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TARDEC Forum Works to Protect U.S. Warfighters

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an Abrams tank's fuel consumption by between 22 and 25 percent, Huffman said. And that's just one project.

Rick Marcone, director of GDLS's MC2, said it's important for events like the symposium to be held.

Money is going to be tight for the military because of budget considerations, Marcone said, adding that by having the government meet with contractors, people can get on the same page faster.

And, Marcone said, it also gives contractors a chance to meet with their suppliers and academics to discuss the state of military systems.

"What I've learned most from talking with people here is that times are tough and money is tight, but that we're also all in this together," Marcone said.

"Relationships are more important than ever and it's relationships that will help us all get through these tough times.

"Right now, we're about speed and agility. We can't do things the way they've been done in the past and it's symposiums like this that make possible the changes in the way things are done. The MLS APU is an example of collaboration done right."

Kelley Blue Book Says Truck Sales Getting Stronger

Kelley Blue Book reported that in August, the growth in the truck segment appears to have no end in sight, thanks in large part to the rise in new home construction taking place across the United States, said Alec Gutierrez, senior analyst at Kelley Blue Book.

In addition to gains attributed to the housing market, the auto industry is heading into the time of year where truck sales tend to ramp up, Gutierrez said.

With seasonal demand predicted to increase during the next few months, Kelley Blue Book expects growth in the full-size pickup truck segment to continue unabated. August full-size pickup sales saw a market-share increase of about 1 percent over 2012.

Also worth reporting is that Ford has seen sales volume improve nearly 13 percent so far this year, benefitting from its own batch of well-received redesigns, Gutierrez said. The bar is raised to new heights with every passing model year and with so many fuel-efficient, stylish alternatives available today, it has never been a better time to buy a new car.

Gutierrez said Ford could have been up even more, but the company has been hampered with production issues from both the Escape and Fusion.

TACOM Engineers Test New Interior Designs in 'Camel'

by Jim Stickford

The U.S. has just spent the last decade fighting two wars and, as these conflicts wind down, engineers and other experts at TACOM want to use what they've learned to build better troop transport vehicles.

The TACOM engineers work in the Technology Enabled Capability Demonstrations (TECD) section.

Ross Boelke, program manager of TECD's Occupant Centric Platform (OCP) program, said that TECD is using something called a "camel" to improve designs for future troop transport vehicles.

The camel is used for what he calls interior bucks, otherwise known as a mockup of the interior of a troop carrier.

This mockup is used to test just how well troops in full battle dress fit in the vehicle, and how quickly then can get in and out.

Believe it or not, Boelke said, in the past, the engineering requirements of building a troop transport platform were such that engineers often don't spend a lot of time thinking about how the occupant – in this case a soldier who is carrying 60 pounds or more of battle gear – sits in the vehicle.

The end result, Boelke said, is that when the vehicles were actually used in real-life battle conditions, it was difficult for soldiers to get in and out of the vehicles in an efficient manner.

What the Army discovered – and passed along to the engineers – was that damage to troop carriers was coming from IEDs planted in the roads, Boelke said. Even when the vehicles weren't severely damaged, the explosive force coming from under the vehicle was transferring the energy through the floor to the seats, doing things like driving shock

up into soldiers' spines and causing compressed spinal injuries.

To solve this problem, engineers are experimenting with "decoupled" floors, which can ease the jolt of an IED. A decoupled floor is not directly loaded onto the hull, which causes energy to be absorbed from the hull and not easily transferred to the floor.

So, by decoupling the floor, the energy is diverted and soldiers don't suffer as many injuries.

"What we are seeking to do is change the military vehicle design paradigm," Boelke said. "We're going to try to change the way military vehicles are designed."

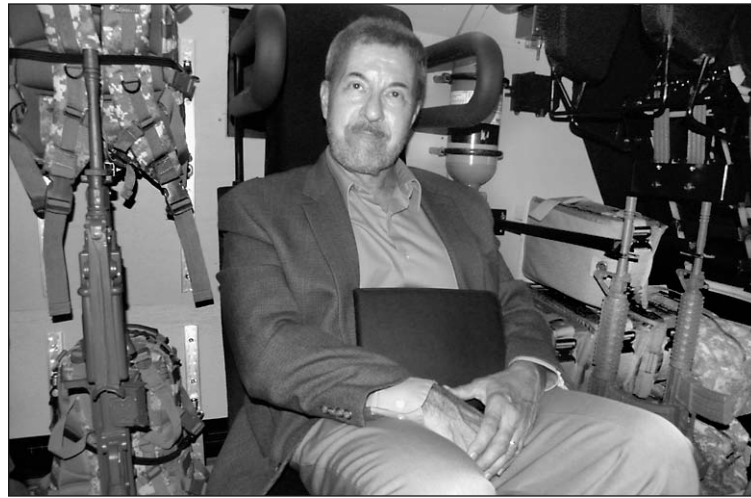
Presently, vehicles are designed to requirement, Boelke said. For example, a troop transport might need to carry 11 soldiers in a squad along with 500 pounds of ammunition, water, medical equipment, be armored, and have guns that can fire back at the enemy. When designing a vehicle like that, it can become relatively easy to not think about how the occupant will fit into the picture.

