



# Windshear in TFS, Pilot View

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go-around

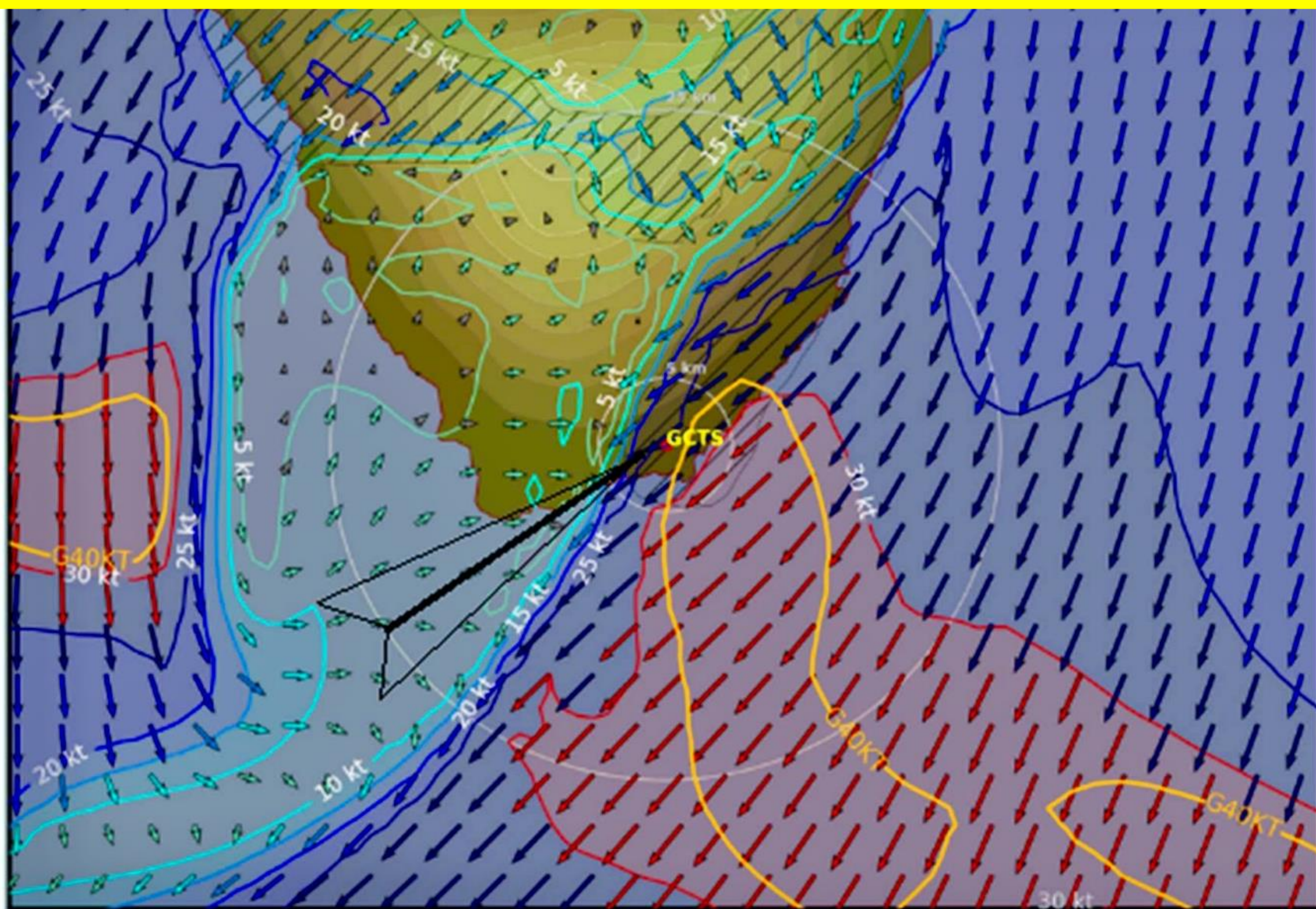
Crosswind  
Landings

50kts



WINDSHEAR





previsto en el aeropuerto: GCTS 121400 05024kt  
racha máxima: 05038kt en la hora previa



