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A scorching Iraqi sun bakes down on the coatings crew positioned on the U.S. military base, Probler guns in hand, geared to battle the elements with on-going combat against blistering heat. Thousands of miles away in Afghanistan, another coatings crew faces the harsh shadow of the Hindu Kush Mountains, spray equipment at the ready, to protect and insulate military structures against bitter cold.

These coatings crews are at the forefront of environmental innovation, as well as military strategy. Not only are the coatings making life easier for the brave men and women who are putting their lives on the line by serving overseas in the U.S. armed forces, the coatings are actually helping to save lives, as well. And, their existence in the military theaters is largely due to the foresight of one persistent man, Joe Amadee of Synovision Solutions, LLC.

SAVING FUEL, SAVING LIVES

“Three years ago Synovision Solutions was asked to review the use of diesel fuel in forward operating bases (FOBs) for the U.S. Army — especially in Iraq and Afghanistan,” Amadee explains. “The Army wanted to reduce the number of lives that were being lost on extremely dangerous fuel transport missions. These missions are deadly, they pull resources from everything else, and they require a lot of fuel to operate. I served stateside in the Army and because my background is in logistics and supply chain strategy, I had a sense of the Army’s goals.” Amadee was the logical job candidate when an Army Rapid Equipping Force (REF) tasked Synovision with a study of alternative fuel sources.

Instead of conducting the study in a war-zone, however, Amadee traveled to Djibouti, Africa (west of Somalia) because the FOB in that country replicated the conditions found in Iraq and Afghanistan, but without the inherent dangers.

“It was blazing hot, upwards of 120°F (48.9°C) during the day. I lived in an uninsulated tent with a generator running 24/7 to try and keep the inside of the tent cool. It was not only a losing battle, it was impossible to sleep because the noisy generators run all the time. In fact, I mention in my report that the military is single-handedly trying to counteract global warming by constantly pumping cold air into the desert,” Amadee says with a wry chuckle.

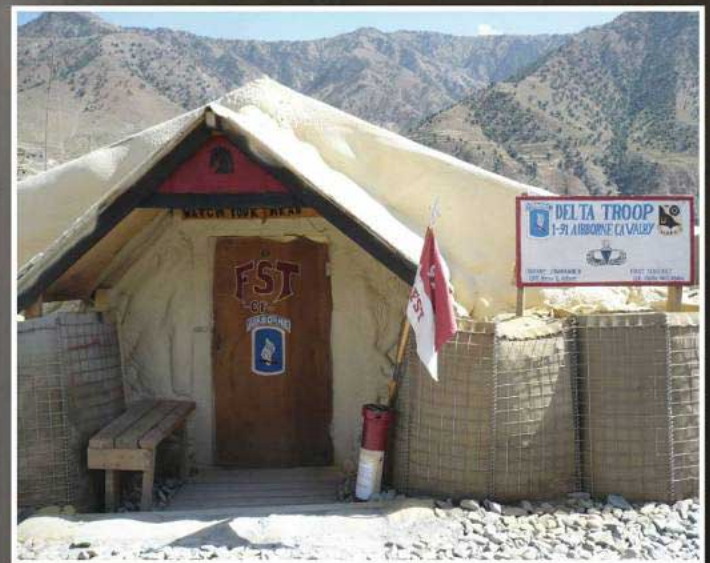
To give a sense of this enormous cost in terms of fuel, he explains, “In rough numbers, they bring 10,000 gallons (37,854.12 liters) of diesel through the gate every day — 10 percent of that is used in vehicles (excluding aircraft), and 90 percent is used to power the generators for air conditioning. And this is just on one base. Think of the savings if the fuel usage could be reduced. Which in turn would reduce the need for convoys. Which in turn would save lives.”

Explored fuel-saving alternatives included solar panels and even wind turbines, which were ultimately dismissed as too expensive. “The main problem was demand. The demand for fuel had to be reduced before we could start looking at any alternative sources of power,” Amadee explains. But how?

THE MYTH OF R-VALUE

While presenting his findings, a seemingly innocent question would cause Amadee to drastically think outside the tent, bringing coatings into play. “A Colonel asked about the R-value of the tent material. This led me to Internet research and David B. South’s article, ‘R Fairy Tale: The Myth Of Insulation Values,’ which claims that R-value is meaningless if air can get through. More importantly, South had built — and insulated — monolithic dome homes using nylon tent-like forms, spray polyurethane foam (SPF), and a polyaspartic top coat.”

