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# Airside INTERNATIONAL

WINTER 2022 #AIRSIDEINT


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# Editor's NOTES


## Mike Bryant
Mike@evaint.com


Welcome to the Winter 2022 issue of *Airside International*, in which we talk to many of the GSE suppliers who demonstrated a range of their wares at the GSE Expo Europe show held at Le Bourget, Paris, in September. These include Denmark's Vestergaard and ITW GSE, France's ADVEEZ, Italy's AVIOGEI, Belgium-headquartered AVIACO, and AeroVect and Textron of the US.

Additional interviews with attendees at the show can also be found in a supplementary section of the digital issue of this magazine.

Autonomy is a feature of this edition, covered in some depth in our chat with the UK's Aurrigo as well as with Stuttgart Airport and Aebi Schmidt, who are collaborating on autonomous snow clearance operations.

Complementing the latter article, this issue's features include one dedicated to the changing technologies associated with snow clearance. We also cover the evolving apron bus market, which is looking to electric solutions, and the very interesting subject of the recovery of stranded aircraft that have suffered a runway excursion.

Finally, we talk to EcoOnline and the Airport Services Association (ASA) about their collaboration on an all-new Safety Incident Data (SID) platform.

We hope you enjoy the issue.


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*Photo credit: Metropolitan Airports Commission*


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WINTER 2022




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*AMS's new Integrated Recovery System, or Fighter Jet Transporter when aimed at the military market*

# Supporting aircraft recovery operations

If an aircraft suffers a runway excursion the potential costs are huge, not only in terms of damage sustained but in the impact on operations at the airport (it could entail a runway closure, for example, or even the suspension of airport operations as a whole) and the knock-on effect on other operators at the gateway. Having equipment and expertise in place is vital if the impact of an aircraft becoming bogged in soft ground following an excursion, with perhaps consequential damage to landing gear, is to be minimised.

AMS Aircraft Recovery is a Farnborough, UK-based specialist in aircraft recovery equipment – it designs, develops, manufactures and distributes a comprehensive range of lifting and moving equipment to help with the process.

The business was established in 1988 as AMS Systems Engineering, becoming AMS Aircraft Recovery in 2014 upon a change in ownership. Then, in 2020, it was acquired by California-based Age Logistics, a family-run business that had worked in partnership with the founders of AMS since the early 1990s. Because AMS has the better-known brand, unusually parent company Age Logistics will in time rebrand to AMS Aircraft Recovery, rather than the other way around, reveals AMS sales director Paul Ryder.

The deal with Age Logistics has worked out very well for AMS, he says, not least because the former has an excellent relationship with the US Air Force (USAF), its primary customer, and a key market for AMS going forward.

AMS already sells to a wide range of customers, however, both civilian and military. In the civil sector, this includes a range of airlines and airport operators – just in the UK, for example, the company's home market, its customers include airlines such as British Airways and airports such as Heathrow, Belfast, Birmingham and Bristol. But the latest customer to add to the global customer base is the Nigerian Civil Aviation

Authority, Ryder informs.

Indeed, while its headquarters are in Farnborough, Hampshire and its manufacturing facility is located in Wiltshire, AMS sells right around the world through a network of distribution agents, he notes.

AMS's product line includes lifting airbags, airbag inflation systems, fuselage lifting systems, turntables and transport systems. All the equipment has been designed to ensure aircraft can be recovered quickly and safely, satisfying Boeing and Airbus requirements as and where necessary.

With its range of airbag-based lifting equipment, de-bogging, towing and sledging equipment, tethering gear and transporters, AMS offers a comprehensive range of products that can recover damaged and stranded aircraft in all sorts of challenging positions and terrains, Ryder explains. It even offers temporary roadway that can be laid between a stricken aircraft that has suffered a runway or taxiway excursion to enable easier recovery to hard ground.

Yet the product portfolio is continuing to grow. For example, over the course of the past year AMS has developed a new Integrated Recovery System that has the capacity to both lift and transport an aircraft, a sort of hybrid of airbag-based capability, sledge and transporter, Ryder says.

Tentatively called the Fighter Jet Transporter when directed at the military market (and USAF is its first confirmed customer) and Integrated Recovery System when aimed at the civil sector, the equipment is currently being launched onto the market. While initially aimed at the fighter jet and business jet markets, there is scope to develop the system to handle commercial aircraft, Ryder confirms. It has a 15-tonne lifting capacity and so could, for example, be used to lift the nose of a typical narrowbodied aircraft. (It is the nosewheel that is usually the first to collapse under stress when an aircraft leaves a runway or taxiway for the soft ground around an airfield hardstanding.)

Another string to the AMS portfolio bow is the training that it offers at its school at Kemble in Gloucestershire. There, the company offers both first-up and refresher hands-on training to clients using aircraft such as B737 or A320 family models as required.

Plus, Ryder says, AMS has also been asked on occasion to actually help with an aircraft recovery. One such occasion – in 2014 – saw AMS staff take their equipment to help recover an ASL aircraft at the UK's East Midlands Airport (EMA), for instance.

While business was quiet during the pandemic, when customers and potential customers simply did not have the budgets to invest in aircraft recovery equipment, demand is now picking up quickly, Ryder says. As passenger numbers near pre-pandemic levels, so potential customers are realising the need to "minimise their exposure to risk" associated with stricken aircraft, he points out.

## RESQTEC offers integrated solutions

Another important player in the area of aircraft recovery is Netherlands-based RESQTEC. Formed on New Year's Day 1972, it is "an innovative solution provider of rescue equipment", says Dennis Beck, the company's sales and marketing director.

An important point in its development took place in 2005, when – due to the perceived limitations of existing aircraft recovery lifting devices – the company was invited by the aviation sector to "create solutions for the aircraft recovery problems they faced", Beck recalls.

"At the request of the aviation industry (including Airbus and Boeing as well as IATA's Aircraft Recovery Task Force), RESQTEC developed a unique solution to lift and recover the new generation of aircraft that had larger, heavier and different wing designs (such as the Airbus A350 and Boeing B787).

"Our aircraft recovery story began then, and we now offer solutions to both civil and military customers," he advises.

Since 2006, RESQTEC has been an active member of the IATA Aircraft Recovery Forum or Task Force and, in 2009, the company's aircraft recovery experts played an active role in updating the International Civil Aviation Organization's Airport Services Manual's Part 5 'Removal of Disabled Aircraft'.

All RESQTEC's aircraft recovery experts and training instructors have more than 10 years of experience in disabled aircraft recovery operations and are contributing members to the IATA Aircraft Recovery Task Force, Beck says.

While headquartered at Lisse, in the Netherlands, RESQTEC also has offices in the US, China and Malaysia.

## Rapid Recovery

RESQTEC offers a wide range of products to support aircraft recovery, including lifting and moving equipment, as well as ancillary equipment. Its product portfolio includes: its single column R2S and R2S MAXX systems (R2S is short for Rapid Recovery System, of which more below); Pneumatic Aircraft Lifting Bags; a Rapid Recovery Multi Sling Lifting Kit; a Rapid Recovery Tethering Kit; a Rapid Recovery Debogging Towing Kit; Aircraft Recovery Dollies; an Aircraft Recovery Trailer System; Q-Mat Temporary Road Panels; and Aircraft Recovery Cribbing Blocks.

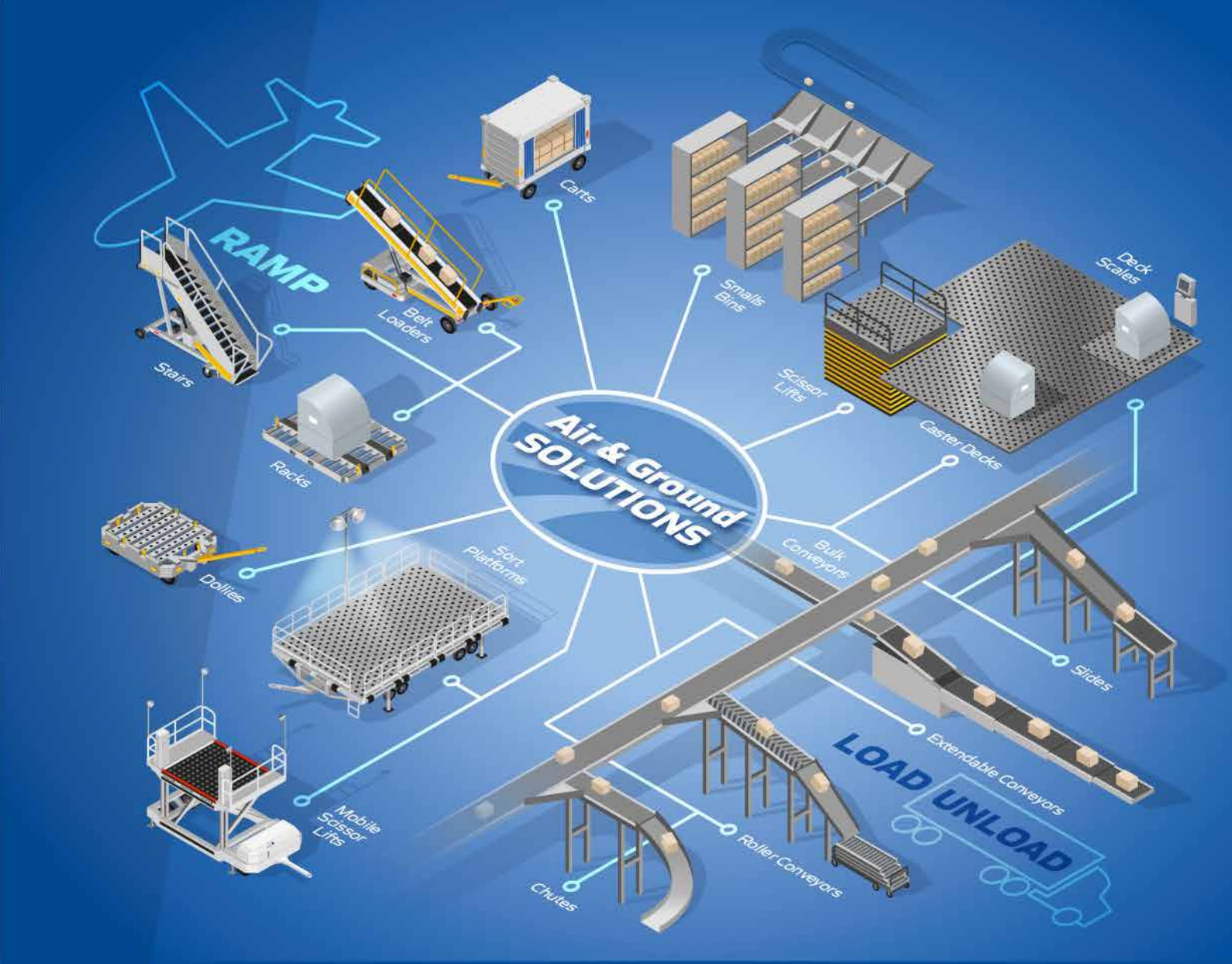
*Above: RESQTEC airbags*
*Below: RESQTEC's R2S comes in the form of single columns and an integrated MAXX system*

As Beck explains, RESQTEC's R2S system was developed to lift and recover the new generation of aircraft that are larger, heavier and have different wing designs. It was specifically designed to allow for controlled and continuous lifting in one go, over a changing angle, without affecting the stability of the aircraft and incurring secondary damage. The equipment works on every aircraft type, is quick and easy to use and is extremely durable, RESQTEC advises. This allows for a short set-up time and ensures the fast removal of disabled aircraft.

R2S single columns can lift up to 30 tons, while R2S MAXX has a maximum lifting capacity of 165 tons and combines jacks and pneumatic lifting equipment.

R2S offers a number of facilities that differentiate it from other aircraft recovery systems, Beck suggests. These include its lifting height capability, being the only such system that can lift up to 6m of height and thus handle A380 and other widebody aircraft. It can reach this height thanks to the high-pressure 10-bar lifting bags it uses and its flexible scissor-type framework, Beck explains. These features also mean that the system is very stable.

R2S's jackpoint adapter enables various aircraft to be lifted at the strongest point of the airframe. Normally used for maintenance jacks, the jackpoint adapter can be used when the wing surface area of an aircraft has been damaged, at the point where the contact bag should be positioned. R2S is one of the fastest systems of

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RESQTEC's R2S in use

its kind available in the market, Beck continues. It reduces aircraft recovery operations to hours rather than days, thus meaning no long closure times of airport runways/taxiways or even entire gateways, due to its ease of use and ability to lift in a single shot.

Finally, it is capable of following the lateral displacement of the new modern wing design without the need for special jacks.

Thanks to these advantages, "R2S is definitely a unique tool for helping with aircraft recovery, as it can work with any aircraft in any situation, and it is time-efficient as it is the fastest lifting system in the world," Beck says. "It definitely solved the lifting problem that the aircraft industry was facing."

## Training

Like AMS, RESQTEC offers its customers training on all aspects of its equipment. Indeed, RESQTEC has an aircraft recovery training centre at Ostrava Airport in the Czech Republic.

"In co-operation with our partner, Ostrava Airport, we have created a realistic training environment with excellent facilities for training any disabled aircraft recovery scenario," Beck informs. "Besides that, we also provide customised training at customers' own locations."

RESQTEC offers an Aircraft Recovery Diploma launched in May this year, which combines the RESQTEC Aircraft Recovery Management Course and the RESQTEC Aircraft Recovery Practical Course.

Its various aircraft recovery management courses include:

- Aircraft Recovery Practical Course
- Aircraft Recovery Practical Course – Advanced
- Aircraft Recovery Practical Course – Customised
- Aircraft Recovery Introduction Course
- Aircraft Recovery Theory Course

Customers who have taken one or more of these courses have included Estonia's Tallinn Airport, Beijing's Daxing Airport, Poland's Krakow Airport, Etihad Airways, Southwest Airlines, Qatar Airways, FedEx, Mumbai Airport, and USAF and North Atlantic Treaty Organization (NATO) personnel.

Furthermore, RESQTEC's team of aircraft recovery experts is always happy to help its customers and any other parties with support and advice in the case of an incident, Beck reveals. "Amongst many others, we have supported our customers following incidents in the Netherlands, Canada, Poland, Brazil and the US."

## Returning to normality

Like Ryder at AMS, Beck is now seeing a marked uptick in spending on aircraft recovery systems amongst potential customers. "The pandemic has influenced all sectors around the world, including the aviation industry," he points out.

"While we saw investments in equipment and training being delayed, postponed or cancelled, we also saw that airlines and airports all of a sudden had time to look into long-term strategic projects, rather than just focus on daily operational issues.

"In addition, airlines and airports now fully realise the impact on their operation of a closed runway or airport." This is perhaps in part because, despite the aviation industry's slowdown, "No significant decline in the number of incidents with disabled aircraft was registered by RESQTEC in the years 2020 and 2021."

Now, Beck goes on, "Following the pandemic, we see an increasing awareness [of the problems caused by stranded and disabled aircraft], with airports preparing for aircraft recovery operations as an important part of ensuring the continuity of their operation at all times.

"Thanks to that realisation, together with all the postponed investments of 2020 and 2021, we are now seeing a very strong increase of investment in RESQTEC aircraft recovery equipment and training in 2022 and for 2023."

*RESQTEC has its own training facility at Ostrava Airport in the Czech Republic*

Supporting that increase in demand will be some "exciting product launches" that RESQTEC has planned for early 2023.

**Goldhofer offers aircraft recovery assistance in ARTS form**

Memmingen, Germany-headquartered Goldhofer is well known in the GSE business for its towbarless and

conventional pushback tractors, but it also offers the industry dedicated Aircraft Recovery Transport Systems, or ARTS.

ARTS comes in the form of either single dollies that can be used in cases of minor damage to aircraft or combination systems that are used in instances of more significant damage having been sustained. ARTS-1 consists of three hydraulic platforms that are used singly or together depending on the requirements of the aircraft recovery. They are self-propelled, so can be used without the need for a towing vehicle.

ARTS-2 sees the dollies used in combination and requires a towing vehicle. Optional computer-controlled multi-way steering guarantees maximum manoeuvrability.

ARTS-3 is a turntable adaptable to various weight applications and is ideal for the recovery of aircraft with damaged landing gear. It can be used in combination with the ARTS-4 recovery dolly (for aircraft with damaged nose or main landing gear) or ARTS-6 recovery trailer (which can also be used to recover broken-down airport vehicles or GSE). Finally, ARTS-5 is a support platform for wing segments which features adjustable angles for the support of wings of various aircraft types.

*Goldhofer's ARTS combination system*

The company has been building ARTS for more than 30 years. The first recovery systems were developed from the heavy-duty modules produced by Goldhofer's transport division (which today manufactures trailers, semi-trailers and other equipment as well as heavy duty modules).

Over the years, recovery systems were also added to the portfolio designed for smaller aircraft, notes Axel Heitzer, sales and key account manager in Goldhofer's Airport Technology division. "Today, we can offer transport solutions in the event of an aircraft recovery for payloads from 12 to 600 tons," he informs. ARTS can thus handle aircraft of all sizes, right up to A380s.

Goldhofer says its ARTS systems offer "superior quality, efficiency and flexibility"; and they were "developed in close co-operation with our customers", adds Heitzer. ■

### Responsibility and preparation

In the event of a runway excursion and resultant bogging or damage to the aircraft, responsibility for the aircraft's recovery lies in the first instance with the operating carrier. It is, after all, their aircraft (although, note, that they cannot recover the aeroplane until such time as the relevant regulatory/aviation safety body assesses the aircraft with a view to understanding the reason for the excursion).

Hence, many of the big legacy airlines have specialist teams that are ready to travel to a stricken aircraft to undertake the recovery process, and have the necessary equipment stored at key hubs to support that process. Some of them are members of the International Airlines Technical Pool (IATP), a convention of airlines made up of over 100 carriers that look to share resources and reduce costs while improving operating efficiency. Under its auspices, members share aircraft recovery kits, as well as aircraft parts and tooling, ground handling equipment and manpower/facilities.