# Windshear definition by ICAO

- ICAO considers unacceptable flight path degradation the following parameters (ICAO DOC 9817):
  - +/- 15 knots Indicated airspeed deviation
  - +/- 500 ft/min vertical speed deviation
  - +/- 5 degrees pitch attitude variation
  - +/- 1 dot of glide slope deviation
  - Unusual thrust position for a significant period of time

# Windshear definition by OMA

- Windshear Wind shear is a variation in wind velocity (direction and/or speed) with distance in the vertical or horizontal plane. It can affect airspeed whenever an aircraft transverses from one wind velocity condition to another in less time than it takes for the aircraft to become adjusted in speed to the new environment.

- Windshear encountered on take-off or approach must be reported to ATC immediately by R/T if considered a hazard, giving details of height and severity. Severe windshear is considered to be uncontrollable changes from normal steady flight conditions below 1000 AGL, in excess of the following:
  - • 15 kts indicated airspeed.
  - • 500 fpm vertical speed.
  - • 5° pitch attitude
  - • 1 dot displacement from the glideslope/glidepath.
  - • Unusual thrust levels for a significant period of time.
- If severe windshear is reported or forecast – **DO NOT TAKEOFF.**
- Full thrust must be used if the nature or severity of the windshear cannot be determined.
- Reduced thrust may be used if any windshear expected during or after take-off is caused by strong winds not associated with CBs or frontal activity.

# Precautions

- The following precautionary actions are recommended if windshear is suspected:

- **Takeoff.**

- Takeoff with full rated takeoff thrust is recommended.
- For optimum takeoff performance, use flaps 5, 10 or 15 unless limited by obstacle clearance and/or climb gradient.
- Use the longest suitable runway provided it is clear of areas of known windshear.
- Consider increasing  $V_r$  speed to the performance limited gross weight rotation speed, not to exceed actual gross weight  $V_r + 20$  knots. This increased rotation speed results in an increased stall margin and meets takeoff performance requirements.
- Be alert for any airspeed fluctuations during takeoff and initial climb. Such fluctuations may be the first indication of windshear.
- Know the all-engine initial climb pitch attitude. Rotate at the normal rate to this attitude for all non-engine failure takeoffs. Minimize reductions from the initial climb pitch attitude until terrain and obstruction clearance is assured, unless stick shaker activates.
- Crew coordination and awareness are very important. Closely monitor vertical flight path instruments such as vertical speed and altimeters. The pilot monitoring should be especially aware of vertical flight path instruments and call out any deviations from normal.

# Precautions

## ■ Approach & Landing

- Use flaps 30 (B737-800) for landing.
- Establish a stabilized approach no lower than 1000 feet above the airport to improve windshear recognition capability.
- Use the most suitable runway that avoids the areas of suspected windshear and is compatible with crosswind or tailwind limitations. Use ILS G/S, VNAV path or VASI/PAPI indications to detect flight path deviations.
- If the autothrottle is disengaged, or is planned to be disengaged prior to landing, add an appropriate airspeed correction (correction applied in the same manner as gust), up to a maximum of 20 knots.
- Avoid large thrust reductions or trim changes in response to sudden airspeed increases as these may be followed by airspeed decreases.
- Crew coordination and awareness are very important, particularly at night or in marginal weather conditions. The pilot monitoring should call out any deviations from normal.



