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Airport Improvement



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Tulsa Int'l Leverages Technology to Maintain Airfield Markings



Naval Air Station Oceana Maintains Operational Volume While Converting to LED Airfield Lighting

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Rare Blizzard Underscores Importance of Teamwork, Planning for the Unexpected at Charleston Int'l



Tucson Int'l Brings Friction Testing In-House

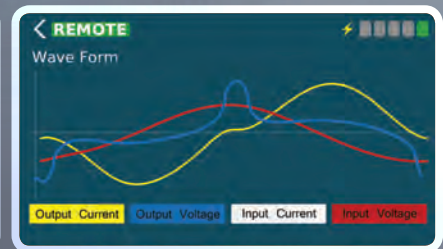
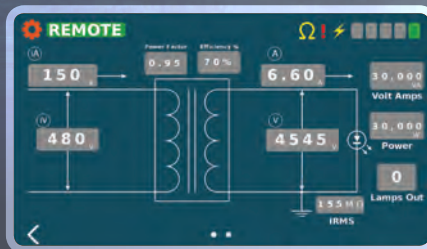
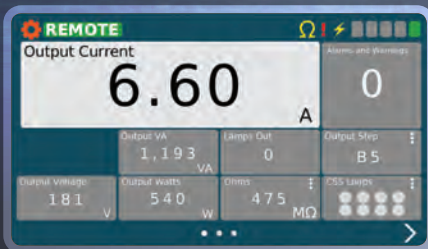
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Publisher
Paul H. Bowers
 paulbowers@airportimprovement.com
 262.510.7832

Editorial Consultant
Rebecca Douglas
 rebeccadouglas@airportimprovement.com
 815.621.4525

Social Media Director
Kristin Shaw
 kristinshaw@airportimprovement.com

Creative & Production Director
Becker 505, LLC - Chad Becker
 chad@becker505.com

Circulation Director
Lisa Monday
 lisamunday@airportimprovement.com

Webmaster
Matt Tews
 matttews@airportimprovement.com

Contributing Writers
 Jennifer Bradley, Mindy Hamlin,
 Nicole Nelson, Paul Nolan, Jodi
 Richards, Brian Salgado, Kristin
 Vanderhey Shaw, Thomas J. Smith,
 Victoria Soukup, Ken Wysocky

Advertising
Paul H. Bowers
 paulbowers@airportimprovement.com
 262.510.7832

Adrienne Gibson
 adriennegibson@airportimprovement.com
 262.844.4368

Vicki Jensen
 vickijensen@airportimprovement.com
 414-331-9768

Editorial Advisory Board
David Byers, Ph.D.
 Quadrex Aviation, LLC

Paul Cudmore
 Eagle Integrated Solutions

William Fife
 Peer Review Consultant

Glenn S. Januska
 Casper/Natrona County Int'l Airport

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Reflections

In late August after the AMAC Annual Conference in Seattle, my wife and I decided to explore the beautiful Northwest by visiting nearby Victoria, BC, on Vancouver Island. It's quite impressive!

While I knew about Victoria International Airport (YYJ) a few miles north of the city, I was surprised to learn that travelers have a second local option. Yup, it's called Victoria Inner Harbour Airport (YWH) and it provides scheduled service using a showcase fleet of single and twin turbine DeHavilland Otters and Beaver seaplanes.

We discovered Victoria's other airport when our kayak tour of the harbor had to hold up to avoid crossing the waterway/runway while a seaplane took off. As we waited, our tour guide explained how choppy water, floating FOD, unauthorized runway access by watercraft and lack of lighting affect flight operations. Hmm, not your typical runway challenges.

This October's Runway & Ramp Special Edition includes a wide collection of articles about more mainstream airfield topics: runway reconstruction, markings, friction testing, noise control, wildlife management and much more. Maybe we'll cover a water runway in next year's edition!

Before I sign off, I want to say "Happy Retirement" and "Best Wishes" to a good friend and mentor. Steve Karlin, senior vice president and general manager of M-B Companies, recently retired from a distinguished career in the airport runway equipment business. Yes, his company advertises in *Airport Improvement*, but Steve also provided us with story ideas, industry information and perspectives that went far beyond M-B products. He was a true student of the industry.



PAUL BOWERS, PUBLISHER

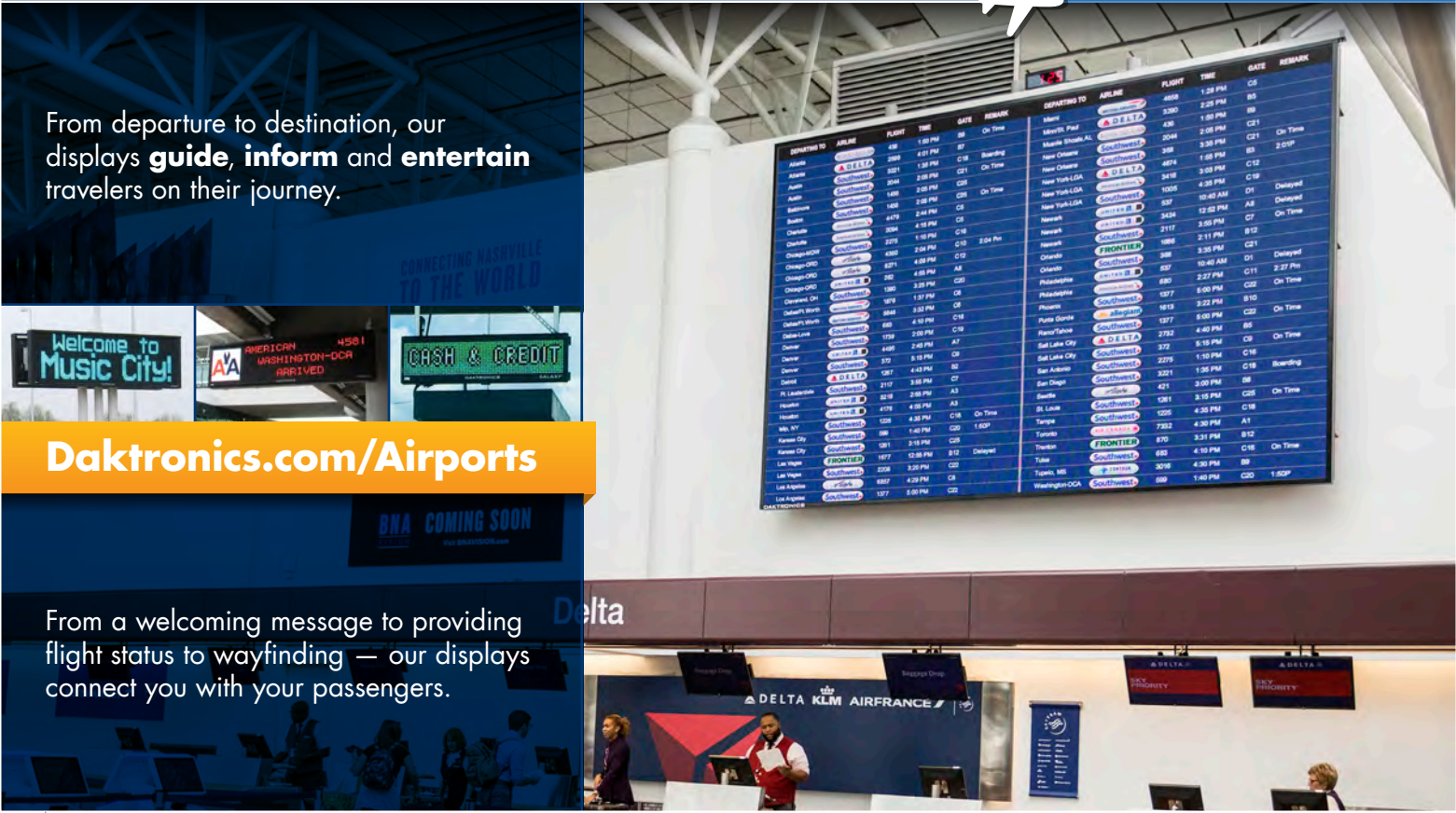
Thank you, Steve. You and your many contributions will be missed!

Paul

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New Main Runway at Reynolds Field Improves Safety & Primes Pump for Revenue Growth

BY KEN WYSOCKY

 Officials at Jackson County Airport/Reynolds Field (JXN) in Michigan are pleased with the results of a \$49 million runway project completed last fall, because they see it improving operational safety, creating new opportunities to generate more revenue and bolstering the airport's position as a local driver of economic growth.

More than 15 years in the making, the project involved shifting and extending a 3,500-foot crosswind runway to 4,000 feet in length and relocating/building a new 5,350-foot main runway. The intersection of the two runways was moved approximately 500 feet north to create room for 1,000-foot-long runway safety areas for the main runway and 300-foot-long runway safety areas for the crosswind runway.

The new design rotated the main runway about 10 degrees clockwise to maintain proper orientation for prevailing winds, while the updated crosswind runway kept its original orientation. The project also added a new parallel taxiway for each runway to ease congestion and make operations safer; new lighting systems for the taxiways and main runway; and roughly 16,500 linear feet of perimeter fencing.

Given its scope, the project required the cooperation of local, state and FAA officials. The project's success underscores the importance of maintaining good relationships with such agencies,

says Kent Maurer, who served as airport manager at JXN for 16 years and retired earlier this year.

Jackson County contributed \$6.5 million to the project, which covered most of the cost of relocating a county-owned landfill that stood just north of the old main runway. The FAA paid for 95% of other project costs, and the state and airport equally split the remaining 5%.

The county's willingness to pay for the landfill removal was important, because that portion of the project wasn't eligible for federal funding. "It reflects the commitment of local government to the airport," Maurer says. "In a lot of communities, a project like this would've been dead on arrival at that point.

"It takes political will," he adds. "Fortunately, our political leaders quickly understood the situation and gave it their support. The airport has an \$18 million annual impact on the local economy and generates about \$500,000 in revenue a year. You don't have to do much math to figure out it's a necessary and vital cog in the local economy."

JXN is a general aviation airport located about 40 miles south of Lansing, 35 miles west of Ann Arbor and 65 miles east of Kalamazoo. It has 103 based aircraft, mostly privately owned



KENT MAURER



FACTS&FIGURES

- Project:** Runway Relocation/Reconstruction
- Location:** Jackson County (MI) Airport/Reynolds Field
- Average Annual Operations:** 42,000
- Key Components:** new 5,350-foot main runway with two 1,000-foot runway safety areas & new parallel taxiway; 4,000-foot crosswind runway with parallel taxiway; new lighting systems; landfill removal
- Total Cost:** \$49 million (includes crosswind runway completed in 2008)
- Runway Funding:** 95% FAA; 2.5% state; 2.5% airport revenue
- Engineering Consultant:** Mead & Hunt Inc.
- Runway Prime Contractor (Phase 1):** M&M Excavating Co.
- Asphalt Paving:** Michigan Paving & Materials Co.
- Electrical Subcontractor:** J. Ranck Electric Inc.
- Approach Clearing Subcontractor:** Heinz Tree Service
- Perimeter Fencing Contractor:** D-K Fence Co.
- Clearing/Grubbing Prime Contractor:** Mead Bros. Excavating Inc.
- Runway Prime Contractor (Phase 2):** Hoffman Bros. Inc.
- Electrical Subcontractor:** Rauhorn Electric Inc.
- Landfill Removal Cost:** \$6.5 million
- Funding:** Jackson County
- Landfill Removal Prime Contractor:** Terra Contracting Services
- Landfill Excavation Consultant:** SME
- Landfill Disposal Consultant:** Envirologic Technologies Inc.
- Material Testing Services Subconsultant:** Somat Engineering Inc.
- Pavement Marking Contractor:** PK Contracting
- Aeronautical Obstruction Survey Subconsultant:** Quantum Spatial Inc.
- Land Restoration Contractors:** North Slope Inc., Diane Dukes Inc.

PHOTO: CHAD ZELLER

planes, but also several corporate jets. It handles an average of about 42,000 operations annually.

The new main runway is the same length as the old one, while the crosswind runway that was built about 10 years ago is 500 feet longer than its predecessor. The extra length enabled the airport to use the crosswind runway as a primary runway during the roughly six months it took to build the new main runway. As such, the airport was able to stay open during almost all of the construction.

Juan Zapata, the new airport manager as of April, says the extra 500 feet of crosswind runway is significant to the airport and overall region. "As a regional airport, we handle a mixture of smaller airplanes, but we're really interested in



JUAN ZAPATA

being able to accommodate more corporate aviation," says Zapata.

As the closest airport to Michigan International Speedway, JXN has 40 to 60 jets landing and parking during the height of racing season. "Most corporate operations prefer at least a 5,000-foot runway, but sometimes they can use a shorter runway," notes Zapata. "Having a 4,000-foot crosswind runway made it possible for JXN to stay open during most of the construction."

Catching Up

The need for recent improvements dates back to 1942, when the U.S. Army Corps of Engineers built the old runways during the early stages of World War II (and runway safety areas were not required). When the FAA started to mandate safety areas, JXN and hundreds of other airports around the country were exempt due to their lack of available space. The specific constraints at

Construction of the new main runway was divided into two phases for funding and operational purposes.



