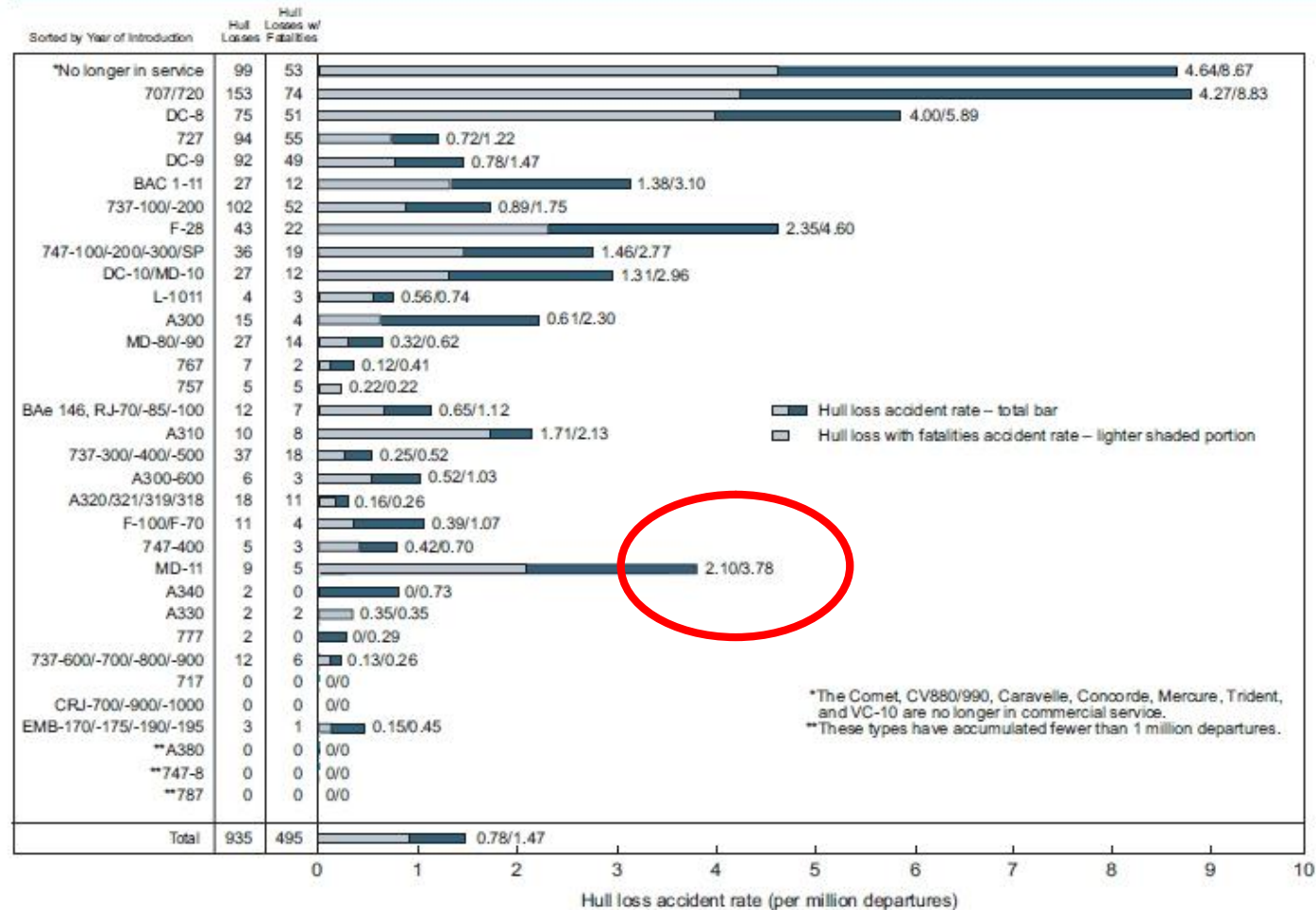


Investigation of the landing behaviour of the MD11



Statistical Summary of Airplane Accidents / Source Boeing

Accident Rates by Airplane Type Hull Loss Accidents – Worldwide Commercial Jet Fleet – 1959 Through 2012



