



Expeditionary Airfields

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***CARVING LANDING AREAS OUT, SOMETIMES IN HARSH TERRAIN,
REQUIRES A SKILLED HAND AND THE RIGHT TOOLS.***

The current expeditionary posture of the United States armed forces requires the agility and flexibility to land forces, equipment and supplies at forward locations expeditiously. During the Cold War, the U.S. military prepositioned forces and materiel six months or a year in advance. Today's commanders need to deploy forces to hot spots within a matter of days. They work on timelines measured in hours instead of days or weeks.

These requirements suggest the capability to quickly stand up functioning airfields in forward areas of operation. Warfighters must prepare the ground for runways and landing zones, and be prepared with lighting and air traffic control systems. Private industry is supplying the armed forces with a variety of materials designed to transform rugged landscapes into suitable airfields,

as well as with portable equipment to allow them to function properly.

Fixed wing and rotary wing aircraft each have their requirements for suitable materials for landing zones at forward airfields. Fixed wing aircraft require materials that are heat- and skid-resistant, among other attributes. Landing pads for rotary wing aircraft must be able to cope with the phenomenon of brownout.

Brownouts occur when dust and foreign object debris is thrown up by the helicopter rotor down wash, and can blind pilots, erode helicopter rotor blades, and affect helicopters' engines, filters and electronic equipment. Experts estimate that three of four helicopter accidents in Southwest Asia have been caused by brownouts.

A variety of materials and methodologies are available to alleviate these hazardous conditions. Matting material can be placed on the ground to prevent the updraft of dust and debris, and the soil can be prepared with chemicals and other materials to reduce dust and strengthen its engineering properties.

To date, the workhorse of matting materials has been AM2, an aluminum extrusion product that has been around since the 1960s, and which has been used to accommodate the more stringent requirements of fixed wing aircraft landing strips, as well as for rotary wing landing pads.

Alfab Inc., a company based in Enterprise, Ala., is a principal supplier of landing mat portable runway systems to the U.S. military. "Over 20 million pounds of landing mat have been produced by Alfab Inc. since 1971," said Neal Brown, the company's executive vice president. "Landing mats can be conveniently transported to remote locations where they can be rapidly laid over most existing subgrades with very little preparation. The mats are completely interchangeable, thus providing a complete airfield."

Despite its long and successful service, the U.S. military is looking to replace AM2, primarily in order to reduce the weight of matting materials. The Naval Air Warfare Center Aircraft Division Lakehurst, which released a request for information seeking alternative sources of light-duty mat, noted that "the substantial weight and cube embarkation profile of this system is slowly reducing the operational capability and feasibility of deploying this system for all applications."

The U.S. Army Engineer Research and Development Center (ERDC) has been conducting research on lighter AM2 replacements. ERDC is looking to reduce the weight of the mats by at least 40 percent.

"We are involved in these activities," said Brown. "An aluminum honeycomb matting system for lighter weight is being tested. This is an ongoing project to refine and improve the product."

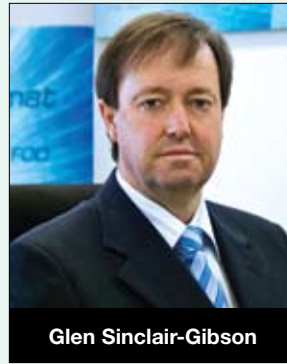
"It won't ever be as strong as AM2," Brown added, "but will be at least half the weight and can be used for many other applications, such as temporary flooring and helipads, where heavy duty materials are not required."

There are a number of other matting products currently on the market and in use by various U.S. military branches. Mobi-Mats, marketed by Deschamps Mat Systems Inc. of Little Falls, N.J., were originally developed in France and were evaluated for U.S. use by the Pentagon's Office of Advanced Systems and Concepts in 2002. The U.S. Marine Corps were the first to buy it, and it has since been used by the Army's 101st Airborne Division, the 10th Mountain Division and others.

"With the increase number of troops in Afghanistan, the Department of Defense has procured large quantities of our Mobi-Mat helipads in order to conduct their operations," said Alex Hamon, Deschamps' defense sales manager.

Mobi-Mat was used for two forward air refueling position (FARPs) during Operation Eastern Resolve in Afghanistan in April 2009. The 3rd battalion, 8th Marines also used the material at a forward operation base in Helmand province, Afghanistan, according to Hamon.

"The Mobi-Mat helipads are used to reduce brownouts and build forward operating bases, enabling helicopters to operate closer to the battlefield," said Hamon. "This capability shortens the force's response time and provides the warfighter increased flexibility for landing zones and medical evacuations."



