

CS27 helicopter Single Engine IFR certification: a Safety enhancement opportunity

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CS27 Helicopter Single Engine IFR certification: a Safety enhancement opportunity

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Summary

- > Abstract
- > Single Engine IFR ... Back to the future
- > How we can get there...
- > Rules to Support...
- > Conclusions

Abstract:

*The first FAA Certification of a **Single Engine rotorcraft** equipped form **Instrument Flight Rule (IFR)** operations in 20 years made a new kind of asset available in the U.S., opening up to several new scenarios which can determine several safety improvements for Helicopter design and operations:*

- > safer and more robust Light Rotorcraft Design;*
- > safer operational capabilities through IFR missions;*
- > safety benefit in case of Inadvertent IMC flight;*
- > pilot training enhancement.*

This new asset could also have positive reflections in congested environment flights operations, HEMS mission costs reductions, insurance premiums reduction.

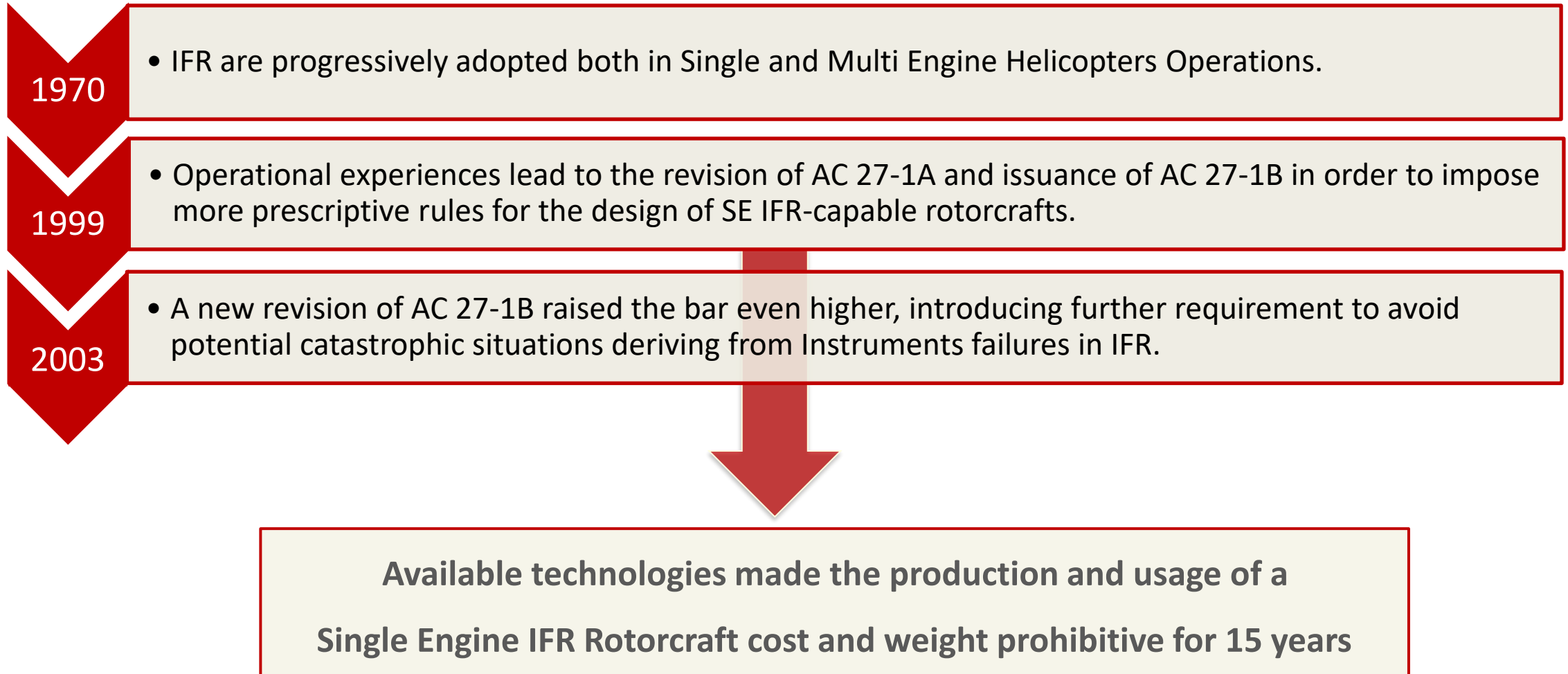
*The proposal is to **explore**, together with EASA and all the other aviation stakeholders, the opportunity to validate/certify a single engine IFR in Europe making it affordable for operators with the spirit to provide a tangible overall safety step change for Helicopter operations.*



