

Subject: Operation Brownout – the helipad demonstration and testing of various matting materials at Fort Campbell, KY.

1. The undersigned, including Tim McCaffery and Gary Dill, were at Fort Campbell from 4/2 to 4/5/02 for the above demonstration. Other personnel involved were: LTC Peter Deluca (Commander, 326th En BN); CPT Michael Holm (326th En BN, Air Assault – Light Equipment); Arthur Claridge (CTR, General Technical Services, Natick, MA), Richard Dickman (CTR-MSBL-Fort Leonard Wood, MO), Kenneth Light (DOI-Fort Leonard Wood, MO), David Light (GFI INC.; MP Mat fabricator), Don Couvillon, Kristin Brach, and Scott Rogers (Representatives for SOLOCO, Inc. and DURA-BASE), Brian Coupe, Gauelle Stuit, Georges-Paul Deschamps (Representatives for DESCHAMPS and Mobi-Mat), Steve Miller (U.S. Sales Representative for ROLA-TRAK), 159th Av. BDE and 101st Av BDE. The matting demonstration took place at landing zone (LZ) Aardvark. This LZ is a dirt strip that was initially very muddy and contained some soft rutted areas. By the time the demonstration occurred the surface was relatively dry, with generally only minor depressions and ruts. There were 4 different types of matting systems demonstrated in the project. These were Mobi-Mat (French), SUPA-Trac (British), DURA-BASE (Lafayette, LA) and Fiberglass, Multi-Purpose (MP) matting (Harrison, AR, matting we bought). The overseas fabricators have American distributors. An owner or representative that gave information and assisted in the training of troops in the placement and removal of the matting represented each material. We (mainly Carroll Smith) provided assistance for the MP matting. Captain Holm was in charge of the demonstration. Their main interest was to locate a material suitable for expedient helipad construction – particularly reducing the amount of dust generated; hence the name Operation Brownout. For ERDC-WES, the information obtained will be useful towards providing functional information/products for the Joint Rapid Airfield Construction Program.

2. On Tuesday, we observed the test site, took some DCP readings, and listened to presentations from each manufacturer about their product. We, along with Dave Heim (MP mat manufacturer), gave information concerning the MP mat - fiberglass matting. On Wednesday, we completed the DCP measurements of the area. The troops of the 101st Division placed the matting systems with the help of the manufacturer's representatives and ERDC-WES on the MP mats. The four placement teams consisted of from 8 to 11 troops. The matting had previously been unloaded and placed next to the test areas. Troops placed all the mats except the DURA-BASE mat, which requires a forklift for placement due to the weight of each panel of the matting. The troops were switched between the different systems one time in the afternoon. Some systems were placed and then partially torn down for practice. On Thursday, each matting system was evaluated, first with a CH-47 Chinook and then a UH-60 Black Hawk helicopter.

3. The Mobi-Mat is a woven polyester fabric that was delivered in rolls 13.8 ft. wide and 33.0 ft. in length. A single roll weighed 176 pounds and could be moved by two people. These were rolled out, stretched by hand, and then anchored or held in place with about 2

ft. long metal pins. Successive rolls are anchored by placing the pins in overlapping holes. Figure 1 shows the Mobi-Mat system.

4. The SUPA-Trac is made from a non-slip polypropylene plastic material that is produced in pieces about 9 x 36 in. and 1.4 in. thick. This matting material is relatively light, at 2.25-lb./sq. ft., and was easily carried when delivered in sections with 5 pieces already fastened together. These pieces snap together and the connections are held together with plastic clips. Metal pins, about 2 ft. long, were used to hold the mat edges down. Figure 2 shows the SUPA-Trac system.

5. DURA-BASE is a high-density polyethylene (HDPE) plastic mat, about 8 x 14 ft in area and 4.25 in. thick (weighing about 1,050 lb per panel). The panels are connected together by the alignment of holes on the overlap and underlap edges of the mats. Each mat is composed of two identical sheets that are welded (heated) together along with several bolts with a designed off-set to achieve the overlap and underlap edges. The individual panels are held together with connector pins made of metal enclosed within plastic. These connectors are turned ¼ turn to lock them in place and connect individual panels. The majority of the panels were held together with about 3 connector pins. They were not anchored to the soil surface because their weight prevents any movement by the helicopters. Because the DURA-BASE system manufacturer had brought extra panels, a T-section pad was also constructed, Figures 3 and 4.

6. The MP mat is a fiberglass panel about 3/8 in. thick and 6 x 6 ft in area. These panels weigh about 115 lb each and can be easily handled by two people. The panels are connected by 6 connecting pins within underlap edges on two sides and corresponding overlap edges on the other two sides. These panels were held in place through the use of cabled duckbill anchors driven into the soil and connected to the outside edges of the helipad. We discovered a problem with this system, in that the ends of the driving rods became deformed and battered (widened at the ends). Then the driving rod would stick into the duckbill anchors, and thus prevent extraction of the rod. With the last one driven, the anchor came back still on the rod and the only way it could be removed from the soil was through the use of a bobcat forklift. Several anchors were successfully placed with a hand operated post-hole driver. The gas-powered jackhammer was successful in driving the duckbill anchors, while the electric jackhammer was not successful. Later testing with the helicopters showed that we probably used an excessive number of anchors. Figure 5 shows the MP mat system. Figure 6 shows an overall view of the LZ with the 4 matting systems prior to testing with the helicopters.

