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ONLINE EXCLUSIVES

How the Spirit-Frontier Merger will Impact the Industry

By Joe Petrie

AviationPros takes a look at how airports may be impacted by the merger of two leading ULCCs.

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VIDEOS

Vestergaard Facility Tour

Brock Crocker, business manager – North America at Vestergaard Company, offered *Ground Support Worldwide* a behind-the-scenes look at the company's recently opened facility in McHenry, Ill.

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PODCASTS

Stage 3 IS-BAH Registration at McCreery Aviation

Bob McCreery, president of McCreery Aviation at McAllen International Airport in Texas, joins *Ground Support Worldwide* editor Josh Smith to discuss the International Standard for Business Aircraft Handling (IS-BAH) program and the FBO's experience earning Stage 3 registration.

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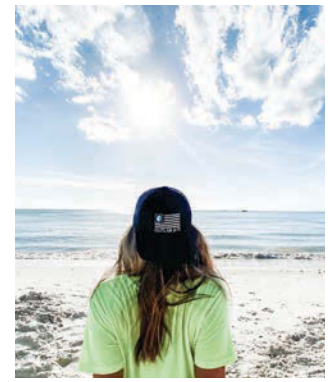
ARTICLES



2022 Private Aviation Outlook: Solid Demand and Increased Ownership

By Felipe Reisch

Michael Farley, founder and CEO of Outlier Jets, shares his vision on what the business aviation market should expect in the upcoming months, after record-breaking figures set by the U.S. domestic demand.

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Debunking the Myth that Digitalization Means Losing Control

By Roy Hughes

Since the emergence of COVID-19, the demand for digital platforms to support stretched operations has accelerated across the industry.

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How Cargo Demand Impacts GSE Needs

By Josh Smith

Airlines and ground service providers are using equipment to overcome cargo capacity challenges.

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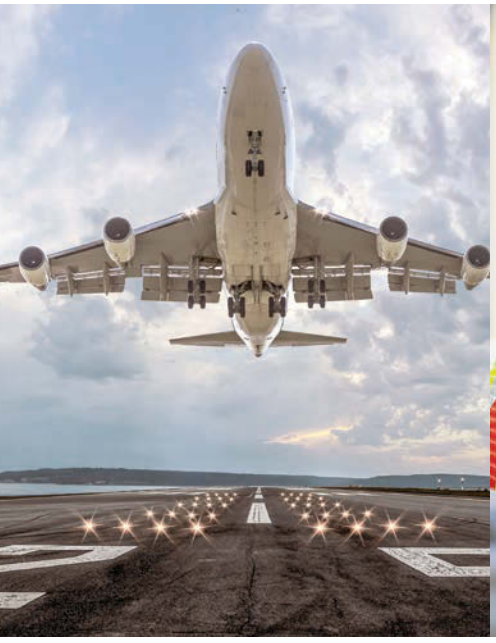

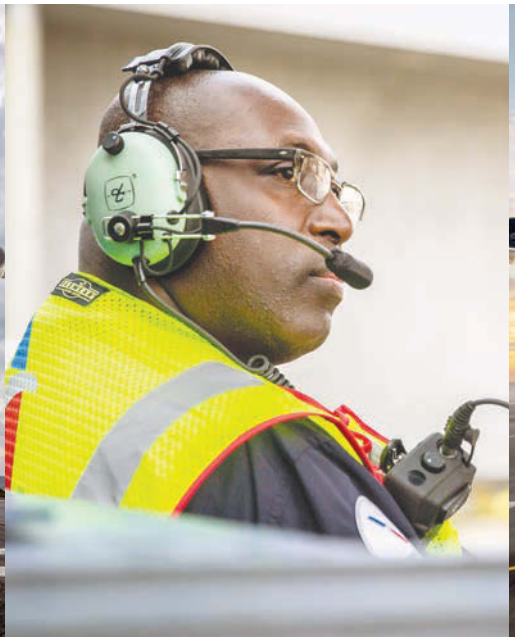

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Editor's Note

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EAGLE's Efforts to Promote Unleaded Avgas

Intent on eliminating the use of leaded aviation fuel, the Eliminate Aviation Gasoline Lead Emissions initiative will have an impact on ground support infrastructure across general aviation.

In February, the Federal Aviation Administration (FAA) announced an initiative outlining steps to eliminate the use of leaded aviation fuel by 2030 without negatively affecting the existing piston engine fleet.

According to a press release announcing the initiative, Eliminate Aviation Gasoline Lead Emissions (EAGLE) will be based on four pillars of action that involve the FAA, the Environmental Protection Agency (EPA), fuel suppliers and distributors, airports, engine and aircraft manufacturers, research institutions, associations, environmental experts, communities and other key stakeholders.

The search for effective unleaded fuels has taken place for more than a decade. The Piston Aviation Fuels Initiative (PAFI) has tested a number of fuels. Supplemental Type Certificates (STC) have also been used to develop unleaded fuels, including Swift's UL94 and General Aviation Manufacturer Incorporated's (GAMI's) 100 octane fuel. These fuels are in use for low compression engines, but a solution is still being sought for high compression engines that make up a majority of general aviation aircraft.

EAGLE's four pillars of action include developing unleaded fuels infrastructure and assessing commercial viability; supporting research and development and technology innovations; continuing to evaluate and authorize safe unleaded fuels; and establishing necessary policies.

Certainly, much thought and planning will be required to incorporate many perspectives on this topic. That's evident by the number of associations involved, including the General Aviation Manufacturers Association (GAMA), Aircraft Owners and Pilots Association (AOPA), American Association of Airport Executives (AAAE), Experimental Aircraft Association (EAA), Helicopter Association International (HAI), National Air Transportation Association (NATA), National Business Aviation Association (NBAA) and American Petroleum Institute (API).

As it pertains to ground support for general aviation, the need for infrastructure to supply unleaded fuels is the pillar that will have the greatest impact. For example, an FBO or municipal airport may have to consider whether to put in another tank so it can offer 94UL fuel or (another alternative) or wait until an unleaded fuel is identified by EAGLE and certified so existing tanks can be converted to handling the new fuel.

"There are a lot of communities and a lot of FBOs that are very concerned because that's not a cheap proposition," said Pete Bunce, GAMA president and CEO, during an AOPA-hosted webinar.

President and CEO of AOPA Mark Baker agreed, noting a drop-in fuel is the best solution for most existing infrastructure at airports.

"Our real intent here is to have a fleet-wide acceptable fuel that's drop-in because the scale of economics around most general aviation airports, you can't have three tanks and make your choices," he said during the webinar. "I also believe there's a high risk of safety if we don't have communication about what's an appropriate fuel for your airplane."

To assist with the communication aspect, the Avgas Coalition, a broad group of organizations "aligned on a smart and safe transition to unleaded aviation fuel," has been established and now has more than 100 members. Baker encouraged anyone involved in general aviation and piston aircraft to join the coalition to stay up to date with the latest developments concerning unleaded avgas.

More information about EAGLE and the Avgas Coalition can be found at www.aopa.org/100ul.

With the urgency established by the 2030 deadline, more ingenuity and developments pertaining to unleaded avgas can be expected. We'll continue to report on the topic at AviationPros.com. I also welcome your thoughts and considerations on the topic. Reach out to me at josh@AviationPros.com.


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TOP NEWS

Jet Aviation Receives IS-BAH Stage 2 Safety Registration for Scottsdale and Bozeman

Jet Aviation has received International Standard for Business Aircraft Handling (IS-BAH) Stage 2 safety registration for its two newest FBO locations in the USA. With these new certificates, all 11 Jet Aviation FBOs in the USA are Stage 2 registered. The company currently operates 30 IS-BAH-registered FBOs around the world.

Launched in 2014 by the International Business Aviation Council (IBAC), the IS-BAH registration process was established to ensure handling systems, processes and practices meet rigorous safety and security standards.

"Congratulations to the Jet Aviation Scottsdale and Bozeman locations for achieving IS-BAH Stage 2," said Terry Yeomans, IBAC's director of the IS-BAH program. "We've been working with Jet Aviation for many years now and compliment them on placing such high value on safe operations. We look forward to continuing our relationship for many years to come."

Ronald Schneider, Jet Aviation's director and GM of Bozeman, said, "We are delighted to have our robust safety measures recognized by the industry. As the highest international safety standard for ground handling, this is a great achievement for a job well done by the entire Bozeman team." Schneider further stated that his continual advice to the team is, "preparation is the key to success."

Upcoming Events

March 29-31
GHI Americas
Miami, FL

April 5-7
NBAA Schedulers & Dispatchers
San Diego, CA

April 27-29
MRO Americas
Dallas, TX

April 29-May 4
NEC/AAAE International Aviation Snow Symposium
Buffalo, NY

May 3-5
NBAA Maintenance Conference
San Antonio, TX

May 23-25
CNS Partnership Conference
Phoenix, AZ

May 23-25
European Business Aviation Convention & Exhibition (EBACE)
Geneva, Switzerland

May 30-June 2
IATA Ground Handling Conference
Paris, France

New Ground Handling Agreement Template to Facilitate a Safe and Efficient Aviation Ecosystem

Airports Council International (ACI) World, in collaboration with the Airport Services Association (ASA), has released a new Ground Handling Service Provider (GHSP) and Airport Operator Agreement Template to facilitate and promote a safe and efficient aviation ecosystem.

The agreement template is a crucial guidance document to improve collaboration between airport operators and GHSPs, by helping to formalize the relationships between the organizations as well as to harmonize requirements and standards for operating at an airport and around an aircraft.

The guidance document can also help overcome some of the additional safety challenges brought on by the social and economic impact of the pandemic, namely the capacity to offer services according to defined service levels.

Together, through improved operational harmonization and human performance, the agreement template has the potential to improve the safety and efficiency of the aviation ecosystem for the benefit of current and future consumers.

"The ACI-ASA Ground Handling Service Provider and Airport Operator Agreement Template is essential to iron out the much-needed harmonization of operational requirements for ground handlers working at the airport environment, essential for a safe and efficient aviation ecosystem and ensuring closer collaboration between airports and GHSPs. Aviation is a symbiotic relationship where each stakeholder must rely on the other," ACI World director general Luis Felipe de Oliviera said.

IATA Launches New Ground Operations Portal

The International Air Transport Association (IATA) announced the launch of the IGOM Portal, a major support tool for the efficient implementation of the IATA Ground Operations Manual (IGOM).

IGOM is the established global industry standard for ground handling worldwide. The IGOM Portal is an online platform where, with IGOM as the primary reference, airlines and ground service providers (GSPs) can exchange information, including any variations, on their ground handling requirements.

"Safe and secure on-time turnarounds are a priority for airlines and a critical deliverable for GSPs. Standardization of procedures through the IGOM is a key enabler. But it must be implemented to be effective. The IGOM Portal will provide the means to understand variances and manage adoption," said Nick Careen, IATA senior vice president operations, safety and security.

The IGOM portal will bring the following benefits to airlines and GSPs:

- Simplified verifiable communications: A fully traceable notification and acknowledgment function facilitates communications between airlines and GSPs on IGOM variations.
- Latest information: Real time updates to the IGOM are immediately published on the portal.
- Benchmarking: A comparison function enables a digital gap analysis between IGOM requirements and the manuals used by airlines and GSPs.
- Network overview: Local variations at all stations can be viewed for network overview of IGOM adoption.

The IGOM Portal is available free of charge to all airlines and GSPs.

dnata Enhances Cargo Offering in Erbil, Iraq

dnata implemented the "OneCargo" system, digitizing processes and maximizing efficiencies across its cargo operations in Iraq. The advanced tool, which dnata plans to launch globally, is expected to deliver significant commercial benefits for customers.

OneCargo automates key business and operational functions, including safety and quality monitoring, reporting and ULD management, with an integrated, cloud-based platform. AI-driven tools and analytics provide enhanced visibility on sales and business performance, allowing customers to match real-time demand with available capacity for maximum profitability. In addition, OneCargo eliminates all redundancies and manual check sheets, substantially improving operational efficiency.

Having launched the system in Iraq, dnata plans to gradually implement OneCargo at additional stations, including airports in Pakistan, Switzerland, UAE, USA and Zanzibar (Tanzania) across its extensive global cargo network. By 2023, OneCargo will have a user base of over 2,000 staff members across 10 stations in six countries, interfacing seamlessly with a host of other system applications within the IT landscape of the business.

"The implementation of OneCargo in Erbil is a major milestone which paves the way for the global launch of this advanced digital solution. In addition to improving operational and commercial performance, OneCargo will help us drive synergies across our international network and ultimately offer more value to our customers," said David Barker, dnata's divisional senior vice president for airport operations.

"We continue to invest in cutting-edge technologies, advanced infrastructure and process improvement to consistently deliver the same high level of safety and quality at every dnata station across the globe."

Havas Completes Acquisition of Zagreb Ground Handling Company

Havas, a TAV Airports and Groupe ADP company, began providing services in Zagreb, the capital city of Croatia. Operating at 29 airports in Turkey, Havas extended its global reach to Zagreb in addition to Riga, Latvia.

With a recently signed agreement, Havas took over passenger, ramp, representation and supervision services, flight operation, load control and communication services as well as cargo and mail services at Zagreb Airport.

"We focus on constantly improving our operations through innovative solutions and providing the best service to our airline collaborations. As a member of the Turquality program, we take the opportunities to achieve growth abroad with the know-how we have gained in Turkey," Havas general manager S. Mete Erna said.