# Windshear escape manoeuvre

- When encountering windshear, the crew is expected to perform the Windshear Escape Manoeuvre

**BOEING**  
737 Flight Crew Operations Manual

Manoeuvres -  
Non-Normal Manoeuvres

### Windshear Escape Manoeuvre

| Pilot Flying  | Pilot Monitoring  |
|---|---|
| <b>MANUAL FLIGHT</b> <ul style="list-style-type: none"> <li>Disengage autopilot.</li> <li>Push either TO/GA switch.</li> <li>Aggressively apply maximum thrust*</li> <li>Disengage autothrottle.</li> <li>Simultaneously roll wings level and rotate toward an initial pitch attitude of 15°.</li> <li>Retract speedbrakes.</li> <li>Follow flight director TO/GA guidance (if available) **</li> </ul> | <ul style="list-style-type: none"> <li>Verify maximum* thrust.</li> <li>Verify all needed actions have been completed and call out any omissions.</li> </ul>  |
| <b>AUTOMATIC FLIGHT</b> <ul style="list-style-type: none"> <li>Push either TO/GA switch***</li> <li>Verify TO/GA mode annunciation.</li> <li>Verify GA thrust.</li> <li>Retract speedbrakes.</li> <li>Monitor system performance****</li> </ul>   | <ul style="list-style-type: none"> <li>Verify GA* thrust.</li> <li>Verify all needed actions have been completed and call out any omissions.</li> </ul>   |