But could the outside of a tent be sprayed? These military tents, which are only supposed to last for a maximum of one year, have been standing for several years. And even though the structures exist on U.S. bases, they cannot give the impression of being “permanent.” They must remain “tent-like.” Would the canvas be an appropriate substrate?



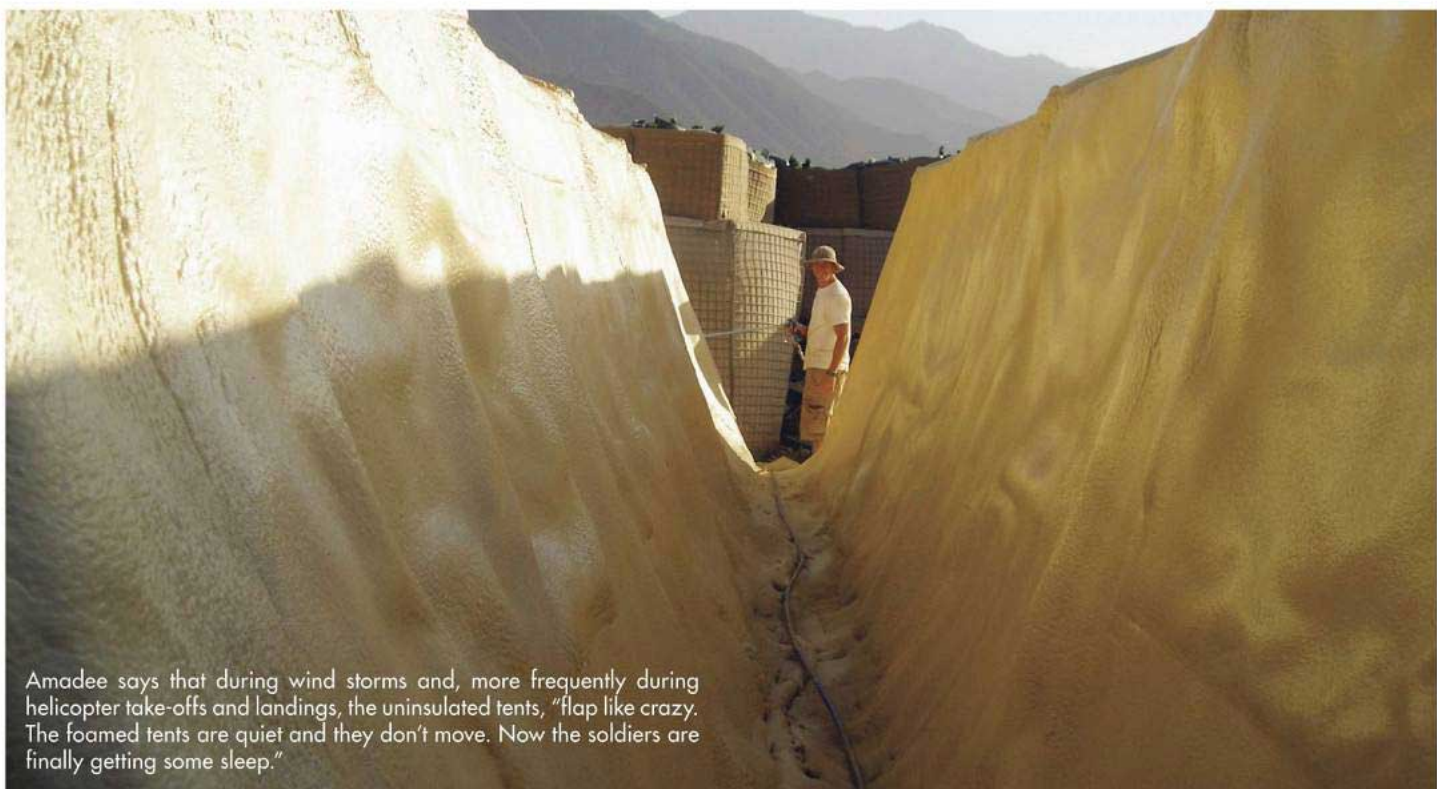
ABOVE ▲ Not only have Amadee and his crews insulated living quarters, but they have also foamed and coated metal containers that the Army uses for offices and weapons storage, as well as water tanks. “In Iraq it gets so hot that the water in uninsulated storage tanks comes out scalding,” says Amadee.