"Approximately 30 airlines regularly fly to Zagreb Airport, which is a significant touristic destination in the Adriatic. We will carry out all processes as the sole ground handling service provider at the airport, which also has cargo and general aviation traffic. We will increase the efficiency of our operations, sustain our investments in ground handling services and continue to be the preferred business partner of airlines."

Havas will provide service in Zagreb with approximately 500 employees and a machine park consisting of 176 motorized and 346 wheeled equipment. The Zagreb station is holds ISAGO certification by the International Air Transport Association (IATA).

PEOPLE

IATA Appoints Leger SVP for Commercial Products & Services

The International Air Transport Association (IATA) has appointed Frederic Leger as the association's senior vice president for commercial products and services. Leger served in the role on an interim basis since July 2021, when IATA's Commercial Products and Services Division was created as part of an internal restructuring. He reports to Willie Walsh, IATA's director general.

Leger holds the concurrent position of president of IATA's Cargo Network Services in the U.S., a responsibility he has held since May 2021.

Leger joined IATA in 2005 as head of e-Invoicing Services. Since then, he has held various roles at the association with a focus on IATA's commercial products and services and cargo.

"IATA's commercial products and services are vital. First and foremost, they support efficient global connectivity. This includes essential offerings such as the IATA Travel Pass and Timatic which, together, provide critical support for efficient checking of health credentials and entry requirements. Furthermore, the commercial success of IATA's products and services enables the association to deliver critical activities on which the global air transport industry relies. Examples include standards setting to enable safe and efficient operations, and advocacy to help the industry achieve net zero carbon emissions. Frederic has taken on a huge responsibility, and I have every confidence in his success," said Walsh.

Leger is a French national based in Geneva, Switzerland. He holds a master's degree in strategy with honors from the Grenoble School of Management and studied supply chain as well as finance at the Lyon School of Management.

Leger

Menzies Aviation Appoints New Digital and Innovation Senior Vice President

Menzies Aviation has appointed Filip Nekvinda as its new senior vice president of digital and innovation. Nekvinda has a wealth of digital transformation experience, which he gained by leading digital projects for global brands including IKEA and Procter & Gamble. From digital employee initiatives, to automation and supply chain digitization, to innovation through various emerging technologies, he has a track record of successfully delivering these on an international scale.

Nekvinda

Nekvinda will lead Menzies' digital strategy and drive forward its digital capabilities. Key focus areas for Nekvinda include employee engagement, operational efficiency and helping Menzies and its customers achieve carbon reduction targets by digitizing processes.

This is a new strategic role for Menzies as the company takes the next step in its digital and innovation journey to become even more efficient and effective across its global operations.

"We're excited to welcome Filip to Menzies and utilize his fresh perspective and wealth of expertise in digital transformation as we continue our digital evolution. We are an integral partner in the aviation supply chain and collaborating with customers to help them achieve their digital transformation goals is essential. Filip's influence will benefit Menzies as well as our customers' digital journeys as we strive to achieve efficiencies and decarbonization goals," Mark Reid, chief information officer at Menzies Aviation, said.

SITA Appoints Lavorel as its New CEO

The SITA Board has announced the appointment of David Lavorel as the company's new CEO.

Under his leadership and vision, SITA will continue to lead a strategic change for the industry, helping its customers implement digitalized and smart solutions.

Lavorel

Over the past 20 years at SITA, Lavorel has served in a range of senior roles, most recently as CEO of SITA at Airports and Borders. He also served as CEO of SITA for Aircraft, where he pursued a strategy to extract the full potential of the connected aircraft for SITA's airline customers. As senior VP corporate development and head of the CEO office, Lavorel's responsibilities included executing the company's growth and development plans.

"The air transport industry has been through an incredibly turbulent period. As we look to recovery, digitalization of the industry is a key focus. David's experience and knowledge of both the industry and SITA will be instrumental in cementing SITA's position as a trusted

partner, working with our shareholders to shape the future direction of the organization," Omar Jefri, SITA board chair, said.

"David brings a deep conviction and commitment to delivering SITA's vision as a vital industry partner. The SITA Council looks forward to working closely with him," Adib Charif, SITA council president, said.

Flux Power Appoints Bo-Linn to its Board of Directors

Flux Power Holdings Inc., a developer of advanced lithium-ion battery packs for electrification of commercial and industrial equipment, announced the appointment of Cheemin Bo-Linn, to its board of directors as an independent director. Bo-Linn will also serve as a member of the audit committee, compensation committee and nominating committee.

Bo-Linn serves as chief executive officer of Peritus Partners, Inc., a valuation accelerator which also provides consulting and operations expertise in software (SaaS), IoT, mobile and digital (analytics, marketing, e-commerce, supply chain and cybersecurity). Previously, during her 20-plus years in senior IBM executive roles, she led global teams as IBM's VP of Industrial Sector/Electronics, responsible for IBM's software, semiconductor chips, storage and consulting services. Bo-Linn earned a doctorate degree in computer-based management information systems and organizational change from the University of Houston.

"We are privileged to welcome Cheemin to the board, bringing diverse and valuable technology industry experience in manufacturing, software, clean tech, battery storage," said Ron Dutt, chief executive officer of Flux Power. "She joins us at an opportune time with her firsthand experience in the global industrial sector and product brand development, as well as leading global brands through hypergrowth and diversification. In addition, her expertise on environmental, social and corporate governance (ESG) strategies will support our expansion. Cheemin will help us increase the breadth and depth of our reach as a company, positioning us to continue our growth and to create value for our shareholders."

"Flux Power has reached a key inflection point in its evolution, and I am honored to offer my insight as the company continues its growth trajectory to meet the increasing demands for its lithium-ion battery packs and the addition of new customers and products. I look forward to working alongside Ron and the rest of the board to build its vision of electrification for the global material handling and industrial equipment sectors," Bo-Linn added.

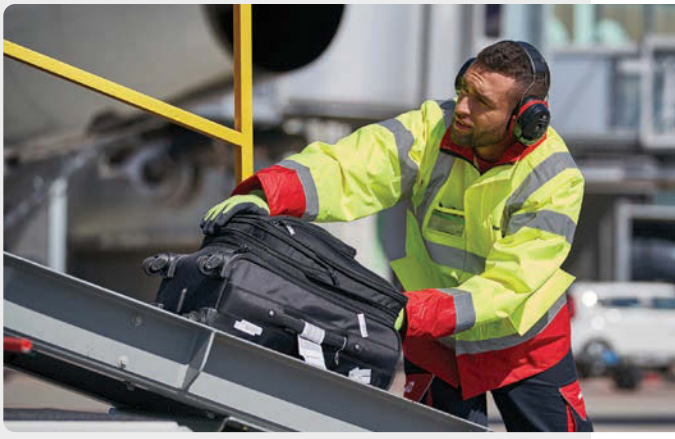
NEW DEALS

Azul Awards Swissport New Business at Viracopos Airport in Campinas

Azul Linhas Aéreas, one of Brazil's leading airlines, has contracted Swissport to provide airport ramp handling, aircraft cleaning and cargo handling for its hub at Viracopos International Airport (VCP). The eight-year contract is an important expansion of the existing collaboration between Azul and Swissport, a leading provider of airport ground services and air cargo handling.

Swissport currently serves Azul at eight locations in Brazil.

"We are pleased to take our partnership with Azul to the next level," said Rene Pascua, Swissport's head of Latin America and the Caribbean. "Swissport has been serving Azul at several airports since the start of their operations in 2008, and we are honored to earn their renewed trust and to serve them at their home base. Swissport is well prepared to support Azul's growth in Brazil and beyond as it adds new aircraft."



GEODIS Awards Manpower Contract to WFS to Manage Paris CDG Cargo Facility

Global logistics service provider GEODIS has awarded Worldwide Flight Services (WFS) a manpower contract to supply a dedicated team of cargo handling professionals for its facility at Paris Charles de Gaulle Airport.

The agreement, which commenced January 2022, will see some 28 WFS handling staff operate GEODIS' brand new 4,000-square-meter cargo facility at the airport, which is expected to handle up to 20,000 tons of air cargo annually. Under the agreement, WFS is providing management and operations personnel to meet GEODIS' service requirements as well as GSE equipment.

The WFS team will be responsible for cargo reception, palletization, cargo security, dangerous goods regulations (DGR) checks, transferring cargo to airlines, documentation and specialist pharma handling. WFS already supports GEODIS with similar services at its locations in Paris Orly, Lyon, Marseille, Montpellier, Toulouse, Bordeaux, Nantes and Strasbourg.

"WFS welcomes this opportunity to reinforce our partnership with GEODIS in France, and to be expanding our footprint at Paris CDG. This is also part of our continuing focus to support the cargo handling requirements of freight forwarders. With our locations across France and connecting trucking network, more forwarders are looking to work closer with us to benefit from our expertise, including WFS' ability to set-up efficient warehouse operations and to optimize ULD and pallet capacity. Our experience of providing in-house freight forwarder assistance and WFS' IATA CEIV certified pharma handling services is very appreciated too. So, we hope to gain more opportunities like the one we enjoy with GEODIS," said Laurent Bernard, VP Cargo France at WFS.

Gerry's dnata Launches Line Maintenance Services in Pakistan

Gerry's dnata has obtained Maintenance Organization Approval from the Pakistan Civil Aviation Authority to provide aircraft line maintenance services to airline customers, and now offers ground handling, cargo and technical services at the airports of Karachi (KHI), Lahore (LHE) and Islamabad (ISB).

Gerry's dnata's team of professionals can provide full line maintenance support and are trained on customers' company procedures, providing a seamless service to both passenger and cargo airlines.

The launch customer is flydubai, which Gerry's dnata already serves at four airports in Pakistan providing a range of ramp and passenger handling services to the airline and its customers.

"As Pakistan's leading ground handler, we constantly enhance our offering to

best meet the needs of our customers. We are confident that our airline partners will welcome the expansion of our portfolio and take advantage of getting quality and safe ground handling and technical services from a single provider. Our team of highly trained, seasoned professionals will deliver world-class quality and safety for our valued customers," Syed Haris Raza, vice president of Gerry's dnata, said.

"We are looking forward to expanding our relationship with Gerry's dnata to include line maintenance services in Pakistan. Having a single, local provider to oversee our line maintenance, as well as ground handling, will add more efficiencies to our fleet management and ensure a quicker turnaround of our aircraft," Mick Hills, senior vice president of Engineering and Maintenance at flydubai, added.

Unifi Expands Full Ground Handling Services with Breeze Airways with 11th Location

Unifi, the largest provider of aviation services in North America, recently expanded its full ground handling services with Breeze Airways with the addition of a new station in West Palm Beach, Fla. The new station marks Unifi's 11th location with Breeze, making Unifi the airline's largest provider of ground handling services.

Unifi has provided aviation services to Breeze Airways since its inaugural flight on May 27, 2021. It is expected Unifi will support six flights per week at the West Palm Beach International Airport.

"We've been a proud partner of Breeze Airways since they started," commented Gautam Thakkar, Unifi's CEO. "As their largest aviation services provider, we are thrilled to support their Seriously Nice approach to their customers by delivering strong performance across all measurable categories."

Unifi provides full ground handling for Breeze Airways at the following locations: Akron, Ohio; Bentonville/Fayetteville, Arkansas; Hartford, Connecticut; Huntsville, Alabama; Louisville, Kentucky; Norfolk, Virginia; Providence, Rhode Island; San Antonio, Texas; Tampa, Florida; Tulsa, Oklahoma; and West Palm Beach, Florida.

"Unifi is an ideal partner for Breeze," said Danny Cox, VP, guest experience at Breeze. "The flexibility they offer allows us to scale up quickly and cost-effectively. Our partnership grows and deepens as Breeze expands, and Unifi helps us deliver on 'Seriously Nice' for our guests."

Universal Aviation Expands Presence in Spain

Universal Aviation, the worldwide ground support division of Universal Weather and Aviation Inc., has expanded its presence in Spain. Universal Aviation Spain has teamed with Andalucia Aviation, adding six ground handling locations in southern Spain. As part of the agreement, the locations will remain branded Andalucia Aviation locally but will now fall under the Universal Aviation network.

The six new Universal Aviation Spain locations include Almeria (LEAM), Ciudad Real (LERL), Granada (LEGR), Jerez (LEJR), Malaga (LEMG) and Sevilla (LEZL). The six new locations join existing Universal Aviation Spain locations in Madrid (LEMD), and Barcelona (LEBL) and Girona (LEGE) giving the network a total of nine locations in Spain and 23 total in Europe, the Middle East and Africa. Universal Aviation Spain has been providing ground handling services in Spain for more than 43 years.

"We've experienced increased demand from our clients to leisure destinations throughout Southern Spain," said Gonzalo Barona, Jr., general manager, Universal Aviation Spain. "Even with the current COVID restrictions, many of these locations are experiencing traffic levels exceeding their pre-pandemic numbers. We expect this to only increase as restrictions hopefully ease in the coming months."

Barona said Universal Aviation will take advantage of the expertise and experience of the current Andalucia Aviation team members while continuing to enhance the company's already strong track record of safety and service.

Aviator Signs New Contract with Eurowings

Aviator Airport Alliance, a full-range provider of aviation services at 15 airports across the Nordics and a family member of one of the largest aerospace service groups Avia Solutions Group, has strengthened their partnership with Eurowings by signing a new contract.