Of course, the airport operator will no doubt help wherever it can, given that is in its interest to clear the airfield for a return to full operational intensity. The cost of an aircraft recovery can be large (as can repairing it and readying it for a return to airworthiness), but the cost of a stricken aircraft impeding airport operations at a busy gateway can potentially run into the millions of dollars on a virtually daily basis. So, airport authorities have good reason to keep airfield recovery equipment on site ready for any eventuality, just as do airlines.

Moreover, some governments are keen to ensure that the necessary equipment is in place to handle any aircraft recovery quickly and safely. The Indian Government, for example, is mandating that airports have such capability in place where feasible. "But this is a slow process," AMS's Ryder points out. ■

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# Staying ahead of the snow

*Norway's Øveraasen produces a range of winter ops machinery*

A report from Maximize Market Research (MMR) estimates the value of the global airport snow removal equipment market in 2021 to have been US$2.73 billion and predicts that it will grow at a compound annual growth rate (CAGR) of 2.7% up to the year 2027. Suppliers and their customers are working hard to improve winter operations airside

Innovative snow clearance technologies include Boschung's Ice Early Warning System that predicts the future of runway conditions, and Yeti Move's autonomous snowploughs that have been supplied to Stockholm and Oslo airports.

Norway-based Yeti Move has also been running a pilot project with Telenor that uses a 5G communications solution for autonomous vehicles.

Also in Norway, snow removal systems manufacturer Øveraasen has been developing its own new products. Says CEO and managing director Thor Øveraasen: "Before New Year 2021, the very first RS 600 Performance Line left the factory in Gjøvik. By the end of September 2022 the last machine among the 12 units which were ordered was delivered to Oslo Airport."

The capacity of the RS 600 Performance Line is approximately 50% higher than conventional snow sweepers, making snow clearance more efficient, reducing costs and cutting down emissions. Just four machines of this size can clear a 3,500m runway in less than eight minutes. In addition, the machines are designed for autonomous operation. All 12 units at Oslo Airport will operate autonomously during the winter of 2022-23.

The RS 600 measures over 25m from the plough to the end of the sweeper unit. The plough itself is more than 10m wide, while the brush has a clearing width of 7.5m. The working speed of this machine is also significantly higher than any other on the market, Thor Øveraasen declares.

"The fact that runway sweepers are becoming autonomous means that both the vehicles and sweepers are fully automatically controlled. No drivers or operators!" he says.

The autonomous control system is delivered by Yeti Move. The company was founded seven years ago and Thor Øveraasen describes it as occupying the dominant position in respect to autonomy at airports.

Another recent development at Øveraasen is its RS 200 Performance Line 'Canuck': a compact version of the RS 200. The Canuck is to be used in combination with any type of towing vehicle such as tractors, smaller trucks or wheel loaders. A modular snow sweeper, it is designed especially for smaller airports that require multifunctional equipment.

The RS 200 Canuck has been designed from the same modules as the RS 200 Performance Line, using the latest developments in engine technology, hydraulics and electronics – making the

Canuck a sustainable alternative for the future, Thor Øveraasen says.

He goes on: "The high working speed, together with the cleaning width of 4m, gives the machine an astonishing cleaning capacity per hour. Several units have already been ordered and [are] successfully in operation in the North American market."

The machine's name – Canuck – is a slang term for a Canadian person.

*Øveraasen's Canuck modular snow sweeper*

### Heavy hitter

North America accounted for 57% of the snow removal market in 2021, according to MMR. Besides being home to a huge network of airports, the region also experiences heavy winter snowfall and ice deposits that must be melted regularly.

"Overall we take care of about 5,000 acres, including 3,400 acres inside the fence at MSP as well as roads outside, plus six reliever airports," says Sara Freese, director of maintenance services and asset management at Metropolitan Airports Commission (MAC), referring to Airlake, Anoka County-Blaine, Crystal, Flying Cloud, Lake Elmo and St Paul Downtown airports that MAC owns and operates besides its main gateway, Minneapolis-Saint Paul International (MSP).

As is the case elsewhere in the GSE arena, electrification of winter fleets is a growing trend as the sector aims to reduce emissions. MAC is pursuing this development, in line with its target to reduce total emissions by 80% from a 2014/15 baseline.

"We are working with manufacturers to see where we can find opportunities for our winter fleet to meet the 2030 goal," says Freese. "We have partnered with a local utility company to study our equipment and see what makes sense in terms of electrification. Of our 600 pieces of GSE overall, we've identified a sample of 100 units to start studying in mid-November."

MAC has over 250 pieces of winter operations equipment, including multifunctional units, snowploughs, brooms and blowers, de-icers and a runway light de-icing machine. It has plans to invest in its winter fleet during the next fiscal year.

At Canada's Toronto Pearson Airport, Greater Toronto Airports Authority (GTAA) is focusing on technology as traffic recovers in the wake of the Covid pandemic and the airport looks to the future.

Tori Gass, senior communications

advisor at GTAA, says: "We are closely reviewing how we can amalgamate existing data from our vehicles, ground radar, multilateration, Airport Collaborative Decision Making (ACDM), weather forecasting, Visual Docking Guidance System (VGDS), inspection reports, de-icing throughput and other key sources to provide a complete dashboard to the operations team. The 'hubbing' of this data will mean we can make better decisions about snow removal tactics and ultimately provide safer surfaces for aircraft and ground handlers."

Last season's snowfall accumulation at Toronto was 129.2cm. The gateway has more than 160 operators and direct support employees, as well as 48 seasonal operators. Its snow removal fleet consists of 35 ploughs/sweepers/blowers, 12 high-speed snow blowers, 10 chemical trucks and 20 units of small snow removal equipment; Vammas PSB & ST/SB vehicles are the most common types of machinery in the fleet.

For both Toronto and Minneapolis, the main challenge this winter relates to the supply chain for both new vehicles and replacement parts. MAC is planning further ahead than ever before so as to stay ahead of the curve, Freese says.

Another change at GTAA is the full adoption of the International Civil Aviation Organization's (ICAO) Global Reporting Format. This is "an assessment method and reporting format for runway surface conditions developed by ICAO to help provide consistent information to air crews", Gass informs. "It impacts how we report runway conditions and how quickly we need to respond to pilot reports and changing conditions."


*A snow bank at Toronto Pearson Airport*

Launched in June 2020, Boschung's ATLAS automated system fulfils ICAO's GRF requirements for runway condition reporting.

A statement at the time of the launch said: "Taking advantages of new sensors like the pavement sensors IT-RWY for runway condition detection and r-snow for snow depth measurement and snow type detection, ATLAS provide the runway condition codes, as well as the contaminant type, depth, and coverage with an unequalled accuracy and without the need for runway closure.

"With twenty-four-seven availability, the system is modular and scalable so that it can be adapted to all kinds of airports in all climate regions."

Back at MAC, "We're looking at different weather forecasting and models to shed more light on what happens here in our area," Freese reveals, noting that there have been some anomalies of late.

"The weather pattern for the last few winters has been drier than normal but a lot colder; we're seeing more snow events where


*Avinor is one of the airport operators that participated in Yeti Move's trials*

the ambient temperature is around 32°F. Heavier, wet snow tends to turn to rain, but now we're getting a dramatic increase in icing. "The long-term forecast suggests that this year could be a heavy hitter. On average we get about 54 inches [137cm] of snow in the metro area each year but this winter we could get another 20 inches [51cm] on top of that."

The typical number of call-outs at MAC's airports in the last five years has been between 25 and 30. How challenging that is to handle depends on how close together snow and ice events occur.

"If it all comes in six weeks, it's more difficult for us to move all the snow, pre-treat for icing events and prepare for the next snowfall," Freese explains. "In a good season, we get a few days' break to clear up and move snow out of the way."

### Co-ordination

Timing is key in this business. To clear Toronto Pearson's runways, snow crews must arrange a time slot to use the runway in between arriving or departing aircraft. "It is very challenging and requires intentional co-ordination of multiple stakeholders to ensure an efficient and effective outcome, and we deploy a dedicated team that ploughs and sweeps the snow to the runway's edge," Gass says.

"We work with all our key stakeholders to balance their needs against the need to provide snow-free surfaces. The co-ordination is early and often, as we meet pre-season and before, during and after every event to discuss tactics and any improvements we can make," she adds.

On the subject of co-operation between the different teams involved in winter airside operations and the pooling of the equipment they use, Lars Barsøe, vice president sales and marketing at de-icing equipment specialist Vestergaard Company, considers: "On snowy days, de-icing crews de-ice aircraft just in time to use runways cleared by the snow removal crew, so there is a lot of cooperation going on.

"At airports with ACDM, this is all co-ordinated based on prior knowledge and time stamps," he adds.

Once cleared, the snow at Toronto Pearson is melted. Due to limited space and a need to return all gates to full operation as quickly as possible, snow accumulating on the manoeuvring area is left to melt in the fields. Any snow that is exposed to the de-icing chemical glycol is melted at the airport's Central Deicing Facility.

Runway de-icing uses relatively low quantities of potassium acetate, which has a negligible impact on the environment – although airports must still adhere to guidelines regarding any effluent. Glycol, on the other hand, can severely harm aquatic life; it is the base fluid for aircraft de-icing, which, naturally, often takes place concurrently with runway snow

clearance and deicing.

Toronto Pearson's Central Deicing Facility is the largest of its kind in the world and is capable of de-icing 500 aircraft in a single day. Crews use two types of deicing spray. Gass explains: "Type 1 is a mix of glycol and water and has a distinctive orange colour. This mixture breaks the bond between frost, ice or snow and the wings of the plane. It's sprayed with force to knock the snow and ice off the plane.

"Type 4 is an anti-icing fluid that stops new ice or snow from sticking to the plane, especially when it's still snowing. This fluid is bright green in colour."

Each de-icing pad at the facility slopes from north to south, so that used glycol spray can run directly into drains connected to underground storage tanks.

These tanks have a combined volume of 15 million litres. Their contents are measured, tested and recycled for use in other markets to keep any glycol run-off from impacting the natural environment, Gass confirms. At Minneapolis, too, melters process any glycol-contaminated snow, and recovered glycol is shipped out for re-use.

## Training

Both de-icing and snow clearance staff receive training tailored to their particular functions and the equipment involved.

*Snow clearance gear in action at MSP; credit: Metropolitan Airports Commission*

While it can be possible for crews to cover some of each other's tasks, Barsøe points out that these operations normally take place at the same time, so crews are generally occupied at their own work.

At any airport that experiences snow and ice events, he says: "It is important to have a comprehensive snow plan, so that everyone knows what is going on, and then it should be trained again and again with all parties of a winter operation. Then there are better chances that operations will run smoothly."

At Toronto Pearson, for instance, training and exercising winter plans are the key to a ensuring its snow removal team is prepared and confident.

"We bring our seasonal staff in to start training in September and start exercising our equipment and practicing our plans in October," Gass says. "This builds confidence and competence for when the snow falls. Our employees are the key to our success, with dedicated professionals that understand the impact their efforts have on the airport and the experience of the passengers."

With travellers continuing to return to the skies in the wake of Covid, this is perhaps increasingly important. MAC's traffic is currently averaging about 77% of pre-pandemic levels and the airport operator has brought in its additional rental fleet and taken on a full contingent of regular and seasonal workers; its total winter ops staff now numbers 170.

According to Freese: "Every fall [autumn], once we have all our staff (many of whom will be returning from previous winters), we deliver a weekend of training. This covers security, human resources, any medical exams, Part 139 snow and ice control (requirements set out in Title 14 of the Code of Federal Regulations) and testing and training on the airfield. We also have a simulator that we sometimes use for driver training."

As a result of its divisional reorganisation, MAC will be publicising new training in the fourth quarter, covering regulatory compliance and other topics. It will also create an interconnected operations centre based on the insights gained through the reorganisation. ■

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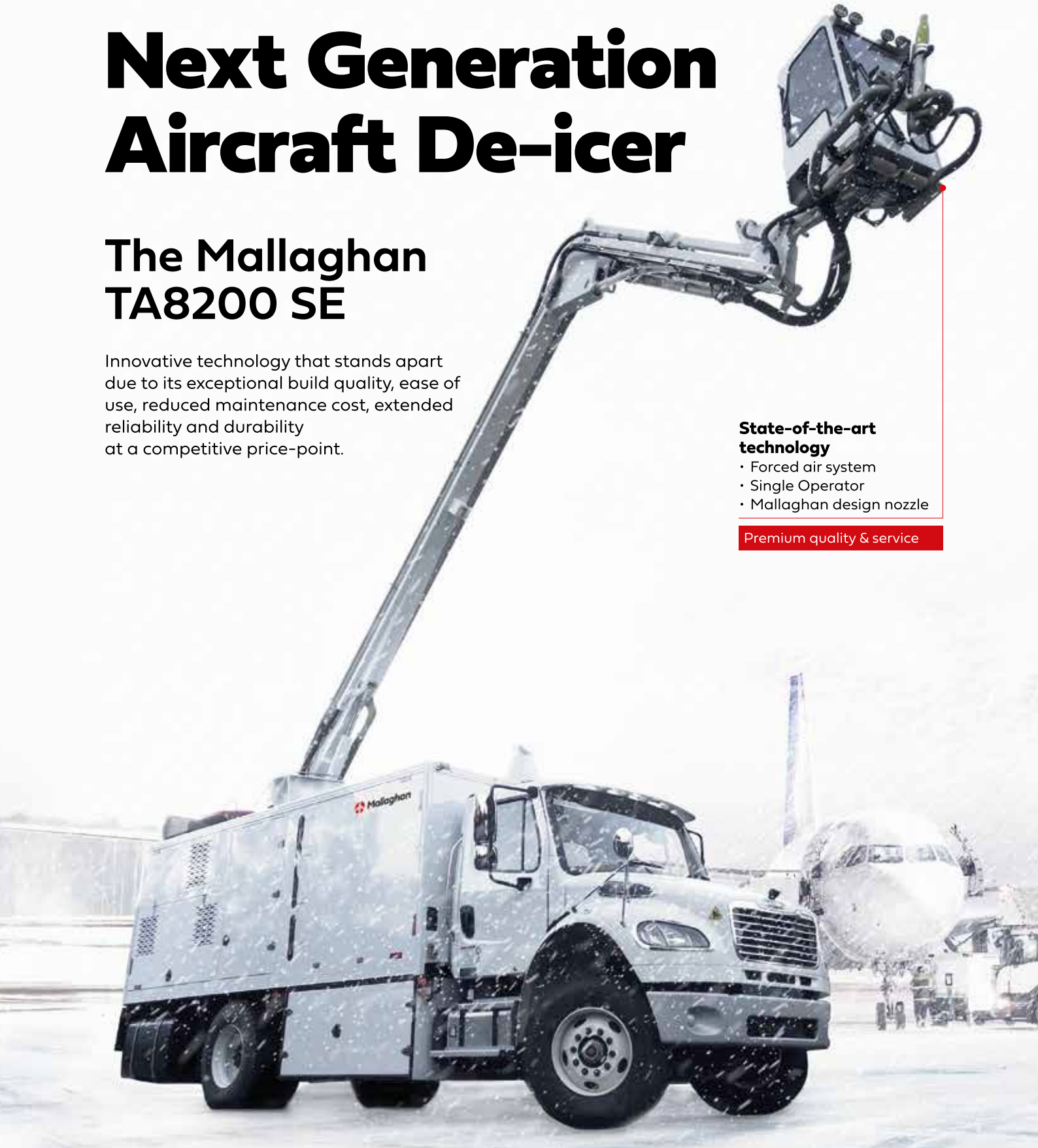


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*One of Aebi Schmidt's jet sweepers prepared for autonomous operation at Stuttgart Airport*

# Autonomous action

Aebi Schmidt Group and Stuttgart Airport have demonstrated on the apron what the future of winter road maintenance using autonomously operating vehicles might look like

In late September, Stuttgart Airport and Zurich-based, municipal and airport equipment manufacturer Aebi Schmidt demonstrated the safe operation of two autonomous runway sweepers on the German gateway's ramp.

The two autonomous TJC jet sweepers were operated autonomously in a simulated snow clearance operation; there were operators in the cabs, but they did not touch the drivers' wheels. The two autonomously operated units were joined by a manually operated vehicle in a simulation both of the safe autonomous driving and navigation of the units as well as, simultaneously, of their sweeping equipment (though, given the time of year, there was of course no snow to clear).

The vehicles were equipped with Aebi Schmidt's autonomous operations technology, and with the layout of Stuttgart Airport's airfield environment programmed into their software and precise geolocation technology plotting their exact position on that apron at any given moment, they were able to drive and simulate snow clearance operations on pre-selected routes.

During the trials carried out on 21 September on the airport's Zulu taxiway, testing of various functions took place, including driving along a specific route, interacting with other conventional winter maintenance equipment when driving in convoy, and using a snow plough, brush roller and blower according to predefined clearing methods.

The test was a culmination of many different trials of individual functions, and demonstrated just how the vehicles could work and operate simultaneously as an integrated package.

While the airport operator notes that individual components of winter service vehicles have been operated autonomously

for some time, Aebi Schmidt has now succeeded in creating a fully integrated system. Notably, both truck and sweeper are controlled via the same platform.

### High-tech

The autonomous vehicles can operate in all weathers, not an unhelpful function given their snow-clearing role. While they do not have anti-collision capability in the form of cameras, light detection and ranging (LIDAR) or similar technologies, they do not need it, explains Martin Hofmann, project lead for the SmartFleet intelligent GSE programme at Stuttgart Airport. The range of sophisticated geolocation systems that are used – more than just GPS – to calculate the vehicles' position at any given moment combine to give a positional accuracy of within 2 to 3cm, he notes, while the ground plan of the areas around pre-assigned routes is meticulously mapped and programmed into the software.

Moreover, the ramp is a carefully controlled environment, and the zone in which the vehicles would be expected to operate would always be cleared of other equipment and personnel.

Finally, the bad weather in which the vehicles will regularly operate has its impact on such anti-collision technologies that are typically used for autonomous vehicles anyway. Hofmann points out.

There is still much to be achieved before the autonomous vehicles would go into live operation at Stuttgart. Further trials might be expected to take place at other gateways to assess their viability in different locations and for further feedback to be gained.

"Once the prototype phase is completed and the vehicles are available in regular series production, Stuttgart Airport is looking forward to increasing the level of automation in its winter fleet," Hofmann confirms.