ABOVE ▲ "In rough numbers," says Amadee, "they bring 10,000 gallons (37,854.12 liters) of diesel through the gate every day — 10 percent of that is used in vehicles (excluding aircraft), and 90 percent is used to power the generators for air conditioning. And this is just on one base. Think of the savings if the fuel usage could be reduced. Which in turn would reduce the need for convoys. Which in turn would save lives."

"That first commercial flight over to Kuwait was something else," says Doss. "We were briefed on the plane about the conditions, about the spraying, the insulating and waterproofing of the tents and buildings, but also about the fact that we could be shot at." He quickly adds, "That's never happened. Besides we're not only helping to save money, we're helping to save lives. And anything that we can do to benefit the soldiers is worth it."

INSULATING MILITARY TENTS: COATINGS COMFORT THE CORPS



Amadee says that during wind storms and, more frequently during helicopter take-offs and landings, the uninsulated tents, "flap like crazy. The foamed tents are quiet and they don't move. Now the soldiers are finally getting some sleep."

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JOB AT A GLANCE

PROJECT:

Insulate tents and other structures on military bases in Iraq, Afghanistan, Kuwait and the United States in order to reduce fuel use and emissions and improve living conditions in severe weather climates

SIZE OF CONTRACTOR:

Varied; a 3- to 4-man crew typically works each project

SUBSTRATE:

Varied; primarily canvas tents. Also spray foam insulation and coat steel tanks, metal containers, and wooden buildings

SUBSTRATE CONDITION:

Aging; untested

SIZE:

Varied; average tent is roughly 20' wide x 60' long x 10' high (6.09m x 18.29m x 3.05m)

DURATION:

Project is on-going

UNUSUAL FACTORS:

- Working on military bases in Afghanistan, Iraq, and Kuwait
- Working in extreme temperature conditions (cold in Afghanistan, hot in Iraq and Kuwait)
- Lowering fuel consumption keeps convoys off roads and saves lives
- Lowering interior temperatures keeps military personnel comfortable in extreme environments
- Working with and employing locals provides opportunity to learn about local culture

MATERIALS/PROCESS:

- Stretch tent canvas with ropes to create a solid structure
- Construct double-door/vestibule using wooden boards
- Remove dust using Sullair 185 air compressor
- Spray-apply Gaco Polyfoam 193 using Graco rigs and Probler guns at varied thicknesses
- Spray-apply Gaco S20 95% solids silicone top coat using Graco equipment at varied thicknesses

SAFETY CONSIDERATIONS:

- Working in war-zones requires constant vigilance, even on base
- Working in extreme heat in Iraq and Kuwait means that crews need to keep hydrated and also need to take frequent breaks
- Crews wear full PPE including half-face masks, fall protection (when working on roofs), Tyvek suits, gloves, hard hats, eye and ear protection



ABOVE ▲ Whether they are insulating canvas tents or wooden or steel structures — in Iraq or Afghanistan — the crews use roughly the same equipment, Graco GH 833 gas hydraulic airless sprayers and Graco 250 Xtreme units.

Amadee called article author David South to find out. “He hung up on me,” Amadee laughs. “So I called back and explained it all again. He wasn’t positive that it would work for the military, but he gave me the name of James Poland at Gaco Western. And he helped me with research on SPF. I talked to several SPF manufacturers and Gaco was the only one who wanted to participate.”

Meanwhile, with a sense of humor undiminished by the enormity of his task, Amadee explained his findings to the Army in tongue-in-cheek terms. “I told them that air infiltration was like having a security force that the bad guys could get through. I wanted to set up a test with the military, spraying foam on fabric to see if this coating idea would even work.” They agreed.

So, Amadee, Poland, and a REF representative met on a base in Italy, Texas in the midst of a winter rain storm.

