AEG

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June 12, 2017

FOR IMMEDIATE RELEASE

American Engineering Group wins top team award for Developing Zero Pressure Tire for US Special Operations Forces Command (USSOCOM)

Akron, Ohio, Akron based American Engineering Group received U.S. Special Operations Forces Small Business Team Award at the SOF Industry Conference in Tampa Florida on May 18th, 2017. USSOCOM Team Achievement awards are presented annually to recognize engineering product development team for top performance in the field of innovation & technology. The Team award is selected based on achievements

and contributions to the overall goal of United States Special Operations Command (USSOCOM).

This award was presented at the Special Operations Forces Industry Conference (SOFIC). SOFIC is the premier venue for the Special Operations Forces (SOF) community to interact with industry and to collaborate on the challenges, initiatives and way-ahead in delivering the most cutting-edge capabilities into the hands of SOF operators. This year more than ten thousand attendees were at 2017 SOFIC and 400 companies and organizations displayed their products and services in a sold-out exhibit hall at the Tampa Convention Center in Tampa, FL. The conference theme was, “Win-Transform-People” reflects the USSOCOM Commander’s vision to win the current fight, transform current capabilities and equipment for future threats. This is the second year USSOCOM has had a Small Business Team Award to recognize a team for developing new product technology for the warfighter. This year USSOCOM elected Akron, Ohio based American Engineering Group(AEG) for the SBIR Phase II project titled ”Improved Tire Technology” which developed a unique Pressure Zero Tire (PZT) for US special forces. The award was presented in the closing ceremony at the Tampa Convention Center in Tampa, FL by USSOCOM Acquisition Executive James Geurts.

"It's an honor to receive this award on behalf of American Engineering Group(AEG) along with team of SOF technologists for the Light Tactical Vehicle Team," said Mr. Abraham Pannikottu, Operations Manager. "AEG work tirelessly every day to provide our SOF warriors with the very best, most effective technology to do their job."

Getting a flat tire is never convenient. In a war zone, it can be deadly. While special operations Tactical Vehicle have been loaded with extra armor to protect troops in Iraq, Syria and Afghanistan, the tires remain vulnerable to attacks by improvised explosive devices (IED). The unique carbon fiber multiple hoop tire design by American Engineering Group may be the key to a new Zero Pressure Tire that could keep military vehicles running after an attack.

American Engineering Group (AEG) received a Phase II project grant in 2014 from the Special Operations Forces to develop a runflat tire that would continue running even after being impacted by roadside bombs or gunfire. The main objective of the project “Improved Tire Technology for Special Operations Vehicles” was to develop a true off-

road ballistic tire that could provide high off-road mobility and also provide improved tire survivability against terrain and ballistic threats. Though military vehicle tires are now equipped with run-flat inserts, SOF wants to upgrade to a tire that's better at carrying heavier loads, has reduced tire weight, and can move soldiers out of harm's way.

When engineers at American Engineering Group began working on tire designs, they settled on a flexible multiple carbon fiber hoop structure which functions like air inside a tire. Along with carbon fiber multiple hoops for strength, the design allows shrapnel and high-caliber bullets to pass through the tire. From Phase I Testing in 2011 to completion of Phase II in 2017, the tires continued to run well – keeping the same functional road performance – even after receiving several rounds of gun shots.

Zero pressure tires have been around for a long time, with major drawbacks such as bumpy rides and overheating. The American Engineering Group (AEG) prototype dissipates heat and has the tire flexibility and strength to support the heavy military pick-up weight while providing a relatively smooth ride.

Though military vehicles outfitted with "run-flat" tires are supposed to travel at least 30 mph for 30 miles (the minimum SOF requirement), field performance of current run-flat tires hit by roadside bombs were reported to be much lower than this minimum requirement. The new AEG Zero Pressure Tire will withstand a minimum of 50 mph speeds more than 60 miles once it's punctured based on results from Phase II.

“This level of load carrying capability and survivability surprised even me” says Dr. Jon Gerhardt, Technical Director of AEG.

A lighter run-flat tire system is important because that in turn would allow military vehicles to carry more payload, said Mark Fox, a Defense Department spokesman, who also is an engineer and part of the military’s AEG tire testing program. The military needs its vehicles to keep moving even if tires have been shot, Fox said. “The tire has to survive longer than a typical ground vehicle, in harsh conditions,” he said.

Defense vehicle weight requirements are increased so much that the current tires cannot support the load. SOF wants to create a tire that extends the mobility of the vehicle as well as the survivability and maintainability. AEG personnel fired a very large-caliber

round with a high-velocity rifle into the tire several times. The damaged tires performed well and could perform at 50 mph speeds for 60 miles or more. The durability characteristics of this design was studied further in this Phase II on four different tire sizes for ATV Polaris, Toyota Hilux, and Toyota Land Cruiser & GMV 1.1. special operations vehicles.

Carbon Fiber Hoops

American Engineering Group works on different combinations of metallic & polymeric materials to make the multiple composite carbon fiber hoops that are bonded to the carcass of the tire. Finding the right combination of hoop dimensions and materials is the challenge. A softer material provides good durability and flexibility but wears out sooner. A harder material lasts longer but also generates more heat.

“We were also able to utilize our suppliers’ experiences and knowledge to develop and manufacture this unique carbon-fiber–metal composite reinforced tire and we’re hoping to utilize this Pressure Zero Tire technology on various DoD tactical light vehicles,” said Dr Thomas Abraham, President of AEG

Road testing

Zero pressure tires were tested successfully on the proving ground at Transportation Research Center (TRC Columbus, Ohio) an independent test facility owned by Ohio State University. This road test demonstrated that carbon fiber–metal spring hoops reinforced tread can provide a pressure zero tire performance as per USSOCOM requirements. This is based on vehicle tire tests completed at TRC on Toyota Hilux(figure 1) & GMV 1.1 vehicles(figure 2) . The Pressure Zero tire demonstrated good performance on the post ballistic zero pressure and tire durability tests.