### SmartFleet

The autonomous jet sweepers are just one part of Stuttgart Airport's SmartFleet project, which is assessing the feasibility of 'autonomous commercial vehicles for safe and efficient airport operations' at the gateway.

Launched in 2019, besides Stuttgart Airport and Aebi Schmidt Germany, the consortium also includes Germany's VOLK Fahrzeugbau GmbH, which is developing an autonomous luggage tractor. The prototype for that project is currently in the VOLK workshop, as it makes further fine-tunings to the unit. Further tests of the baggage tractor are going to take place at Stuttgart over the next two months, Hofmann confirms, principally in the airport's airside baggage sorting facility. The autonomously operated vehicle has already undergone tests in a variety of operating environments, with trials in the baggage facility expected to be amongst the last to take place.

SmartFleet has been funded by the German Federal Ministry for Economic Affairs and Climate Action (formerly the German Federal Ministry for Economic Affairs and Energy) to the tune of approximately 3.9 million Euros (US$3.8 million), but the three-year programme comes to an end at the end of this year. Of course, that does not mean that development of autonomous vehicles at Aebi Schmidt or VOLK will come to an end; nor will Stuttgart Airport's interest in these cutting-edge technologies.

It will be very interesting to see just when the first items of fully autonomous GSE do go live on the apron at Stuttgart Airport. ■

*These manually operated Aebi Schmidt TJS 630 jet sweepers are seen in Dublin*

### Aebi Schmidt: the potential for autonomy

When Stuttgart Airport operator Flughafen Stuttgart GmbH launched its SmartFleet project in 2019, the authority decided to co-operate with Aebi Schmidt and VOLK on the programme – but, of course, its focus was entirely on the specific requirements of its own airport.

Independently, however, Aebi Schmidt had already been working on technologies that enable autonomous airside operations since 2017.

Crucially, "Aebi Schmidt is convinced that there will never be an off-the-shelf autonomous equipment and operation concept [for all gateways], but that it is all about adapting the technology to the particular framework and conditions at any specific airport," insists Thomas Schiess, head of group marketing at Aebi Schmidt.

"While we were able to present the first stage of our approach – our driver assistance system – to the market as early as 2020, in Stuttgart [at the recent trials] we were able to show the second stage for the first time, which includes the full integration of both the truck and sweeper," he says.

Aebi Schmidt's autonomous technology works independent of the manufacturer/brand, Schiess continues, "and enables an airport to have all its current and future vehicle and equipment fleets integrated autonomously, independent of the manufacturers".

He adds: "The technology has been intensively tested and is now ready for effective application. [In September], the press and interested parties were able to see for themselves that the fleet operates autonomously on previously assigned routes. Due to current legislation and security concepts, we still had a driver in the truck cab – but hands-off und just for emergency scenarios. We could proudly demonstrate that the fleet and equipment runs autonomously."

As for the future: "We are continuously developing our technologies. The next steps will largely depend on whether interested airports succeed in convincing their stakeholders of [the value of] autonomous operations." A regulatory framework will also have to be put in place.

"In any case, the technology is ready and so is the interest of quite a few airports," Schiess observes. "We have learned from decades of experience at airports that autonomous operations are not only more efficient and cost-effective, they also allow mission-control managers to react more flexibly to changing situations, thereby contributing to greater safety and lower emissions." ■

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*The new COBUS Hydra*

# Apron bussing is going green

As with so many types of GSE, there seems to be an unstoppable trend towards electric equipment when it comes to those all-important apron buses that carry passengers to and from airports' remote stands. Many of the established apron bus manufacturers now offer dedicated electric variants of their traditional diesel buses, while specialist electric vehicle suppliers are now eyeing the aviation space as a market

Wiesbaden, Germany-headquartered airport bus specialist COBUS Industries gave visitors to its stand at the GSE Expo Europe show in Paris in September a taste of two new, innovative apron bus models.

The first was an early example of what is expected to be a new line of electric buses. The model is called COBUS Vega, named after the star that is amongst the brightest in the night sky. The Vega line will complement the existing range of electric e.COBUS vehicles that were launched in 2016 and which will continue to be marketed and sold alongside the new Vega class of buses.

The fully electric Vega bus has a completely new chassis and, while it has the same external dimensions of an e.COBUS, it has additional passenger carrying capacity due to a change in the layout at the front of the vehicle around the driver's cabin; as such, it is being marketed as the world's biggest airport bus by passenger capacity.

It retains the same level of comfort as that enjoyed by passengers travelling to and from remote stands on e.COBUS vehicles, however. While the chassis is the same size as that of the e.COBUS, the COBUS Vega features other design changes that include a fourth door on the front right-hand side of the vehicle (adding to three extra-wide doors on both sides of the bus).

The COBUS Vega incorporates new battery technology from COBUS minority shareholder Daimler Truck. Either two, three or four lithium-ion NMC3 battery packs will be carried, depending on customer requirements – if the bus is working in particularly hot or cold climates, more battery power may well be required to run either air conditioning or heating units, for example.

Two COBUS Vega prototypes, including the one on the COBUS stand, are

currently in Germany in preparation for intensive testing and Laila Engler, the company's head of marketing and sales manager, confirms that COBUS hopes to be rolling out the first fully operational Vega model for sale in 2024.

### New constellation

Also cause for discussion on the COBUS stand in Paris was news of an all-new COBUS Hydra hydrogen fuel cell-powered airport bus line that is currently in the final development stage. The Hydra brand continues the star-based theme for the bus supplier (Hydra is a constellation – the largest in the sky), as well as offering a nod to the hydrogen-based nature of its power source.

While COBUS Hydra represents the world's first hydrogen fuel-cell powered apron bus, the hydrogen fuel cell – a Toyota fuel cell stack – that will power the Hydra is already proven in bus operations, confirms Engler. Daimler Truck has a minority share in COBUS Industries, but the majority shareholder is Portugal's Salvador Caetano Group; Caetano's primary shareholder is Toyota, hence the tie-up with the Japanese industrial giant. Meanwhile, CaetanoBus also offers a hydrogen fuel cell-powered bus of its own.

The COBUS Hydra is based on the e.COBUS 3000 vehicle design but its fuel cell will give it a range of 400km hydrogen without top-up. A refill takes less than nine minutes at an optimal charging station, while the water that is created as a by-product of the process that generates the bus' drive power can be collected for later use.

Engler is hopeful of a COBUS Hydra prototype being ready for testing next year.

With the Vega and the Hydra added to the already extensive range of battery-powered e.COBUS and diesel COBUS vehicles, there will be an ideal design for any airport operator looking for low-floor airport buses, she states.

Moreover, as well as those looking to purchase new vehicles, COBUS also offers the capability to retrofit customers' existing vehicles to more environmentally friendly options – a service called e.START. For example, those customers that want to continue to use conventional diesel engines for the moment might choose to move to battery or hydrogen fuel cell power packs at some point in the future, something that COBUS can undertake as and when required.

### After-sales and training

COBUS places great emphasis on the services it offers around the physical element of its buses. Thus, for example, it offers a range of financing and rental options for customers, while the COBUS Service Team provides a wealth of factory overhauls and refits as well as spare parts for customers.

A new service known as REAL – short

for Remote Expert Assistance [for] Life – enables those who are looking to maintain or repair their own COBUS vehicles and who have the appropriate virtual reality (VR) glasses to be tutored as to what work they might need to perform using the state-of-the-art VR equipment.

REAL complements COBUS's dedicated online service platform that includes numerous manuals, details of warranties and possible maintenance programmes for customers to access digitally.

Finally, the company also recently launched a COBUS Academy to step up its training offering. Trainees can receive instruction digitally, at COBUS's facilities or at their own place of work.

### Mallaghan's i-tec innovation

Dungannon, Northern Ireland-based GSE supplier Mallaghan is developing an innovative range of electric ground support equipment under its i-tec brand, amongst which is its Árbus electric airport bus.

This vehicle can carry up to 118 passengers in comfort and features hydraulic front steering, pneumatic, regenerative braking and pneumatic suspension, with kneeling available on both sides of the vehicle. Driven by a 250kW Automated Magnet Motor, the Árbus is available in five battery capacity configurations for different customer requirements.

The vehicle was introduced at the end of 2021 with Ryanair as its launch customer. Tadej Podgrajšek of Mallaghan's Airport Bus Sales Division explains that the electric Árbus has been "warmly received by the market", not least because it offers an "operational solution for any size of airport, large or small".

Of particular note is the fact that there is no requirement for any special electrical infrastructure and the electrical power sockets required for bus charging can be the same as those utilised for some other electric GSE equipment. Thus, there is no need for additional investment into growing power grids to make 100A+ available – which means airports and operators can avoid extra costs by using Mallaghan electric buses, Podgrajšek notes.

He is fully expecting Mallaghan's emphasis on environmentally friendly GSE to only gather momentum. "With public statements from airports and airlines [promising] to reduce carbon emissions within aviation over the next 10-20 years, we anticipate our focus shall pivot from manufacturing diesel buses to electric buses within our target markets over this same period," Podgrajšek says.

In fact: "We are confident that electric buses will soon replace the majority of diesel buses within the UK, EU and North American markets over the next five years. For this very reason, we anticipate our sales and production focus shall move from diesel buses to electric throughout this period.

"For this reason, both the European and North American geographical zones are of primary focus [to us], since these regions are at the forefront of green initiatives to reach stated 'net carbon zero' targets."

Mallaghan has plans to further develop the environmentally friendly Árbus. Podgrajšek explains: "From our first Gen I range of electric buses we are already developing our Gen II model to include improved passenger capacity and other technical innovations."

Furthermore: "We are currently developing a future version of the drivetrain for our electric buses to further increase the performance advantages that we offer today. More exciting innovative news from Mallaghan is to be announced soon," he confirms.

Future developments will build on a vehicle that has been well received by the industry. "We have had very positive feedback to date" on the electric Árbus, Podgrajšek informs. "Our airport buses (both diesel and electric) are earning a market reputation for all the [same] positive reasons as our other GSE products – technical innovation, high quality, reliability and ease of use and maintenance.

"These are the features that Mallaghan has become renowned for and this typifies the feedback we are receiving from our bus customers."

Mallaghan continues to offer its diesel-powered Árbus 50W model alongside the electric version. And, in general,

Podgrajšek notes: "Demand for airport buses is recovering very well but we don't expect it to be back to 100% normality until passenger recovery figures reach 100% or more."

### Quantron: a dedicated electric offering

Augsburg, Germany-headquartered Quantron is a specialist in what it calls 'e-mobility', and its product portfolio takes in electric trucks and transporters of various kinds, including buses.

As might be expected, the company is rapidly developing its product offering, including those vehicles that it sees as ideal for the airport bus market. Alexander Stucke, head of sales bus at Quantron, advises: "Our product portfolio for the aviation industry has broadened quite a lot. In the LCV [light commercial vehicle] sector, our retrofit QLI Light range has been expanded and we can offer vehicles from 3.5 to 7.2 tonnes for different applications.

"Plus, we have launched our 12m Cizaris electric vehicle as a low-floor bus. This bus is ideal for airport operation due to its flexible seat layout and availability of a three-door version. With the different

*Quantron's Cizaris 12 electric bus*

battery options available, we can also easily adapt the vehicle to the range that is needed for the customer's specific operation."

While Quantron does not as yet offer vehicles that are designed specifically and only for the airport market, "We are also deeply looking into fully adapted airport buses – though in this area we are only in pre-market study," Stucke notes.

That potential evolution is being stimulated by the fact that Quantron has received some "really good, detailed requests for proposals for buses that are suitable for airports", he says. "Regarding LCVs in the aviation sector, we have had some requests but it seems that airports are concentrating more on people-transport."

The requests for proposals relating to airport buses are also illustrative of a general recovery in demand for buses that Quantron is now seeing, Stucke suggests. "The pandemic has for sure delayed some investments in eGSE (electric ground support equipment), but we see growth coming up," he says. "Green purchasing requirements will not stop at the airport fence. ebuses will be the future on-airport for sure. And yes, Quantron is prepared to meet the challenge [for electric bussing] at airports as well."

Conversion of older diesel buses to electric by Quantron is a possibility but the financial viability of such an adaption is unlikely in most cases, Stucke says. "It is really down to the business case for each request, with comparison of retrofit and new.

"We have decided to concentrate on new buses, with the big advantage that the unit is then really built from the ground up as electric and so the batteries or even hydrogen fuel cell can be integrated totally differently.

"Also each bus is different and does need a new adaptation in both hardware and software. So the value of modifying an old bus considering the cost of conversion is likely to be very limited," Stucke concludes. ■


*Textron's new TUG Endurance baggage tractor*

# Textron launches new capabilities in Paris

GSE supplier Textron GSE has launched a new TUG Endurance™ baggage tractor and introduced its innovative Intellimix™ technology to its Safeaero 220 de-icer

In September, Textron GSE announced the launch of its new TUG Endurance baggage tractor. The vehicle was unveiled at the GSE Expo Europe event held at Le Bourget in Paris in the middle of the month.

The TUG Endurance has a modular design that is said by the manufacturer to prioritise performance, safety, ease of service and sustainability. It is available with either a forward cab or aft cab driving position, with the driving compartment designed and built to offer comfort as well as safety, including "superior visibility". It also comes with an electronic parking brake.

As well as gas/petrol and diesel variants, the TUG Endurance is also available in a lithium-ion battery powertrain model that incorporates General Motors (GM) and Powertrain Control Solutions (PCS) technology. This powertrain was, says Textron, "specifically designed in collaboration with Textron GSE to withstand the rigours of ground support applications".

In this variant, the high-capacity lithium batteries together with the GM and PCS driveline offer extended operational use without need for charging. The vehicle is also capable of DC fast charging – plus, it can be opportunity-charged as operations demand.

Each variant's drivetrains are designed to be interchangeable, so that operators can upgrade gas/petrol and diesel models to lithium battery power at any point in the future as airside electric charging infrastructure becomes more commonplace.

TUG Endurance models feature electronic steering that offer a level of

high manoeuvrability, and they have a drawbar pull of up to 6,000lbs (2,722kg).

Bolt-on panels with easy access to major components, as well as Bluetooth-enabled remote diagnostics capability, make for easy serviceability. Various options on the unit include inching controls; cab-door variants; LCD display; heating, ventilation and air conditioning (HVAC); and back-up alarm. Autonomous control systems are also built in to the vehicle to position the platform for potential technological changes of the future, Textron informs.

"Built on a foundation of customer insights and future-facing technology, the new TUG Endurance baggage tractor was developed to provide a new level of efficiency to customer operations," says Matt Chaffin, vice president and general manager at Textron GSE.

Of the lithium-ion battery-powered model specifically, he notes: "The collaboration with GM and PCS has enabled us to utilise decades of proven leadership in high-capacity lithium technology and leverage its advantages for ground support equipment."

The TUG Endurance's lithium-ion drivetrain adheres to automotive-based testing and standards, and constantly checks for conditions such as ground faults and disconnections. It includes a manual safety disconnect for lock-out/tag-out procedures.

Travis Hester, vice president of EV [electric vehicle] growth operations at GM, comments: "Our ongoing collaboration with PCS and Textron GSE underscores GM's commitment to extending the performance benefits of electrification to a wide range of applications, which is helping many other industries to achieve their own emissions targets in the process."

And Dan Boucher, president of PCS, observes: "It is exciting to see the TUG Endurance bring advanced propulsion technology to the ground support industry.

***Textron GSE is always looking for ways to enhance its products and position them for the future***

***Matt Chaffin,***
*Textron GSE*

"This technology, after decades of refinement in the automotive space, was integrated with the focus of enhancing safety, efficiency and reliability on the ramp."

### Growing demand for green GSE

Chaffin tells *Airside* that Textron has seen increasing demand for an electric baggage tractor, and indeed for electric GSE in general, over recent times. "Given the drive towards sustainability and the associated benefits of operating electric equipment, customers are eager to learn more so they can understand the opportunity to integrate electric technology into their operations," he reveals.

One of the advantages of Textron's collaboration with GM and PCS, he says, is that TUG Endurance models have been built to leverage automotive charging technology. This means that an operator can charge the tractor utilising a J1772 connector up to level 2 charging or with a DC fast charger.

A level 1 charger enables the TUG Endurance to be plugged into any outlet and the DC rapid charger – which is widely used in the automotive world – can charge the TUG Endurance tractor in less than two hours. As support vehicles such as trucks, airport buses and high lift equipment transition to electric platforms, automotive charging will become commonplace in airports around the globe, Chaffin points out.

As for the possibility of expanding the GM and PCS technology into other Textron GSE in the future, he remarks: "Textron GSE is always looking for ways to enhance its products and position them for the future. The collaboration with GM and PCS enables us to explore synergies of the technology and opportunities to electrify other categories of equipment."

### Ideal time

According to Chaffin, based on the annual tractor sales cycle, the GSE Expo Europe in Paris represented an ideal time to introduce the new baggage tractor to customers. Textron hopes to go into production on the unit in the second quarter of next year.

The TUG Endurance received a lot of interest at the show, he recalls. "Its overarching value proposition includes many features that were developed based on direct feedback from customers. Attendees were excited that the TUG Endurance is a heavy-duty baggage tractor and were interested to learn more about the automotive high-capacity lithium technology.

"The GM and PCS technology has been integrated specifically for ground support applications. The electronic parking brake and autonomous-ready control systems were also of interest because TUG Endurance models have been developed with future technology advancements in mind."

Of the potential customer base for the vehicle, he explains: "All TUG Endurance baggage tractors have been designed for the global market. With a modular design it allows customers the option of cab forward or cab aft driving positions, which is typically dictated by geographical region.

"A diverse range of drawbar pull also allows TUG Endurance models to be used at both small and large operations. TUG Endurance models are CE-certified and meet SAE and IATA requirements."

CE stands for Conformité Européene, or European conformity. SAE International, formerly called the Society of Automotive Engineers, is a US-based, globally active professional association and standards developing organisation for engineering professionals in various industries, while IATA is the International Air Transport Association trade body that represents air carriers.

### Intellimix for the Safeaero 220 de-icer

Also attracting interest on the Textron stand in Paris was confirmation that it has made its Intellimix de-icing technology available on its Safeaero 220 single-operator de-icer.