History of MD11 Landing Incidents / Accidents

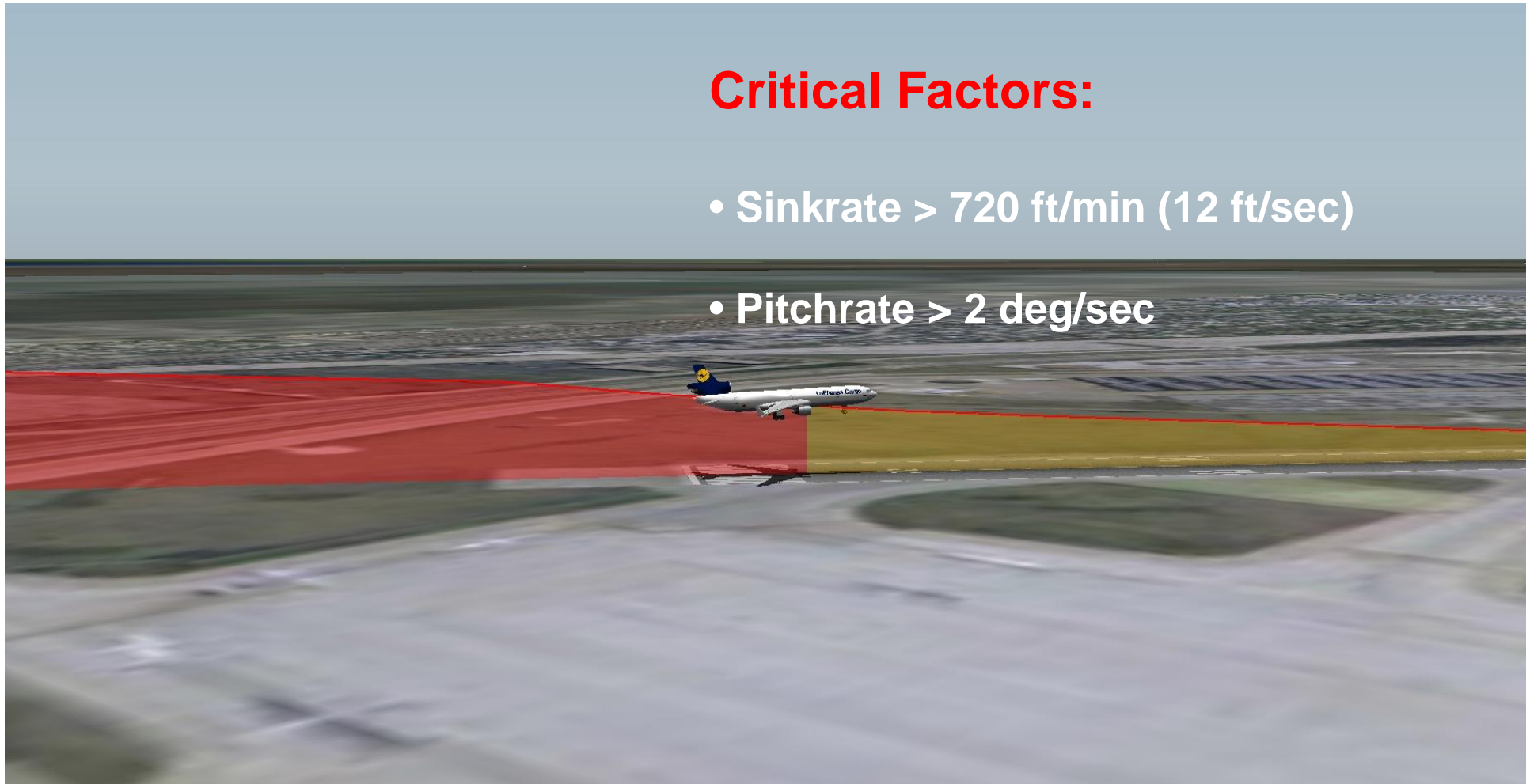
- 1997 EWR: 5,0 ft, 205 t, Flaps 50, 1,7g - 1,7g
- 2007 JNB: ?? ft, 201 t, Flaps 50, 2,1g - 2,5g
no detailed FDR investigation
- 2009 MEX: 3,8 ft, 198 t, Flaps 50, 2,6g - 2,7g
- 2009 NRT: 5,0 ft, 194 t, Flaps 35, 1,6g - 2,2g - 3,0g
- 2010 RUH: 4,6 ft, 206 t, Flaps 35, 2,1g - 3,0g - 4,6g
- developing a new Data-frame for MD11 DAR
- resolution improvements for investigation of landing incidents