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Single Engine IFR ... Back to the future



Single Engine IFR ... Back to the future

Operational Scenario:

In the same period of time, the Civil Helicopters have significantly increased their operational capabilities and performance while continuing to **mainly adopt Visual Flight Rules**.

This means that, also having adequate equipment and capabilities, only a marginal part of the overall flight hours are carried out in IFR.

This trend has a significant impact on flight safety:

Between 2001 and 2013 were observed **247 accidents** worldwide which were related to Inadvertent entry into IMC, improper execution of IFR procedures or Controlled Flight Into Terrain aimed to avoid weather. 194 accident happened on SE VFR Helicopters. 133 of them were fatal and resulted in 326 deaths. Remaining 53 were on Twin Engine Helicopters, typically IFR Capable. 36 of them happened during VFR flights performed in less-than VFR Conditions.

(14 CFR 27 Single-Engine IFR Certification Proposal – Association and Industry White Paper, June 2015)

Single Engine IFR ... Back to the future

2015

- The Helicopter industry asks FAA to consider reducing certification barriers for SE-IFR Helicopters (Industry White Paper: “14 CFR 27 Single-Engine IFR Certification Proposal”).

2017

- The FAA releases policy statement PS-ASW-27-15, “Safety Continuum” for Part 27 Normal Category Rotorcraft Systems and Equipment.

2019

- FAA certified first Single Engine Helicopter with IFR capabilities since 1999 according to 14CFR part 27 and FAA AC27-1B.



Single Engine IFR ... Back to the future

2020

- EASA launches RMT.0712 “Enhancement of the safety assessment processes for rotorcraft designs” which could be a proper booster for such kind of applications.

2021

- *Life Link III* & *Mercy Flights Central* become the launch customers for the first Single Engine Helicopter with IFR capabilities to be introduced in the U.S. CIVIL market.



Is no more an opportunity.
It's a reality!



... How can we take advantage from this trend to improve also Helicopter flight safety ?



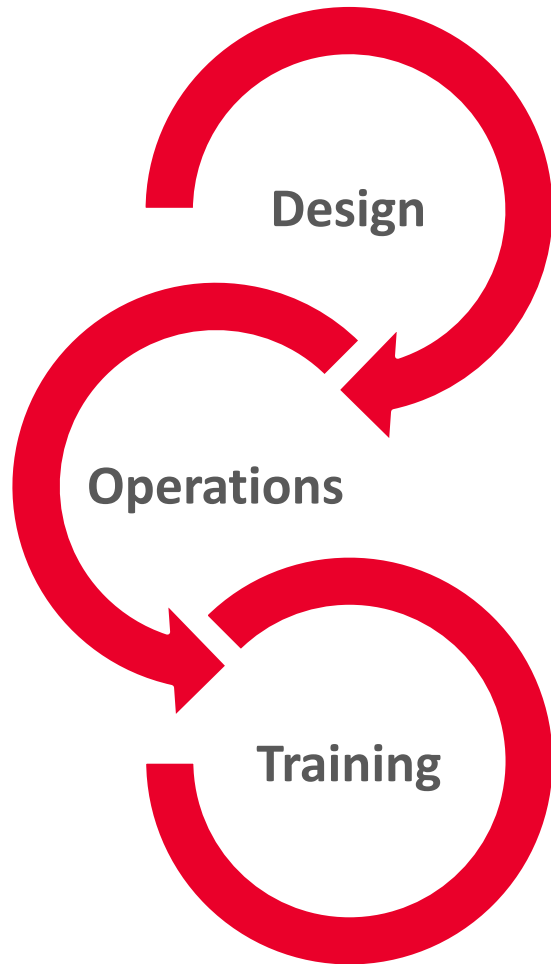
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How we can get there...