| <b>MANUAL OR AUTOMATIC FLIGHT</b> <ul style="list-style-type: none"> <li>Do not change flap or gear configuration until windshear is no longer a factor.</li> <li>Monitor vertical speed and altitude.</li> <li>Do not attempt to regain lost airspeed until windshear is no longer a factor.</li> </ul>  | <ul style="list-style-type: none"> <li>Monitor vertical speed and altitude.</li> <li>Call out any trend toward terrain contact, descending flight path, or significant airspeed changes.</li> </ul> |

**Note:** Aft control column force increases as the airspeed decreases. In all cases, the pitch attitude that results in intermittent stick shaker or initial buffet is the upper pitch attitude limit. Flight at intermittent stick shaker may be needed to obtain a positive terrain separation. Use smooth, steady controls to avoid a pitch attitude overshoot and stall.

**Note:** \*Maximum thrust can be obtained by advancing the thrust levers full forward if the EECs are in the normal mode. If terrain contact is imminent, advance thrust levers full forward.

**Note:** \*\*Do not exceed the Pitch Limit Indication.

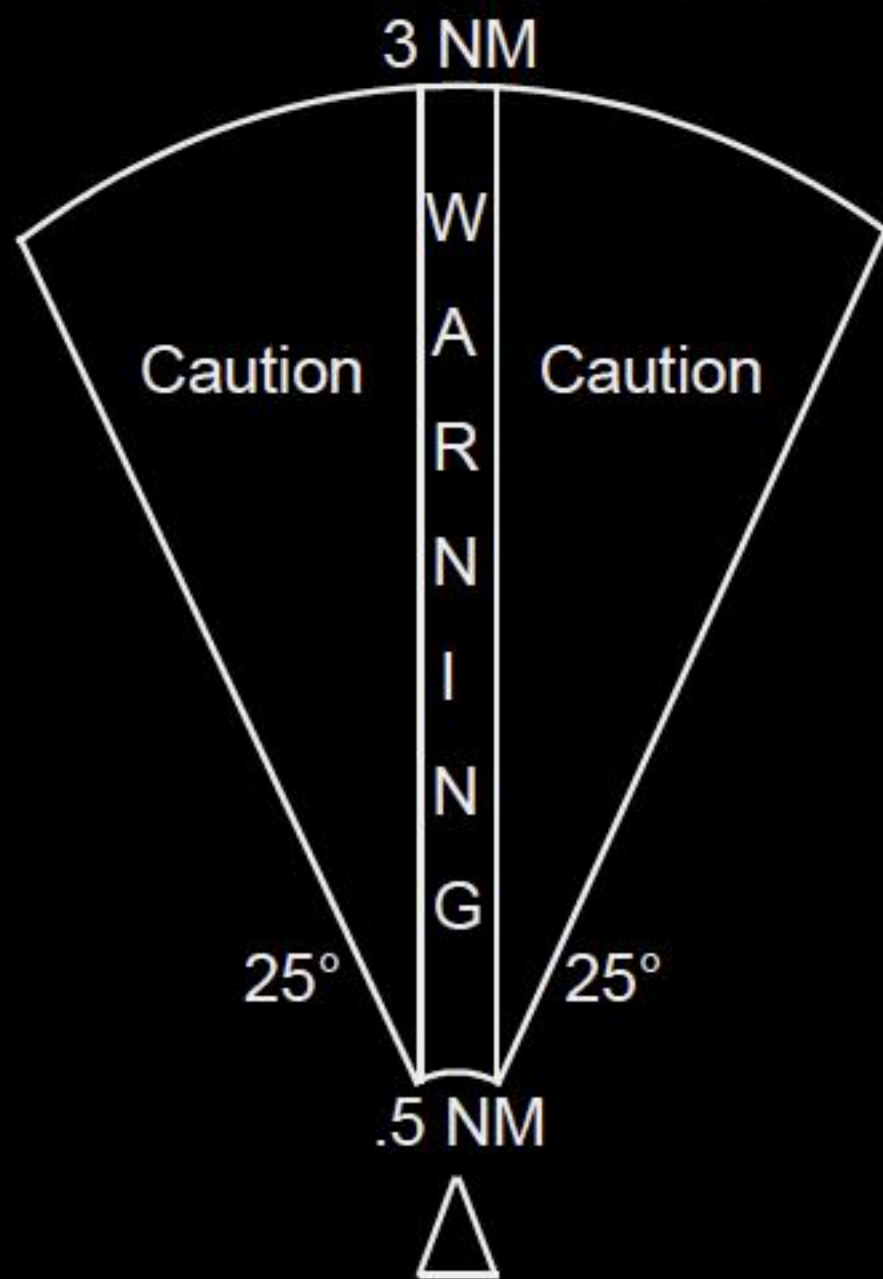
**Note:** \*\*\* If TO/GA is not available, disengage autopilot and autothrottle and fly manually.