JXN were an airport road on the east end of the main runway and a railroad track on the west end.

“There was basically no way to add any flat surface to the ends of the runway, absent building a brand-new one,” Maurer relates.

Years ago, a string of aircraft overruns prompted the FAA to lift safety area exemptions nationwide, which forced airports like JXN to comply. If airport officials and project designers couldn’t find a way to add the required safety areas, JXN would have had to operate with a declared landing distance of 4,349 to create de facto safety areas on the existing primary runway.

“That would’ve precluded many aircraft from using the runway,” Maurer explains.

Planning for separate safety areas actually began in 2002, with the development of an airport layout plan. But the start of the project was delayed by the nationwide recession during the late 2000s and the time needed to remove the landfill and acquire 10 land parcels and 16 easements to cut down trees that posed safety hazards. The landfill was old, unlined and filled with unknown contents, so relocating it required extensive and time-consuming soil testing.

“Plus, there were other competing projects in the state that were ahead of us and in a better position to start,” adds Maurer.

Planning & Design

The new crosswind runway built during 2007 and 2008 ensured that the airport could maintain aircraft operations during construction of the new main runway. The airport also completed the intersection of the new crosswind runway and new main runway at this time. “It was a good decision by Mead & Hunt, the consulting engineers,” Maurer notes. “We were able to use the crosswind runway (as a primary runway) only because that new intersection was already constructed. That allowed for a lot more functionality.”

Construction of the main runway was divided into two phases, largely due to the timing of funding distributions and the need to keep the main runway open as long as possible. “We could’ve done most of the major earthwork during the first phase,



DAN KEHOE



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but the impact would've been too severe," says Dan Kehoe, project manager of aviation services at Mead & Hunt. "We couldn't take the main runway out of service for almost two years."

The first phase focused on completing major earthwork on the west end of the project and relocating the landfill. It started in November 2015, stopped that December, resumed in March 2016 and finished that October.

Refuse from the landfill was taken to other certified landfills in the region. In all, crews removed about 200,000 cubic yards (260,000 tons) of material—enough to fill 6,700 double-bottom gravel haulers.

"Of course, you then have this big hole that requires you to haul in another 200,000 cubic yards of dirt to fill it," Maurer says. "Plus, that end of runway was low, so it had to be brought up to grade." Overall, the airport imported about 1 million cubic yards of soil.

Pleasant Surprises

In fall 2014, the FAA decided to provide nearly \$10 million in discretionary funds to JXN at one time rather than in two phases as airport officials anticipated. The mid-project funding windfall prompted a course-correction for the bidding process.

"We knew we'd need a significant amount of asphalt, almost 32,000 tons, which would eat up a lot of money," Kehoe explains. "So we ended up bidding all of it out at one time. The contractors worked with us on the pricing (to accommodate any price increases that might occur during the project); but asphalt prices stabilized somewhat anyway, so it was almost a moot point."

During the second phase of the project, crews removed the old runway and built the new main runway and associated parallel taxiway. They also installed taxiway lighting and approach lighting for the runway. In an eco-friendly move, construction crews used roughly 25,000 cubic yards of pulverized asphalt and gravel debris from the old runway to build the sub-base for the new one.

That recycling effort not only reduced the cost of buying and hauling in new materials; it also decreased expenses associated with trucking away and disposing pavement debris from the old runway. "It saved about \$250,000," Kehoe estimates. "That's a drop

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Beyond pavement, the project included new lighting and perimeter fencing.



in the bucket compared to the entire project, but every little bit helps.”

The last stage of the project involved building the intersection where the new taxiway meets the crosswind runway. The new runway opened in mid-

September 2017, and the crosswind runway-taxiway intersection opened in November.

Overall, the airport was closed for less than a week—four days while crews laid the asphalt pavement for the new main runway, and two other nights, while crews grooved the runway at the intersection.

Reaping the Benefits

The new main runway and 10-year-old crosswind runway—both with grooved pavement—add to the reputation for safety that JXN’s existing control tower helped establish. Airport officials hope to leverage both features to attract more business aviation traffic. Moreover, the new runway location freed up space for more revenue-generating hangars.

The airport currently owns 18 hangars—two corporate box hangars and 16 T-hangars for small private aircraft—and leases land for 65 hangars that are privately owned. All county-owned hangars are occupied, so the airport collects more rent payments than land-lease payments.

Recent airfield improvements, however, are spurring requests from private pilots and corporations for more hangars. That’s prompting JXN officials to consider building more hangars or leasing land to aircraft operators so they can build their own.

“More people want to base their planes on the airport, but they don’t necessarily want to build their own hangars,” Zapata explains. “So we’re looking at the best option for the airport, including whether the county wants to invest in building hangars.”

The airport would generate more revenue renting hangars than leasing land for privately owned hangars, but development is a pricey venture. Zapata estimates that building just one corporate hangar could easily cost \$1 million and T-hangars to accommodate 10 smaller aircraft would cost about \$750,000, with a 10- to 12-year payback period. Deliberations and cost-benefit analyses lie ahead, he says.

Cooperation & Leadership Forge Success

The FAA originally proposed shortening the old runway to create safety areas and decrease project costs. But given the economic implications, JXN, county and state transportation officials all actively lobbied for a new runway. Their success reflects the importance of cooperative relationships with local government, Zapata notes.

“In years past, a community could get a political sponsor to get a new runway constructed or lengthened,” he says. “Now, all projects need justification. As less and less of airport operations come from the small general aviation community, airport sponsors need to cater to the segment of aviation that is growing tremendously. So any airport interested in providing the best benefit to their community needs to accommodate corporate aviation.”

In retrospect, Maurer says bringing all the relevant stakeholders together and keeping them focused on the project was essential to project’s success. “They all have their own projects going, too,” he points out. “But the stars really aligned for this project ...we had the right people in the right places.” Maurer specifically credits the county commissioners, county airport board and James Shotwell Jr., the long-reigning chairman of the Jackson County Board of Commissioners, as instrumental to the project’s success.

“We had very good DNA on this project,” he reflects. “Many people made it a priority for 15 years—from the initial runway safety study in 2002, when alternatives were explored, right up to project completion.”

Kehoe agrees that it was a special project. “There aren’t a lot of brand-new runways being built these days, so everyone had to be at the top of their game,” he says. “Working with Jackson County officials was great because they provided such good leadership. Everyone’s goals were aligned...they knew this was a top-priority project because of the economic impact on the county.” ✈️

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This scene of a hawk swooping in as a peregrine falcon eats a gull portrays the compounding nature and challenges of wildlife management.



Vancouver Int'l & Yakima Air Terminal-McAllister Field Share Tips for Managing Wildlife

BY JENNIFER BRADLEY



Like oil and water, wildlife and aircraft just don't mix. The U.S. Department of Agriculture (USDA) reports that civilian aircraft suffered 13,000 wildlife strikes at 662 U.S. airports in 2016 alone. While many incidents are minor, some have devastating consequences. Between 1990 and 2016, wildlife strikes resulted in 262 human fatalities at U.S. airports, and 247 civil aircraft were destroyed or damaged beyond repair.

In addition to the inherent safety risks wildlife strikes present, they can also be very costly. According to the USDA, wildlife strikes cause about \$1 billion in aircraft damages every year. "It's staggering," says Laurence Schafer, an airport biologist for USDA Wildlife Services in Washington state. "Some of that damage is direct, where birds get sucked into engines and they implode. But even if a strike doesn't cause damage, an airline may need to take that aircraft out of service for a couple hours to investigate, and then it has delays and downstream effects."

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FACTS&FIGURES



Project: Wildlife Management/Deterrence

Location: Yakima Air Terminal-McAllister Field (WA)

Challenges: Wildlife from nearby mountains, forests & 3 on-airport streams

Guiding Philosophy: "Back-to-Basics"

Primary Strategies: Vegetation & water management; non-lethal deterrents such as sirens & horns; documenting wildlife sightings on computer spreadsheets to identify movement patterns

2018 Achievement: USDA Airport Wildlife Award



Project: Wildlife Management/Deterrence

Location: Vancouver (BC) Int'l Airport

New Tool: Avian radar, by Accipiter Radar Technologies

Implemented: May 2018

Other Control Methods: Habitat management; tracking wildlife movement/patterns; pyrotechnics, sirens, trained raptors & dogs



LAURENCE SCHAFER



This spring, Vancouver Int'l began using avian radar to track bird movement.

To minimize such risks, airport operators employ a variety of strategies. Yakima Air Terminal-McAllister Field (YKM) in Washington state and Vancouver International Airport (YVR) in British Columbia both have formidable wildlife challenges they choose to face head on.

Grassroots Approach

This summer, YKM received a Washington State Airport Wildlife Award for the proactive measures it has taken.

“Yakima has progressed significantly faster than others,” comments Schafer. “They’ve been doing so well these last few years...It was time to recognize their efforts.”

Nestled in a valley between several mountain ranges, YKM has a diverse ecosystem to manage. Three streams run directly through the airport’s property, but the climate is dry enough for tumbleweeds to be a common part of the landscape. Coyotes come out of neighboring forests to catch small animals, especially pocket gophers that like to dig underneath the airfield’s security fences.

“Wildlife is always present, whether it be birds or mammals on the ground,” says Airport Director Robert Peterson. “It’s a snowball scenario within that ecosystem. You may have a few beavers in the stream, and they attract geese or ducks to sit right adjacent to the airfield environment.”

In short, the full circle of life can be seen at the airport.

Given the multiple challenges, Peterson chose to focus on the basics shortly after he took over as airport director in 2012. “The key was to understand the airfield, the environment and what’s attracting wildlife to the airfield,” he explains. “I think that laid a foundation for us to address a lot of our wildlife issues.”

Peterson consequently stresses the importance of monitoring and tracking hazards, versus just reporting incidents.



ROBERT PETERSON

“Opportunities have come up in the past few years on our wildlife priority list to ensure we’re addressing projects such as infrastructure, vegetation management as well as airport landscaping to minimize wildlife strikes,” he notes.

His team uses standard Excel spreadsheets to document and categorize the movement of various wildlife. “It’s a good foundation to bring to the annual meeting with the USDA, so we can talk about what we’re seeing and also identify changes over time—what types of species come and go, as well as patterns in occurrences,” Peterson explains.

The USDA appreciates YKM’s database and how Peterson uses the information to identify hotspots around the airfield. “It’s difficult to manage something you’re not monitoring,” Schafer advises. “He’s able to see what is coming up and if a problem is developing with a different kind of bird, or if a problem moves.”

For the last four years, YKM has banded together with nearby airports in Moses Lake, Richland, Prosser and Walla Walla to collaborate about ways to deter wildlife. The strategy has proved effective, as many of the airports encounter the same species of birds and critters. Each year, employees from YKM and other airports receive wildlife training from the USDA. This coordinated effort not only saves the USDA time and money, but also helps the airports identify common issues and solutions.

This year, the main priority at YKM has been vegetation management. The maintenance crew is making extra efforts to keep lawns mowed and remove vegetation such as berry-producing bushes that attract wildlife. Removing a variety of trees inside the air operations area to ensure wildlife are not perching there was a key focus, and Peterson had no qualms about getting rid of the trees. “Passenger safety is the top priority, and removing trees has actually allowed a nicer view of the airport terminal,” he explains.

Schafer notes that airport executives often face conflicting mandates associated with multiple environmental, water quality and wildlife habitat requirements. Add in the need to maintain an



The aftermath of wildlife strikes is never pretty, as evidenced by this scene at a Wisconsin airport after a King Air struck a flock of gulls.

aesthetically attractive campus, and the job gets even more complicated.

“It’s really difficult, but the bottom line is that we have to protect public safety—and sometimes that comes at the cost of landscaping,” he says.

Removing pocket gophers and stream management are other ongoing efforts at YKM. “We increased patrols to ensure beaver dams are removed and water levels are kept low, so that water flows freely to the streams and migratory waterfowl don’t want to settle in for a rest on an airport pond,” Peterson explains. “The highlight of the whole program is that it’s back to basics.”

Schafer says that YKM excels in three important areas: training its staff, providing the tools they need and trusting their judgment. Peterson notes that one key part of the effort has been explaining to ground personnel and airport tenants that open garbage containers are strong wildlife attractants.

Turning to Tech

Like YKM, Vancouver International Airport (YVR) uses data to track how various wildlife move about the airfield—and help identify the risks they present. Lately, its efforts have taken a high-tech turn. Since May, the Sea Island airport has been using avian radar to track bird movement.

After exploring numerous options at trade shows and conventions, the Vancouver Airport Authority partnered with Accipiter Radar Technologies for a one-year equipment lease. Airport personnel were familiar with the Ontario company because of its strong connection and work with the Bird Strike Association of Canada.

“The main goal is to understand how different birds move at night, says David



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Bradbeer, wildlife program specialist with the Authority. “But first, we want to validate the data we’ve been seeing.”

Initial trials with the radar equipment have been doing just that, he reports. “It was nice to see and confirm the songbird migration. Songbirds migrate generally at night, and we saw lots of small radar tracks to the west of the airfield.”

