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Seek Professional Help

I recently read about an airport failing an FAA runway inspection because the glass beads in its markings had worn off and were not providing enough reflectivity. OK, that's easily fixed, right?

Most airports would either contract the job out to a reputable airport markings firm or purchase the equipment and training to handle the work in-house.

But according to what I read, this airport chose a third path. Instead of spending money to hire an experienced firm to apply the markings or train its crews, the airport decided to simply purchase a sprayer, paint and beads. I can almost hear the rationale: "This can't be that difficult; I've heard any monkey can do it."

However, a number of questions spring to mind: Does the airport's new paint sprayer include a dispenser that will apply glass beads simultaneously with the paint? Is the dispenser attached securely and calibrated properly?

You don't just grab a fistful of beads and throw them on top of the paint.

What about preparation? What about training? Nothing was mentioned about that. Does the airport plan any type of surface

preparation? Are the current markings flaking? Do they have any buildup of any dirt, mold or anything else that would prevent a new coat of paint from adhering to the surface?

Simply applying a new coat of paint is hardly ever the right fix.

Lastly, FAA's Advisory Circular 5340-1 Revised Paragraph 1.3.8 says: "Personnel involved with the application of airfield surface markings should complete training which includes surface preparation, removal and application of surface markings and maintenance standards."

Taking the initiative to do things yourself should be applauded. But that's only half of the equation. Information or experience with proper marking management is also needed. Like many airfield projects, there are nuances about markings that are hard to know about without formal training. I hope the airport I heard about gets that help.

Cheers,

Paul



PAUL BOWERS, PUBLISHER

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Yeager Airport Rebuilds Runway Safety Area After 2015 Landslide

BY JODI RICHARDS



FACTS&FIGURES

Project: Rebuilding Runway Safety Area

Location: Yeager Airport—near Charleston, WV

Owner/Operator: Central West Virginia Regional Airport Authority

Cost: \$25 million

Funding: 90% FAA Airport Improvement Program; state funded the 10% local match

Catalyst: Collapse of runway safety area structure in March 2015

Damage: 540,000+ cubic yards of fill slid down embankment, across road & onto a church; material also spilled into a creek, causing flooding that damaged nearby homes

Emergency Response & Cleanup: \$11 million

Runway Safety Area Study & Master Plan: Landrum & Brown

Project Engineer: Schnabel Engineering

Design Services: Airport Design Consultants Inc.


Engineered Materials Arresting System: ESCO/Zodiac Aerospace

Geofoam Expanded Polystyrene Blocks: Plasti-Fab

Noteworthy Detail: Airport remained operational throughout aftermath



BEFORE

 Four years of passionate perseverance, determination and hard work paid off on July 19, when Yeager Airport (CRW) finished the \$25 million reconstruction of its runway safety area. Completing the project was an important milestone as the West Virginia airport continues to recover after a massive airfield landside that occurred on March 12, 2015.

The catastrophic failure of a mechanically stabilized earth retention structure on the 05 end of Runway 05-23 sent more than 540,000 cubic yards of fill sliding down a steep slope, across a roadway, onto a church and into a creek. No one was killed or injured in the incident; but the church was destroyed, nearby homes were damaged by subsequent flooding, and the airport's runway safety area (RSA) and engineered material arresting system (EMAS) were destroyed.

After intense emergency response and cleanup efforts, CRW had to formulate a new engineering approach, reconstruct the RSA and deal with multiple legal issues. While many would consider the extended recovery process exhausting or overwhelming, Airport Director Terry Sayre characterizes the last four years as "trying."



TERRY SAYRE

Elevated Airfield

The airfield at CRW sits high on a hill, with steep slopes off the end and both sides of Runway 05. In fact, crews leveled three mountaintops and filled in the valleys between them to create the airport back in 1947.

In 2006, FAA funded a \$9.2 million fill project to improve the RSA on the 05 end of CRW's sole runway. The EMAS that was installed sat atop 1.5 million cubic yards of engineered fill. At the time, the 240-foot structure was the largest man-made fill project in North America and won multiple awards.

The RSA improvements proved invaluable in 2010, when a Bombardier CRJ-200 carrying 34 people overran the runway and stopped 128 feet inside the EMAS. "The plane skidded almost 2,000 feet on the runway before it went into the EMAS," Sayre recalls earnestly.

Unfortunately, the structure began exhibiting signs of deterioration in summer 2013. During routine inspections, airport maintenance workers noticed that the EMAS blocks had separated. "There was an obvious crack that you could see with the naked eye," Sayre explains. "So we monitored that, per the engineer's recommendations."

In March 2015, maintenance workers started seeing drastic settlement—as much as 6 or 8 feet overnight. "The fill project was slowly collapsing, and the rain and freeze/thaw that were going on in March just made a bad situation worse," Sayre laments. "We knew it was going to go; we just didn't know when."

In preparation for a possible disaster, CRW began reviewing its emergency management plan. The day before and again just two hours before the 2015 collapse, airport staff and local emergency responders performed tabletop emergency exercises to project



what would happen if a collapse occurred. "We anticipated the creek would be dammed up and we would need to evacuate the neighborhood to keep everyone safe," relates Assistant Airport Director Nick Keller. "Preplanning was really key. We basically laid out the scenario, so everybody had time to think about it, and talk over what we would do."



NICK KELLER

Thanks to those discussions and exercises, personnel were more prepared to respond when the collapse occurred, Keller reflects.

For instance, local 911 services sent automated phone messages that had been crafted in advance to inform airport neighbors about the collapse and urge them to evacuate. Fire and police department personnel also went door-to-door spreading the word.

Per CRW's emergency response strategy, 139 people were evacuated from nearby homes. Displaced residents were accommodated in local hotels and given a per diem from the airport. "We tried to take care of the neighborhood the best we could," Sayre says. Police patrolled the area around-the-clock to protect evacuated homes.

Fearing another slide, the airport remained in emergency management mode. "Every time it rained, we had to make sure the rest of the material didn't collapse," Sayre relates. Sadly, another collapse occurred that summer, and 10,000 to 20,000 more cubic yards of dirt tumbled down the embankment. "Then, the rest of it was standing up there like a big cliff, ready to fall about any moment," he recalls.

Inclement weather only added insult to injury. "Unfortunately for us, during the second event, it just kept raining," relates Sayre. Fill material eventually dammed the creek, and several nearby homes were flooded. "There was a lot of property damaged," he remarks somberly.

During the lengthy aftermath, CRW spent approximately \$11 million out of pocket on emergency response, which included purchasing about a dozen flooded homes. The airport took loans against its parking and rental car garages to meet the financial obligation, and its insurance carrier settled with the church and other property owners. The airport netted about \$8 million (after attorney fees and case-related expenses) when legal settlements were reached earlier this year with the companies involved in the design and construction of the original man-made fill project.

Moving forward, the airport hired Landrum & Brown to conduct an airfield master plan. Discussions with the FAA and airport prompted the team to begin with an RSA study to improve safety and restore as much of the runway length as possible, explains Monica Geygan, an associate vice president with the consulting firm. FAA funded the study.



MONICA GEYGAN



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Recovery Process

Solutions to rebuild were limited due to the local landscape and the runway's proximity to a nearby county road. "We knew we didn't want to go back with a man-made fill project after watching one just fall over the hill," Sayre remarks.

One thing was certain: The plan had to include an EMAS that fit the airport's aircraft mix, which includes a combination of CRJ-200s, CRJ-700s, Embraer 145s, 737-700s and A319s.

Shortly after the initial landslide, CRW retained Schnabel Engineering to manage the deconstruction of the remaining structure and develop alternatives for the rebuild. Using a risk management approach, the company helped stakeholders outline potential risk factors, and then used that list as a guide for evaluating alternative ways of deconstructing the slope.

Ultimately, engineers decided to reduce the load on top of the slope so contractors could stabilize it as they worked their way down. "We couldn't start from the bottom and work our way up because it would have destabilized the slope and caused more movement," explains Allen Cadden, a principal with Schnabel.



ALLEN CADDEN

Cleaning up debris from the collapse took roughly two years and cost about \$5 million. Crews moved approximately 540,000 cubic yards of material into a barrow area on property adjacent to the damaged end of the runway CRW purchased after the collapse. Crews separated out the debris, and some of the earth material was used during reconstruction.

About eight alternatives were considered for rebuilding the RSA and runway. Many included plans to completely fill in the valley, which would have required considerable earthwork and reduced the length of the runway. Working with the EMAS manufacturer (Zodiak), engineers determined that the new aircraft overrun bed could be smaller than the previous one and still provide the same level of safety. "That allowed us to start looking at a shorter length, and it happened to align well with where the rock was encountered in the deconstruction," Cadden states.

The project team used a risk assessment matrix to evaluate the eight alternatives. After balancing the risks identified during deconstruction with long-term operational issues, engineers calculated the probability and associated consequences of each risk and applied a weighting factor of importance. "We didn't take that as an absolute number," says Cadden. "But it allowed us to compare the eight options and eliminate some that really looked



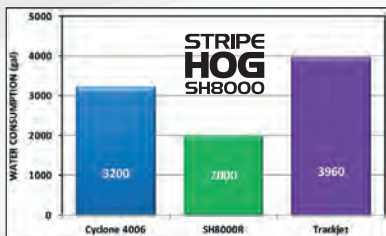
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WHO REALLY CAME OUT ON TOP?

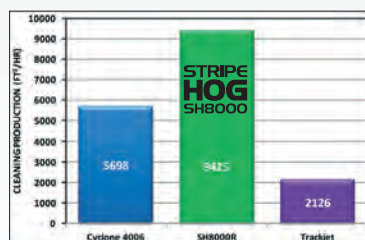
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high risk and low value. Then, we could dive a little deeper into the two or three that were most appealing.”

The solution that emerged includes an 85-foot concrete wall anchored with steel bars into the rock. The wall supports one corner of the fill project and provided room for the new EMAS bed. Cadden notes that the remaining fill was put back on a 2-to-1 slope gradient, making it more stable than the original build.

Typically, retaining walls backfilled with soil have very high pressure on them; so constructing a retaining wall of this size with the strength to resist such pressure would have been both a “significant and expensive endeavor,” Cadden explains.

To address this issue, the lower 25 feet of the retaining wall was backfilled with soil; and 60-foot piles for the wall are anchored 35 feet into the ground, with two rows of tiebacks into the rock. The upper 55 feet of the wall is backfilled with lightweight molded geofoam blocks, manufactured by Plasti-Fab. On top of the 6,000+ expanded polystyrene blocks is roughly 3 feet of soil, which provides a cap over the geofoam to spread out the weight load from aircraft. A membrane was added between the geofoam and soil fill to protect the foam from damaging contaminants such as jet fuel.

An instrumentation system attached to the piles monitors deflections on the face of the wall in half-meter increments. Another

monitoring system tracks compression of the backfill soil.

Sayre notes that the new structure also includes drainage to remove the rain that West Virginia often receives. “If you don’t have the proper drainage and control the water, it’s hard to keep what you have stable,” he explains.

Engineers added a drainage system behind the wall at the base and up the existing slope to manage seepage during construction. “There was a lot of effort to make sure we had redundant systems to get water out from behind the wall,” Cadden notes.

Another critical step in moving forward was ensuring that stakeholders were comfortable with the engineering solution. To help instill confidence, the airport hired an independent third-party engineering firm to perform a peer review of the proposed fix, and an expert in geofoam technology from the University of Memphis also weighed in. Both provided assurance about CRW’s plan.

During reconstruction, access for crews proved to be a challenge. Working at the end of the runway, on a slope, the team had a narrow bench to install piles and drill in the anchors. “It was basically one operation at a time,” says Cadden. “You could put the piles in, then you could put the anchors in; but you really couldn’t do two or three things at one time.”

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Legislative Intervention

In addition to overcoming geography challenges, the airport had to come up with a plan to pay for the recovery and replace the RSA. "FAA said they'd like to help us," Keller relates. "Unfortunately, a rebuild would not be eligible [for federal funding]."

Airport officials consequently turned to local stakeholders and their congressional delegation. Working tirelessly, the coalition managed to amend U.S. code by adding a provision for RSA repair. "Once that became law, it made the project eligible for FAA funding," he adds.

Geygan and other Landrum & Brown executives credit the "level-headed persistence" of the airport and its stakeholders for ensuring that the project could be completed.

Michelle Gallo, the company's project manager, agrees: "They are fully committed to making sure the airport is safe and providing the air service the region needs."

CRW has about 500,000 total passengers and 33,000 operations annually.



MICHELLE GALLO

"Emergency management is key, but you have to be able to plan and have to be persistent," Keller reflects. "We couldn't give up. We had to have a rebuild. The FAA wanted to help, but they didn't have a mechanism to; so we had to get our congressional delegation to help."

Operational Impact

Through all of this, CRW never shut down. That said, flight operations dramatically declined when the airport displaced its runway threshold 577 feet to allow room for machinery to work outside the safety area during clean up and reconstruction.

Carriers accepted weight penalties on many flights; but some were cancelled. For instance, American Airlines permanently discontinued its service to Dallas Fort Worth International because weight penalties made it inefficient to fly CRJ-200s out of CRW.

"Some carriers refused to come in here because our declared distances changed and our landing distance went down to 5,724 feet," Keller explains. "That hurt us quite a bit."

Another complication: The airport had to turn off its navigational aids for Runway 05 during reconstruction because they were aligned with the previous threshold. "That cost us a lot of operational problems and issues with the airlines," he adds.

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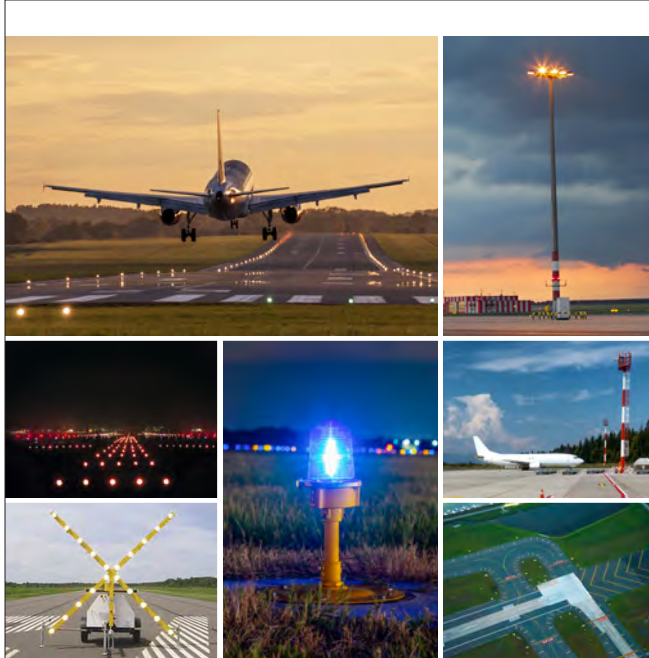
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Engineers added a drainage system behind the new retaining wall to manage seepage during construction.

Overall, Runway 05-23 lost about 75 feet of length; but the project returned almost 500 feet of runway to operation on the 05 end. "We're back to as normal as we can be now," Sayre reports. The instrument landing system is operating for Runway 05, and CRW has a reimbursable agreement with the FAA for a new precision approach path indicator that is scheduled to be operational this fall. "We're in a lot better shape than we were," he says optimistically.