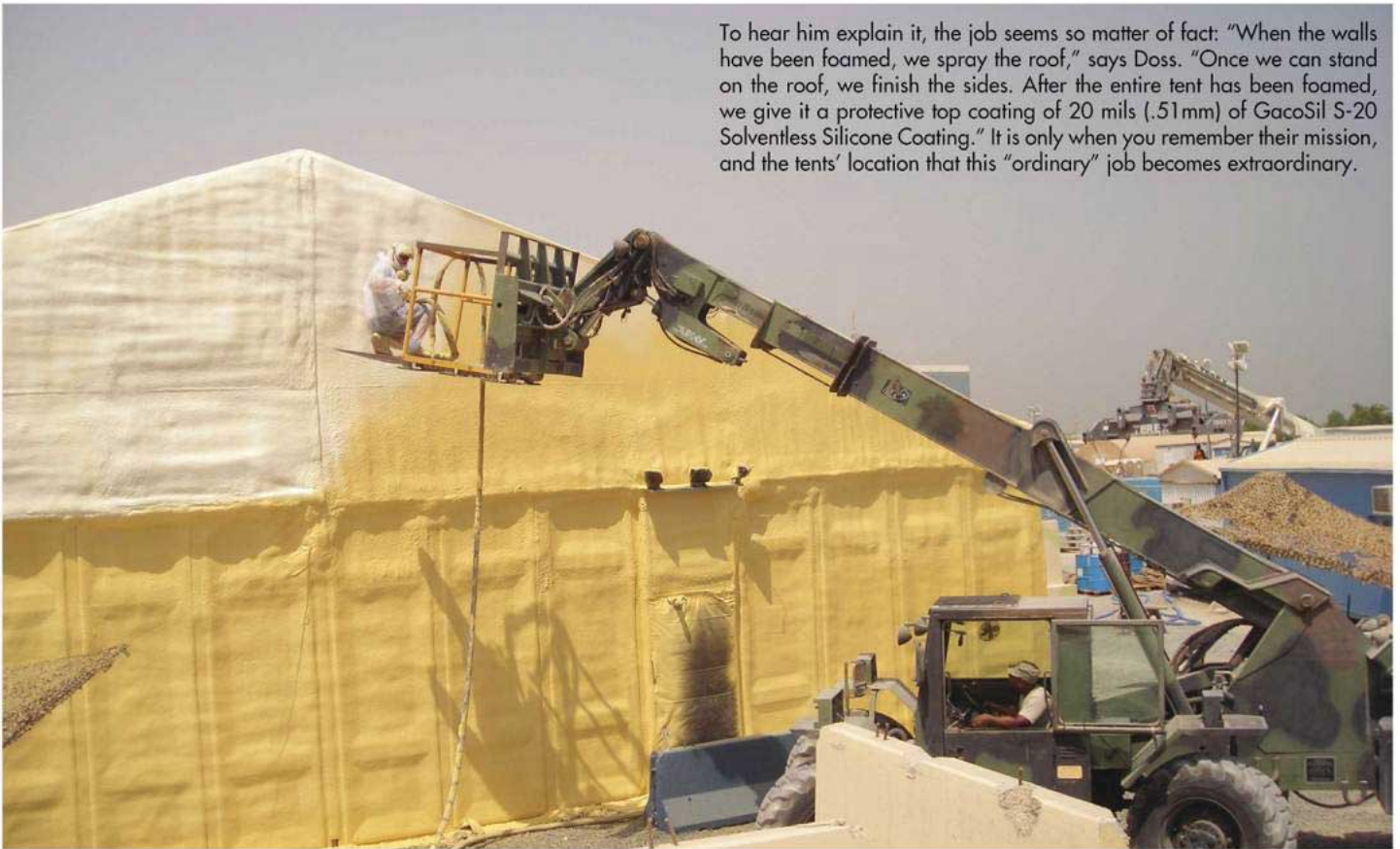
“Using a Graco rig, a Probler gun, and a canvas camping shower stall that Poland picked up at a camping store, we sprayed foam onto the material, in what I now know are less than optimal conditions,” Amadee says. “When the foam had cured, the REF rep hit it by swinging a piece of wood against it like a baseball bat. The impact of the wood on the cured SPF knocked the wood out of his hands. He was shocked — and wanted to test again by spraying an actual tent, this time on base at Fort Benning in Georgia.”

PITCHING AND FOAMING A TEST TENT

Through contacts with Gaco, Amadee found SPF applicators. “I had no clue where to turn. But Poland put me in touch with GlenCo Roofing and Insulation and Doss Twins Urethanes out of Oklahoma.”

