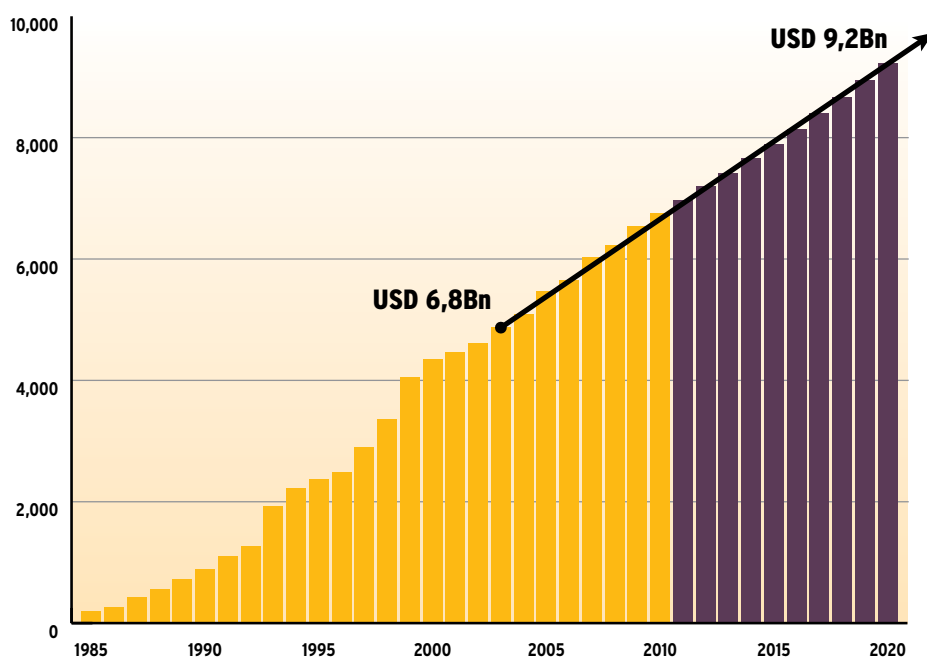


# RUNWAY EXCURSION AT LANDING, THE No.1 SOURCE OF CLAIMS FOR AVIATION INDUSTRY

## HOW TO REDUCE THIS RISK THROUGH INNOVATIVE AVIONICS?

Runway excursions are the most common aviation accidents. Since 1985, cumulative hull losses and liabilities represent respectively USD 5.4 billion and USD 1.1 billion. In other words, 33% of hull losses incurred in the last 25 years are linked to these accidents. In taking into account 2% rate of inflation and considering in average the same trend that the one observed since 1985, we believe that these cumulated hull losses will represent USD 9.2 billion by 2020. This figure does not include impact on airport infrastructures and airport/airline operational continuity.

### USD(M) CUMULATIVE HULL LOSS VALUE - ADJUSTED AT 2% PER ANNUM



*Airbus-Willis analysis based on ASCEND data*

Clearly, the importance of developing effective mitigation for overruns cannot be overstated. Preventative risk controls become crucial to reduce their likelihood and consequences. These include safe approach techniques, pre-landing risk assessments, line-oriented flight training, clear policies on go-arounds, runway surface quality with safety features such as grooving and surface texturing, ICAO-recommended runway end safety area (RESA) and backing like Engineering Material Arresting System (EMAS) and runway lighting.

While these mitigations are potential lifesavers, there is an old saying however that “an ounce of prevention is worth a pound of cure”. The Runway Overrun Prevention System (ROPS) developed by Airbus provides that “ounce of prevention”. Following the start of preliminary research in 1998 as a Ph.D. thesis, ROPS has now been selected on more than 70% of ordered A380s and in operations on Air France, Lufthansa and Emirates. ROPS is standard in A350XWB definition. With a certification planned next year, ROPS is an option, easy-to-install within one night stop, on A320 family and A330/A340.

## 1. MAIN CONTRIBUTING FACTORS

There are many contributing factors to runway overruns during the landing phase. One of the major contributors has been, and remains unstable approach, to which the industry has responded by emphasizing training and procedures. Being in an unstable condition, but without having actual information on the risk of a consequent runway overrun, the crew may be tempted to continue an approach in the belief that they may recover the situation or that they have sufficient landing distance margins.

Other identified factors contributing to overruns at landing are:

- Wind shift at low altitude,
- Long flare,
- Long de-rotation,
- Late selection of engine thrust reversers,
- Inadequate cancellation of reversers,
- Runway friction coefficient lower than expected (Contaminated runway snow, ice or more slippery than reported),
- Late/weak manual braking,
- Technical failures affecting the landing distances during the landing (tyre burst, braking system failure, etc.).