Intellimix technology optimises the de-icing process by "delivering the perfect blend of heat and fluids", Textron says. In traditional de-icers, fluids are mixed and heated on the vehicle's chassis and then pumped up the unit's boom for spraying. This process requires fluids to be flushed between aircraft de-icing procedures as the ambient temperature changes, in order to ensure that the correct fluid mix is deployed.

Fluids are typically flushed when the ambient temperature drops and a higher concentration of type 1 de-icing fluid to water is required. In traditional de-icers, purging is necessary to flush fluids from the tank to the boom, to ensure

> ***Intellimix technology enables us to increase our customers' operating efficiencies while strengthening our commitment to sustainability***
>
> ***Matt Chaffin,***
> *Textron GSE*

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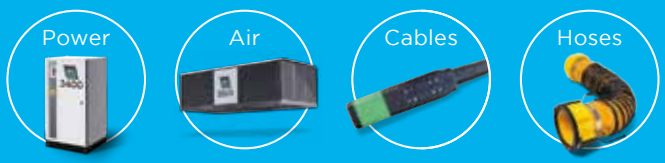


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*Textron offers Intellimix technology for its Safeaero 220 de-icer*

the right mix is utilised based on the ambient temperature. This process can be expensive and unproductive, and releases excess chemicals into the environment, Chaffin notes.

"Intellimix technology delivers efficiency to the de-icing process because fluids are heated in the chassis, but not blended until they reach the nozzle," he explains. "In traditional de-icers, mixing occurs at the chassis, earlier in the process, and if temperatures change, fluids cannot be used and must be purged which adds more time and cost to the de-icing process."

Intellimix eliminates the need to flush fluids, lowering operating costs, increasing productivity, enhancing safety and reducing environmental impacts, Textron declares.

The technology was developed because of specific customer feedback asking for the benefits it brings, Chaffin confirms, and the general need for solutions that drive efficiency to their operation.

It was designed specifically for the Safeaero 220, which also offers its users the efficiencies of one-person driving, manoeuvring and de-icing all from the cab. Its features include an extensive operational radius and compact size, stainless steel tanks, four-mode nozzle control system, automotive steering and a collision warning system.

"Intellimix technology enables us to increase our customers' operating efficiencies while strengthening our commitment to sustainability," comments Chaffin. "The Safeaero 220, equipped with Intellimix, is designed to exceed customer expectations and offer superior performance when time matters most."

Intellimix technology garnered a lot of interest from attendees who visited the Paris GSE Europe Expo, he continues. "Customers are eager to learn more about products that will enable them to operate more efficiently and sustainably."

Development of Intellimix began just prior to the Covid pandemic, which delayed the launch timeline, but the technology will be in production for the 2023 de-icing season. It will be a feature on all future Safeaero 220 models, although – due to the design of the technology and how it is engineered into the de-icer – Intellimix technology will not be offered as an after-market solution for existing vehicles.

As well as baggage tractors and de-icers, Textron GSE offers a diverse range of conventional and towbarless pushbacks, belt loaders, ground power units (GPUs), air start units (ASUs) and air conditioning units (ACUs). Textron GSE operates as part of the Textron Specialized Vehicles business. ■

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# A change at the helm at ITW GSE

In a change that was effective as of 1 September, Poul Elvstrøm has become the new vice president/general manager at ground power unit and pre-conditioned air unit supplier ITW GSE

Elvstrøm has been with ITW GSE for nearly 25 years, having joined the business in 1998, and will likely already be well-known to *Airside* readers from his achievements in his previous role as vice president global sales & marketing for ITW GSE.

In that role, Odense, Denmark-based Elvstrøm helped bring together into one division the various businesses of previously separate GSE suppliers Hobart, AXA Power, Trilectron, J&B Aviation and Houchin.

He has replaced Henrik Olsson, who decided to step down as vice president/general manager (VP/GM) but will retain a reduced set of responsibilities with ITW.

David Feuga, who had been based in ITW GSE's Dubai branch office, became global sales director on 1 September, and he has taken over Elvstrøm's responsibility for global sales and marketing. (ITW GSE has two manufacturing facilities: in Palmetto, Florida, in the US, and at Odense in Denmark. It also has branch offices in Dubai and Singapore, and is supported by more than 100 distributors around the world.)

## Looking ahead

His promotion did not come as a surprise, Elvstrøm tells *Airside*. His move to the position of VP/GM had been planned for some time, with the requisite preparations being made both by himself and Olsson. The question as to 'when' had not been exactly determined,

but Elvstrøm had worked towards this promotion for some years with the ITW corporate leadership team, he says.

In his new role, Elvstrøm is accountable for all matters – operational, financial (full profit and loss responsibility), human resources and so on – across all of ITW GSE. He reports to the executive vice president, speciality products, at ITW's headquarters in Glenview, Illinois, in the US. ITW GSE's parent company, Illinois Tool Works (ITW) is a US$14.5 billion multinational business. It manufactures a wide range of advanced industrial technology and has 82 business divisions and operations across 52 countries, employing approximately 45,000 people.

Elvstrøm is looking to the future, but he is also fully cognisant of the fact that the aviation industry remains in "an unprecedented situation". While the sector has suffered other shocks and huge downturns in fairly recent times in the form of such crises as 9/11, SARS and financial crashes, the impact of the Covid pandemic has differed both in severity and in duration, and its effects are still being felt.

"We can be very happy that passenger numbers are rising quickly and, on some domestic routes in the US, passenger load factors are even above what they were pre-pandemic," Elvstrøm says. The US market has picked up especially well but, "As a global player, we can certainly see that not all aviation markets have recovered." In particular, he points to the usually huge number of passengers flying into and out of China – where, today, international travel remains severely curtailed.

Another problem that the industry is facing right now, and one that also has an impact on demand for GSE such as GPUs and PCA equipment, is that the recovery in demand for flying capacity seems to have caught some carriers on the hop. Notably, many airlines now find themselves short of staff to operate the aircraft they have at the desired increased operational intensity.

Some ground service providers (GSPs) are facing the same problem, but they typically require less time to train new staff members, Elvstrøm observes, so they perhaps face less of a long-term issue in this regard.

So, while there is certainly plenty of cause for optimism for the industry's ongoing recovery, Elvstrøm's first priority will still be to see ITW GSE through what is left of the hard times caused by the pandemic, with its unwanted effects on the aviation sector and consequent impact on demand for GSE.

### The transition to electric

Another major priority will be to meet the increasing demand for both mobile and greener GPUs, Elvstrøm confirms. ITW GSE is very well set to do just that, he advises.

For example, it already leads the market

in offering a comprehensive range of battery-powered GPUs, Elvstrøm notes. Right from its 28V DC eGPU available for small propeller-driven aircraft and helicopters up to its 90kVA for narrowbodies and 180kVA for widebodied aircraft, there is a battery-powered ITW GSE GPU for all applications, he says.

And demand for such units is certainly ratcheting up, he observes. In May of this year, ITW GSE celebrated moving its 100th battery-powered 400Hz, 90kVA eGPU off its Odense production line. Those 100 units had been sold in the few years since 2018; yet by as early as January next year, Elvstrøm believes that the company might have shipped 200 of them. Demand for battery-powered GPUs is growing fast – "there is real acceptance in the market now" for such green power units, he stresses.

The biggest sticking point holding back eGPU sales has simply been the same thing that has held back conventional diesel sales – the impact of the pandemic on the aviation industry and on the budgets of purchasers of GSE such as GPUs. But, as we have already seen, that picture is becoming much rosier. American and European airlines in particular are today investing heavily in new equipment such as GPUs, Elvstrøm says.

One way round a temporary shortage of funds – and while American airlines, amongst others for example, are today investing in GSE, they like most other carriers are short of available capital – is to lease rather than buy. As a consequence, perhaps, ITW GSE has seen a significant rise in acquisitions of its GPUs through leasing specialists such as TCR and HiSERV. Power-by-the-hour is another option for those operators looking to rein in their costs as much as possible in the short term. In fact, Elvstrøm estimates that approximately 45% of deliveries of its mobile eGPUs are now being acquired on lease or on power-by-the-hour terms.

Of course, there are limits to the speed at which the transition to electric will take place. In particular, a large proportion of airports do not yet have the relevant


***Poul Elvstrøm** is now ITW GSE's vice president/general manager*

charging infrastructure in place. "The battery-powered technology is here, the [GPU] equipment is available, but there is still a real need for sufficient airport charging infrastructure," Elvstrøm insists.

"Airport operators play a significant role in making this transition [to electric] process possible. So we need more communications between airlines, handlers and airport operators on this issue."

Another sticking point is obvious: GSE operators will generally only replace old diesel models with new battery-powered equipment when the time has come to phase out the old. Thus, the period of transition will necessarily be a prolonged one. Notwithstanding, Elvstrøm is expecting that between 20 and 25% of global demand for GPUs next year will be for the battery-powered kind.

There are also positive drivers to the process. Adding to the general pressure on operators to move to more environmentally friendly operations, there are sometimes financial incentives to do so. Some US states, for example, offer funding for those companies investing in greener equipment – California's Clean Off-Road Equipment Voucher Incentive Project (CORE), is one such – and Elvstrøm points to more and more of these sorts of incentives being put in place. Indeed, he confirms that many of ITW GSE's recent eGPU sales to US customers have been specifically assisted by such incentives.

## Delivery

Elvstrøm expects to build on the strength and success of ITW GSE's past history and he believes the company to be exceptionally well positioned for the future. In part, this is because – alongside the two ever-critical factors of price and capability – operators are now basing their selection of which GSE manufacturers to work with on the question, 'Who can actually deliver?'

ITW can do that, thanks in part to having a strong and stable supply chain at a time when delivery lead times can otherwise be worryingly long, as well as to the fact that it offers products based on simple designs that share numerous common components. Thus, for instance, all ITW GSE's GPUs share a common user interface and control board, cutting down on unnecessary complexities that might create bottlenecks in a supply chain and lessening the number of different parts that have to be supplied to produce any given GPU machine. This commonality also minimises training requirements for operators.

In fact, ITW GSE has historically operated on a 'common platform' concept, when new product designs are not created from scratch, but built around the common designs of their predecessors. "That is a strength for us that also helps in relation to sourcing parts and raw materials," Elvstrøm points out.

The fact that ITW GSE did not release any of its staff during the pandemic also means that it still has the skilled human capital in place to ramp up production to meet growing demand.

They are going to be needed. In pre-pandemic times, ITW GSE hit a peak sales figure of 2,500 GPU and PCA units; next year, Elvstrøm expects that figure to be in the region of 2,300 – a highly creditable figure given that the China market remains in the doldrums and the Ukraine war has meant a collapse in the Russian market too.

The future, then, is bright, not least in terms of the transition that we are seeing towards battery-powered GSE. Elvstrøm believes ITW GSE to be at least a couple of years ahead of its peers in this regard and, always looking down the road, is already investigating the potential for options such as hydrogen fuel cell technology, as the business looks to build on past success and continue to grow year on year. ■

# Demand rises for AVIACO electric retrofits

Partners AVIACO and XYZ Dynamics are working together to offer GSE operators a green and cost-effective service to convert their diesel GSE to battery power


*AVIACO showed off its 100% electric pushback tractor at the recent GSE Expo Europe show at Le Bourget in Paris*

Last year, *Airside* reported on the launch of a partnership between GSE leasing, maintenance and fleet management specialist AVIACO and Eindhoven, Netherlands-based XYZ Dynamics, a specialist in retrofitting vehicles to electric powertrains (https://www.airsideint.com/issue-article/aviaco-and-xyz-dynamics-co-operate-on-electric-gse-conversion-option/).

Together, the partners offer GSE operators the option of converting their conventionally powered equipment to a sustainable battery-powered configuration. And demand for that service is taking off quickly, informs Danny Vranckx, AVIACO's CEO.

XYZ Dynamics has already converted both a set of passenger stairs and a pushback to battery power (either lithium-ion or lead-acid options are available) and these have been demonstrated at locations including Spain's Valencia Airport and Belgium's Brussels South Charleroi Airport.

Orders are coming in from operators such as Rome's Fiumicino Leonardo da Vinci International Airport, while carriers like Ryanair and handlers like Aviapartner are also showing an interest, says Vranckx. In fact, he notes, "Everyone that is seeing the new offering has been saying 'wow'.

"This is the start of something big," Vranckx believes, the combined AVIACIO/XYZ Dynamics offer being a "win-win" for those looking to operate environmentally friendly GSE without incurring the cost of new battery-powered equipment.

The drive towards green GSE is gaining even more momentum in the post-pandemic environment, Vranckx points out. And the conversion offered by the partners is incredibly cost effective compared with the price of new electric units. Furthermore, AVIACO's rental option is seeing great demand in a GSE market that, while recovering quickly, is still "short of money" for new vehicle purchases.

For the moment at least, AVIACO is concentrating on offering retrofit options for GSE used to service narrowbody aircraft specifically: belt loaders (such as TLD, MULAG and EINSA models); self-propelled passenger stairs (such as TLD, JBT and EINSA models); pushbacks (such as TLD and Goldhofer/Schopf models); and baggage tractors.

These are not the only types of GSE that might be converted in the future, though. Alex Pap, one of the co-founders and CEO of XYZ Dynamics, points out: "We get a lot of requests for other types of equipment as well. One of the core strengths of the partnership between

AVIACO and XYZ Dynamics is our ability to quickly anticipate customer demands.

"XYZ Dynamics has a wide range of knowledge of electric drivetrains and integration in existing vehicles, while AVIACO knows what our customers need thanks to its long-valued experience."

Conversions can be undertaken at a customer's own facilities in a process that takes as little as three days and avoids any transport costs, as well as at XYZ Dynamics or AVIACO facilities; another option is for the retrofit to be supplied in 'kit form', with the customer undertaking the conversion itself. This is by no means as challenging for the operator as it might sound, says Vranckx, because thanks to some very clever engineering, the XYZ Dynamics electric driveline and battery power pack can be installed onto the same brackets that are found in conventionally powered GSE units.

Training is then provided on the converted GSE as required. ■

## Environmentally friendly and cost effective

While converting GSE to electric power clearly benefits the environment in terms of the harmful emissions that are otherwise produced by equipment powered by conventional internal combustion engines (ICEs), the battery-powered retrofits offered by AVIACO and XYZ Dynamics also offer significant cost savings, Vranckx notes.

In terms of operating costs, time spent in maintenance and repairs is lessened because AC battery power produces less wear and tear than, say, a diesel engine does. AVIACO and XYZ Dynamics estimate that there is a minimum of a 35% financial saving to be made in terms of the greater reliability of electric drivetrain and lower preventive maintenance requirements as compared to traditional ICE-powered equipment. The operational lifetime of battery-powered GSE is also likely to be longer, the partners posit, while of course battery-powered GSE also burns no fuel at the point of use, thereby saving on diesel costs.

Equipment downtime is also typically lower, while system diagnosis can be undertaken remotely to facilitate smart fleet management. ■


*The Aurrigo Auto-Dolly with ULD*

# Aurrigo floats for growth

UK-based transport technology innovator Aurrigo has floated on the London Stock Exchange. The funds raised are expected to finance significant growth and development for the company and a number of its products

On 15 September, Coventry, UK-based autonomous transport technology specialist Aurrigo International listed on the AIM market of the London Stock Exchange (LSE), as it raised funds to expand its product development and testing programmes. AIM is a sub-market of the LSE that provides a market for small and medium-sized companies looking to grow.

Miles Garner, Aurrigo's sales & marketing director, spoke to *Airside* on the day of the initial public offering (IPO). He reports that £8 million (US$9.1 million) was raised, 40% of the value of the company. The remaining 60% for the moment remains in the hands of David and Graham Keene, brothers who founded the business 29 years ago.

The company had looked at all the possible options for attracting further investment to grow, says Garner, but the owners decided that the best option would be an IPO. The process of listing on the LSE began as far back as November 2021, with the shares actually going live on the market at 08.00 on 15 September 2022.

David Keene, CEO of Aurrigo, comments: "An AIM IPO represents a significant milestone for Aurrigo and provides a platform to fulfil our potential whilst making a meaningful difference to airports, airlines, passengers and cargo around the world."

He adds: "The global transportation market is ripe for disruption. Aviation has significant structural constraints, with decades-old technology/equipment and labour shortages hampering its recovery from Covid-19 and its long-term growth prospects.

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*Aurrigo's* ***Miles Garner***

"Our innovative, autonomous technologies are ready to revolutionise airport ground handling of baggage and cargo."

## Auto-Dolly

The funds raised by the IPO will be used in large part to support the further development of Aurrigo's Auto-Dolly® product, an autonomous vehicle for moving passenger bags and cargo at airports.

As reported in *Airside* last year (see https://www.airsideint.com/issue-article/aurrigo-launches-innovative-autonomous-auto-dolly/), an electric Auto-Dolly can navigate autonomously, moving from one task to another, being available for picking up and then dropping off bags or cargo without the need for any human operators.

Moreover, an Auto-Dolly is designed to be able to move baggage or cargo in either interior or exterior airport operating environments in all weathers. All-weather operation is enabled by "weather-hardened sensors and innovative software processes" that allow the machine to operate in snow, heavy rain, direct sunlight and fog.

Initially, the new capital will be used to finance a big increase in headcount on the Auto-Dolly project, says Garner, particularly electronic and software engineers. In fact, more than 50 jobs are to be created at the company in the UK and at overseas sales and technical offices in North America and the Far East.

These new posts will help the company as it progresses the testing of the Auto-Dolly currently taking place at Singapore's Changi Airport, as well as allowing a scale-up in the intended production run of the unit. Testing in Singapore – where Aurrigo has been working with airport operator Changi Airport Group (CAG) and the Civil Aviation Authority of Singapore (CAAS) via a joint UK/Singapore government grant-funded programme – has gone well, Garner reveals.

Aurrigo has been on the ground at Changi since October 2021 and currently has an office at the airport's Terminal 2 and a team of engineers supporting trials of both the Auto-Dolly and its Auto-DollyTug® unit (of which more below). "It's been a good demonstration of the technology," says Garner, and, with the re-opening of the airport's Terminal 4 in mid-September, more testing will be carried out.

Tweaks have been made to the vehicles as a result of the testing, but there has been no need for any major changes, Garner asserts. As for the future, Aurrigo is currently in conversation with a number of potential operational users of Aurrigo technologies around the world, he says, adding: "They are very interested in this tech from us."