Amadee and his newly assembled coatings crew arrived at Fort Benning in late January for their test. “The average military tent is 20-feet wide by 60-feet long by 10-feet high (6.09m x 18.29m x 3.05m). Then, a wooden double-door vestibule is built onto each end. This is the size of the majority of the living-quarter tents in Iraq and Afghanistan. This is what we were given to foam as a test tent. The test even included building the vestibules.”

To hear him explain it, the job seems so matter of fact: "When the walls have been foamed, we spray the roof," says Doss. "Once we can stand on the roof, we finish the sides. After the entire tent has been foamed, we give it a protective top coating of 20 mils (.51mm) of GacoSil S-20 Solventless Silicone Coating." It is only when you remember their mission, and the tents' location that this "ordinary" job becomes extraordinary.



After the tent was sprayed and top coated, thermostats were placed inside it and inside an uninsulated control tent to measure power usage and humidity levels, as well as the internal and external temperatures. Amadee says that going into the test, the government would have been satisfied with a 40 percent reduction in power usage — which would represent a savings of billions of dollars. But Amadee's research showed that they could expect an 85 to 90 percent reduction, within one year! And he said so. "They thought I was crazy. But the monitoring equipment proved me right."

He was given the green light to spray a small sample of representative tents in the "real" world — specifically Kuwait and Africa. "I had to start from absolute scratch, putting together two complete rigs in two 20-foot (6.09m) shipping containers. It took the equipment 45 days to reach Kuwait. It took five months to reach Djibouti, Africa."

COATING THE REAL THING

"Right away in Kuwait we started to see a difference," Amadee says. "The outside temperatures were around 140°F (60°C), which meant that the uninsulated tent fabric is about 138°F (58.9°C) and inside the tents it is around 100°F (37.8°C), with the A/C running 24/7. Once we spray-apply the foam, the inside temperature stays constant around 70°F (21.1°C). They can cool it and it will stay that way without constant A/C."

While spraying tents with a two-man crew in Kuwait, Amadee was visited by General Steve Anderson with the Multi National Task Force (MNFI). "He wanted to reduce the number of trucks in Iraq and was interested in foaming. Coincidentally, we had just sprayed the base chapel. The General asked the Chaplain what he thought of the insulation. The Chaplain replied that more people showed up for services now because it was cooler. And since it was also



LEFT ◀ On occasion the crew relies on help from soldiers, as well as from local villagers, to complete the insulating and coatings on schedule. Working with the locals provides the applicators with an opportunity to learn about some of the customs and quirks of life off the base.

quieter, they could actually hear the sermons. With a wicked smile the General asked, 'Is this good or bad?' And never missing a beat, the Chaplain replied that he wasn't totally sure," Amadee laughs.

Impressed, the General asked for a significant demonstration in both Iraq and Afghanistan. So even though he was still waiting for the African rig to arrive, Amadee assembled rigs and crews for Afghanistan and Iraq, with an initial "demo order" for 100,000 square feet (9,290.30m²) of substrate to be foamed and coated in Iraq. "And now, between Kuwait, Africa, Iraq, Afghanistan, and the U.S., we've sprayed almost 5,000,000 square feet (464,515.2m²) to date," says Amadee. "This encompasses thousands of tents, plus wooden buildings, metal structures, water tanks, and even dog kennels for the K9 soldiers."

"FOAMERS OF FORTUNE"

So from a coating applicators' perspective how does this work? Larry Doss, co-owner of Doss Twins Urethanes, and one of the two men initially with Amadee in Kuwait and subsequently in Iraq and Afghanistan, describes the average tent insulating process.

The PPE requirements are similar to those here in the States. "We wear 3M half-face masks, Tyvek suits, disposable goggles, ear protection, gloves, and safety harnesses and lines while working on the buildings. When we're working on the tents, however, we can't wear steel-toed shoes because they would tear the fabric, so we do wear tennis shoes. They also give us a better grip against the material," Doss states.

Most importantly in terms of staying hydrated — especially when working in Kuwait and Iraq — the crew constantly drinks water, "even when we're not thirsty," Doss says. "Nobody has gone down from heat yet, because we constantly drink water and take small breaks, sometimes for several hours during the worst heat. Working in the desert hasn't been as hard as I thought; it's still hot, but not as bad as I imagined, especially now that we have places to cool off."