This AEG innovative run-flat tire tested on vehicles provided the capability to move for at least 60 miles with a complete loss of air pressure in two tires on opposing corners. The 60 miles consisted of 30 miles (flat, hard, smooth gravel) at 30 mph, 9 miles (primary/paved road) at 30 mph, 9 miles (secondary roads) at 21 mph and 12 miles (cross-country) at 12 mph

The run-flat tire also survived the specified 30-mile test, after ballistic events of five (5) small arms shots to the sidewall and 2 small arms shots directly through the tread in accordance with the FINABEL 20.A.5 standard to cover both threshold and objective requirement.

The run-flat tire also survived the 30-mile test specified above after a 1-inch long gash on the sidewall. The final test was a 12,000-mile reliability, availability, maintainability, and durability test also performed on vehicles at TRC (Columbus, Ohio) an independent test facility managed by Ohio State University.

Since the tire is still under development, there's no price tag. AEG is expected to develop a tire that costs the same or less than current military tires.
“AEG’s motivation and driving force for this tire project is that AEG gets the privilege to be of help to save lives our soldiers" Pannikottu added.

About American Engineering Group
AEG started its operation in Akron, Ohio in 2000. The company, which has patents pending for the Zero Pressure tire technology. This tire company will help with manufacturing of commercial tires. As for commercial applications of the Zero Pressure design for run-flat tires, AEG is focusing its current efforts on the pick-up truck. However, this technology eventually could be used on all-terrain vehicles, as well as mining and construction vehicles. AEG’s other products include football helmets designed to reduce the risk of serious head injuries during play and low-cost implantable titanium Hip and Knee joint designs.

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Abraham Pannikottu, AEG Founder & Operations Manager

Figure 1: Toyota Hilux vehicle provided by USSOCOM for AEG TRC testing(Fitted with AEG Pressure Zero Tire)

Figure 2: Test GMV vehicle provided by USSOCOM for AEG TRC testing(Fitted with AEG Pressure Zero Tire)

SOF Industry Conference in Tampa Florida on May 18th, 2017. USSOCOM Team Achievement award

Figure 3: Dr Jon Gerhardt, AEG Technical Director & Abraham Pannikottu, AEG Founder & Operations Manager

PRESSURE ZERO TIRE(PZT)

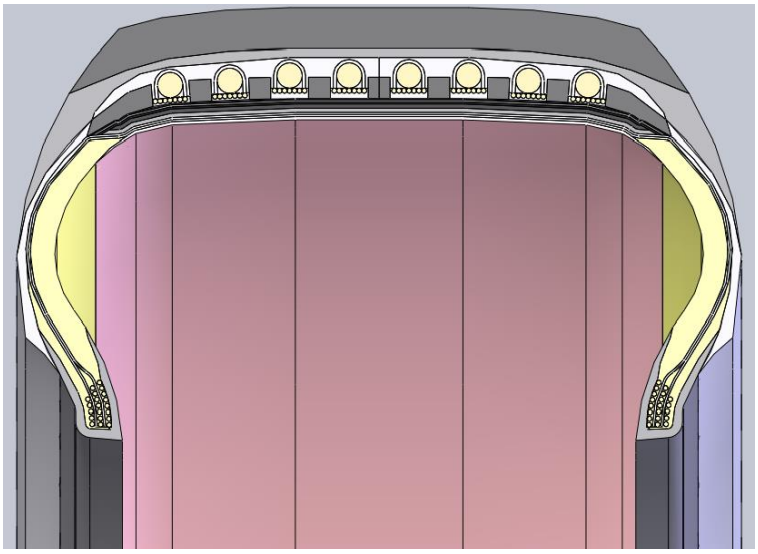

FIGURE 5: CUT-OUT VIEW-37X12.50R17 PRESSURE ZERO TIRE(THIS PZT TIRE DESIGN SHOWS 8 RINGS)

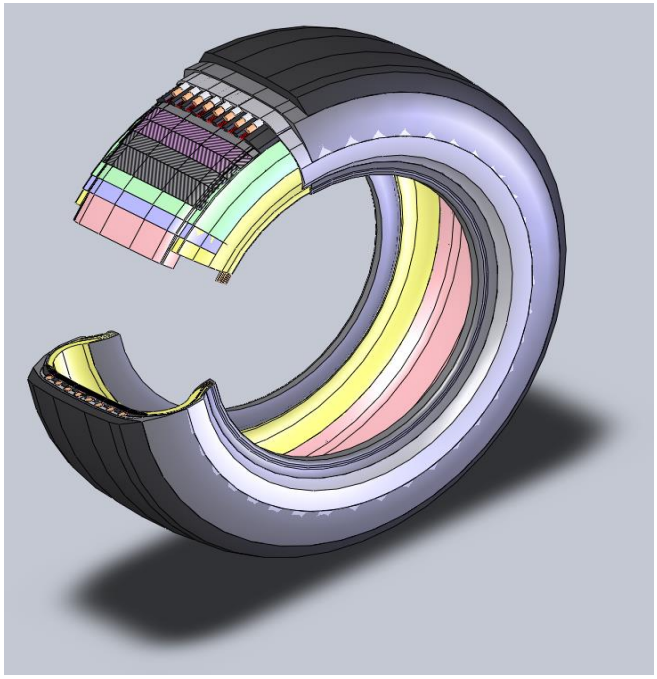

FIGURE 6: SECOND CUT-OUT VIEW--37X12.50R17 PRESSURE ZERO TIRE