## Simulator

The additional funds accruing from the public listing of the company will also support the further development of Aurrigo's Auto-Sim® simulator, which is "a digital twin modelling tool" for airports, Garner explains. It is a proprietary, sophisticated cloud-based

tool that can be used by airports, airlines and ground handling companies to model a business case for the deployment of autonomous Aurrigo vehicles, including the Auto-Dolly and the Auto-DollyTug.

The Auto-DollyTug is another autonomous unit, this one being designed to carry a standard aviation baggage container – a ULD – or loose bags like the Auto-Dolly product, but with the added benefit of being able to tow an additional three conventional baggage dollies. The vehicle can be driven manually or operate fully autonomously.

Auto-Sim can also be used for the simulation of all other currently manually driven airside vehicles and operations, and Garner believes its potential benefits to customers are both varied and significant. It has been demonstrated to various potential customers, one recent interested party being Grand Rapids Gerald R Ford International Airport in Michigan, US, and has attracted plenty of interest elsewhere as well, Garner says.

*The Aurrigo Auto-Dolly*

Another product developed and being manufactured – like all of Aurrigo's – from "the ground up", is the Auto-Cargo® vehicle. This is the "big brother" of the Auto-Dolly, says Garner, and is intended to be able to carry a standard cargo pallet while also towing a standard cargo trailer, thereby replacing the existing 'dockside truck' and two-dolly combination commonly used at airports.

"This is a very exciting time for us and for UK innovation more generally," says Garner, noting that the investment generated by the IPO will allow the company to expand internationally. ■


# By the GSE community, for the GSE community

*Jennifer Matasy*

In September, a new event dedicated to ground support equipment was launched. GSE Expo Europe, held at the Le Bourget Exhibition Centre, Paris, attracted large numbers of GSE suppliers and operators, and was hailed as a big success by its organisers, the International Airport Equipment Manufacturers' Association (IAEMA)

Jennifer Matasy is the chair of IAEMA, having taken over the role from Michael Bloomfield in June this year (she has also been an active board member of IAEMA for four years). As such, she played a critical role in the show and is well placed to look back on its success.

She and IAEMA are "exceptionally happy" with the way that the show went, Matasy says. Association members were delighted with the quality of the customers and potential customers that visited the event. In total there were more than 3,500 exhibitors and visitors over the three days of what was IAEMA's first such European event, which was held in "a great location, surrounded by so much of the history of aviation" at Le Bourget.

There was very active participation from sponsors and the media, while the emphasis on innovation was widely welcomed by attendees, Matasy continues. The extremely positive feedback that IAEMA collected from those who visited or exhibited at the event referred to the

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location and the time of year at which the Expo was held, the number of attendees, and the engagement that was shown by so many involved in what was a pioneering event.

There was of course some early scepticism before this entirely new event, but any doubts were fully dispelled by its success, Matasy advises. She is delighted with the inclusivity that brought together all the exhibitors, both IAEMA members and non-members, in Paris.

Designed and managed as a "dedicated community hub for GSE suppliers and users", GSE Expo Europe is to be held every two years (in even-numbered-years), with IAEMA's US-based exhibition to be held every other year (odd-numbered years) in Las Vegas.

### Demonstration and innovation

As there has been at GSE Expo Europe's Las Vegas counterpart, in Paris there was an outdoor Demo Zone for various items of GSE brought to the show by some of the biggest of the industry's equipment manufacturers. On show were Boschung's Pony P3.0 multipurpose vehicle, SYN TRAC's new vehicle attachment docking system, Timsan's SAV5800 ambulift, and SM Rental Fenwick's Linde electric tow tractor. Outdoor demonstrations were held over all three days of the show.

There was also an Innovation Zone at the event for those looking to showcase the very latest in GSE development. Targa Telematics offered its thoughts on how to use data to meet and exceed key performance indicators (KPIs), Plug Power talked about the advantages of using hydrogen to decarbonise GSE operations, and EasyMile considered how autonomous technology can be used on today's and tomorrow's airport ramps.

News from the show included the handover of a PHOENIX E electric pushback by German GSE supplier Goldhofer to handler PortGround (one of two destined for its Leipzig operation), as well AeroVect's new partnership with Dubai-headquartered handler dnata – a story covered elsewhere in this magazine.

On stands right across the exhibition were numerous items of GSE that boasted the latest technological developments, news about much of which can also be found in these pages – see, for example, the stories on Denmark's Vestergaard, Italy's AVIOGEI and the USA's Textron in this issue of *Airside*.

A number of revealing interviews with various exhibitors at the show can also be accessed in the larger digital issue of this edition.

The event was devoted entirely to GSE, rather than the wider aviation and airport business. Say the show's organisers: "Our collective ambition was to create a GSE show by the community, for the community". They certainly seem to have succeeded.

The next GSE Expo Europe, to be held in September 2024, will not, however, be held at Le Bourget because the Olympics of that year are to be hosted by France's capital city. It will instead be held in another primary European location, Matasy confirms. IAEMA has already narrowed the field down to three possible host cities. She believes that the 2024 event will build on the momentum achieved in Paris, and is likely to be even bigger. ■

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# Adapting to change

Adapt GSE was on stand B60 at the GSE Expo Europe. *Airside International's* publisher, ***Parveen Raja***, met there with ***Eamonn Maguire*** and ***David Russell***, respectively commercial director and business development director of Adapt GSE, to discuss their backgrounds and to think about the future

**Raja**: Tell us about yourselves?

**Maguire**: I have ten years' experience in the GSE industry. I previously worked for a GSE OEM [original equipment manufacturer] group based in Northern Ireland, where my role was Middle East regional sales manager. I spent five of the eight years based in Dubai servicing the North African, Middle East and Indian markets, and then I moved back from Dubai and left the company in July 2020.

**Russell**: I also worked previously for this same OEM group and I was there for almost 13 years, for

eight of which I was the regional sales manager for the Asia-Pacific region based in Singapore. I then relocated back, and was looking after Western Europe and China. I also left this same company in September 2020 and later on Eamonn and I got together and sat down and decided to develop two businesses that we called Adapt GSE and Adapt Global Solutions. So we have two arms to the business. Adapt Global Solutions is where we represent some of the GSE OEMs, like Kalmar Motors (of Sweden), Dynell (of Austria), Doll (of Germany), and dBD Communications (of the UK).

**Maguire**: We are the UK and Ireland agents for the four brands mentioned by David and we also do some additional consultancy work for Doll in selected Middle East and Far East markets. In terms of Adapt GSE, this company is focused entirely on the remarketing and resale of GSE assets. We have recently partnered with HiSERV, the German rental and leasing company, and we are very busy selling their younger life GSE assets to rest-of-the-world markets as they come off the rental business.

**Raja**: How successful has it been? You have been going now since 2020?

**Maguire**: Yes, we set up Adapt Global Solutions in November 2020, and then registered Adapt GSE in December 2020. Obviously it goes without saying, the era of Covid-19 was challenging for us during our first year of business. However, now we are into our second year of trading, and the traction has been very good this year. We have made multiple sales and deals in rest-of-the-world markets and second-hand sales.

**Raja**: Are you looking to expand? Or is it just very much Europe-based for now?

**Russell**: No, our sales cover Asia-Pacific, the Middle East, the African continent and over into the Americas markets too.

**Maguire**: We are located in Northern Ireland, and we have a small but very dedicated team of GSE engineers with proven experience and ability. We have recently built a new workshop and we have been doing a number of overhauls on machines – including full sand blasting, priming and painting as well as hydraulic piping and electric refurbishments and general retrofit work.

**Raja**: Are you two the sole shareholders in the business or do you have an investor?

**Russell**: No, we are the sole owners in the company. We invested our own money to develop the company back in 2020 and I suppose we were lucky in a way with the pandemic because we were able to get access to equipment at quite reasonable prices. Although, as Eamonn has said, it was a difficult time, and any start-up is always challenging, so we had to sit on a lot of that for a while. We invested in building our new workshop facility.

**Maguire**: Considering our Adapt logo, we have the Globe representing the world GSE trading network and then we have the Dragonfly, which symbolises change. Literally, adapt means change, so we thought the Adapt name was poignant and suitable. It was one word and it's quite catchy. We had to adapt to change and the dragonfly [represents] our resilience to do what we did and when we did it – to make a change in ourselves and what we are doing, to transition from selling brand-new OEM-manufactured equipment into the second-hand GSE market, and of course remarketing and selling GSE products that we have never looked at before, as well as dealing with the various manufacturers on that side of it as well.

**Russell**: It's been great working with the wider community in the GSE industry and we have reconnected with many longstanding friends at the GSE Expo. The show has been great this week. Moreover, we have also met a lot of new people. Previously, it's been fantastic to visit many OEMs' manufacturing facilities within the GSE industry this past 12 months or so.

**Maguire**: We have met of course a lot of previous faces [at the show] and we both say that this GSE industry is a very close-knit community with a global reach. More often than not, people tend to stay within this sector, albeit maybe with career and company changes. Whilst we were always based in the new equipment side of things, you meet established people but now also that we are looking at the premium used GSE market, we are meeting a lot of new customers from the African continent, the Middle East and from the Asia-Pacific region.

**Raja**: There are a few companies out there, as you know, doing what you guys are doing, so what is your USP compared to your competitors?

**Russell**: It goes without saying that, as in any sector, competition is always very healthy. We want to concentrate first on giving a very good service to new and existing customers. I would say the unique selling point of Adapt GSE is in our collaboration with HiSERV GmbH. HiSERV is also quite a young company, and part of the wider WISAG group. They have very high expertise in maintenance and the GSE assets coming off the rental cycle are generally younger life assets, reduced hours and fairly priced, and so we want to position ourselves in the market and provide good products and services with very good manuals and very good maintenance records, all at a fair price to the customer.

**Maguire**: David and I have had a very enjoyable GSE Expo and there has been a great atmosphere throughout the show all week. We wish all participants the very best and great success for the remainder of 2022 and into 2023, and we look forward to meeting the GSE community and its customer base again at the various shows and events in the future. ■

# Keeping track

***Parveen Raja***, *Airside's* publisher, spoke with ***David Read*** and ***Jean-François Bouilhaguet*** from Resonate MP4, primarily about XOPS – the brand name of the digital, 'SMART' fleet and operations management system offered by the France-headquartered company. ***Bouilhaguet*** is the co-founder and CEO of Resonate, while ***Read*** is the general manager of Resonate UK


***Jean-Francois Bouilhaguet*** *and* ***David Read***

**Raja**: Tell me about your latest products and contracts...

**Bouilhaguet**: First we will start with the latest projects. We specialise in telematics and now we have a new web-based application dashboard for the electrical management of all of the new electrical GSE equipment, all their various new battery power systems, now coming onto the market.

GSE operators need to have very precise control of their energy consumption and we developed [this] in the first instance for Hong Kong, where XOPS has been used for GSE pooling at Terminal 2 for several years now. Plus, for the next ten years we have been selected in the recent Terminal 1 tender. Hong Kong International Airport (HKIA) has decided to have 100% electric and to start to implement electrical charging points everywhere.

**Raja**: Can you tell us more about this?

**Bouilhaguet**: We are helping to manage between 600 and 1,000 pieces of GSE provided by HKIA and used between its three big handlers – SATS, HAS and JAAT – as well as supporting the cargo activity at the airport. Approximately 7,500 drivers will share the equipment thanks to XOPS.

The GSE equipment to be used must be in good condition and with the correct level of battery charge; otherwise, if a ground handler arrives to use the equipment and the battery charge is too low, they will not be able to complete their ground handling task and this can delay the aircraft's departure. That is why we had to develop something very accurate and – especially with all the many GSE suppliers now

coming from China with new battery power systems – we have to work closely with these suppliers. Now most of the battery power systems on the market can be monitored with our XOPS system. That is for the electrical side...

**Read**: Another important commercial point is the ability to invoice for the use of the vehicle.

**Raja**: How will that work?

**Read**: So, the XOPS system records precisely how much power is used for any task and how much time the GSE is used for. That data allows the overall fleet manager to send an invoice to either SATS, HAS, JAAS or HACTL [Hong Kong Air Cargo Terminal Ltd, a cargo handler at HKIA] – whoever is using the piece of equipment. This is a critical part of the process of ensuring the commercial aspect [of pooling] can be managed.

**Bouilhaguet**: Of course, HACTL works only on cargo. It has around 15 loaders of its own using XOPS, but it can also access the GSE fleet and sometimes uses the loaders belonging to Hong Kong Airport. Pooling was mainly done for companies with a [ground handling] license on the passenger side, and only three were licensed.

After the electrical management side of things, which needed to be strong because everyone is going green, the second thing is that we have recently developed – with a partner – an integrated in-vehicle camera with XOPS. With the integrated camera, a GSE operator is able to store the data, typically for about seven days, in the internal camera memory. Thereafter it can be deleted if it is not needed to better manage data storage costs. If there is an incident or accident, then video footage data can be accessed locally or remotely for further analysis as required.

**Raja**: Are you selling it directly to the ground handlers, or are you selling it to the GSE manufacturers?

**Bouilhaguet**: We are selling it mainly to the ground handlers. Some basic cameras can be limited because uploading many images from a camera's memory for further analysis can become a significant, unviable cost to the business. With the XOPS integrated camera system, the existing XOPS telematics logs a list of customer-defined vehicle events, or 'triggers', such as when it stopped suddenly, or attached to an aircraft, or a GPU was plugged in, and then, automatically, when a trigger comes from the XOPS telematics system it sends a message to the camera to request footage for a customer-defined period (such as from 20 seconds before the event to 20 seconds afterwards).

This means that when an incident or impact occurs, the system will automatically record events before and then after the incident. Just this limited time stamp of video can then be transferred via the GSM network to the XOPS server automatically. Through this 'integrated managed process', a piece of video footage becomes a relatively small amount of data, so the cost of transmission becomes much less expensive and 100% incident-related. When you are handling with 700 GSE units you can't go to each handler asking the driver, 'did you have a collision today? Let me know because I must upload the images', because, of course, the driver may never tell you that they had had an incident.

**Read**: So, to summarise, I think the key point to that is it's the combination of the camera technology and the XOPS software which allows the end user to manage and target the footage that they want to record and then analyse, and it's that recording and analysis that makes XOPS so different from most normal camera solutions – you are only getting footage for the incidents that you want to see whether it is an accident or something else.

There are two main types of camera systems, a simple one that is either just forward facing or both forward facing and cabin facing, and then we have a system that fully surrounds both the interior and exterior of the vehicle using multiple cameras. So there is an entry level and then a more specialist requirement level, if you like, for any of the higher value GSE, such as an aircraft pushback where there can be a business case to have cameras covering the full 360 degrees.

**Bouilhaguet**: Here, in fact we have the simple KP2 model with two cameras: there is one camera you see on the front of the vehicle and another one inside the cabin. The first one is fixed but the cabin camera can be removed so that if there is a policy preventing this being used it can be removed.

A good real-life example for this camera would be when GSE operators use the camera during training, such as for a new towbarless system, the trainer (who may have several people to train) can sit in the vehicle to train each user for an hour and then monitor them from their computer while they continue to operate the GSE alone. If something is wrong, identified by the telematics, the trainer can contact the user and discuss the problem with the aid of the camera.

**Bouilhaguet**: During a training period people agree to be filmed in the cabin because it's better having the camera rather than someone standing nearby. When the equipment is stopped because the driver is waiting for a new task the camera will stop; this means when you get outside nobody can take an image. Its only when you start the GSE that you get the image.

**Read**: There are two important things to note. Number one, a lot of the ground handlers need to have cameras as it can be in their licence as a requirement at an airport; in this case they are able to buy their camera solution along with the telematics. That way they can use one supplier to provide an integrated capability.

Secondly, an integrated telematics and camera solution can offer significant operating advantages.

Rather than having a camera system and a separate telematic system and having to work out whether a particular piece of footage relates to a particular incident, with XOPS it is all integrated so that

when the incident happens, the relevant footage just pops up on the user screen. The combination of the telematics and the camera makes it very easy and less expensive for the ground handler to buy and use the service. We also offer a managed service so if the ground handler wants us to do the analysis for them, we can do that too.

**Raja**: Are you working more with the airports or the ground handlers?

**Read**: We work with airports, airlines, ground handlers and in some cases others who are on the periphery of the airport. It really depends on project by project so if you take, for example Heathrow, we work primarily with Heathrow Airport, in Hong Kong we work with a combination of the airport authority and their appointed contractor to manage all the GSE. If you take Paris, we work a lot with Air France and its suppliers such as [Groupe] Europe Handling and all the ground service providers.

Every project is different. Usually, once we are working within an environment, like Paris, you find that the community starts to say, 'Okay, if Air France is using XOPS, then as a ground handler I'll use the XOPS system as well.' It takes time for XOPS to establish itself within the community as the telematics solution of choice.

**Raja**: Sure, and how did the Hong Kong contract come about?

**Read**: I think that like many of these contracts, it came about by attending exhibitions like this one at Le Bourget year after year. Bouilhaguet has been doing this for around 10 years now. The Hong Kong airport authority did their research, they met Bouilhaguet and many other vendors many times and in about 2018/19 the appointed contractor at Hong Kong airport, a company called DAS, was awarded the contract to manage the fleet. They came to Bouilhaguet to manage the installation of the telematics. So, it came about over several years of meeting with the airport authority, meeting with the relevant contractors in Hong Kong until the tender was announced, then we supported the tender and that's how we got the contract.

**Bouilhaguet**: With Hong Kong, we first won the international tender in 2018. It was only for one terminal but last year they reopened a new tender just for T1 – and XOPS was again successful, being awarded the second tender and now has the full airport for the next ten years.

**Raja**: You said when the ground handlers use the GSE they will be invoiced. Which invoicing system is being used? Is it an XOPS system?

**Read**: We can do invoicing, but most customers have their own invoicing system for their business, so they don't want a special invoicing one just for GSE pooling. XOPS generates the supporting data and like many systems the data is then exported or delivered by integration into a billing system which then generates an actual customer facing invoice document.