Under the new partnership agreement, Aviator will provide Eurowings with ground handling and deicing services at the newly established airline's base at Stockholm Arlanda airport. The contract will be in effect until 2028.

What the Latest Update to ATA 103 Means for Fuel Handlers

Water barrier filters meeting EI 1588 have been recognized as an acceptable replacement for filter monitors that utilize super absorbent polymers (SAP).

By Josh Smith

Airlines for America (A4A) recently announced it is modifying its ATA 103 standard for jet fuel quality control at airports to immediately allow the use of water barrier filters.

Bulletin 2022.1 notes water barrier filters meeting EI 1588 qualifications are an acceptable replacement for filter monitors that utilize super absorbent polymers (SAP).

Filter monitors containing SAP are being phased out of the industry after an IATA Special Interest Group was made aware of multiple incidents where the presence of SAP in engine/airframe fuel system components had been confirmed.

During a NATA-led webinar in February, Rob Guglielmi, global business development manager for Parker Hannifin Corporation's Aerospace Filtration Division, said developing a replacement for monitor filters has been a challenge for manufacturers, and added his company felt a drop-in replacement was crucial in order to phase out SAP as soon as possible.

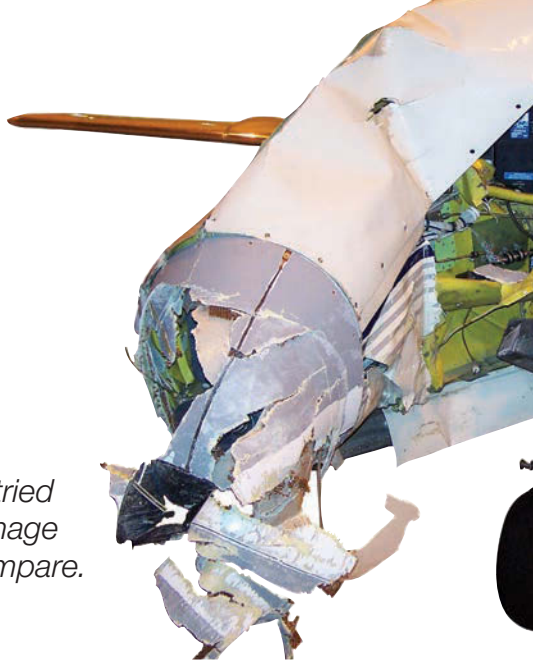
"We've removed all the SAP from this technology. It still performs the water slug testing. It still meets the emulsified water testing, the solace testing, the compatibility testing and the structural testing. So, the performance requirements of the 1588 is as stringent as 1583, only it's without the SAP media," Guglielmi said.

"It is a 2" drop-in replacement," he continued. "It's able to remove water and dirt and doesn't allow any of it to pass, so you get clean, dry fuel without the use of SAP."

During the same webinar, Amy Carico, director of fuel services and technical standards at A4A, said testing was required in both a laboratory setting and in the field.

"A4A teamed up with IATA and JIG, the Joint Inspection Group, to put together a set of challenges, if you will, at airports across the globe to see how these things performed in real life," she said.

"We learned a lot in that process," Carico added. "The bottom line is, the filters underwent an extensive amount of testing for us to validate and get to this point where we felt very confident that these types of technologies could be brought out to the field in a safe and effective manner."



Break the Ground Damage Code

While many organizations within the aviation industry have tried to create a common formula for measurement, ground damage is often calculated in different ways and can be difficult to compare.

BY IVAR BUSK

Ground damage is a well-known problem in the aviation industry. The problem has existed since the start of aviation. In recent years (before the coronavirus pandemic), there has been a lot of focus on exactly this subject.

The cost often involves a loss that directly impacts the bottom line. Many initiatives have been taken to come up with solutions to prevent these occurrences.

But up until now, the situation has not changed significantly, despite the many efforts and as so, safety is still a very important issue.

Definitions

Various organizations in the aviation industry have tried to agree on a common definition of how ground damage should be registered and not least associated to disruption cost. One is the definition of where the damage happens — and the best one — is as follows. *"Aircraft ground operation can be defined as from the moment the aircraft start taxiing, after landing run and until the throttles are commenced for take-off."*

A further detail is breaking down what exactly is included in damage of ground operation:

- Servicing, which includes all handling activities
- Maintenance
- Aircraft operation under own power
- External actions e.g., airport authorities

Another question is what should be reported. In general, all damage should be reported when it happens and should be assessed by qualified maintenance staff before new departure.

However, unfortunately the most common damage is seldom reported when it happens and it becomes classified as "unreported damage."

This will present a major problem if the damage has a bearing on the flight characteristic. Most damage happens by service equipment during handling. Exposed places include cargo doors, surroundings and wing-mounted engines.

Statistics

Statistics are often calculated in different ways and can therefore be difficult to compare.

Also, the definition of a "ground damage" is different depending on the airline or organization. Many organizations within the aviation industry have tried to create a common formula for measurement.

The International Air Transport Association (IATA) has been in the lead. Airports Council International (ACI) and Flight Safety Foundation (FSF) by their ground accident prevention (GAP) project have also tried. The calculation is based on the number of departures verses the number of registered as damaged, including unreported damage. On a worldwide basis, there were approximately 32 million departures with jet aircraft in service in 2019, up from approximately 18 million departures in 2001.

The damage frequency is normally calculated per 1,000 departures. Over the last 20 years, the damage frequencies have been on an average of 0.6-0.75 per 1,000 departures – some years higher and some years lower.

Based on the figures above, the total number can be calculated as, per 2019, 32 million departures multiplied by 0.7 per 1,000 departures equaling 22,400 damages per year worldwide.

But it should be noted that the magnitude of the damage ranges from a scratch that needs repair to a total loss due to ground damage.

Cost of Damage

The cost of ground damage has always been a subject of discussion.

Depending on the organization within each company, the way cost is calculated can vary.

Also, depending on where in the world it occurred, the cost can vary a lot due to the country's economic standing. For example, the Nordic countries have a higher cost level than east Asian countries do.

If we use the Nordic countries cost level, an average damage's direct cost has been calculated to approximately $18,000 (USD) per damage and the indirect cost (consequential/disruption) 4-10 times higher.

If we assume that six times higher is an average, the cost will be $18,000 multiplied by 6 multiplied by 22,400 equates to $2,419,200,000 (USD) – or the same as 30 new 737s or A320s.

It should be noted, that in this calculation personal injuries of staff is not included. The cost for passenger injury is marginal and also not included. The indirect cost is the most difficult to calculate. The immediate indirect cost is

Continuous development of equipment and procedures is required to reduce ground damage.

obvious, but the longer the incident disrupts the operation, the more difficult it becomes to calculate.

The cost of disruption affects the airport, where the damage happened, and the disruption can impact a number of connecting flights as well.

Normally, the airlines have to take all the disruption cost, unless the agreement includes a specific liability to cover disruption cost caused by a third party.

Recently, disruption cost has increased due to the EU 261 passenger protection article.

A delay of more than X-number hours can be compensated. The compensation is depending on delay time and destination of flight, as a longer flight gets more compensation. Until now the airline would have to pay, even if it is a contracted party that is responsible. If the airline wants to be covered for this type of cost, they should have it incorporated in the contract agreement (in practice IATA Standard Ground Handling Contract) or a special insurance clause.

Examples of Ground Damage

A 737 needed maintenance on the engines, which required start up and test of the engines. Unfortunately, the maintenance created a delay of the flight schedule. During towing to the departure gate, the flight deck operator started the engine and applied more thrust to one of the engines for test of the bleed system. The towing was straight forward and suddenly the aircraft took over control resulting in a jack-knife situation. The result was severe damage to the radome and the RH engine nose cowl.

Estimated repair cost amounted to $600,000 (USD) plus the aircraft out of service cost was not included. The incident could easily have been avoided by following the procedure and accepting a relatively small delay. The insurance will normally cover the repair cost above the deductible of $500,000 / $750,000 (USD).

In another example, an aircraft had a normal catering handling at the RH forward service door. The catering truck was a standard box type. The operation lever for up and down operation with the box has had a period failure but was not corrected. When the operator was in an up transition with the box, the control button would not stop from moving in the upward direction. Before the emergency button was activated, the entire aircraft was lifted until the hinge broke and the door had severe damage. The direct estimated repair cost was $275,000. The failed operation lever could have been replaced for $25 (USD).

Preventive Actions to Reduce Ground Damage

Normally the reason for most ground damage involves a human being in one way or another. Therefore, focus should be in that direction, especially following the COVID-19 pandemic.

Many ground service personnel were laid off at the beginning of the pandemic. Now, one to two years later, many have been called back. That means, that routine and procedures should be refreshed, as many things have been changed.

In general, a few important steps are recommended before and upon employment:

- Effective screening of staff and background
- Basic training
- Recurrent training
- Feedback
- Team orientation
- Incentives / rewards
- Company culture knowledge

During the years, many examples of preventive actions have been implemented, some with success and some with less success. One of the more successful was the extended use of tip cones. In the mid-'90s there were a lot of commercial low-wing aircraft in operation and quite a lot of collisions between wings and trucks. Each collision had a cost of $75,000-$150,000 (USD).

Via the IATA Airside Committee, it was suggested and implemented as a standard to use tip cones to prevent wing damage. After some initial problems in introducing the procedure, it became normal to use them worldwide. Statistics from one airline operating a high number of lower wing aircraft showed, that after years using the cones, this particular damage was lowered 60 percent.

The tip cones are also used in front of aircraft with wing-mounted engines. This has also had a significant impact on the number of lip nose cowl damage.

The Next Step for Breaking the Ground Damage Code

There is a continuous development of equipment and procedures in order to reduce ground damage. For example, IATA's Safety Audit for Ground Operations (ISAGO) and the IATA Ground Operations Manual (IGOM) implementation has not had an impact enough to break the ground damage code so as to reduce the number of incidents significantly.

Another way is to step up the investigations of an incident to find the root cause. Very often ground damage investigation is concentrated to those directly in "contact" with the aircraft.

Another new approach in order to prevent ground damage, is the development of driverless ground equipment. The new equipment will soon be tested in operation and could prove a code breaker for ground damage. Time will tell.

Finally, to be directly economically accountable for damage and disruption, a preventive method would be best. But several attempts to modernize contracts and agreement in that direction have not been able to do this so far. **GSW**

ABOUT THE AUTHOR

IVAR BUSK

Ivar Busk has 40 years of experience in aviation, including as aircraft engineer, head of airside safety worldwide and group insurance and claims at SAS. He received a human factors degree and safety management training certificate from the University of Southern California. He has been a member of the IATA Airside Safety Group, Australasian Aviation Ground Safety Council (AAGSC) and Artex. Busk is now owner of Aviation Care Consulting.

SUPPORT

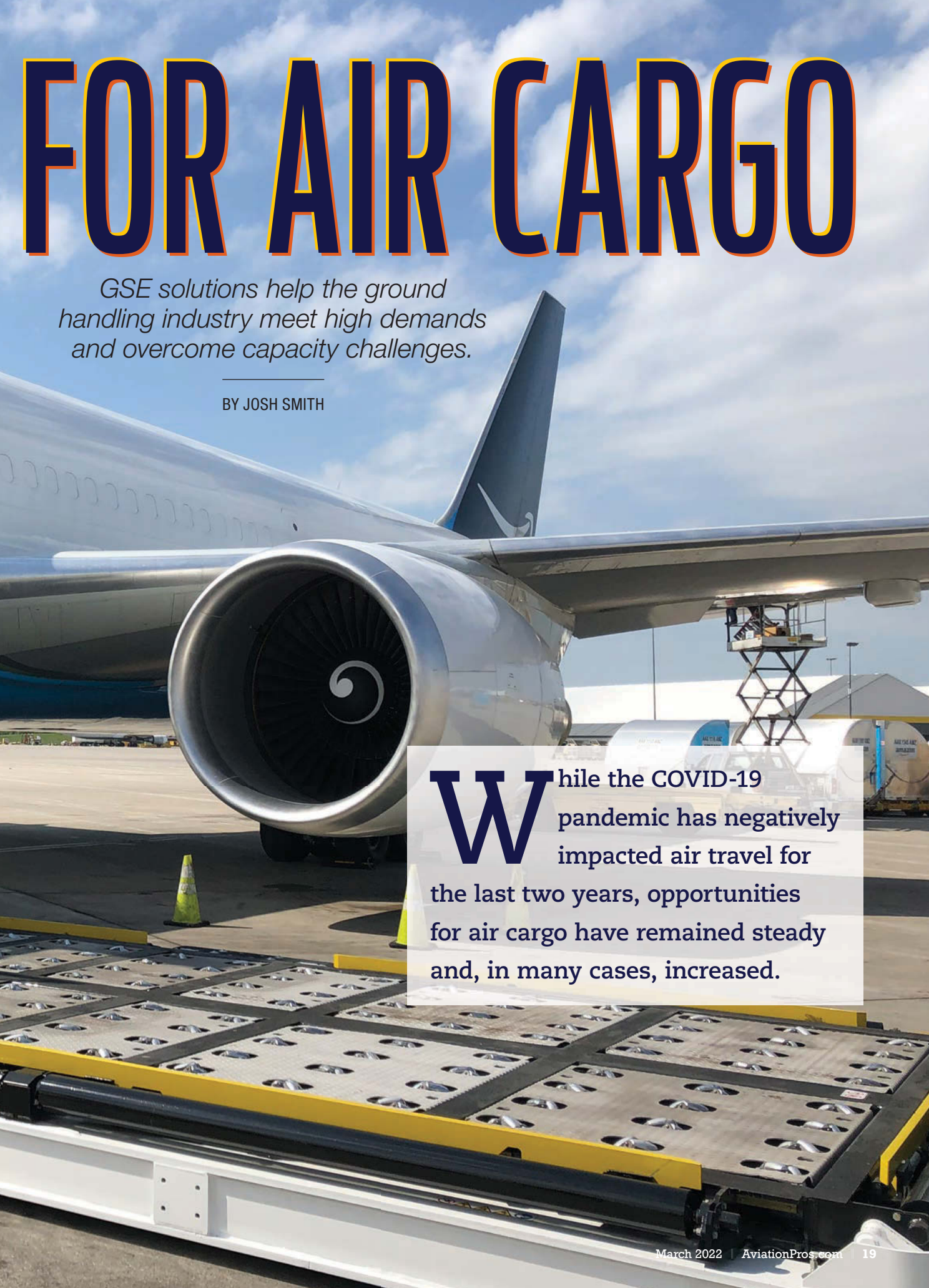
Consumer purchasing habits coupled with the pandemic's role in slowing production has created a massive demand for goods and services.

