Leitgen's custom build drone can carry a 30 lb. payload and has a 65-in. dia. aluminum hoop frame.

Custom-Built Cover Crop Seeding Drone

Drones being marketed for use in agriculture keep getting bigger, but they still have their limits, notes Tom Leitgen, Aeroseeder. Leitgen does custom application of crop protection chemicals, as well as in-season seeding of cover crops. He also sells drones equipped for spraying fields, and one he builds specifically for seeding cover crops.

"In the past year, the market has exploded, with Chinese companies introducing drones with 60 to 110 lb. carrying capacities," says Leitgen. "I have one I sell that has a 110 lb. capacity."

Leitgen designed and built his own after failing to find a commercial alternative suitable for cover crops. The Aeroseeder AS30 seeding drone shares the lift-generating multi-mini helicopter aspects of traditional drones. However, the 65-in. dia. hoop frame supports a cone-shaped seed bag to hold the 30-lb. payload of seed. The design also differs with its 55-in. height landing gear.

The AS30 has GPS-controlled positioning and features an adjustable seeding rate, sensor-controlled altitude and terrain following, and an automatic "return when empty/resume where left off" function.

"I went with aluminum versus carbon fiber because it's more cost-effective," says Leitgen. "Conventional drones need a nice flat surface for landing. My landing gear design is more stable when landing in weeds or soft and uneven ground with its wide footprint."

Dedicated software also differentiates the AS30 from its competitors. Leitgen has worked with a software firm to develop control software specific to agriculture and cover crop seeding.

"Our software is more flexible in terms of distance flown," says Leitgen. "We have certain functions we can turn on and off as needed. Seeding cover crops is easier than applying chemicals. We don't have to fly as close to the ground."

The AS30 can seed up to 240 acres in 8 hrs. Leitgen notes that while a flight to distribute seed may take 4 1/2 min., that likely includes 2 min. of ferry time back and forth to the area being seeded. The 6-min. refill is the bottleneck in the process.

"I'm looking at adding peripherals to speed reloading," says Leitgen. "Now we have one man filling and weighing buckets of seed and a second person filling the seed hopper. At the end of the day, having handled 1,000 lbs. of seed, I know I was out there working."

While flight patterns are programmed, landing and takeoff remain a manual control job. Leitgen is looking at light guidance systems that would automate landing at a precise point. This would facilitate having multiple drones on a trailer with an automated refill system.

Currently, drones are most efficient at specialty jobs, such as in-season cover crop seeding or applying chemicals in small, odd-shaped fields. Leitgen notes that they're also effective at applying very low-rate products such as fungicides at 2 gal. per acre.

"When you're trying to handle a large volume, the drone is just one small piece of the puzzle," says Leitgen. "Sooner or later, drones will be making major applications. However, if doing 50 gal. per acre, you must have certain efficiencies built into the system."

"Chinese companies are now the market leaders, and they have some very good products," says Leitgen. "Package delivery and other novel uses are still hard to justify. In agriculture, we have people willing to pay us to do the work because a drone is often the best piece of equipment to do the job."

"We're planning to launch a model with an American-made brain in 2024," says Leitgen. "It's becoming more important to have American-made components to know you can control the data. Anyone dealing with infrastructure should be concerned about back doors in Chinese-made drones."

While FAA regulations have been slow to adapt to drone use, Leitgen is encouraged about changes being considered. Insurance is now available from several companies.

"Farmers don't want to have to wait to do what they want done," says Leitgen. "Given the price of a new tractor or drill, $25,000 for a sprayer drone or $17,500 for my AS30 is cheap enough, and they're easy to use."

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Smoke from burning chunks of wood is pulled down through the fire tube and, with the charcoal, produces carbon monoxide, hydrogen and some methane. These gasses are filtered, cooled and diverted to the engine to fuel it in place of gasoline.

Wood Splitter Runs On Wood Gas

David Boyt makes lots of wood chips sawing up logs, as much as a ton on good days. He also burns about 4 gals. of gasoline. With a ton of wood chips equaling the energy in 120 gals. of gasoline, it made sense to put them to work.

