

Safety in LHD – A new perspective

By Nannoni Fabio
SVP Safety System Governance





Contents:

- **LHD Safety Management System Governance Implementation**
- **Flight Operations Safety: LHD Concept**



Contents:

- **LHD Safety Management System Governance Implementation**
- **Flight Operations Safety: LHD Concept**



LH – Safety Systems Governance (SSG) Organization (1/4)

- LHD aims to be recognized as “**The Safest OEM**” worldwide;
- Safety in Operations is a key driver of the **Company vision** and activities;
- For these reasons a new “**Safety Systems Governance**” Function is established by LHD (SSG). **Internal, External and Statutory safety contexts** are inside its perimeter;
- The new SSG Function is implemented **to steer the Division’s global Safety Management Systems focus** toward the state of the art processes, products and services;
- Leveraging on internal “**network of safety partners**” to a total Customer’s “Operational Safety Care”.



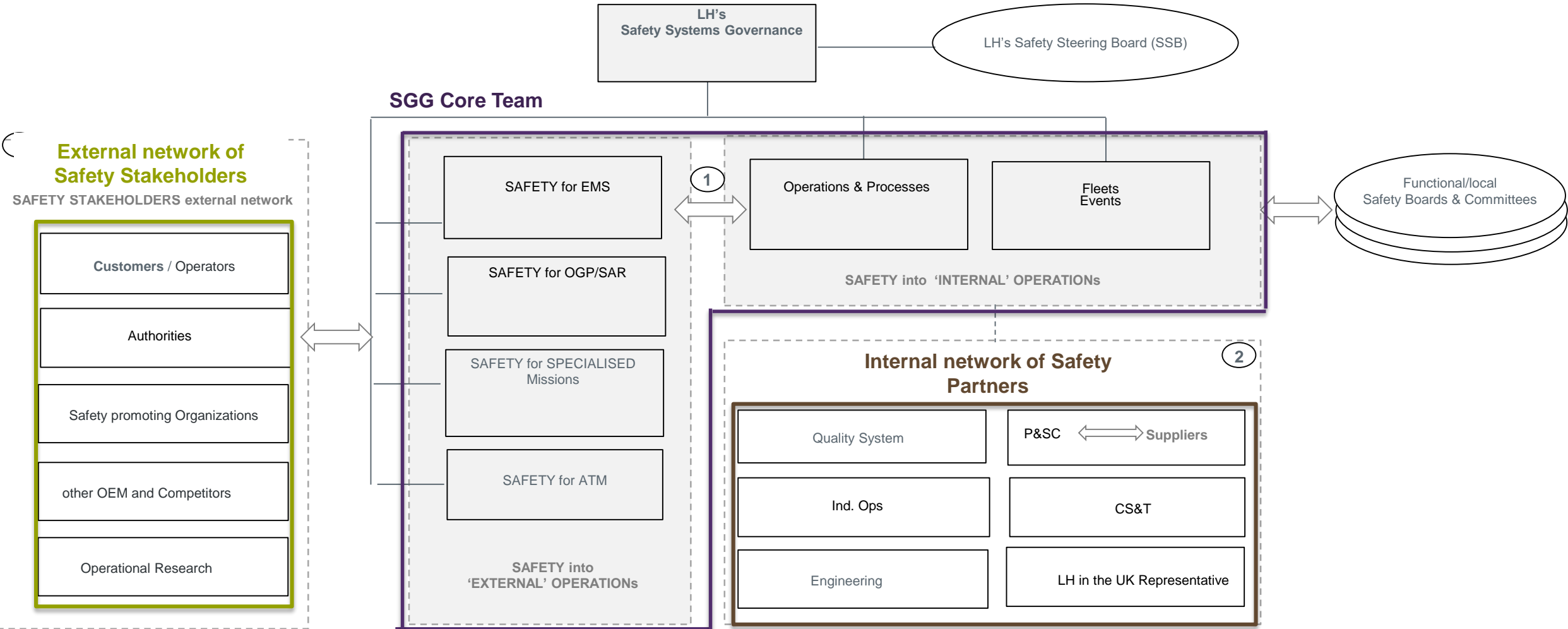
LH – Safety Systems Governance (SSG) Organization (2/4)