With growing confidence in the radar’s ability to track birds and help its team understand movement patterns, the airport will begin using the data to help guide strategy decisions. Better field information will help YVR be more effective quantifying daily patterns, forecasting bird activity and deploying wildlife personnel to key areas at the appropriate times, explains Bradbeer.

That said, he also stresses the importance of understanding the capacity and constraints of any system. “Every sensor that exists out there will have limitations, and that’s fine. We know radar doesn’t see everything, but as we work through these



With three streams on property and several mountain ranges nearby, YKM faces multiple wildlife challenges.

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very early days, I’m sure we are going to gather a ton of experience using this tool.”

He encourages other airports to have a true understanding of the data they collect before acting on it.

Habitat management—making the airfield less attractive for birds and other animals—is another main pillar of YVR’s wildlife program. “We also work on drainage, to remove ponded water,” says Bradbeer. “Despite our best efforts, birds will come to find food; and then we have to try and change their behavior.


“It’s our responsibility to ensure safe aircraft operations while conserving wildlife,” he summarizes.

Sound Practices

While YVR’s new avian radar is helping it track birds more effectively, the airport also deploys a variety of pyrotechnics, sirens, trained raptors and dogs to move birds off the airfield.

“We always say it’s the coolest job at the airport,” Bradbeer says with a laugh. “Someone has to do it.”

In a similar vein, personnel at YKM use sirens, horns, “bird bangers” that make firecracker noises, and “screamers” that whistle like bottle rockets. “We do everything we can non-lethally to scare them away,” says Peterson.

According to the USDA, fully 92% of bird strikes occur at low altitudes—below 3,500 feet. In essence, both airports are “playing the odds” by working to keep birds and other animals off their airfields. Minimizing the food and habitats they prefer helps encourage wildlife to take up residence a safe distance from active air traffic. 

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SAFE FLIGHTS BEGIN WITH AIRFIELD ASSESSMENTS



Tulsa Int'l Leverages Technology to Maintain Airfield Markings

BY PAUL NOLAN



FACTS&FIGURES

Project: Airfield Markings Assessment/Reflectivity Testing

Location: Tulsa (OK) Int'l Airport

Scope: 10,000-foot main runway; 7,736-foot crosswind runway; 6,101-foot general aviation runway

Consultant: Sightline Inc.

Completed: Spring 2018

Project Duration: 2 nights

Results: 6% of markings required immediate maintenance, 43% needed maintenance in near future, 51% rated good to excellent

Marking Removal/Cleaning Equipment: Stripe Hog SK2000, from Waterblasting Technologies

Striping Machines: LineLaser IV 5900, 200HS, 250DC & 3400, from Graco



Roger Moats, airfield maintenance manager at Tulsa International Airport (TUL), understands that flight safety begins and ends on the ground. It's why he regularly emphasizes to his crew the importance of their work.

"When I started 20 years ago in this department, we had 20 people. We shrunk that to 10, and we're doing as much, if not more, than we did with 20," Moats says. He cites better training and improved equipment as two key factors for the increased productivity.



ROGER MOATS

In August, TUL had its annual FAA Part 139 safety inspection, and for the third year in a row, it came away with zero discrepancies. Moats and his team prepared by checking markings early in the year and compiling a list of which needed work.

Outside Input

The airport owns a handheld reflectometer (StripeMaster 2 Touch from RoadVista) to take daytime and nighttime readings of portions of markings. But this year, TUL contracted Sightline Inc., a Virginia-based airport markings consultant, to complete a full, independent assessment.

Mike Speidel, Sightline's vice president, says the company offers more than 50 years of cumulative experience with runway markings—a wealth of knowledge that some airport maintenance teams just don't have.



MIKE SPEIDEL

"It's a simple science to install and maintain markings, but it's still a science," says Speidel. "The reason I have a job is because this industry doesn't do it very well. There is no formal training required."

The education comes from a tribal sort of knowledge. It's passed down from predecessor to successor, and there are good and bad habits being passed down.”

Speidel's mother, Donna, founded Speidel Construction in 1981 to paint highway and airfield markings. Eventually, Sightline focused strictly on airports and now only completes assessments.

Sightline crews use a new mobile retroreflector from RoadVista (model LLG7-A) to analyze airfield markings. The unit attaches to a vehicle and provides continuous pavement marking assessment. According to Speidel, it is the only commercially available instrument that does not require a dedicated vehicle or vehicle modifications to operate. “It's pretty state-of-the-art for aviation,” he remarks. “The DOTs have used it on highways for several years, and the technology continues to evolve. This particular unit that we own is the only one that has been tailored for use on airports.”

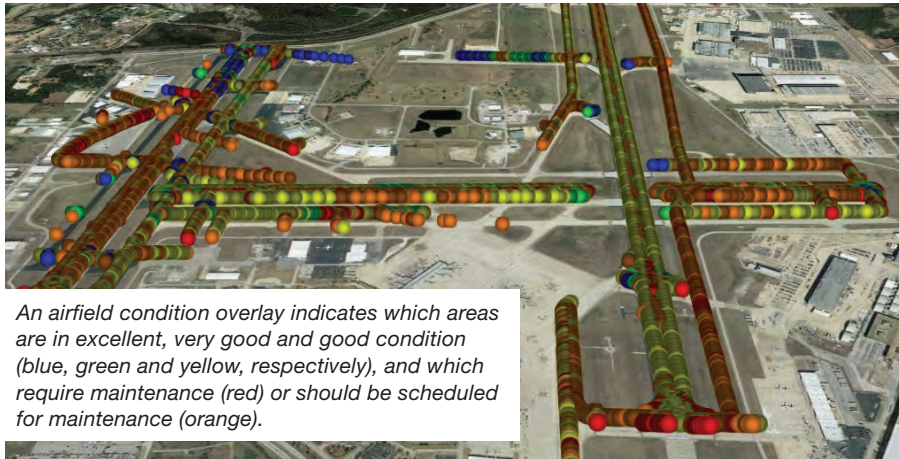
The report Sightline provides after a full airfield analysis is similar to a pavement condition index, which uses a numerical system to indicate the general condition of pavement. “The reason we created this whole assessment concept is it didn't exist before,” Speidel explains. “Currently, there is no maintenance criterion for airports to assess their markings' performance. We've created something that helps an airport objectively determine the performance of its markings.”

Early Adopter

Moats met Speidel when TUL hosted one of Sightline's first markings symposiums in 2010. The company has conducted more than 30 similar symposiums since.

Nearly a decade later, Moats contracted Sightline to perform an independent assessment at TUL, and crews worked for two nights measuring reflectivity. Overall, the company determined that 6% of the airport's markings required immediate maintenance, 43% would need maintenance in the near future, and the remaining 51% tested between good and excellent.

Postponing work on markings that are in good shape can save airports hundreds of thousands of dollars a year,



An airfield condition overlay indicates which areas are in excellent, very good and good condition (blue, green and yellow, respectively), and which require maintenance (red) or should be scheduled for maintenance (orange).

says Speidel.

Many airports repaint all of their markings at the same interval (often right before an annual FAA inspection), and crews often paint directly over the old, dirty markings. “It's a reactive culture that leads to a lot of other problems,” Speidel cautions. Cleaning airfield markings is significantly cheaper than painting them, and may be all that's needed, he adds.

Moats estimates that TUL saves 86% when it can clean rather than repaint. “The bigger the job, the more we save,” he adds. The airport owns a Stripe Hog SK2000 water blaster for cleaning and removing markings.

He recommends performing internal assessments twice a year (at the beginning and end of paint season) and keeping careful records to help set budgets for future years. “You will also get a sense of how long markings last at your airport,” he notes. “A marking that may last five years in Tulsa may only last two years somewhere else due to the geographical region and snow operations that go on at that airport.”

When repainting is required, Speidel says it's crucial to adequately clean the existing surface so new paint can bond properly. To avoid a potential conflict of interest with its independent markings assessment services, Sightline does not provide painting and maintenance services.

In the Paint


The importance of well-maintained airfield markings cannot be overstated, stresses

Moats. Markings are among the first things the National Transportation Safety Board checks if there is a runway incident. “If the lines are wrong, something can happen,” he notes. “You don't want that on your plate at the end of the day.”

Speidel credits Moats for his commitment to learning the best ways to maintain effective markings and adapting TUL's practices accordingly. “The biggest change is they set out to paint less and clean more. That's something we've been preaching for 10 years,” Speidel says.

TUL uses four Graco LineLazer machines to paint markings, including a 200HS with auto layout, which Moats says shaves half the time off striping jobs. The airport's LineLazer 250DC and 200HS can paint up to a 3-foot-wide line in one pass, and each has the capability to paint two colors at once. Both machines have a pressurized glass bead system that distributes beads more evenly across the lines, says Moats.

By using lasers, TUL has eliminated the need to string lines. A long-line laser allows daytime workers to paint a line up to 600 feet at a time, reports Moats. Crews then use a dot laser to double check the straightness or radii accuracy.

Moats says his attention to detail with markings is a result of how he was trained. “I've been here going on 21 years, and I painted pretty much as soon as I got here,” he reflects. “Our approach to painting is very strict. I'm the one who makes it that strict. Painting is my area of expertise. Not much gets by me.” 



TOP 5 SUBJECTIVE AIRFIELD

Airports certificated under FAA Part 139 are responsible for properly maintaining its pavement markings on the airfield “ensuring that each item provides an accurate reference to the user”.¹ While that may seem obvious, it is more difficult than you may think to determine what is compliant, and what is not. Based on data presented by the FAA, airfield markings are nationally among the most commonly cited discrepancies during annual certification safety inspections over the last several years.

The relatively high incidence of marking discrepancies may correlate to the lack of objective standards related to marking compliance. For example, maintenance thresholds for visibility do not currently exist to objectively determine when a red surface painted holding position sign is faded or when runway centerlines are no longer bright enough at night. Without measurable standards, airport personnel and FAA inspectors are left with their own subjective opinions about how markings are performing.

Several more conditions are not black and white, so to speak, yet they have appeared in FAA inspections as discrepancies. Here are the Top 5.

TOP 5 SUBJECTIVE AIRFIELD MARKING CONDITIONS

1. FADING. The mother of all conditions and the most commonly industry-used term to describe many conditions. Current standards do not address when the color of a marking becomes too faded.

2. FLAKING. Virtually all airports experience peeling paint to some degree, but guidance is not clear about how much has to be present to remain compliant.

3. THICKNESS. Routine repainting leads to thick markings and potential FOD. Airports can easily measure thickness but have no upper limit to compare it to.

4. REFLECTIVITY. Glass beads are required and applied in the majority of markings in the movement areas, however a maintenance standard for how reflective they should be currently remains subjective.

5. NON-UNIFORMITY. If it looks striped, wavy, or uneven, the marking likely is considered non-uniform, but an objective standard has not been defined.

BE OBJECTIVE

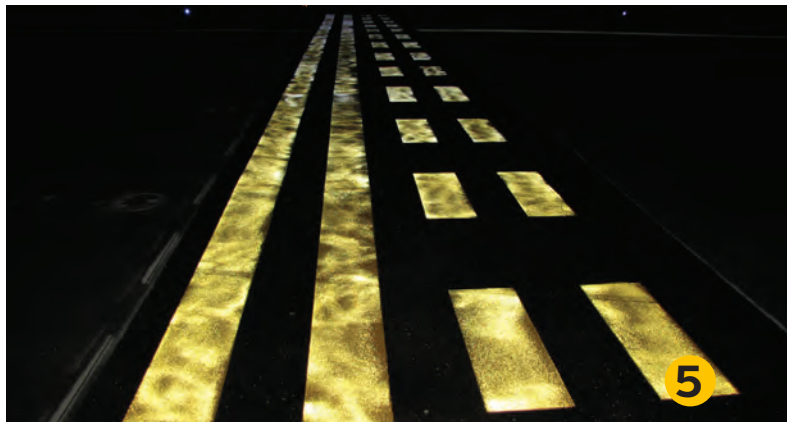
Despite a lack of maintenance criteria, airports are still required to ensure airfield markings provide an accurate reference to the user for operational safety – How can airports satisfy this requirement?

“What gets measured gets improved.”
–Peter Drucker

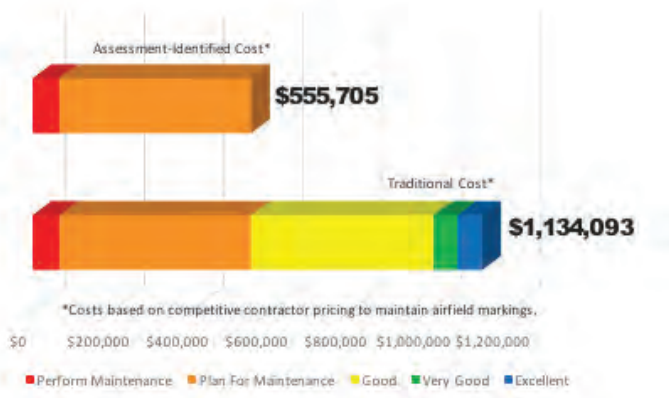
Sightline invented the Airfield Marking Assessment in 2008 to eliminate subjective inspections by systematically calculating airfield marking performance. Ten years later, the assessment has evolved by leveraging the only American-made mobile reflectometer specifically designed for the airfield, the LLG7-A (“A” is for Airport).

