

Step-By-Step Video Shows Tractor E-Conversion

When Pearce Jensen applied for a grant to convert an Allis-Chalmers G weeding tractor from gas to electric, the application had a dual purpose. The small-scale (one-acre) vegetable farmer and his wife, Eleanor, could use the tractor, especially as they expand in the near future. Jensen also wanted to help other farmers do the same.

"There are two problems this project addresses," stated Jensen in his SARE (Sustainable Agriculture Research and Education) grant. "The first problem is there are currently no easy-to-understand guides on how to convert this type of weeding tractor from gas to electric power."

The second problem he outlined was the cost of commercial alternatives, which can run around \$20,000. He set out to resolve both problems by converting a G to battery power for considerably less and creating a step-by-step video guide as he did so.

Jensen received help from two mentors more experienced with electrical components. He and one of the mentors completed the conversion in May 2025. The total cost

was \$7,300, with 15 to 20 hr of labor. That didn't include the cost of the G. His final SARE report included a detailed parts list and costs for each item.

In February 2026, he posted his video guide to YouTube. It consisted of three parts: removing the gas engine and prepping the tractor, assembling the electric components, and installing the components and reviewing the wiring.

Both the conversion and the video were successful. The electric G has been used for general weeding and for hilling potatoes. Jensen reports better speed control than with gas power.

The video has also been a success. It had about 240 views in the first two weeks and 576 views in the first 6 mo.

In addition to the video, the Jensens hosted a field day for interested farmers to view and interact with the converted G.

In his summary, Jensen emphasized the importance of sizing the tractor frame to accommodate both battery storage and planned components. He noted that he had

extended his frame to provide more room for the batteries but had not accounted for attachments.

He also noted the extensive time spent studying product manuals and ensuring proper connections.

"If someone purchased the exact same parts as us, they could follow along in our video," he noted. "However, if they purchased different parts, then they'd need to read each manual to understand how that individual component connects to the others."

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Off-Gridder Upgrades Solar Power System

Gary Mull began his solar journey more than 13 years ago. Starting with a small solar panel, lead-acid batteries and a controller, he taught himself to build solar-powered systems. About 10 years ago, he went off-grid (Vol. 45, No. 3). Since then, he's continued to refine and expand his system, converting from lead-acid to lithium battery packs from the online provider Big Battery.

"I've added more solar panels on the array for the house and boosted my battery storage

to 20 kWh," says Mull. "As lithium batteries have fallen in price, they're actually cheaper than lead-acid."

One of Mull's first projects was installing 1,500-watt solar panels on a golf cart's roof, something he now does for others as a side business. He recently upgraded the golf cart's storage to 10 kWh with lithium batteries.

"If necessary, I could use my golf cart to power my house for 24 hr," says Mull. "I also have the option of recharging the golf

cart batteries with the house system or from a separate ground-based solar array."

He can also use the golf cart to pull the mower he converted to electric power. While he had earlier converted a tiller to run on its own battery pack, the mower simply plugs into the golf cart. He installed Husqvarna e-motors and an e-bike controller he bought on eBay.

"I can mow for 3 1/2 hr straight, recharge with the solar panel on top of the cart, and I'm ready to go by late afternoon," says Mull.

Recently, he added yet another backup system by converting a 2-WD Yamaha ATV to battery power. He used the electric drive from an old Raven MPV7100 hybrid lawn tractor, which he received in exchange for a front-end alignment. The MPV7100 had a gas engine with a generator to power the electric driveline; however, the electric motor was shot.

"I pulled the Yamaha engine and rear end out," says Mull. "I put two Big Battery Eagle 2 battery kits in place of the engine. They provide 32 amp-hours of power. The kits fit the frame perfectly, with heavy-duty straps and super-clean wiring. At \$2,000, they were the most expensive part of the repower."

Mull built brackets under the ATV to install a 1,000-watt Husqvarna electric motor and the Raven's two-speed rear end. Mull also made adapter plates for the Raven hubs to mount ATV wheels.

"The ATV has the same charging port I have on all my lithium battery packs," says Mull. "I can charge it off my home system or the golf cart, and it'll easily do 25 mph."

Mull considers the backup available from



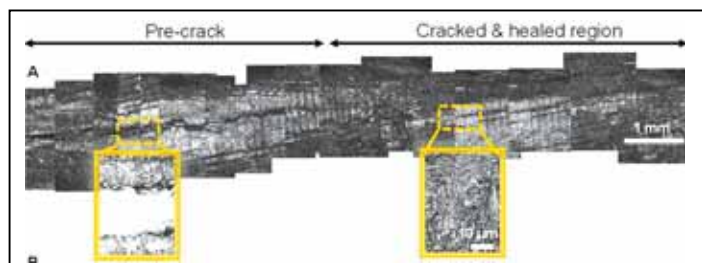
As lithium batteries have fallen in price, they're actually cheaper than lead-acid, according to Mull.

the golf cart and the ATV a fail-safe should a hurricane with cloudy weather reduce power to the house from its solar array.

"I installed a solar-powered battery system for another fellow locally," says Mull. "When we had a recent power outage, he and I were the only ones in the parish with lights on."

Mull does custom solar installations and is building solar roofs for golf carts. He has about 20,000 followers across YouTube, Instagram, TikTok and Facebook. He's a strong believer in Big Battery systems and includes links on his sites to discounts on the company's products.

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Microfractures before and after "healing" at the 10-micron level.

Researchers Develop 'Self-Healing' Plastic

Texas A&M has laid the groundwork for automotive plastics that allow dents and scratches to be removed with a hair dryer.

The same technology will likely find a market even sooner in the aerospace and defense industries.

"One of the main challenges with composite materials is repair," says Mohammad Naraghi of the Nanostructured Materials Lab at Texas A&M. "Some damage can be well inside the material, where it can't be seen, but can manifest itself through catastrophic failure."

Naraghi heads a research team that includes researchers from the University of Tulsa in Oklahoma. They designed a self-healing carbon-fiber plastic composite. The plastics, called vitrimers, are reinforced with discontinuous fibers. They recover their original shape under heat treatments and outperform steel in strength.

"With a good, high-end microscope, you can look at a structure and see internal cracks that could be super small, tinier than the thickness of a human hair, nanoparticle size," says Naraghi. "Those cracks can come together to form larger defects. Our material

restores them, due in part to the material, but also due to a chemical reaction in the material."

The material is a reality, according to Naraghi. The carbon-fiber plastic composite is called Aromatic Thermosetting Copolyester (ATSP).

"We've been working on it for about 5 years," he says. "Now we're looking for applications."

As ATSP matures and scales up in production, Naraghi suggests it has the potential to transform commercial and consumer industries. An added benefit of self-healing is recyclability. ATSP can be melted and reused without loss of function.

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