- **Safety Systems Governance aims to address in a strategic and organic way the whole LH "Operational Safety"**, i.e. the platform safety and the safety into operations, in the light of Regulatory evolution of Safety Management Systems, that requires greater focus towards the effectiveness of organizational models adopted.
- **Organizational models must be able to identify**, in all internal and external Operations and Processes, strong and **weak signals relating to Safety aspects**, ensure proactivity in preventing potential "Safety Escapes" and encouraging the spread of "**Safety Just Culture**" required by regulations.
- **SSG shall also promote the collaboration with Customers** to better understand their operational needs and foster all the **safety capabilities and features**, today embedded in all AW Products, allow them to operate more safely and efficiently.



LH – Safety Systems Governance (SSG) Organization (3/4)

Safety Organization Chart – The three building blocks





LH – Systems Governance (SSG) Organization – Internal Network (4/4)

The SMS core departments (SSG Perimeter)

ATO SMS

Final Assembly Line SMS

INTERNAL OPS

Part 21, Cont. A/W

The above SMSs are under the boundaries of action of the new SSG to:

- continuously collect weak signals coming from all the LHD's Operations
- pursue the mitigation of the safety risks
- improve the safety performance
- achieve a documented, process-based approach
- better harmonize the interdependencies and relationships



Contents:

- LHD Safety Management System Governance Implementation
- **Flight Operations Safety: LHD Concept**



Flight Operations Safety: LHD Concept

- **SAFETY by Design**
- **SAFETY by Operations**
- **SAFETY by Training**





Flight Operations Safety: LHD Concept

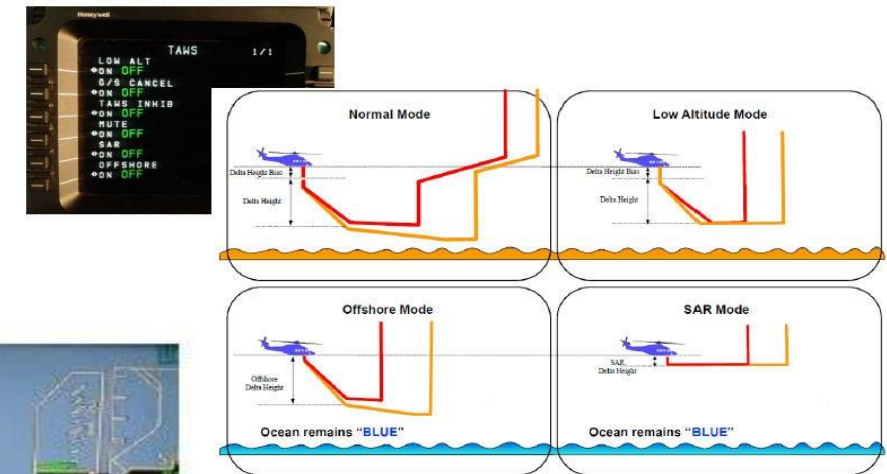
- **SAFETY by Design**
- **SAFETY by Operations**
- **SAFETY by Training**



Safety By Design - Off-Shore HTAWS

- CAA(UK)/HeliOffshore New Algorithms supported by IOGP/ASC
- Improved Warning Times
- Working with HeliOffshore on implementation
- Discussions with Honeywell, EASA, Other OEMs indicate possible update but requires testing and Certification. **We need to ensure that spurious warnings will not increase.**
- AW139 already has a customised Offshore HTAWS mode