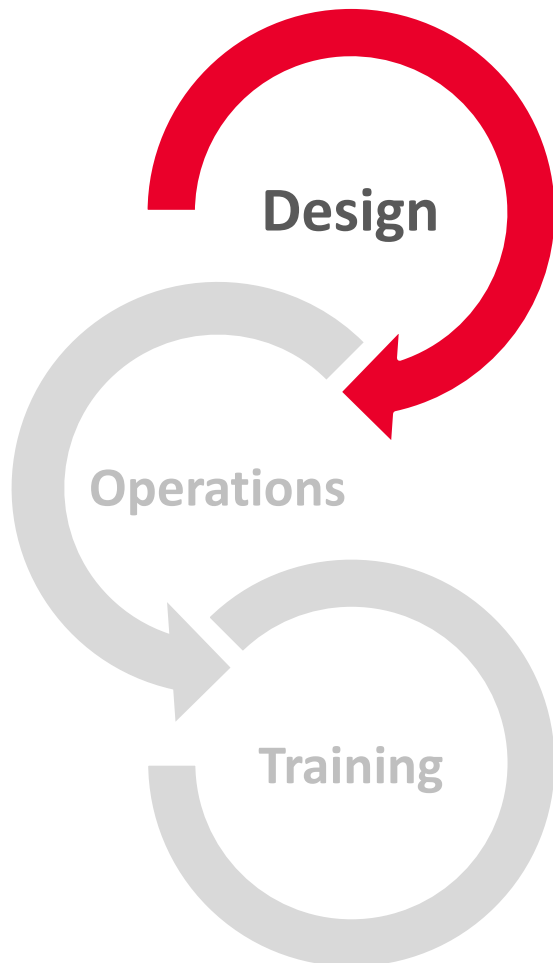
A Single Engine IFR Helicopter could provide tangible safety enhancement with respect to Single Engine VFR Configurations:



- Improved and Reliable Design
- New Operational Scenarios
- More Supporting Infrastructures
- Cheaper costs
- Increased quality and diffusion
- Induction of a “IFR mind set”



How we can get there...

