Bumps in the road

Crash report: collisions between ground support vehicles and aircraft are more common than popularly supposed.

With ground damage growing across the industry, Alan Dron investigates what's being done by ground support equipment providers to reduce accidents and improve efficiency.

The video footage from Chicago O'Hare Airport in late August was remarkable. A small airport ramp vehicle, being driven at some speed, swerved past a tug and squeezed through a tight gap between it and a tractor before ramming the nose of a parked United Airlines Boeing 737.

Nobody was injured, but the impact left deep dents in the underside of the aircraft's nose that would require a visit to the maintenance hangar and keep it out of revenue service for several days.

Remarkably, such incidents are surprisingly common, as can be seen from a quick visit to YouTube.

All too often, a moment's misjudgement or lack of attention by the driver of one of the innumerable ground support vehicles that buzz around an airliner when it is at an airport gate can lead to a headache for an airline's maintenance and operational planning staff.

The International Air Transport Association (IATA) highlighted the phenomenon of ground collisions in a December 2022 report and called for a transition to enhanced ground support equipment (GSE) to improve safety and reduce the cost of such incidents.

Enhanced GSE uses anti-collision technology to automatically slow a vehicle as it nears a parked aircraft, improves vehicle control and increases docking accuracy, all of which minimise the risk of damaged aircraft.

COUNTING THE COST

Denting an aircraft may seem like a relatively low-cost matter, but it is not. IATA estimates that the annual cost of ground damage could double to nearly US$10 billion by 2035 unless preventative action is taken.

New approach: the motors for WheelTug are installed in the aircraft's wheel hubs.

One last push

A common cause of damage to aircraft are accidents involving tugs, the low-slung vehicles that hook up to an airliner's nose undercarriage leg for pushbacks, or to tow an aircraft to a hangar for maintenance.

A slight misjudgement by the vehicle's driver and the resulting impact with the landing gear can mean an airliner being put out of action for days.

One novel approach to eliminating such accidents is espoused by WheelTug, which installs electric motors within the wheel hubs of the nose undercarriage gear, allowing the aircraft to taxi backwards or forwards under its own power, removing the need for tugs.

The device is currently in the certification stage for the Boeing 737NG series and WheelTug Director, Jan Vana, says the process is "80 per cent through with the FAA".

Due to bilateral agreements between the FAA, EASA and other regulators, "Once we get the FAA approval, we'll submit it to EASA and others and, in principle, they will recognise FAA certification."

Getting the device into service is subject to the company finding the last tranche of money to get the system over the regulatory finishing line.

Vana said in August that the company was "close to the final chunk of funding that we need to finalise certification. Once the funding is available, it will take 15 to 18 months. We'll hopefully start [production] in 2025."

WheelTug will be a retrofittable system, capable of installation in two overnight sessions, he says. The biggest task is installation of new wiring and a small control panel on the flightdeck.

Apart from removing the risk of collision, the electrically powered wheels allow the aircraft to taxi to near the end of the runway before lighting up its engines, saving both fuel and emissions.

WheelTug estimates that a short-haul aircraft can save around seven minutes of engine running per flight. If the aircraft completes four to five sectors, that adds up to one tonne of CO_2 emissions saved per day.

WheelTug-equipped aircraft are also not delayed by having to wait for a tug to turn up during busy periods at airports and airlines will no longer have to pay a ground-handler for a tug's services.

Additionally, Vana says, WheelTug allows the aircraft to be more manoeuvrable on tight aprons – the system allows wheels to turn up to 78 degrees, rather than the usual maximum of around 45 degrees when using a towbar.

The company is also aiming to install the device on the Airbus A320 series.

"Basically, we're targeting narrowbody types," says Vana. "But other types such as widebodies and cargo aircraft or regional jets are also under consideration."

Interest in the system is high, with letters of intent to equip more than 2,500 aircraft received so far from more than 25 airlines.

"They understand it's a no-brainer when you can move the aircraft with no need for a tug – especially for low-fare carriers, because we can save a lot of time on the ground for them."

That cost forecast is based both on direct costs (including labour and material costs, plus the expense of temporarily leasing replacement aircraft and administrative costs) and indirect costs (lost revenue, crew and passenger repositioning costs, plus compensation costs for delayed services).

The IATA study found that most aircraft ground damage is caused by motorised GSE striking the fuselage of the aircraft.

The increasing use of composites in aircraft construction involves new and hidden risks, says Tim Rane, Regional Director of French GSE manufacturer Charlatte Manutention.

"If you hit aluminium, there's a dent," he says. "If you hit composite, it springs back, but it's damaged behind."

IATA's ground damage incident database logged belt-loaders, cargo-loaders, passenger stairs and passenger boarding bridges as causing 40% of all incidents.

"Transitioning to Enhanced GSE with anti-collision technology is a no-brainer," says Nick Careen, IATA's Senior Vice-President for Operations, Safety and Security.

"We have proven technology that can improve safety. And with the cost of ground damage growing across the industry, there is a clear business case supporting early adoption.