Runway 05-23 is once again long enough for most current operations at CRW, Landrum & Brown is currently working on a second RSA study that addresses a fully standard RSA and runway length to support even more operations. The firm is also working on a 20-year master plan that will address future airfield needs. ✈️



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Cincinnati/Northern Kentucky Int'l Uses Green Products to Address Common Airfield Challenges

BY JENNIFER BRADLEY



Weather in the Midwest may be unpredictable, but the commitment to environmental safety at Cincinnati/Northern Kentucky International Airport (CVG) is not. The evolving Midwestern airport is proactively tackling airfield challenges with a duo of environmentally friendly products—a liquid concentrate that reduces silica exposure from pavement dust, and a deicing fluid that minimizes harmful effects to the nearby ecosystem.

Matthew Gabbert, senior manager of Airfield Maintenance at CVG, notes that he and his staff are always on the lookout for products that will make conditions and tasks safer for airport employees, passengers and neighbors.



MATT GABBERT

“We want to be green in our operations and keep our eyes open to environmental concerns,” Gabbert explains. “As an organization, we take a lot of care and pride in the fact that we are doing things the right way.”

Over the last three years, CVG has grown local passenger volumes by more than 50%, now serving about 9 million

passengers per year. Air cargo is a huge part of the airport’s footprint, too. Amazon is building an air cargo hub at the airport, which represents a \$1.5 billion investment; and DHL operates its second-busiest “global super hub” out of CVG. “Our airport campus has changed a lot over the last 10 years ago, so we want to make sure we’re doing our job to make sure we’re taking care of the environment around us,” Gabbert comments.

Reducing Silica Exposure

Gabbert learned about NeSilex, made by Chemtek/Aerogroup, at the International Snow Symposium in Buffalo, NY.

David Rigsbee, the company’s founder and CEO, explains that harmful silica particles in pavement dust are so small that people do not know they are floating through the air and into their lungs.

But the micro-size contaminants are being linked to serious health concerns such as lung cancer, chronic obstructive pulmonary disease and silicosis.



DAVID RIGSBEE



FACTS&FIGURES

Project: Search for Environmental Products

Location: Cincinnati/Northern Kentucky Int'l Airport

Silica Dust Management Product: NeSilex, from Chemtek

Key Benefit: Reduces exposure to tiny silica particles in pavement dust that are linked to lung cancer & other serious health issues

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Key Benefit: Provides similar performance as acetate formulas, but pulls three times less oxygen from nearby ecosystem



The airport uses a spray-on product to minimize exposure to dangerous silica particles in pavement dust.

“It’s like itty-bitty broken pieces of glass floating in the air,” says Rigsbee, noting that dangerous silica particles are released when crews cut or abrade concrete and asphalt.

To help airports address this issue, his company developed NeSilex, which is added to the water source of construction and maintenance equipment to manage the associated dust. Gabbert took two dozen quarts of the solution home with him from the Snow Symposium, and crews started using it in early May. Now, they won’t drive trucks without putting NeSilex in the water tanks first, he reports.

“When we’re sawing concrete, we use a lot of water and it creates a huge mess,” Gabbert explains. “This product actually traps the dust.”

The product has also made a tremendous difference in managing dust created by airside sweepers that run two shifts per day, he adds.

Rigsbee notes that NeSilex meets the OSHA Table 1 requirement that addresses the addition of surfactants to water, and it complies with the OSHA law that limits workers’ silica exposure to 50 parts per million over an eight-hour timeframe. For reference, that’s less than a matchbox-size individual packet of sugar spread over an entire football field.

“Silica is only dangerous if it is airborne, and it can be carried for many hundreds of yards since it is so light,” Rigsbee explains. “The only way pure water can control silica in the air is to have voluminous amounts, like a wave, knocking the dust down.”

When CVG crews add NeSilex to water in their equipment, they use much less water, Gabbert reports.

The airport found so much success with the Chemtek product, it purchased a 55-gallon barrel that it equipped with a pump to distribute the liquid. One pavement sweeper only uses about 15 ounces per day, says Gabbert.

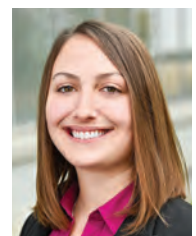
“Dust is not good for our employees,” he emphasizes. “Several years ago, we made everybody with any exposure to it wear a face mask or respirator. We’ve seen a huge reduction in dust from the street sweeper and the 2-foot mill attached to our backhoe for repair work. It’s a lot safer.”

Greener Deicing

Gabbert decided to try a potassium formate pavement deicer from Nachurs Alpine Solutions after reading an article about its success at Denver International Airport (DEN). (Visit airportimprovement.com to read the article about DEN in our May/June 2018 issue.) Although CVG had a milder-than-usual winter in 2018/19, personnel were still able to put the environmentally friendly deicer to the test. Based on the results, Gabbert plans to continue using the product this winter. BASF has the only formic plant in the Americas, allowing for local production and supply of formic acid, the key ingredient for Alpine RF-14F®, manufactured by Nachurs Alpine Solutions.

Kerry Sayther, marketing manager for chemical intermediates at BASF, notes that RF-14F® is a 50% by weight w/w potassium formate based solution that meets FAA requirements of the latest edition SAE AMS1435D specifications.

Sayther notes that acetate (another common deicing chemical) and formate



KERRY SAYTHER



This winter, CVG will continue testing an environmentally sensitive pavement deicer.

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have similar freezing points, but different environmental implications. “The chemical oxygen demand required for the potassium formate vs. acetate is three times less,” she explains.

That means that potassium acetate pulls three times more oxygen that is needed by surrounding plants, wildlife and marine creatures.

Although many North American airports use potassium acetate solutions for deicing, BASF’s formic acid plant in Louisiana now makes it possible for them to access a more sustainable, biodegradable product that has been available and successfully applied in Europe for decades.

Sayther acknowledges that the somewhat higher price of potassium formate deicer is offset by performance and environmental benefits. “If environmental concerns are a focus at your airport, this is definitely the optimal choice when it comes to deicing,” she asserts.

Gabbert emphasizes that it’s important to balance cost with results. Moreover, he says that throughout his 22 years at CVG, management has always been willing to try something new. If it proves to be beneficial, then officials make sure it’s also a good investment, he adds.

Last winter, his team worked to educate crews about RF-14F® deicer, assign specific trucks to carry it and label equipment accordingly.

“The product is readily accessible, and our stormwater manager would like to trial it for a few more years yet to see how it does, since we had a mild winter,” he adds. “In addition to the environmental benefits, it should last a bit longer because it requires fewer applications.”

Everybody Benefits

“It’s so important to start paying attention to harmful airborne silica,” stresses Chemteck’s Rigsbee. “People would be surprised what we all breathe in every day.”

He says education is usually the biggest hurdle at airports; so his mission is to help them recognize dangers that may have been there all along.

When Rigsbee and Gabbert discussed the topic recently, they both reached the same

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Potassium formate deicing fluid pulls less oxygen from the nearby ecosystem.

conclusion: “How can you put a price on someone’s health and life?”

With that thought as a backdrop, Gabbert says the price of going green can be inexpensive in certain applications, and the benefits can outweigh the costs. The benefits of minimizing airborne silica from airfield pavement extend well beyond construction and maintenance workers, adds Rigsbee. “When we were doing a demo, 10 or 15 people came right through our work area—loading food for airplane carts, handling baggage and performing safety and security functions.”

Gabbert agrees, noting that continued growth around CVG increases the importance of environmental awareness at the airport. As new structures are built and upgrades are made, management is committed to testing and implementing new solutions, he adds.

“We have to be mindful of our tenants and others, too, making sure they understand that we take things very seriously from both an environmental and safety standpoint,” Gabbert emphasizes. “We want to work with them to make sure we’re looking at the same goals.” 



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FACTS&FIGURES



Project: Acquiring Multifunction Snow Removal Machines

Location: Aberdeen (SD) Regional Airport

Annual Operations: 69,000

Average Annual Snowfall: 38-40 inches

2018/2019 Snowfall: 80 inches

Main Runway: 6,900 ft.

Crosswind Runway: 5,500 ft.

Equipment Purchased: MB5

Manufacturer: M-B Companies

Cost: \$1.5 million (2 full machines)

Engineering Consultant: Helms & Associates

Funding: 90% FAA Airport Improvement Program grant; 5% state; 5% city

Delivery: Dec. 2017



Location: Jackson Hole (WY) Airport

Annual Operations: 27,000

Average Annual Snowfall: 150-175 inches

Main Runway Length: 6,300 ft.

Equipment Purchased: RS400s

Manufacturer: Overaasen

Distributor: Myslik Inc.

Cost: \$1.05 million (3 sweepers without cabs)


Funding: Airport capital improvement funds

Deliveries: 2016, 2017, 2018

Key Benefits: Lower maintenance costs; faster runway clearing

Small Airports Share Tips About Buying Multifunction Snow Equipment

BY MIKE SCHWANZ

 Small airports in the northern U.S. share one common trait with huge airports such as Chicago O'Hare and Kennedy International in New York: They have to keep their runways and taxiways clear of snow during winter.

Most, however, don't have multimillion-dollar budgets for accomplishing this. The two small airports featured in this article manage to operate high-ticket multifunction machines. Here's how they afford them.

Funding Finesse

Aberdeen Regional Airport (ABR) in South Dakota logs about 69,000 annual operations. In addition to serving an active general aviation community, it has two commercial carriers: SkyWest and Sun Country. "We only have one main runway (6,900 feet) and a crosswind runway (5,500 feet); so our customers really depend on us to keep the runways and taxiways open," states

Transportation Director Rich Krokkel.

Unfortunately, ABR's aging equipment made snow removal increasingly difficult. "We were using two plow trucks that were roughly 20 years old, and our broom was at least 10 years old," explains Mark Hanley, the airport's operations and maintenance manager. "We were getting more and more mechanical breakdowns that extended runway closures."

Obtaining new snow removal equipment became a priority. After researching multiple options, Krokkel and Hanley decided ABR



RICH KROKEL



MARK HANLEY

Jackson Hole Airport receives 150 to 175 inches of snow per year.



BROOKE EDGAR

needed a multifunction machine with a plow, broom and air blower, all in one chassis. They began the search process by meeting with a few equipment manufacturers to learn about their options

and get help developing specifications for a new machine. They also enlisted the help of local engineering consultant Helms and Associates, which has a five-year contract with the airport for construction projects. Brooke Edgar, a project engineer with the company, helped ABR finalize its official request for proposals. From the submitted bids, airport officials decided to purchase two MB5 multifunction rigs, built by M-B Companies in Chilton, WI. The mammoth machines cost \$750,000 each.

The next step was applying for FAA Airport Improvement Program (AIP) funding. Edgar spent many hours meeting with Krokell and Hanley in late 2016 to develop the detailed information needed for ABR's proposal. "The key was that the airport had excellent maintenance records dating back several years, explaining not

only the cost of new parts, but also the number of man-hours that were required to fix machines," says Edgar. "They also recorded the amount of time runways had to be closed while machines were being fixed. These detailed reports helped us justify why an expensive multifunction machine would be worth the investment."

Scott Scharinger, regional sales manager for M-B, also helped with the funding application. "I have worked with many other airports to develop AIP funding requests for the MB5, which is our most popular snow machine. I am always glad to show how this product can save airports time and money," he says.



SCOTT SCHARINGER

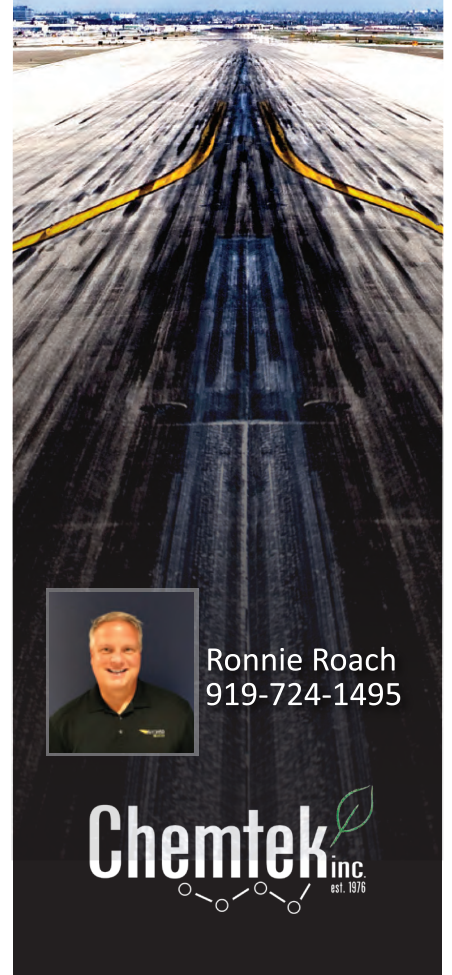
"The FAA places a high priority on snow-removal equipment, and appreciates the solid reputation of multitasking equipment. That helped us get this funding," Krokell adds.

Obtaining the rest of the funding was relatively easy, he asserts. "The Aberdeen city manager always has been supportive of capital improvement projects and acquiring equipment to improve our facility

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here,” Krokkel explains. “State officials also have been supportive in granting our funding requests over the years.”

In the end, FAA provided about 90% of the \$1.5 million the airport needed to buy two rigs, and the state of South Dakota and city of Aberdeen each contributed 5%. ABR ordered the machines in February 2017 and received them in December 2017.

At delivery, Scharinger helped set up the two rigs and train ABR’s maintenance staff. “I try to be there upon delivery, along with one of our service people,” he says. “We usually spend two days of training once a vehicle is delivered. At ABR, the staff was very savvy, so it only took us one day to finish the training.”

“The guys in our shop are quite handy, and these new machines are very user-friendly,” adds Hanley. “I honestly could teach someone off the street how to use them in 30 minutes.”

Once the MB5s were operational, Hanley noticed an immediate improvement after the first snowfall. “With the old equipment, it took us 25 minutes to clear the runways. When we got the two new MB machines, it took just seven minutes—so it was more than three times faster,” he comments.

The airport’s first winter using the machines (2017-2018) was relatively normal, with about 40 inches of snowfall. But last winter (2018-2019) was one of the worst on record, and the area received more than 80 inches.

ABR’s two multifunction rigs were really put to the test. “With the new machines, we can keep both the main runway and crosswind runway open,” Hanley reports. “During big storms, we were able to keep both runways open 70% of the time. With our old equipment, we only did that 20% of the time.”

Components vs. Cab Units

Jackson Hole Airport (JAC) in western Wyoming took a different approach to upgrading some of its snow removal equipment. Rather than buying new multifunction machines, it added towable sweepers with blowers to existing Oshkosh plow vehicles.

Located in prime ski country, JAC receives 150 to 175 inches of snow per year. As a result, its 12-person winter operations crew is constantly clearing the airport’s 6,300-foot main runway and full-length parallel taxiway.

