THE CASE FOR EMAS

Improving the Outcome of a Runway Overrun

A growing number of airports are turning to an innovative solution to increase safety, while maintaining existing runway lengths. Engineered materials arresting systems (EMAS) may drastically reduce the risk to aircraft passengers, and those on the ground. With EMAS, the landing gear for an aircraft involved in a runway overrun simply sinks into a bed of crushable concrete blocks at the runway's end. The crushing motion slows the aircraft, and in many cases, completely stops it.

Though the need for EMAS isn't frequent, business aviation operators and airports involved in some recent runway overrun accidents have found it's a nice safety net to have.

Peter Horton, airport manager at Florida's Key West International Airport (EYW), touts his airport as the poster child for the benefits of having an engineered materials arresting system (EMAS) at the end of runways. Even though the odds of having a runway overrun accident are miniscule, Key West was the site of not one, but two, major runway excursions over a four-day period in the fall of 2011. "The chances are one in a million, but we had two in a week," said Horton.

What's more, the EYW overruns were at opposite ends of the airport's single 4,800-foot runway, with the contrasting outcomes clearly demonstrating the value of an EMAS.

On October 31, 2011, a Gulfstream 150 sustained significant damage, and three passengers suffered injuries, when the aircraft overran Runway 27, skidded through an unpaved safety area and came to rest just shy of a large area of trees. The accident received significant media coverage because NASCAR team owner Rick Hendrick and his wife, Linda, were passengers in the G150, which was owned by NASCAR driver Jimmie Johnson.

Four days later, on November 3, 2011, a Cessna Citation 550 went off the east end of Runway 9, crossed the 35-foot paved blast deflector area at the runway's end and was completely arrested 148 feet into the EMAS that had been added to that runway end just about a year earlier. According to Horton, the Citation sustained only minimal damage and the passengers quickly exited the aircraft "without a bruise or a scratch." Without the EMAS, the incident may have had a markedly worse outcome.

SOME FACTS ABOUT EMAS

Currently, 68 EMAS systems are installed at airports around the world (8 to 12 more are in development), with the vast majority of them in the United States. The installations, constructed by the only FAA-approved supplier, Engineered Arresting Systems Corporation (ESCO), range from large Part 139 airports such as Kennedy (JFK) and O'Hare (ORD) to some solely general aviation airports such as Teterboro Airport (TEB) in New Jersey and Greenville Downtown Airport (GMU) in South Carolina.

EMAS is essentially a concrete bed of increasing depth that contains several thousand blocks of crushable, cellular cement material that quickly decelerates an aircraft in an emergency overrun. According to Mark Slimko, business development leader at ESCO, EMAS beds at general aviation airports typically vary in size from about 200 to 400 feet long – although some can be as short as 150 feet – after placing the first row of EMAS blocks a minimum 35 feet past the runway's end. "There are three different strengths of material density," said Slimko. "We use the proper blocks based on the fleet mix at the airport."

According to Slimko, in order to meet FAA specifications, most EMAS installations are designed to arrest an aircraft exiting the runway at a speed of 70 knots with little to no structural damage to the aircraft. After an EMAS arrestment, only the damaged blocks need to be replaced, cutting down repair costs dramatically. Maintenance of an EMAS bed is relatively simple, although airport personnel must be trained properly and instructed to never drive a vehicle on the EMAS surface, which could damage the blocks. Excessive snow should be removed from the bed, and weekly inspections are encouraged.

EMAS is suited for airports that don't have adequate space to meet the required dimensions set forth in FAA AC 150/5300-13, Airport Design, and FAA Order 5200.8 for a runway safety area (RSA), typically 1,000 feet long by 500 feet wide at Part 139 airports. Other options include displacing the runway threshold or imposing declared distances; however, those have other negative impacts on aircraft operations where they are used. According

Paying for an EMAS Arrestment

Insurance experts, airport operators, aircraft owners and manufacturers are still working out the intricacies of settling who pays for what in the aftermath of an EMAS arrestment, given how recent the technology is and the relatively few incidents there have been. "It's a great new technology, but it certainly isn't free," noted Timothy McSwain, chief claims officer at Allianz Global Corporate & Specialty and a member of NBAA's Aviation Insurance Committee. According to McSwain, all EMAS repairs to date have been paid for, after determination of who was liable.