JBT

FOR AIR CARGO

GSE solutions help the ground handling industry meet high demands and overcome capacity challenges.

BY JOSH SMITH



While the COVID-19 pandemic has negatively impacted air travel for the last two years, opportunities for air cargo have remained steady and, in many cases, increased.

Earlier this year, the International Air Transport Association (IATA) released data for global air freight markets. According to IATA, full-year demand for air cargo increased by 6.9 percent in 2021, compared to pre-COVID levels in 2019 and 18.7 percent compared to 2020.

IATA officials note this was the second biggest improvement in year-on-year demand since the organization began monitoring cargo performance in 1990. Only 2010's 20.6 percent gain was larger than 2021's performance.

The pandemic's influence on consumer purchasing habits, coupled with the pandemic's role in slowing production created a massive demand for goods and services.

"The demand for goods and services is at an all-time high," says Bryan Del Monte, president of The Aviation Agency.

"Will it stay at that tremendous height forever? No. At some point, things will equalize. But the demand for goods and services, I don't foresee as an economist, any reason why suddenly there would be a contraction," he adds. "We're way too reliant on the free flow of goods. In the past two years, air cargo filled in that gap."

With cargo serving a vital role globally, the need to facilitate air cargo throughput remains crucial. To assist the cargo handling segment, many ground support equipment (GSE) manufacturers are providing solutions to benefit the ground handling industry. The following are just a few examples of those cargo handling innovations.

JBT's Electric Approach to Cargo

With decades of experience producing electric and alternative powered ground support equipment, JBT has applied this know-how to cargo handling equipment.

The C30i E electric powered main deck loader debuted in 2018. Later this year, the company will start production on a new variation with an extended range.

The Commander 30i E is part of the company's continued push to make clean energy versions for all of its products, explains JBT's Kevin Cecil, engineering manager - loaders, and Gary Walter, ground support equipment regional director - the Americas.

"The Commander Cargo Loader lineup has electric versions of the C15i and C30i available today. C40i and C60i will be part of the continued development in the near future," Cecil and Walter say.

"The Ranger Cargo Loader is also available in electric and we have also done a trial with a hydrogen fuel cell in place of a battery as a proof of concept."

By moving to electric products, JBT officials are seeing more efficiency, less use of power, less emissions and lower maintenance costs.

However, Cecil and Walter note that all new developments come with challenges, including engineering development, supplier lead-times and more.

"One place we can see a need across suppliers is for better standardization of charging connectors, message protocols, etc., to allow customers to have options that work regardless of the OEM, batteries or chargers they choose to utilize," Cecil and Walter say. "This is an opportunity for the industry to come together and set standards for this via SAE, IATA, CE, CAAC or others as needed."

Moving forward, JBT is looking to integrate common design principles and components across all of its products, according to Cecil and Walter.

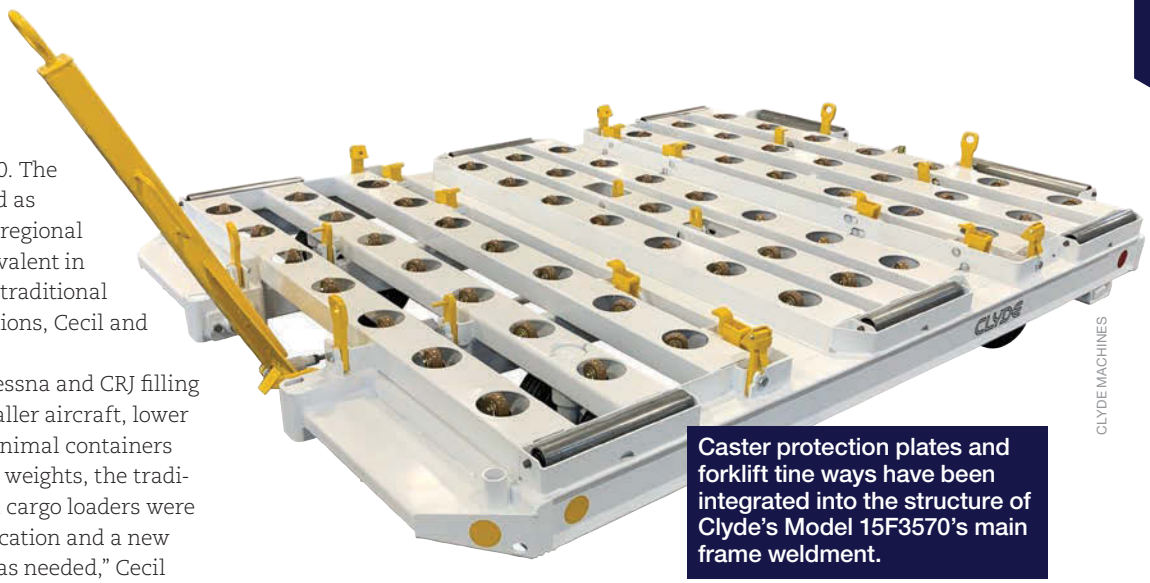
"This will allow for better component utilization, better reliability, and will also help with maintenance and training for customers," they say.

Beyond its electric offerings, JBT started production on the Falcon

JBT

The Commander Cargo Loader lineup includes an electric version of the C30i.

The EasyLift Towbar System on FAST's M-Series dolly allows increased control during tow-bar motion and lowers the force required to raise the tow-bar.



CLYDE MACHINES

Caster protection plates and forklift tine ways have been integrated into the structure of Clyde's Model 15F3570's main frame weldment.

Cargo Loader in 2020. The Falcon was launched as more containerized regional aircraft became prevalent in the industry versus traditional bulk load configurations, Cecil and Walter explain.

"With the ATR, Cessna and CRJ filling a new spot with smaller aircraft, lower door heights and minimal containers and lower container weights, the traditional dual platform cargo loaders were too big for this application and a new ground up design was needed," Cecil and Walter say.

"By moving to containerized cargo, more synergies can be found in the freight network and handling," they add. "It is also better for all weather conditions and can increase the speed of the onload/offload."

FAST's Focus on Ergonomics and Safety

Looking to provide a cargo handling solution that reduces fuel consumption, improves total cost of ownership, offers commonality within an existing fleet and improves safety and ergonomics, officials at FAST Global Solutions began developing the M-Series Cargo Dolly in 2018 and paired the dolly with its proprietary EasyLift Towbar.

"The M-Series dolly development began in 2018 with prototyping, testing, modeling and FEA, a true ground-up engineering development. Currently, the M-Series is at the pilot stage with full production launching this year and orders starting to line up," says Tim Hildebrandt, vice president of sales at FAST Global Solutions.

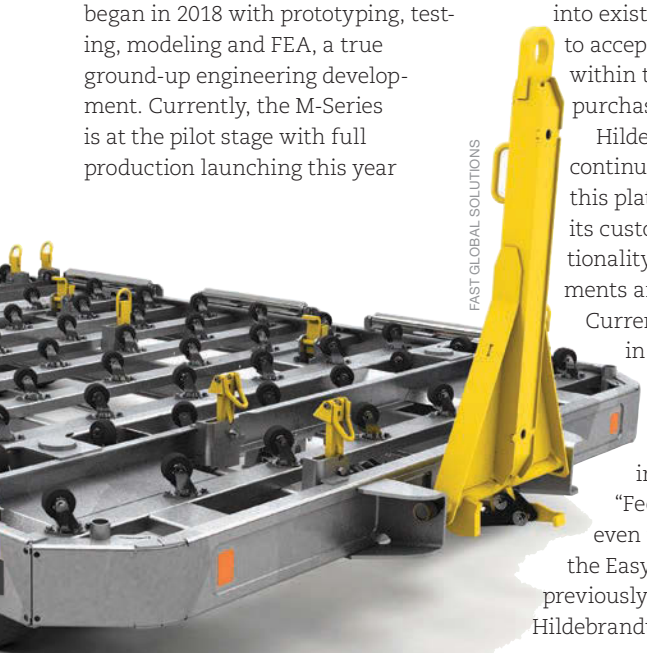
According to Hildebrandt, the M-Series Dolly incorporates ergonomics, safety and the ability to integrate with existing fleet equipment. What's more, the EasyLift Towbar System allows increased control during tow-bar motion and lowers the force required to raise the tow-bar. The EasyLift Towbar improves the ergonomics for ramp operations teams when attaching or disconnecting units, providing a 60 percent reduction in lifting forces compared to standard tow-bars.

"By integrating the collective needs into our engineering process, the result is a dolly with commonality to marry into existing fleets of equipment and to accept parts and enhancements within the inventory the customer purchases," Hildebrandt says.

Hildebrandt notes FAST plans to continue engineering variations of this platform, innovating alongside its customers' end-users for functionality that meets safety requirements and efficiency demands.

Currently the M-Series is produced in the United States, with plans for the company's European production facility to fulfill demand from its international customers.

"Feedback has been positive, even more so when paired with the EasyLift Towbar and for all the previously mentioned advantages," Hildebrandt says.



FAST GLOBAL SOLUTIONS

Clyde's Emphasis on Cargo Dollies

Perhaps overlooked on the ramp, the cargo dolly's role in meeting cargo demand is crucial.

"It is a critically important piece of equipment in moving containers from aircraft to warehouse and vice versa," notes Chad Barsness, president at Clyde Machines.

Clyde's line of cargo dollies, including the Model 15F3570, helps enable these functions.

The Model 15F3570 offers a cargo capacity of 15,000 pounds. Its trailer capacity is capable of handling LD1, 2, 3, 4, 6, 7, 8, 9, 11 and 29 containers as well as 88"x125", 96"x125" and 88"x108" pallets.

"Customers really like the Model 15F3570 as it has all of the container lock configurations built into the dolly," Barsness says.

It offers a recessed frame to protect customer markings, tow-bar actuated self-adjusting rear brakes, dual front-wheel swivel casters with rigid dual rear wheels and an E-type spring loaded hitch, among other features.

"We integrated caster protection plates and forklift tine ways into the structure of the main frame weldment. This was done based on feedback from customers trying to keep their maintenance costs down," Barsness adds. "We are continuously working to improve current designs based on customer feedback and continue to innovate."

As the industry shifts toward electric vehicles, Clyde officials are focused on

keeping the weight of the dolly as low as possible to facilitate transport without compromising the durability and lifecycle of the dolly, itself.

The Model 15F3570 is part of Clyde's line of cargo pallet trailers that also includes the Model 15F3680, Model 15F3580, Model 15F2710 and Model 15F3285.

"The main difference is container stop options and caster protection options," says Barsness. "We also offer roller bed and caster bed options as well."

MULAG Expands Pulsar Line

MULAG's Pulsar 7 E is a container pallet transporter with electric drive that can transport heavy cargo, standard LD and MD containers and pallets up to 196" (5640 mm) without CO2 emissions.

The cargo loader is powered by two 12 kW asynchronous motors and two 465 Ah traction batteries. The vehicle travels up to 15.5 mph (25 km/h).

"Ground service providers and airlines benefit from the quality and reliability of the Pulsar 7 E, which builds on decades of experience in the development and manufacture of container pallet transporters," says Daniel Müller, area sales manager for GSE at MULAG. "Thanks to the innovative electric drive technology, the product requires less maintenance and can be used ecologically sustainable in airport operations."

Following the introduction and development of the Pulsar 7E electric container transporter in 2015, officials at MULAG introduced the Pulsar 7 SL side-loader container transporter at the end of 2021. The Pulsar 7 SL offers a revised cab concept and new electronic control platform.

"The technical design of the Pulsar container pallet transporters was optimized in the course of further development by means of a modular component system, and electrification and digitalization were further advanced," says Müller.

As part of a product family, there are also diesel-powered Pulsar container transporters with 7 tonne and 14 tonne payloads, as well as a side-loading version where container pallets can also be received and transported at 90 degrees from the side.

"The main difference besides the payload is the size of the roller bed for handling up to three pallets at a time. In recent years, there has also existed a high-loader variant as a special solution in this product range, which is mainly used in the defense sector," Müller says.

MULAG's product range will continue to be developed and expanded, in regard to future-oriented drive technologies, Müller adds.

Units from the Pulsar container pallet transporter range are in use at European and international airports in a variety of configurations, including some of which that are customer-specific, Müller says. **GSW**

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MULAG

Units from the Pulsar container pallet transporter range are in use at European and international airports in a variety of configurations.