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December 14, 2017 D6-27370-RAS-RYR(AS) MAN.1.11

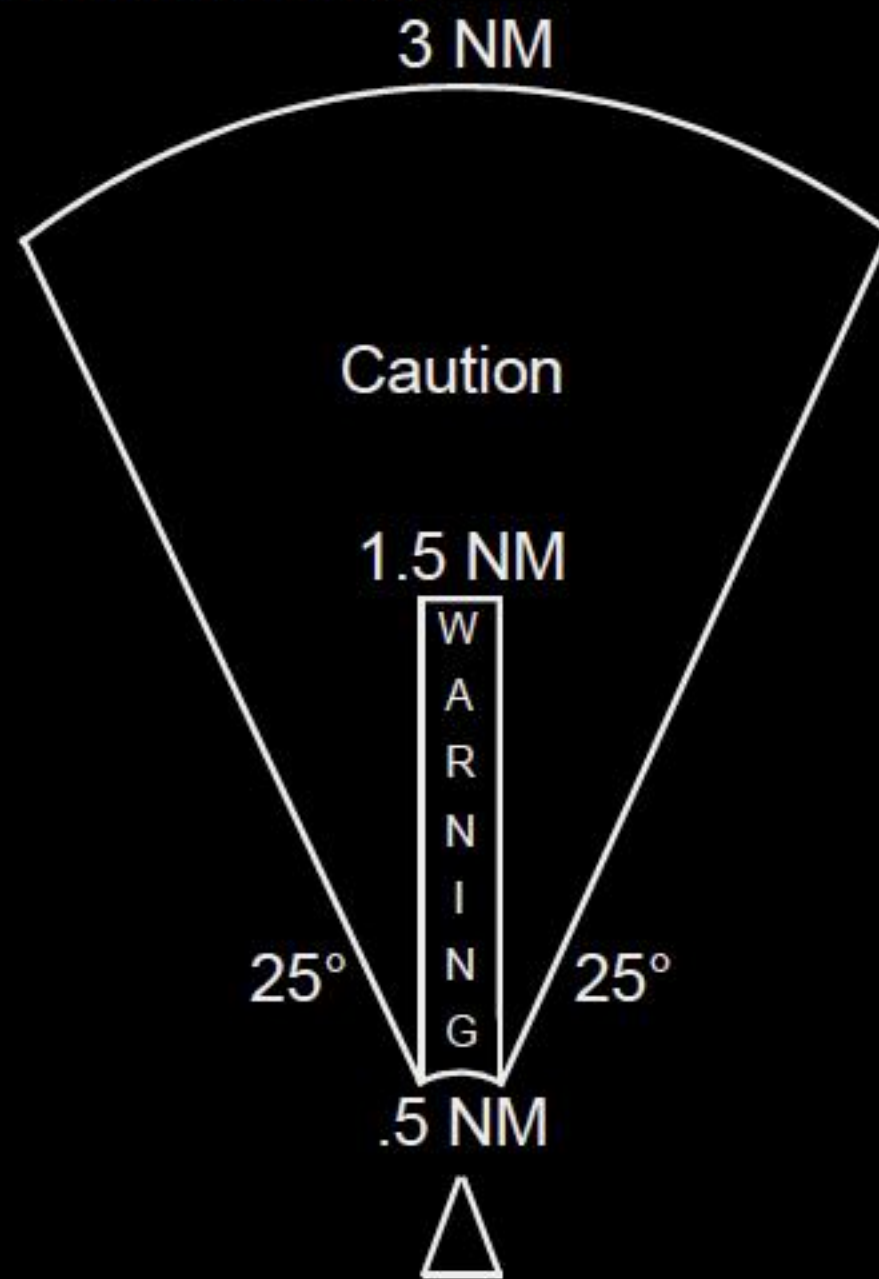
# Windshear alerts

- Windshear alerts are available during takeoff, approach, and landing:
- The GPWS provides a warning when the airplane is in a windshear.
- The weather radar provides alerts for excessive windshear ahead of the airplane. These are “predictive windshear alerts.”
- Windshear warnings are accompanied by a red WINDSHEAR message on the attitude indicators and voice aural alerts.
- Windshear cautions are accompanied by a voice aural alert.