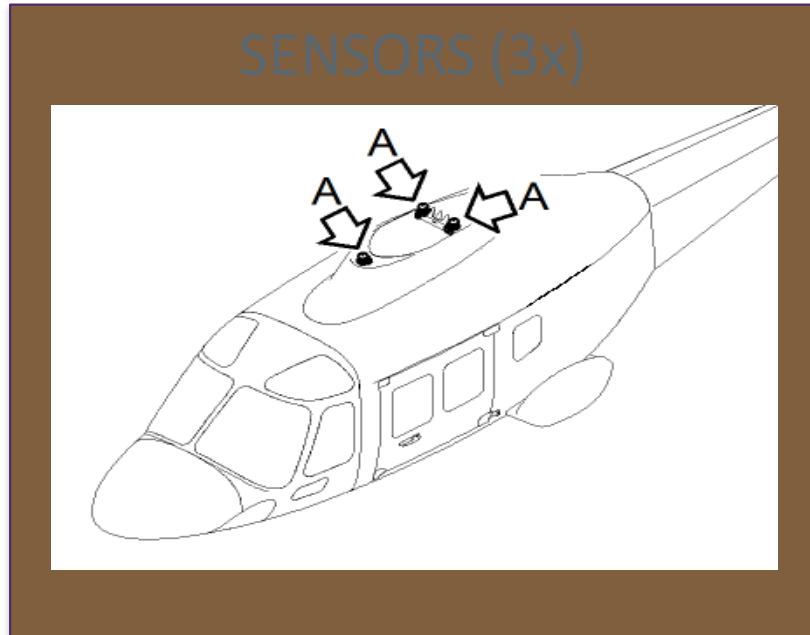
AW139 TAWS Selectable Envelopes (From Phase 7 on)



Safety by Design - Obstacle Proximity LIDAR System (OPLS)

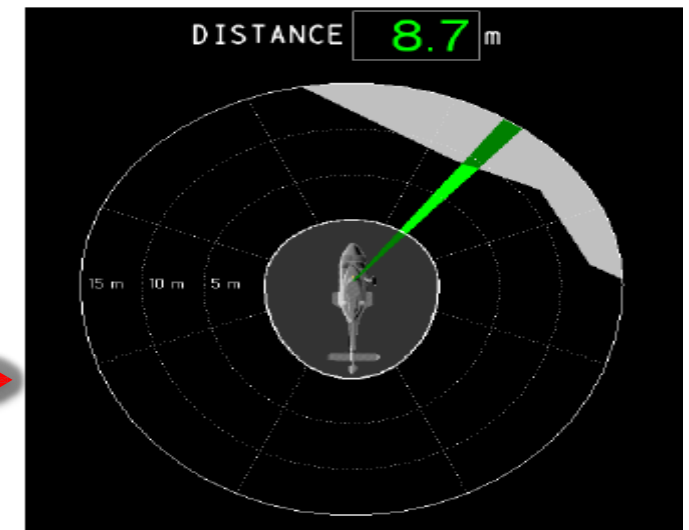


- knows the helicopter's main rotor disc size
- 360°
- three laser sensor units installed on the top of the fuselage, around the main rotor.