7. Each of the four systems was able to successfully withstand the 3 CH-47 landings and takeoffs along with one rolling pass of this helicopter and one landing with a 360 degree turn of the UH-60 Black Hawk helicopter. None of the systems had any problem or exhibited any distress from the landings, hovering, or turnings.

8. On Friday, all personnel involved in the demonstration, including the manufacturers, ERDC-WES, and Fort Campbell – 101st personnel met to discuss the test results. The 101st announced that it had selected a mat system that would undergo an additional demonstration in about 3 weeks, and would eventually be used in deployments overseas. The Army personnel rating the various matting systems on the following criteria: Ease of transport, Ease/speed of construction, Ease of anchoring, Durability, FOD reduction, Training required, Cost, and Availability. The order that they rated the four products to meet their use of FOD control in a desert environment at a forward operating base was as follows:

1. Mobi-Mat
2. MP Mat
3. SUPA-Trac
4. DURA-BASE

9. The Army acknowledged to all the manufacturers that there would probably be use for each of their products for different applications. They were told that the information gained on their products from this demonstration would be forwarded throughout the Army and other military services. They were told they could receive orders when an application or need most closely fit the type of product they manufacture. In particular for MP Mat, they mentioned that there was a need for the development of a method for easier assembly of the panels. This included not requiring the same degree of alignment of the holes, reducing the number of connector pins, and that the anchoring system was probably over engineered (although they didn't mention the name Rube Goldberg). Several possible methods to accomplish these goals were discussed with the product's manufacturer.

10. In summary, the Army was in need of a product for helipad construction to suppress dust and these mat systems were judged on that basis. The demonstrated mat systems were not evaluated structurally. The Mobi-Mat system was selected for further evaluation based upon its lightweight, simple design, and ease of construction.

Gary Anderton
Carroll Smith
James Shoenberger



Figure 1. Mobi-Mat on LZ Aardvark, note tops of pins used to hold it in place.

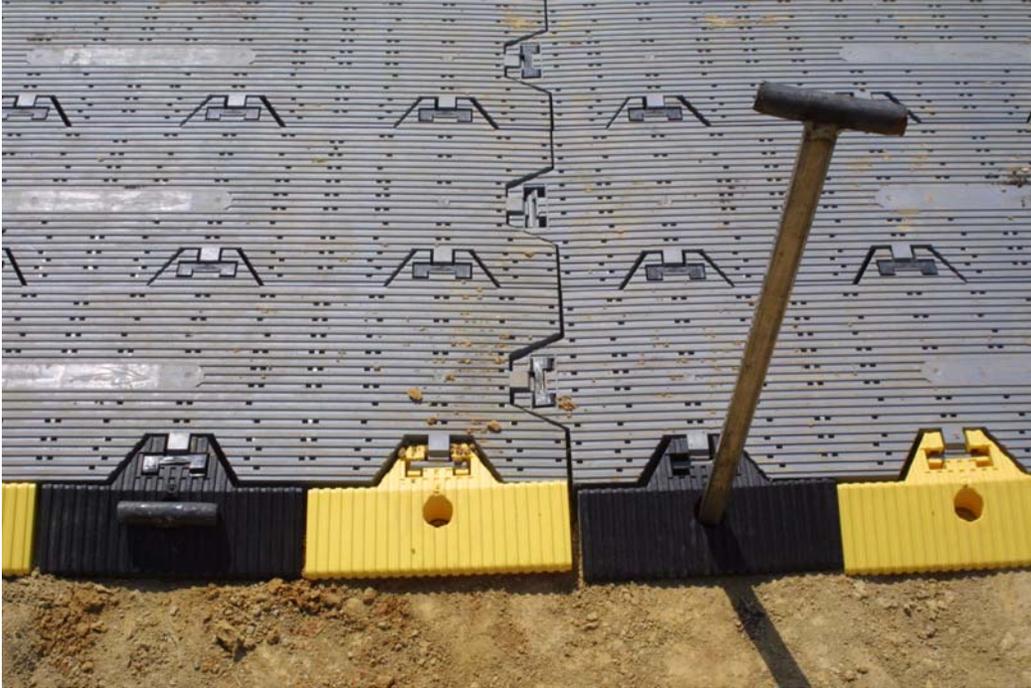


Figure 2. SUPA-Trac, with edge pieces and pins used to tied down the edges.



Figure 3. CH-47 landing on DURA-BASE (larger section)



Figure 4. Smaller, separate T section of DURA-BASE



Figure 5. UH-60 (Black Hawk) landing and taxiing on MP matting



Figure 6. Overall view of LZ Aardvark, the 4 matting systems from bottom to top are SUPA-Trac, MP Mat, Mobi-Mat, and DURA-BASE.