

Challenges for the development and validation of affordable 4 axis Autopilot on light helicopters

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European Rotors 2021

Challenges for the development and validation of an affordable 4-axis Autopilot on light helicopters

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Agenda

1. Context
2. Safety Assessment
3. Situations in which a 4-axis Autopilot can improve safety
4. Videos of the StableLight Autopilot installed on AS350/H125
5. Challenges for the development and validation of a 4-axis Autopilot

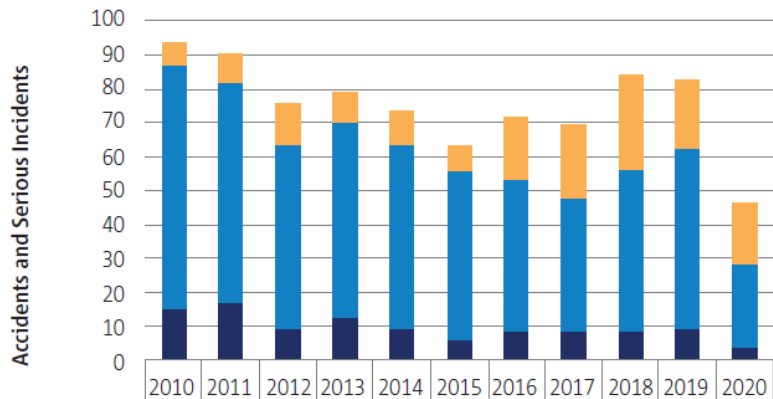


- Today, most of the light helicopters do not have an Autopilot, and none have a 4-axis Autopilot
- A majority of helicopter accidents and serious incidents concerns light helicopters
- The main Key Risk Area is the aircraft upset (loss of control), that a 4-axis Autopilot can prevent, or at least help to mitigate

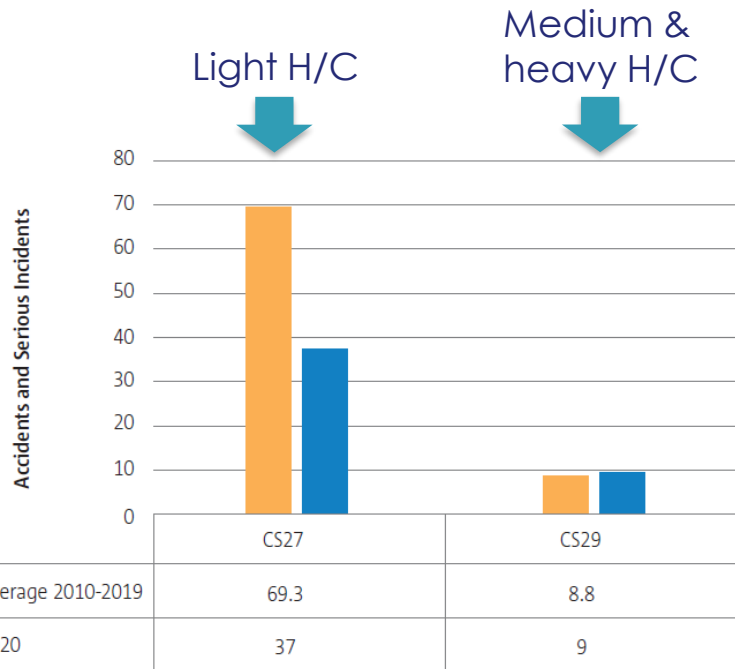
Safety of Flight for light helicopter is a key issue!

Light Helicopters Safety Assessment

EASA Annual Safety Review 2021



■ Serious Incidents	6	7	11	9	9	7	18	21	28	20	18
■ Non-Fatal Accidents	71	65	54	58	54	50	44	39	47	52	24
■ Fatal Accidents	16	17	10	12	10	6	9	9	9	10	4