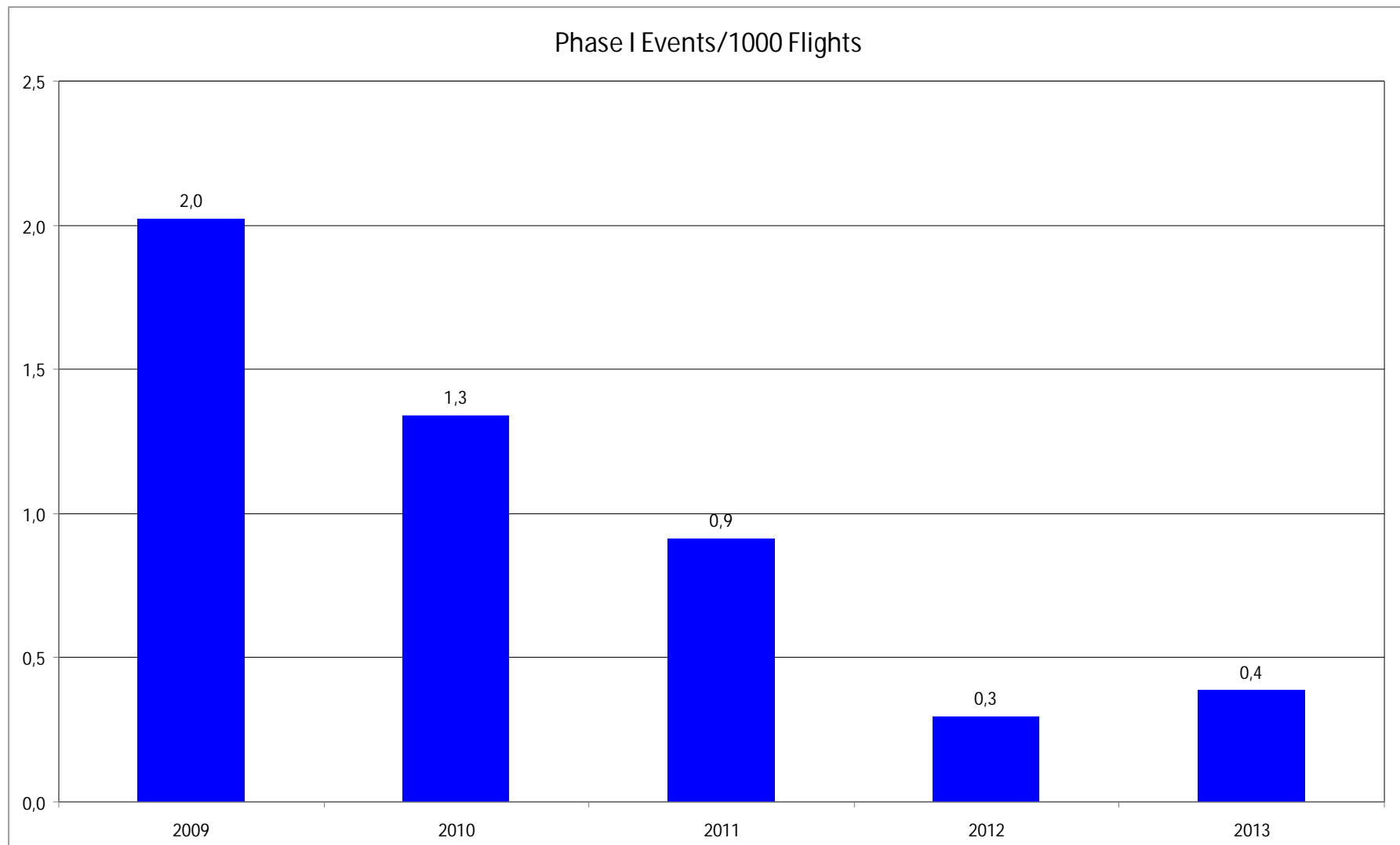
Phase I (80ft-MLG T/D)