## Predictive Windshear Alert Area



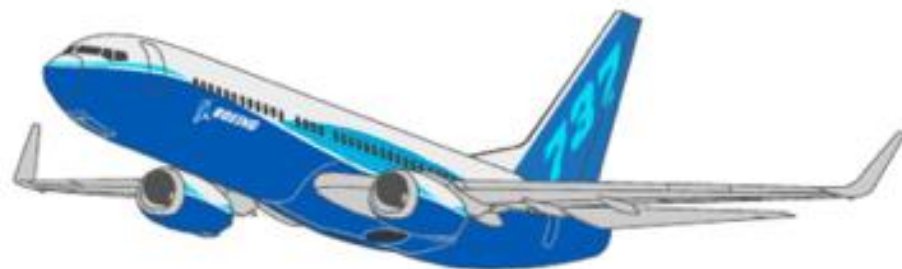
**On Ground**



**In Flight**

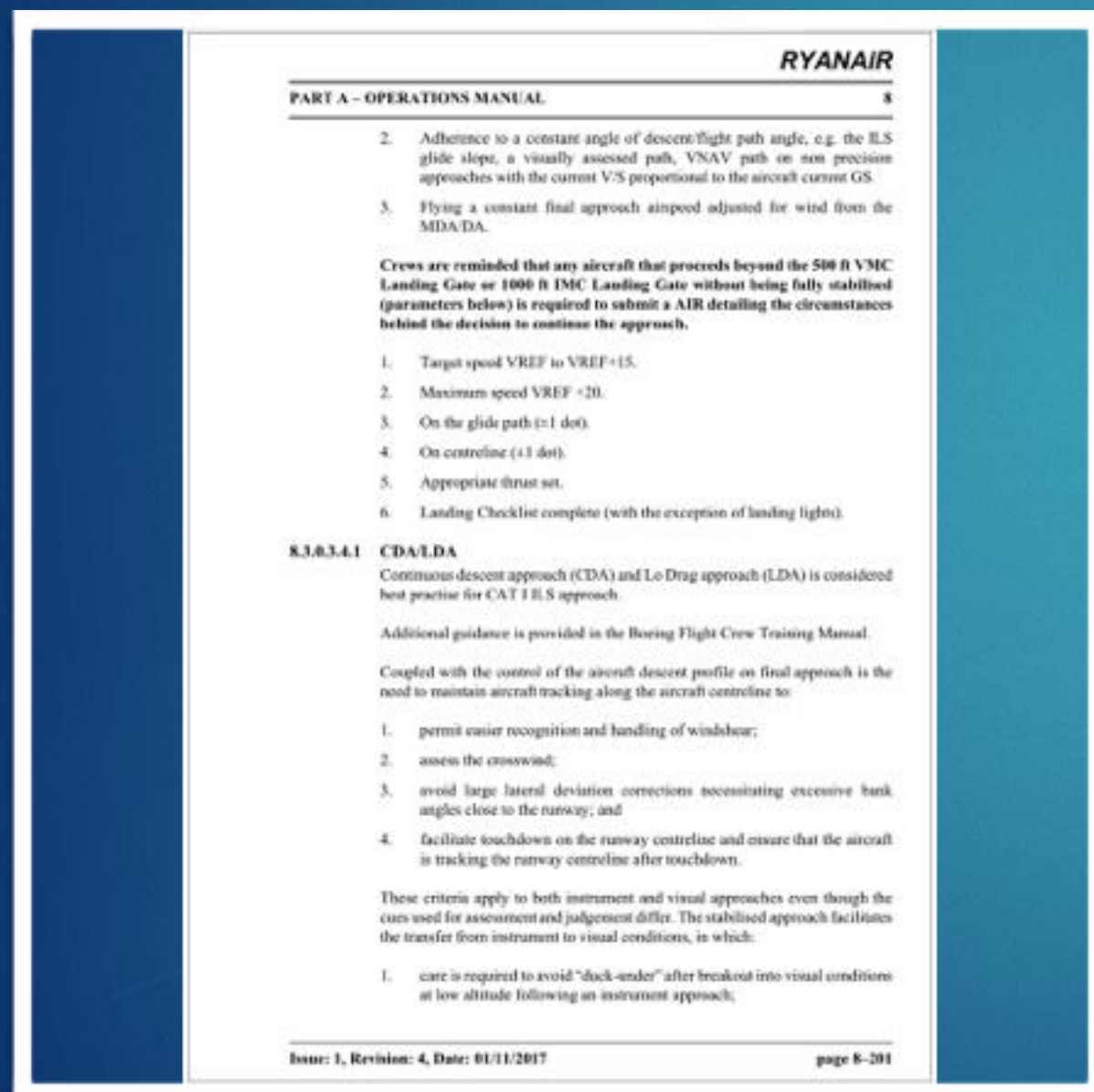


# Stabilized approach criteria



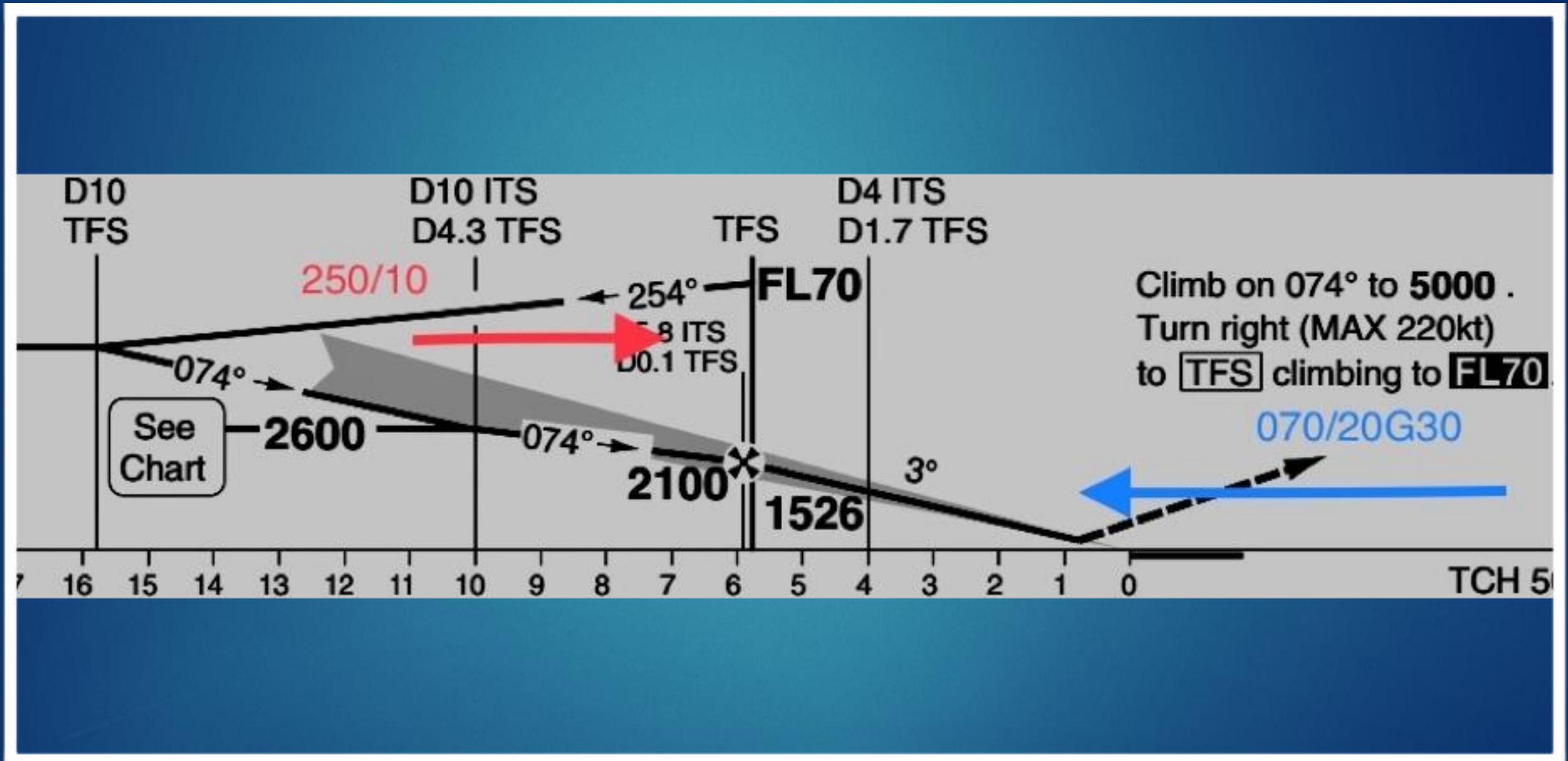
- Airlines have introduced stabilized approach criteria to avoid high speed landings, hard landings, RWY excursions and all other consequences of High energy approaches.

# Ryanair: landing gate



- Ryanair defines the stabilized approach decision point as “Landing Gate”.
- Landing Gate is at 500 ft in VMC and 1000 ft in IMC conditions.
- If stabilized approach is not achieved by landing gate, Go-Around should be performed by crew