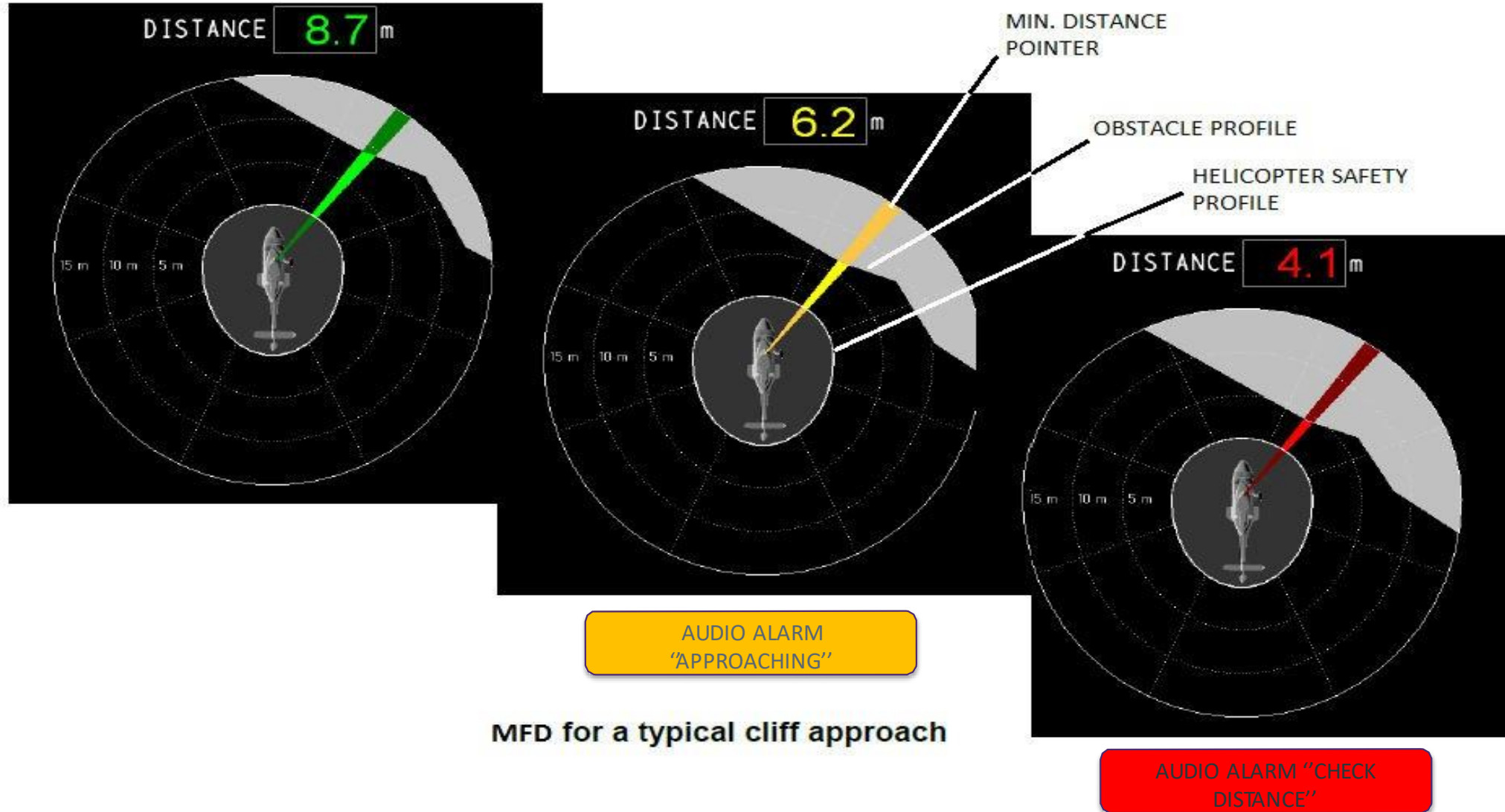


AUDIO ALARMS

OBSTACLE DISPLAY



Safety by Design - Obstacle Proximity LIDAR System (OPLS)





Flight Operations Safety: LHD Concept

- SAFETY by Design
- **SAFETY by Operations**
- SAFETY by Training





Safety by Flight Operations- Performance Based Navigation (PBN)

GLOBAL IFR NAVIGATION STANDARDS are transitioning from:
SENSOR Based into **PERFORMANCE Satellite Based Navigation**

PBN now allows operations which were previously impossible as:

- Helicopters **Point in Space Approaches/Departures**
- Helicopters **Low Level IFR Routes**



SAFETY IMPROVEMENT

- Potential CFIT elimination
- Real All Weather day/night capability
- Consistent predictable flight paths
- Stabilized approach paths

OPERATING AND ENVIRONMENT RETURN IMPROVEMENT

- Reduces fuel costs
- Reduces investment in ground based systems
- Reduces time in flight