“Our old brooms were aging, and needed constant maintenance,” says Dustin Havel, assistant airport director-operations. “At the same time, there has been a steady growth in our winter operations, since we are a major destination for skiers. For our situation, we needed combo pieces of equipment, so one driver can perform all plowing tasks by himself.”



DUSTIN HAVEL



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Maintenance records and runway closure data bolstered ABR's application for equipment funding.



JAC decided to purchase new sweepers, and selected the Overaasen RS400, made in Gjovic, Norway. Instead of buying complete cab units, the airport opted to add three new sweepers to its existing Oshkosh trucks.

Buying just the sweepers saved JAC considerable money. Each one cost about \$350,000 vs. \$750,000 to \$800,000 for a traditional full machine. Consequently, the airport did not apply for federal funds to buy the new equipment. It used capital improvement funds to purchase these sweepers.

“During the last three years, we have purchased three new sweepers—one per winter,” Havel says. “Two of our trucks, the Oshkosh H-series models, are relatively new. They were specifically designed so that they came with a fifth-wheel coupling, which would attach to the sweepers. We also are using an older Oshkosh P-series truck for the other sweeper. To make that work, we had to install the coupler ourselves.”

The RS400, which was revamped in 2015, includes numerous features that appeal to Havel and his crews. “They are very user-

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Monitors inside JAC's Oshkosh vehicles help drivers operate the new Overaasen sweepers.

friendly, offer a lot of automation, come with easy-to-change bristles (30 minutes or less) and are easy to maintain. In addition, the brooms stow at 90 degrees to easily store in a building," he says.

During delivery, setup was supervised by Bill Myslik, the main distributor of Overaasen products in the U.S.

"When each new sweeper arrived, our staff helped install the control systems in the cabs, and then

ran the cables to the back of the chassis to connect with the sweeper. Once we did that, it became a fully operational multifunction piece of equipment," says Myslik. "This was especially easy to do with the newer Oshkosh trucks the airport already owned, which had the fifth-wheel assemblies installed at the factory."

One special accommodation was needed to place the monitors in the Oshkosh cabs. "We had to build a custom-made rack to hold the screen, so that it is now very easy for the driver to control everything," Havel explains.

JAC sent a few maintenance workers to the Overaasen plant in Norway for training on the new equipment, and manufacturer representatives joined Myslik to provide onsite training for the entire maintenance staff when the equipment was delivered.

"Taking delivery, connecting to the truck, doing tests and putting the unit into service could be done in a full day, but we like to schedule at least three days so we can do some additional training with our operators and mechanics," Havel remarks. "This was invaluable last winter, when we received close to 200 inches of snow at the airport. Everyone on our staff worked long hours, and it was imperative they knew every aspect of operating the rigs."

Havel reports that the new sweepers were instrumental in helping the airport get through a particularly tough winter last year. Moreover, JAC's performance was recognized at the 2018 International Aviation Snow Symposium in Buffalo, NY. "We are very proud that we received an honorable mention for the Bachlen/Post Award in the small commercial airport category," says Havel. ✈️



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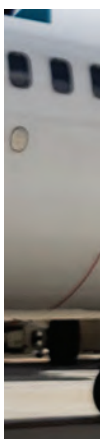
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Southwest Florida Int'l Counters Lightning Delays With Automated Docking Systems

BY KRISTIN V. SHAW

PHOTO: JAMES HESS, LEE COUNTY PORT AUTHORITY

FACTS&FIGURES

Project: Automated Docking Systems

Location: Southwest Florida Int'l Airport

Gates Equipped: 3 (one in each concourse)

Product: ADB SAFEGATE Safedock A-VDGS

Design-Builder: AERO Group

Designer: AERO Systems Engineering

Builder: AERO BridgeWorks

Installation: System installed on D concourse in Sept. 2018; B concourse in Jan. 2019; C concourse in May 2019

Implementation: Airport Terminal Services (ATS)

Key Benefits: Enhanced safety during thunderstorms because marshaling crews can stay inside; improved gate efficiency & planning



Sandwiched between two large bodies of water, the peninsula of Florida receives lots of warm, humid air. When combined with sunlight and ocean breezes, it's the perfect brew for thunderstorms—and operational challenges for airports like Southwest Florida International (RSW) in Fort Myers.

"Thunderstorms happen quite a lot in this part of the country," says Al Gulamali, the airport's director of operations and safety. "You can



AL GULAMALI

almost set your watch by it as the humidity builds."

When lightning is raging, it's simply too dangerous for ground crews to be on the tarmac guiding aircraft into gates. RSW recently installed an automated docking system on each of its concourses to mitigate such risks and keep planes moving.

The seed was planted two years ago, when Jeff Mulder, RSW's new executive director, saw a demonstration of an automated docking system at the annual conference for the American Association of Airport Executives. He gathered more information on the show floor and filed it away in his mind.



Six months later, Mulder looked out his office window during a typical summer storm and saw aircraft on the ramp waiting too long to be parked. “Arriving aircraft were pulling into the ramp but were holding out a couple of hundred feet,” explains Gulamali. “There was not any marshaling going on due to the lightning all over the place. It wasn’t safe for the ramp crew.”

The scene sparked Mulder’s memory about the trade show demo, and he picked up the phone...ultimately kicking off the process to issue a bid for a docking station to solve the problem.

After reviewing two responses to its request for proposals, the airport selected ADB SAFEGATE to install its Safedock advanced visual docking guidance system (A-VDGS) system for testing at D10, one of its common-use gates. RSW was already familiar with the company, as it has provided runway lighting and other systems to the airport for more than 20 years.

In order to use 2018 budget funds, RSW moved through the process quickly, and ADB SAFEGATE responded in kind. The company diverted a system from another project that had been delayed, and equipment was on site in 30 days.

Automated Docking Here & Abroad

The Safedock system uses cameras and lasers to provide precision guidance during irregular operations, notes ADB SAFEGATE Sales Manager Frederick Roe.



FREDRICK ROE

“Think about the camera on the back of your car. It requires contrast,” explains Roe. “Now imagine a white aircraft on a snowy or whiteout day. An absence of contrast is challenging for camera-only systems. That’s why we include cameras, but rely on the lasers for accuracy.”

During the docking process, lasers actively scan the gate area vertically and horizontally to capture and track aircraft. Scanning horizontally, the system measures parts of an approaching aircraft on either

side of the centerline to determine the specific aircraft type and subtype. This ensures compatibility with the gate and also provides the flexibility to accommodate curved lead-in lines, multiple centerlines and challenging gate layouts, notes Roe.

Automation facilitates safer operations by reducing the opportunity for human error, and speeds up the docking process, adds Gulamali. “In various kinds of weather, aircraft are parked faster, fuel burn and emissions are reduced, and ground crew are both safer and more efficient,” he elaborates. “As a result, the airlines can better deploy staff and plan more effectively.”

Roe notes that advanced visual docking guidance systems have been more widespread in Europe and other overseas markets because of the prevalence of common-use systems. Elsewhere in the world, ADB SAFEGATE often sells directly to airports, which then distribute the stations across their gates. In North America, the company sells to airports, airlines and facility operators.

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A control panel inside the jet bridge allows aircraft to be parked without personnel outside on the ramp.

Dallas Fort Worth International was one of the first U.S. airports to install the Safedock system back in 2008. Last year, Delta Air Lines ordered and installed 157 stations at Hartsfield-Jackson Atlanta International, the busiest passenger airport in the world. (A time-lapse video of the installation is available on YouTube.)

Installation

When RSW hired Aero Group to install its new docking stations, it did so under a separate contract from ADB SAFEGATE. Chris Britton, Eastern U.S. vice president of Aero Systems Engineering, notes that many airports prefer having a single point of contact, so one company is ultimately responsible. "It's typically smoother for us to have a full design-build process," he asserts.



CHRIS BRITTON

In retrospect, Gulamali encourages other airports installing docking systems to use one contract vs. two, if possible.

After airport personnel received the A-VDGS equipment, they turned it over to Aero Group. The next step was reviewing the layout and determining the best point of attachment to the structure of

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the terminal building, explains Jason Pearson, a project executive at Aero BridgeWorks. To minimize the impact on airport operations, the company completed as much work as possible before the onsite installation.

Typically, the operator/control panel is installed at the wheel of boarding bridges for easy access, but RSW went one step further. “Most docking systems have one control panel on the apron. But to better use it during lightning storms, we installed a second control panel inside the jet bridge so aircraft can be parked without anyone being outside,” explains James Hess, the airport’s airside operations manager. Gate agents simply walk down the inside of the boarding bridge to enter the relevant information about the aircraft without endangering themselves or anyone else, he comments.

A change in plans about which gate would serve as the test site at RSW required quick adjustment by Aero Group personnel, who had already fabricated a bracket for the specific dimensions of another gate.



JASON PEARSON



JAMES HESS

“It turned into a quick scramble to make sure we had the right mounting,” recalls Britton. “Typically, it takes two days to complete this kind of project. We have to terminate power, mount the bracket, hang the unit and then terminate the cabling to the unit and operator panel. Even with the gate switch, we were able to perform a two-and-a-half day installation.”

Aero Group started with the aircraft layout and gate arrangements. The team considered the height of the aircraft that typically park at that gate to configure it properly.

“We did a similar project in Atlanta,” says Britton. “We had multiple-height parking at one gate, and it was a challenge to accommodate them all.”

Once the unit is mounted, ADB SAFEGATE calibrates it to that specific location. If the system is moved, a technician may have to recalibrate it and define the field of view for the equipment and striping elements—a process that takes a few hours. “Basically, you’re defining the containment zone,” explains Britton.

Ideally, the docking station is mounted on a building, he adds. “Sometimes, we can’t get away from locating the system on a pole mount; but it’s always better to keep the units off the ramp if possible.”



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Mounting the system on a pole sometimes requires reconstruction of the apron area, which adds time and cost. “You could go from a simple installation to adding a pole, running fiber, dealing with concrete and rebar and so on,” Pearson says.

“Not all installation locations are the same,” adds Rob Brethaur, vice president of business development at AERO Group. “For example...this particular south Florida location required more complex structural engineering design to ensure that the system could withstand hurricane force winds.”



ROB BRETHAUR

Integration

As the ground handler for several airlines at RSW, Airport Terminal Services (ATS) trains its staff on how to use the aircraft docking system. The company also provides baggage delivery and aircraft cleaning services at the airport.

ATS Ramp Manager Frank Pinho reports that ground crews and pilots appreciate RSW's new docking system. “They'd rather work with electronic guidance because it's nearly foolproof,” says Pinho.

Hess emphasizes that the Safedock system is not complicated to operate. Gulamali and his team use a walking test, which allows ground crew to make sure the station is working properly by literally “standing in” for a plane.

“The computer control panel guides you through it very easily,” he says. “Once you train someone how to use it, it's simple to pick up.”

Carrier Challenges

While pilots across the board are reportedly thrilled about the docking stations, some airlines have been slower to approve them than the airport had hoped. For Gulamali, the system's benefits are clear, and he predicts that airlines currently unsure of the technology will quickly recognize its advantages. Getting passengers off planes during storms has a huge impact on passenger satisfaction, he notes.

There are also benefits to be had during good weather—for carriers and the airport. “Let's say an airline has arrivals coming in within two minutes of each other but only has one ground crew,” explains Hess. “They could use the docking station on one gate and the ground crew on the other. It helps with resources and improves customer service. Then, passengers can de-board the aircraft, use the restrooms, stretch their legs, purchase concessions and so on.”

More Automation Anticipated

RSW's first docking station was installed on gate D10, which is used by JetBlue, American Airlines and Spirit. After it proved successful, airport officials decided to install two more units, so each concourse would have one. Gate C1 was chosen because United and WestJet usually share it. On the international concourse, a station was installed at B3, mainly for Air Canada, Frontier, EuroWings and Southwest.



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Gulamali reports that the docking systems get quite a bit of use—especially in Concourse C.

“It’s only a matter of time before more airlines will secure approval to use it,” he predicts. “Pilots are keen to dock at an automated gate because many of them have used them before.”

“Every airport wants to improve safety and efficiency on the ramp,” adds Roe. “In the case of lightning, having aircraft parked at the gate and not idling is useful for airports and airlines. As a passenger, think about every time you hear ‘We’re just waiting for a crew to dock us,’ and imagine what it would be like to avoid that. We see significant gains for airports that experience a lot of lightning; but airports using this see gains across the board.” 



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FACTS & FIGURES

Project: New Fuel Farm

Location: Great Falls (MT) Int'l Airport

Farm Owner: Holman Aviation

Total Capacity: 180,000 gallons

Configuration: Five 30,000-gallon jet fuel tanks; one 15,000-gallon Avgas tank; one split tank for 10,000 gallons of diesel fuel & 5,000 gallons of unleaded auto gas

Construction: 3 months

Commissioned: Jan. 2019

Design & Construction: American Environmental Aviation

Tank Manufacturer: J.L. Houston Co.

Electrical: Liberty Electric

Overfill Protection System: Scully

Electronic Tank Gauging System: Omntec

Trench Drain: ABT Inc.

Specialty Under Slab Fittings: Nyloplast

Key Benefits: Increased storage capacity; faster delivery; backup power system; enhanced spill containment & overfill protection

New Fuel Farm Increases Efficiency at Great Falls Int'l

BY VICTORIA SOUKUP

 A new fuel farm at Great Falls International (GTF) is providing additional fuel capacity, faster delivery and peace of mind about protecting the pristine environment that surrounds the Montana airport.

The aboveground facility, which was commissioned in January, replaces a series of underground tanks installed in 1974. The new farm includes seven double-walled tanks with a combined capacity of 180,000 gallons; the older units could hold a total of 160,000 gallons. A new backup power supply

provides operational assurance.

"We're thrilled to have modern infrastructure that we know can safely deliver fuel to the commercial airlines, general aviation community and military for many years to come," says Airport Director John Faulkner. "It's a real sigh of relief to have such reliability in place that we can all count on."



JOHN FAULKNER

Holman Aviation, the airport's principal fixed base operator (FBO), privately financed the project. Construction took three months.

Long Time Coming

Given the age of the previous storage tanks, discussions about a new fuel farm had been brewing for at least a decade. "The tank farm had modifications over the years to comply with environmental regulations, but the system was clearly very dated," relates Dwight Holman, president of Holman Aviation. "And we started wondering how we would know if we were at the end of life of an underground fuel system. We certainly didn't want to wait until we had a leak."



DWIGHT HOLMAN

Holman consequently worked with the airport to select a site, facility design and contractor; and construction began adjacent to the old tank farm in fall 2018. Crews installed seven new tanks: five 30,000-gallon tanks for jet fuel (including one for JP-8 military jet fuel); one 15,000-gallon tank for Avgas; and one interior-split tank that can hold 10,000 gallons of diesel fuel and 5,000 gallons of unleaded gasoline for automobiles.

The new facility includes an asphalt/concrete pad to minimize contamination from potential spills—a high priority for Holman, as two delivery-related spills in the last few years have left him understandably skittish. Fuel from the spills seeped through the pea gravel mixture that covered the previous tanks and entered the soil. "It was very difficult to clean up," he recalls. "The contaminated soil had to be removed and replaced with clean soil." In both cases, the truck delivery companies executed and paid for the cleanup.