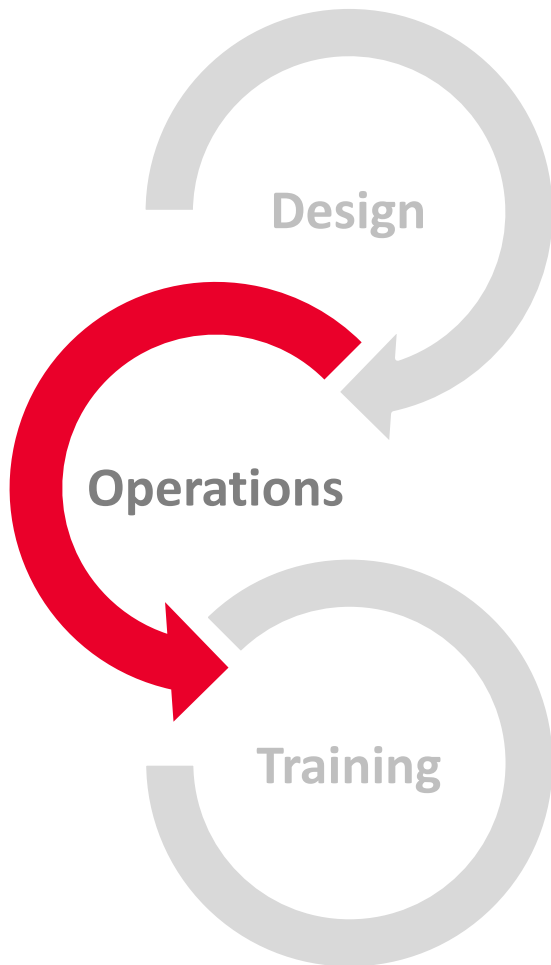


with an Improved and Reliable Design

Improved Light Rotorcrafts designed for IFR Operations would combine some Twin Engine features with a **cheaper general architecture and operational cost** of a Single Engine machine.

Standard Design Features for Twin Engine IFR Helicopters	SE VFR	Candidate SE IFR
Redundant Flight Stability Augmentation	✗	✓
Redundant Attitude Sensors	✗	✓
Redundant Airspeed Sensors	✗	✓
Redundant Barometric Altitude Sensors	✗	✓
Redundant Electrical Power Generations System	✗	✓
Redundant Hydraulic Systems	✗	✓
Navigation Aids & GPS	✗	✓
Enhanced EMI protection	✗	✓

How we can get there...

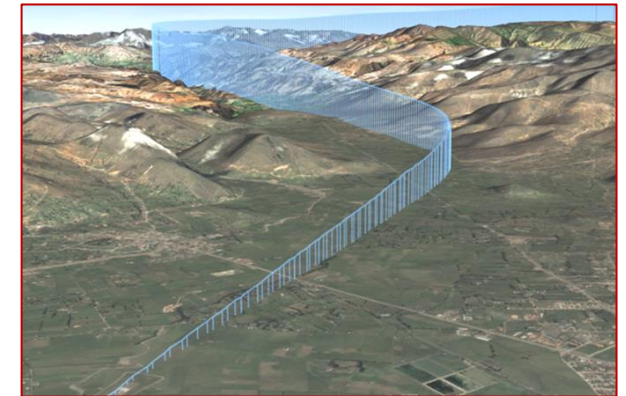


offering Advances Capabilities

Robust Design will also increase Single Engine Helicopters Operational Capabilities.

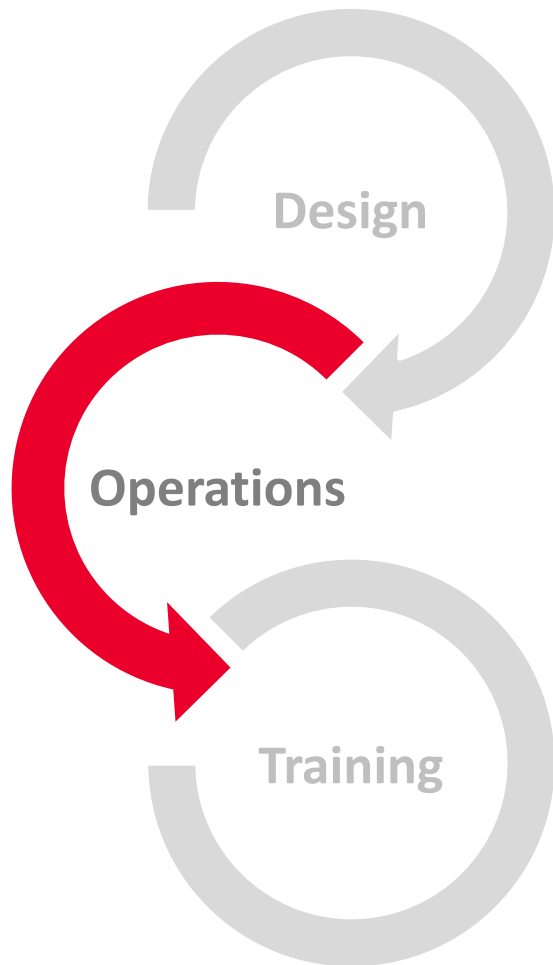
A Carefull revaluation of Operation Rules, All Weather Operations (AWO) Criteria and Engine Failure Considerations will lead to:

- ✓ ***All Weather Operations (AWO)***
- ✓ ***Commercial Air Transportation (CAT) in IFR***
- ✓ ***CAT in Congested environments***
- ✓ ***PBN / RNP Operations and Approaches***



... Can we make the IFR Operations more attractive for the Industry?