Utilizing Sightline’s experts (they wrote the Airfield Marking Handbook for the FAA) and their cutting-edge process and equipment, airports are quickly able to make data-driven decisions and plan maintenance activity based on objective analysis.

¹14 CFR 139.311(d) - Marking, signs, and lighting.



MARKING CONDITIONS



Airports save a lot of valuable time and money by only repainting the markings determined to require maintenance, when compared to the traditional method of repainting the entire airfield annually.

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Rare Blizzard Underscores Importance of Teamwork, Planning for the Unexpected at Charleston Int’l

BY NICOLE NELSON

Even during the most bitter winters, the Southern port city of Charleston, SC, seldom experiences a deep freeze. But last winter proved to be a major exception. Winter Storm Grayson shocked residents and effectively closed the airfield shared by Charleston International Airport (CHS) and Boeing SC at U.S. Air Force Joint Base Charleston from Jan. 3 to 7.

Authority and U.S. Air Force—which owns the shared runways—were simply not equipped to handle the highly unusual winter storm.

Weathering the Anomaly

Based on the airfield’s geographic location and the historical infrequency of snow events, the Air Force does not own or maintain any airfield equipment specifically designed for snow and ice removal at Joint Base Charleston and CHS. Furthermore, there was not an effective plan in place for clearing the unexpected ice and snow.

However, a coordinated effort between Charleston County Aviation Authority, Joint Base Charleston and Boeing SC safely cleared enough snow and ice to reopen Runway 03-21 by noon on Jan. 6. Flight operations and the entire airfield reopened the following day at 2 p.m.

In order for the entire base installation to resume normal operations, crews had to recover the airfield, remove snow on the roads and address facility issues such as broken water lines and damage to the

“It has probably been over one hundred years since we had that kind of ice and snow,” says Paul G. Campbell Jr., executive director and chief executive officer of CHS. “We had four days in a row that it never got above freezing. It would just get warm enough at the end of the afternoon to get a little bit of a melt, and then it would refreeze again overnight.”



PAUL G. CAMPBELL JR.

With temperatures hovering in the teens and up to 3 inches of ice accumulated on the runways, the Charleston County Aviation



CHARLESTON
INTERNATIONAL AIRPORT

FACTS&FIGURES

Project: Winter Storm Readiness

Location: Charleston (SC) Int’l Airport

Stakeholders: Charleston County Aviation Authority; Joint Base Charleston; Boeing SC

Catalyst: Winter Storm Grayson, Jan. 3-7, 2018

Facility Damage: Nominal

Associated Lost Revenue: About \$700,000

Inaugural Task Force Meeting: Jan. 30, 2018

Memorandum of Agreement: June 14, 2018

Strategy: Put contractors on retainer to assist with snow/ice removal & facility repairs

heating, ventilation and air conditioning system. “These services are taken for granted until they’re no longer there,” says Col. Rockie Wilson, 628th Mission Support Group Commander. “When the power or water goes out, or people are unable to pass through roads, response teams kick in and save the day.”

Col. Jeff Nelson, 628th Air Base Wing Commander, commends the dedication of personnel throughout the base installation to bring the airfield and base back up to full operations—everything from security forces patrolling roadways for travelers to weather specialists monitoring conditions and providing vital storm updates.



COL. JEFF NELSON

“From the beginning, our priority was safety,” notes Nelson. “A great deal of caution and consideration had to be taken into account as we worked through our response to this historic snow storm and multiple days of temperatures below 40 degrees. Many of our teammates worked long hours to ensure the safety of both our personnel and resources.”

Local municipalities and the South Carolina Department of Transportation worked hard to clear main roads in the surrounding area, he adds. Subsequent crews that cleared surrounding roads enabled people to travel to and from the airport once the runways were cleared.

“It took a great deal of teamwork and resourcefulness throughout the storm, and I’m thankful for the men and women who worked around-the-clock to restore operational capability at the airfield,” says Nelson.

Campbell was similarly impressed by and grateful for the widespread responsiveness.

“It was an unusual set of circumstances that caused us to go through a learning curve, but we had a really great team,” he reflects. “I can’t say enough good things about the United States Air Force at Joint Base Charleston and Boeing. We work very well together.”

Call to Action

After airfield operations returned to normal, CHS and Joint Base officials initiated a comprehensive strategic review. While property damage was nominal, Winter Storm Grayson caused both organizations to incur other costs. Doug Boston, chief financial officer for the aviation authority, estimates that CHS suffered revenue losses from flights, concessions and associated businesses of approximately \$700,000.

“We realized the need to identify and review the lessons learned from this historic storm to build a better plan to improve our relationships, readiness and response to assist us in clearing ice

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Crews from the airport, Joint Base Charleston and Boeing SC banded together to clear ice and snow so operations could resume.



and snow from the taxiways and runways for future, albeit 20-year, events,” explains Nelson.

A taskforce of subject-matter experts was created on Jan. 30 to review lessons learned and study the weather-related emergency response plan for the shared airfield. After five months

of discussions, the Joint Base and Charleston County Aviation Authority signed a formal memorandum of understanding to address the cooperation and coordination of snow removal operations at the jointly-used facilities.

“We will meet annually in the fall to conduct pre-season winter weather management coordination and issue a plan to each of our organizations to improve our readiness and coordination required for snow and ice removal from the airfield during significant winter weather related events,” says Nelson. The new memorandum does not supersede nor void the more comprehensive existing joint-use agreement between the U.S. Air Force and Charleston County Aviation Authority.

New Response Plan

To supplement the pre-season coordination meetings, a snow control command structure is ready for activation when inclement winter weather has the potential to affect airfield operations. The command center will coordinate activities related to winter weather response such as pavement clearing operations and airfield assessments. It will help ensure that runways, taxiways and ramps remain operational before, during and after inclement winter weather by providing updates related to current runway surface conditions. Other responsibilities include drafting Notice to

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Airmen (NOTAM) updates for dissemination; managing inventory, location, storage and staging of equipment and deicing chemicals and applications; and discussing procurement actions and disposal of snow and ice in compliance with the Clean Water Act and applicable state regulations related to stormwater management, snow and ice containment and collection and snow removal.


Retainers vs. Purchases

While the new memorandum of understanding dictates increased communications and command, it does not call for the purchase of dedicated equipment to clear snow and ice. Instead, contractors will be put on retainer to bring plows and other equipment to the airfield in the case of another weather anomaly. This approach is more cost-effective given the rare occurrence of snow and ice storms in Charleston, explains Campbell.

The recent experience with Boeing SC serves as an effective blueprint. The aerospace company, which is located adjacent to CHS and shares the runways and taxiways with the Air Force Base and airport, used its own equipment to assist Aviation Authority and Joint Base personnel in clearing the snow and ice, returning runways to operational status and fixing damage caused by Winter Storm Grayson.

Boeing SC will participate in the planning/response meetings and work with the Air Force Base and Aviation Authority to tackle any future storm issues, although specific duties have yet to be assigned.

“We are going to have a standing agreement with contractors, so they can come in quickly,” Campbell says, noting that they are still identifying and securing companies to be on standby for clearing operations. “We may even, in the meantime, stock a few of the chemicals to put down if we see a storm coming.”

Nelson is similarly optimistic about contingency plans put in place after last winter’s unusually harsh weather. “In partnership with the Charleston Aviation Authority, we are better prepared to jointly plan and respond to any similar severe winter weather related storms affecting our airfield operations and ensure our military readiness to support our rapid global mobility mission,” he remarks. “Our goals for future similar weather-related events include providing coordinated responses, relying on our strong partnerships and ensuring Joint Base Charleston remains postured to respond to potential inclement winter weather.” 



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Dallas Love Field Adds New Noise Monitoring

FACTS&FIGURES

Project: Noise Monitoring

Location: Dallas Love Field

Owner/Operator: City of Dallas

Cost: \$502,696 (includes purchase/installation of noise monitors & 5-yr maintenance contract)

Scheduled Completion: End of 2018

Noise Monitors: Larson Davis, a division of PCB Piezotronics

Flight Tracking System: Casper



The central location of Dallas Love Field (DAL)—just seven miles northwest of the downtown business district—is a double-edged sword. While ultra-convenient for travelers, the airport is surrounded on nearly all sides by residential developments, which presents myriad challenges when it comes to “keeping the peace.”

The city of Dallas, which owns and operates DAL, is committed to being a good neighbor while also maximizing the economic performance of the airport. To complement

its voluntary noise control program, the city is investing more than \$1/2 million to upgrade DAL’s existing noise monitoring system. Crews are scheduled to install new equipment by the end of this year.

The city council approved the purchase/implementation of a new noise monitoring system in January. The \$502,696 investment is funded through the city’s general operating funds



CHRIS PERRY

original monitors was not being utilized as much. “It just became kind of a check,” explains Mehrlich. “After they would do the model, they would go back and make sure that nothing looked strange.”

Upgrading the noise monitors will help DAL’s noise program remain transparent to the community, because citizens can access the data directly, without worrying that the airport is “filtering something out,” he notes.

“The community has definitely had an interest in what goes on here because of the Wright Amendment,” Mehrlich remarks. The Wright Amendment restricted operations for all airlines at DAL, but significantly affected Southwest Airlines, the airport’s predominant carrier. In October 2014, the Wright Amendment was repealed and replaced with the Five Party Agreement, which limited DAL to 20 gates and banned international commercial flights.

Much to everyone’s surprise, traffic volume at DAL has increased substantially following the repeal of the Wright Amendment, Mehrlich reports. In 2013, the airport served 4.2 million passengers; in 2017, it served 7.9 million.

Not surprisingly, community members took notice of the increased air traffic. “For them, it’s a drastic change,” Mehrlich acknowledges. Airport and city officials are consequently making extra efforts to stay engaged and involved in the community. Their main objective is to explain that despite the recent traffic increases, the number of gates at DAL is limited, and there will not be further growth.

Initially, noise complaints increased, and the airport stepped up its efforts to educate the community about the airport’s role and “make it simple for them to get answers up front.” DAL’s community outreach program is designed to make sure its neighbors are informed. “We found that as long as we stay

Technology

BY JODI RICHARDS

and includes a five-year service contract, notes Chris Perry, communications manager for DAL.

Environmental Operations Manager Paul Mehrlich explains that noise monitors were originally installed at DAL in the 1990s to facilitate mapping airfield noise contours. Since then, modeling has changed and technology has improved, so the data gathered by the



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Dallas Love Field uses a combination of high-tech noise monitors and operational policies to keep peace with residential neighbors.



ahead of it, they don't feel like we're hiding anything, and we've actually seen a decrease in noise complaints now," Mehrlich reports.

Tech Upgrade

The 13 existing TA-40001 Noise Monitoring Stations will be removed and replaced with four Larson Davis 831-NMS noise monitors. The new monitors will be located off the ends of the main 8,800-foot runway to provide the most useful noise information. Deployment should not impact flight operations, as the monitors will be placed about 1,000 feet off the ends of Runway 13R-31L.

The airport considered the use of portable noise monitors for added flexibility, but ultimately determined stationary monitors would provide more benefits.

The new Larson Davis 831s will provide data to the airport's web-based flight tracking system in near-real time, says Mehrlich. The solar-powered units feature remote calibration checks and leverage cellphone-based technology. Airport officials were especially interested in a product that uses cellular phone technology, as opposed to the previous system which relied on hard phone lines. "We had a lot of problems with static," Mehrlich recalls.

It was also important for the noise monitors to be solar-powered, he adds. In addition to being more environmentally friendly, solar power will provide operational reliability during a power outage.

Tracking Builds Trust

The core of DAL's noise program is flight tracking. "We are constantly trying to make sure flight tracking is more accurate and that more information can be provided to the community," Mehrlich relates. "We found by being completely open and honest with the community and providing more than they ask helps create trust. We care about what they're worried about, and we're sharing with them everything we know."

The new noise and operations monitoring system, by Casper, includes a public portal that provides flight tracking and noise data in Spanish and English. It is also optimized to allow community members to file complaints through their cellphones.

One of the biggest requirements for the new system was speed—specifically, the ability to disseminate noise data to the public as quickly as possible. The previous system took noise measurements and then performed a daily "data dump" that was not accessible until the following day. "Because of that, if a community member had questions, we weren't able to use the current data, because we couldn't see it yet," Mehrlich notes. Having access to noise data in near real-time will provide the community with more information and expedite noise investigations when necessary.

"Some community members are trying to see if they can find something out of the ordinary," Mehrlich explains, noting that reactions to aircraft noise vary from person to person. "When something comes over their house and they notice it, they want to figure out why."

In October, DAL will add Noise Lab, which allows community members to run reports about flight statistics themselves. The system, also from Casper, displays the number of flights using optimal departure procedure, automatically generates charts and graphs, shows departure and arrival routes, and displays flight track concentrations and noise contours.

