on approach with level flight

With deflector Without deflector

Noise simulated on Real Flight trajectory collected during Flight Test in Toulouse Airport in the frame of R&T project



Note : Points 1, 2, and 3 correspond to flap configuration changes until LG down.

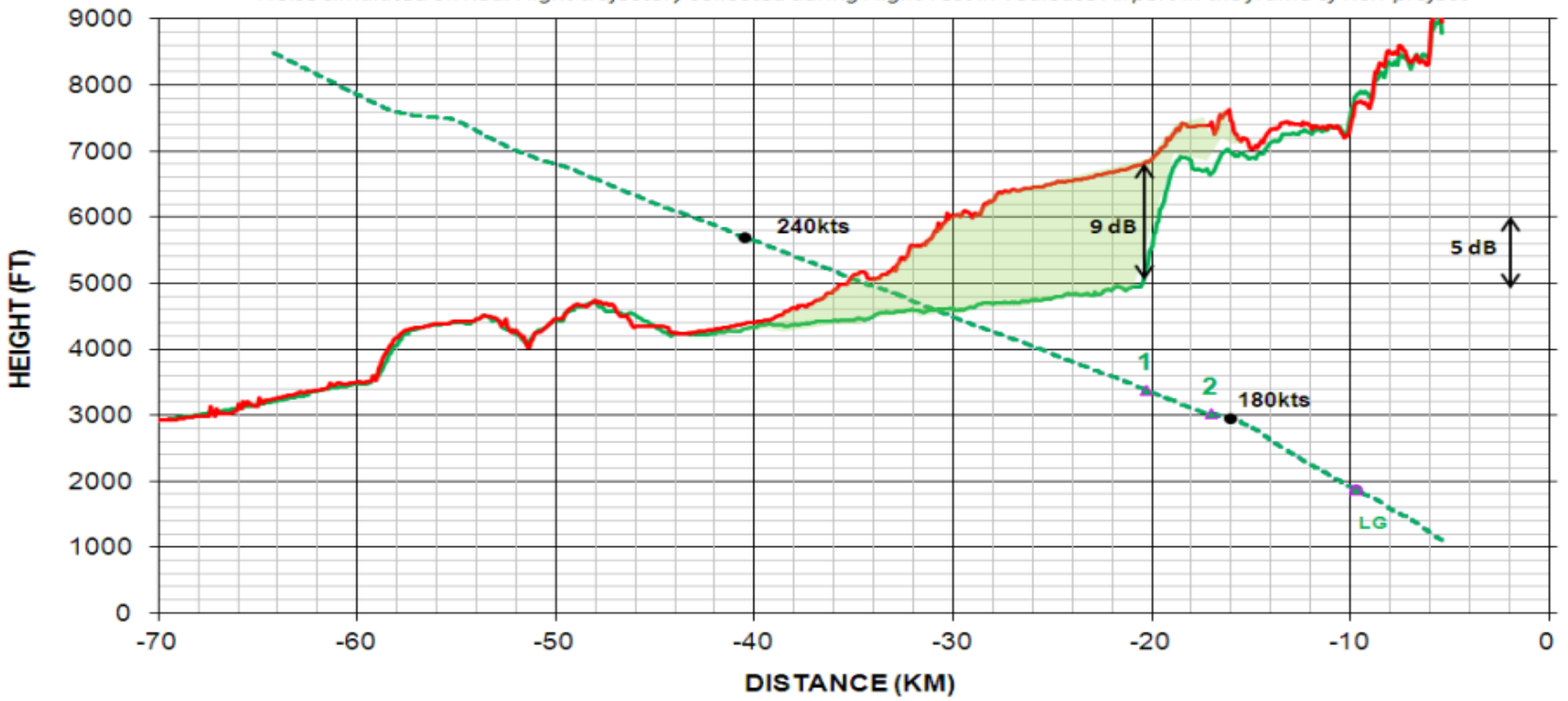
Engine thrust adjustments also impact the noise levels perceived

Flow deflectors for the A320 Family - test data

A320-231 - I Impact of Flow Deflectors on a CDO at -2 deg slope

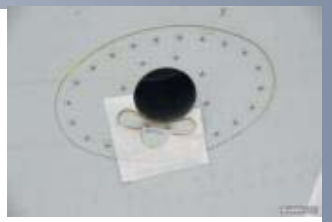
With **deflector** Without **deflector**

Noise simulated on Real Flight trajectory collected during Flight Test in Toulouse Airport in the frame of R&T project



Note : A/C noise significantly reduced in far approach phase

Way forward for line fit and retrofit



➢**Line fit:**

✓ Fitted on A320 family aircraft from May 2014

➢**Retrofit:**

✓ SB availability Early 2014

✓ Embodiment aspects

- Removal of the fuel over pressure protectors
- Installation of flow deflectors
- Re-installation of the fuel over pressure protectors

✓ MH: ~ 10 per aircraft + partial de-fuelling

Conclusion

- Flight tests demonstrated the benefits of the FOPP Flow Deflectors
  - ✓Typically between 12 to 40 Km from landing, on approach
  - ✓Valid for A320 family with either Wing Tip Fences or Sharklets
  - ✓Benefits extended when operating Continuous Descent Approaches
  - ✓FOPP Air Flow Deflectors will similarly benefit the A320 Neo family