How we can get there...



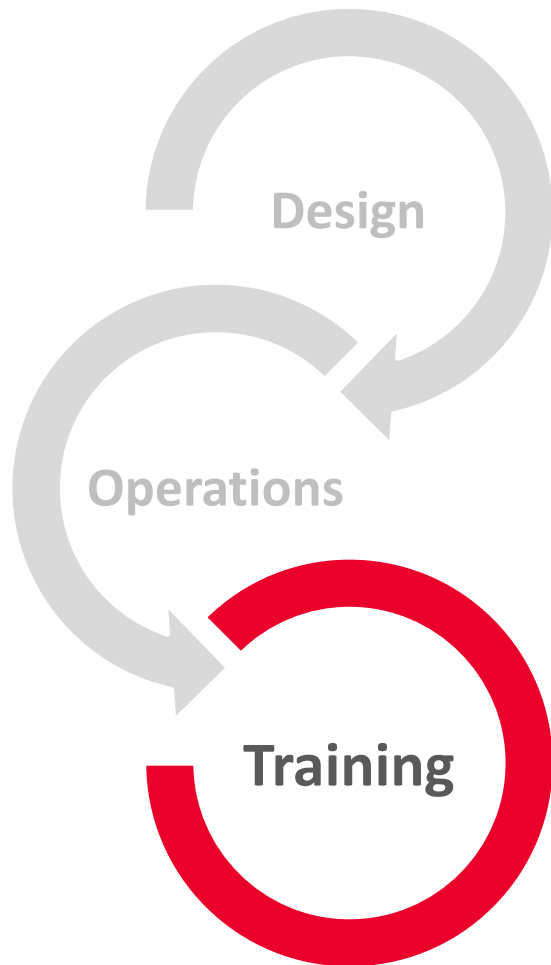
providing better Infrastructures and appropriated AWO Criteria

- ✓ *Helicopter specific IFR infrastructure must improve;*
- ✓ *Approach criteria and weather limits/infrastructure must be **defined for all approaches**;*
- ✓ *Approach to an aviation facility can be done – but what would the **approach visibility and cloud base limits** look like?*
- ✓ *Approach criteria for **remote sites** difficult to do safely – required visual cueing, weather at destination, obstacle environment?*

... Can we support an operational paradigm shift?