Noise data is a tool that helps the community stay informed, Mehrlich emphasizes. Whether it's a difference in flight pattern, aircraft or time of day, airport neighbors are often interested in figuring out *why* they noticed a particular flight. The combination of Noise Lab and the Complaint Management Module allows community members to make a noise inquiry by clicking on a specific aircraft.

Proactive Efforts

In addition to leveraging technology and equipment, DAL follows a Voluntary Noise Control Program to minimize the impact of aircraft operations on surrounding neighborhoods without restricting use of the airfield. Developed with the participation of airport officials, neighborhood representatives, the city of Dallas and FAA, the program includes:

- a preferential nighttime runway (13R-31L) for all jets and any aircraft weighing more than 12,500 pounds to use between 9 p.m. and 6 a.m.
- noise abatement departure procedures for night operations on Runway 13R for all turbojet aircraft and aircraft weighing more than 12,500 pounds
- prohibition of aircraft engine run-ups by maintenance staff from 10 p.m. to 6 a.m. (expanded from midnight);
- the use of optimal take-off profiles; and
- phone and online options for reporting noise complaints.

The Love Field Environmental Advisory Committee, which includes representation from the airport, airlines, FAA and surrounding neighborhoods, meets quarterly to review operations reports and provide information about upcoming airport projects. This helps keep everyone informed and allows feedback, explains Mehrlich. Given the demographics of surrounding neighborhoods, the airport presents its entire program in English and Spanish. ✈️

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New Runway at Key West Int'l Required Creative Project Plan

BY KRISTIN VANDERHEY SHAW



FACTS & FIGURES

Project: Runway Reconstruction

Location: Key West (FL) Int'l Airport

Runway Length: 4,801 ft.

Cost: \$10 million

Funding: FAA; FL Dept. of Transportation; passenger facilities charges

Construction: 5 months

Asphalt Installed: 24,000 tons

Project Completed: April 2018

Pavement Engineering Consultant: RDM Int'l Inc.

Project Consultant: Jacobs

General Contractor: General Asphalt

Subcontractor: Charley Toppino & Sons

Airfield Lighting: Florida Keys Electric Inc.





Key West may be a small town of only 25,000 residents, but it's a thriving tourist spot that's growing in popularity. As a result, passenger traffic at Key West International Airport (EYW) is also projected to rise—to the tune of 2.4% per year for the next 20 years. Airport executives estimate that 750,000 travelers will pass through their island facility by the end of 2018.

"There are few places I can think of that are quite like the Florida Keys," says Thomas J. Henderson, acting director of airports for Monroe County, which owns and operates EYW. "It has a lot of aviation history, going back to international air service from the Keys to Havana. When people arrive here, they get the full experience of landing at an island airport."



THOMAS J. HENDERSON

This spring, EYW completed a \$10 million renovation of its sole runway to ensure that the "full experience" included smooth landings and takeoffs. At only 4,801 feet long, Runway 9-27 is able to accommodate aircraft as large as Boeing 737s. Despite occasional weight restrictions, Delta Air Lines, American Airlines, United Airlines and Silver Airways operate direct air service to a number of cities from EYW.

Renovation vs. Relocation

EYW and its general aviation counterpart, Florida Keys Marathon Airport (MTH), are both covered by a Florida Department of Transportation program that contracts an engineering firm to conduct periodic inspections of airfield pavement throughout the state. Based on these inspections, Henderson and his team knew that Runway 9-27 was safe but would need to be replaced soon.

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“The runway pavement was at the end of its serviceable life span,” says Jacobs Project Manager Lasa Ennis. “When runways are not maintained on time, foreign object debris (FOD) tends to break up on the runway.”



LASA ENNIS

Airport personnel had not experienced problems with FOD on the runway, and they wanted to keep it that way. Officials consequently scheduled a reconstruction project to:

- mill and overlay the existing runway surface with new pavement;
- widen the shoulders from 10 to 20 feet on both sides;
- upgrade runway lighting to LED;
- add 270 feet of takeoff distance; and
- improve drainage in the grass safety areas that abut the runway.

The new pavement overlay strengthened and improved the condition of the runway for years to come, notes Ennis.

Opting for Asphalt

During the design phase, engineers took into account factors like weather and the rising sea level. They specified asphalt instead of concrete so the new runway surface would cure quickly, and disruption to air traffic would be minimal.

“Asphalt is quicker for constructability, especially when you have to re-open a runway each morning throughout construction,” says Ennis, who also acted as the engineer of record on the project.

One of the first challenges the project team ran into was material procurement. General Asphalt, the Miami-based company that won the contract, was located three hours away, via the long, bridge-laden Overseas Highway that connects the Keys to each other and the mainland.

“We had to put a provision in the plan that said crews could not begin milling until the asphalt trucks were an hour away from the airport,” notes Ennis.

Workers milled about ½ inch from the existing runway to rough up the surface and help the new asphalt adhere. They then placed asphalt until 5 a.m., which allowed time for the asphalt to cure and crews to clean up the worksite before the first flights at 7 a.m.

The new design elevated the runway by 6 inches, which required 24,000 tons of asphalt. On average, crews placed 650 tons of asphalt each night.

The work schedule was developed around Key West’s rainy season. Paving began in January, because the first three months of the year are typically the driest. However, that time of year is also part of Florida’s busy snowbird season, which runs from December to March.

Finding the Rhythm

In order to complete the project within a five-month window, EYW closed its sole runway every night at 10 p.m. and reopened at 7 a.m. Airport personnel worked closely with the airlines to help maintain normal operations throughout construction.

“We entered this project with the right mindset and good preparation,” says Henderson. “Like any airport with a single runway, we knew we needed to do this

at night and ensure we had smooth runway closure and demobilization, and clean up and be ready for business by 7:00 the next morning. We got in a rhythm that helped.”

Ennis and Henderson agree that communication between the various work crews was crucial to their success. At peak, there were up to 50 workers on the runway each night. Henderson reports that construction was largely seamless, thanks to good planning and coordination. He also credits the airport’s relationship with Jacobs as instrumental to moving the project forward.

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"We had weekly progress meetings, and we also had a communication line and an airport representative from Jacobs on site," adds Ennis. "Updates were reported daily between on-field representatives, myself, the airport and the contractor."

Knowing crews could not build the runway in one night, the team planned precisely how much runway they could cover with each night's production. For every inch of asphalt overlay on the existing runway, contractors had to build a 15-foot ramp to ensure smooth takeoffs/landings and comply with FAA regulations.

"There were no surprises during construction," reports Ennis. "The biggest challenge was the timing. Construction went smoothly because we planned well in our design phase; plus, we had an experienced contractor in General Asphalt. They were very knowledgeable about their product and had worked on numerous runways. They knew that if the runway is just a minute past opening, they are losing money. They were very aware and respected that timeline, and they were prepared."

Grooving the runway had to be finished by April 15, but was completed ahead of schedule on April 7. Afterward, crews placed sod, installed new inlets on the drainage line for the infield areas,

raised all edge and threshold lights, and built a concrete area on the west side of the runway for turning maneuvers.

Minimal Impact

Of the four airlines that operate out of EYW, Delta was the only one that had to alter operations during the runway project, and it experienced only minor scheduling impacts. Because the runway had to remain ungrooved while the asphalt cured completely for 30 days, the runway's friction coefficient would be compromised during wet conditions. That combined with the runway length affected certain flights.

"We had to closely monitor wet versus dry conditions for Delta to operate," explains Henderson. "Since the project was in the winter and spring, we didn't have any cancelled flights due to wet runway. Delta had three diversions, but we still consider that a success. Silver, United, and American didn't experience any operational impact."

While airfield improvements typically create some inconveniences and frustration, Henderson and Ennis agree that pre-planning and proactive communication about the project managed expectations and mitigated most complaints.

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“I would recommend that all major parties involved in a project like this— maintenance, operations, air traffic control, station managers, engineering consultants, and all of the players—need to be a part of the planning process at least a few months ahead, so they can see it coming and plan accordingly,” says Henderson.

With runway renovations complete, taxiway and terminal improvements will be the next major projects at EYW. The airport plans to expand its 2009 terminal and add a new departures lounge and connections to jet bridges to enhance passenger safety.

“We promote a positive, customer-friendly experience,” explains Henderson, noting that the airport is now ready for the next generation of Key West visitors. ✈️

Plans for future terminal improvements will include a new departures lounge and jet bridge connections.



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BWI Marshall Uses Vehicle Tracking Airfield Management

BY MINDY HAMLIN



FACTS&FIGURES

Project: Improving Ground Safety/Situational Awareness

Location: Baltimore/Washington Thurgood Marshall Int'l Airport

New Tool: AirBOSS, by INDMEX Aviation

Avg. Initial Investment: \$20,000-\$40,000

Avg. Recurring Cost: \$20,000-\$30,000/yr

Evolution: BWI began using SnowBOSS to track airfield maintenance crews during winter snow removal operations, later expanded use to other modules such as all-weather vehicle tracking & runway incursion prevention

Operations and maintenance crews at Baltimore/Washington Thurgood Marshall International Airport (BWI) are no strangers to winter weather. With more than 600 flights on any given day and annual passenger volumes exceeding 25 million, the airport takes an “all-hands-on-deck approach” to snowy and icy precipitation.

With more than 300 people committed to the airport’s snow removal efforts, situational awareness is critical to ensuring safe and effective winter operations, says Mark Wisbeski, BWI’s

supervisor of airport operations. His search for a solution to facilitate more efficient snow removal operations culminated with the purchase of an airfield monitoring system designed to improve safety for the airport and its tenants.

“Back in 2015, we wanted to see about a program that would give us more situational awareness during a snow situation,” explains Wisbeski, noting that team leaders oversee snow removal efforts on all runways, taxiways and ramps.

Winter storms not only create hazardous conditions for aircraft, but also for snow removal crews. Low visibility, for example, makes it difficult for team leaders to know where their crew members are located.



MARK WISBESKI



System to Improve

At BWI, each team leader is responsible for 10 to 15 pieces of equipment at any given time, notes Wisbeski.

Knowing there must be a better way, Wisbeski searched for tools to help team leaders keep tabs of their equipment and personnel during active storm response efforts. He found a tech-based strategy, and BWI subsequently launched a test program of SnowBOSS, from INDMEX Aviation. It is an individual module of AirBOSS, the company's wider-ranging airfield management system.

"When we first started using the program, communication was only between the team leaders, so they could see their personnel coming off of a runway," says Wisbeski. "The team leader would look at his INDMEX device and see that the crews were, indeed, off the runway."

Success during a massive snowstorm led the airport to expand its use of the system.

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"During the Nor'easter of 2016, all of the stakeholders were able to coordinate off the same picture at the same time," explains INDMEX President and Founder Carlos Nevarez. "After this, the airport wanted to expand it to the entire airfield management operations team."



CARLOS NEVAREZ

More Equipment, More Coverage

Together, INDMEX and BWI customized AirBOSS for the airport's unique needs. Using AirBoss Web, the company created a display for BWI that serves as a common operational and Surface Management System.

The airport's maintenance and operational vehicles are outfitted with transponders the size and shape of hockey pucks that track their location at all times. In addition, INDMEX built a real-time web-based airport map that integrates with FAA's NextGen ASDE-X/ ADS-B data to provide the operations team a complete view of airfield operations. This allows the airport to monitor conditions on

the airfield and coordinate with air carriers in real-time, explains Nevarez.

The airport's operations center features a 42-inch monitor that displays and tracks the location of all aircraft and maintenance/operations vehicles 24 hours a day, seven days a week. "It gives me a good representation of what is happening on the runways at any one time," says Wisbeski. "For instance, if foreign object debris is on a runway, all I have to do is look on the map and see which vehicle is the closest to go remove it. We also use it at night when we are inspecting and repairing lights and doing other electrical maintenance."

Further expanding its deployment of the system, BWI now uses the AirBOSS Runway Incursion Warning System. The airport's operational and maintenance vehicles have laptops equipped with an FAA-certified software platform that warns drivers of other activity in the movement area.

"If I'm traveling on a taxiway, I can see if an aircraft is approaching," explains Wisbeski. "In poor visibility, it helps drivers navigate the airfield. Even if they can't see aircraft or other vehicles on the airfield, they can see them electronically."

Today, BWI has 30 vehicles with tracking devices. The next

step in the works is to extend the program to other airport departments and tenants.


"We would like to get the fire department and other entities that might drive on the runways and movement area to be part of the system," says Wisbeski.

Currently, BWI is rolling the program out to airlines to assist with deicing activities. Not only will AirBOSS help airlines manage their equipment, it will also allow the airport to identify which ramps are available for snow removal equipment.

Collaboration is Key

Wisbeski and Nevarez agree that collaboration has been the key to success regarding airfield management at BWI.

"It has been a really great relationship with Carlos [Nevarez] and INDMEX," says Wisbeski. "If any one of the operations personnel had an idea, they took it to Carlos and he came up with solutions for us."

Nevarez sees wider-reaching effects stemming from the collaboration. "Our partnership with BWI has benefited other airports around the world," he points out. "The FAA has even gotten ideas from the work we have done with BWI." 