CZECH AIRLINES HANDLING

Implementing the Environmental, Social and Governance (ESG) methodology can help ground service providers reduce CO_2 emissions.

Ground Handlers' Green Plans

Across the industry, ground service providers are focused on reducing emissions generated on the ramp.

BY MARIO PIEROBON

Ground handling service providers (GHSPs) operate an extensive fleet of ground support equipment (GSE) vehicles that are mainly operated by combustion engines.

However, because of the increasing awareness in aviation as to the importance of reducing the industry's global carbon footprint, GHSPs are concentrating their efforts to cut emissions industry-wide.

Cutting Emissions

Representatives of Czech Airlines Handling (CAH) say in order to be able to affirm that measures taken actually reduce the carbon footprint, it is necessary for a company to start monitoring and evaluating these parameters.

"We have been processing this information since 2021. The information does not only include CO_2 indicators, but also indicators of water protection and waste management. At the same time, we are in the process of implementing the Environmental, Social and Governance (ESG) methodology. We see reducing CO_2 emissions as a social responsibility," say CAH officials.

According to the "Destination 2050 – A route to net zero European aviation (D2050) report," lowering emissions from aircraft ground movement and auxiliary power unit (APU) usage, through the introduction of electrical operational towing and using electrical ground power, has the potential of realizing CO_2 cuts by 1.5 percent to 3 percent per flight – depending on the aircraft type and mission, affirms Nick Rhodes, the European Regions Airlines Association's (ERA) head of operations, safety and infrastructure.

"There are also possibilities with hydrogen propulsion. For example, in Germany, NOW GmbH (National Organisation Hydrogen and Fuel Cell Technology) has created a work group with airports and GHSPs to review common standards on new technologies for ground support equipment and approached the industry to develop

respective GSE," he says. "This change is already on its way, mainly with the increased adoption of electric drive, but electric operational towing or taxiing solutions should be developed for all common aircraft. Equally, it will be important, of course, to ensure support for charging electrically powered equipment, including GSE."

Investment in infrastructure is therefore required, according to Rhodes.

"This would not only provide environmental benefits, but provide focus on efficiency, throughput of GSE and result in reduced costs further down the line. Nonetheless, care needs to be taken to ensure that the increased capital expenditures in decarbonizing the GSHP estate does not price airlines out of serving specific or niche markets," he says.

To reduce emissions and thus the company's carbon footprint the companies of Baltic Ground Services (BGS) Group have been upgrading their ground support equipment, introducing more fully electric models to their fleets.

"We strive to have as little impact and emissions as possible, therefore we want to introduce more electric machinery. In 2020, we have added to our fleet the first in the Baltics electrical bus designed specifically for the airport. We aim to further develop our inventory of electric vehicles and ground handling equipment to replace traditional vehicles in all GH stations we operate now and will work in the future," says Monika Kliokiene, head of compliance at BGS Group.

"Furthermore, our ground handling companies that provide logistics services also provide eco-driving training for drivers. Through this training, we contribute to a healthier environment by reducing fuel consumption by approximately 5 percent in daily driving. Another advantage is the improvement of driver safety and the avoidance of the risk of errors. In order to be more efficient, we optimize transportation routes as much as possible, avoiding unnecessary kilometers. This enables us to reduce unwanted costs, noise pollution and our carbon footprint."

Drivers of Change

According to Kliokiene, the drivers of change in the ground handling industry with regard to CO_2 emission reduction have to do with the fact that introducing smarter and more eco-friendly changes to operations enables the industry to reduce the current impact on the environment caused directly by ground handling business.

"We are doing our best to reduce the impact we have on our environment. In addition, we can see clear benefits to our business as it saves time and costs over the long-term," she says.

Every stakeholder of the aviation supply chain is expected to decarbonize, observes Rhodes.

"It has to be a collaborative effort with GHSPs included. The ground handling sector is well aware of the European Green Deal and the European Union's goal of carbon neutrality; and is already taking action to contribute to the aviation industry's overall efforts," he says. "Although GHSPs have already begun making changes on their own initiative, it is likely that airlines and airports will begin to include sustainable requirements in tenders for handling services and ground service equipment as well. This way all stakeholders in the value chain are stimulated to take their responsibility when it comes to reducing CO_2 emissions. After all, stimulating sustainable behavior now can contribute to a changed mindset urgently required in the years to come."

In addition to a general social responsibility, according to CAH officials, there is also an economic motivation.

"This comes both from customers, as there is pressure on the suppliers' environmental approach to reduce their carbon footprint when handling their aircraft, and from the ground handling providers themselves, i.e., the cost of electrified funds is already in many cases lower than for fossil fuel funds," officials at CAH say.

Operations Design and GSE Procurement

Rhodes notes that the infrastructure available at airports is often significant, and this can limit ground handling operations.

"GSE has to be available whenever needed in order to handle an aircraft safely and efficiently, ensuring not to

BGS

Introducing smarter and more eco-friendly changes to operations enables the industry to reduce the current impact on the environment caused directly by ground handling business.

endanger the whole aviation system in view of generating possible delays. Therefore, airports need to provide solutions which enable workers to continue doing so," he says. "GHSPs are reliant on airport operators to create the respective processes and infrastructure, whether that be for battery electric or hydrogen energy."

CAH has in place the implementation of investments and orders for mechanization means considering its preference for electrified equipment over diesel equipment.

"Ideally, the equipment that is offered with solar panels for self-charging means. At present, we have several boarding stairs of this kind," say CAH officials.

"Another example of this type of equipment are belt-loaders. As part of handling an aircraft, we make every effort to reduce the number of technical crossings and thus allocate the equipment to more places so that it is more easily accessible." they add.

While certain electrical GSE might have higher initial costs, in the long run it tends to even save money, points out Kliokiene.

"Electric GSE run at lower operating and maintenance costs than regular diesel counterparts. Therefore, investing in such equipment proves to be highly beneficial," she says. "Our companies are constantly introducing new equipment to their fleets and, when possible, opt for more sustainable, electric versions of the equipment."

In the context of this transition to electric GSE, standards relating to new equipment have to match existing standards, or even improve it, according to Rhodes.

"As we move from a carbon-driven environment to one that is decarbonized, a harmonized and industry-approved regulatory approach will be essential to ensuring continued safe ground operations," he says.

Frame of Mind

In order for the aviation community to work together on the decarbonization challenge ahead, awareness with operational employees is also required.

"Pilots and air traffic control officers are a straightforward example, but maintenance personnel, ground handling agents, airport personnel and many others can each contribute. Coupled to increasing awareness across the organization comes the responsibility to recognize sustainability as a full-fledged part of the business. It should not be regarded as something different or extra – but part of the working activities of all involved," says Rhodes.

According to BGS officials, to make a change one has to constantly encourage it.

"We provide various training, including sustainability training, to our staff to ensure that they are well familiar with the topic," says Kliokiene. "We put a lot of effort working on our ESG strategy and our top management continually encourage even the smallest green initiatives from all employees and emphasize the importance of sustainable attitude not only at work, but also in personal life."

While there may be potential for some mindset changes with regards to being more carbon efficient, it should be noted that to an extent GHSPs are limited to the level of changes they can make, according to Rhodes.

"Their role is to operate the GSE available, using the number of GSE necessary to carry out the job at hand, which is dependent of the aircraft type, size, its load factor, and the ground time," he says. "Nonetheless, as we all embark on this sustainability journey together, awareness and education campaigns for staff should be considered in order for staff to understand the impact of the choices they make on a daily operational basis." **GSW**

ABOUT THE AUTHOR

DR. MARIO PIEROBON

Mario Pierobon provides solutions in the areas of documentation, training and consulting to organizations operating in safety sensitive industries. He has conducted a doctoral research project investigating aircraft ground handling safety. He may be reached at mariopierobon@az-all-in-one.com.

Perishable Cargo in the Pandemic Age

While some aspects of shipping perishable and pharmaceutical cargo have changed, much has remained the same thanks to well established industry standards and practices.

BY WALKER JAROCH

The handling of pharma cargo and perishable goods took on an increased significance with the onset of the COVID-19 pandemic. Nearly two years later, the role this crucial cargo plays has only grown as the pandemic lingers and supply chains tighten.

"The supply chain has been subject to increased attention, reduced capacity and extreme challenges. This required increased communication and coordination among stakeholders, advanced planning, and is what, for example, made the COVID-19 vaccination program the most successful logistical operation of its kind," says Ronald Schaefer, senior principal, IATA Consulting Americas.

The pandemic made it evident how important it is to have a good quality management program in place for the shipping of pharmaceuticals, Schaefer says.

"Companies with a CEIV Pharma certification were well-prepared to handle these sensitive products by ensuring availability of temperature-controlled facilities and equipment as well as maximizing the use or repurposing of existing infrastructure and minimizing temporary builds. In addition, availability of staff trained to handle time- and temperature-sensitive vaccines and installing robust monitoring capabilities ensured that the integrity of the vaccines was maintained," he adds.

At the onset of the pandemic, when there were indications of large-scale temperature-sensitive vaccines being moved as air freight, John Dowds, VP service delivery – EMEAA, Worldwide Flight Services (WFS), says they initiated a systemic check of their cold storage and cargo capabilities.

"We initiated Project Coldstream as a coordinated evaluation of our capability for temperature control handling, looking at where we may need to increase our capacity and how we would procure contingency capacity if there were peaks of vaccine flow," he says.

As it turned out, most vaccines would not be as temperature-sensitive as initially suspected, but WFS was ready for the task either way.

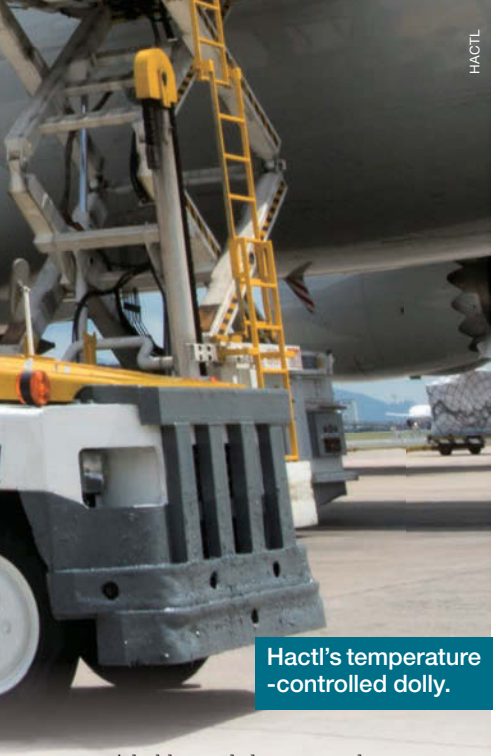
"It should be remembered that the pharma industry, airlines and handlers like WFS already had very resilient handling and transportation solutions for pharma shipments long before the COVID outbreak. Pharma has been an increasingly important product for our airline customers in recent years, and we have invested significantly in training, processes, equipment and facilities to support this growth in pharma volumes and to ensure the capacity to meet our customers' service requirements," Dowds says.

Wilson Kwong, Hactl chief executive, says when the pandemic hit, Hactl was already fully skilled, resourced, accredited and ready for the handling of pharma and perishables. This meant COVID-19 did not change their working methods or require any additional preparations.

"The challenges were the more general industry issues of staff absenteeism through compliance with quarantine regulations, governing staff who have tested positive and their respective close contacts, which are very strict in Hong Kong; and the dramatic cutbacks in scheduled passenger services, which reduced bellyhold capacity to a fraction of the normal levels and led to an increase in scheduled and charter freighter services," Kwong says.

Trained for Resilience

As noted by Schaefer and demonstrated by WFS and Hactl, having a strong foundation based on the right training, requirements and technology to handle


HACTL

Hactl's temperature -controlled dolly.

perishable goods has gone a long way to weathering the worst of COVID-19.

The IATA CEIV standards for both fresh and pharmaceutical goods govern the handling processes of different types of perishable goods. There are similarities between the two CEIV standards, notes Sonia Ben Hamida, head of special cargo, IATA, but the requirements differ from commodity to commodity, adding a layer of complexity.

"Pharmaceutical products are often more valuable and involve a larger packaging and refrigeration budget. They may have more stringent time and temperature requirements. And in some cases, these shipments may be considered dangerous goods because they use dry ice or cargo tracking devices containing lithium batteries. Dangerous goods require appropriate labels and markings," says Hamida.

IATA has harmonized processes with the Temperature Control Regulations (TCR) and the Perishable Cargo Regulations (PCR), and Hamida adds that IATA has also developed the CEIV Certification Programs to address their good implementation.

"Temperature maintenance is essential throughout the entire supply chain for both perishables and pharma, as temperature 'excursions' outside the stipulated range can cause damage and reduce shelf life for perishables and — more seriously with some pharma shipments — reduce or destroy the product's efficacy," says Kwong.

The temperature ranges applicable to some pharma and most fresh produce are the same – 15-25 degrees C, often known as "controlled ambient," says Kwong. Some pharma shipments require other temperatures – such as 2-8 degrees C, often referred to as "refrigerated" or minus 15-minus 25 degrees C, often called "frozen."

To maintain these standards and ensure a product never goes outside of the threshold of safe temperature requires intense and serious training.

Dowds says that WFS has their own Training Academy at the Paris Charles de Gaulle Airport (CDG), which has previously been identified by IATA as one of the world's top five aviation training providers.