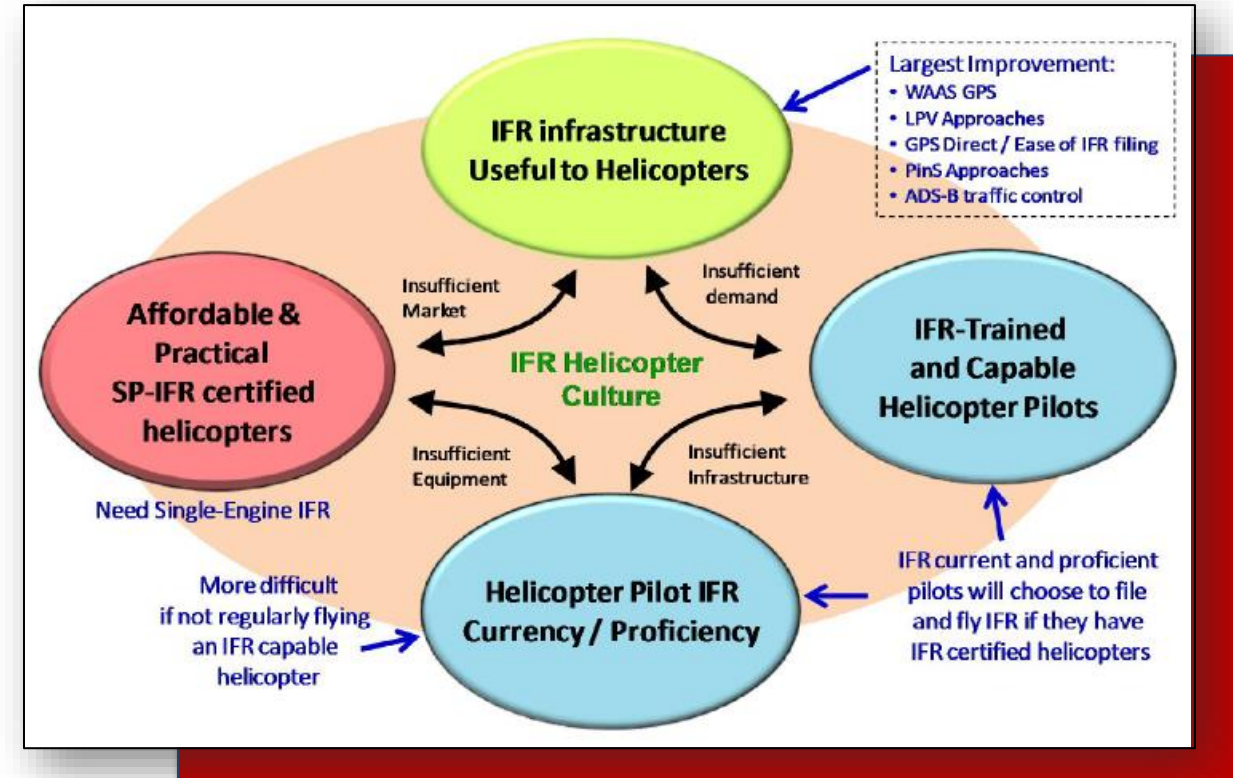
How we can get there...



Having the Right Skills

Having modern SE IFR Helicopters certified for a wide range of operations will both:

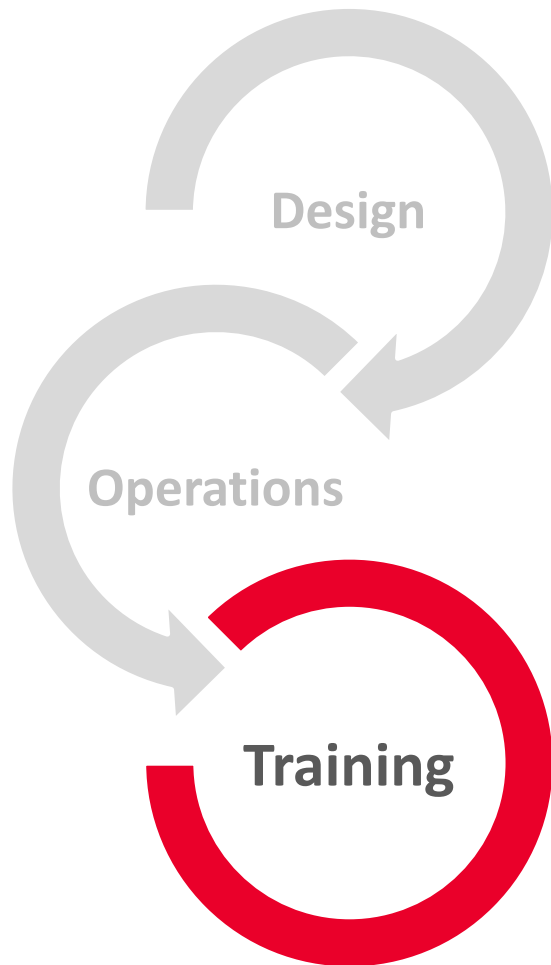
- ✓ **increase the demand** of new IFR-rated crews;
- ✓ **increase the proficiency** of already IFR-rated pilots.