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Naval Air Station Oceana Maintains Operational Volume While Converting to LED Airfield Lighting

BY VICTORIA SOUKUP



Naval Air Station Oceana (NTU) in Virginia Beach, VA, is moving into the final stretch of a \$120 million airfield project to reconstruct one runway and replace aging incandescent airfield lighting with energy-saving LED fixtures.

The \$80 million electrical and lighting upgrade was a high priority because the previous system had been plagued with power failures, repeated maintenance issues and systematic shortcomings that sometimes disrupted operations. Improving the airfield lighting was imperative to support the associated Naval installation's 16 squadrons, 300 based aircraft and 250,000 annual operations, explains Airport Manager James "Gramps" McDowell, C.M.



JAMES MCDOWELL

"Oceana had suffered a number of cascading failures from old cabling, direct burial and worn-out equipment," says McDowell. "Equipment and circuit fires had forced the diversion of aircraft to other stations, which disrupted the squadron training and flight schedules. We knew it was only a matter of time before Oceana would be completely out of the night/instrument meteorological conditions flying business."

The project began more than a decade ago when officials began discussing how to improve lighting on NTU's four runways (three 8,000 feet long, one 12,000 feet long). At the time, LED was just coming onto the market as the most energy-efficient fixture that would meet the airfield's requirements.

"Our problem was that high-intensity LED lights were not yet approved by the FAA, just medium-intensity," McDowell explains.



"We continued down the road with the idea that we would at least get the taxiways done, make improvements to the runway edge lighting, and if LEDs were available for high-intensity at the time, then we would make LEDs the primary choice for the runways as well."

Fortuitously, the U.S. Navy had rebuilt nearby Naval Auxiliary Landing Field Fentress in 2012 with all LED lighting and the same lighting control system planned for NTU. "Fentress became the test bed for what we wanted to do at Oceana, and Fentress has worked out extremely well," remarks McDowell.

Beyond upgrading to LED technology, the lighting project at NTU also involved re-segmenting the airfield; increasing the number of circuits from 28 to 48; increasing, relocating and updating lighting vaults; and replacing airfield signage. "We shortened some of the runs, and with the five newly updated vaults, we would have



FACTS&FIGURES

Project: Airfield Upgrades

Location: Naval Air Station Oceana—Virginia Beach, VA

Major Components: Runway reconstruction; implementing LED lighting

Total Cost: \$120 million

Electrical & Lighting Upgrades: \$80 million (of total \$120 million)

General Contractor: The Lane Construction Corp.

Electrical Contractor: Atlantic Electric

Airfield Lighting Supplier: ADB Safegate

Timeline: Construction began July 2015; completion anticipated in July 2019

Lighting Installed: 350 LED in-pavement runway guard lights; 300 LED airfield guidance signs; 800 Navy runway centerline lights; 500 high-intensity runway edge/threshold lights

Of Note: Aircraft operations have not decreased with 2 of 4 runways closed for construction

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less chance of a complete failure coming out of one vault. We interleaved the circuits, so if we lost something, we could at least survive for the moment and wouldn't lose the entire taxiway or runway until we could come back to correct it."

Electrical and lighting upgrades accounted for \$80 million of the \$120 million airfield project, which was funded through the U.S. Navy Special Projects budget. Construction began in July 2015, and the first LED fixtures were in place within three months. The project also involved the complete reconstruction of runway 14L-32R.

Above & Below Ground Work

In order to upgrade NTU's airfield lighting, crews had to replace "every inch" of conduit and all underground cables, says Ryan Terry, district manager of The Lane Construction Corp., which served as general contractor for the project. "Upgrades included surveying the edge and centerline lights to adjust the locations to put the lights in a straight line, so they would be in line with the centerline of the runways and taxiways," relates Terry. "This also meant the existing edge of pavements had to be adjusted, which involved removing and replacing paving and adjusting the new shoulder paving limits."

One of the project's biggest challenges was managing the airfield's power consumption during the upgrade, notes Brian Nettles, senior project manager with Atlantic Electric. "Ultimately, we were renovating or constructing five vaults; but during the time of construction, there was one building from which 90% of the airfield was power sourced."



BRIAN NETTLES

"We had to maintain power and controls to the old lights that were still in service on runways and taxiways that were not completed while we installed new circuits, equipment and controls and brought the new airfield lighting control system (ALCS) on line in our work areas," adds Terry. "This meant that before we went into a new phase of work and shut down power to a section of airfield, we had to first understand how to maintain power and controls to the rest of the airfield."

Nettles explains that it was also difficult getting around the airfield to work on the vaults, lay power cables and ensure active areas were adequately lit during construction. "Our work often required us to cross active runways," he recalls. "It was mind-boggling. There weren't enough ways around active runways, so



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The scope of the overall project spanned from new LED lights to runway reconstruction.



we had to cross them—and Oceana has four runways and four intersections. The volume of air traffic on this airfield compared to most other military airfields is huge.”

NTU is the only master jet base on the East Coast and home to the F/A-18 Hornet and Super Hornet. “It’s a very busy airfield, and supporting the Navy’s mission meant that we could not impact flight operations,” Terry says.

To ensure safety, a crew member maintained radio communication with the control tower at all times. “We needed people who were very competent to be on the radio,” Nettles stresses. “And it was still nerve-wracking at times to have to remember runway directions. For example, you had to remember if you were on 5R or 5L.”

Terry explains that Lane worked with the airport to create movement plans and identify areas that were available for work. “Active military operations meant that our plans could change at any time,” he recalls. “The schedule and crews had to be flexible to support the mission. Lane’s contracts included five phases of work and 91 sub-phases. Understanding each phase and how it impacted the movement of aircraft and the other phases was critical to our success.”

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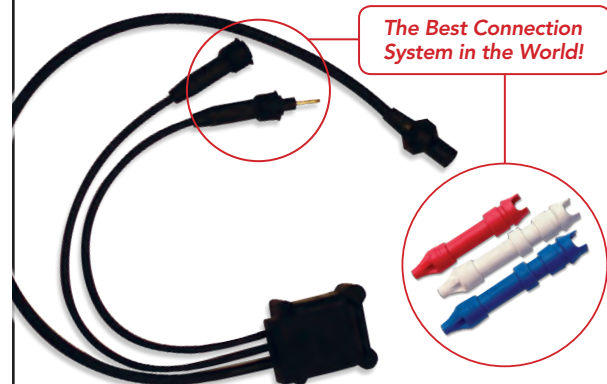


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New electrical vaults were installed to support the new lighting.



GALEN DIXON

where the vaults get power from. With all the updates to the switches and transformers, it's all going to work much better."

The specific LED fixtures used, L852N Navy Runway C/L from ADB Safegate, are stainless steel and designed to withstand tail hook damage from Navy tactical aircraft such as the F/A-18 Super Hornet. The upgrades place NTU at the forefront of airfield lighting technology, notes Galen Dixon, regional manager for ADB Safegate. All the electrical vault buildings have been built new or rebuilt, and the company's Switchgear Regulator System powers the new lighting.

According to Dixon, the low-wattage LED products are two to three times more efficient than traditional incandescent fixtures. Average life for the new fixtures should approach 100,000 hours.

"Not only will Oceana Naval Air Station see a reduction in energy usage, but also a substantial reduction in ongoing maintenance costs related to re-lamping incandescent fixtures. Typically, they would be re-lamping all fixtures one or two times per year. Now, they can go years without the need to re-lamp."

Twofold Cost Savings

McDowell looks forward to NTU consuming dramatically less power when the lighting project is completed next summer. "For us, it's not only a cost savings, but also a savings in maintenance costs," he comments. "We now know where all the circuits originate and

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Overall, the project required 350 LED in-pavement runway guard lights, 300 LED airfield guidance signs, 800 Navy runway centerline lights and 500 high-intensity runway edge/threshold lights.

“The benefit to pilots while landing and taxiing these massive machines is the additional safety LED provides because of its brightness and pure color wavelength that stays consistent at all steps of the constant current regulator,” says Dixon. “There will be no color shift, which is inherent to incandescent light sources that operate at varying brightness output. This provides a more consistent perception of the lights as pilots are landing and taxiing the airfield.”

LED fixtures were not installed for approach lighting because high-intensity lights had not yet been approved for the application when the project started. When the airport opts to upgrade, it will only have to change the regulator size, notes Nettles.

Steady Volume Despite Reduced Capacity

Terry says the biggest successes have been maintaining two control systems (the old and new) throughout the project and helping the Navy continue its regular traffic volume during construction. Effectively, the Navy has cut the operational capacity at NTU in half by removing two of four runways from service for construction, but it hasn't reduced the number of operations performed, he explains.

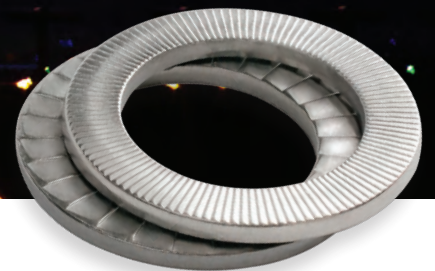
“We are able to support the Navy's mission while we work through the phases—without pilots being impacted.”

McDowell acknowledges that the project has been challenging. “We could have done less construction at one time, but we would have ended up with the same closures and it would have taken twice as long,” he reasons. “We'd be at this for seven or eight years instead of four.”

Even though preliminary plans detailed how much ground would be affected, he didn't envision what the airfield would look like during the height of construction. “There was digging everywhere,” McDowell chuckles. “We tried to be as efficient as possible, but we took the approach that if we're going to do the runway and lighting, we were going to do it in a series of planned phases. At the same time, you had to have a sense of humor. There were times when I looked at myself and asked, ‘What the heck are we doing?’”

When facing the typical inconveniences associated with ongoing construction, he focuses on the ultimate outcome: a safer, more reliable airfield that features a newly reconstructed runway and completely updated lighting system with accurate as-built drawings and a modern control system. ✈️

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New Amazon Facility Bodes Significant Cargo Growth for Cincinnati Int'l

BY PAUL NOLAN

FACTS&FIGURES

Project: Growing Cargo Business

Location: Cincinnati/Northern Kentucky Int'l Airport

2017 Development: Amazon signed 50-yr lease on 900 acres for U.S. airfreight hub

Airport Investment: \$5 million for unspecified improvements

Veteran Tenant: DHL has invested \$280 million in services & facilities at the airport since 2009

Recent Record: Airport handled more than 1 million tons of cargo last yr—27% increase vs. 2016



“A house is just a place to keep your stuff while you go out and get more stuff. It’s a pile of stuff with a cover on it. You see that when you take off in an airplane. You look down and you see that everybody’s got their own pile of stuff. And when you leave your stuff, you have to lock it up. You wouldn’t want somebody to come by and take some of your stuff. They always take the good stuff. Ain’t nobody interested in your fourth-grade arithmetic papers.”

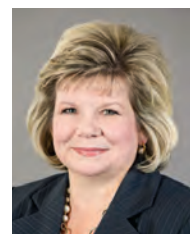
– George Carlin

Like other airports, Cincinnati/Northern Kentucky International (CVG) in Hebron, KY, is in the people transport business; but it’s also in the business of moving stuff. And the “stuff side” of the business is doing quite well. In fact, CVG is the fastest-growing cargo airport in the United States. It’s also the eighth largest cargo airport in the country, and the 34th largest in the world.

For the first time in its history, CVG handled more than 1 million tons (2 billion pounds) of cargo last year—a 27% increase over 2016. That’s nearly four times the North American average growth rate of 7%. Fueled

by increased business from longtime tenant and global shipping giant DHL, the airport surpassed its previous record for cargo volume in a single month last December, handling 109,380 tons—a 34% increase over December 2016.

Things are only going to get busier for CVG Chief Executive Officer Candace McGraw and her management team. In January 2017, Amazon announced it will build a \$1.4 billion



CANDACE MCGRAW



hub to support its growing Prime Air cargo fleet. The facility will be Amazon's largest hub in the world, with a fleet of more than 100 cargo planes and 2,700 new local jobs. The company signed a 50-year lease for 900 acres of airport land to house it.

With plans for its new facility still on the drawing board, Amazon began operating at CVG in May by striking an agreement with DHL to use its facilities during the day, when they previously sat dormant. DHL operates about 55 daily flights that arrive at night and depart before 9 a.m. At full capacity, Amazon aircraft will log more than 200 daily takeoffs and landings.

As of July, a completion date for Amazon's new freight hub had not been announced; but McGraw told local media that the company would like to get shovels in the ground as soon as possible.

The airport's central location for North American shipping makes it extremely attractive to DHL, Amazon and other freight operators. McGraw emphasizes that location is not the only feature bringing so much cargo business to CVG.

"We pride ourselves on being good business partners. We try to be flexible in how we operate," she explains. "We recognize that

private companies move at a quick pace, and we try to do that here as well. We have a staff that's receptive to that, as well as a board and business community that is receptive. We can get a business deal done."

The airport's nimble organizational structure eliminates bureaucracy and allows its executive team to be business friendly, she adds. "While airports in the U.S. are public or quasi-public entities that must ultimately act in the best interest of their communities, it is necessary to infuse a private business mentality into the decision-making process."

When Amazon announced its decision to locate at CVG, the company's senior vice president of worldwide operations cited the area's "large, skilled workforce; centralized location with great connectivity to nearby fulfillment locations; and excellent quality of living for employees" as important factors.