The airport's new farm was constructed on a hard surface that is surrounded by a retaining wall. In addition, the surface slopes toward a common drain to capture any spills. "The drain is always kept closed," notes Holman. "That way, if something were to fail in the system when we are not there, when we are taking delivery of fuel or filling up our mobile refuelers, it will all be retained."

He's also more confident that if a spill would occur at the new farm, cleanup would be simpler and faster. Previous spills at the former facility required years of soil and groundwater monitoring.

Updated Features

The farm was designed and constructed by American Environmental Aviation to provide faster flow rates. Jet fuel now pumps at 300 gallons per minute, Avgas at 200 gallons per minute, and automotive fuel at 100 gallons per minute. "The increased pumping speed at the new facility reduces and even eliminates late fuel deliveries to planes,"



PAUL SUNDBY

reports Paul Sundby, vice president at American Environmental Aviation.

There is also a reduction in fuel delivery costs, due to notably faster offloading times, adds Holman. The primary company that delivers fuel to the airport has a specific line item on its invoices that documents the amount of time required to deliver each load of fuel.

The facility includes a secondary overfill protection device to prevent spills if the shutoff device on a refueling truck malfunctions. Although this feature is not currently required, Sundby reports that it will be mandated in several years. "This is an environmentally protected area, as the Missouri River goes right through Great Falls," he notes.

In addition to faster pumps and overfill protection, the new farm has a backup generator designed to automatically kick in during a power outage. "The old fuel farm did not have a backup generator or backup electricity," says Holman. "When we experienced a power outage at the farm, we did not have access to fuel beyond what was already in the trucks; yet the airport continued operating. The generator is another huge step forward."

From a supply point of view, the facility includes an electronic tank gauging system. "This is connected to our computer network so we can easily access our inventories," he explains.

New Ownership Arrangement

On paper, the new fuel farm represents a change in guard at the airport. Previously, GTF owned the underground tanks, and Holman Aviation owned the aboveground equipment such as pumps. The new farm is completely owned by Holman.

"Like many airports, we ended up owning the tanks at the old farm. But the fuel was delivered under the supervision of the FBO, it was pumped by the FBO, and some of the fuel was even owned



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The new farm includes seven double-walled tanks with a combined capacity of 180,000 gallons.



by the FBO,” Faulkner relates. “It wasn’t our team that was taking care of it every day. We never touched the fuel or even used the fuel farm. It clearly wasn’t the best system, liability-wise, for the airport.”

Having Holman Aviation own the fuel farm makes much more sense, he reasons. “It’s really a better matching of commercial opportunity and responsibility for the tanks,” says Faulkner.

The old fuel farm is in the process of being decommissioned. Holman is responsible for removing the aboveground equipment it owns, and the airport is securing estimates to remove the underground tanks. Faulkner reports that tank removal is expected to cost about \$300,000.

To support Holman Aviation’s investment in the fuel farm, GTF

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consolidated all of the FBO's leases with the airport into one master lease and extended it by an additional 15 years.

Racing Winter

The airport's northern location and proximity to the Rocky Mountain Front made it important for crews to monitor weather conditions throughout construction. Fortunately, last autumn brought little rain. But crews *had* to finish certain tasks before winter arrived. "We raced against time to get the asphalt and concrete in before the cold weather came and shut down the plants," recalls Sundby. "After a moderate fall, we did have a little snow. But we got lucky: The severe cold snap, when the thermometer hit 27 degrees below zero, didn't come until a week after we finished. And despite those temperatures, the fuel farm worked really smooth."

Danny Hirschberger, president of American Environmental Aviation, characterizes the project at GTF as relatively straightforward, with a smooth permitting process and no significant construction problems. "Plus, we were very fortunate to have good subcontractors," he notes. "By the time the trigger was pulled, we were able to make the project happen on schedule." ✈️



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FACTS&FIGURES

Project: New Terminal

Location: Mobile (AL) Downtown Airport

Owner: Mobile Airport Authority

Cost: \$8 million (\$5 million for building renovations; \$3 million for security enhancements)

Funding: Self-financed

Strategy: Renovate warehouse into commercial service terminal

Carrier: Frontier Airlines

Terminal Features: 5 ticket counters; 2 hold areas; 3 rental car counters; 1 TSA security line; ramp space for two A320s & 1 regional jet; mobile boarding stairs/ramp; new public parking area & vehicle turn lanes

Renovation Timeline: Fall 2018 to late April 2019

Relocation Feasibility Consultant: VHB

Master Plan Consultant: Leigh Fisher/Jacobs

Terminal Architect & Interior Designer: KPS Group Inc.

Space Programmer: Jacobsen/Daniels

Construction Manager at Risk: JESCO Inc.

Structural, Mechanical, Plumbing: AVCON Inc.

Electrical: Humber-Garick Consulting Engineers

Boarding Ramp: Keith Consolidated Industries

Other Investment: \$425,000 for ground support equipment

Strategy: Save money by using in-house crews & equipment for ground handling service vs. hiring third-party provider

Mobile Authority Readies Downtown Airport for Commercial Service

BY THOMAS J. SMITH



When the Mobile Airport Authority gave the go-ahead to begin moving commercial operations from Mobile Regional Airport (MOB) to Mobile Downtown Airport (BFM), it then had to build a terminal and find a way to provide ground support at what was strictly a general aviation facility.

Fortunately, the runways and other key infrastructure were already in place because BFM is located within the authority-owned Mobile Aeroplex at Brookley. Airbus, another tenant, manufactures A320s, A321s and A220s at the air industrial complex.

The airport authority is moving scheduled airline service from MOB to BFM to make air travel easier and more accessible for residents living in the city's fast-growing suburbs. (BFM is closer and has better interstate and highway access than MOB.) Authority President Chris Curry says Mobile is currently losing too much business to neighboring airports in Pensacola, FL, and New Orleans.



CHRIS CURRY

(For more background about the decision and strategy to move service, check out our November/December 2018 issue at airportimprovement.com.)

The airport authority selected a 50,000-square-foot warehouse for BFM's new commercial terminal. Airbus had been using the Foreign Trade Zone facility to sort parts it imports to build A320s. Initially, only 22,000 square feet of the warehouse will be used for the terminal, but that number will grow as traffic grows.

The airport authority established strict project deadlines to prepare the facility in time for Frontier Airlines to begin service from BFM to Denver and Chicago in May.

Originally, Via Airlines was going to be the launch carrier, with initial service at MOB transitioning to BFM once the terminal was ready. However, Via ceased service from Mobile last summer.

Challenge Accepted

When work on the warehouse began last fall, Mobile Airport Authority had 160 days to renovate the structure and secure necessary approvals from TSA.

In October 2018, it retained the Birmingham, AL, office of KPS Group to design the building. In turn, KPS retained JacobsenDaniels to assist in creating a building program. The firms provided a plan to authority officials within two weeks of getting the assignment, notes KPS senior principal Gray Plosser.

Due to the tight deadlines, a traditional contractor bidding route was not appropriate, he explains. Instead, the firm assisted the airport authority in hiring its first construction manager: JESCO Inc.

“The challenge was how to make a silk purse out of a sow’s ear,” Plosser recalls. “It was just a big old metal warehouse building.” KPS was charged with creating a terminal to accommodate near-term traffic: five A320 flights a week.

The completed terminal has five ticket counters, two hold areas with gate check-in positions, three rental car counters and one TSA security line. There is parking space on the ramp for two A320s and one regional jet. Rather than installing jet bridges, the airport is using mobile boarding stairs/ramps that are compliant with the Americans with Disabilities Act.

Demolition work began in early January while the airport authority awaited final building permits, explains Brian Slaughter, JESCO’s senior project manager. Crews removed exterior metal siding and three loading docks. Inside, a firewall was built down the middle of the open building to separate the new terminal from space Airbus will to continue to use.

“The structure was never intended to be a ‘people building.’ It was an alien thing for its new use,” Plosser observes.

Contractors replaced the overhead roll-up doors with storefront windows and doors that allow natural light into the interior, and added insulation on the exterior walls and roof. Spaces for the ticket counters, restrooms and TSA area were prepared; and the warehouse’s high ceilings and exposed ductwork were maintained for the entrance area and in holdrooms.

Plosser compares the project to a performing a tenant build-out in an existing building while simultaneously having to upgrade its exterior envelope.

JESCO crews worked 10-hour days, seven days a week for about two-thirds of the project, Slaughter reports.

The biggest challenge was erecting a new steel canopy on the front side of the building. Obtaining the desired steel roofing panels in short order was difficult, he notes.

The fast turnaround also caused headaches in procuring equipment needed for the baggage handling system and backup generators, add KPS Project Manager Jasper Cornett.

The schedule also dictated some of the terminal’s interior finishes, as there was not enough lead time to order imported marble or other high-end materials.

New Service, New Needs

While contractors transformed the physical structure, personnel from the airport authority worked with TSA on a security plan for the new terminal. Because Airbus would continue using part of the building, it was important to keep that portion isolated from the airfield.

At TSA’s direction, BFM was equipped with a baggage screening area and a single-lane passenger checkpoint that can be expanded to accommodate a second lane if needed. Team members note that cooperation and support from TSA were essential in achieving the abbreviated schedule.

The airport authority spent \$5 million transforming the warehouse into a terminal, and another \$3 million to add perimeter fencing, surveillance cameras and other security features needed to support commercial airline operations.

The authority financed the project with cash on hand.

Landside improvements include a new public parking area across the street from the terminal and new turn lanes on Michigan Avenue to separate terminal traffic from Aeroplex traffic.

Construction crews completed the bulk of their work on April 24, and TSA approved the security plan on April 29. As scheduled, the first Frontier flight arrived on May 1.

BFM’s terminal was specifically designed to serve low-cost airlines like Frontier rather than legacy carriers, explains Plosser. “Our charge was to deliver the biggest bang for the buck,” he says. “Our job was to produce something that would exceed the expectations of the airport authority, and we think we did that.”

“It looks like a finished terminal,” Curry observes. “It is not an elaborate structure. You will see some carpeted surfaces and a

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The airport uses mobile stairs/ramps rather than jet bridges.



of lot concrete. It has exposed ductwork and was built to transition people through as quickly as possible with the least amount of expense to passengers and the airline.”

The only concessions in the terminal are vending machines, which are located before and after the TSA checkpoint.

Curry does not expect to add service to BFM from American Airlines, Delta Air Airlines or United Airlines anytime soon. “The brand of the legacy carriers is different from the low-cost carrier,” he explains. “They want a structure with more amenities. We do not use jet bridges at this time, and that is something that is important to the legacy carriers. They are better suited to make the transition once we build another facility.”

Toward that end, Leigh Fisher/Jacobs is creating a 20-year master plan outlining what additional buildings will be needed to complete the shift from MOB to BFM. The firm anticipates completing the plan in June 2020.

Phased Expansion

In the meantime, work to expand BFM's new terminal into the rest of the warehouse is expected to begin before the

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end of this year. The additional space will accommodate two more gates and holdrooms, and a larger luggage screening area.

The expansion is not contingent on securing another carrier or more Frontier flights, specifies Curry. The current terminal was designed so existing operations will not be disrupted when the rest of the building is being converted, Plosser adds.

The new capacity at BFM will be about 10 A320 flights per day. By comparison, three carriers at MOB currently fly 23 flights a day to four hub cities. Fully 80% of those flights are on regional jets.

Costs for carriers are lower at BFM. While a full rates and charges study is currently underway, Curry notes that it costs FedEx \$1.98 per 1,000 pounds to land a cargo plane at BFM vs. \$2.20 per 1,000 pounds at MOB.

Mobile Airport Authority's air service incentive program does not favor one airport over the other, Curry advises. In addition to granting a two-year fee waiver and providing above- and below-the-wing ground handling services for flights to new destinations, it also offers \$50,000 marketing assistance for the first year and \$25,000 the second year. Depending on the destination, community groups may provide additional marketing assistance, he adds.

The airport authority is very active and competitive with airline recruitment, Curry emphasizes. "New carriers are always on the line. It is just a matter if you can pull them out of the water," he remarks.

Frontier's arrival brought two new destinations to the Mobile market. The Denver-based carrier is flying three times a week to Denver International and twice a week to Chicago O'Hare.

United stopped flying to its Chicago hub from MOB last October.

When Frontier committed to the Mobile market, the possibility of service to Orlando was highly desirable to the airport authority. The Florida destination is reportedly of keen interest to local residents, and BFM officials continue to discuss the route with Frontier.

"The market has responded extremely well," reports Curry. In July, flights to Denver were averaging 90% load factors, and Chicago flights were in the mid-80s.

Overall, enplanements have been growing: from 2,600 in May to 3,000 in June and 3,700 in July.



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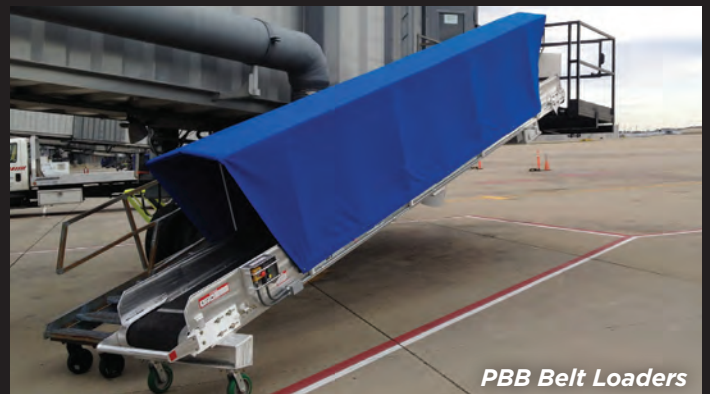


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In-House Ground Support

Providing the promised ground handling services for Frontier's limited flight schedule could have evolved into a "financial nightmare," Curry relates. Airport personnel suspected that hiring a third-party provider would be costly due to the carrier's initially intermittent schedule—and responses to a proposal solicitation proved them right.

"We thought we could do this ourselves with the right equipment and right personnel," he explains. Two factors inspired them to try: the high cost of outsourcing the work and the chance to control the entire customer experience.

"We worked to make sure we could provide what Frontier required and that we could meet their standards," explains Izzy Bonilla, vice president of Operations.

The airport authority consequently invested about \$425,000 in new and used ground support equipment for the carrier's A320s. "You can hit the used sales and find some relatively new equipment. We just put a new coat of paint on them," says BFM Station Manager Doug Bullock of the airport's used belt loaders, bag tugs, luggage carts, ground power and ground air conditioning units.



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The airport's only major piece of new equipment is a boarding ramp purchased from Keith Consolidated Industries. With it in place, BFM can dual load an A320 with a stair truck and the boarding ramp, or simultaneously load two A320s using each plane's front entryway.

During ground operations, in-house crews vacuum aircraft, perform light cleaning, vacuum and re-stock supplies, soft drinks and ice. Signature Flight Support, the existing fixed-base operator at the Aeroplex, handles fueling.


Nine airport authority employees perform above-wing services and another nine handle below-wing tasks. Some are full-time employees; others work part-time.

Companies that provide ground services at MOB also employ several of the part-time crewmembers. Bullock notes that the airport authority pays competitive wages to avoid losing staff to the firms at MOB.

