Solar-Powered Pump More Efficient, Easier To Fix

By Jim Ruen

After more than 20 years of research and experimentation, Buddy Armstrong is ready to start marketing a solar-powered water pump that he says runs more efficiently than other solar-powered pumps on the market, is easy to install and repair, and doesn't have rings or leathers to wear out and be replaced. Pump capacity varies by model from 600 gallons. per day for the smallest "Gardener" unit to 36,000 gallons/day for the irrigation-size "Big Boy" pump.

Armstrong's project started after he met a young man from Kenya who talked about the need for an inexpensive and simple-to-repair water pump for remote areas of his country. He told Armstrong, "There must be a way to pump water out of the ground efficiently, economically and dependably." The words started Armstrong down a long road of research and development.

After reviewing existing pumping systems, the largely self-taught electrical engineer began to design a new style pump. To increase efficiency, he replaced heavy sucker rods with a carbon fibre activator rod that weighs 80% less. The pump sits on the surface above the well shaft. It's walking beam/rocker arm design is similar to that of oil well pumps and offsets the down hole weight. A spring mechanism pulls the piston down instead of pushing it up. And when the pump reaches 40 rpm's, a concrete-filled flywheel kicks in.

Placing the pump at the surface, as opposed to using a submersible pump, further reduces the amount of energy needed because DC power availability drops over distance.

Simplifying the pumping system also meant reducing potential for damage to the pump from sand and other contaminants. On wells of less than 150 ft depth, leathers or rings were eliminated. The piston is made of carbon fibre plastic and the cylinder of stainless steel. Armstrong reports losing 10% of the water in a 100 ft. deep well, but the reduced friction increases efficiency enough to make up for water loss. Sand granules that otherwise would scour and scrape leathers and rings pass by.

"Our goal was efficiency and dependability," says Armstrong. "I wanted to build a pump that farmers could fix just from seeing it run and a customer could use and pass on to his grandkids."

Armstrong says his pumps run on half the array of solar cells competitors require. Batteries will be available, but he recommends against them due to potential for lightning damage and increased maintenance. He suggests using water tanks and cisterns to provide water when the sun isn't shining.

The pump is designed to be operated by hand in an emergency and this fall Armstrong plans to introduce a wind-powered alternator that can be attached to the pump in addition to or instead of the solar array.

Solar-powered pump has a walking beam/rocker arm design similar to that of oil well pumps. Concrete-filled flywheel kicks in at 40 rpm's to boost efficiency.

Armstrong is looking for dealers.

"Our first market will be the livestock farmer, secondly the light irrigator and finally third world countries," says Armstrong.

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Former Dairy Farmer Now Makes Manure Pumps, Repairs Mixers

As a young man, Mike Friedenfels enjoyed working in the shop on his family's dairy farm near Medford, Wisconsin.

That's why, he says, after several years of dividing his time between dairy farming and selling silage and manure handling equipment, he decided to turn his empty dairy barn into a custom farm equipment fabrication shop.

He had started making manure pumps from new Browning transmissions when he was approached by Neal Koepke, an Edgar, Wis., dairy farmer, who wanted to know if he could make one from the gearbox on an old square baler. Koepke had heard a story about someone who had done it but he didn't know how.

Friedenfels agreed to give it a shot if Koepke would provide the parts.

Koepke located a Deere 14T baler at a dealership and paid $50 for it. Friedenfels tore the gearbox down and successfully modified it to pump manure.

"A new pump and motor were going to cost me $6,000 or so," Koepke says. "Including what I paid for the baler, Mike's pump was less than half that, and he installed it, too."

Word of the baler gearbox-turned-manure pump spread and Friedenfels' phone began ringing with requests from dairy farmers who wanted one.

"I invested in some shop tools and began making more and more of them," he says. "There are hundreds of old balers sitting around that nobody wants so we're recycling parts. After all, a manure pump is really just a gearbox with arms on it. We make use of the flywheel, too, because that allows the pump to work better with less power."

Friedenfels has made about 80 manure pumps since he built the first one for Koepke six years ago. "We've made several changes in the design over the years," he says. "Just about any baler transmission will work for these pumps."

With one full-time employee, he made and installed 20 pumps the year before last. He says last year was a little slower because of lower milk prices.

In the process of making and installing manure pumps, Friedenfels identified another need on many dairy farms. "Dairymen who feed total mixed rations needed someone to repair their TMR mixers," he says. "Half my business now is rebuilding mixers. We fabricate new parts, remanufacture augers and flighting, and basically restore them to near-new condition at a fraction of the cost of a new machine."

In the process of working on mixers he has come up with a number of his own repair methods.

"I can rebuild augers ranging in diameter from 4 in. to 3 ft.," he says.

He also fabricates manure handling augers and conveyors. "I've developed an auger that can be used with sand bedding," he says. "Not many augers can handle both manure and sand, but we've come up with the right materials, bearings and seals to do it."

Friedenfels says he's not spent a cent on advertising his business, yet he has more than enough to keep him busy. He says the secret to running a successful fabrication business is being able to help customers solve their problems with quality equipment and then providing the service to back it up. "That, and you have to be happy doing what you're doing," he says.

He figures the need for custom fabricating shops like his is on the increase, as farmers everywhere want equipment modified to fit their needs or just need things rebuilt to save the cost of buying new.

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Friedenfels used the gearbox from an old square baler to make a low-cost manure pump.

"Vacuum-Powered" Portable Water Tank Always Stays Full

"My trailer-mounted 500-gal. water tank uses a simple vacuum design that's trouble free. I made it from a 550-gal. fuel tank so it didn't cost much to build," says Eldon Marks, Amboy, Minn.

Marks uses the tank to water a cow-calf herd on pasture.

The tank rides inside a wooden saddle mounted on a 2-wheeled trailer. Marks used 4-in. channel iron to make the trailer frame and welded auto wheel hubs onto the frame. A water trough is welded to the frame on back.

A garden hose is used to fill the tank from the top. A discharge pipe runs out of the back of the tank into the trough.

Marks says the tank works on the same vacuum principle used by old chicken fountains. As the animals drink they lower the water level in the trough, which causes the discharge pipe to suck air into the tank, releasing more water down the pipe. "The incoming air causes the water to gurgle and also keeps it fresh," says Marks. "It keeps water from freezing as rapidly. It'll work in temperatures down to 20 degrees above zero without freezing up, as long as I park the trailer so the discharge pipe faces toward the sun."

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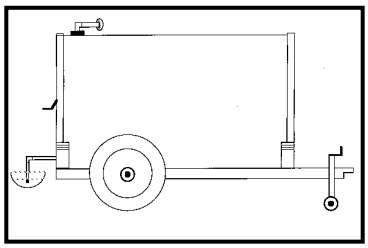

As animals drink they lower the water level in trough, which causes discharge pipe on back of tank to suck air into tank, releasing more water down the pipe.