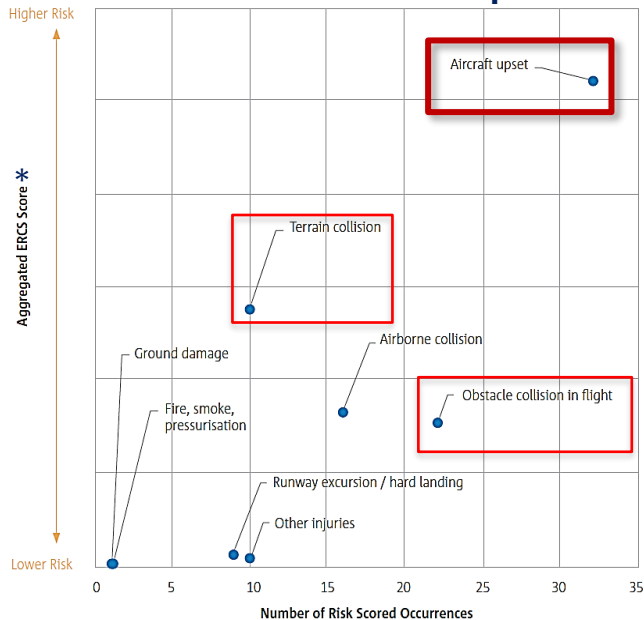


**In Europe, over the decade 2010-2019,
89% of HC accidents and serious incidents concern light helicopters**

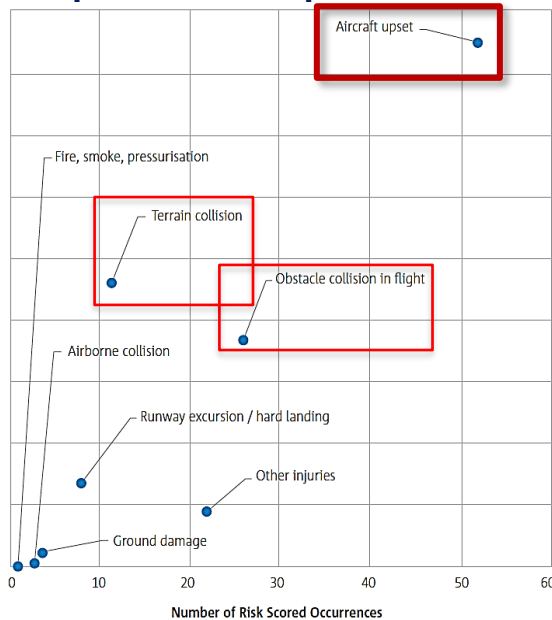
Light Helicopters Safety Assessment

EASA ASR 2021

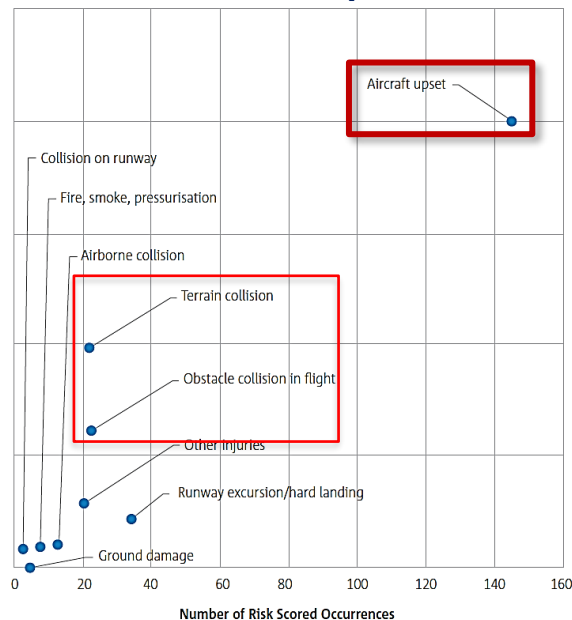
Commercial Air Transport



Specialized Operations



Non Commercial Operations



Aircraft upset (Loss of Control in flight) is by far the highest risk during HC operations

Light Helicopters Safety Assessment



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: September 24, 2009

In reply refer to: A-09-87 through -96

- "A review of the NTSB Aviation Accident Database revealed that during the 8-year period from 2000–2008, 123 HEMS accidents occurred, killing 104 people and seriously injuring 42 more. All but nine of these accidents involved operations with only one pilot. Pilot actions or omissions, in some capacity, were attributed as the probable cause in 60 of the 123 accidents. **Most of these 60 accidents might have been prevented had a second pilot and/or an autopilot been present** "
- "In the absence of a second pilot, **use of an autopilot might enhance a pilot's ability to cope with high workload, such as in inadvertent flight into IMC** "
- "The NTSB therefore recommends that the Federal Aviation Administration: [...]Require helicopters that are used in emergency medical services transportation to be equipped with autopilots "

Light Helicopters Safety Assessment



United States Helicopter Safety Team

Our Vision: A Civil Helicopter Community with Zero Accidents



HELICOPTER FACTS

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4 Key Helicopter Technologies That Will Save Lives

After analyzing dozens of helicopter accidents that resulted in fatalities for pilots and passengers, the U.S. Helicopter Safety Team (www.USHST.org) has determined that the further development and wider usage of these four flight technologies will improve safety across the helicopter industry and save lives.

Develop Autopilot Equipment for Light Helicopters – Current light helicopters have flight characteristics that are challenging and demanding of pilot work load. The development and certification of a stability augmentation system (or autopilot device) for light helicopters will increase flight stability and mitigate loss of control issues. The USHST believes that current equipment used in the aviation industry can be adapted for light helicopters and be an effective safety tool during low visibility, low ceiling and unintended IMC conditions.

The First
pillar of 4
identified by
USHST

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What a 4-axis Autopilot can bring to improve safety

- It stabilizes the helicopter
- It allows flying fully hands-off, freeing up pilot workload for the mission
- It provides envelop protection & dedicated safety features (HTAWS, GA...)