Critical Factors:

- Sinkrate > 720 ft/min (12 ft/sec)
- Pitchrate > 2 deg/sec



Development Phase I Risk Flights



TRAINING Phase 1 à Bounce Avoidance

Information: Emphasize on avoidance

- of high sink rates
 - late flare
 - pitch inputs during flare and before / during touch down
- “Landing” was sole training item in “Line Check Topics 2011”
 - TRIM Chapter “Landing the MD11” is redesigned
 - Simulator Training is configured based on FOQA results of MD11 landings and MD11 operator meetings



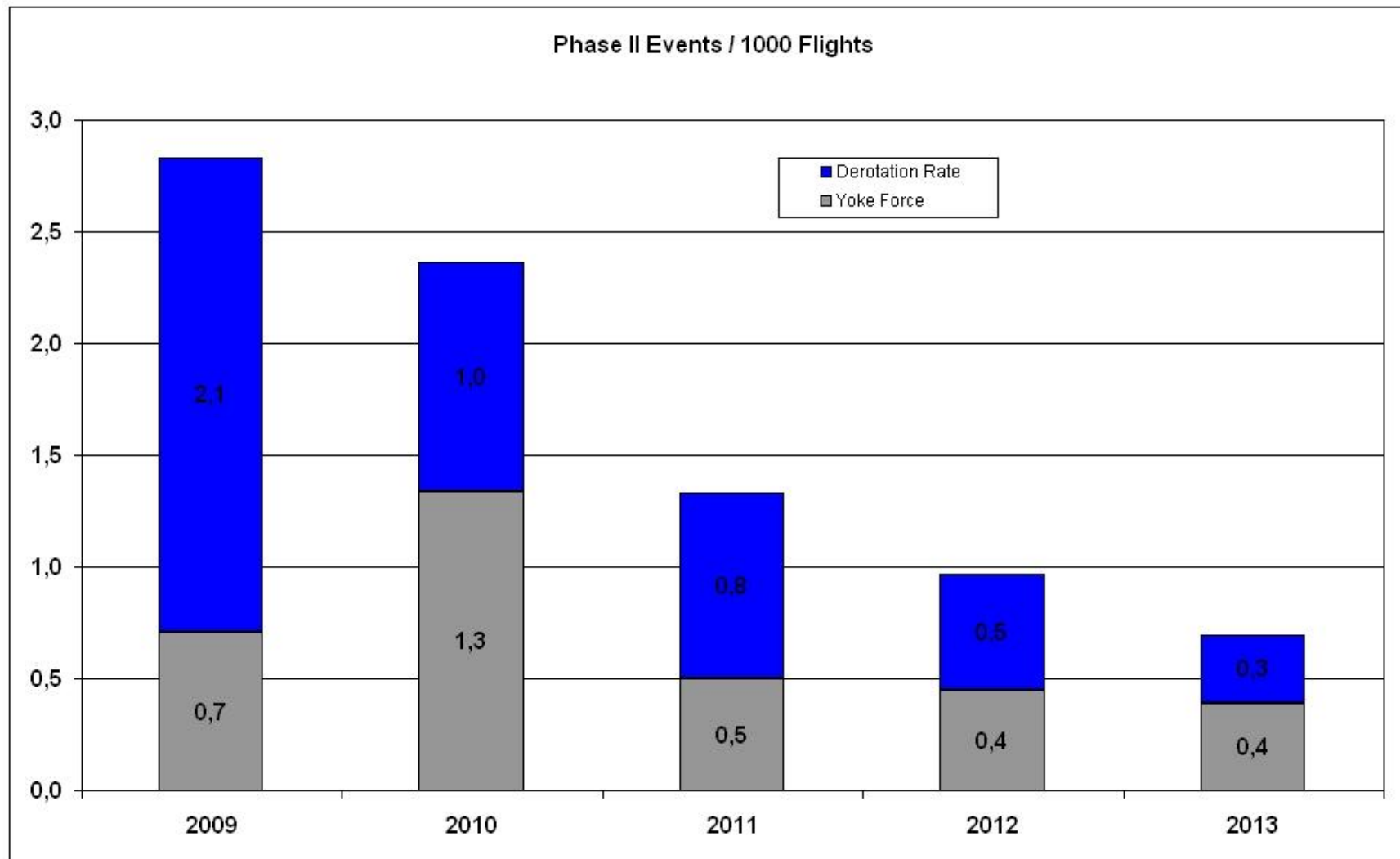
Phase II (MLG T/D – NLG T/D)