Ready to Grow

Although cargo growth is occurring rapidly at CVG, it's been a long time in the making. McGraw notes that her team began conducting due diligence several years ago on the best uses for available airport land. Environmental issues, height restrictions, capacity for utility services and other factors were assessed on a proactive basis.



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Last year, CVG handled more than 1 million tons of cargo.

"We had a lot of that basic knowledge already gathered, so when tenants such as Amazon or others have come to us with different development proposals around the airport, we have a basic business case that we can get to them on what is workable for that land. There are few airports in the country that could accommodate what Amazon needed."

Having ample runway infrastructure already in place was another important advantage to securing a gem tenant like Amazon. CVG has three parallel runways (8,000, 10,000 and 11,000 feet) that can operate independently and simultaneously, plus a 12,000-foot crosswind runway.

Limited Costs, Considerable Benefits

McGraw notes that the recent growth at CVG comes at relatively minimum expense to the airport itself. Amazon is investing \$1.4

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billion to build its new hub on 900 acres it is leasing from the airport. Since 2009, DHL has invested about \$280 million in new construction and improvements to its facilities and equipment at the airport. Its hub at CVG is the company's second largest; an expansive operation in Leipzig, Germany, is the biggest.

When DHL announced plans for a \$108 million expansion at its CVG facility in 2015, the Kentucky Economic Development Finance Authority approved tax incentives of up to \$1 million for the company. More recently, the same board approved up to \$40 million in incentives to help lure Amazon to the region.

The airport agreed to \$5 million in unspecified capital improvements as part of the Amazon deal. Investments may include road improvements or utility upgrades for water runoff—projects that will benefit all airport tenants, notes McGraw. In addition, CVG plans to demolish an old FedEx hangar to build a

cargo hangar that will be used by cargo carriers other than Amazon and DHL.

On the revenue side, new lease payments and landing fees from Amazon allow CVG to reduce fees for passenger airlines. "It only helps the air side of our business," says McGraw. "We have more than adequate capacity, even with all of the growth, and we've been able to drive down the overall landing fees by almost half in the past four years."

Even without CVG's compelling geographic location, other airports interested in similar growth can take crucial steps to become a more attractive cargo partner, says McGraw. "I can't overstate the ability to move quickly," she emphasizes. "Unfortunately, some of my airport colleagues work with constraints that make it take a long time to have decisions made. We are fortunate to have a great board and great elected officials who let us do the work of the airport. We are agile." ✈️

Increased business from DHL helped the airport surpass its previous record for single-month cargo volume.



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Tucson Int'l Brings Friction Testing In-House

BY BRIAN SALGADO



FACTS & FIGURES

Program: Friction Testing/Rubber Removal

Location: Tucson (AZ) Int'l Airport

Purpose: Routine removal of rubber residue on runways to improve aircraft braking & control

Friction Testing Equipment: 2018 NAC-Dynamic Friction Tester, from Neubert Aero Corp.

Price: \$58,000

Comparative Cost for Outside Testing: \$5,400-\$7,200/yr

Rubber Removal: Cyclone Technology

When it comes to runway safety, Tucson International Airport (TUS) isn't waiting for an accident or regulatory sanctions to make improvements. It's acting proactively.

Last fall, the Arizona airport purchased its own continuous friction measuring equipment to enhance operational safety and boost the efficiency of its ongoing rubber removal efforts. If not removed, rubber residue left behind by aircraft tires during landing eventually will impede aircraft braking and control, with potentially catastrophic results.

"We can maintain our runway at a better value for a longer period of time, and more accurately evaluate runway safety conditions," explains Marc Gomez, director of Airside Operations at TUS.

Because the FAA does not actively enforce friction testing rules, many airports do not adhere to the standards until there is an incident that forces the issue, says Tim Neubert, president of the International Friction Pavement Association and president of Neubert Aero Corp., which manufactured TUS' equipment. TUS took the initiative to keep airport users safe on its own accord, he emphasizes.

"This is a federal requirement, but complying is up to you," says Neubert. "Airports like Tucson International are in a leadership position



MARC GOMEZ



TIM NEUBERT



data also tells maintenance crews when it is time to remove rubber residue. Frequency for friction testing is based on the average mix of turbojet aircraft operating on a particular runway, as outlined in FAA AC 150/5320-12C - *Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces*. Testing is also required immediately after rubber removal to evaluate whether friction values have increased accordingly.

“In theory, if a runway is contaminated due to weather or rubber buildup, the airport performs a friction survey and sends data to pilots, who make an assessment about how much braking to apply or how to adjust the aircraft,” says Neubert. “Planes are typically configured to land on dry surfaces, so landing on a wet surface can create a hydroplaning effect, and the tires will lock. This data will help them adjust how much skid resistance to apply on jet braking systems when landing.”

Many airports rely on their rubber removal contractors for friction testing—a practice Neubert and others advise against due to the potential for a conflict of interest. Having the same company test whether its removal services are needed could raise questions about the objectivity of its test results, he explains.

For Neubert, it all comes down to airfield safety. “The No. 1 reason we perform friction testing is to prevent aircraft

using reliable and repeatable equipment to make good decisions when questions about airport runways should be open or closed.”

Regulations are in place to make sure runways are safe for pilots and passengers, but there are no penalties for failing to comply with the regulations, he adds.

By Neubert’s estimation, there are less than 100 pieces of continuous friction measuring equipment at all 2,800 commercial service airports in the United States.

In-house Testing

Previously, TUS cleared its runways of rubber residue three to four times a year based solely on visual inspections and a general sense that it was time for upkeep. “We really could have applied this benefit a couple years ago, but it works out good now,” says Gomez.

The friction tester purchased last fall allows TUS to evaluate the status of runways objectively and eliminates guesswork regarding safety limits, explains Neubert. The unit measures traction on runways and the operator then sends data to the control tower, which then relays it to pilots before they make their final approaches. The



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Tucson Int'l uses a strategic combination of friction testing and rubber removal to enhance airfield safety.



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reopening its main runway after a six-week closure for resurfacing. The recent runway improvements gave officials another reason to invest in equipment to maximize the lifecycle of a key airfield asset, says Gomez.

“Since it’s a brand-new runway, there wasn’t much to do maintenance-wise,” he relates. “But it *is* interesting to see the results after a friction survey—to see where the aircraft touchdowns are and see it on the graphs after that, knowing what gets hit the most. This helps us with scheduling painting.” 

For more information about continuous friction measuring equipment, see Page 66 for our Industry Insider column from John O’Callaghan of the National Safety Transportation Board.

accidents,” he stresses. “That’s why it’s important to have this or another certified unit at every commercial service airport.”

Equipment Details

TUS purchased a standard tow-behind NAC-Dynamic Friction Tester in November 2017 for \$58,000. Company personnel note that it is one of only a handful of friction testing units certified by the FAA for airport use. Choosing a tow-behind unit rather than a dedicated testing vehicle boosts operational flexibility, because vehicle components are more likely to need service than the actual testing equipment, says Neubert.

Now that TUS owns its own friction testing equipment, there is no need to outsource the job to a contractor. At an average cost of \$1,800 per runway, that would have amounted to \$5,400 to \$7,200 per year, reports Neubert. He also estimates the airport has saved hundreds of thousands of dollars in planned but unneeded rubber removal.

Staff members at TUS received two days of training with their new equipment—one day of classroom presentations about friction testing and another day of hands-on sessions to learn about the unit’s specific features. “You need qualified operators trained by the manufacturer for generating and disseminating results to pilots,” says Neubert.

Gomez and his crew took delivery of the new testing equipment just as the airport was

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Oshawa Executive Preps Airfield for Growth

BY BRIAN SALGADO



FACTS & FIGURES

Project: Runway Replacement & Expansion

Location: Oshawa (ON) Executive Airport

Total Cost: \$6 million

Funding: City of Oshawa

General Contractor: Metric Contracting Services Corp.

Runway Design, Project Management & Quality Control: Avia NG Airport Consultants

Project Review & Quality Assurance: Tetra Tech Canada

Engineering: WSP Engineering

Aggregate Suppliers: Dufferin Aggregates; Lafarge Aggregates

Lighting & Signage: ADB/Safegate

Airfield Markings: Airlines Line Painting

Electrical Contractor: Tristar Electric

Material Details: Crews moved 100,000 cubic meters of earth/topsoil, placed & compacted 110,000 metric tons of granular material, paved 14,000 metric tons of asphalt, installed 2,100 linear meters of storm sewers with 49 structures, & upgraded/replaced runway lighting



After a series of surface-level fixes throughout the years, it was high time the runways and related infrastructure at Oshawa Executive Airport (YOO) in Ontario received the upgrades they truly required. The only question for the project team was how to make up for nearly 80 years of patchwork solutions in just 35 days.

“Getting as much done as possible in advance was key,” explains Airport Manager Stephen Wilcox.

The plan was to replace the entire aging runway, all subsurface drainage and lighting/electrical infrastructure, which was also reaching the end of its lifecycle. The original work scope also included new runway end safety areas made out of grass.



STEPHEN WILCOX



Instead, however, YOO chose to pave the safety areas to increase safety in the event that a plane overruns the runway. It also opted to replace two portions of taxiways to avoid future disturbance on the main runway for eventual taxiway renovations. In total, the comprehensive improvements cost \$6 million.

The final work scope called for full-depth excavation of 4,250 feet of runway, including the removal of topsoil and installation of new drains. From there, crews built the runways back up with conventional standards based on pavement loadbearing.

The project also took on the next wave of safety regulations on the horizon from Transport Canada. Whenever an airport

undergoes major reconstruction, it triggers the next highest standard of safety regulations, notes Wilcox. The additional work, in turn, expanded the total amount of paving for the project to 4,750 feet, including taxiways, intersections and the first 250 feet of each threshold runway end safety areas.

In total, general contractor Metric Contracting Services Corp. moved about 100,000 cubic meters of earth/topsoil, placed and compacted 110,000 metric tons of new granular material, paved 14,000 metric tons of asphalt, installed 2,100 linear meters of storm sewers with 49 structures, and completely upgraded and replaced the existing runway lighting.



Crews moved about 100,000 cubic meters of earth/topsoil and placed 110,000 metric tons of new granular material.

Planning Stages

There was no question the vast runway reconstruction project was required; it was more a matter of finding the best way to execute it, explains Wilcox. Basically, the airport had two options:

- 1) suspend evening flights for crews to dig up/repave sections of 100 to 200 feet over multiple nights and shut down around-the-clock for two weeks during construction on the intersection of the “X” runways; or
- 2) shut down completely and work 24/7 to get the job done in 35 days

Stakeholders realized the second option made the most sense, even if it would be a difficult pill to swallow, businesswise. YOO logs 70,000 movements annually, including 5,000 corporate flights, and is home for two flight training schools and various recreational pilots.

The impending closure of a nearby general aviation airport also steered YOO management toward the more expedient Option 2. Traffic at YOO was expected to jump by more than 30,000 annual aircraft movements when Buttonville Municipal Airport (YKZ) closed in fall 2017. As it turned out, YKZ remained open longer than originally anticipated; but YOO stands ready to accommodate its traffic. Local news media report that YKZ is now scheduled to remain open through spring 2023.



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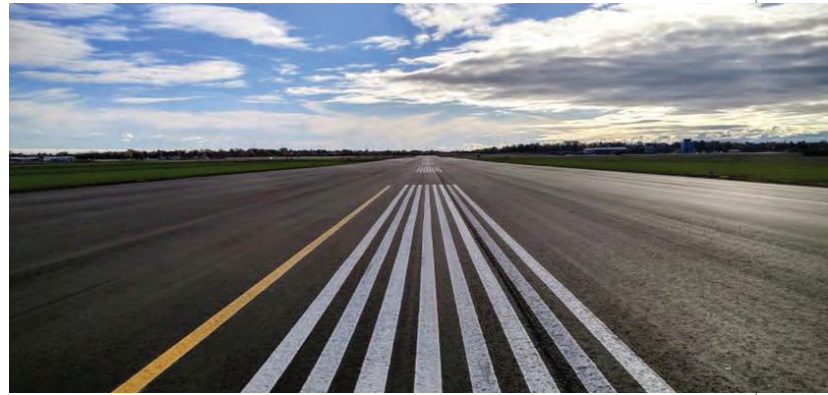
The 35-Day Plan

In order to make sure the project was completed on time, the team focused on staying ahead of schedule. One major milestone was stockpiling and staging 48,000 metric tons of granular material and managing the equipment and trucks to pull that off.

“We didn’t just decide to make a plan six months before the project started,” Wilcox recalls. “Once we awarded the contract, early in the process we started discussing construction timing and what they could do to mitigate the time for us.”

Early in the planning stages, airport personnel conducted a thorough analysis of historical weather data to determine the best time of year for airfield construction. The ideal window was August, because it is typically the driest part of the year. But August is also the busiest for the airport; so YOO elected to break ground in September.

Wilcox acknowledges that even September is a busy time of year for airport traffic, but the job couldn’t be pushed to October out of concerns for inclement weather and freezing ground conditions. Spring was out of the question due to the likelihood of rain that would saturate the ground.