# Wind encountered during ILS RWY 07

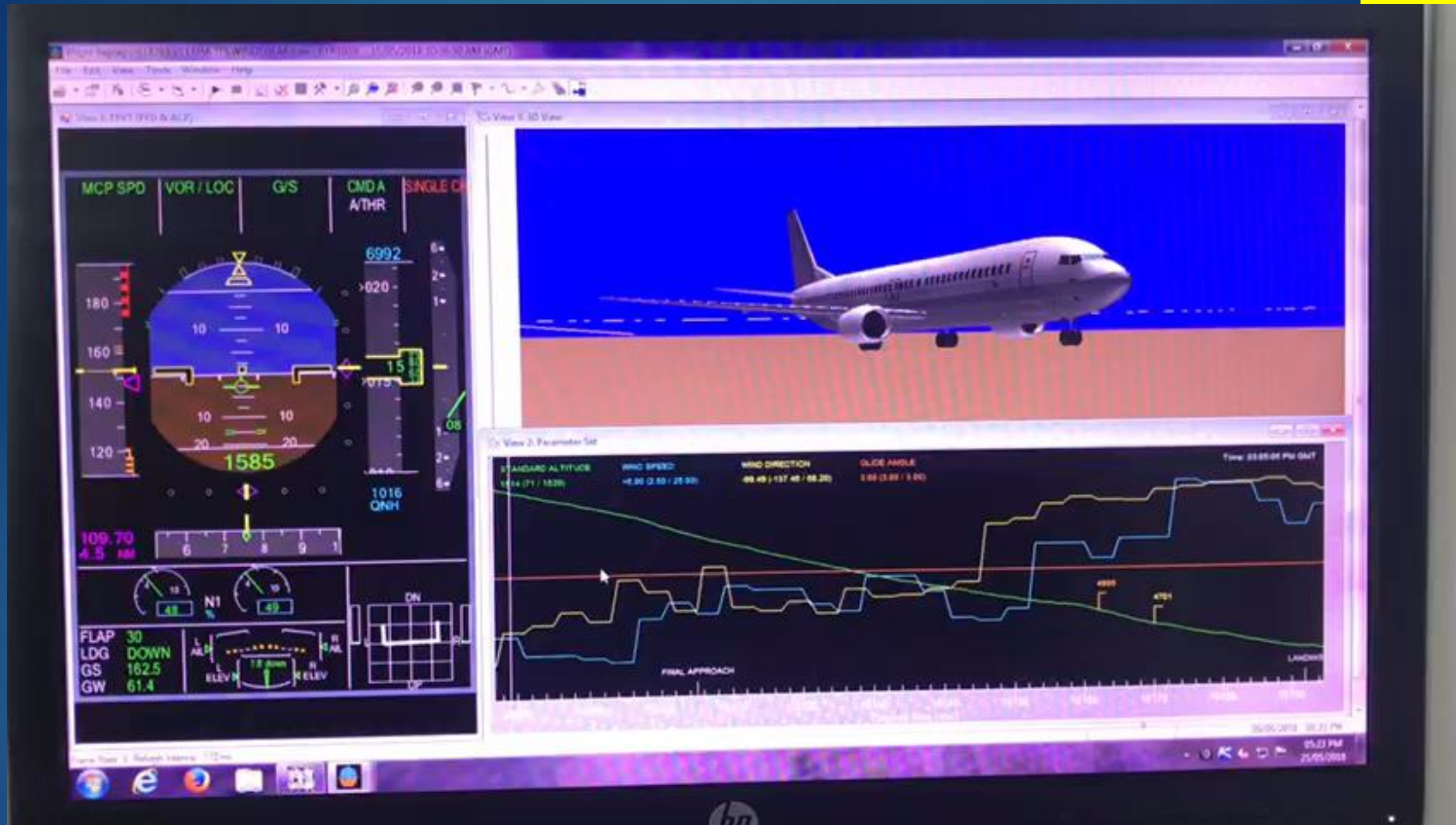




# OFDM DATA

- RYANAIR aircrafts record all the data from every flight through the OFDM (OPERATION FLIGHT DATA MONITORIUM) datasystem. This data can be used to study the effect of the windshear in TFS.

Add **OFDM** VIDEO



Yellow line: WIND DIRECTION  
Blue line: WIND SPEED



# Consequences of a **go-around**

- Discomfort and delays for the passengers.
- Increased traffic due to the repetition of the approach.
- Possible diversion to alternate airport.
- Increase environmental and economical cost.

**Question?**

