The Global Voice of Pilots

IFALPA

POSITION PAPER

26POS10
3 February 2026

Future Ground Handling

EXECUTIVE SUMMARY

The paper discusses the growing use of automated and autonomous systems in airport ground handling, driven by technological advances and workforce shortages, and highlights the associated safety risks, human–machine interaction challenges, and accountability questions. IFALPA supports automation only where it demonstrably enhances safety, preserves human oversight and intervention capabilities, and is accompanied by comprehensive risk assessments and clear regulatory frameworks, especially as autonomy levels increase.

BACKGROUND

In various countries, trials are underway at airports using automated and autonomous systems for the ground handling of aircraft. For example, in Amsterdam there is a fully automated passenger boarding bridge, in Dubai and Zurich there are trials with autonomous ground handling vehicles, and several airports are experimenting with baggage robots. This development is driven by technological advances and workforce challenges; however, automation must not be used to remove safety-critical human roles.

While these developments promise efficiency gains, they also introduce new operational hazards, human–machine interaction challenges, and questions of responsibility. Such initiatives must ensure that safety considerations, human oversight, and clear accountability remain central as these technologies are developed and implemented. When developed and implemented carefully, these new systems have the potential to increase the level of safety in ground operations.

A clear distinction must also be made between automation and autonomy. Automation refers to systems that support or execute specific tasks under defined conditions while remaining under human supervision and control. Autonomy, by contrast, implies systems capable of making decisions and acting independently without continuous human input. This distinction is critical in the ground handling context, as increasing levels of autonomy raise significant concerns regarding oversight, accountability, and the ability to intervene promptly in safety-critical situations.

POSITION

IFALPA supports the introduction of automation in the ground environment in cases which demonstrably increase the level of safety, reduce physical strain on workers, and enhance operational resilience. As pilots retain ultimate responsibility for aircraft safety during ground operations, the introduction of automated and autonomous ground systems must not increase pilot liability without providing pilots with corresponding authority, transparency, and means of intervention. Any automated system must provide a clear safety benefit compared to existing procedures and must not erode established safety margins.

The ground environment presents unique challenges; it is dynamic, congested, and characterized by proximity between personnel, vehicles, and aircraft. Therefore, before any automated or autonomous ground system is implemented, a comprehensive and transparent risk assessment process is essential.

This assessment must consider not only technical reliability but also human factors, system failure modes, degraded operations, environmental influences, and interactions with aircraft and personnel. Risk assessments should involve all relevant stakeholders, including pilots, ground handlers, airport operators, and regulators, and should be revisited continuously as systems evolve or operating conditions change.

In general, the system should be designed with a failsafe architecture to minimize threats to persons and aircraft in the event of system misbehaviour. Furthermore, Pilots and ground personnel must retain the ability to monitor system behaviour, intervene as necessary, and immediately stop system operation in the event of unsafe or unexpected conditions.

Automation must support human operators. It must not be used to justify the reduction, removal, or remote displacement of safety-critical ground personnel. Automated systems must therefore be designed to allow rapid human override at all times, and a human should be easily physically available to intervene if required (emergency, technical issues, assistance to the crew and passengers, etc.). Therefore, systems should provide clear situational awareness for pilots and cabin crew, be easily recognizable, and integrate seamlessly with existing procedures without imposing additional cognitive workload or extensive new training requirements.

Before implementing automated systems in the ground environment at airports, further research is necessary to assess their impact on safety and on the general working environment for ground staff and crew members. There is also a need for regulation to define precise requirements for automatic and autonomous systems. These should

address developers of these systems, airport operators, and other parties involved, such as ground handlers and airline operators.

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