AIRSPACE CAPACITY IMPROVEMENT

- More efficient direct routes
- Reduces airspace conflicts

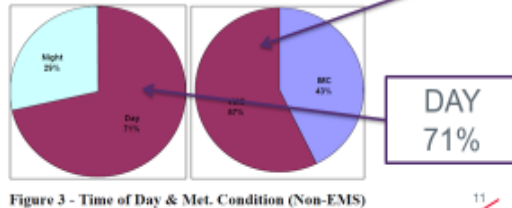
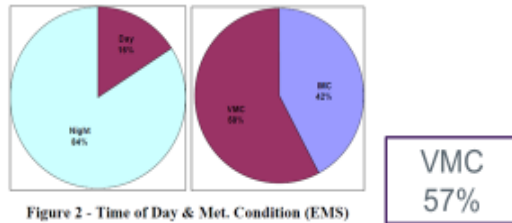
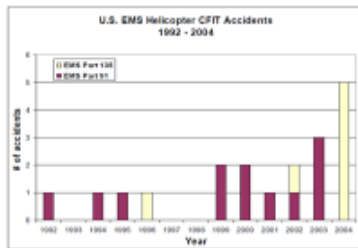


CFIT - Historical data on Leonardo Helicopters events

Helicopter CFIT – A Safety Issue: LHD's view

CFIT – When does it happen? Helicopter case

- The nature of many helicopter operations exposes helicopter pilots to greater risk of CFIT.
- It is common for helicopters to fly at low altitudes or adjacent to terrain, increasing the likelihood of CFIT



Source: CFIT Accidents in Helicopter: EMS & Offshore Operations. Helicopters International. Flight Safety Systems International, Washington U.S.A., June 20, 2005
© 2019 Leonardo - Società per azioni



- **29 CFIT events** on all Leonardo Helicopters aircrafts produced since 2006;
- Civil and Military operated aircraft involved (Military operated in peace time scenario);
- No critical geographies areas but significant **prevalence of mountain and low visibility as critical factor**;
- Analysis of the operational environment highlighted:
 - 6 over water;
 - 13 mountains;
 - 10 others.
- 19 out of 29 events took place in low visibility conditions:
 - 14 Day light;
 - 5 Night

LHD Study defined Optimal Safety Barriers Now part of our Training offer



Safety by Flight Operations- PBN LHD Experience



AREA NAVIGATION

- B-RNAV ± 5 nm (95% flight time)
- P-RNAV ± 1 nm (95% flight time)

RNP CAPABILITIES

- Enroute: RNP 2 / RNP 1 / RNP 0.3 *
 - Terminal: RNP 1 / RNP 0.3 *
 - Approach: RNP APCH / RNP 0.3 *
RNP AR (0.3/1) AW169/189
 - Departure: RNP 1 / RNP 0.3 *
- (*) RNP 0.3 for Helicopter Operations

PBN ROUTES for ITALIAN REGION “TRENTINO ALTO ADIGE”

AW139 equipped with latest avionic suite has been used to validate PBN departures and approaches for HEMS operations in Trentino Alto Adige Region

[Comunicato stampa provincia autonoma di Trento]

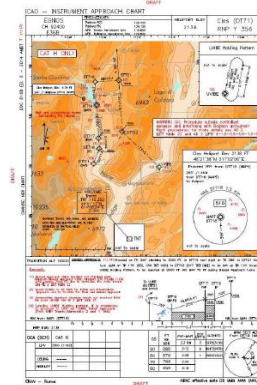
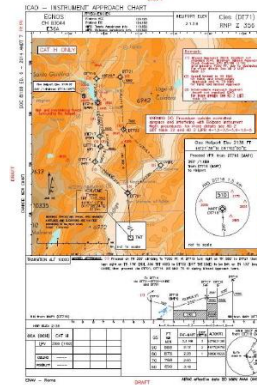
Volò strumentale a bassa quota, presto sarà una realtà