(14 CFR 27 Single-Engine IFR Certification Proposal – Association and Industry White Paper, June 2015)

...can we further improve the preparation of our pilots inducing an “IFR Mind set?”

How we can get there...



Taking advantage from modern technologies:

Partially due to training costs, IFR operations are not encouraged.

Typically, the cost of a IFR rating is almost the same of the related initial Type Rating

It's essential to decrease this cost:

- ✓ *Basic and recurrent trainings standards are not a function of engine configuration. **Reducing the cost of training whilst maintaining and improving standards help to remove a barrier to IFR operations.***
- ✓ *More credit has to be given to the new **Flight Simulation technologies** based also upon the virtual reality simulators*

... can we make the IFR rating more accessible?



If we will succeed...





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Rules to Support...

FAA Environment

FAA approach was initially based upon the “**Safety Continuum for Part 27 Normal Category Rotorcraft Systems and Equipment**” published in 2017.

The aim are:

- ✓ **Facilitate a more rapid incorporation of advances in technology** for systems and equipment.
- ✓ Recognize a **balanced approach between the risk and safety benefits** for installing such technology.



Flexible certification policies to make **safety technology more accessible, easier and less expensive** to install so more lives will be saved. This safety technology includes autopilots and primary flight displays, which typically include attitude, altitude and airspeed indicators.

Single Engine Helicopters have been successfully certified on 2020 and they are now starting to operate in United States (both Military and Civil)

Rules to Support...

EASA Environment

It is possible to certify by using CS-27 BOOK 1 - Appendix B - Airworthiness Criteria for Helicopter Instrument Flight where it is stated that:

Additional equipment requirements:

- ✓ SAS
- ✓ *Additional flight and navigation instruments*

Before Rule Making Task RMT.0712

CS 27.1309 (c) applies to CS-27 single engine rotorcraft to be approved for IFR

*“The equipment, systems, and installations must be designed to **minimize hazards** in the event of a probable malfunction or failure.”*

After RMT.0712

Harmonization of the safety assessment provisions contained in CS 27.1309 and CS 29.1309 with their FAA equivalent will be increased and **proportionality** for the safety objectives for small CS-27 rotorcraft created taking into account performance based rules, type of operations being performed and European rotorcraft operational context

Rules to Support...

FCL Rules

From a preliminary analysis of the European Rules for FCL and OPS it emerged that:

There are no apparent impacts in the Commission Regulation (EU) No 1178/2011 of 3 November 2011 – Aircrew, so:

- ✓ *No changes in pilot qualification;*
- ✓ *No additional qualification needs to be introduced.*

▪



Rules to Support...

OPS Rules

Additional provisions are required in the Commission Regulation (EU) No 965/2012 of 5 October 2012 - Air Operations:

- ✓ *rules for SE Turbine Helicopter operations at night and IMC approval for CAT need to be reconsidered,*
- ✓ *as well as the extension of the capabilities of NCC, NCO and SPO need to be evaluated.*

Current Operational Rules require operational accountability for engine failure; for Performance Class 3 rotorcraft, the flight path has to account for a **safe landing in the event of engine failure**.

This is difficult to achieve when IMC/IFR and a fundamental **rethink of the Operational Rules** will be required in this case.

Leonardo is keen to Support EASA in the revaluation of the current OSD Rules in light of this new scenario.