Glen Sinclair-Gibson

The Mobi-Mat is a light tri-dimensional polyester mesh that comes in 13-foot 11-inch by 33-foot rolls, weighing 176 pounds. Two men can transport the roll and three can unload, unroll, connect and stake it down.

"The Mobi-Mat installation rate is a minimum of 10,000 square feet per hour for a 16-man team on an eight-hour shift, using only common handheld or powered tools,"

said Hamon, and the same goes for its removal rate. "The Mobi-Mat system has the ability to accomplish this process of installation, removal and re-installation a minimum of three times in any 12-hour period, including all applicable anchoring installation and removal iterations."

CGear, a company based in Port Melbourne, Australia, provides a lightweight flooring comprised of two layers of woven polyethylene mesh sewn together, with reinforced binding at the edges. The product, known as CGear Tactical Helimat, is designed to be used on ground that is relatively flat, said the company's chief executive officer Glen Sinclair-Gibson.

The CGear Tactical Helimat includes multi-layered, open-weave polyethylene mesh that prevents brownout by inhibiting the sand and dust underneath the mat from coming back up even when being pounded by a powerful rotor down wash.

"The product was originally designed as a beach mat," explained Sinclair-Gibson. "The holes in the polyethylene mesh are very fine, allowing sand to fall through them, but at the same time preventing the sand from coming back up."

The size of each segment is 20 feet by 20 feet. Sizing of the landing pad depends on the rotor span of each particular helicopter, with dimensions of the helipad approximating 33 feet wider than rotor span in all directions. The 100 foot by 100 foot helipad configured with 25 segments, suitable for a Black Hawk, Huey or Super Puma, can be contained in less than 211 cubic feet. A Chinook would require a configuration of 6 by 6 Helimat segments, or 120 feet by 120 feet.

The shape of the CGear Tactical helipad can be customized to suit individual requirements, said Sinclair-Gibson, and it can be quickly and easily moved from one task to another. It can be packed up and deployed at FARPs, increasing helicopter time over target. The fabric's weave technology prevents it from tearing or fraying and it is impervious to petrochemicals.

The CGear Tactical Helimat has been extensively tested by the U.S. Marine Corps and other military organizations, according to Sinclair-Gibson. "In U.S. Marine Corps trials at Navair Lakehurst airbase, the CGear Tactical Helimat stood fast, even when the Marines attempted to lift and rip apart CGear's joining and anchoring systems using a Huey, a Black Hawk and a Super Stallion helicopter," he said. "There was no risk of the Helimat being sucked up and tangled in the rotors when correctly installed." Testing of the Tactical Helimat in Abu Dhabi in November 2007, using a Chinook helicopter confirmed that the product eliminates brownout and FOD.

The Marine Corps and has awarded CGear two contracts since 2005 to deliver a total of two million square feet of the product.

In conjunction with the Marines Corps, CGear recently developed a night vision version of the product. "The night vision enhancement comprises of a light colored main material bordered by a dark green one foot band, which is made from the same mesh material," said Sinclair-Gibson. "When this is stitched in place it provides for a 12 inch contrasting border on all four sides of the mat or segment. The deployment of the standard 100 foot configuration provides the pilot with a contrasting border pattern, which allows the pilot an indication of approach angle and speed, as well as some perspective of distance from the landing zone."

Soil stabilization products improve the properties of soil by increasing its strength to make it amenable for aircraft landing. The materials maintain compaction and prevent the erosion of soil by retaining sediment, reducing permeability and limiting dust emissions. These products are sometimes used by themselves but also in conjunction with matting materials. There are numerous commercial products used for stabilizing soils.

ESSI, a company based in Costa Mesa, Calif., markets a product called DustLess, an environmentally-friendly organic, medium- to long-term dust suppressant. "It is designed specifically for areas where the surface will be continually disturbed," said N. Stephen Van Valkenburgh, the company's chief executive officer. "DustLess doesn't require water to be added, it doesn't evaporate, and it doesn't wash away. It can withstand temperatures of below zero and above 150 degrees. It is designed for use in the desert."

DustLess has been used by the U.S. military throughout the Middle East as well as domestically, at installations such as the White Sands Missile Range and Fort Bliss in New Mexico, Fort Carson, Colo., and others. "What the military has found," said Van Valkenburgh, "is that using DustLess allows them in a short period of time to set up and build a mobile camp." DustLess has also been used in conjunction with matting materials, Van Valkenburgh added.

Environmental Products & Applications Inc., a company based in Palm Desert, Cal., has been supplying the U.S. military with its Envirotac II soil stabilization product for a number of years. Dubbed "Rhino Snot" by the Marines who used the product at Camp Rhino, the first U.S. land base established in Afghanistan during Operation Enduring Freedom, the material is a vinyl acrylic polymer that comes in a thick liquid state.