Critical Factors:

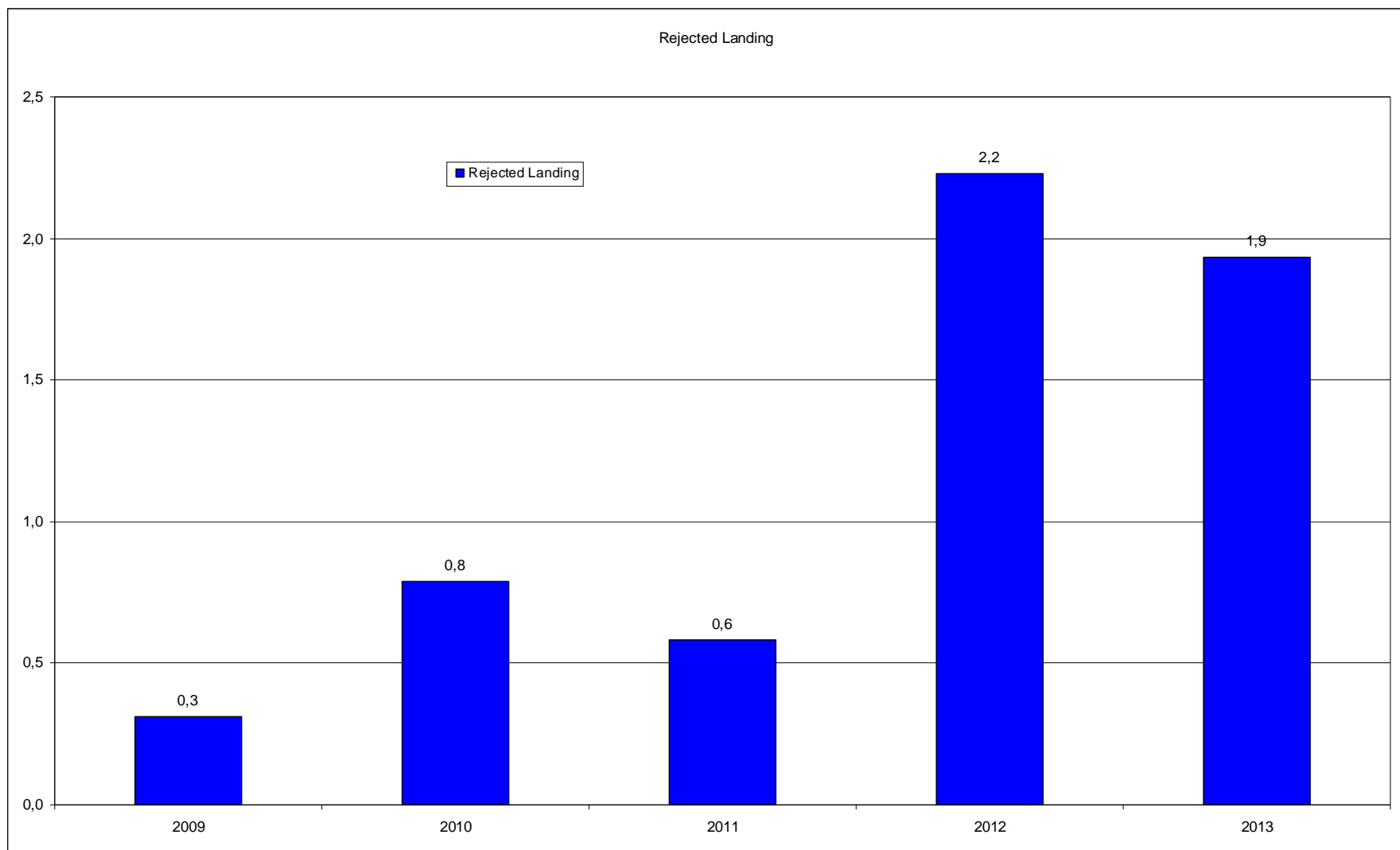
- Bounce height
- Derotation rate



Phase II Risk Flights at LH Cargo



Go-Around initiated below 10ft



TRAINING Phase 2 → Bounce Recognition and Reaction

Information: Emphasis on

- no pitch inputs during touchdown
- immediately “fly away” from the ground
- “Line Check Topics 2011” → what, if a hard landing / bounce happens
- TRIM Chapter “Landing the MD 11” → reaction on bounce / hard landing implemented
- Implementation of all recommendations and results from MD11 operator meetings



TRAINING Phase 2 à Bounce Recognition and Reaction

Training:

- SIM Refresher Recurrent Training Syllabus No 24 (Mar-Nov 12)
Pure manual flying mission à including bounced landing training
(bounce initiated by IP)
- In every SIM Refresher training Syllabus since then:
manual flying / landing is part of training – including Bounces
- monitoring results of this training concept with FOQA



TRAINING Phase 2 à OGAS

Landing Condition:

- Either 1 of the main landing gear struts compresses: 10 s timer starts (system armed)
- If thereafter both MLG struts are fully extended, advisory light **ON**
- One of the MLG struts compress again, advisory light **OFF**
- The timer reset for each subsequent strut compress - extend cycle



Takeoff / Climb / Cruise / Descent Condition:

- The advisory is off during taxi and takeoff run as long as one MLG is on ground.
- During the takeoff run as soon as both MLG struts extend following rotation, the timing circuit will enable and the advisory will illuminate for a period of ten seconds then extinguish