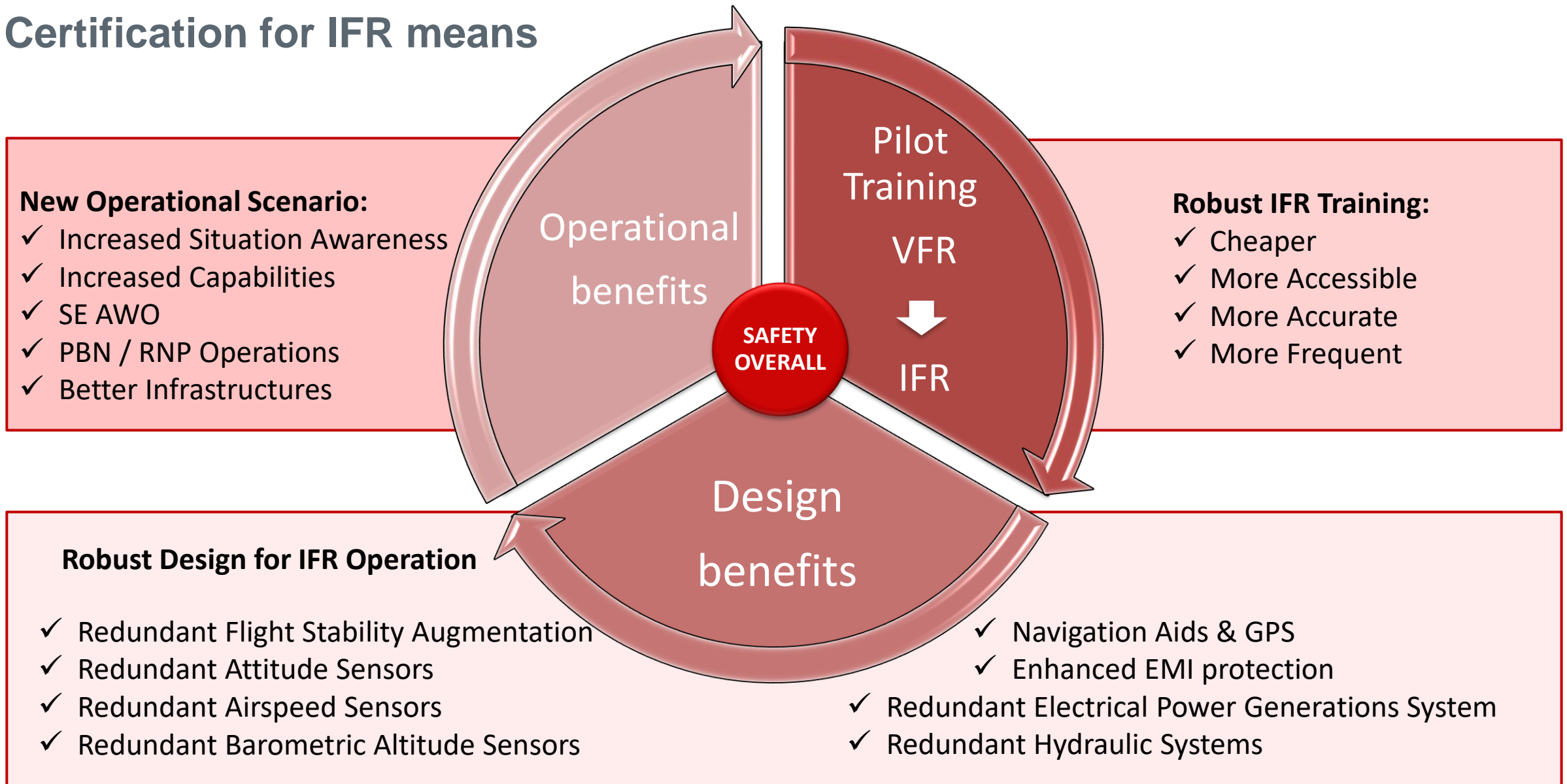




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Certification for IFR means



Conclusions

A Single Engine IFR Helicopter introduces:

Advanced Technologies
Systems Redundancies
Higher Design Reliability

A Single Engine IFR Helicopter allows to:

Increase Mission Performances
Increase Operational Safety Barrier

A Single Engine IFR Helicopter will:

made IFR training and rating cheaper and accessible
induce a mind-set change in Rotorcraft operations

*Same Safety Standards +
Increased Flight Operation =
LIGHT IFR*

To promote this asset we need to:

- Complete first type validation/certification in EASA;
- Set up a more affordable “light” IFR training;
- Explore the benefits when IMC happens.



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HelicopterS DIVISION



THANK YOU
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