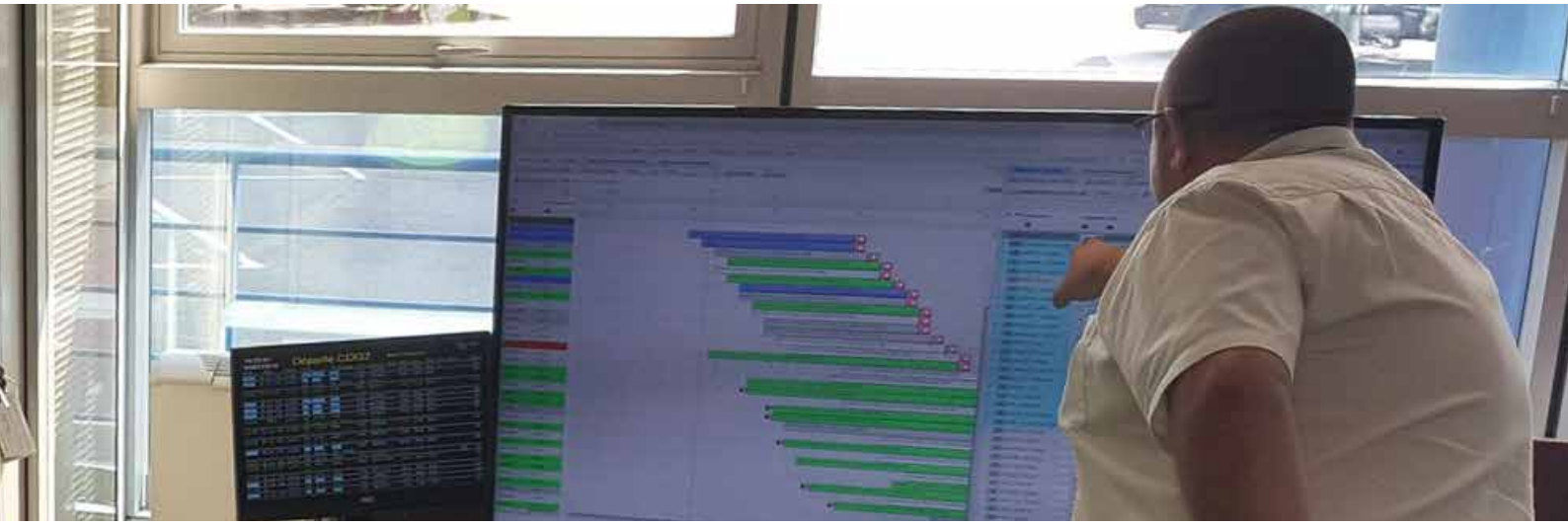
**Raja**: And would that be the airports themselves that receive that data from XOPS and then would they send out the invoice to a GSE user?

**Bouilhaguet**: In the case of Hong Kong, the airport authority does the invoicing, identifying first the aircraft/flight number, and then matching this with the correct ground handler to invoice them for the use of the equipment based on the time it's used for the flight.

At the end of the year, if one ground handler is faster than the competition then by using XOPS there can be a difference in the actual amounts charged to each ground handler based on actual usage, whereas at the very beginning of the project it was a fixed price, which meant that a GSE user would get invoiced for 45 minutes regardless of the time actually taken.

**Raja**: And will HKIA have enough equipment to service the three major ground handlers?

**Read**: Yes. There are usually two goals; one is to always have enough equipment and the other is to reduce the amount of equipment used so as to be efficient both in terms of cost but also in terms of pollution and congestion at the airport. So, our customers use XOPS in order to make sure



they optimise the levels of equipment and also balance their positioning, because most large airports have multiple terminals over large areas to support.

If you take Charles de Gaulle Airport, for example, it has Terminal 1, Terminal 2 and Terminal 3, spread over a huge amount of land. If the GSE is not in the right place at the right terminal for the morning, afternoon or evening peak, with XOPS they can reposition the equipment as needed and then over the course of several weeks/months they can use the data to identify which types of GSE they need less of and what they need more of, as well as where and when they need to be positioned based on changing aircraft schedules. But yes, overall, XOPS is designed to allow and make sure they always have enough equipment for the ground handler to be able to do their scheduled activity.

**Raja**: Do you have more contracts in the pipeline that have been awarded to XOPS?

**Bouilhaguet**: We have recently grown our business in the catering sector because we now serve one of the global leaders in catering that have one operational support system and process worldwide that uses one single IT technology – and it has selected XOPS.

All of its catering trucks are tracked and managed by our system and we assign the trucks automatically to a flight, and manage the task completion performance. This helps the customer on the ground to optimise the allocation of vehicles and drivers based on daily flight schedules and then reduce the mileage that the catering vehicle fleet does in one day.

Resonate has developed an artificial intelligence model that works in real time, checking the drivers and directing where they should go with the optimal vehicle for the task to make sure that, at the end of the day, mileage and energy consumption are limited only to what is necessary for the task or tasks to be completed efficiently. From this project we have already equipped 10 airports in the US.

**Read**: That's right, nine main airports and one auxiliary airport. Our first project was Washington IAD, then we moved to San Francisco, Chicago, Los Angeles, Seattle, La Guardia, Denver, Newark and San Diego.

**Raja**: Are you working directly with this catering customer?

**Read**: In this case we are. It has been an excellent customer because it has understood how to use technology to change its business processes. That is such an important part of the success of XOPS as once you have a piece of technology that tells you how to make a change to improve you then have to change your business process – for example, how you cater for a flight and how you manage your business operations around this.

**Bouilhaguet**: In addition to the US, we have also equipped Servair at Paris, and we have the potential for further expansion in Europe and in Asia and North America.

**Raja**: Are you working directly with any ground handling agents or airlines?

**Bouilhaguet**: Yes, we won the tender for Europe Handling and we already have its branch in the UK, Cobalt [Ground Solutions]. We are also the unique provider for Ryanair with hubs at Stansted and 27 airports in Europe.

**Raja**: So, what are you doing for Ryanair?

**Read**: The first project for Ryanair was Stansted Airport in the UK. It decided that to improve performance, one key aspect was ground handling. Previously the airline had outsourced its ground handling but it had problems with achieving the performance needed, so it decided to buy its own GSE and effectively self-handle. So, Ryanair has its own GSE and uses its own staff. In order to manage that we put XOPS into the business, which allows the airline to now control and monitor the performance of its turnaround teams.

If you fly Ryanair, you know that when the plane lands, 20 minutes later it takes off again. The airline now manages that critical 20 minutes internally via all the GSE that it owns and operates itself. In a nutshell, Ryanair wanted XOPS to provide the visibility to the data in real time so that it could both see and impact how well its turnaround, baggage, fuelling and other teams were performing. ■

# High-tech telematics


***Philip Davis,*** *Transpoco*

***Phil Davis***, enterprise sales account executive at Transpoco Telematics – an Ireland-based innovative technology company focussing on telematics and artificial intelligence (AI) safety camera technology for airport ground handlers – spoke with *Airside* publisher ***Parveen Raja*** at GSE Expo Europe about the company's product offering

**Raja**: Tell us about Transpoco, in a nutshell?

**Davis**: At Transpoco Telematics we provide an integrated telematics and AI camera solution for airport clients focussing on safety and security around the airport, driver operators and other actors. We work closely with Iberia across various stations in Spain, we have Aer Lingus on board as well as a valued client and we work with some airport authorities just providing insight into the operations at their airports.

In terms of the primary features of our solutions, we focus on safety as I mentioned: things like driver access control for the equipment is very important, so if an operator is not trained or authorised to drive a piece of equipment when they present their badge to start the vehicle it won't start. This means no one is going to drive the equipment unauthorised within the airport.

Another area that we focus on is AI safety camera technology, so a new project that we have been working on includes getting better insights into how drivers are operating equipment not just through the telematics data you know – speed, harsh braking, etc – but also including insights around mobile phone use, drowsiness, fatigue, texting, distraction whilst driving, etc.

If we can improve drivers' standard of behaviour whilst they are driving the equipment in real time and alert them if they are in a potentially hazardous situation, it goes a long way to reducing incidents on-airport and that's important because obviously it's a high-stress, very volatile environment.

We also provide back-up statistics, so building a better profile on drivers that we know companies need to focus on when they are looking to train. It's not just if the equipment being driven too quickly: it's if operators are nearing the end of their shift, do they feel fatigue, are they constantly drowsy, are they not paying attention?

**Raja**: Can I ask you how your telematics differentiate Transpoco from your competitors?

**Davis**: I think one of the main areas that we see progress in is around the integration of systems – pulling the data from vehicles is one thing, but it's also what you do with that information.


There is great value in telematics data but [not] if its siloed, if it's only sitting on a system. You're going to get some good insights absolutely but at the end of the day if our system can talk to the management systems you're using for the equipment or scheduling tools or procurement or human resources, can we provide better insights on what is happening in real time and align that with what is happening within other operations of the airport?

**Raja**: Do you offer a data solution where you manage the data and feed it back to the customers?

**Davis**: Yes absolutely. We offer a fully managed solution – it's essentially ISO 27001 IT Security-certified. We manage the data [and provide] full API access for any relevant information that they may need in real time, so immediate decisions can be made if needed.

**Raja**: Does your system also offer an invoicing system for airports if you sell it to them for pooling GSE?

**Davis**: Yes, pooling GSE is a big thing; airports are getting crowded, so operating equipment efficiently and utilising the space that you have is critical. And, yes, airport pooling ties in with driver management, so you could have multiple clients using the same bit of equipment. If we know that it was 'Jimmy' from Swissport that used that tug or used that pushback for four hours on Tuesday, then we can bill that back to Swissport and provide that kind of insight in reporting.

**Raja**: Are you working with major ground handlers other than Iberia?

**Davis**: Not so much: like everyone we were focussing on a couple of key clients, getting them right. There is also some development work going on to improve the CANbus capabilities with some of the manufacturers, like Charlatte Manutention and TLD, so we pull insight from them.

In terms of carriers, Iberia and Aer Lingus would be the main two we are focussed on, but we are looking for any new business obviously. ■

# Looking to expand

***Raghunandan Jagdish***, CEO and managing director of Nandan GSE Pvt Ltd talks to *Parveen Raja* about the company and its plans for growth

***Raghunandan Jagdish,*** *Nandan GSE Pvt* ***Ltd***

**Raja**: Can you introduce your company to our readers?

**Jagdish**: Nandan GSE Pvt Ltd is a 30-year-young organisation based in Mumbai in India. We manufacture there in India and deliver around the world. Currently, we export to all of India, the rest of Asia except China and the Middle East. Africa has a lot of our equipment too, and we intend to expand to the Americas, so we are just setting up a US branch office.

Here in Europe we have no immediate intentions of expanding, but we are looking for collaborations. For example, if there is a company who's got a product that is exporting to France, if they want to get the same product made in India, we can do it no problem.

I am looking in particular at electric GSE; I believe that the airport is going to be an electric place. By myself I might not have all the electric solutions, but I have the applications for airports so we can make the applications electric from someone else and we can do a marriage that will work.

We are looking to sell into places like South America, Central America and the rest of Africa. We are looking for dealers that can work this out. In India, if somebody wants to sell equipment, we can do sales and service for them even though it's not our equipment; we can do that and we can provide after-sales service because we have a fantastic service team that can go across and serve the customers' products in these markets.

At the end of the day, it is all about value, and we believe we give value for investment for the customer. In fact, it's a three-times win: the first win is for the end client because he gets something at a good value, saving every dollar going to the bottom line. The second is the company who wants to get it done [sell] can benefit from us because they get it done at a lower cost, so the profit is defined by what they retail. And, the third is for us of course, because we can manufacture and utilise whatever capacity we have. We have 250 people in 100,000 square feet of factory space.

**Raja**: And are you now building electric GSE? You said you want to partner with somebody...

**Jagdish**: Yes, we have built a few small ones, but I think the traction is not fast enough; if we do partner with somebody, I think the speed will go much faster.

**Raja**: Indian airports are not into electric GSE so much?

**Jagdish**: That is changing very fast. Just to give you context, in India, skill levels can be phenomenal – ten years back we had barely one mobile phone among 100 people, but today we have close to 1.2 mobile phones for every person. That's the kind of penetration we have.

We are talking about 5G, we are even talking about the vegetable seller on the street having a QR code, so you don't give cash, you don't give credit cards, you just scan and pay. So, India has 25 billion transactions; the next biggest is China, which has 14 billion, so I think in India, the scale we can grow at is fast. As for the [aviation] ministry, the government want to make airports a cleaner place – there are already circulars passed which talk of a green environment, so they are doing solar, like in my own factory, for which 60% of power is coming from solar. Five years back it looked like a dream, but today it is a reality.

**Raja**: You are also creating a lot of employment as well, so how are you looking to train your staff and retain them?

**Jagdish**: I believe that more than salary, it is learning and development and self-actualisation that will make people like to stay. I have people that have stayed with me for 30 years. There is constant upskilling in what we do, and we have invested in our own online learning management portal where a lot of training is video-based and staff must do it – it is compulsory. Two hours of learning per week is mandated. ■

# Leading the charge

***Parveen Raja*** talked to ***Seth Stansell*** of PosiCharge, a division of the Webasto Group, at Le Bourget during GSE Expo Europe to learn about the company and what it offers to the aviation industry


***Seth Stansell** is on the left*

**Raja**: Could you introduce yourselves to our readers and say a little about Webasto PosiCharge?

**Stansell**: My name is Seth Stansell and I am the senior sales manager for ground support equipment at Webasto PosiCharge. We provide industrial fast-charging systems, primarily for airport applications. Our customers include all major airlines in the US and across Asia and North America, as well as international airports all over the world.

Over the last 20 years we have installed tens of thousands of charging ports for equipment all over the world and our technology allows for some of the most efficient and cost-effective fast charging in the world. This has given us significant market share in every market we operate in but particularly in North America, where we enjoy over a 90% market share – which is maintained today through customer service and great products.

**Raja**: Can you mention some of the airports at which you have installed your equipment?

**Stansell**: Yes, especially in the US every major airport, almost every international airport, has PosiCharge chargers installed, amongst the biggest ones being San Francisco, Los Angeles, Atlanta, Newark, Dulles, Miami, Houston, Austin and Denver.

**Raja**: And beyond the US?

**Stansell**: Singapore Changi is exclusively PosiCharge, Hong Kong International Airport [HKIA] is also exclusively PosiCharge, both runways 1 and 2; the new third runway expansion is underway [at HKIA], and we are expecting to deliver first batches within a month for the third runway that is all exclusively PosiCharge. Wellington and Auckland in New Zealand are also exclusively PosiCharge. Bogota in Columbia, Panama City in Panama...

**Raja**: What about in Europe?

**Stansell**: Yes, in mainland Europe and the UK. For example, we have some installations in France, Denmark and Germany. We are expanding the product line in Europe and coming up with some unique solutions for the somewhat unique challenges found there, particularly in regards to power availability and power management.

These factors are going to be key worldwide as more GSE converts to electric power, power availability is going to be a critical factor for growth. In some

areas we are already running up against limitations, and Europe is a key area where that is happening.

**Raja**: How do you compete with your competitors?

**Stansell**: So, because we have such a dominant market share, we don't have any, I would say, 'large' competitors in this space. We have been doing this for over 20 years and some of the designs we abandoned have been adopted by our competitors, which we are fine with, but the reason why we have maintained our market share is because of our power distribution and the way we manage our outdoor rating. There are no filters on our system – they're not necessary. We have a proprietary design that allows the system to cool without air exchange internally.

So, while no outside air gets into the components on the inside it still remains cool. Having no filters in the system reduces maintenance requirements and the life expectancy on our system can exceed 20 years. We have systems in the field that are 20 years old and still going strong, which is a massive cost benefit advantage.

Another benefit is that we can maximise the number of ports per input power supply. At an airport, getting access to electricity can be difficult, and it's very expensive. A certain airport, for example, did a project with a competitor. They had 16 chargers installed and they estimated a cost of about US$2.1 million just for the infrastructure for these 16 chargers. [We estimate] it would have cost them around $147,000 for infrastructure for us to match the same output, which would have been a massive saving on installation cost, and that is because of the intelligent power distribution technology that we have patented.

**Raja**: How does it work? Because obviously the power is used by different ground handlers at the airport, by different service providers, so how does the airport then recover its costs? Is it charged to the service providers? Are you billing them?

**Stansell**: That is an interesting question. We do enable airports to recover their costs if that is their goal, but you would be surprised how few airports see that as a primary goal for installing these chargers.

Some airports don't even bill for the electricity that is being used, which is a great advantage for those that use it and motivates some carriers and operators at those airports to go electric. But for those who think [recovering costs] is important, we do have a fantastic and robust analytics system that allows them to bill straight from the system. With Skylink-enabled devices you can access the chargers, you can track and manage assets including the vehicles themselves, you can see their state of charge, their charging history, battery data as well as bill for the electricity straight from the app.

**Raja**: Is that a programme that you developed?

**Stansell**: Yes, it is, it was built in-house by our team.

**Raja**: So, do you have that as an add-on? Or does it come with the system that you have installed?

**Stansell**: A customer will have the device and then it is up to them whether to activate it or not, but we are seeing more and more almost total activation going forward by customers because that data is so critical – especially for tracking, usage, cost and asset management. Some users even use it to understand asset distribution and if there are ports which are not being used very often and other ports which are always busy, then the data is very powerful.

**Raja**: Is there anything else you would like to add?

**Stansell**: I think electrification is a question mark for some users. As we convert from combustion to electric there is some uneasiness amongst some users, and that is natural. It's new, they don't have the mechanics to handle and to fix electric equipment and they don't understand what their costs are going to be.

We try to be not just a charger sales group but an asset to our customers, so even in things which don't make us money we like answering their questions, showing them we have free tools that they can use to understand what their conversion to electric would look like, what it would cost them, and most importantly what it will save them. Plus, we enable the data necessary to get government funding for those programmes.