"For perishables, we provide a half-day initial training for any operations-based people handling these cargoes. This can be classroom and virtual training and aligns with the IATA Perishable regulations and standards. There are periodic refresher courses to ensure any new requirements are incorporated and the user stays familiar with the product and handling requirements.

"Pharma training is also aligned with IATA's pharma regulations and standards. We are currently in the process of the latest revision of our pharma training course, which is expected to go live in Q2 this year. These courses are issued to all stations across our global network to provide consistent, high quality training and awareness," he says.

Kwong describes perishable and pharma handling training as an integral part of Hactl's training for all ground handling staff on the ramp and in the terminal, ensuring that every shift has plentiful staff resources to accommodate these products.

"Hactl conducts its own staff training, using impressive resources including training suites occupying an entire floor of our office building, VR training and online training initiated during the current

restrictions. Training is ongoing: refresher courses are run regularly to ensure up-to-date knowledge and compliance; this is enshrined in our CEIV operating manuals," Kwong continues.

Temperature Technology

Of course, training alone doesn't keep temperature-sensitive goods from perishing. The right technology needs to be in place to keep temperatures at the proper levels.

"Our pharma centers are equipped with temperature monitoring management systems with active alarms for any temperature deviations. This ensures that even in the rare event of a temperature room deviating from its required range, we have the processes and contingency to ensure the shipments aren't adversely affected," Dowds says.

He adds that a rollout of new mobile technology is allowing greater visibility and control throughout the process and ensuring real-time updates or change of status are communicated internally and to WFS' customers.

"In Paris CDG, we also have a tailored solution of temperature-controlled dollies, which are used to transport pharma shipments to the aircraft. This allows us to continue our temperature protection until the point of loading on the aircraft. Similar solutions are being evaluated in markets where we provide the airside transportation to aircraft," he adds.

Kwong says technology is helping with the maintenance of temperature, with remote monitoring of containers and shipments – but stresses it is no substitute for active measures and procedures.

"CEIV Pharma and Fresh have been very helpful in creating a single standard for all parties, but prevention is better than a cure – and so Hactl has invested heavily in equipment and processes," he says.

Hactl created a "Golden Route" fast-track through the ramp and terminal, designed to reduce the time taken from aircraft unloading to storage in controlled conditions, or hand-out to waiting customers. The Golden Route works alongside Hactl's mobile app for customers, which enables them to pre-advise truck arrival and gain fast-track entry to its parking and truck bays.

"Unloading of aircraft and fast transfer to the terminal is assisted by mobile computing, which enables our ramp team to input arriving cargo data and receive instructions on the go. These have all been proactive measures on the part of Hactl, designed to improve efficiency and quality of handling for all temperature-controlled cargo – with the aim of enabling our airline customers to fully capitalize on this lucrative revenue stream," adds Kwong.

Prepping for the Future

While the pharma and perishable goods cargo industry has experienced little change from the COVID-19 pandemic, that doesn't mean that the next challenge will be so kind.

With that in mind, Schaefer says to deal with future pandemics, it is advisable that companies shall on a continuous basis be focusing on:

- **Forecasting vaccine and logistics needs:** Determine equipment, supply and budget requirements needed to support deployment and vaccination operations based on the size of the population to be vaccinated.
- **Assessing available storage capacity:** Assess vaccine volumes and corresponding cold chain capacity per catchment area.
- **Identifying surge capacity:** Assess and map available cold chain capacities according to the three temperature ranges (e.g. +2 to +8 degrees C, -20 degrees C, and -70 degrees C) for stor-

ing the different types of COVID-19 vaccines under development. Include all available cold chain equipment outside the immunization program in the inventory and calculation of capacity.

- **Planning for the security of vaccines and concerned staff:** Clear security arrangements must be in place to ensure the safety and integrity of COVID-19 vaccines and ancillary products throughout the supply chain. Develop a plan to safeguard the security of all concerned staff and all vaccine storage facilities, including during transit. **GSW**

KEEPING COOL

Founded more than 35 years ago, Envirotainer offers a large fleet of containers globally, standing at about 6,000, says Niklas Adamsson, chief operating officer, Envirotainer.

"Envirotainer researches, develops, manufactures, leases and manages temperature-controlled air cargo containers. We also provide innovative tools and services for validation, planning, shipping and monitoring of them," Adamsson says.

The containers are battery-powered and insulated, able to have up to five pallets of pharmaceuticals loaded into them, depending on the model and size. Units can maintain a constant internal temperature for up to a week.

They are purpose built to be loaded as air freight unit load devices (ULDs) and travel around the world in a circular economy like high-tech shipping containers designed specifically for air transport.

"The product range includes the Releye family of advanced containers, launched in 2021, which are designed to meet the strictest requirements in pharmaceutical air freight. They were created with control, monitoring, autonomy, value and sustainability in mind," says Adamsson.

"These are complemented by the CryoSure series, also launched in 2021, which offer a revolution in -70 degree C cold chain transportation. Whereas the majority of temperature-controlled pharmaceutical shipments have historically involved temperature ranges of 2–8 degrees C and -15 to -25 degrees C, many pharma products such as cell and gene therapy, mRNA vaccines and biospecimen samples require below -70 degrees C shipments. CryoSure meets that need," Adamsson adds.

He continues that the Releye RAP is currently the biggest and most advanced container in its field, and offers 170 hours of autonomy to maintain temperature and protect cargo.

"In most cases, it will be regularly recharged and keep protecting the cargo indefinitely. The integrated live monitoring enables a unique insight into

product condition, location and progress of the shipment. Its large size ensures costs and environmental impact can be reduced by maximizing the amount of pharmaceuticals that can be held within," Adamsson says.

Customers have been needing bigger and better solutions that are cost-effective and sustainable, according to Adamsson. In such a highly regulated market, he says they're looking for control to keep shipments safe; monitoring, to ensure there are no temperature deviations, tampering and to assist with any investigations; and they also need autonomy, to allow for delays and challenges with an air freight system under pressure.

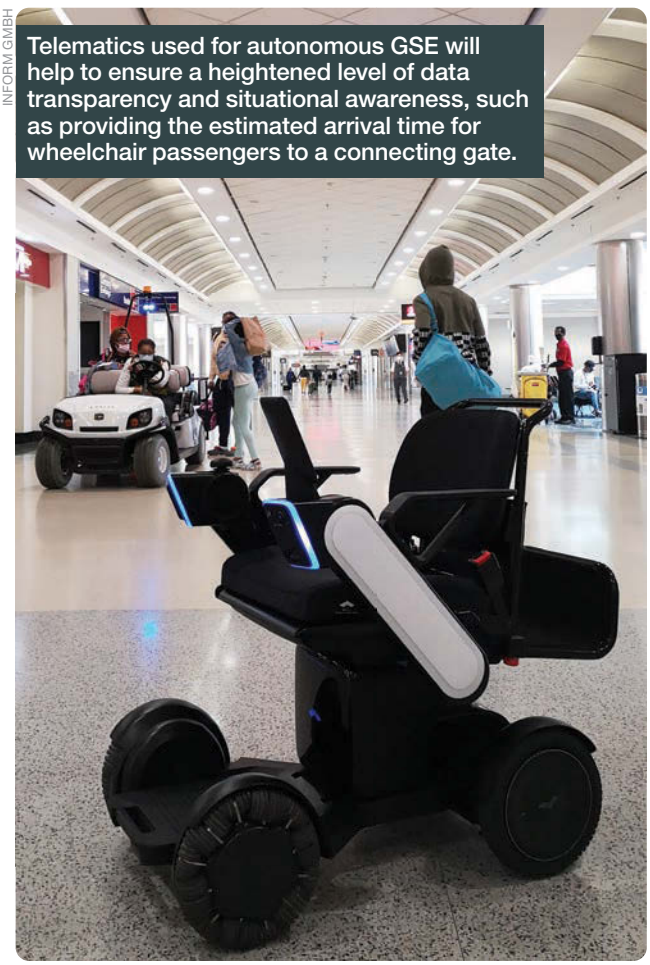
Autonomous Vehicles Gaining Traction in Ground Support

Understanding autonomous technology and how it can optimize ground support operations is important for airline, airport and ground handling professionals.

BY MICHAEL REINKOBER

Autonomous vehicles are no longer a futuristic concept. They are here and are proving very valuable across diverse industry operations. Regular use of such vehicles in airport ground operations is just a matter of time – and most likely it will be sooner rather than later. That is not to say there are not any challenges.

The need for more universal communications standards and more reliable transmission technologies to support telematics, as well as roadway considerations are among these challenges. Still, there remains great potential for driving improved ground support operations and related benefits by using autonomous vehicles.



INFORM GMBH

Telematics used for autonomous GSE will help to ensure a heightened level of data transparency and situational awareness, such as providing the estimated arrival time for wheelchair passengers to a connecting gate.

Understanding the current state of autonomous vehicle technologies and how they will further optimize ground support operations is important for airline, airport and ground handling professionals.

Optimization Software Helping to Steer Autonomous Vehicles

At the core of successful autonomous vehicles will be advanced optimization software to support operations ranging from autonomous baggage handling to docking of jetways, steering passenger and cabin crew buses and fueling trucks.

Optimization software will be instrumental in terms of optimizing staff and ground support equipment (GSE) in the management of both aircraft and passengers. Leveraging this software, which incorporates artificial intelligence (AI), machine learning and proprietary algorithms, we will start seeing staff and autonomous GSE performing many of the same tasks.

This becomes increasingly more valuable as labor shortages, due to low paying work and the physical demands of these tasks, continue to grow.

Optimization software-driven autonomous vehicles will also prove an asset in mitigating safety problems stemming from human error and carelessness. Another advantage of autonomous vehicles in certain applications is that, unlike humans who require certain qualifications and regular practice for performing certain functions, autonomous vehicles do not. Further, they are available on a 24/7/365 basis with the only exception being when they are being maintained and/or having their batteries replaced.

There is still a way to go to gain the full value of autonomous vehicles, which will require industry collaboration and greater strides in meeting various technology and infrastructure needs.

The Work to Be Done

While telematics used for autonomous GSE will help to ensure a heightened level of data transparency and situational awareness (e.g., providing the estimated arrival time for wheelchair passengers to a connecting gate, or for tail-to-tail

rides of transfer luggage), there remain hurdles to overcome to achieve this outcome.

For instance, while some software solutions are relatively independent of hardware and transmission technologies, many are not. In the field of telematics, non-motorized units remain a problem since they require a high transmission quality with low energy. Energy-saving transmission technologies such as LoRa, the physical layer (wireless) modulization that creates the long-range communications link or LoRaWAN, the media access control layer protocol built on top of the LoRa modulization, have not proven to be very reliable in the airport setting where there are many moving aircraft and massive steel structure for GSE and dollies.

What is now preferred for increasing the reliability of information transmission are mesh networks, wherein a wide variety of objects can communicate with each other, bridging long distances and increasing the accuracy of the localization by comparing different position information.

Additional fixed objects at precisely defined positions also can significantly increase accuracy. For example, this enables one to determine the exact position of a catering truck at a loading dock. There still, however, remains the issue of the truck's GPS signal not being accurate enough, especially when near buildings or under roofs.

Mesh networks, while definitely offering a better solution, remain a challenging option as they can only be achieved with many devices widely distributed over the apron; a setup many find difficult.

Another area that must be addressed in terms of infrastructure is that of creating an environment where both conventional and autonomous vehicles can move safely without disruption.

While numerous production plants have created this environment, the airport setting might require decoupled roadways to be built to accommodate, for instance, bus shuttles or the allocation of luggage from luggage rooms to staging areas.

As the performance and flexibility of autonomous vehicles grows, the need for conventional and autonomous vehicles to share roadways will increase, but eventually will become more seamless.

Autonomous Vehicles and Labor Challenges

Without question, autonomous vehicles can have a major role in both supporting workers and addressing labor-related shortfalls, including those brought on by the COVID-19 pandemic. They can be critical in helping to future-proof GSE operations in the post-pandemic environment.

There is little doubt that autonomous vehicles can effectively perform a wide range of tasks. For example, passengers with reduced mobility can be supported by airport staff as well as autonomous wheelchairs.

Through a disciplined approach to combining both staff and autonomous vehicles, many productivity, safety and passenger experience benefits can be derived. When combined with the latest sensor, 360 camera vision (i.e., for collision detection and avoidance, geo-fencing for operations within approved, white-listed areas, heightened environmental awareness) and light detection and ranging (LiDAR) technologies, the optimum outcomes can be achieved.

Potential accidents on the airfield or within the terminal can be more effectively avoided especially when supported with optimization software, boosted by machine learning, including "Federated Learning" in which part of a GSE fleet learns something new and this knowledge is automatically transferred to other autonomous vehicles.

Bridging the Gap Between Man and Machine

By aligning both human and autonomous vehicle operations, ground support operations can be greatly improved. Driven by advanced technologies, human resources can be optimally managed, communications relating to flight updates such as gate and dispatch of GSE enhanced, and the passenger's experience made more predictable and seamless.

Through the better utilization of autonomous vehicles/GSE (e.g., baggage handling, pushbacks, GPUs, bobtails, etc.), a reduced dependency on labor and lower transport costs can be achieved. Both safety and security objectives can be better achieved with the broader application of safe autonomous driving shuttle technology.

In the end, the expectations of all constituents – the airlines, the airports, ground handlers and most notably, passengers – will be well-served when autonomous vehicles are more widely and effectively deployed in ground support operations.

