Self-Propelled TMR Mixer

If a high-producing dairy herd misses its twice a day Total Mixed Ration (TMR), it can crash herd health along with milk production. That's why Pat Mullenbach built his self-propelled TMR mixer.

Mullenbach started with a new 375 cu. ft. Patz TMR mixer. Because it was needed morning and night to mix feed, work time on the add-on power unit was limited to mid day hours. That worked OK because Mullenbach intended to build it so it could be converted back to its tractor-tow configuration.

"I can convert it back to a tractor-towed unit in 20 minutes if I ever have a problem with the engine or other components on the power unit," says Mullenbach. "I just take six bolts out, lift the power unit out of the way, bolt the original hitch up and drive away."

He replaced the mixer's original axle with a hydraulic-powered truck axle. In its tow mode, the axle free-wheels.

Building the front end was trickier. Because it could not be integrated with the mixer's chassis until the last moment, Mullenbach built it so he can move it around with a forklift. This allowed him to move it into place on the mixer when needed.

"It was easier than using overhead hoists or blocks," says Mullenbach. "I can use the forklift to remove the power unit if I need to switch back to tow mode."

The power unit itself consists of an engine and hydrostatic drive from an IH 815 combine mounted on a frame built of 2 by 12-in. steel tubing. The operator area, without enclosure and front axle as well as the tin for enclosing the drive unit, came from a White 8700 combine. Originally, he had planned to use its motor and hydrostatics as well but that would have required mounting a separate hydrostatic drive unit with a drive belt.

"I ran across the IH 815 with the hydrostatic drive already mounted," explains Mullenbach. "It made the job super easy."

Integrating the chassis of the trailer with the chassis of the power unit was key to the project's success. The Patz hitch is designed to be adjusted to fit various height tool bars. Removing the hitch left a faceplate with six holes. The trailer frame angled to a point at the faceplate. Mullenbach designed his power unit frame with a plate that would bolt to the trailer hitch. The power unit frame also extended behind the plate to fit against the top of the trailer frame. Two posts extending down from the power unit frame, one on each side of the trailer frame, act as stabilizers.

Mullenbach mounted the engine so it faced the TMR trailer, leaving air space between the two. Tin mounted over the engine extends back and slightly over the trailer to block feed from spilling on the radiator.

Mounting the engine backwards allowed him to drop a belt from the main drive pulley to a 26-in. pulley mounted on the frame with a 540 pto shaft in line with the TMR pto. A hydraulic pump mounted in the IH gearbox provides power to raise, lower and run the unloading conveyer.

Mullenbach reworked a Patz 375 cu. ft. TMR mixer to build this self-propelled model.

The open seat and controls mount high on the frame for visibility. "I wanted to see over the top of the mixer instead of using mirrors," says Mullenbach. "With no cab, I have to deal with the weather, but I have super visibility without having to wash windows."

He reports the unit works great on his concrete lot. He estimates out-of-pocket costs for the power unit and trailer adaptations ran him about $1,800.

If he were doing it over, Mullenbach says he would consider building an integrated power unit and chassis with combine drive wheels. Rather than unhooking the mixer trailer for tow-behind use, he would simply lift the mixer and wagon box off the new chassis and return it to the original chassis.

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How To Build An Electric-Powered Pickup

Bill Wilson is able to drive to town without burning an ounce of fuel. That's because he converted his 1983 Ford Ranger pickup to electric power.

Instead of an engine, the pickup now has six 6-volt, deep cycle batteries under the hood and 12 12-volt deep cycle batteries back in the bed. Wilson removed the pickup's engine, radiator, and exhaust system. All those components were replaced by a 10 hp DC electric motor off an old forklift. A 3-stage controller links the motor to all the batteries. The motor direct-drives a 3-speed Chevrolet transmission, which replaces the pickup's original 5-speed transmission.

Gauges installed in the cab tell Wilson how many amps are being drawn by the motor and how many volts are still left in the batteries. A 110-volt charger is used to charge the batteries.

"It's virtually maintenance-free and eliminates the need for mufflers, fuel and oil filters, fan belts, antifreeze, oil changes, spark plugs, and tune-ups," says Wilson, who made the conversion last year. "I use it all the time, mainly to get parts in town which is 10 miles away. Everyone around here is interested in it.

"I figure it costs only about one third as much to operate this electric-powered pickup as it would cost to operate a regular pickup."

The truck weighs about 1,000 lbs. more than when Wilson bought it, mainly because of the batteries. "I chose this Ford Ranger because it had a small diesel engine in it and therefore a heavier suspension.

"It'll go a bit more than 20 miles on one charge. I paid $100 for the pickup and $250 for the electric motor. I paid $20 apiece for the batteries, which I bought from a battery wholesaler. The batteries were from golf carts where all batteries had been replaced as a set. My total cost for all the components was about $1,000."

The pickup goes down the road at 40 mph. "It's not a highway machine, and I don't have a lot of torque going uphill. I plan to add a small gas engine to make it into a hybrid vehicle to boost the pulling power on uphill grades and also to charge the batteries. Since I made the conversion I don't have any heat, but using the gas engine I intend to make a heat exchanger off the exhaust."

Through different wiring strategies, he's able to connect the batteries in series and in parallel to deliver variations of 18, 36 and 48 volts to the motor. He controls the switch from one voltage level to another using the pickup's original gas pedal. As he increases pressure on the pedal, it activates different micro-switches and relays that then change the power source combination to give different voltage levels and hence different drive power. "I start out on 18 volts, then I go to 36, then to 48," says Wilson. "I pull 12 volts off one of the batteries to operate the lights, horn, and other accessories."

Some of the elements of driving the electric truck have been a learning experience. For example, with no noise except the tires on the road, you don't realize how fast you're going. "At first I found when slowing down there was too much momentum so I frequently had to use the brakes harder. At the same time, the motor doesn't provide the back pressure for slowing down like an internal combustion engine so that impacts the operation as well.

"I only use the transmission to set speed ranges, not to shift going down the road," he notes.

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Photos courtesy Sanders County Ledger

Bill Wilson converted his 1983 Ford Ranger pickup to electric power. Instead of an engine, the pickup now has six 6-volt, deep cycle batteries under the hood.

Pickup's engine was replaced by this 10 hp DC electric motor off an old forklift. Motor direct-drives a 3-speed Chevy transmission, which replaced the original transmission.

There are twelve 12-volt deep cycle batteries in the bed of the pickup.