Although Frontier flies from BFM on Mondays, Wednesdays and Saturdays, the ticket counter is open six days a week so passengers who don't want to book online can purchase tickets at the airport. Counter personnel are employed by the airport authority, and wear Frontier uniforms on flight days and BFM uniforms the other three days.

Per the airport authority's incentive program, Frontier is not changed for any of the ground handling services it receives at BFM. "After two years, the carrier will need to determine whether to hire a third-party, do it themselves or hire us. We would like to put ourselves in a position that they will hire us," says Bullock.

In late July, BFM was tied for first place in a customer satisfaction contest Frontier was conducting. "We have had zero bags lost," Bullock reports.

After seeing the ground crews in action, an industrial tenant at the Aeroplex approached the airport authority about providing ground handling services for its Airbus operations. Curry also hopes to win ground handling business at MOB from American, Delta and United when their existing contracts with third-party partners expire. 

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FACTS & FIGURES

Project: Runway Reconstruction

Location: Martha's Vineyard (MA) Airport

Runway Length: 5,504 ft.

Cost: \$10.5 million

Funding: FAA, 90%; state, 5%; county, 5%

Airport Owner: Dukes County

Operator: Martha's Vineyard Airport Commission

Project Engineer: McFarland Johnson

Environmental Engineer: Tetra Tech

General Contractor: Lawrence-Lynch Corp.

Barge Service: Tisbury Towing

Stone Supplier: Cape Cod Aggregates

Liquid Asphalt Vendor: All States Materials

Liquid Asphalt Supplier: C L Noonan
Transportation

Hot Mix Asphalt Supplier:
White Brother's Lynch LLC

Local Sand Supplier: Goodale Construction Co.

Hot Mix Asphalt Aggregate Supplier: P J
Keating

Electrical Sub Contractor: KOBO Utility
Construction Corp.

Noteworthy Details: Runway materials had to be shipped in via barges & freighters; paving crews working 7-day shifts were housed on the island; negative feedback about standard hot mix for the region prompted airport to alter asphalt formula mid-project

Island Location Complicates Runway Project at Martha's Vineyard Airport

BY THOMAS J. SMITH



Runway reconstruction is often a nail-biting experience for small airports with limited options for takeoffs and landings. When the airport is also on an island, every worker and load of materials must be carefully choreographed to finish the project on time.

In spring, Martha's Vineyard Airport (MVY) completed a \$10.5 million reconstruction of its main runway two days early. Racing against time, crews laid asphalt daily—sometimes seven days a week—from late March until May 13. JetBlue Airways resumed its seasonal flights on May 17.

Located on a picturesque island about seven miles off the coast of Cape Cod, MVY handles a mix of seasonal commercial traffic provided by JetBlue, American Airlines and Delta Air Lines, all flying Embraer 175s and 190s. The airfield also accommodates Cape Air's year-round schedule with Cessna 402s and a variety of private jets.

Prior to the recent project, MVY's 5,504-foot main runway was last reconstructed

in 1991. The airport also has a 3,328-foot secondary runway, but it cannot support commercial carriers or large private jets. So for some operators, MVY is essentially a single-runway airport.



GEOFFREY FREEMAN

"Our fleet dynamic has changed over time from the ATR 42s of the '90s to more mainstream regional jets," explains Deputy Airport Director Geoffrey Freeman. "We have had a lot of wear and tear on the runway,"

For instance, when former President Obama vacationed on the island, a bevy of military support aircraft came, too.

In its 2017 pavement evaluation, the Massachusetts Department of Transportation deemed the main runway as mostly fair, but with poor conditions along the edges. At that point, airport officials began planning for its replacement.

“We thought about all the angles on this project and how to get it done—not just from the airport’s standpoint, but also how we could help out our contractor,” says Freeman.

Officials considered dividing the reconstruction in two, with part of the project ending in fall 2018 and the remainder wrapping up in spring 2019. Instead, they decided to close the entire runway in early 2019 and complete the reconstruction all at once to create a smooth, uninterrupted finished surface.

During the design process, project engineer McFarland Johnson worked with the airport to understand and mitigate potential disruptions to flight operations. “We were able to limit the duration of impacts by developing multiple construction phases and using around-the-clock construction,” says Rich Lasdin, P.E., the company’s project manager.



RICH LASDIN

In general, the plan was to complete all preliminary work by the time the contractor’s asphalt plant could re-open in March. Achieving that required an extensive amount of pre-construction staging; and working on an island added considerable challenges.

“Construction phasing, accurate quantities and cost estimating is absolutely critical for project success in an island environment,” says Lasdin. “Diligence during the design process and continuous monitoring during construction resulted in a project that was completed ahead of schedule and under budget.”

Peter Kelly, the project manager for general contractor Lawrence-Lynch, notes that almost all materials for the project had to be shipped in—even the stone, as Martha’s Vineyard is an island of sand and does not have a quarry.



PETER KELLY

Material Delivery

The project required about 33,880 tons of crushed aggregate for a new 7-inch base. It took 37 barge trips to deliver the sub-base material from docks in New Bedford, MA, to the island’s small port, Vineyard Haven. But first, the stone had to be trucked from the supplier’s facility, one hour north of New Bedford.

The barge operator’s landside facilities in Vineyard Haven did not have a solid surface to unload the material onto during winter, so Lawrence-Lynch installed an asphalt pad to facilitate deliveries.

Shipping began on Jan. 7 and ended on March 21, with a new barge load of materials arriving almost daily. The barge operator



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shipped and unloaded the stone and aggregate materials day and night, but the contractor could not deliver the stones to the airport until the next day because local laws will not allow large trucks on the island's narrow roads after dark.

Initially, the aggregate was stockpiled at the airport; but there was not enough space to store all the sub-base material. As the project progressed, crews trucked stone directly from the barge to the runway.

Asphalt production was also an issue. Lawrence-Lynch already had a small asphalt plant just 2 miles from the airport, operated by White Brother's Lynch LLC, but its capacity is limited to 60 tons per hour. And to keep peace with the neighbors, it can only operate during daylight hours. In addition, the facility didn't have enough room to store all the raw aggregate materials, and it lacked sufficient tank capacity to hold all of the liquid asphalt needed to manufacture the 22,700 tons hot mix required for the airport project.

When winter turned to spring, space on the barges became constrained by other customers shipping goods onto the island. So Lawrence-Lynch also used the Steamship Authority ferry and freighters to deliver its raw materials. In the end, it also shipped approximately 17,525 tons of aggregate raw materials from

another stone supplier and 1,240 tons of liquid asphalt across Buzzards Bay and Vineyard Sound. The contractor also used 5,000 tons of native sand from an island supplier to create a 5-inch layer of asphalt made up of a binder and top course for the runway.

Often, a new tanker of liquid asphalt arrived every other day from Rhode Island via a local freighter. Typically, the plant uses one 30-ton tanker of liquid asphalt per month, notes Kelly.

As a contingency, the contractor and liquid asphalt supplier kept an empty self-pumping tanker on-site as a spare. They also located on-island trucking sources and imported off-island truckers during critical construction phases. The contractor ran many operations simultaneously and maintained at least one backup of all the major equipment utilized, to ensure no down time. To gear up the asphalt plant for production, crews spent several weeks maintaining and rebuilding components to make sure everything was in good working order. "We could not afford to lose time because of an equipment breakdown," Kelly emphasizes.

Although Lawrence-Lynch had completed other pavement projects at MVY, this was by far the most extensive.

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All Systems Go

Construction began on Jan. 14 with crews removing 9 inches of asphalt and the runway's stone sub-base. Grinding operations proceeded without delays, thanks to a mild winter with little snow or extreme temperatures, reports Freeman. The old material was stockpiled at the airport, and Lawrence-Lynch is gradually removing and re-using it in new pavement elsewhere on the island.

By the time air temperatures rose in late March and the asphalt plant came online, crews had installed and graded the runway base. With the May 15 deadline looming, the project team decided to "go seven days a week."

Despite the urgency, crews only worked from 6 a.m. to 5 p.m. "We had to be conscientious of the traffic and smell, so we were not impacting the neighbors too much," Freeman explains. As the runway



Materials for the job needed to be transported in via barges and freighters.

neared completion and seasonal residents returned to their homes in spring, crews stopped working on Sundays.

Early in the project, Lawrence-Lynch ferried work crews between the island and mainland every day on its own small boat or the Steamship Authority ferry. During paving operations, the contractor rotated its crews and housed workers in a hotel on the island. Personnel worked seven days at MVY, and then returned to Cape

Cod for seven days of more routine paving and downtime.

Curveball

A major change order was processed mid-job, when the airport requested a new formula for the top layer of asphalt. After the contract had been awarded and Lawrence-Lynch proved to the FAA it could make the correct hot mix using the agency's regional formula, MVY received

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Runway 6-24 Reconstruction



Challenges

- ✓ Budget constraints
- ✓ High cost bidding environment
- ✓ Critical timelines
- ✓ Island logistics
- ✓ Peak season construction on Primary runway

Successes

- ✓ Contractor engagement plan
- ✓ Seamless design to construction coordination
- ✓ Unique and flexible phasing plan

Results

- ✓ Delivered under budget
- ✓ Delivered ahead of schedule



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The Foam Problem

Like many other U.S. airports, Martha's Vineyard Airport (MVY) off Cape Cod, MA, is dealing with a relatively new environmental issue: potential soil and groundwater contamination from chemicals in firefighting foam.

The possible presence of per- and polyfluoroalkyl substances (PFAS) in soil underneath the main runway emerged as a potential snag during MVY's recent \$10.5 million reconstruction project. Compounding the issue, traces of PFAS have been detected in the drinking wells of neighbors.


Geoffrey Freeman, the deputy airport director, explains that PFAS are not completely regulated by Massachusetts, but the commonwealth's environmental regulators consider them "an emerging hazard."

Based on airport records—and Freeman's personal experience—crews located an area of the runway where PFAS-laced foam was discharged in the 1990s. The Massachusetts Department of Environmental Protection asked that the soil underneath that section of the runway be removed, set aside and tested.

Samples from the 50 tons of material crews removed came back clear, and no further treatment was required, Freeman reports.

But earlier last year, MVY decided to investigate further before regulations were enacted. "We found some contamination of an area just south of the airport where it reached the groundwater of a neighborhood," says Freeman.

The airport consequently worked with regulators and environmental engineers from Tetra Tech to test about 100 home wells and has subsequently installed filters on 36 wells. After the filters were installed, no detectable levels of PFAS have been found.

Freeman notes that Massachusetts regulators have yet to issue state guidelines regarding safe PFAS levels, and the EPA has not set national standards. 

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troublesome feedback from airports in nearby Hyannis and Nantucket. Their relatively new runways, paved with the FAA's standard formula, were developing ruts and minor failures, explains Freeman.

Working with engineers from McFarland Johnson and Lawrence-Lynch, the MVY project team proposed changes to the FAA formula to strengthen the finished pavement. It also added another inch of asphalt to the design spec for the final layer, notes Kevin McMahon, McFarland Johnson's resident engineer for the project.

Typically, it takes the FAA about six months to review project changes; but the formula and design changes were approved in just two months, reports McMahon.

Thanks to the agency's speed, changing the liquid asphalt properties and stone ratios did not delay the start of paving. "It was a curveball," Kelly recalls, noting that the contractor was able to change its order for materials just before the supplier began shipping.



Out of courtesy to airport neighbors, crews worked from 6 a.m. to 5 p.m.

"The Martha's Vineyard Airport Commission recognizes the need for infrastructure upgrades to maintain and operate the airport's facilities and has planned accordingly," says Airport Director Cindi Martin, who arrived at MVY after the runway reconstruction was completed. "This project was critical to achieving the goal set forth by the commission to provide our community and the flying public with a safe, secure and compliant airport facility."

In the next three to four years, MVY will begin planning for the reconstruction of its secondary runway. Although there has been some discussion about extending it, Freeman doesn't foresee that happening.

In 20 years, engineers will assess the remaining life of the main runway, and a new overlay may be applied to extend its life another five years. ✈️



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Airfield Solar Farm Puts Enormous Dent in Chattanooga Metro's Electricity Bill

BY SCOTT BERMAN



FACTS&FIGURES

Project: Solar Photovoltaic Power Farm

Location: Chattanooga (TN) Metropolitan Airport

Configuration: 3 ground-mounted arrays installed on airfield; all associated electricity is sold to local utility

Annual Output: 3.84 million kWh/year—roughly same amount consumed by airport-owned buildings, airfield & equipment

Total Cost: \$10.3 million

Funding: \$4.3 million VALE Grant; FAA Section 512 Energy Efficiency Grants of \$3.4 million & \$1.7 million; \$940,000 from airport passenger facility charges

Associated Revenue: Airport sold \$235,000 of solar-generated electricity per year to local utility in 2017 & 2018. Income expected to increase this year, with recent addition of 3rd array

Project Timeline: 2010-present

Design/Installation: Inman Solar

Panel Manufacturer: Suniva for Phases 1 & 2; Heliene Solar for Phase 3

Ongoing Operations & Maintenance: Inman Solar



Chattanooga Metropolitan (CHA) has managed to turn unused land alongside its runways and taxiways into an environmentally sound source of electricity that powers the same amount of energy that CHA facilities at the Tennessee airport use each year.

CHA's \$10.3 million solar photovoltaic farm is 2.74 megawatts (MW) in size and generates about 3,840,000 kilowatt hours per year—roughly the same amount consumed by its buildings, airfield lights and equipment. The airport sells power generated by the farm to its local utility provider, and then purchases electricity just like other customers.

Last year, CHA spent \$264,000 on electricity for its commercial service terminal; in 2017 it purchased \$255,000 of power, reports Airport Planner Jack McAfee. The solar initiative has made an enormous dent in that cost. In 2017 and 2018, CHA earned \$235,000 per year selling power from its farm. Revenue will undoubtedly be higher this year due to the recent addition of a



JACK MCAFFEE

third solar array. McAfee estimates it will add about \$50,000 of revenue per year, bringing the farm's annual earnings total up to \$290,000—more than the CHA spent purchasing power last year.

Thanks to federal grants, the airport's out-of-pocket cost for the entire farm was less than \$1 million. (See Facts & Figures section to the left for funding specifics.)

"We were the first airport in the nation to achieve the renewable energy goal of generating enough green power to match our energy usage," reports John Naylor, the recently retired vice president of Airport Planning for the Chattanooga Metropolitan Airport Authority. "We produce the amount of power that we use."



JOHN NAYLOR

After expanding steadily over several years, CHA's solar initiative currently includes three ground-mounted arrays. Located on the airfield, the solar farm is flanked by several airport buildings that have achieved high certifications for Leadership in Energy and Environmental Design (LEED).

“First and foremost, the Chattanooga Airport is here solely to support our community and customers,” emphasizes Naylor. “And one way we do that is by helping clean the air as providers of green power. Our move to produce renewable power started out about saving money. But it’s not only about money. It’s about serving our customers. In accomplishing the goal of reducing energy consumption and costs, the airport was able to hold down costs for the airlines, which ultimately brought more service to the community.”

