

## Hybrid Retrofit “Boosts MPG 30 Percent”

Fuel-saving hybrid engine retrofits for start and stop drivers will soon hit the market. While fleets of shuttles, busses and delivery trucks will be the first to be hybridized, individual retrofitting is expected to follow. Since announcing the system, Larry Zepp, Variable Torque Motors, LLC (VTM), says the company has been swamped with requests for information. The system is still in beta testing, but VTM is getting ready for the next step.

“We’re in the process of establishing a network of outfitters who can retrofit fleets,” says Zepp. “We’re researchers and developers and will sell the system through dealers.”

The company is far enough along that they can estimate prices to be in the \$25,000 to \$30,000 range. “At \$30,000, if you install it in a shuttle that runs 30,000 miles a year and uses \$4/gal. diesel fuel, it’ll pay for itself in 23 months,” says Zepp. “We estimate that start and stop applications like school busses will save 30 percent in fuel.”

VTM’s system consists of a permanent magnet electric motor powered by ultracapacitors. The motor is powered up or down by adjusting the magnetic field. Regenerative braking harvests energy and stores it in the ultracapacitors, which in turn feed it back on demand. The beauty of the system is

that it can be quickly and easily installed in an existing drivetrain between the transmission and the differential. It can also be transferred from one vehicle to another.

The parallel system requires no modification of the existing engine, transmission or other vehicle systems. Standard brake and accelerator pedal activity is integrated electronically to activate the electric motor through a VTM controller.

During acceleration, the electric motor does the bulk of the work. As speed increases, the diesel engine takes over and the VTM motor supplies less and less torque. When it’s time to brake, the electric motor becomes a generator, harvesting energy for the next acceleration. Not only is fuel saved, brake wear is reduced and tailpipe emissions are severely reduced. At the same time, response is immediate from the 60 hp motor.

Zepp says most people don’t ask more than to be able to go from zero to 30 in 10 to 12 seconds. Fulfilling that expectation was how they sized their motor.

“When you tromp on the accelerator, you can get 400 lbs. of torque at the driveshaft because electric motors deliver full torque at zero speed, something diesel and gas engines can’t do,” says Zepp. “We figured we needed

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60 hp peak available to launch and stop the vehicle. A wimpy motor doesn’t have the power to accelerate or catch enough energy from braking to handle the next acceleration.”

That type of acceleration and regeneration meant tremendous draw down on the energy storage source and equally fast recharge. Batteries simply couldn’t handle the task. Zepp says the company turned to ultracapacitors from Maxwell Technologies.

Ultracapacitors are similar to batteries with their cells and use of electrolytes. Unlike batteries, energy is stored electrostatically rather than chemically. As a result, they can provide quick bursts and withstand hundreds of thousands of charge and discharge cycles. Maxwell makes modules of cells.

“We use two 48-volt modules and once charged up, they can give you 1,000 amps per second, though we don’t need that much” says Zepp. “Most other comparable hybrids require 300 to 500 volts DC.”

VTM’s lower voltage requirement helped get their unit approved for school busses. Zepp says it makes the system much safer for mechanics to work with, as even skilled electricians treat high voltage with extreme care.

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Quick Spade slips onto the front of bucket and is secured by a chain and binder.

## Quick Spade Makes Cheap Digger

It looks like an oversized shovel, but at 99 lbs. and mounted on skid loader forks, the Quick Spade is a powerful, inexpensive digging tool.

“It’s quick and easy to use and very affordable,” says Bruce Wahlstrom, who designed and manufactures the patent-pending Quick Spade with his partner, Chad Paumen. They introduced it last September, and anticipate that prices will remain under \$200 and \$300 for their two models.

Made of solid steel with military strength welding, the Quick Spade slips on standard skidloader forks and is secured with a chain and binder. (The more expensive model fits on forks or a bucket.)

Made heavy duty for industrial use, the spade does everything from digging trenches and holes, digging out stumps and brush, planting trees and moving heavy boulders.

Instead of using a bucket to make a hole that’s too big, the 20 by 18-in. spade is perfect to dig trenches or dig out rocks.



The 20 by 18-in. spade works great for digging trenches when attached to skid loader forks.

Dealer inquiries welcome.  
Contact: FARM SHOW Followup, Bruce Wahlstrom, 5008 Hillsboro Rd., New Hope, Minn. 55428 (ph 763 551-1441; www.QuickSpadeS.com).



Made for heavy duty use, the spade can even be used to dig out big rocks.



Form-fitting leather protectors are designed to prevent the cuts, scratches, bruising and burns that occur in many daily activities and occupations.

## Arm Chaps Protect “Working Limbs”

When Rick Redman made his first pair of Arm Chaps, it was to protect his arms from cold air blowing up his shirt sleeves when riding his motorcycle. He had no idea that his hand, wrist and forearm protectors would catch on with workers in a variety of occupations and help others with medical problems. He patented Arm Chaps and found a quality overseas manufacturer.

“Basically they’re form-fitting leather protectors that are very comfortable to wear,” says Redman of River Falls, Wis. “They’re designed to prevent the cuts, scratches, bruising and burns that occur in many daily activities/occupations. They have zippers that run from the wrist bone up the forearm to allow you to adjust the amount of warmth and ventilation to the forearms.”

Owners use it for a variety of jobs including: stringing barbed wire, handling hay bales, cutting brush, picking fruit and berries, working with livestock and poultry, sandblasting, welding, fabrication projects and working on hot engines or exhaust systems.

In addition, the high quality gloves

provide wrist support. Redman didn’t realize Arm Chaps’ medical potential until he put them on the market.

“Many people are now taking blood thinning medications. Many of these people are now bruising very easily from simply bumping into things,” Redman says.

Others wear them for sun or allergy sensitivities or for extra wrist support or warmth for poor circulation.

“Arm Chaps is unique in that they’re anchored by the thumb and don’t move around on your arm,” Redman adds. They’re made of a breathable leather that Redman says he wears in 90 plus degrees without getting too hot.

Arm Chaps sell for \$36.95 and come in eight sizes from children’s to large adult. Besides standard black leather, Arm Chaps will soon be available in a skin tone tan and safety blaze orange for hunters. Another option is a non-metal zipper for power line workers.

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