Following certain events, the Airworthiness Authorities have recognized the need to create new regulations for the in-flight computation of the Landing Distances published in the Airplane Flight Manuals. This led to the creation of the Take-off and Landing Performance Assessment Aviation Rulemaking Committee (TALPA ARC), an industry group mandated by US FAA, in which regulators, airlines, airport operators, associations and manufacturers, including Airbus, were represented. The Committee has now finalized its proposal for new regulation for in-flight landing distance assessment. The ROPS computation algorithms are already consistent with these proposed regulation changes.

## 2. ROPS DESCRIPTION

ROPS assists the flight crew during the final approach and roll-out in preventing runway overruns.

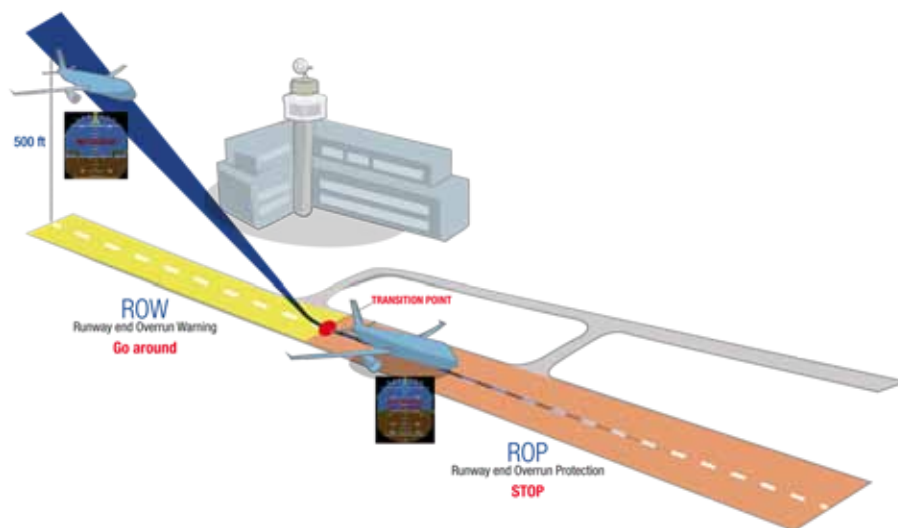
The system integrates two functions:

- A warning function, called Runway Overrun Warning (ROW), which applies in flight and is go-around oriented.
- An active protection function, referred to as Runway Overrun Protection (ROP), which applies on ground and is stop oriented.

In order to be effective, through a dedicated rule established by EASA in 2009 for all avionics systems pretending to prevent runway excursions, ROPS:

- Computes permanently in real time aircraft realistic landing distance and remaining landing/ stopping distance,
- Compares it in real time with legal Landing Distance Available (LDA),
- Triggers, only when necessary, clear alerts with simple operating procedures,
- Guarantees both reliability and not excessive margins,
- Avoids any additional tuning by airline (no liability transfer).

This does not invalidate the need to fly stable approach, but goes well beyond the necessary Stable Approach concept widely deployed since 1998 by the Flight Safety Foundation.



### 3. A LONG DEVELOPMENT

In 2001, Airbus sanctioned the research phase initiated in 1998 by starting the translation of the theory into a workable test model. This work was completed in April of 2004 by a first flight using an A340-600 test bed. By March of the following year, the system had developed to a stage where it could begin operational testing (carried out at Paris – CDG). By September of 2006, the system tests had been completed and, following the Lufthansa decision to become ROPS launch customer on their A380 fleet, industrialization started. First flights on A380 and A320 happened respectively on May 2008 and December 2010. ROPS has been approved by EASA on October 2009 for the A380 fleet.

### 4. A RECOGNIZED SOLUTION

Airbus ROPS has been widely recognized within the industry and even shortlisted at the 2009 Flightglobal Achievement Awards with Virgin Galactic Spacecraft, Bombardier CSeries Programme and Pratt & Whitney PurePower engine. Among a series of positive feedbacks, IFALPA, in its July-August 2009 InterPilot journal, emphasizes that, “with ROPS, Airbus has created a system which will inevitably, become a life saving addition to the safety system.”

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In early March 2011, during the Annual Willis Aerospace Conference in Asia bringing together airlines, industry service providers, global insurers, specialist lawyers and Adjusters, Airbus announced its decision to set-up a dedicated structure to ensure quick deployment of ROPS for all aircraft manufacturers. Through an alternative investment, active contribution from Insurance and Risk Management community should be a key success factor in reducing runway overrun costs while favoring ROPS deployment on fixed wing aircraft.

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