"We first introduced Rhino Snot in Yuma, Ariz., where it was applied over the proving grounds for soil stabilization so that



This MV-22 landing clearly illustrates the operational environment typical in Iraq and Afghanistan and the need to prepare landing sites as much as possible. [Photo courtesy of the U.S. Marine Corps. Photo by Lance Cpl. Justin Loya]



airplanes such as Harriers and helicopters could land dust free over sandy areas," explained Justin Vermillion, a company vice president.

Rhino Snot mixes with water and sprays over a surface to bond particles together. "It has been used for many things, such as runways and roads to keep the dust down," said Vermillion. "It has also been used on base, even at the canteen so that blowing dust doesn't give away the position."

Once applied, the material lasts for 12 to 18 months and it is "100 percent environmentally safe," said Vermillion. Environmental Products & Applications has sold the product to all branches of the armed services.

Expeditionary airfields require easily transportable lighting to illuminate runways and landing zones. Cejay Engineering, a company based in Bonita Springs, Fla., has developed a product called CIRLS, a rugged beacon system engineered to meet the needs of drop zone and emergency airfield marking requirements.

"Each CIRLS light head includes an 18-LED [light emitting diode] array in a domed head," explained Steve Bronson, the company's director of business development. "The dome is filled with a proprietary resin that enhances the LED's light dispersion while sealing the electronic components from the environment."

CIRLS is available in a model equipped with a daylight sensor switch so the light will switch itself off automatically during the day. The product is also available in infrared so that it can be discerned with night vision equipment. CIRLS usually is provided in units that include ten lighting domes and 9-volt batteries in a kit which weighs 10 pounds and can be fitted in a backpack. The CIRLS system is currently utilized by United States Army and Air Force as well as by NATO.

Tektite Industries Inc. of Trenton, N.J., markets landing zone marking kits that utilize strobe lighting instead of LEDs. The company's Emergency Landing Zone (ELZ) Strobe Kit has been used by the U.S. armed forces in Iraq and Afghanistan as well as in other locations.

"The LED is a solid state device that is very directional," said Scott Mele, Tektite's president. "To get good 360-degree coverage

you need to make an array. A strobe is basically a camera flash pumped up to a higher energy pulse and can be visible from miles away. LEDs are visible from less than two miles.”

Each of Tektite’s ELZ strobe kits includes a rugged case, five strobes with bases, instruction manual and safety guides. The strobes are equipped with spring-loaded weighted bases to keep the lights upright in high winds and rotor wash.

“The kit is quite robust,” said Mele. “We built these products to take a beating, to be tripped over and run over. The parts are over-engineered and are kept as simple as possible to service. Everything in the kit is modular.”

Tektite first sold the kits to the U.S. Navy in 1998. In 2003, it was awarded a contract by the General Services Administration. The company also has a multiyear contract to supply the kits with the Defense Logistics Agency.

Expeditionary airfields require some sort of air traffic control system for the safety of aviators and ground crews. ANPC, a company headquartered in Hood River, Ore., provides a transportable transponder landing system that was originally developed at Lockheed Martin Skunk Works with a grant from the Defense Advanced Research Projects Agency. The system has been sold to the Spanish and Australian air forces and has been tested by the U.S. Marine Corps and Air Force.

The Air Force is expected to release a request for proposal for a deployable instrument landing system later this year, according to Jeff Mains, ANPC’s CEO, and the company will be bidding for that

contract. “Our system meets all of the Air Force’s requirements,” he said.

“This is by far the most portable piece of equipment of its type,” he added. “It takes up no more than two pallet positions on a C-130. Three men can site, install, survey, calibrate and operate the system from expeditionary airfields.”

The system, which is self-contained on a trailer, tracks aircraft by way of triangulation. “It is meant to work anywhere, any time,” said Mains. “It is ideally suited to expeditionary operations.”

The system determines the location of the aircraft by interrogating the aircraft transponder and then resolves the transponder’s location in azimuth, elevation angle and range, from measurements provided from two angle-of-arrival sensors. The system can also provide guidance to a tracked aircraft in two modes. The first enables the controller to complete conventional ground controlled approach, while the second emulates an instrument landing system approach.

“The system also supports approaches for rotary aircraft if for tactical reasons they need to avoid enemy fire,” said Mains. “There is a lot of flexibility based on mission requirements enabling warfighters to come back safely in any weather.” ★

For more information, contact *SOTECH* Editor Jeff McCaughan at jeffm@kmimediagroup.com or search our online archives for related stories at www.SOTECH-kmi.com.

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