Once they are suited up and properly hydrated, the crew is ready for action. "First, we stretch the tent material with ropes because it is usually loose and baggy. This creates a more solid structure. Then, we use wood — hopefully we'll have 2 x 4s (0.61m x 1.22m) handy — to build a vestibule on both ends of the tent." According to both Amadee and Doss, the tents can vary in size from 1,000 square feet (92.90m²) to huge 100,000-plus square foot (9,290.30m² plus) mess tents with attached kitchens.

Doss continues, "Next, we use Sullair 185 air compressors to blow the dust off the tent. Then, using Graco plural-component spray rigs, with 300 feet (91.44m) of hose attached to Probler guns, we spray the tent sides with one-and-a-half to two-inches 3.81cm to 5.08cm) of Gaco Western WallFoam System 193." The Gaco Western WallFoam System 193 is a zero-Ozone-depleting, closed-cell, low-density SPF that is recommended for use in a wide range of temperature extremes from -40°F to 200°F (-40°C to 93°C).

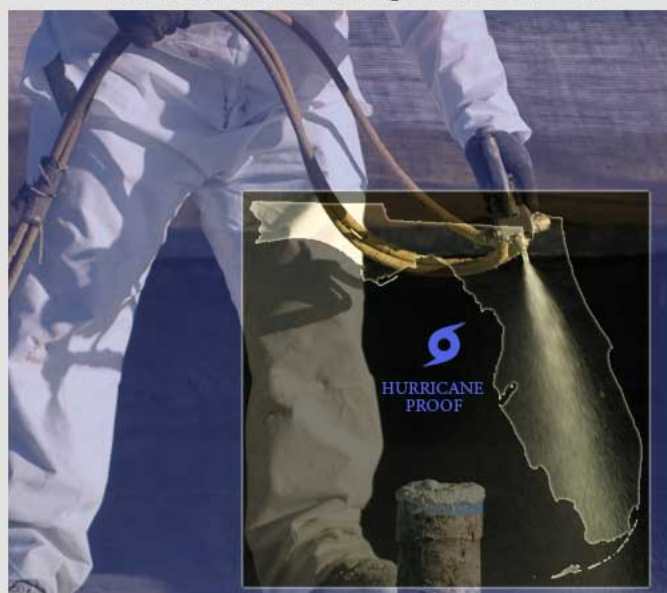
"Then when the walls have been foamed, we spray the roof," says Doss. "Once we can stand on the roof, we finish the sides. After the entire tent has been foamed, we give it a protective top