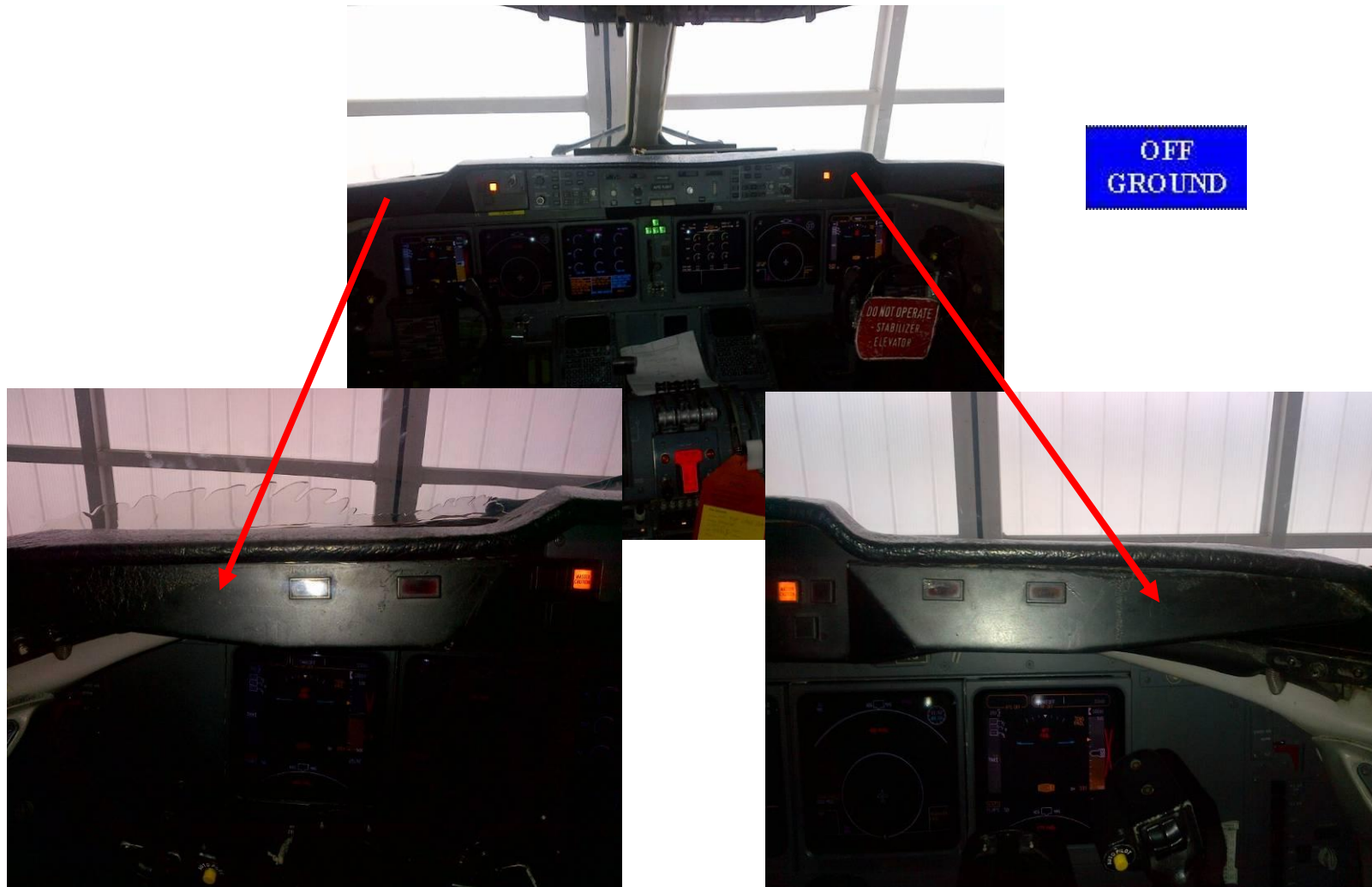


Go-Around Condition:

- If a go-around maneuver is performed after initial touchdown, the system will illuminate the advisory for a period of ten seconds (then extinguish) from the time both gears transitioned from compressed to extend.



OGAS Location



Risks in Operation monitored with FOQA

- Abnormalities during Go-Around / Rejected landing
 - Fast Reverse
 - Overboost
 - Overspeed
- Auto Ground Spoiler failure during landing
- Risk of RWY Overrun



FLYING SAFE IS GOOD BUSINESS