Paving the Way for Autonomous Vehicles

According to Allied Market Research, autonomous vehicle technology was estimated at a value of $54 billion in 2019 and is projected to expand ten-fold to $557 billion in 2026. To get there, steps will be needed across key areas of infrastructure, regulations and public-private cooperation.

For airport ground support operations, enhanced communication systems and telematics will be critical. Also needed will be new standards and regulations to support safety concerns, data analysis, record keeping and vehicle testing, among other requirements.

Governments and the aviation industry will need to work together to help ensure the highest standards of operations, maintenance and monitoring of autonomous vehicles in the airport environment prevail. **GSW**

ABOUT THE AUTHOR

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Goldhofer's Emission-free Towbarless Tractor

The PHOENIX E was designed to match the performance of the company's fourth-generation diesel model.

BY REBECCA KANABLE

Goldhofer delivered its first PHOENIX E, an electric towbarless aircraft tractor, to Lufthansa LEOS, at Frankfort Airport in December 2021. A couple of years prior, a prototype of the PHOENIX E was unveiled at inter airport Europe 2019.

"The challenge for the Goldhofer engineers was to develop and produce an electric version to match the existing diesel tractor in performance, design and handling," says Rüdiger Dube, head of product management.

The challenge was met using Goldhofer's tried-and-tested IonMaster Technology, a 700V lithium-ion battery system with active thermal management.

The PHOENIX (AST-2), representing the company's fourth generation of towbarless tow tractors and introduced in 2015, is considered the flagship among Goldhofer's tow tractor fleet. The versatile tractor meets the requirements in pushback and long-distance towing for the full range of today's aircraft with a maximum take-off weight of 352 tons. The flagship is capable of handling passenger and cargo aircraft on the market from the ERJ170 to the B777. With a 220 kW direct drive, towing speeds for maintenance tows are up to 32 km/h.

Sustainability

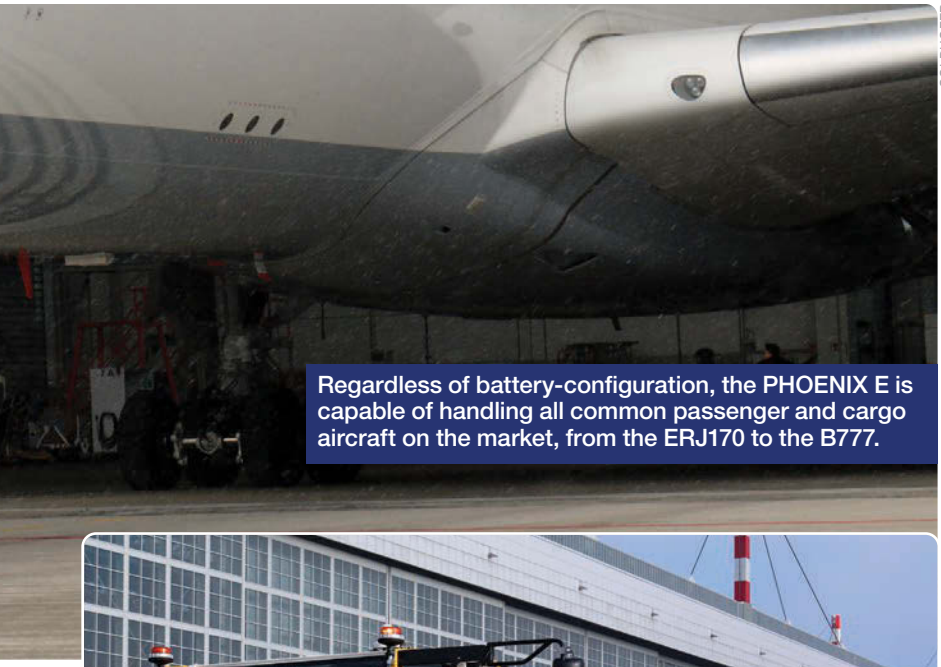
The PHOENIX E, the electric version of the PHOENIX tractor, caught the attention of the German Sustainability Award Foundation, which listed the all-electric tractor as a finalist for the 2021 German Sustainability Award.

At Goldhofer, sustainability is a focus for not only products but for all business areas and activities, according to Dube.

"This applies not only to the quality of our durable and highly efficient products and solutions, but also to the manufacturing processes themselves and to our services such as training, maintenance and repair," Dube says.

"Goldhofer offers purely battery-electric alternatives for the new generation of aircraft tow tractors in the Airport Technology product portfolio. In addition to the PHOENIX E towbarless tractor, this also includes the conventional aircraft tractor BISON E and our cargo tractor SHERPA E. So zero-emission ground support on the airport apron is now a reality," he continues.

"At the same time, we are committed to sustainability with regard to the services we provide. A rapid response – through our local facilities and agents around the world and our web store in



GOLDHOFER

Regardless of battery-configuration, the PHOENIX E is capable of handling all common passenger and cargo aircraft on the market, from the ERJ170 to the B777.

The PHOENIX E turns Goldhofer's towbarless aircraft tractor into a zero-emissions vehicle.

the case of spare parts – makes long downtimes a thing of the past. Our customers and we, ourselves, are also very happy with our online training courses and online support for maintenance work using smart glasses, all of which brings enormous savings in travel expenses."

Electric vs. Diesel

In addition to "outstanding total vehicle efficiency and availability with the highest level of zero-emission performance," Dube says the PHOENIX E has enormous potential for real energy savings compared to conventional tow tractors.

One of the advantages of the PHOENIX E is lower operating costs. According to Dube, up to 40 percent energy cost savings based on an annual operating time of 2,500 hours and up to 30 percent less maintenance cost is possible. Maintenance intervals are extended because the electric drive does not have idling components like the diesel version does. The electric drive also is less complex and has fewer parts than diesel. Less maintenance means less downtime.

The e-version comes with Goldhofer's IonMaster Technology, which allows short charging times and supports quick opportunity charging. The PHOENIX E can be charged at all standard AC and DC charging points. It takes just 30 minutes, for example, to charge a 66 kWh battery from 20 to 80 percent in the case of opportunity charging at a fast DC charging station with a charging capacity of 70 kW.

One of the keys to long battery life is the temperature management system (TMS) that is a part of the Goldhofer IonMaster Technology. With its cooling compressor and heater, it ensures that the battery temperature is always in the optimum range between 15 and 40 C. Dube says this system adds 25 percent to the range of the vehicle and increases the battery's life significantly.

The modular battery concept in the PHOENIX E starts in the basic version with 66 kWh. The battery system can be extended depending on performance requirements up to 165 kWh.

In addition to an all-electric model, a hybrid solution is available with 66 kWh battery capacity and a range extender.

Not all benefits related to savings can be easily measured in numbers.

"The most frequently heard feedback from our customers during all test drives and demo operations was that the PHOENIX E adds substantial value and comfort for the aircraft tractor operator," Dube says. "This is a significant upgrade to the workplace in terms of operator health and mood."

Future-ready

The PHOENIX E is designed to meet the demands of both today and tomorrow, according to Dube.

"We at Goldhofer are convinced that true sustainability is only possible if our products are technologically sophisticated and are reliable in every respect," Dube says.

"With our groundbreaking Goldhofer IonMaster Technology, we are able to offer durable, economical vehicles with incredibly high operational readiness and outstanding performance, and thus future-oriented," he adds.

Furthermore, Dube says ground handlers can look forward to Goldhofer's new LINK IoT platform, which combines effective telematics, monitoring and condition-based maintenance tools for Goldhofer products and solutions. The LINK IoT platform has been launched with the first basic monitoring information and will be expanded step by step. **GSW**

MODULAR CHASSIS AND WAGON SYSTEM

STINAR

The Stinar Modular Chassis and Wagon System offers a 48v electric chassis with a range of 40 miles and a load capacity of 5,000 lbs. The 17hp, 13kW electric motor provides ample power to allow the chassis to carry a multitude of different modular units and function as a small to mid-size tow vehicle with towing capacities of 10,000 lbs. The unit was designed with both regional airports and smaller FBOs in mind, eliminating the need for multiple tow vehicles, offering flexibility with multiple modular pieces and providing maneuverability on crowded jet ways. The new line features numerous modular interchangeable units adaptable to both the chassis and wagon systems, ranging from lavatory service, potable water and baggage to passenger transport and maintenance with a full line of options.

AviationPros.com/21243370

MODEL M150 PUSHBACK AND TOW TRACTOR

WOLLARD INTERNATIONAL

The Wollard International Model M150 Pushback and Tow Tractor offers diesel (Tier 4 and Stage V), gasoline and electric power options. With a drawbar pull of 10K – 16K, the M150 provides four-wheel steer and four-wheel drive. The tractor offers wet mesh internal brakes. At 167" long, 80" wide and 59" high without cab or 84" with cab and beacon, seating for up to three is provided and a climate-controlled cab is available. Multiple hitch and commissioning options are available and a one-year warranty comes standard.

AviationPros.com/21244010

TUG ALPHA 1

TEXTRON GSE

The TUG ALPHA 1 is a narrow-body pushback, purpose-built for productivity, safety and operator experience. Equipped with an exclusive center-drive design for superior tow-bar visibility, ground access maintenance points and ergonomic operator controls, the TUG ALPHA 1 is loaded with features. With three models, including lithium for performance, energy efficiency and cost savings, the TUG ALPHA 1 has everything needed to keep operations moving.

AviationPros.com/21243545

CHALLENGER 150E

TREPEL AIRPORT EQUIPMENT GMBH

Trepel's electric conventional aircraft tractor allows users to handle B737 and A320 fleets while also pushing out the B767-200/300 at maximum ramp weight. The hydro-pneumatic front-axle suspension provides driving comfort for the operator. Options include open driver's stand with side safety bars and solid tires.

AviationPros.com/12432218

TOWBARLESS TOWING TRACTORS

KALMAR MOTOR AB

Kalmar Motor AB offers a full range of aircraft towing towbarless tractors and all models are available as electric (EL), electric with range extender (ELRE) or diesel-powered.

AviationPros.com/12434600

MARK III LOW PROFILE TOW TRACTOR

TROWIN INDUSTRIES INC.

The Mark III Low Profile Tow Tractor has recently been refined to include the Cummins QSF2.8 T4 Final diesel engine. This engine choice joins the gas, LPG, CNG and electric options available. The Mark III can be rated from 3,000 to 6,000 DBP and has a wide array of options available.

AviationPros.com/21156504

AIRSIDESIM XR

L3HARRIS TECHNOLOGIES INC.

The AIRSIDESIM XR Ground Handling Training Simulator is an immersive training system for ground handling vehicles that simulates pushback tractors, baggage trucks, baggage loaders, fuel trucks, passenger transport and more.

AviationPros.com/21243403

ELECTRIC TOW TRACTOR

NANDAN GSE PVT. LTD.

The Nandan GSE Electric Baggage Tractor is designed to tow baggage carts from the airport terminal building to the aircraft and vice versa. They are also used in outdoor areas when environmental considerations have to be taken into account. Features include: a robust system designed in accordance with IATA/AHM 930 and BIS, ergonomic operator compartment, smooth-profile design and direct hitch visibility. Fully electric technology will help to reduce carbon emissions. Other features include high power and efficient electric motor, warning devices, emergency operation and safety protection devices, high durability and reliability, designed with carefully matched components, resulting in minimal or no unscheduled maintenance or repair, and user-friendly controls.

AviationPros.com/12216242

PUSHBACK PROCEDURES VR TRAINING SIMULATOR

KBY SOFTWARE LLC

The KBY Software Pushback Procedures Simulator (PPS) provides an interactive, controlled, environment for training in pushback ramp operations. KBY customizable courseware standardizes and re-enforces a company's policies, procedures and best practices in an office setting. Increase training efficiency and frequency. Train to specific standards using VR and voice recognition technologies. Increase employee engagement in a safe environment. Reduce instructor workload. Desktop and full-fidelity configurations are available. Enterprise custom configurations available. Available as full-service rental or purchase.

AviationPros.com/21110547

AP8950SDB-AL-250 TOWBARLESS PUSHBACK TRACTOR

JBT LEKTRO, INC.

JBT LEKTRO's AP8950SDB-AL-250 is an emissions-free, towbarless pushback tractor. Certified to tow virtually every narrow-body airliner from the B757 down through regional turboprops, this tug can handle them all.

AviationPros.com/12371112

TE.208 BAGGAGE/ TOW TRACTOR

CHARLATTE OF AMERICA

The TE.208 baggage/tow tractor is a battery-powered, four-wheel towing vehicle with enough power to provide a superior alternative to a full-size baggage tractor for those operations that don't require one. The unit is a compact highly maneuverable vehicle, which allows easy access to the operator's compartment with good front and rear visibility. A low center of gravity provides excellent stability. The unit is capable of a top running speed of 9 mph (14.4 km/h) when empty with a drawbar pull of more than 1,100 lbs. (499 kg). The operator's compartment contains all the controls and indicators necessary to drive the unit including foot-operated accelerator pedal, directional lever, keyless power switch, light switch and horn switch. The battery connector is located for convenient power disconnects.

AviationPros.com/12017864

AIRCRAFT MAINTENANCE VEHICLE

WILCOX GROUND SERVICES

Wilcox Aircraft Maintenance Vehicles are designed and built with safety in mind. Each and every vehicle is engineer certified and is welded by CWB (Canadian Welding Bureau) certified welders. Wilcox Aircraft Maintenance vehicles are available with LED lighting, emergency lighting, fall restraint systems, first aid and flare kits, fire extinguishers, non-slip surfaces and much more to ensure safe work performance. Providing equipment that allows users to perform their job safely is the company's top priority.