Boelke said that his brethren in the military aviation industry had the same problem a couple of decades ago. The Air Force found that they were losing a lot of planes and pilots, and they were looking for ways to reduce losses.

"So they brought designers and aviators together," Boelke said. "These are two groups of people who don't always get along."

"But, by working together, they were able to design planes that took the needs of pilots into consideration."

That reduced losses. By applying that same thinking to ground vehicles, the Army hopes that the next generation of troop



Designer Ross Boelke in the newly designed seat that protects soldiers.

transports will save lives by protecting soldiers and reducing injuries.

That's how the creation of the TECD's camel came about. Engineers are able to mix and match different components to "design a vehicle from the inside out," Boelke said.

They are able to put in different kinds of seats to see which ones are the most comfortable for soldiers in full battle dress. They've found that doing something as simple as changing the angle of the seat compared with the floor can relieve a great deal of stress on the soldier who is wearing a bulletproof vest.

The camel makes it possible to create different interior designs to see what works best for the troops that actually have to sit in the transports.

"If you've ever had to sit in one of these things while carrying 100 pounds of gear, having a seat that has an indentation to compensate for your flack vest makes a huge difference," Boelke said.

"We are able to look at different types of restraints, seats,

trim and cargo capacity levels, (that's holding things like gear, water and ammunition) and floor materials to see which combinations produce the best results for the soldiers who need to be protected and be able to get in and out of the transport quickly."

Boelke said they've been using this camel for more than a year. The analysis is going to go on for four years.

Once the data is collected, it will be shared with contractors who will build the next troop transport vehicles.

Those engineers, Boelke said, can use this data to inform their designs.

"We want people to use this hard-learned knowledge and put it to use so that our troops have the best," he said. "We want the design standards that we are developing to be used so that the next troop carrier will be the optimal platform that protects soldiers."

The ultimate goal is to use the camel to help in the design of a vehicle that "creates something that's gone right," Boelke said.

Ford Telematics Studies Space Robots

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The development of connected vehicle communications has the potential to reduce traffic accidents and ease congestion by enabling vehicles to communicate with each other. They also would be able to communicate with buildings, traffic lights, the cloud and other systems to deliver a message or detect and respond to imminent collision warnings, Daitch said.

"Ford has been committed to the research and development of connected vehicle communications for more than a decade," said Paul Mascarenas, who is the chief technical officer and vice president, Ford Research and Innovation.

"Our participation in this research can aid in the development of next-generation Ford driver-assist technologies.

"These technologies will globally benefit Ford customers, other road users and the environment."

One promising development from Ford's research project with St. Petersburg Polytechnic University is the advancement in emergency vehicle communication methods, Daitch said.

Ford is analyzing how emergency messages should be sent to ensure delivery if network failures were to occur, identifying the systems and methods that provide redundancy in case of primary delivery failure.

For example, if an accident were to cause vehicle-to-cloud communications (V2C) to be broken, a vehicle may still have access to a vehicle-to-vehicle (V2V) communications network.

An emergency signal message could potentially be sent through V2V to a vehicle nearby, and then between vehicles and infrastructures until it reached EMS, Daitch said.

"The research of fallback options and robust message networks is important," said Oleg Gusikhin, technical leader in Systems Analytics for Ford. "If one network is down, alternatives need to be identified and strengthened to reliably propagate messages between networks."

Telematics – the long-distance transmission of digital information – developed for use on space stations, provide excellent potential for improving the reliability of future vehicle-to-cloud, vehicle-to-infrastructure, vehicle-to-vehicle and other forms of communication (V2X), Daitch said.

The communications blend multiple networking technologies including dedicated short-range communication (DSRC), cellular LTE wireless broadband and mesh networking to ensure robust and reliable connectivity for optimum signal strength for critical messages.

Using the knowledge accrued from analyzing the space robots, Ford engineers could then develop an algorithm that is integrated into the V2X system resulting in a message that would route through the appropriate network depending on the level of its importance, Daitch said.

An emergency message, for example, may be communicated through the faster mesh network.

However, an entertainment-related message would route through a vehicle-to-infrastructure application, an embedded device or a brought-in device network.

"We are analyzing the data to research which networks are the most robust and reliable for certain types of messages, as well as fallback options if networks were to fail in a particular scenario," said Gusikhin.



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