Farm-Based Biodiesel Plant Produces 1.2 Million Gallons Per Year

"Five years ago I filled up my semi tractor with diesel and the bill came to more than a thousand dollars," says Luke Jaeger of Minneola, Kan. "That's when my brother and I decided to figure out a way to produce our own fuel for our farming and trucking business."

Luke and his brother Matt made their first batches of biodiesel in the kitchen but it didn't quite meet fuel standards. They kept tweaking the process and eventually devised a workable system. They built their own reactors to expand production capacity rather than buy expensive new equipment. "That's probably the smartest thing we did," says Luke, "because we've paid for the materials as we've grown rather than borrowing a big sum of money to build a large capacity plant."

For a few years they produced biodiesel only in the winter. Now their plant can produce up to 5,000 gal. in 24 hrs., 23,000 gal. a week and about 1.2 million gallons a year. Their commercial license allows them to produce and sell biodiesel to farmers, truckers and other customers in the area.

"We get most of the oil to make our biodiesel from a nearby soybean processing plant but we also collect used vegetable oil from several businesses," Luke says. "We've also made biodiesel using canola oil, corn oil, chicken fat and beef tallow. Some of those products have low value on the commercial market, so it's a real benefit for us to make some very good fuel from what is basically a waste product."

Some of the equipment in the Jaegers' current plant was purchased used from an oil refinery. Other pieces they made themselves or had custom-built in a local machine shop. "It's wasn't too difficult to scale up the production once we knew the process and had the system figured out," Luke says. "We have an engineer who oversees the operation so we can run the plant 24 hours a day." With their current production they make all the biodiesel for their own farm tractors and diesel-fueled trucks and sell to several customers within 100 miles of the plant.

The Jaeger's plant has allowed the brothers to help build better awareness among friends and neighbors of the benefits of biodiesel. "The fuel we're making is better at lubricating an engine and it has 10 to 15 percent higher cetane than straight petroleum diesel," says Matt Jaeger. "That means an engine will have less wear over time and produce more power. Our biodiesel also has 80 percent lower CO2 emissions, so engine exhaust is cleaner."

The Jaegers have been able to sell all of the biodiesel their plant can produce, but they're not going overboard to expand. "The plant is making money and paying for itself," Jaeger says, "but we'll move slow on expansion. We're giving our customers a quality product for less money than petroleum-based diesel, and that's the main focus right now."

Luke and Matt Jaeger can make up to 1.2 million gallons of biodiesel a year in a plant they built themselves.

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Home-Built Lawn Tools Keep 86-Year-Old In Business

When Frank Orr needs a new piece of equipment for his lawn care business, he makes it. A simple modification to a zero turn mower lets him trim with it as well as mow. He turned a 3-pt. hitch aerator into a pull-type for use behind his mower, and he also built a dethatcher to fit the mower.

"I'm 86 years old, and these attachments help me keep my business going," says Orr.

Trimming with a zero-turn mower is easy for Orr. Not wanting to use a push mower or string trimmer, he figured a way to tip just the front left deck corner of his mower.

"I wanted to lower the entire left side of the deck, but I settled for the front corner," says Orr.

The entire bed raises and lowers as before for typical mowing. Normally the lift mechanism is attached to the deck at four points. However, when Orr wants to trim, an added electric actuator comes into play.

The actuator attaches to the left front lift bracket on the deck and goes through a sleeve that's bolted to the mower lift arm for that corner of the deck. Retracted, the actuator has no affect on the deck, and it raises and lowers normally. However, as it's extended, the weight of the deck allows the left front deck corner to tip toward the ground.

"I can drop that corner as much as 3 in. lower than the rest of the deck," says Orr.

Converting a used 3-pt. aerator to hydraulics and a trailing hitch meant Orr didn't need a tractor. He also didn't have to wrestle the heavy aerator to hook it up.

"I need attachments that are easy to connect and disconnect," says Orr. "I put a cylinder on it and rear wheels so I can raise it off the lawn."

Orr fabricated a hitch and pinned it to the receivers for the 3-pt. lift arms. Initially he attached an electric actuator between the hitch and the receiver for the top-link arm.

"The actuator was slow, so I replaced it with a hydraulic cylinder," recalls Orr. "I mounted a power steering pump to power the cylinder."

Orr mounted steel wheels with hard rubber surfaces from an old cultivator to the rear of the aerator. To vary the depth of the aerator tubes, he simply extends the cylinder on the ram to tip the entire unit back on the wheels.

"I added a steel rock box," says Orr. "It holds 700 to 800 lbs. to push the tubes into the ground."

Orr's front-mounted dethatcher removes thatch and chops it up at the same time. "I mow as I go over it with the dethatcher and then mow again," he says. "It chews up dead grass fine so I don't remove any nutrients from the lawn."

Orr fabricated the dethatcher frame using 1 by 2-in. steel tubing. A rectangular frame supports two swivel wheels at its front. Orr bought the wheels, but made the swivel brackets.

Two arms extend from the frame to a round steel shaft that fits in a bracket Orr attached to the front of the mower frame. The shaft is held in place by two pins.

The actual dethatching unit consists of side delivery rake teeth attached to two, 5-ft. long pipes. The pipes are mounted to a subframe that pivots inside the main frame. An electric actuator mounted to the round shaft at the mower frame extends to an L-shaped upright mounted on the pipes. Orr can adjust dethatcher height by extending or retracting the actuator shaft. Attaching or removing the dethatcher is just as simple.

"All I do is pull two pins and unhook the power to the actuator," he says.

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Deck tipper added to zero turn riding mower lets Frank Orr use machine to trim as well as mow. Electric actuator is used to tip front left deck corner of mower.

He built a dethatcher to fit on front of the mower (above) and turned a 3-pt. hitch aerator into a pull-type unit.