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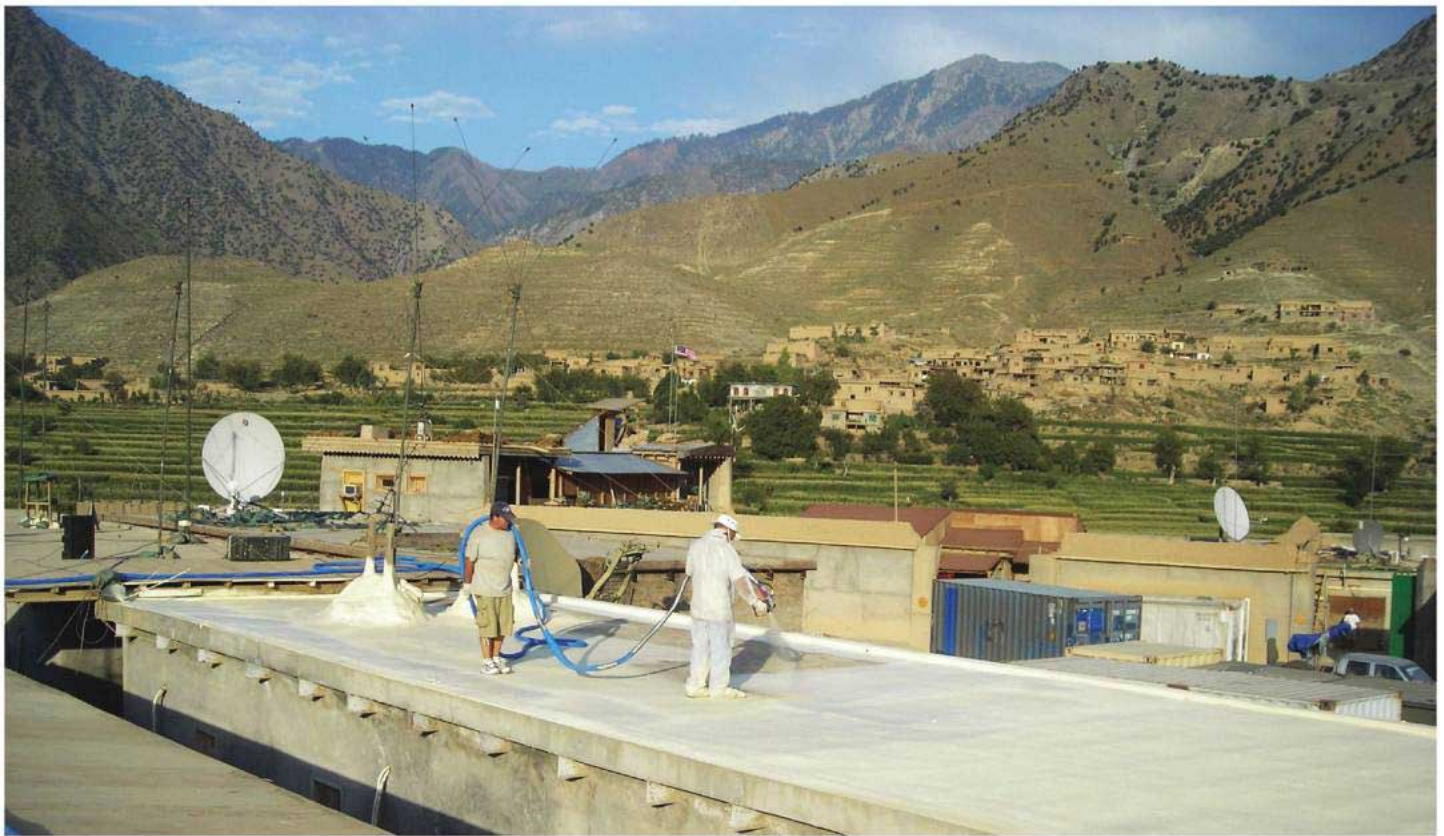
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ABOVE ▲ After removing the dust and debris from the surface with Sullair 185 air compressors, the crew uses Graco plural-component spray rigs, with 300' (91.44m) of hose attached to Probler guns, to spray-apply 1 1/2" to 2" (3.81cm to 5.08cm) of Gaco Western Wall-Foam System 193 to the structure's sides and roof.

coating of 20 mils (.51mm) of GacoSil S-20 Solventless Silicone Coating." GacoSil S-20 is a single-component, elastomeric, waterproofing, moisture-curing, silicone coating designed for use in areas requiring excellent weatherability. "We have a system down," Doss says. "Depending on the size, the average tent takes about an hour to spray."

Although the system may be average, the locations are anything but. Doss concurs with a chuckle. "We pretty much

stay on the bases 24/7 to stay safe. That first commercial flight over to Kuwait was something else. We were briefed on the plane about the conditions, about the spraying, the insulating and waterproofing of the tents and buildings, but also about the fact that we could be shot at." He quickly adds, however, "That's never happened. Not once. We've seen shooting at a distance in Afghanistan, but we've never felt in danger. I've always felt safe. Besides we're not only helping to save money, we're helping to save lives. And anything that we can do to benefit the soldiers is worth it."

Amadee also tells of the benefits to the soldiers. "I have actually had soldiers come off of patrols in Afghanistan and throw their arms around me because now they can finally get cool. The foamed tents are quiet. They don't move during windstorms or when helicopters land and take-off. Not only do they go out on fewer convoys, our soldiers are finally getting well-earned sleep."

For Amadee and his "Foamers of Fortune" coatings crew, this is just the beginning of the battle. Given its efficiency and innovation, Amadee says, "Foam is so amazing it could even lead to the cure for world hunger." But for now, Amadee's crews remain ever vigilant, spray guns at the ready, to ensure and defend the comfort and safety of those who defend us, all while saving tent-loads of fuel, money, and effort. Persistence pays off! **CP**

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