martedì 17 ottobre 2017

Sulla rotta Trento - Cles già validate le procedure

Volare a bassa quota, per gli elicotteri del soccorso, ha i suoi vantaggi: per esempio riduce la possibilità che sulle pale si formi del ghiaccio, molto pericoloso, durante la stagione più fredda. Presenta però anche dei rischi, soprattutto in caso di poca o nulla visibilità. In questi casi, per evitare di rinunciare alla missione o di correre rischi molto alti, con le conseguenze che in entrambi i casi si possono immaginare, è fondamentale poter volare con l'aiuto della strumentazione di bordo, seguendo “strade” dei cieli che siano sicure e libere. Oggi lo si può fare utilizzando i segnali che agli apparecchi giungono dalla rete satellitare. E' questo il senso di un progetto, a cui collabora anche il Nucleo Elicotteri del Corpo Permanente dei Vigili del Fuoco di Trento, che si sta concretizzando. Si è cominciato con la rotta tra Trento e Cles ma l'idea è quella di procedere certificando rotte sicure a bassa quota verso tutte le valli trentine. In questo modo si potrà volare e prestare soccorso praticamente in condizioni meteorologiche peggiori rispetto a quelle considerate accettabili fino ad ora.

Nei giorni scorsi è stato portato a termine con successo il volo di validazione delle nuove procedure strumentali a bassa quota, del tipo che in gergo specialistico vengono chiamate “Performance Based Navigation” e che utilizzano il sistema satellitare europeo Egnos. Riguardano la tratta di collegamento tra l'aeroporto Caproni di Trento e l'elisuperficie di Cles. Le rotte, dette “Pins - Point in the Space”, che a breve - si prevede entro un mese - saranno pubblicate e rese note in ambito aeronautico, saranno quattro, due per muoversi verso l'ospedale della Val di Non e due per il ritorno. Il volo “di prova” è stato eseguito al termine di un intenso lavoro, durato circa un anno, coordinato dall'Aeroporto G. Caproni in collaborazione con Nucleo Elicotteri, Enac, Enav, Pildo (azienda spagnola che ha sviluppato un sistema dedicato alla registrazione delle performance di volo dei sistemi che utilizzano la rete di satelliti Egnos) e Leonardo divisione elicotteri. Il progetto ha una dimensione europea ed è finanziato al 60% dalla Global Navigation Satellite Systems Agency. Con queste nuove procedure l'assistenza al volo non si baserà quindi sulle antenne al suolo ma sui dati della rete satellitare. Anche i due elicotteri AW139 della flotta provinciale, dedicati al soccorso e al trasporto sanitario, sono stati aggiornati nel sistema operativo e nell'hardware - similmente a come si fa con i personal computer - per renderli adatti alle nuove procedure di volo, a cui per il momento anche alcuni piloti sono stati addestrati.



Safety by Flight Operations- Performance Based Navigation (PBN)

What is necessary to implement PBN routes?

1.

A new class of PBN certified Helicopters must be operated together with trained Operators and Pilots qualified against national PBN Operational Approval

2.

National Local PBN regulation shall exist including all the national «Operational Requirements» (e.g. ATC requirements)

3.

Approved PBN Infrastructures shall exist (Routes, Flight Procedures etc)





1. LHD PBN certified Helicopters



AW109
GRANDNEW

AW109
TREKKER

AW169

AW139

AW189

All LHD New Helicopter Family are already certified to operate in PBN/RNP environment



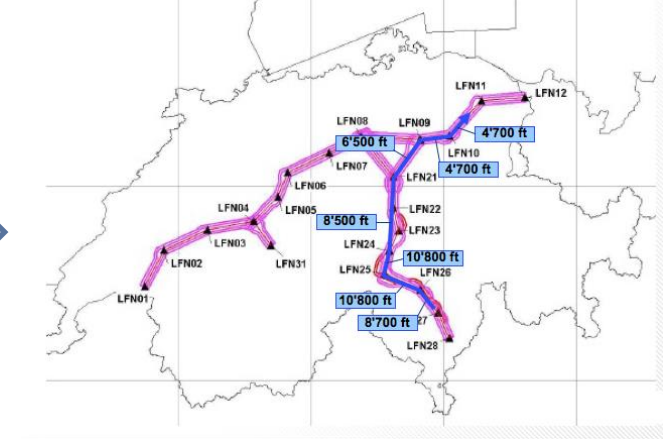
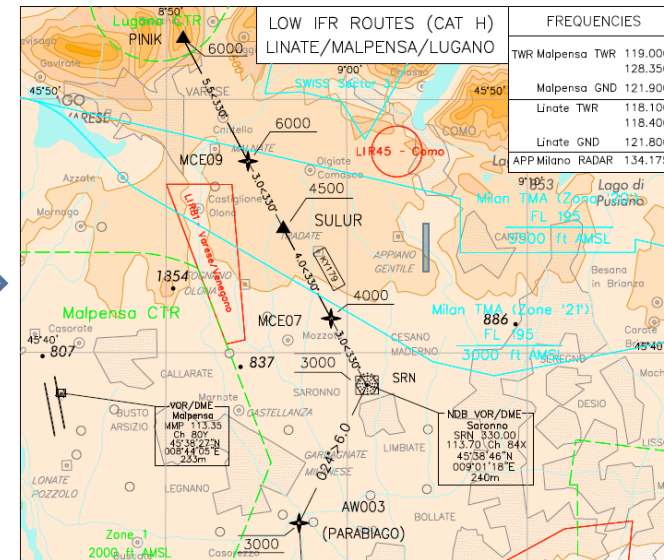
2. Leonardo could facilitate the implementation of PBN Rules and Requirements through:

1 Coordination between Local Authorities and International Bodies

Thanks to its experience, LHD can coordinate the activities to favorite the exchange of information between the Local Authorities and International Bodies or Agency that already have developed helicopters PBN/RNP related Rules

2 Support Local Authorities and Operators with IFR/PBN courses

Support the Local Authorities and the Operators setting up dedicated IFR/PBN training courses; mandatory for the obtainment of any “Operational Approval”



3. Leonardo can Support the creation of Local Infrastructures

1. Working with the local National Authorities to define a high level **“Collaboration Framework”** with international Companies certified for the design of Helicopters PBN applications.
2. Thanks to its specific competences, **support the Local Authorities in setting up a dedicated national “Pilot Case”**, defining also the design and performance minimum requirements
3. Thanks to its Avionic Labs and Rigs, **verify by simulation the design quality of the “Defined Procedures”**
4. Independently perform the necessary ARINC coding, the validation and the **creation of the certified “Navigation Database”**, to introduce the new procedures in the helicopter FMS
5. Support the **final “Flight Validation” of the procedures making available a fully equipped Helicopter** to execute them and make available the **“Post Flight Analysis Report”** as required by ICAO and Local Rules





Flight Operations Safety: LHD Concept

- SAFETY by Design
- SAFETY by Operations
- **SAFETY by Training**





Safety by Training - Customized Type Rating Programs

AIRCREW

MULTIMEDIA CLASSROOM



FLIGHT TRAINING DEVICE



FULL FLIGHT SIMULATOR



DISTANCE LEARNING



GROUNDCREW

MULTIMEDIA CLASSROOM



VIRTUAL MAINTENANCE TRAINER



MAINTENANCE TRAINING SIMULATOR

Safety by Training - Glass Cockpit & Automation Management



Courses to supplement the preparation for the Type Ratings including **Glass Cockpit & Automation Management** through the use of interactive Trainers.