Last year, the two-runway airport logged 504,000 enplanements and handled 9,500 tons of cargo.

Implementing Solar

CHA’s solar initiative began in 2010 with relatively small steps. The first phase, a 1 MW array with nearly 4,000 solar panels, started operating in 2011; and another installation followed two years later. The effort gained further momentum in 2017, when a conversion of the airfield and terminal lights to more efficient compact florescent and LED fixtures prompted a wider conversation about energy efficiency. Inman Solar designed and installed all three phases of the solar farm. The panels were manufactured by Suniva for Phases 1 and 2 and Heliene Solar for Phase 3.

In the early years, the airport worked with EPB, its local power utility, to identify grant opportunities for solar projects. Armed with that information, airport personnel developed a solar plan and presented it to the FAA.

Safety concerns regarding potential reflectivity problems left the agency decidedly unenthusiastic. Officials were particularly worried about glare into the control tower and aircraft cockpits. “They really pushed back on us during our first grant application,” Naylor recalls.

Mark Jones, a principal at Inman Solar, says complying with offset/elevation rules and conducting a glint and glare study are two important steps airports can take early in their project planning to address FAA’s key concerns.



MARK JONES

As for glint and glare, arrays must be located south of control towers to minimize the possibility of solar panels reflecting sunlight into a tower and compromising the vision of controllers inside.

At CHA, Naylor conducted an airfield study that examined a number of factors. FAA’s CFR Part 77 emerged as a key issue. “Siting and reflectivity must be looked at carefully,” he emphasizes.

Part 77 rules require structures, including ground-mounted solar arrays, to be located at least 400 feet from runway centerlines, and at heights below a 7-to-1 slope beyond the 400-foot offset distance. To comply with these requirements, Inman technicians modified the original design configuration of CHA’s first array. Subsequent phases of the project required earthmoving crews to change the elevation of nearby sites for the next two arrays—in one case lowering the elevation, and raising it in the other.



The solar arrays were installed on unused land along the runways and taxiways.

“The land areas in all three phases of the solar project could not have been used for a building or other structures due to the Part 77 offset rules,” Jones explains. “Using these areas for ground mounted solar arrays allowed the Chattanooga Airport to utilize what would have otherwise been unusable land.”

Naylor describes another challenging aspect of the process: “We also needed to study all of the environmental issues, which included a FEMA study. The site was in the flood plain and we had to have the site surveyed and a LOMA [letter of map amendment]



- Inman Solar designed and constructed Phases 1, 2 & 3 (2.7MW total) of the Chattanooga Metropolitan Airport.
- Inman Solar has a 20 year Operations and maintenance contract with CMAA for all 3 phases also.
- Inman Solar designed and installed the Valdosta, Georgia airport solar farm
- Inman Solar installed a 440kW solar installation at the FAA Peachtree City Air Traffic Control Center

Inman Solar has also installed solar for the US General Services Administration, the US Military and at two Presidential Libraries (Carter and Ford).

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Other Airport Arrays

Chattanooga Metropolitan (CHA) is in good company when it comes to U.S. airports harnessing solar power.

A 2015 ACRP report by The National Academies of Sciences, Engineering and Medicine lists 70 such projects in 25 states and the Virgin Islands. The article, titled *Renewable Energy as an Airport Revenue Source*, notes that the projects vary in size, cost, output, installation strategy and ownership arrangements.

According to the report, the largest U.S. installation is Indianapolis International's 25 MW ground array. Other sizable farms include a 10.2 MW system built in installments at Denver International Airport from 2008 to 2014; and a 4.9 MW roof system at Phoenix Sky Harbor International Airport. Global standouts include the 40 MW solar farm that opened at India's Cochin International Airport in 2015.

A free PDF of the report is available at nap.edu/catalog/22139. ACRP also offers related publications, including *Developing a Business Case for Renewable Energy at Airports* and *Guidebook for Developing a Comprehensive Renewable Resources Strategy*. ✈️

filed and approved. Once all of that was completed, a 7460 was filed with the FAA to study if there were any NAVAID or airspace issues. Everything was approved, and the local FAA Systems Support Center (SSC) objected. Therefore, a second 7460 was filed and the FAA SSC objections were denied; and approval was granted."

The end result: CHA officials identified usable land south of the tower for its renewable energy project.

Jones reports that installing the structures was otherwise fairly routine. He notes that CHA's grid-connected system sells all the power it produces to the local utility for subsequent distribution/sale—vs. a net metered system, which provides power directly to its owner/operator. Typically, facilities with net metered systems are still connected to the grid so they can receive electricity when the sun is not shining, he notes.

Financing airport solar farms is another matter. CHA received federal grants for each phase of its project: a \$4.3 million FAA VALE (Voluntary Airport Low Emissions) Grant in 2011 for Phase I; a \$3.4 million FAA Section 512 Energy Efficiency Grant in 2013 for Phase II; and a \$1.7 million FAA Section 512 Energy Efficiency Grant in early 2019 for Phase III. CHA paid for its 10% share—\$940,000—with passenger facility charges.

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Integrating Solar

CHA's solar farm is part of a larger environmental program that has made the airport greener and more energy-efficient. While Inman crews installed the three arrays, CHA was also executing other sustainability projects.

When the first solar array began producing power in 2011, the airport debuted its LEED Platinum general aviation terminal and a LEED Gold hangar. In 2013, during the second phase of the solar project, another LEED Gold hangar and office complex was completed.

More projects followed in short order. In 2014, the commercial service terminal was renovated and certified as LEED Silver; and in 2016, a third LEED Gold hangar opened at CHA.

"Involve your power companies and FAA Airports District Office from the start," advises Naylor. "You will be a team."

Jones also encourages airports to contact their local electric providers, noting that rules and regulations regarding solar power vary from state to state.

Interest from within the industry seems to run high. Throughout the years, personnel from about 50 airports have contacted CHA with questions about the costs and benefits of its solar farm.

Naylor suggests starting out small: taking steps to reduce energy consumption, and then reinvesting those savings into larger

projects. "Do your homework, as solar is not the answer for every airport," he cautions, noting that some will simply not have the right land or site available to comply with FAA safety regulations.

What's Next?

CHA officials are not resting on their laurels. Beyond more solar panels, a number of other sustainability projects are also in the works.

"Moving forward, we will continue to set energy goals to reduce our carbon footprint," remarks McAfee. "As we remove older, inefficient buildings, they will be replaced with modern, LEED-certified buildings that are energy-efficient."

In addition, the airport is continuing its ongoing conversion to electric ground support equipment with charging stations. Electric charging stations are also slated for vehicle parking lots.

"We should not remain satisfied having been an early integrator of solar," says McAfee, "We want to continue to set an example for other airports to follow. The largest obstacle to overcome in the near future is convincing and educating others on the benefits of going green.

"I can't predict the future any better than the next person," he adds. "But as new green opportunities present themselves, we must be open to thinking outside the box." ✈️

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Edmonton Int'l Turns Tech Partnership into Business Opportunity BY MINDY HAMLIN

At Edmonton International (YEG), strategic partnerships with technology companies are helping the airport tackle common industry challenges such as wildlife management, perimeter security and ground support services. One venture led to the development of a new portable diesel heater to keep jet bridges and parked aircraft warm during cold Canadian winters.

Investing in aviation-based technology is one way the Alberta airport is carrying out its mission to drive regional economic prosperity through aviation and commercial development.

"Several years ago, we launched a strategy to develop our land into an airport city, leveraging the airport and airfield to bring on companies and manufacturing that would support the airport and the region," explains Steve Maybee, YEG's vice president of operations and infrastructure.

In June 2015, the Alberta Aerospace and Technology Centre opened at the airport to provide aerospace training, and support aviation research and innovation.

YEG partnered with the airline Canadian North and Canadian Helicopters, Edmonton Economic Development Corporation and the government of Alberta to launch the new facility.



STEVE MAYBEE

New Aircraft Heater

One of the most promising innovations to come out of the Alberta Aerospace and Technology Centre is a piece of ground support equipment. Some involved with the project predict that the portable diesel heater could change the way airports and airlines take the chill off parked aircraft.

Three years ago, the airport began working closely with Absolute Combustion International, an Edmonton-based company known for developing unique heating technology for the oil, gas and recycling industries. Regional economic developers wondered if its technology could be adapted for aerospace



FACTS&FIGURES

Project: Technology Partnerships

Location: Edmonton (AB) Int'l Airport

On-Site Training/Innovation Facility: Alberta Aerospace & Technology Centre

Key Partners: Canadian North; Canadian Helicopters; Edmonton Economic Development Corp.; government of Alberta

Commercial Venture: Airport is partnering with Absolute Combustion Int'l to sell ACI-SM1000 portable aircraft/jet bridge heater it developed

Key Product Benefits: Faster heating; operates at -50 C; smaller footprint than standard units

Products in Development: Robird, a peregrine falcon drone by Aerium Technologies used to scare geese & seagulls off airfield; driverless all-terrain vehicle used for perimeter security developed in cooperation with the Alberta Centre for Advanced Microprocessor & Nanotechnology Products

applications, and the airport began talking with company personnel about aircraft heaters.

“We started with the question ‘What if?’ and went from there,” explains Maybee.

Soon, YEG officials invited the company to locate at the on-airport technology center; and engineers began creating a prototype. After three years of prototype development and testing with Canadian North, YEG and Absolute Combustion announced it would begin selling the ACI-SM1000, a portable diesel heater designed to operate in extremely cold temperatures. Their main markets are airports and airlines that want to heat aircraft parked at gates.

“The heater we developed is a much more efficient way to distribute heat in the aircraft,” explains Koleyá Karringten, chief executive officer of Absolute Combustion. “If you have fuel under pressure and a long flame, it is not very efficient and creates a high level of emissions. We have complete combustion within only 8 inches, and the burner is so efficient it does not produce carbon monoxide.”



KOLEYA KARRINGTEN

The heater also requires less space. “Since we only have an 8-inch flame, we can use a unit that is smaller than a traditional heater and is able to use less BTU to produce the same amount of heat,” adds Karringten.

Moreover, the ACI-SM1000 uses 50% to 70% less fuel and requires no assistance from auxiliary power units to heat aircraft on the tarmac.

One of the biggest benefits, notes Karringten, is that it can operate in temperatures as cold as -50 degrees Celsius, and bring the cabin of a Boeing 737 from -30 C to 20 C in just 30 minutes. Conventional systems typically take more than 90 minutes to accomplish the same task.

Karringten credits YEG with providing critical input and feedback throughout the design and development phases. “Our incredibly strong partnership with YEG has allowed us to make the challenging quantum leap from research to commercialization,” says Karringten.

In return for its investment of several hundred thousand dollars, YEG maintains a revenue sharing agreement with Absolute Combustion. They will derive revenue from the mechanical patent, which it shares with Absolute Combustion, and the sale of the ACI-SM1000.

Absolute Combustion and YEG declined to provide the cost of the heater and sales projections.

The airport purchased the first three units manufactured and will begin marketing the heaters to airports and airlines. Maybee sees strong market potential for the product. He notes that beyond heating jet bridges and aircraft, the product could also be used to keep construction shelters and runway pavement warm.

Aerium is developing a falcon drone to help scare birds away from active flight areas.



Drone Technologies

YEG is working with two other companies to develop and test products specifically targeted for airport applications. One focuses on wildlife management, the other on perimeter security. Both leverage drone technology.

Robird is a drone created by Aerium Technologies to mimic the predatory peregrine falcon. Its purpose is to scare geese and seagulls off airport property and reduce the risk of wildlife strikes for aircraft.



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The airport is testing a driverless all-terrain vehicle with cameras to use for extra perimeter security.

Although Robird is manufactured in the Netherlands, the company operates from the Alberta Aerospace and Technology Centre; and YEG is its primary tester. “We are testing the drone to prove that it can work at airports even while they are operational,” says Maybee.


“The drone program has been very effective in our operations and effective at hazing and scaring birds away,” he adds. “We have experienced the birds leaving and not returning, and we continue to test and utilize the Robird as part of our day-to-day bird and wildlife program.”

In a similar vein, the airport unveiled a driverless all-terrain vehicle last year to monitor the perimeter of its property. The vehicle’s five cameras supplement existing perimeter security measures and wildlife detection efforts by informing airport staff of activity. The drone vehicle was created for YEG through a partnership with the Alberta Centre for Advanced Microprocessor and Nanotechnology Products.

“We continue our trial testing of the security vehicle and are upgrading systems to be more effective in our

conditions,” reports Maybee. “It’s primarily used to patrol the fence line looking for anomalies in the base conditions.”

Overall, he says that airports work well to incubate startup companies. “We see the bigger, overall picture and overall operations,” he explains. “We see where efficiencies can be made.”

In doing so, YEG is helping chart a course for how the industry can leverage technology. “YEG has developed a whole digital strategy around technology,” Maybee adds. “We are working to determine how we can embrace technology and leverage it instead of having to react to it. We want to be part of the disruption instead of being disrupted. We are trying to break the mold.” 