**Reduces significantly pilot's workload
and improves handling qualities**

Situations in which a 4-axis autopilot can improve safety

■ Hovering close to obstacles/terrain and preventing Brown-out & White-out

[Approach to Hover.mp4](#)

[Hover and Brown-Out Go-Around.mp4](#)

Approach to Hover and Departure modes



Situations in which a 4-axis autopilot can improve safety

■ Hovering close to obstacles/terrain and preventing Brown-out & White-out

[Approach to Hover.mp4](#)

[Hover and Brown-Out Go-Around.mp4](#)

■ Preventing CFIT in DVE with a Max Continuous Power Go Around triggered by HTAWS

[HTAWS.mp4](#)

Automatic Go-Around
triggerred by HTAWS

Automatic C
triggerred b

Automatic Go-Around

Automatic C

Situations in which a 4-axis autopilot can improve safety

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[Approach to Hover.mp4](#)

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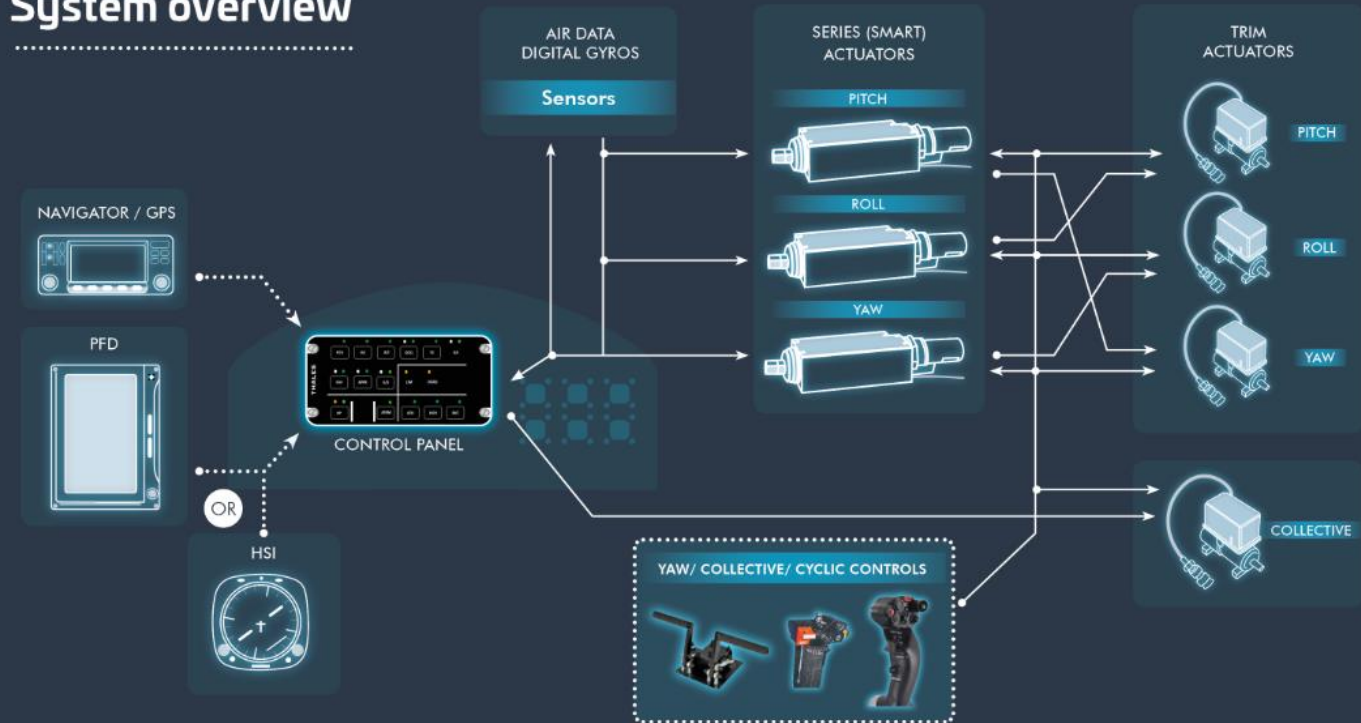
[HTAWS.mp4](#)

■ Prevent loss of control in case of inadvertent IMC

[Inadvertent IMC Go-Around.mp4](#)

Thales/StandardAero solution for AS350/H125

System overview



STABLELIGHT
The TRUE AUTOPILOT for light helicopter professionals

STC submitted
to FAA for
validation
expected in S1
2022

Thales/StandardAero solution challenges faced during program

Mechanical integration of actuators

- 3 smart Serial + 4 Parallel actuators integrated under the AS350 deck
- Compact and light solution: the Autopilot computer is removed

Human Machine Interface

- Integration of controls on the sticks & pedals
- Collective axis management for autorotation

AP Performance vs avionics low-grade primary reference sensors

- Filtering and monitoring adjustments

Hardover tests

- Cross axis architecture serial / parallel actuators => reduces failure criticality

Your TRUE Autopilot Experience Starts Soon-Stay tuned!



More info

<https://go.standardaero.com/The-TRUE-AutoPilot-for-Light-helicopters>

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