AviationPros.com/12434302

EVA HD9500-D-CE

AES INC.

The battery-operated EVA series is designed for short towing operations and the movement of fighter aircraft, GSE and equivalent equipment in congested areas. The EVA series tow vehicle is based on six parameters: controllability, safety, ease of use, maneuverability, storability and no emissions. Tested to conformity with the following standard(s) or other normative document(s): EN ISO 3691-1:215, EN 16307-1: 2013 EN 1175-1+A1: 2010, Annex 1of 2006/42/EC EMC machinery Directive 2006/42/EC, Electromagnetic Directive 2014/30/EU Directive.

AviationPros.com/12434634

BOB TAIL TRUCK

AEROSERVICIOS USA INC.

This Bob Tail Truck is built on a new F-350 chassis, and offers a gas engine. Ideal for towing GSE long distances, the truck has a capacity 55,000 or 75,000 pounds, LED and beacon lights, dual back-up cameras, speed limiter and many more options.

AviationPros.com/21242226

EMOVER

HYDRO SYSTEMS KG

HYDRO Systems offers an emissions-free electrically powered emover, able to push and pull several types of aircraft ranging from the E170 to the A380.

AviationPros.com/21110416

TECKNOSIM PUSHBACK AND TOW SIMULATOR

TECKNOTROVE SYSTEMS

The Tecknotrove Systems TecknoSIM Pushback and Tow Simulator has been specifically designed for training and skilling of pushback operators. The simulator combines the original controls of pushback equipment with a high-definition curved display screen and is mounted on a 3 DOF electric motion platform to create a realistic and immersive training experience. TecknoSIM simulates both tow-bar and towbarless pushback equipment with actual vehicle dynamics and a realistic airport environment. The simulator allows training operators pushback operations on 15 types of aircraft from the Airbus A330 to A380 and Boeing 737 to 787. Once the simulator is integrated with multiple desktop stations, it allows multiple people to operate in the same environment.

AviationPros.com/12349154

27,000LBF MDP – DIESEL AIRCRAFT PUSHBACK

AVRO GSE

Avro "next generation" aircraft pushback tractors offer leading-edge performance, design and functionality. Designed to exceed expectations and deliver extraordinary ROI, each pushback features standard functionality such as hydraulic steering, front and rear towing couplers, four-wheel drive and steering, complete cab enclosure including windshield and wiper kit, Curtis controller with self-diagnosis functionality, vacuum-assist hydraulic brakes, complete telematics (Avro Tracker) for remote diagnostics and monitoring, along with the company's managed maintenance program (Avro Care).

AviationPros.com/12425912

TOW TRACTORS

TIMSAN

Timsan offers several tow tractors with drawbar pull from 17 to 120 kN. The company has several military customers including Turkish Army and military forces of ally countries. The TIM 17 and 25 has electrical versions available.

AviationPros.com/12428428

COMET 4 FC

MULAG FAHRZEUGWERK GMBH U. CO. KG

This innovative airport towing tractor offers a hydrogen fuel cell drive and up to 30t trailing load (drawbar pull 20 kN), 30 kW axle integrated AC motor with 15 kW continuous power and a driving speed up to 18 mph. Ideally suited for baggage tasks and cargo tasks, the tractor features a zero-emission powertrain to implement the increased environmental requirements for GSE while still having high availability and short refueling times.

AviationPros.com/21233938

MODEL HTSB TRACTOR

HARLAN GLOBAL MANUFACTURING, LLC

The Harlan Model HTSB is available with the latest model U.S./Euro Emission-compliant engines. This compact, shorter wheel-base, low-profile design is robust with excellent all-around visibility. Designed for cargo and baggage applications, this unit can also be utilized for pushback of small aircraft, with the front hitch option package. Some options include complete cab assembly, heat/defrost, mirrors, beacons, variety of hitches and suspension-style seats.

AviationPros.com/21159192

AIRCRAFT TUGS

SKYBUS, LLC - GLOBAL GSE

Global GSE has a wide variety of aircraft pushback tractors, airport tugs and baggage tractors for sale and in stock. The company has for sale smaller tugs from a 3,000-pound drawbar pull through to heavy aircraft pushback tractors with the ability to tow aircraft up to 750,000 pounds.

AviationPros.com/12434628

MOTOTOK 8600 NG

MOTOTOK AMERICA LLC

The Mototok 8600 NG is a small electrical towbarless pushback and MRO aircraft tractor with up to 210,000 lbs. towing capacity.

AviationPros.com/21233926

JP125S – 125,000 LB CAPACITY

JETPORTER, A TRONAIR COMPANY

Powered by dual AC motors, the JP125S pairs unmatched turning capabilities with regenerative braking technology to smoothly decelerate in a short distance. Featuring oversteer protection and an aircraft selection system, the JP125 will safely move regional and large cabin business jets.

AviationPros.com/12379192

AV50E LITHIUM ELECTRIC BAGGAGE TRACTOR

A&V REBUILDING, INC.

A&V Rebuilding is now offering zero-time baggage tractors repowered using a specifically engineered lithium electric drive system. These electric tractors are built on the platform operators are accustomed to, so additional operator training is minimal. The A/C drive system is designed for use exclusively with lithium batteries. There are multiple charging options available and lithium A/C repower kits are also available for existing fleets.

AviationPros.com/21159207

AIRCRAFTCADDY DNW AIRCRAFT PUSHBACK TUG

DJ PRODUCTS, INC.

The AircraftCaddy DNW Aircraft Pushback Tug is ideal for larger aircraft up to 35,000 lbs. It works well on single or dual nose wheels and offers an electric winch to pull aircraft on to a lazy Susan. It is battery-powered for smooth and silent operations. With a heavy-duty steel frame it is capable of traveling 0-3 mph forward/reverse.

AviationPros.com/21147437

B950 HEAVY-DUTY TOW TRACTOR

JBT

The B950 is JBT's 31,750kg to 45,360kg GVW tow/pushback tractor capable of servicing large RJs up to B777/B787 aircraft. Easy to operate, the B950 drives like a car with automatic transmission, front-axle leaf springs, a tight turning radius and available 4-wheel steer and 4-wheel drive options. Easy to maintain, the heavy-duty pushback tractor has ground level access to nearly all maintenance and service points and is available with an integrated hydraulic jacking system and elevating cab. The reliability of the B950 is unparalleled with its "ring-of-steel" protection, diagnostics capabilities and superior drive components.

AviationPros.com/21148894

TPX-100-E

TLD

The TLD TPX-100-E is a fully electric towbarless tractor designed for the pushback of most commuters, and single-aisle aircraft up to 100 tons. The TPX can now be fitted with a remote control feature, allowing single-person operation over the entire pushback event to offer a faster, safer, more environmentally friendly experience. The ergonomic cabin also offers protection from the elements to deliver flexibility for the operator.

AviationPros.com/21112102

EAGLE TTR SERIES

EAGLE TUGS, A TRONAIR COMPANY

The Eagle TTR Series is the next generation of Eagle tractors, implementing clean burning Tier 4 technology and improved design features. The Eagle TTR-6, 8 and 12 tractors were designed to tow or push rotorcraft and light to super mid-size business and regional jets in all weather conditions.

AviationPros.com/21112080

TIGER TC 30/60 LI-ION TOW TRACTORS

TAYLOR-DUNN MANUFACTURING

Taylor-Dunn's Tiger TC 30/60 Li-ion Tow Tractors provide 60,000 lbs. of towing capacity, while offering zero vehicle emissions for increased sustainability, decreased maintenance for greater labor efficiencies, greater cost savings and increased safety benefits. The Tiger TC 30/60 Li-ion tow tractors simplify maintenance by having significantly fewer parts needing service, repair or replacement. Fewer parts also contribute to a longer-lasting drive system. The Tiger TC 30/60 Li-ion Tow Tractor's programmable regenerative braking extends vehicle range and reduces brake pad wear. The onboard diagnostics quickly and diagnose issues. Additionally, a smart industrial charger enables a full recharge in only two hours.

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A Look Back at Leadership

Since 2005, Ground Support Worldwide has sought to honor key members of the ground support industry.

BY JOSH SMITH

***Ground Support Worldwide* began its Leaders of the Year awards in 2005. At its inception, the award was a singular one: Ground Support Leader of the Year. The award was created to spotlight an individual or company that had made a significant contribution to the industry.**

Jim Houck of Continental Airlines won the inaugural award. Delta Air Lines' Tim Wix won the following year and Greg Nist of US Airways received the honor in 2007.

In 2008, Ground Support Leader of the Year was expanded into an award program aimed at recognizing leaders in several aspects of our industry, including safety, environment, engineering and processes.

In 2008, the Lifetime Achievement Award also joined the line-up of annual awards and sought to recognize a person who has demonstrated commitment to the industry through numerous years of dedicated service. GSE Today founder and publisher George Prill received the first Lifetime Achievement Award.

The Green/Environmental Leader of the Year Award was presented to a person or a company that had introduced environmentally friendly equipment or processes with Jody Lonergan of Continental Airlines earning the first recognition.

The Leaders of the Year, class of 2008.

PAGE founder Jerry Eberle was honored with the Lifetime Achievement Award in 2015.

The Engineer/Innovator Leader of the Year Award was awarded to a company or a person that has introduced a revolutionary product. Joe Hart accepted the first of these awards.

Mark Pollack of Sage Parts Plus, Inc., won the first Kaizen Leader of the Year Award, which was presented from 2008 to 2010. Japanese for "continuous and incremental improvement," the award went to a person or company that had implemented a new business philosophy about business workplace practices, focusing on efficiency and improvement in productivity, performance or processes.

2008 Lifetime Achievement honoree George Prill.

2019 Lifetime Achievement winner Dewey Kulzer.

The Safety Leader of the Year Award was presented to a person or company that had introduced a new method, procedure or product to improve industry safety records. Banyan Air Services' Shawn Mack was the first to win this honor.

The Team Leader of the Year Award, similar to the original Leader of the Year Award, was intended for an individual who had taken a leadership role with personnel. Larry Laney of Southwest Airlines received the honor in 2008.

In 2012, the current format was introduced featuring the Product/Service Leader, Team Leader and Lifetime Achievement Award as cover story subjects in *Ground Support Worldwide*. The Product/Service Leader of the Year celebrates the products, services and manufacturers making a difference in the industry. The Team Leader of the Year and the Lifetime Achievement Award continues the tradition of honoring an individual who has taken a leadership role with personnel and recognizing a person who has demonstrated commitment to the industry through numerous years of dedicated service, respectively. **GSW**

For a complete list of all Leaders of the Year winners, since 2005, please visit www.AviationPros.com/21253291.

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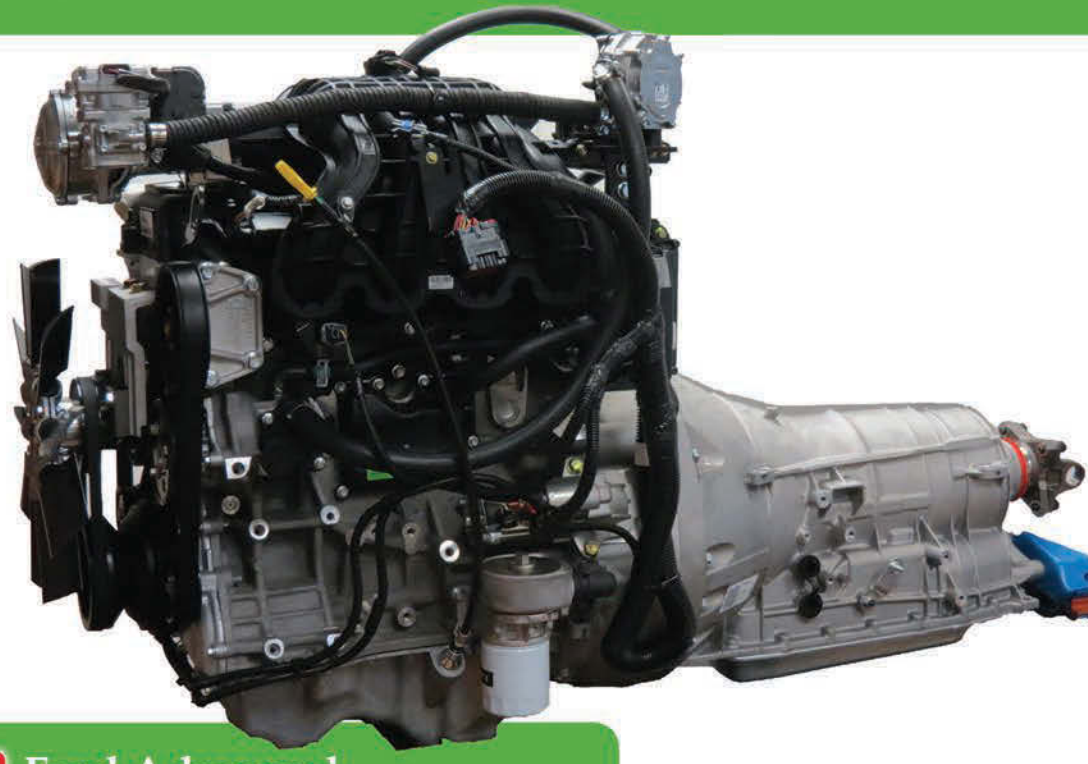

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