For the most part, aviation experts agree that the airport's insurance is the primary one when it comes to EMAS repair, with the aircraft owner's insurance often paying any balance. Whether EMAS is considered insured as airport property, or as an emergency service, however, "is still a question in my mind," said McSwain.

Another concern, according to McSwain, is the EMAS material itself, which can get ingested by the aircraft engines and require extensive repair and recertification.

Ultimately, however, aviation insurers and industry experts agree that the negatives to an EMAS arrestment are far outweighed by its prevention of possibly a far more serious accident.

Photos courtesy of Greenville Downtown Airport (GMU)

to NBAA Director, Airports & Ground Infrastructure Jeff Gilley, installing an EMAS is the most desirable solution at business aviation airports – if funding is available – because it can be built in existing runway areas, thereby having minimal environmental and operational impact.

HOW AIRPORTS BENEFIT FROM EMAS

At Key West, where airport manager Horton still had to spend years getting environmental assessments and approvals done, installing the EMAS impacted the surrounding salt ponds and mangroves far less than building a 1,000 foot RSA would have.

In addition, many airports – general aviation included – do or would benefit from the protection that an EMAS bed gives against runway overruns into obstacles such as buildings, roads, rivers, steep embankments and the like. A Gulfstream IV overrun at Teterboro in October 2010 was arrested by an EMAS just 300 feet from Route 46, a busy six-lane highway.

Another well-publicized EMAS save was made at Charleston, WV (CRW) in January 2010. A PSA Airlines CRJ-200 with 31 passengers and three crew on board was prevented from plunging down a steep mountainside – due to an aborted takeoff on Runway 23 – by an EMAS at the end of the runway. No one was injured, and the airport was able to reopen a mere five-and-a-half hours later, after the aircraft had been pulled out of the EMAS bed and moved elsewhere on the airport.

Funding for an EMAS has traditionally come from FAA's Airport Improvement Program, which in the past has typically paid for 90 or 95 percent of the cost, with the balance usually paid for by the airport from its own revenues. At Greenville Downtown Airport in South Carolina, long-time airport director Joe Frasher was able to get the state to pay for half of the 10 percent cost for GMU's EMAS that the FAA did not fund (GMU paid for the other 5 percent).

GMU was the first general aviation airport in the nation to get an EMAS back in 2003. "Our EMAS cost a total of $1.8 million, including the design, fill, engineering and EMAS itself," said Frasher. "Otherwise, it would have cost us $15 to 16 million to fill the huge drop-off that we had at the end of Runway 1." Frasher has even been able to secure AIP funding to retrofit the tops of GMU's EMAS blocks with ESCO's newer, more durable plastic lids that, according to Frasher, are much easier to maintain than the older version.

GMU, the busiest general aviation airport in the state, has already seen the benefits of its EMAS. In July 2006, the brakes on a landing Falcon 900 malfunctioned, and the aircraft overran Runway 1 but was then successfully arrested by the EMAS. The $20 million aircraft sustained no damage except for a scratch on the exit door, and the owner was so grateful at the outcome that he paid for the entire $174,110.10 bill to repair the EMAS.

FUNDING CHALLENGES

Unfortunately, obtaining FAA funding for EMAS installations at general aviation airports has gotten more difficult in recent years, especially with continual FAA reauthorization challenges. Dennis Rouleau, airport manager at busy reliever Chicago Executive Airport (PWK), is hopeful that now with FAA funding set through 2015, his airport may be able to obtain $6 million in FAA funding it needs to build an EMAS at the end of Runway 34. The FAA-approved RSA determination also proposes an EMAS at the other end, Runway 16, but because of the cost, the projects will have to be phased in.

Rouleau noted that PWK gets only $150,000 in FAA entitlement funding, but the airport has already done most of the EMAS design work and has obtained FAA environmental and airspace approval for the installation. "EMAS is a system that would improve the overall safety of our busy business aviation airport," said Rouleau. Pending funding, "we are ready to go," he said.

According to NBAA's Gilley, "existing EMAS installations and those planned for future establishment at airports, where they are needed, will greatly improve safety; certainly the safety benefits will far outweigh the costs. We look forward to working with airport operators, FAA, and airport users in these endeavors."

FOR MORE INFORMATION

Learn more about runway safety issues at www.nbaa.org/safety.

ABOUT NBAA

Founded in 1947, the National Business Aviation Association (NBAA) is the leading organization for companies that rely on general aviation aircraft to help make their businesses more efficient, productive and successful.

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