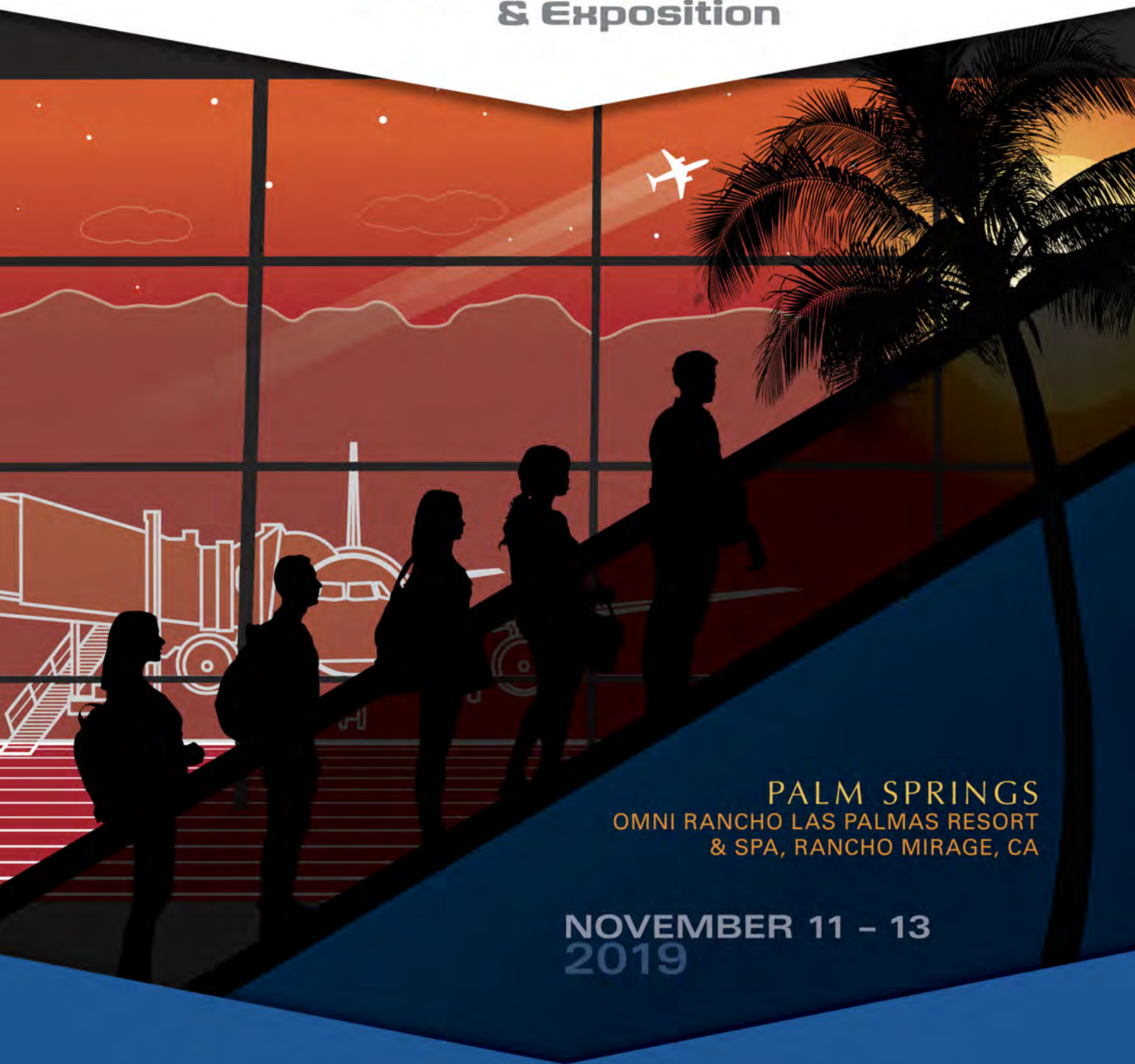
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Snow Removal Equipment at Juneau Int'l Gets A New Home

BY PAUL NOLAN



FACTS & FIGURES

Project: Snow Removal Equipment Building

Location: Juneau (AK) Int'l Airport

Facility Size: 43,000 sq ft

Cost: \$31 million for new building, adjoining 3,300-sq-ft wash bay & the sand/chemical storage facility currently under construction

Funding: About 94% FAA Airport Improvement Program grants; 6% local sales tax revenue

Design: ECI Architecture

Contractor: F&W Construction

Completed: Jan. 2018

Key Benefit: Protecting snow removal equipment from harsh winter weather

Related Projects: New building is 2nd phase of 4-phase plan for snow removal equipment facilities

Of Note: Improved storage facilities inspired FAA to provide \$5 million for new equipment; another \$5 million is anticipated in coming years

In Alaska, the days start to cool quickly in September, and by October, daily high temperatures struggle to reach 50 degrees. At Juneau International Airport (JNU), the ground maintenance team knows what's looming: cold, freezing rain in autumn, followed by an average snowfall of more than 85 inches during winter.

For years, crews have kept JNU running through harsh winters with a collection of sand trucks, plows, power brooms and deicing tankers that are now, in many instances, more than 20 years old.

Until recently, the fleet took a pounding from the elements because the airport's 1950s equipment building could not accommodate large modern vehicles. The vehicle bays were too small to house the equipment or allow personnel to safely perform many maintenance tasks; most of the equipment was left outside year round for lack of indoor storage space.

In January 2018, construction was completed on a new 43,000-square-foot snow

removal equipment building (SREB) with indoor parking for the airport's entire 23-piece fleet. Nine months later, an adjoining 3,300-square-foot wash bay was completed. Now, it's much easier for crews to clean off snow removal chemicals and sand, which can be extremely harsh on equipment components.

Due next is a \$9.7 million sand and chemical storage facility, which is scheduled to be completed this October, and an equipment fueling station that will be ready by early November. Plans also call for a maintenance shop, lighting shop, offices, training room, locker rooms and staff support space. A timetable for those facilities is still in the works.

New Facility Begets New Equipment

The \$31 million SREB has been a long time coming, says Catherine Fritz, airport architect at JNU.



CATHERINE FRITZ



The much-needed storage facility cleared the way for FAA to fund much-needed equipment upgrades, says Fritz. Previously, the FAA was disinclined to allocate money for new snow removal equipment that would be parked outside through the brutal Alaska winters, she explains.

“These pieces of equipment that are needed to maintain an airport in the winter are expensive,” she remarks. “We had gotten to the point where the FAA was reluctant to give us additional funding for equipment unless we had a garage to park it in because the equipment deteriorates so quickly and there are safety problems for the crew that has to try to keep the equipment running.”

Since the SREB was completed, JNU has received \$5 million in FAA funding for new equipment. So far, the airport has taken delivery of three new MB2 plow/broom vehicles to replace its 16-year-old high-speed runway brooms. Total cost for the order was \$2.24 million. JNU also has a \$1.4 million build order with Oshkosh Airport Products for a trio of six-wheel drive, six-wheel steer plows with 10-yard dump bodies. The airport expects to take delivery of those vehicles in spring 2020 to replace 21-year-old plow/dumps. The purchase of additional units will be prioritized in due course.

“This project has made such a phenomenal difference for Juneau to be able to do the work we were already doing, but do it more efficiently and safer for everyone. The airfield crew is incredibly resourceful, and they have done a remarkable job keeping our airport open and safe under all kinds of weather conditions. Some of the things they had to do to make that work we don’t necessarily want to brag about,” Fritz muses.

While the new facility was being built, Airport Superintendent Scott Rinkenberger told local reporters, “We spend a lot of money on equipment repairs, and it’s directly related to it being exposed to the elements 365 days a year. My maintenance staff is constantly battling with trying to keep this equipment up and running.”

In reports filed to support their funding request, airport executives explained that a lack of proper storage facilities caused vehicles to waste fuel and incur extra wear on the engines because they had to keep their motors running to prevent them from freezing. Reports also communicated safety concerns about vehicle maintenance areas.

Fritz, who pays meticulous attention to numbers, says the project was 93.75% funded with FAA Airport Improvement Program grants. Juneau voters approved a measure to use sales tax revenue to cover the remaining cost of the airport improvements that were not eligible for FAA funding.

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Even In Alaska, It's Possible to Extract Underground Heat

Alaska has some of the largest oil fields in North America, yet Juneau International Airport (JNU) incorporated a geothermal heating and cooling system in its new facilities for snow removal equipment to decrease the airport's reliance on fossil fuels.

The closed-loop geothermal system is like a fuel tank in the ground, says Doug Murray, a mechanical engineer and principal with PDC Engineers, the engineering company that oversaw installation. Geothermal systems use underground piping to convert the ground's constant temperatures into a heating and cooling source.



DOUG MURRAY

Workers drilled 144 boreholes on 20-foot centers, each 300 feet deep, in a 24x6 grid on an open lot adjacent to the airport's new snow removal equipment building (SREB) and sand/chemical storage facility. They buried U-shaped tubes in each borehole and connected the tubes to Daikin TGZ model water-to-water heat pumps in the SREB. A mixture of propylene-glycol and water constantly circulates through the tubing, absorbing heat from the ground during winter and taking heat from indoors and transferring it back into the earth during summer.

The new geothermal system is a more advanced version of a system JNU installed in a portion of its passenger terminal about 10 years ago. The technology has advanced even in the last decade, Murray notes. Bids are going out this fall to complete the next

phase of terminal work, which will include extending the geothermal system throughout the entire building.

"Geofields get us off of a diesel-based system and give us an efficiency factor that makes the electric heat pump system highly efficient," says JNU Architect Catherine Fritz.

Because geothermal systems cost exponentially more to install than traditional fossil fuel-based systems, it's challenging to find proponents in the business world who will undertake these projects, says Murray. Burying a fully monitored double-wall oil tank in the ground costs \$50,000 compared to the \$1 million cost of a complex closed-loop geothermal system like the one JNU installed.

Once installed, however, the geothermal system provides cheaper and more efficient renewable energy than fuel. He expects the airport's new geothermal system to have a performance coefficient of at least 2.5, which essentially means that it is 250% efficient. "If you put \$1 of electricity into the heat pump to turn its motors and compressors, you get \$2.50 of heating or cooling out of it," explains Murray. "It seems like magic, but that's the beauty of it."

In addition to delivering environmental benefits, geothermal systems have a better cost/value ratio than burning fuel when analyzed over decades, adds Murray. The airport's first geothermal system in the passenger terminal paid for itself in fuel cost savings within eight years, he reports. Officials anticipate a similar payback period for the new geothermal system. ✈️

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"We're in the process of upgrading the entire fleet now that we have the facility to park them in," says Fritz. "We are scheduled to receive another \$5 million in FAA grants for equipment in a few years."

Still on the airport's wish list is funding for additional vehicle maintenance space. Mechanics currently perform major repairs in a makeshift facility that was built in the 1960s for other uses.

Locally Designed & Built

The new SREB was designed by Anchorage-based ECI Architects, and the project's main contractor was F&W Construction, also out of Anchorage. Dawson Construction from Juneau is building the sand and chemical building.

Airport personnel and the ECI design team studied how several other cold weather airports house their equipment. A key element to the design they ultimately developed is allowing equipment to move forward rather than backward. Equipment drives into the wash bay where it is cleaned before proceeding forward into the parking

area. According to Rinkenberger, 90% of incidents with the large vehicles occur when they are backing up.

When planning the new facilities, JNU executives wanted to continue the airport's use of renewable heating and cooling sources. The SREB and sand/chemical storage facility are consequently heated and cooled by a geothermal system. (See sidebar on Page 60 for more details.)

A similar system was installed in part of the passenger terminal when it underwent renovations from 2009 to 2011.

Like many other business leaders, officials at JNU insist that employees are their greatest asset. However, they also acknowledge that upgrades like the new SREB go a long way to boost morale and keep workers engaged.

"The whole airfield operations crew is happier and more excited about their work," Fritz reports. "They're feeling like a valued part of the team." ✈️



The new facility provides more room for equipment storage and maintenance.

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Operation Airdrop Brings Post-Hurricane Relief With Help of Airports & Volunteers

BY JENNIFER DAACK WOOLSON



FACTS & FIGURES

Project: Supporting Hurricane Relief

Location: Raleigh-Durham (NC) Int'l Airport

Volunteer Response Organization: Operation Airdrop

Relief Effort: 517 flights with 284,000 pounds of crucial supplies such as water, diapers, batteries, medication & hot meals after Hurricane Florence in Sept. 2018


On-Site Volunteers: 150 pilots & 900+ land-based workers

In-Kind Support: TAC Air donated use of its on-ramp facility & provided fuel at cost

Airfield Impact: Airport's daily flight operations tripled during relief efforts

Mitigation Strategies: Operation Airdrop worked with approach control to develop special VFR reporting procedure to manage inbound traffic from its pilots; TAC Air provided additional security & supplied safety escorts for volunteers working on the ramp

For More Information: Visit www.operation-airdrop.com or email the team at contact@operation-airdrop.com

 In September 2018, Hurricane Florence dumped 35 inches of rain on the Carolinas, with winds gusting up to 130 mph. The Category 4 storm created widespread flooding that closed major freeways and other roads for days after landfall, completely cutting off access for 120,000 people in Wilmington, NC, and many more in surrounding communities.

Those numbers are extreme. But even more remarkable are the numbers posted by Operation Airdrop, a volunteer disaster response organization that flew in desperately needed supplies. Over six days, it executed 517 missions to deliver 284,000 pounds of water, diapers, batteries, medication, hot meals and other vital provisions. Thanks to social media posts, news stories and word of mouth,

the organization had the help of 150 pilots and more than 900 land-based workers. And they *all* volunteered their time to help communities devastated by Florence.

Not bad for a one-year-old organization that formed organically in the wake of Houston's Hurricane Harvey in 2017. With just eight volunteer employees, Operation Airdrop is at the ready to help when need arises.

Since Harvey, Operation Airdrop has provided relief in the aftermath of Hurricane Irma in Florida, Maria in Puerto Rico and Florence in North Carolina. In each case, the local airport and its tenants provided critical support.

Feet on the Ground & in the Air

The team that descended on Raleigh-Durham International Airport (RDU)



Meanwhile, Garrity, an EMT and pilot who has done stints in both the U.S. Army and Air Force Reserves, set up a command center at Business Air, a fixed base operator (FBO) at Denton Enterprise Airport.

While he greatly appreciates *all* the airports and airfield tenants that have helped with relief operations, he considers the facilities made available after Hurricane Florence the best yet. “RDU really was the zenith of our capabilities to date. It was a perfect storm,” Garrity says, no pun intended.

Part of the serendipity was a nearly vacant building right on RDU’s ramp. Because TAC Air was undergoing renovations at the time, a large part of the FBO’s building was vacant. That’s where Daniel Mansfield, general manager of TAC Air at RDU, came into the picture.

The day after Florence made landfall, he received a call about Operation Airdrop needing space to set up its command center. Wanting to help, Mansfield gave the go-ahead to use TAC Air’s facility. “I had no idea what we were really talking about at first,” he acknowledges. “I knew that [providing access to] this area would keep the operation away from the rest of the business. But I had no clue what kind of operation it was going to turn out to be. It went from me thinking it was probably going to be 20 volunteers, to something much bigger than that.”



DANIEL MANSFIELD

Basic Requirements

Wherever a hurricane hits, Operation Airdrop looks for support from the local airport and airfield tenants. Here’s what the organization needs to do what it does best:

- Facilities

Relief efforts are large-scale operations; so the organization needs a large hangar, ideally with ramp access, for supply drops and subsequent sorting, packing and weighing. “We don’t want to truck stuff to load airplanes,” Garrity says. “Part of the ability to move quickly is that it gets weighed and sealed off and then takes off.”

On site, the team sets up technology to support dispatching/distribution plans and help coordinate volunteers. At RDU, it used a network of tablets supplied by Microsoft.



ETHAN GARRITY

after Florence included Ethan Garrity, the organization’s assistant director of operations, and Brian Kelly, its executive director.

Both were on the ground in Texas when Operation Airdrop President Doug Jackson founded the organization—literally on the fly—in response to massive flooding in the Houston area. Kelly’s background as an air traffic controller and a navigator for HC-130 search and rescue missions was invaluable for helping set up operations for response efforts. He was part of the first supply run in Houston, which used a Cessna 421 to fly in a minivan load of supplies for the Salvation Army. Throughout the next week, Operation Airdrop and other organizations flew 120+ flights into Hawthorne Field



BRIAN KELLY

Airport in Kountze, TX. Its diverse volunteer fleet even included a DC-3 that was used in the Berlin Airlift.