**Raja**: Is that available worldwide or is it just in the US?

**Stansell**: The tools are available worldwide. Each region is handling electrification differently, but we provide the data and the knowledge to be able to take advantage. ■


*AVIOGEI's president, Franco Cesarini, is on the left, while Andrea Cesarini, CEO of AVIOGEI Airport Equipment, is on the right*

# Leading from the front

Franco Cesarini, president of AVIOGEI Airport Equipment, talks about his many years of experience in serving the aviation sector and how AVIOGEI has developed into a major GSE supplier

AVIOGEI first began manufacturing in 1969 as a division of a company called Officine Meccaniche Latina, or OML, a prominent player since 1952 in the field of precision mechanical construction and also a producer of aeronautical equipment for civil and military applications. But, says Cesarini: "I separated AVIOGEI from OML activity in 1970, so in that year the company became completely independent.

"During the subsequent years, we expanded our business, and AVIOGEI has de facto become the AVIOGEI Group, made up of highly specialised companies that have highly customised manufacturing capabilities, a global service offering and training, as well as short- and long-term rental and purchase options on a wide range of ground support equipment.

"Our headquarters is in Ariccia (Rome). In Italy, we have two plants: one in Campoleone and another in Aprilia. We also manage an airside workshop at Rome's Fiumicino International Airport where we undertake trials and maintenance activities."

Plus, AVIOGEI has a facility in the US, with a plant in Dallas, Texas, dedicated to the manufacture of electric GSE. "Over the years, AVIOGEI has become the most important manufacturer of GSE in Italy and a leading global player in the business," Cesarini asserts.

Today, AVIOGEI maintains a lean organisation and management structure model, and employs about 70 highly qualified staff. "Since the beginning with the company, my aim has always been to provide every customer with high-quality

and technologically advanced, as well as durable, airport equipment," he adds.

As part of that strategy, AVIOGEI integrates in its production process the latest-generation technologies as regards electric and control systems, Cesarini informs.

### Working with customers

When he started out in the business, the industry was already characterised by intensive collaboration between the manufacturer and the customer, and gradually there developed an increasingly varied offer from GSE manufacturers, Cesarini outlines.

For AVIOGEI: "Our policy is to be a partner of our customers, and in general of the airport and handling world," he advises.

"It is essential for GSE manufacturing companies to establish a high level of product offering, with an excellent quality/price ratio, plus after-sales assistance," Cesarini continues. AVIOGEI's technological sophistication has evolved over time, as has the breadth of the products it offers, complemented by its customer-oriented approach and flexibility.

Also critical has been its commitment to continuous innovation. Finally, "The brand has always been recognised as a 'Made in Italy' quality product," Cesarini notes.

As for what lies ahead, further changes are certainly on the horizon both for the industry and for AVIOGEI, he believes. "In recent years, airports have gone through a wave of digitalisation, and all stakeholders are interconnected, allowing for greater proactivity in airport management.

"Investment in digital solutions at airports has increased to improve passenger experience and airport operations and it is expected to grow in the coming years.

"Civil aviation authorities, airport managers, airlines and handlers are looking for solutions to digitise fleet management that will allow them to tackle many of the issues relating to GSE. Plus, across Europe, airport operators, competent authorities and carriers are looking for telematics solutions.

"We have supported the increase of services for customer support and the increase in partnerships among our main stakeholders, while autonomous machines is another area in which we are investing as part of our research and development efforts."

And on the subject of collaboration and its criticality for the industry's move towards a greener future, he opines: "Partnerships will be very important for meeting sustainability goals, as this will require the collaboration of different partners (airports, ground handlers, GSE manufacturers, energy providers and civil aviation authorities amongst them).

"While our products help in reducing the total cost of ownership (TCO) of GSE for operators, they also offer higher levels of safety and sustainability." ■

## Demonstrating its priorities

AVIOGEI showed off its latest designs at the GSE Expo Europe show held in Paris in September. In particular, it decided to emphasise its environmental awareness, choosing for exhibition on the stand its green products. Inside the AVIOGEI booth, it presented a small-scale prototype of a hydrogen hybrid powertrain for GSE; in the outdoor area, it exhibited a passenger stair powered by means of photovoltaic panel, as well as its electric Thunderlift 6000 and its new NS450LE electric conveyor belt.

"AVIOGEI has always had an open-minded approach in relation to new energy sources that can reduce the impact on the environment," says Cesarini. "Our R&D Department considers any sustainable energy source for GSE, although currently the effort is focused on hydrogen technology that is expected to be a key element of future strategies as we look to clean and renewable energy transition.

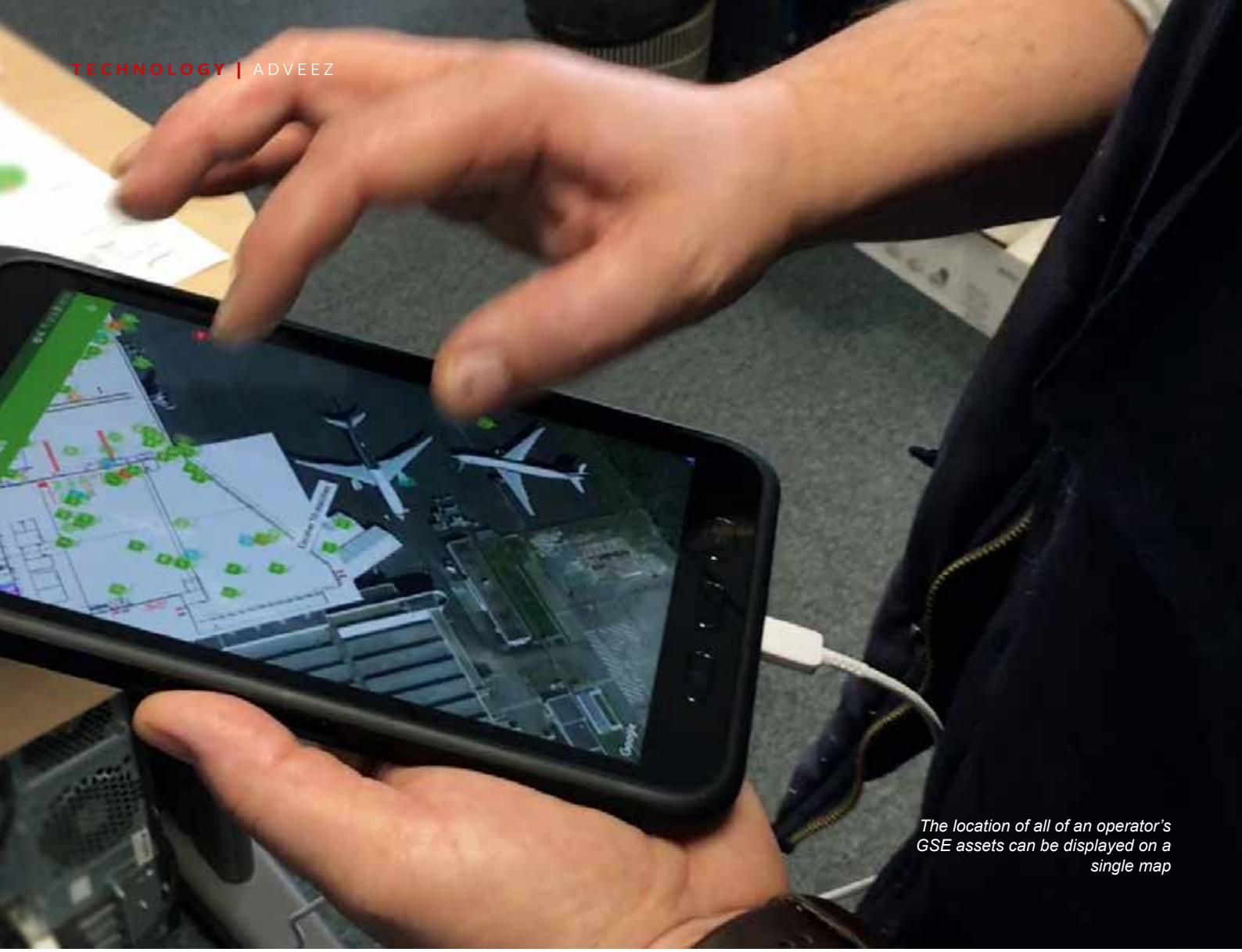
"For example, we are currently undertaking R&D activity with an important university on a hydrogen-related project and for electrically motorised wheels for our GSE.

"In the future, we aim to organise our plants with specific areas for electric and hydrogen-related production. The company is growing up and intends to hire new talented and specialised resources, especially highly qualified professionals able to manage complex projects that rely on the use of new technologies."

Meanwhile: "In our vehicles, we also integrate industry 4.0 [the fourth industrial revolution] technologies, in particular Internet of Things [IoT] applications and analytics. The operators that use our GSE (drivers and fleet managers in this context) have access to different vehicle parameters that they can check easily and without being present thanks to remote diagnostics."

GSE Expo Europe was a good show for the company. "We received many guests, very interested in all our products, but especially so in the Thunderlift that is dedicated to passengers with restricted mobility (PRMs)," Cesarini declares. "Many customers got in the passenger compartment of the unit and were impressed by the reliability and comfort of our GSE."

The expo gave AVIOGEI an opportunity to demonstrate that its products meet the challenges that face the civil aviation sector. However, Cesarini also notes that, "We are continuously working to improve our military range as well; plus, we have been involved and we are involved in pandemic and humanitarian projects." ■



*The location of all of an operator's GSE assets can be displayed on a single map*

# ADVEEZ offers real-time GSE performance monitoring

Based at Toulouse, France, ADVEEZ specialises in telematics systems that are designed with the particular needs of the airport ramp environment in mind (though it also sells into other markets, including ports, railways, industrial sites and maintenance, repair and overhaul businesses). The company name combines two concepts: Advanced and Easy

Formed in 2011, ADVEEZ has been supplying its telematics technologies into the aviation sector for more than 10 years. Its first customer was European ground service provider Aviapartner; today, its clients in the aviation space include Airbus (also based in Toulouse and which uses ADVEEZ systems to track equipment used on and around its assembly lines), European airlines such as British Airways (part of Anglo-Spanish group IAG), US carriers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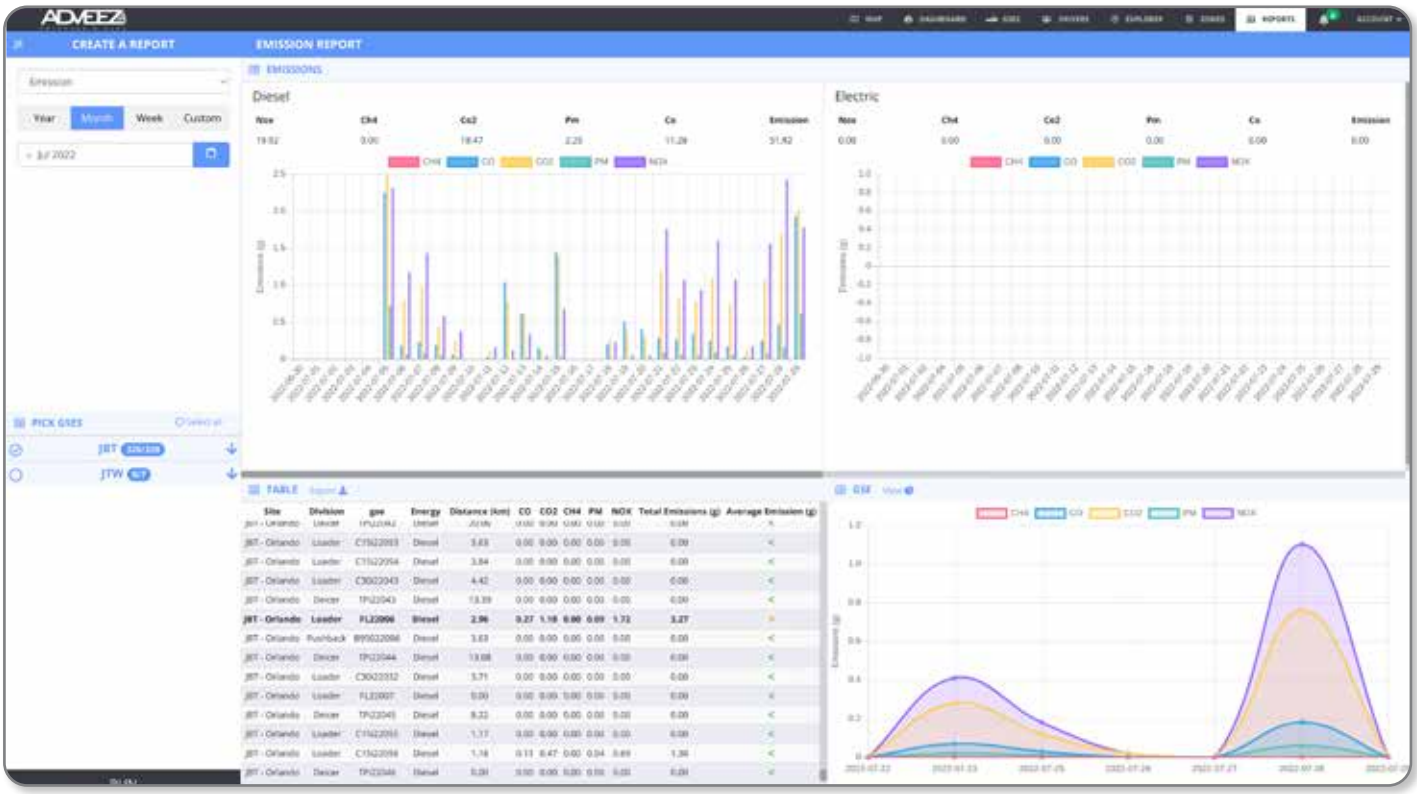


*ADVEEZ offers customers the ability to accurately assess the quantity of harmful emissions being produced by their GSE fleets*

Delta Air Lines and United Airlines, plus airports including Brussels Airport, local gateway Toulouse-Blagnac Airport and Aéroport de Lyon-Saint Exupéry. ADVEEZ also partners with GSE manufacturers JBT and Airmarrel.

Its primary markets have traditionally been Europe and the US, advises Matthias Moulinier, ADVEEZ product and customer integration director, who is responsible for both product development and solution delivery for the company. Now, though, business is expanding into the Middle East and elsewhere in Asia.

Moulinier and some of his colleagues were in Paris for the recent GSE Expo Europe event, and there was no shortage of interest on the ADVEEZ stand from both existing and potential customers in its current product range – and especially in some recently added features that support its Localeez telematics software.

ADVEEZ developed Localeez itself, just as it did the complementary hardware that is installed into GSE and which then provides relevant data for the system. It describes Localeez as "intuitive and interactive software" that displays reliable data in real time, easily accessible through its own web platform or directly onto a tablet or cell phone.

Data collected by the hardware enables monitoring of GSE performance in real time through the Localeez software. The latter will also trigger event monitoring alerts when applicable – such as when an operator is working in a non-approved area, or perhaps is using a particular vehicle without authorisation (the system can also be set up with an access control facility such that a non-approved operator is not able to start up a motorised GSE unit at all).

Dashboards allow management teams to analyse data such as the location and usage rates of GSE units, speeds, emissions, driving performance and so on, helping them to optimise their fleet management strategies. Appropriate maintenance plans can be planned and scheduled, and GSE operators might be asked to retrain if their performance on any given unit is not deemed up to scratch.

Available 24/7, Localeez comes with GPS tracking and can support an unlimited number of users, with all of a user's GSE assets being visible on a single map display.

## Ongoing improvements

A number of recently added Localeez features were highlighted in Paris. One such was the software's ability to generate a 'GSE driving score' for any given operator. This score is derived in real time and takes in such factors as harsh braking or turning; rapid accelerations; speeding; and, of course, any impacts. From this data, either individual operators might need to be retrained or fleet managers can simply see how and where improvements in general driver performance might be encouraged across the fleet.

A second new facility comes in the form of automated speed control around aircraft. Thanks to geofencing technology, the ADVEEZ telematic system can pick up a GSE unit's proximity to an aircraft and enforce a speed restriction on it, thereby minimising the potential for any 'ramp rash' in the form of GSE/aircraft collision.

A couple of customers are already using this facility at different gateways, Moulinier confirms.

Another new feature enables operators to calculate the quantity of harmful emissions given out by any given piece of GSE. Based on data relating to a given vehicle's engine type, fuel usage, duration of use and its performance during that time, levels of $CO_2$ and NOx emissions, for instance, can be accurately calculated. Such analysis can help the ground services provider using that equipment to identify the most polluting units and subsequently take steps to mitigate those emissions.

Thanks to another improvement, Localeez now enables users to monitor battery performance and charging patterns of GSE too. If a particular piece of GSE is being consistently charged more than necessary, it is occupying valuable on-airport charging infrastructure, for example, and patterns of behaviour might need to be changed.

Earlier this year, ADVEEZ also began to offer an automated Occupational Safety and Health Safety Inspection Checklist. Typically, today, GSE operators might occasionally complete a hard copy such checklist – but this is rarely done, and the paperwork can be mislaid or not passed on and action points missed.


*ADVEEZ's OTM GSM is a new outdoor tracking module – or OTM – that can communicate with any on-site Global System for Mobile Communications, or GSM, gateway and is easy to install and maintain. It is designed for the tracking of non-motorised assets*

So ADVEEZ developed a mobile app that links to the hardware mounted in a GSE unit that enables the digital completion of a checklist. Moreover, any problems that are recorded can trigger an appropriate response – from small issues that send an alert to the handler's maintenance team, to more concerning matters that will cause the vehicle to be disabled and prevent it from being started other than by approved maintenance personnel.

ADVEEZ is currently working on other new developments. For instance, it is improving its telematic software designed specifically for non-motorised ramp assets, such as dollies and towbars.

Meanwhile, the company is developing a sophisticated predictive maintenance algorithm based on new reporting structures; plus ADVEEZ is looking carefully into new billing capabilities that will support on-airport GSE pooling. "Good hardware and telematics software is vital if GSE pooling is going to succeed," Moulinier points out, and that includes systems that enable an airport to bill its ground service providers according to their own individual GSE usage.

Finally, ADVEEZ is also working on a machine learning algorithm with a data scientist in order to take the value of its data analysis "to the next level". ■

# EcoOnline and ASA partner on new safety incident data platform

The Airport Services Association (ASA), the trade body that acts as an advocate for the international ground handling industry, has collaborated with leading digital health and safety (H&S) specialist EcoOnline to create and launch a digital platform called SID – short for Safety Incident Data

SID has been designed to support ground service providers (GSPs) in benchmarking safety performance, identifying trends and facilitating in-depth analysis of accidents and near misses that will stimulate best practices and minimise accidents on airport ramps.