Metric Contracting dedicated extra resources and worked crews in 12-hour shifts to meet YOO’s tight deadline. “We basically brought the right tools to do the job,” explains Marco Parmegiani, district manager for the company. He notes that Metric could have had crews working 24 hours by including weekends, but 12-hour stints gave the team some margin for error in case things went awry.



MARCO PARMEGIANI

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Working Ahead

Wilcox and his team also identified components of the project that could be accomplished well ahead of groundbreaking without impacting airport operations. For example, in order to build the paved runway safety areas, crews had to move the 100-year flood plain basin. Wilcox likens relocating the 50-foot-deep, 75-foot-wide ditch to moving a river. Getting this complex task out of the way early helped the rest of the schedule, explains Wilcox.

The airport also had to move fencing surrounding the perimeter of the property to make way for construction work.

During the design phase, project planners intended to have crews remove all runway soils offsite. However, workers were able to separate the materials and use some to fill in the flood basin.


Excavated materials were also used to create a large earth berm. Airport users are sensitive to the noise they create and want to be respectful of their neighbors, explains Wilcox. With that in mind, YOO has built a total of four earthen berms to mitigate ground noise associated with aircraft activity. The new sound barrier is 3/4-mile long and runs parallel with houses that back onto the airport.

Unforeseen Challenges

Any time there is massive construction on a 77-year-old jobsite, there are bound to be surprises beneath the surface. At YOO, crews encountered unexpected infrastructure during the excavation process.

Crews discovered drainage pipes and asphalt that were put in place but never commissioned under the taxiway tie-in, just beneath the current asphalt. As far as Wilcox could tell, the pipes were laid in 1997 when the airport built the taxiway, and crews misjudged the grading. Instead of rectifying the mistake, workers apparently built on top of the grade as it was.

“It was literally brand new, just 2 feet underground, in the area of the storm sewer, built exactly to spec,” Wilcox relates.

Crews also discovered soft subgrade, but wet soil conditions were dealt with efficiently and expediently and thus proved to be a minor issue. Metric simply let the problem areas dry naturally, and the project carried on with minimal delays and added costs. 

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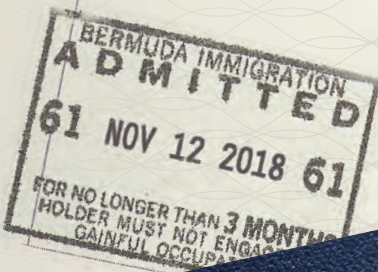
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John Wayne Airport Boosts Airfield Safety With Rubber Removal & Ground Vehicle Signage

BY THOMAS J. SMITH



FACTS&FIGURES

Project: Enhancing Airfield Safety

Location: John Wayne Airport—Santa Ana, CA

Airport Owner/Operator: County of Orange

Illuminated Vehicle Signage: AirEL

Cost: \$1,000/vehicle

Rubber Removal: Surface Prep & Maintenance

Frequency: Every 4 months

With a single runway handling 10.5 million passengers annually, John Wayne Airport (SNA) relies on safe nighttime operations to maintain its carefully orchestrated traffic schedule.

Located in bustling Orange County, California, SNA is subject to community-imposed noise restrictions that limit commercial traffic to no more than 10.8 million passengers per year through the end of 2020. In addition, its control tower operates from 6:15 a.m. to 11:15 p.m., and the allowable overnight noise level is capped at 86 decibels.

As a result, the county-owned airport conducts almost all of its airfield pavement maintenance at night, when only low-noise general aviation aircraft are allowed to operate.

“Other airports don’t have to do maintenance work at night, but we don’t have other options,” explains Maintenance Supervisor Martin Ness.



MARTIN NESS

Every four months, an outside contractor comes in to remove rubber buildup from 125,000 square feet of the 5,700-foot runway. The runway is closed to all traffic for

three nights while a lone equipment operator works from 11:15 p.m. to 5:30 a.m.

“We scope the runway and take friction readings to determine what areas need the most work,” notes Ness.

The contractor, Nevada-based Surface Prep and Maintenance, uses a single rig equipped with high-pressure water sprayers and two cyclonic brush heads. Built-in vacuums collect the water and small rubber pieces it loosens. The debris is separated out for recycling, and the water, once tested as safe, is released into the sanitary sewer.

SNA maintenance crews then repaint the clean centerlines over the course of two to three nights. All of the airfield’s white lines are repainted once a year—and the work always occurs at night, notes Ness.

Lighting up the Night

In 2015, SNA took an additional step to improve safety for Operations staff driving on its dark runway by increasing the visibility of on-field operations vehicles with illuminated identification numbers. The new vehicle markings use electroluminescent technology to light up, and are designed to be seen from 700 to 1,000 feet away. It costs the airport about \$1,000 to equip each car with the new illuminated numbers.



More Uses for Illuminated Vehicle Markings

When John Wayne Airport (SNA) added illuminated identification numbers to all of its Operations vehicles, it may have started a trend. Long Beach Airport (LGB), in Los Angeles County, now uses the same product, and four other U.S. airports are currently testing it for potential use on their airfields.

AirEL, which developed and patented the use of electroluminescent technology to illuminate markings, has sold about 500 sets in the last three years.

The company tested its illuminated signage at the FAA test facility in Atlantic City. R.J. Garwood, the company's senior vice president of sales, reports that the agency is incorporating AirEL's specifications into suggested revisions as it revamps advisory guidelines on airport signage.

"It is one more layer of safety. We are all responsible to know where vehicles are on the airfield," says Garwood, noting that there are no similar products on the market.

Officials at LGB opted to place the illuminated numbers on the rooftops of airport security vehicles. The airport security division is part of the Long Beach city police force, which also uses the illuminated numbers on cars used by supervisors and gang units.

Dallas-Fort Worth International Airport (DFW) is testing the illuminated signage on top of airport police vehicles and the sides of airport operation trucks. Reno-Tahoe International Airport (RNO) and Minneapolis-St. Paul International Airport (MSP) are testing the illuminated signs on snow removal equipment.



R.J. GARWOOD

"We did not do this in response to a close call," specifies Jeff Rountree, airside operations manager. "We did this as an enhancement."

The illuminated signage, manufactured by AirEL, was originally developed for police operations, so squad cars could easily be identified at night. When SNA tested the product for airport application, personnel in the control tower were notably enthusiastic. According to AirEL personnel, the specific response was, "Holy cow—that's fantastic!"

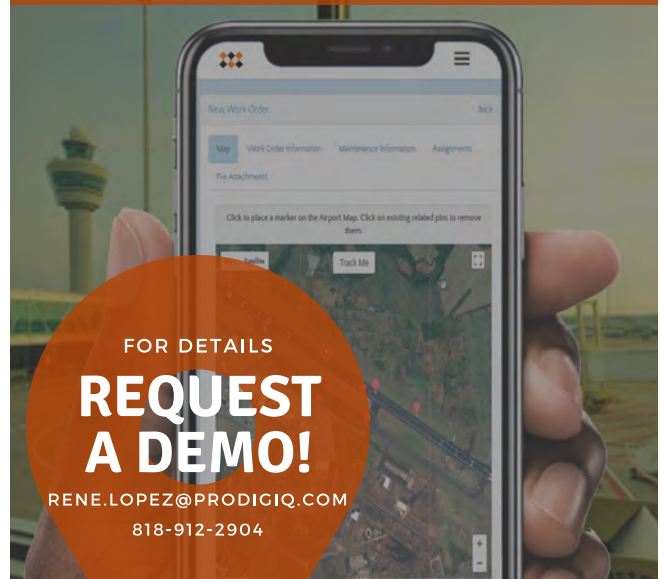
SNA and AirEL initially tested the illuminated numbers on the side of an aircraft rescue and firefighting (ARFF) truck. When the vehicle reached the end of the runway and turned back toward the tower, the illuminated numbers immediately popped out from the rest of the field, recalls R.J. Garwood, AirEL's senior vice president of sales and a full-time police officer and helicopter pilot in Orange County.

But instead of putting the new numbers on its ARFF vehicles, the airport applied them to airfield operation vehicles.



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“The airfield is not that large; everything is one-half to three-quarters of a mile from the tower. The ARFF vehicles are large, bright and have lots of flashing lights, so they don’t need the additional illumination,” Rountree explains.

Conversely, the Operations vehicles weren’t as readily identifiable; yet they are on the airfield more often. “We wanted a look to set us apart,” says Rountree. “We wanted to be more distinctive, and now we are more identifiable.”

In 2015, the airport began replacing its fleet of older Ops vehicles with five Ford Explorers equipped with the “Police Interceptor Package,” which includes light bars and high-performance engines. It also added distinctive wrap, logos and illuminated numbers to the side of each car.

The new vehicles are also equipped with Whelen “Liberty” LED light bars, Rountree adds. The light bars have flashing amber lights and bright white forward-facing spotlights to better illuminate runways and taxiways during daily nighttime and early morning airfield inspections.

SNA decided not to add the illuminated numbers to its police cars, since these vehicles seldom go onto the movement areas of the airfield. The Maintenance Department also decided it did



New illuminated vehicle numbers are designed to be visible from 700 to 1,000 feet away.

not need the AirEL product, since its vehicles enter the airfield only at night when the runways are closed.

The maintenance fleet includes 15 to 20 pieces of equipment, but only three regularly go onto the airfield. ✈️

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Just How “Slippery When Wet?”

 If you’ve developed a personal relationship with the National Transportation Safety Board (NTSB), chances are you’ve had a bad day. Thankfully, for most in the aviation industry, the work of the NTSB will remain something they read about and benefit from, but have no occasion to observe first-hand. Nonetheless, many do become personally acquainted with the agency; airport operators often get their chance as the result of a runway overrun.

Poor runway friction can contribute to runway overruns, and while it is well known that friction will deteriorate with the accumulation of frozen contaminants (ice, snow, slush), one might be surprised by how much more slippery a runway can become even if it is merely wet. NTSB investigations of several wet-runway overruns indicate that the runway friction in each case was significantly worse than that predicted by industry models. The investigations also indicate that Continuous Friction Measuring Equipment (CFME) devices can help identify slippery-when-wet runways, and even be used to predict aircraft stopping distances on wet runways.

The 2015 FAA Safety Alert for Operators (SAFO) 15009 summarizes the wet-runway friction problem, noting that overrun events “occurred on both grooved and ungrooved or non-Porous Friction Course overlay (PFC) runways,” and that “applying a 15% safety margin to wet runway time-of-arrival advisory data, as recommended by SAFO 06012, may be inadequate in certain wet runway conditions.” The SAFO states that “the root cause of the wet runway stopping performance shortfall is not fully understood at this time; however issues that appear to be contributors



JOHN O'CALLAGHAN


John O'Callaghan serves as the NTSB's National Resource Specialist for Aircraft Performance. He came to the agency in 1997 after six years as a stability and control engineer with a major aircraft manufacturer.

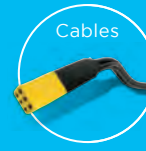
are runway conditions such as texture (polished or rubber contaminated surfaces), drainage, puddling in wheel tracks and active precipitation. Analysis of this data indicates that 30% to 40% of additional stopping distance may be required in certain cases where the runway is very wet, but not flooded.” The SAFO encourages aircraft operators to “consider additional conservatism in their time-of-arrival assessment,” such as “assuming a braking action of medium or fair when computing time-of-arrival landing performance or increasing the factor applied to the wet runway time-of-arrival landing performance data.”

SAFO 16009, issued in October 2016, implemented the use of the Runway Condition Assessment Matrix (RCAM). The RCAM is “used by airport operators to perform assessments of runway conditions and by pilots to interpret reported runway conditions...the RCAM replaces subjective judgments of runway surface conditions with objective assessments tied directly to contaminant type and depth categories.” The RCAM provides two codes for classifying wet (but not flooded) runways: code 5, corresponding to “Wet (Includes damp and 1/8-inch depth or less of water)” and equivalent to a pilot reported braking action of “good,” and code 3, corresponding to “Slippery When Wet (wet runway),” equivalent to a pilot report

of “medium.” There is no mechanism in the RCAM for a wet runway to be classified as code 4, equivalent to a pilot report of “good to medium” braking action, even though wet runways may in fact perform in this range.

According to AC 150/5200-28F, to be classified as RCAM code 3 “Slippery When Wet,” a runway must be surveyed with CFME and “[fail] to meet the minimum friction level classification specified in AC 150/5320-12.” Consequently, if airport personnel do not have access to CFME, they will not be able to determine (except by pilot reports) that their runways should be classified as RCAM code 3 instead of code 5 when they are wet. By default, RCAM code 5 will be reported in wet conditions, even though the runways may perform below that level.

The NTSB’s analyses of wet-runway overrun events and wet-runway friction research indicate that CFME devices can also be used to determine airplane stopping distances on wet runways more reliably than other friction models (for the technical details, see <https://dms.nts.gov/public/52500-52999/52556/618065.pdf>). Monitoring the friction levels of runways with CFME may help airport operators issue more accurate RCAM reports, and perhaps forestall a visit from the NTSB. 



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