Self-propelled robotic tug can easily tow 10 adults on a trailer at 2 1/2 mph, says inventor Roy Visser.

Power for the tug is provided by an engine-driven generator. Power tools can be plugged into a pair of 110 and 220-volt outlets.

Robotic Tug Can Pull Trailer, Power His House

Roy Visser's generator goes where it's needed as he walks alongside, directing it with handheld controls. If the house has a power outage, Visser directs the self-propelled unit to the house, disables the drive and plugs the generator into the house circuits. If he needs to move a trailer around the yard, the little tug, which he calls "Anti-OSHA", does that job as well.

"I like building things with multiple uses," says Visser. "When my teenage son and I decided to build a robotic tug, I wanted it to do more than just pull a trailer."

An older Coleman generator provides power for the tug. Driven by a 6.2 hp Briggs and Stratton engine, the generator puts out around 4.5 kW. Power is fed directly to two 1.0 hp, 220-volt AC motors.

"The motors are mechanical drive with high starting torque," says Visser. "They have so much torque that we had to increase our drive gear size and rebuild the boxes. We broke one of the gears in half."

Most of the frame is composed of 1-in. sq. tubing with some 1-in. round tubing and 10 and 11-gauge steel plate. The tug itself is only about 4 ft. by 3 1/2 ft. and about 4 ft. high, but weighs 550 lbs.

The main frame of the tug ties everything together. Drive wheels mount to the main frame with spindles from a 1979 Chevette. Front caster wheels, with their 600-lb. weight limit, are mounted to a collapsing spring. A kneel bar protects the caster wheels if the tug drops off an edge or if the tug is lifting something heavy.

"We drove the tug off a 6-in. drop and when it hit the sod, the kneel bar took out an 8-in. deep chunk in the lawn," says Visser. "The caster wheels had collapsed up and behind it."

The kneel bar is also needed if another structural element is put to use – an armor-plated front end. The 10-gauge steel plate pivots on the lawn tractor's front axle. Visser designed it for dual purpose as well. Linkage allows it to be used like the blade on a bulldozer to slowly raise or lower the bottom edge of the plate up to 18 in. off the ground. Or it can be set to trigger with substantial force.

"It's articulated with a large suspension spring from a mid-sized car," explains Visser. "You can replace the linkage with flexible cable and a latch. Then if you strike the center of the blade, it springs loose. It can throw another robot through the air or would easily lift a car off the ground. We stretched a 3-ton rated ball joint with it."

The armor plate and its supports can be removed from the main frame as a single component. It alone accounts for 175 lbs. of the total weight.

The final structural element is the motor/generator sub frame. It's mounted to the main frame on rubber connectors. They protect the main frame from generator-produced vibrations.

Although Visser and his son built the tug largely for fun, it really is multi-purpose. He can plug power tools, a compressor or a welder into a pair of 110 or 220 outlets. If the tools are on wheels, the tug can pull them to the work site and then supply power. Visser also uses the tug as a drive unit when groups visit the farm.

"It can easily tow 10 adults at 2 1/2 mph on the trailer," he says.

Canadian researcher Richard Grosshans built this cattail harvester that's towed by an 8-wheel Argo amphibious vehicle.

Unit carries a small, gas engine-powered hydraulic pump that operates a 6-ft. sicklebar mower.

Cattail Harvester Provides Fuel, Captures Phosphorous

If Canadian researcher Richard Grosshans is right, cattails could be a new wonder crop. What started as a way to filter phosphorous (P) from surface water has evolved into a much bigger deal. He has even designed and built a cattail harvester.

"Phosphorous runoff has been looked at as a pollutant and waste product, but it's actually a valuable resource. If we can harvest plants that absorb it, we can capture energy and recover the P."

Funded by the International Institute for Sustainable Development, Grosshans initially looked for a way to remove the excess P that ends up in surface water and that cattails naturally absorb. Using the cattails for biofuel made sense. Now the researcher is looking at cattail fuel ash, which retains 90 percent of the P, as a fertilizer source.

To test his ideas, Grosshans designed and built a cattail harvester. The harvester is a trailer about 5 ft. long and 5 ft. wide with ATV-type flotation tires. It's towed by an 8-wheel Argo amphibious vehicle. It carries a small, gas engine-powered, hydraulic pump and a heavy-duty, 6-ft. sickle bar mower.

"The trailer is also hydraulic, so we can lower the mower and then adjust the cutting height by raising or lowering the trailer," explains Grosshans. "After trying air boats and other systems, we discovered the best harvesting condition was to be in water a foot or less in depth."

He also discovered that the best cutting height for the plants was about a foot. Cut too low, and the plant would drown.

"We want the stubble to live so the plant will regrow to be harvested again," says Grosshans.

The cut cattail stalks were initially baled for use in a burner designed for square bales. Grosshans switched to pelletizing for a standardized fuel product. The next step is to build a bigger harvester that cuts, gathers and hauls the material out of the wetland.

"It may be like a corn forage harvester with large balloon tires for low impact," he says. "We are also looking at modifying some European machines that harvest reeds for roof thatching.

At first the cut cattail stalks were baled for use in a burner, but Grosshans has since switched to pelletizing the stalks.

"We are doing some greenhouse experiments to see how valuable the cattails are as a fertilizer source," says Grosshans. "We hope to have the harvester ready in about a year and a half as we go from pilot scale to commercial scale."

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