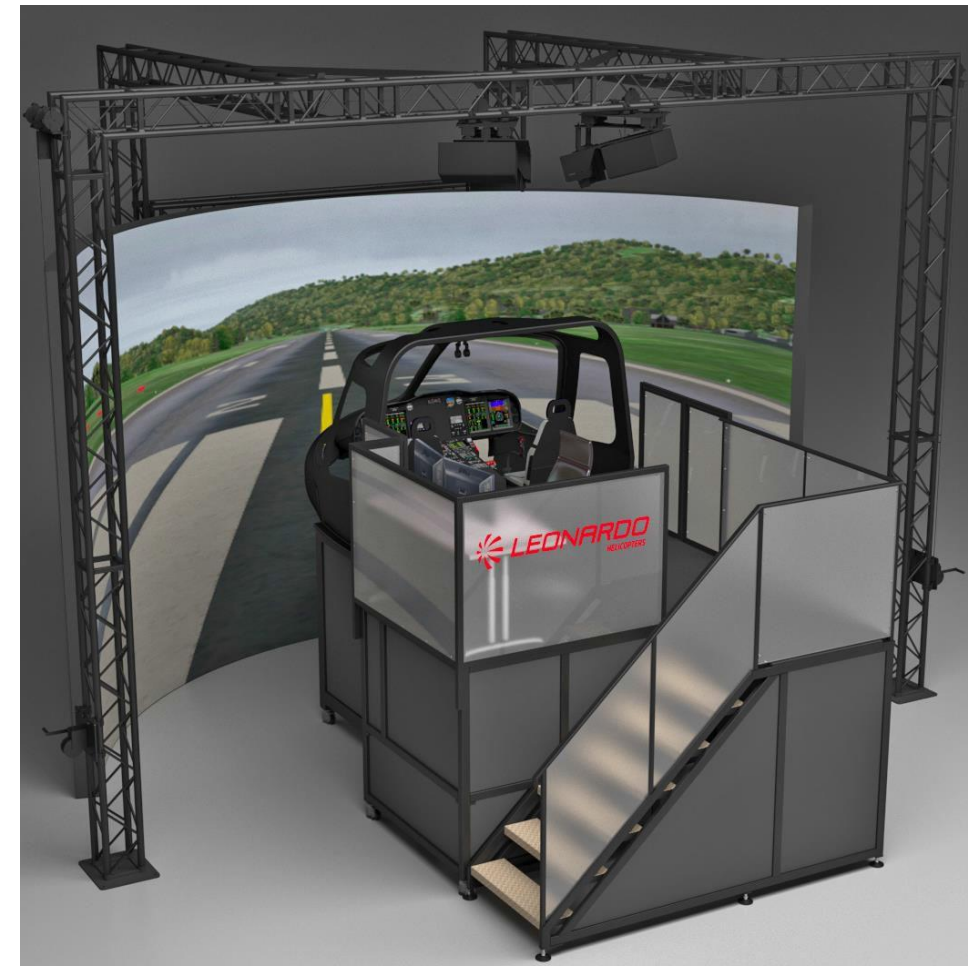
Safety by Training - Full Flight Simulator (FFS)



- FFS is a full motion and certified simulator (in some countries it can be a zero flight time training tool).
- They require a substantial investment and managing effort, but they provide superior quality.
- Leonardo Helicopters is currently **the only OEM** that is producing FTD and FFS for its products.

Safety by Training - FTD: TOP LEVEL SIMULATION FIDELITY

- **FTD is basically an FFS without motion.** It is a valuable tool for initial and recurrent training
- Specific **Flight Dynamics** and Performance Model based on **Lev. D certified FFS flight** model
- **High-fidelity Avionics** aligned to latest version of Avionics configuration phase
- **H/C subsystems** (electrical, hydraulics, engine, etc.) accurately simulated
- **Full cockpit enclosure** to guarantee the proper immersion
- **Tactile replica** of the cockpit controls
- **High performance Control Loading System** directly derived from high-end Full Motion Simulators





Safety by Training – Further Offer

1. LH is the leading OEM in the development of the **Flight Crew Operating Manuals (FCOM)**.
2. LH has developed a **Risk assessment Tool** available to everybody **at no cost**.
3. LH is the first OEM to offer a **comprehensive CFIT mitigation Training**.
4. In our training areas of special emphasis are addressed with particular care using **Glass Cockpit Transition courses**.
5. LH is now developing specific training **courses to manage “Critical Emergencies”**

Safety By Training - “Learning by Experience” (FDR/FDM Analysis)

The FDR /FDM can be processed using the Planesciences FAS-INV software, to generate the A/C flight path using the available GPS, AHRS and Air data sources.

The FAS-INV software is also capable of either using a built-in animation tool or to interface itself to the commercial simulator X-Plane 10 via a custom plugin.



Further available Customization:

- A custom 3D model of AW139, developed by LH;
- High definition terrain elevation data;
- VFR sceneries (including man-made objects, roads, buildings, trees and other obstacles based on real open street-map data).



Conclusions



Safety is in our DNA

HELICOPTERS DIVISION



THANK YOU
FOR YOUR ATTENTION