The platform will, the partners believe, help in the identification of trends and ongoing challenges as well as supporting the implementation of mitigation strategies to strengthen the safety record of the industry as a whole. The database might also facilitate economic savings for GSPs, given that better data will enable them to make better decisions. ASA director general Fabio Gamba confirms that the association "stands fully behind the project".

Data fed into the platform regarding incidents and accidents involving ground handlers will be accessible by ASA members for the greater good of them all. Moreover, crucially, the data will be anonymous – or 'de-identified' – so that no handler is identifiable as having

been involved in any given incident. ASA members will have free access to quarterly reports and can personalise their own interface dashboards.

Colin Ball, enterprise sales director at EcoOnline, comments: "We are convinced that [ASA] members will understand the commercial benefits of safer aircraft handling and reduced errors, which will result in fewer delays and greater savings. Additionally, they'll understand how crucial this is for travellers, who stand to gain from fewer delays caused by ground damage."

**Bespoke product**

Ball tells *Airside* that EcoOnline has quite a broad portfolio of offerings across a wide range of businesses. Its Cloud and software-as-a-service (SaaS) products primarily support customers in the environmental H&S space, particularly addressing environmental, social and governance (ESG) issues along with quality and even crisis management.

To sum up, its digital services are all about "protecting people, property and the environment", he says.

EcoOnline has its origins in the Nordic region but it has expanded rapidly far beyond this area. The company has been "especially acquisitive" over the last couple of years, Ball reports, and – taking some of these companies into account – the EcoOnline business has been active in the aviation industry for about a decade now.

Its clients in the aviation sector include one of the world's biggest handlers and two of the biggest UK airports, EcoOnline primarily providing operational H&S software that is used by these customers at all levels of their business, and covering the full range of environmental H&S (EHS) and risk and crisis management.

The history of EcoOnline's collaboration with ASA on SID dates back nearly three years, Ball recalls. Many ASA members, including many of its governance team, were well aware of EcoOnline and what it could provide. It was a meeting of minds on the potential value of a platform such as SID, but "We did a lot of work together to confirm that we could really deliver what ASA wanted," he says.

There was never a question of EcoOnline not having the capability – it is a "Rolls-Royce" provider of digital software such as this platform, Ball suggests – but it was critical to work closely with ASA to develop a bespoke portal that was exactly right for the trade association and its members.

And, indeed, regarding that consultation, "A really great strategic partnership came out of it." The result of that partnership, namely SID, will "really drive a safety culture through shared best practices across the aviation industry", Ball considers.

In the Beta testing, developmental phase of the platform, GSPs submitted data through ASA to EcoOnline. Going

forward, the likelihood is that handlers will themselves input relevant incident reports to keep things as simple as possible, but whatever the methodology all data made available to members will be non-identifiable in terms of the parties involved.

Handlers will be able to benchmark themselves against the industry average and be able to show that data to their airline customers. All ASA handler members will thus potentially benefit from the platform, individually as well as collectively in the sense of raised industry safety awareness.

Looking forward, there may be opportunities for more widespread use of the data held within the portal. It is not EcoOnline's data to share, of course, but Ball can certainly see "huge potential" value in the data collected. Plus, he says, SID might well be expanded to take in a wider range of data pertaining to on-apron incidents – of which more below.

There is a "real buzz" in the industry regarding such a system, he believes. There is an ever-growing realisation of the need for well-considered safety management systems (SMS) and SID helps with this as well as with the benchmarking capability that it offers.

***A really great strategic partnership came out of it***

***Colin Ball,***
*EcoOnline*

### ASA: looking to drive 'continuous improvement'

Yogesh Parekh, chairperson of ASA's Safety Group and senior vice president operational risk at Menzies Aviation, agrees with Ball on the value of SID and what it offers the aviation industry as well as individual ASA members. "Our core purpose [with SID] is to prevent and reduce accidents providing a safe, secure, quality service," he says.

He recalls that ASA's awareness of the need for such data as collected and made accessible by SID dates back some years, and pre-dates the organisation's collaboration with EcoOnline on the SID platform.

The International Air Transport Association's (IATA's) Ground Damage Database (GDDB) had been wound up in 2018, he notes, with work on its successor – the Incident Data eXchange (IDX) – not yet widely known. "Yet, as ASA's Safety Group, we wanted to be able to identify accident-related damage trends and needed data to support what was causing those accidents," he tells *Airside*.

"As an association we represent handlers – some of the biggest employers at airports – yet we didn't really have a voice on the issue," Parekh continues. "Although we participate in industry forums, we often lack the data intelligence to support the initiatives that matter the most. SID not only plugs that gap but also provides a framework for standardised reporting to drive continual improvement."

Thus, SID was designed to offer a "universal set of damage-related data", he advises. While being completely anonymous in nature, it has also been kept easy for handlers to share their data, Parekh points out. "And the most important thing for us has been to keep the system simple."

While EcoOnline has played a vital role, of course, in developing the platform and ensuring that it is customised for ASA's needs, the company was by no means the only possible supplier: a number of companies were invited to tender and then those that were shortlisted were asked to demonstrate their potential solution to the ASA Safety Group. ASA spent much of 2020 firming up its requirements for the system and the system supplier was only decided the next year. The following months were then spent on fine-tuning the platform for ASA and putting it through its paces in a testing programme to prepare it for its recent launch.

### Future developments

The platform in its present guise may well not be the finished article. For example, Parekh would like one day for it to potentially include personal injury data as well as aircraft-related damage and near misses, and possibly also incidents relating to vehicles, security or the operating environment. He also has ideas, like Ball, for how ASA could use the portal in collaboration with other industry stakeholders.

There are potentially great synergies with the aforementioned IDX, for instance. "We could compare and contrast our data," he says, "to understand what's being reported by GSPs and what's being reported by airlines.

"If the data is different, why is it different? And we can work with IATA to see how the industry – airlines and handlers – can work together to minimise risk."

*The most important thing for us has been to keep the system simple*

***Yogesh Parekh,***
*Airport Services Association*

IATA has a significant interest in monitoring incidents of 'ramp rash', of course, and in identifying trends to recommend best practices that minimise such incidents for the benefit of its airline members – manifest in its International Ground Operations Manual (IGOM) and International Cargo Handling Manual (ICHM).

ASA has been in dialogue with the European Aviation Safety Agency (EASA), which of course has its prevailing interest in aviation safety on the Continent. The International Civil Aviation Organization (ICAO) is another interested party with which collaboration might be very promising when considering how safety can be benchmarked and dangerous incidents minimised on airport aprons.

All this adds to the promise offered by SID, complementing the "win/win" that it already represents for ASA members, Parekh considers, in the form of a free service to all ASA members that submit quarterly incident data, the database allowing them to benchmark their own performance, see where they might be going wrong and show their customers where they are doing well. There is much to admire, then. ■

# Vestergaard acquires remaining shares in Kalmar

Roskilde, Denmark-headquartered Vestergaard Company has acquired the remaining shares it had not previously purchased in Swedish pushback specialist Kalmar Motor, thereby becoming its sole shareholder

What Vestergaard and Kalmar describe as their "strategic partnership" has developed over the seven or so years they have been working together, such that prior to this latest news the companies were already working closely on sales and service functions.

Stefan Vestergaard, Vestergaard's CEO, comments: "We are delighted to have been given the opportunity to continue the proud legacy of Kalmar Motor. We are extremely proud to be able to bring together the best-in-class products and offer our customers a strong brand such as Kalmar Motor. Both companies place a great emphasis on delivering highly efficient and sustainable airport equipment to customers around the world."

Magnus Johansson, Kalmar's CEO, adds: "It has been important for me to ensure the continuity of Kalmar Motor – for the benefit of the customers and employees. Our long-term partnership has been a success, and I am confident Vestergaard Company is the best owner to take Kalmar Motor to the next level."

The two companies are expected to continue to operate as independent companies with their own product brands. Johansson is to sit on the Board of Directors, offering his support in the transition period.

According to a jointly issued statement, the co-operation between the companies will be "further strengthened to position each better for future growth". Moreover: "In the short term, investments have been made to increase the production capacity [of] Kalmar Motor, in order to keep up with the growing demand for their innovative electrical tractors."

Vestergaard's marketing manager, Karina Læssøe, tells *Airside* that the collaboration between the two GSE manufacturers started with Vestergaard Company becoming a service partner for Kalmar Motor in North America in January 2015. Vestergaard started out having a minority stake in Kalmar Motor and gradually worked towards full ownership that took effect on 1 October this year.

She explains that both Kalmar Motor and Vestergaard Company have very similar values and strategies. Moreover: "Both have strong brands and many years of experience within development and production of high-quality GSE equipment," Læssøe notes.

"Both companies have invested heavily in new technology training and green development to be able to supply our customers with sustainable GSE equipment and solutions," she continues. "We believe that the synergy and exchange of experience will benefit both companies as well as our customers."

Vestergaard is perhaps best known for its aircraft de-icing products, although it also offers high-end toilet service vehicles, water service vehicles and aircraft washing systems. Kalmar offers a wide range of both

conventional and towbarless tractors and is well known for its focus on green electric and hybrid power products.

As a result, then, "The Vestergaard and Kalmar teams will work together to be able to offer our mutual customers a wider portfolio of state-of-the-art GSE products," says Læssøe. "We believe that it will benefit our customers to have easier access to information on a wider product range. From the customer side, it is often the same people/departments who both use and are responsible for the purchase of several GSE products, so the Kalmar Motor product line will complement the Vestergaard products when offering high-class, sustainable GSE to our customers."

While there will be synergies to be gained from coming together, the strengths of both companies will also continue to live on. "It is important to state that Kalmar Motor continues to exist – both as a company and as a brand," says Læssøe.

"Kalmar Motor employees will stay on, and production and development will continue to take place in Kalmar, Sweden. Plus, as already mentioned, we see advantages to be gained in co-operation between the development and sales teams."

Læssøe offers more detail on the announcement that there will be further investment in Kalmar. "Kalmar Motor moved to new and larger production facilities prior to celebrating its 50th anniversary in 2019," she informs. "Currently, an additional production facility is being added to the premises to further increase production capacity in Kalmar."

As for the possibility of further acquisitions: "Vestergaard Company has no plans for further acquisitions at this stage, but of course if the right match and the right business case emerge, then we will look at that as every other business would do."

## Demonstrating the latest innovations

Vestergaard showed off various improvements it had made to two of its products in particular at the recent GSE Expo Europe held at Le Bourget in Paris in September.

Says Lars Barsøe, Vestergaard's vice president sales & marketing: "Our focus at the GSE Expo Europe 2022 was to showcase our newest products and developments within sustainable GSE. We brought to the show our e-Mini MY Lite [de-icer], e-BETA [de-icer] and our new electrical VTS [Vacuum Toilet Service] unit.

"The e-BETA is the world's first electrically operated de-icer, now sold to and operating in six airports worldwide, while the e-Mini MY Lite is the first fully electrical de-icer in the market – and of which the first couple of units have already been sold," Barsøe says.

Plus: "We have further developed our e-VTS which has really taken hold in the market over the last few years. The new model has several improvements and has an interesting price level."

There were plenty of visitors to the stand taking a look at these units. "We definitely feel that the market is looking towards sustainable GSE solutions and we saw a lot of interest for our electric product range," Barsøe recalls, adding: "There are lots of follow-ups to be done after the show."

The interest is perhaps indicative of a recovery in the GSE market post-Covid. "We do see that the market is picking up," Barsøe confirms. "The Covid-19 pandemic fostered uncertainty in the market, and naturally companies deferred from making any investments.

"Now that the sector has picked up again and in some markets is close to pre-Covid-19 levels, the needs are there and investments are flowing again. Furthermore, in many markets the crisis has been used to make a change to more environmentally friendly solutions, and that will benefit us in the years to come."

But he does offer a cautionary note: "The world is, however, still uncertain with war in Europe, supply chain issues, and fast-rising inflation which again may put a damper on people's demand for flying." ■


*AeroVect was at GSE Expo Europe 2022, promoting its collaboration with dnata*

# AeroVect: A start-up success story

Eugenio Donati is a co-founder of AeroVect, a California-based specialist in technology for the autonomous operation of GSE. He explains how the company's original equipment manufacturer (OEM)-agnostic, self-driving software AeroVect Driver has quickly attracted the interest of some major players in the aviation industry, the latest of which is Dubai-headquartered ground services provider dnata

**Can you tell us about the origins and thinking behind AeroVect?**

We started AeroVect in June 2020, just a few weeks after graduating from university, right in the middle of the pandemic. I met my co-founder Raymond Wang at Harvard [University], and we quickly became friends – we're both deeply passionate about aviation and logistics (Raymond is a pilot in his free time).

We started AeroVect to help solve some of the toughest challenges facing the global aviation industry – chronic labour shortage, ground damage and inefficient handling operations – with OEM-agnostic automation technology for GSE that can be retrofitted on existing vehicle fleets.

We want to reinvent ground handling at the world's busiest airports with our GSE automation software – we call it the AeroVect Driver – starting with baggage and cargo tractors. Our team is primarily

made up of self-driving and robotics engineers from some of the leading companies and universities – including Argo, Apple, Harvard, Stanford, MIT [the Massachusetts Institute of Technology] and Ford – and is backed by the leading aerospace and automation investors from Silicon Valley.

**You have made big progress in just a couple of years; it must have been quite a journey?**

Raymond and I started AeroVect in the garage of a house just two years ago after graduating from university, and we're now working with the world's largest airlines and ground handlers to deploy AeroVect at scale at some of the busiest global airports – it has been an incredible journey so far, and we're beyond excited for the years ahead as we scale AeroVect into the leading global provider of airport automation technology.

## Building from the ground up

Donati tells *Airside* that the requirements of autonomous GSE operations are different to those of other autonomous vehicles, such as those in the automotive industry.

Hence, the founders' decision to "take a different approach" and build AeroVect Driver "from the ground up" specifically for airport GSE operations. The hardware that it uses to sense objects around it – cameras and light detection and ranging (LIDAR) equipment – might be off-the-shelf, but the software created by Donati and his colleagues is unique. For instance, AeroVect Driver software is able to take data from the system's sensors and use it to identify other types of GSE or aircraft that it encounters.

The GPS built into the system – also off-the-shelf, "efficient and cost-effective" – allows an AeroVect Driver-operated GSE unit to know where it is precisely on the Earth's surface, while the airport 'map' programmed into the system enables the unit to identify where it is in the airport environment and whether any object it encounters is 'dynamic' or 'non-dynamic'.

What then is really unique about AeroVect Driver, Donati adds, is that the system can make decisions about its ongoing behaviour based on that input data – whether to go left or right, forward or stop, etc. ■

It's very rewarding to see our technology being deployed at large airports in live operations by the world's leading airlines and handlers.

**Tell us about the recent news announced regarding your partnership with dnata**

We're partnering with dnata, one of the largest handlers worldwide, to pilot and deploy our OEM-agnostic GSE automation technology across its global operations, starting at a major airport in the US next spring.

dnata has a bold and ambitious vision for the future of handling, and with its unparalleled scale, passion for innovation and commitment to service excellence to its airline customers, it's a logical partner for AeroVect.

**Will the testing of a dnata baggage tractor be undertaken at one of the US airports that you have already mapped?**

Yes, the initial pilot deployment will involve a cargo tractor retrofitted with AeroVect's OEM-agnostic automation software at a major US airport, which we mapped last fall [autumn]. We will autonomously transport cargo between cargo warehouses and the airport's terminals.

**We looked at your collaboration with US ground service provider GAT in the summer issue of *Airside* (https://www.airsideint.com/issue/summer-2022/); can you bring us up to date on how the testing with GAT has gone?**

We partnered with GAT, one of the largest and fastest-growing handlers in America, to pilot and deploy AeroVect GSE automation across their North American operations, including at major hubs such as SFO [San Francisco International Airport].

We successfully completed an initial pilot deployment at SFO earlier this year, and are excited to continue working with GAT in 2023 to deliver the benefits of ground handling automation across their stations in North America.

**Airlines are also beginning to take a close look at AeroVect Driver, are they not?**

We're also working with a US legacy carrier to pilot and deploy GSE automation technology at its large US hubs, which include some of the world's busiest airports. We'll be announcing that partnership very soon.

We have received an overwhelming amount of interest in our GSE automation technology in recent months from many of the world's largest airlines and handlers, who are keen to leverage our industry-leading automation technology to boost efficiency and safety on the ramp.

We're currently laser-focused on working with our three launch partners – GAT, dnata and the US legacy carrier – to scale AeroVect across their US and global operations.

**What plans have you got for the coming months? Are you intending to develop the AeroVect Driver technology further or map more airports' airside environments?**

We have lots of exciting plans for the months ahead – we have a few big announcements coming up in the next two to three months, and we'll be kicking off our pilot deployment with dnata in the spring.

We'll also be rolling out additional capabilities for AeroVect Driver – our GSE automation software – to further enhance performance and reliability.

Regarding mapping, we have already built the world's largest and most diverse dataset of airport driving data, including data from more than half of the top 10 US airports, including a wide variety of road and weather conditions, and we plan on mapping additional stations early next year.

**Are there any particular markets that you are targeting for sales?**

We're currently focused on working with large self-handling airline and handling customers across the US, Europe and the Middle East – regions that are home to the world's largest and most complex ground handling operations and in desperate need of GSE automation technology to address the deep pains caused by today's chronic labour shortage, including pervasive delays and soaring costs.

***Eugenio Donati,** CEO, AeroVect*

**Do you think that there is going to be a pretty much unstoppable trend towards more autonomous operations on the ramp, including the use of autonomous GSE? Has the pandemic sped up that process?**

Airlines and handlers have been struggling with labour shortage, rising costs and ramp safety issues for years. Covid resulted in a massive dislocation in the labour market for ground handling (and logistics more broadly), making it nearly impossible for large airlines and handlers to run their ground operations efficiently with human labor.

Large airlines and handlers have realised that ramp automation is essential to running efficient, safe and cost-effective ramp operations, and – with AeroVect – the technology is finally here.

The airside automation revolution is already here, and it will only accelerate in the coming months and years as demand for air travel bounces back post-pandemic. ■

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