"Running my gasoline engine on wood gas has been on my to-do list for over 40 years," says Boyt. "Cars, trucks, motorcycles, tractors, barges, and even German tanks were converted to run on wood during World War II. However, after the war, most people happily scrapped their wood gasifiers and returned to the convenience of gasoline and diesel."

Boyt notes that when fuel prices skyrocketed in the 1970's, interest in gasifiers flared up (Vol. 28, No. 4). In a belated response, the Federal Emergency Management Agency (FEMA) published a manual, Construction of a Simplified Wood Gas Generator for Fueling Internal Combustion Engines in a Petroleum Emergency. Boyt used the manual as a basis for his project, quickly learning the manual overestimated ease of construction.

"FEMA claims the gasifier can be built in a couple of days from commonly available scrap with simple tools and no special skills," says Boyt. "That assumes you have 6-in. steel pipe, 4-in. threaded pipe, caps, and more in your scrap pile.

"It also assumes you have the skills and tools for airtight brazing, stainless steel welding, and cutting 1/8-in. steel plate," he adds.

The manual was for a stratified downdraft design. Smoke from burning chunks of wood is pulled down through the fire tube and, with the charcoal, produces carbon monoxide, hydrogen and some methane. These gasses are filtered, cooled and diverted to the engine to fuel it in place of gasoline.

An essential element of the plan is that the gasifier be airtight. This is vital, not only for operation but also for safety. A wood gas leak could flare unexpectedly.

Components included the fire tube, a grate, the enclosing barrel, a 5-gal. filter chamber filled with wood chips, and a flexible steel hose between the barrel, the filter chamber, and the engine carburetor. Other elements included a cleanout tube at the bottom of the barrel, a shaker mechanism to prevent ash buildup in the grate, and a blower to initiate downdraft.

Once completed, all that remained was firing it up. That was a multi-step process that included adding a bed of charcoal to the grate through the fire tube and oil-soaked, crumpled newspaper on top of the charcoal. Boyt then dropped a wad of burning paper in. Once the fire was established, he first added a 6-in. layer of pine wood and then filled the fire tube with oak wood chips and started the blower.

"The first time, all I had was smoke," says Boyt. "The second time, I oven-dried wood cubes for several hours, and once the fire started, I paid close attention to the mix of air and wood gas."

He notes that it took trial and error to get the right mix. Once he had the engine running smoothly, it ran without hesitation. His first use of the wood gas was on an engine powering a wood splitter. It ran without hesitation.

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World's Only Flexible Lightbulb

IncrediBulb is the world's only flexible, 100 percent shatterproof LED bulb. It's ideal for shops, barns, stalls, basements, boats, motorhomes, and other spaces where light bulbs can be easily knocked around and accidentally broken.

"The inspiration behind IncrediBulb was to create a safe lightbulb, where you never have to worry about broken glass," says IncrediBulb inventor Joelle Mertzel. "They work like any traditional lightbulb. It has a standard base and fits into virtually any fixture."

They can last up to 13 years and are made from environmentally-friendly silicone instead of plastics. The bulbs will stay cool to the touch even after running for hours. Furthermore, these flexible LED bulbs provide as much lighting as a traditional bulb but with only a fraction of the energy.

The 5W IncrediBulb can replace a standard 40W bulb, while the 7W replaces a 60W. "Since the bulb uses LED technology, it requires a fraction of the energy to operate," says Mertzel. "It will significantly reduce your utility bill."

Choose from "Daylight" for a bright white color in the kitchen, office, and bathroom, or "Soft White" for a warmer look in bedrooms, dining rooms, and living rooms. "There are no special care instructions for using these bulbs," says Mertzel. "They're also suited for outdoor locations."

IncrediBulb is made from silicone rather than glass, making it shatterproof.

All IncrediBulbs ship from the company's warehouse in Northridge, Calif. At publication, it's possible to purchase a two-pack for $9.99 or a 12-pack for $49.99. Shipping is a flat rate of $3.95 per order.

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