"The challenge now is to put together a roadmap so that all stakeholders are aligned on a transition plan."

Getting off the ground: WheelTug has installed its system for trials with launch customer, Spanish charter operator AlbaStar.

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TOP PRIORITIES

IATA says that together with reducing the cost of damage, a transition to Enhanced GSE would also support the industry's commitment to achieve net zero CO2 emissions by 2050, as most new vehicles are moving away from the traditional diesel engines that for decades have plumed dark exhaust fumes as they go about their business on airport ramps.

"Most Enhanced GSE is electrically powered, making it cleaner and more energy efficient," Careen says. "While the main focus of aviation's decarbonisation efforts is on how we power aircraft, what happens on the ground cannot be ignored. The transition to Enhanced GSE will contribute to our industry's top priorities of safety and sustainability."

IATA has said that it will work with industry partners to implement strategies to drive the adoption of Enhanced GSE. The organisation's Airport Handling Manual already advises on the design and use of GSE anti-collision systems as a best practice.

IATA has urged operators of GSE to develop business plans to transition their fleets to enhanced versions of their vehicles.

According to Andrea Endacott, Communications Director of AFS Aviation, which supplies GSE to airports and airlines, manufacturers of the new-generation vehicles have been pushing their wares for a decade, but profit margins at ground-handling companies have been squeezed by increasingly tough contracts imposed by airlines, leaving little cash available for investment.

Until very recently, electrically powered vehicles have been much more expensive that their diesel counterparts.

"The ground-handlers haven't got the money to spend on a lot of new equipment, especially on the electric side of things," says Endacott.

Additionally, it was normal for a ground-handler to get 15 to 20 years out of a ground vehicle.

"If you've had something for only five to seven years, you're not going to look at replacing that," Endacott says.

However, she believes that there is now increasing pressure from airlines for ground-handlers to make the switch to electric vehicles.

"If customers come and ask us, we will certainly go out to the market and ask, but it's not something we've just got sitting there," she says.

NET ZERO TARGETS

For one of the world's major ground-handling companies, Menzies Aviation, bringing electric GSE into service has been a core focus in recent years, according to the company's Head of Sustainability, Katy Reid.

Her role specifically looks at vehicles such as electric taxiing systems and tugs.

Menzies has had electric vehicles in its fleet for some time, although the incidence of vehicles varies considerably from the global average of just over 16%.

Europe is by far the largest number, with "well over 40 per cent" electrically powered – an indication of the seriousness with which decarbonisation of the industry is being treated on the continent.

The Americas are lagging somewhat and "that's probably the region we need to have greater focus on, going forward," says Reid.

Menzies' corporate goal is to reach net zero emissions by 2045, five years ahead of the target the aviation sector has set for itself.

"At the moment, we're aiming for 50% globally by 2030," says Reid. That figure is scheduled to increase to 65% electric – "or at least, non-diesel" by 2033, Menzies' bicentennial year – and 90% by 2040.

"Last year we brought in close to 200 new GSE pieces of equipment and this year we've already exceeded that with nearly 240," Reid told *LARA* in August.

One factor delaying the deployment of electric vehicles is the lack of charging facilities.

"We're having a lot of conversations with airports in terms of infrastructure," says Reid. "What are they implementing [and] how can we work with them on that?"

At large airports, GSE vehicles have longer distances to travel, which puts an additional strain on their battery powerpacks.

In some regions of the world, solar-powered vehicles may be the way forward, Reid suggests.

An increasing number of GSE vehicles are of the "enhanced" generation, she notes.

"Cargo loaders, belt loaders, passenger stairs are typically fitted with damage avoidance systems. I think the way they operate, in terms of how they brake, is a bit more effective than diesels.

"They are easier to control, because we can produce more torque at lower speeds, [making them] easier to control by operators and easier to manoeuvre at low speeds." ■

Profile: Tim Rane

Tim Rane, Regional Director of major GSE manufacturer Charlatte Manutention, has been in the business for 30 years.

He says that the vast majority of ground collisions are down to human error or lack of maintenance of GSE, rather than any design faults on the equipment.

IATA has produced an Airport Handling Manual standard for GSE, AHM913.

"That covers how to approach an aircraft in a slowed-down manner," says Rane. "[But] it's an advisory, not a mandatory standard. If you're a company that operates to IATA standards, you can specify AHM913 on your purchase order [for GSE machinery used by a ground-handler]."

That means that GSE machinery used to service your aircraft will require the sensors that detect the proximity of an aircraft to be fitted to the vehicles and slow the vehicle to 6 km/h.

"Pretty much all the manufacturers have produced options for this AHM913 standard and more and more customers are specifying them," says Rane.

The problem is that the sensors – whether provided as line-fit items or as retrofit kits – are expensive. And not every GSE operator can afford them.

Some will say: "I'll deal with this in a different way. I want a simple machine and will spend extra to train the operators to be careful around aircraft."

"There's a big industry ready to reduce the amount of damage to aircraft," says Rane. "But how you do it affordably is a more complex issue."

Plugged in: a rank of electric ground vehicles recharging in readiness for their next shift.