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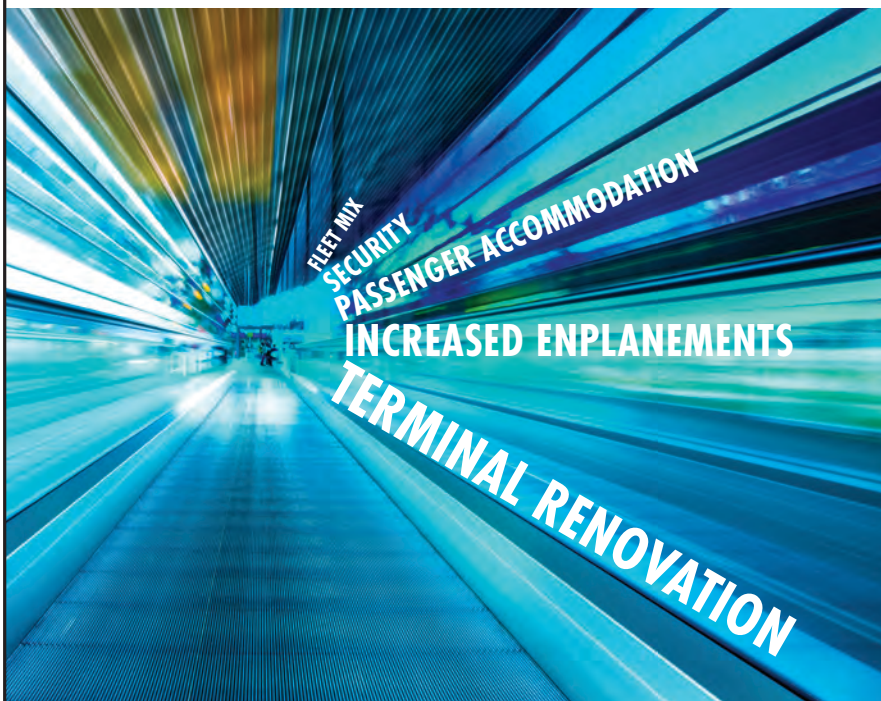
- Flexibility

By nature, hurricanes are unpredictable. Mansfield says the most important thing for everyone involved is the willingness to adapt to changing situations. "It's not going to always go as you planned, and you have to be OK with that. We adapted to what we could do and what we couldn't do," he says. "If you come in with a plan saying 'This is exactly how it's going to be,' your sand castle is going to get kicked over."

- Fuel

Multiple days of around-the-clock missions require a lot of fuel. Because Operation Airdrop pilots donate their time, and pay for expenses out of pocket, fuel costs are a top concern. In addition to offering use of its on-ramp facility, TAC Air at RDU provided fuel at cost.

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- Facilitation

Communication and coordination with all areas of the airport are essential, stresses Garrity. While commercial and general aviation airports have different levels of bureaucracy, Operation Airdrop staff members "speak the language" of both. In fact, all eight volunteer employees have aviation backgrounds. This allows them to communicate effectively with operations staff, air traffic controllers, TSA officials and airport authorities to make sure everyone is in the know and can play their respective roles to facilitate relief efforts.

- Focus on Safety

With hundreds of extra aircraft and volunteers on site, ramps can get cluttered. Mansfield knows that can turn into a dangerous situation if inexperienced individuals are on the ramp near moving aircraft, turning props, running engines and other dangers some volunteers don't know to look out for. "Safety still has to be No. 1," he stresses. "You have to make sure they get to the aircraft and back, and they don't accidentally hit or run into anything." He advises diligent education and escorting even if that slows the process slightly. "You never want anybody who has a good heart and is trying to come out here and do good to get injured."

It Takes a Village

Garrity says that the blueprint for disaster relief changed after Hurricane Katrina, when people realized that the government may not come right away. Today, communities are much more open to the idea of grassroots disaster relief, he notes.



TAC Air provided safety escorts for volunteers working on the ramp.

"There's a lot less bureaucracy at that level, which means that it's a lot of faith and trust."

The leadership team's qualifications and industry connections engender confidence and facilitate cooperation from airports and regulators. "We've noticed that most small grassroots organizations don't possess the same level of access as Operation Airdrop, simply because they don't know how to speak the languages," Garrity explains. "We've been able to streamline a logistics source... and have people like Brian [Kelly] and others who know how to call the airport authority and FBO. Instead of just showing up and being a pain in someone's butt, we let them know what we're doing and get them involved."

At RDU, Mansfield says he considered it his job to help Operation Airdrop provide relief services without causing any significant operational or regulatory issues for the airport. He and his staff consequently provided extra security and ramp escorts. Mansfield credits the RDU operations staff, airport security personnel, air traffic controllers and TSA with being flexible and accommodating.

And there was quite a bit to accommodate. Operation Airdrop tripled RDU's daily operations with its response missions. To mitigate the impact, Kelly leveraged his air traffic control experience and worked with on-site approach control to establish a VFR reporting procedure that helped manage inbound traffic.

Beyond the Eye of the Hurricane

So far, Operation Airdrop has focused exclusively on providing assistance after hurricanes. Other flooding in the U.S. has been handled more efficiently by local organizations, explains Garrity.

In April, however, he met with Kenmore Air in Seattle. As the nation's largest seaplane operator, it regularly practices moving supplies in and wounded out of disaster areas. Garrity was asked to help run a drill for a West Coast seismic event—preparing for tsunami-related flooding associated with an 8.1 to 8.3 earthquake of one to three minutes.

Since Hurricane Florence, Operation Airdrop has been relatively quiet. Although its staff would love to be permanently out of work, they anticipate needing to execute at least one relief effort every year. Based on their track record, they'll be ready to go when the need arises. ✈️

Editor's Note: As this issue was going to press, Operation Airdrop was already back at work, providing relief after Hurricane Dorian.

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Hollywood Burbank Airport Repaves Ramp with Advanced Asphalt

BY BRIAN SALGADO



FACTS & FIGURES

- Project:** Ramp Rehabilitation
- Location:** Hollywood Burbank Airport (CA)
- Owner:** Burbank-Glendale-Pasadena Airport Authority
- Project Budget:** \$5 million
- Schedule:** Sept. 2018 - March 2019
- Installation Site:** General aviation ramp
- Asphalt Specified:** P-404
- Product Cost:** \$170/ton
- Amount Applied:** About 4,500 tons
- Engineer:** RDM Int'l Inc.
- General Contractor:** Sully-Miller Contracting Co.
- Asphalt Supplier:** HollyFrontier Asphalt Co.
- P-404 Binder & Mix Concept:** Associated Asphalt Partners LLC
- Key Benefits:** Fuel & oil doesn't penetrate into the pavement; increased resistance to ruts & cracks



Known for its ability to resist damage from spilled fuel and oil, P-404 asphalt mix has been used throughout the world for at least three decades. In the U.S., it emerged as the mix of choice for a major repaving project at LaGuardia Airport about 17 years ago, and the supplier reports that it is still holding strong with years of life remaining.

The polymer-modified material was also selected for the recent \$5 million ramp rehabilitation at Hollywood Burbank Airport (BUR) in California. However, since this was the first time P-404 was installed on the West Coast, the project team encountered some challenges. Mix design/production and various installation issues proved to be new frontiers.

With the project complete, however, BUR is looking forward to high performance throughout the material's lifecycle. The new pavement is located on a general aviation ramp regularly used by prominent media conglomerates.

"We have quite a few tenants in this area," says Karen Sepulveda, manager of Construction Services for BUR. "Although tenants house their aircraft within the hangar space, there are occasions when some park on the ramp. We decided to have this fuel-

resistant mix uniformly placed in front of all the hangars. Certain tenants may need to place metal plates on the pavement if they have very heavy aircraft, since the material is highly resistant, but not impervious."



KAREN SEPULVEDA

Product Breakdown

The FAA P-404 specification (renumbered from P-601 in December 2018) is a highly polymer-modified asphalt mix that helps prevent damage from jet fuel and hydraulic oil that spill onto airfield pavement. It also does not require sealers to maintain fuel resistance later in the life of the pavement—a primary attraction for BUR. Moreover, the polymers in the liquid asphalt make the pavement extremely resistant to rutting and cracking.

The product uses the P-401 mix gradation, but the mix design criteria is modified to include more asphalt. The resulting P-404 mix is designed to include 2.5% air voids (compared to 3.5% for P-401 mixes) and is compacted with 50 Marshall blows or 50 gyrations (compared to 75 blows or 75 gyrations for P-401). These changes

typically increase the liquid asphalt content in the P-404 mix to 7% (compared to a typical 5.5% asphalt content for a P-401 mix).

Lower air voids in the P-404 mix make it impermeable to jet fuel and hydraulic oil spills. Instead of seeping into the pavement, the damaging liquids sit on the surface and either evaporate or get cleaned up. Higher asphalt content in the mix, combined with the polymers in the liquid asphalt, make it more durable.

Associated Asphalt Partners LLC developed the P-404 binder and mix concept for use in the U.S. Ron Corun, the company's sales and marketing manager for specialty products, explains that enhanced resistance to fuel, rutting and cracking makes P-404 an ideal pavement for aprons and taxiways where planes are parked or moving very slowly. The structural strength and fuel/oil resistance both appealed to BUR for its recent project.



RON CORUN

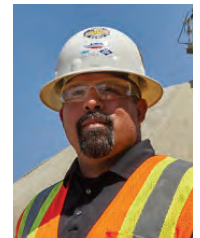
The special properties of the mix allowed engineers to reduce the wearing course layer thickness to a 1-inch minimum depth. The associated savings helped offset the increased cost of the P-404 mix.

Learning Curve

While P-404 had the right properties to address fuel stains and ramp sealing, BUR also chose it to help tackle other previous issues in its

hangar areas. But to deliver those benefits, the project's general contractor had to design and produce an unfamiliar asphalt mix and bridge the associated knowledge gap.

Mix design was the most difficult aspect for Mike Ramos, quality control manager at Sully-Miller Contracting Company. Not only was P-404 new to his company, no other contractor in California had made it, either.



MIKE RAMOS

Sully-Miller initially relied on expertise from Associated Asphalt regarding the gradation/binder concept, and then conducted multiple trials at its own test lab to learn about and verify the mix properties. After the mix was verified at the Sully-Miller plant, Ramos and his team made sure it was workable within the scope of the job.

Yet another challenge: The fuel-resistant binding agent, PG 88-22FR, was not available in California; so Sully-Miller had to procure it out of state. HollyFrontier Asphalt Company, a regional partner of Associated Asphalt, supplied the binder from its facility in Phoenix. The company routinely sells liquid asphalt products in California, but this was the first time it produced and sold the PG 88-22FR binder.

To verify that the binder was properly formulated with the fuel-resistant additive, samples of the proposed aggregate and binder were sent to Rutgers University for testing. Once the proper binder formulation was developed, the binder was produced at the

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The airport installed P-404 asphalt on a general aviation ramp.

refinery in Phoenix and shipped to Sully-Miller's hot mix asphalt plant in California for further mix design development.

The production process included a few hiccups due to the special logistics of trucking in the binder from Phoenix. Initially, the product took hours to pump off the truck, because it was too cold. After Sully-Miller communicated with the refinery, it produced and shipped the binder at a higher temperature to help reduce the off-loading time. Coordination between plant personnel and the project team proved critical throughout production.

"We had to go through several plant trials to get the mix dialed in, and sought some advice from the manufacturers of the binder and additive to get that done," Ramos recalls. "Eventually, we got the mix design together, verified the mix at the plant and in the field, got approval from the airport and went forward with placement."

Give an Inch...

The airport selected RDM International Inc., a consulting firm that specializes in pavement design, as the project engineer. It specified a 1-inch thick P-404 overlay for the wearing course of the apron based on FAA's recommended range of 1-inch minimum and 2-inch maximum for the material. Project Manager Chris Decker explains that



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specifying a 1-inch thickness helped address budget considerations yet still provided a durable product for long-term performance. The savings added up quickly, because the technologically advanced material cost \$170 a ton for about 4,500 tons.

However, the thinner overlay created some problems during installation. BUR Construction Manager Mike Perry explains that the P-404 cooled too quickly, especially at 1-inch thickness. The project was consequently phased into small areas to address daily operations, and it required hot longitudinal joints between paving lanes. When the material temperature dipped below 160 degrees Fahrenheit during inclement weather in January, crews had to cut the longitudinal paving lane joint and pave up against a new edge. As a result, the pulls were not very long. While the pavement is functional, the joints are not as aesthetically pleasing as it would have been with a thicker layer, explains Perry.

"We have experienced a lot of problems with cold joints, so we try to avoid them if possible," adds Sepulveda. "The material looks like silk with a nice looking mat without them. The hot joints are much less noticeable. So in this case, you do see all the cold joints."

Corun, from Associated Asphalt, notes that the P-404 specification includes a stringent density requirement for a maximum of 4% in-place air voids. "A 1-inch pavement thickness and cool weather conditions made this a challenge, but the Sully-Miller paving crew quickly developed a roller pattern that allowed them to meet the specification," he comments.

In retrospect, Decker says a 1½-inch layer thickness would have given the contractor more leeway when placing the material. In fact, FAA Advisory Circular 150-5370-10H—which was issued in December 2018 after the BUR design was complete—raised the minimum thickness for future P-404 pavement to 1½ inches.

Spec changes notwithstanding, Decker believes BUR's new pavement will serve the airport well for many years to come. And Corun predicts it will outperform and outlast any P-401 pavement alternative. 

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An Evolving Design Approach

The future of aerial ridesharing is now on the horizon. Today, eVTOL (electric vertical take off and landing) vehicles are nearing flight demonstrations, and certification with the FAA hovers within reach. A critical window to study and address the technological, planning and behavioral challenges is upon us.

One such challenge will be the creation of the operational infrastructure to accommodate a high number of flight operations in a traditionally planned



TIM HUDSON

is a principal and the firmwide Aviation Practice area leader at Gensler, a global architecture, design and planning firm with 48 locations across Asia, Europe, Australia, the Middle East and the Americas. He has led project teams at some of the world's busiest airports, such as Hartsfield-Jackson Atlanta International Airport, Dallas Fort Worth International Airport and Los Angeles International Airport, supporting both airport and airline clients.

urban environment with restricted flight areas. Gensler has addressed this challenge by developing a forward-thinking solution to retrofit existing parking structures (that are strategically located) with the infrastructure needed to support eVTOL flight operations. These solutions will evolve into ground up, bespoke structures meant to serve as a transportation hub and a thriving community asset.

As aerial rideshare matures, so will the approach to the planning and design of this modality. Current regulatory guidelines state that skyports will follow traditional heliport design. As eVTOL vehicles reach maturity, technology will be tested, refined and improved. This will give us the ability to rethink regulatory requirements and open the planning paradigm to more opportunities.

While demand for ground-based and aerial rideshare grows and throughput requirements peak, congestion will be an issue in the sky, just as it is on the curbside. Ultimately, this will result in noise concerns for the surrounding communities. Vehicle manufacturers are already in the process of addressing these

concerns. First, eVTOL vehicles are being designed as all-electric vehicles. Second, designers are incorporating multiple smaller rotors rather than create lower volume rotor harmonics that will blend together. In contrast, a vehicle with one large rotor would create a singular higher volume with a more intrusive noise profile.

Community Assets

Ultimately, the biggest impacts will be on the community experience. Skyports will play a vital role in shaping the way cities are navigated, lived in and explored.

Transporting people from greater distances with more efficiency will affect our cities in two ways. First, a reduction in parking need will reduce the size and number of parking garages and single-use surface lots. Second, the rise of skyports will bind diverse community functions together, serving neighborhoods with shopping, dining, education and health/wellness programs, while also reducing congestion across the city. These skyports will facilitate unprecedented orchestration of movement and modality with the potential to redefine the future of cities. ✈️



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