Linttas hybrid electric combine (artist impression).

Electric Combine Closer To Reality

Terry Krieg and Malcolm Lucas of Kangaroo Flat, Australia, combined their skills and expertise to build the world's first electric combine.

Krieg, with a power industry background, and Lucas, an innovative farmer-inventor, created and tested their prototype Linttas Electric Harvester over nine years.

Surprisingly, this working original was stolen from the farm in broad daylight. Fortunately, the pair were already developing a new and upgraded design based on their learned experience and observations.

"An electric combine is well overdue in the history of agricultural machines," Krieg says. "Especially as it's arguably the most complex machine on the farm."

Since the earliest typical harvesters, Krieg says there's been little or no concern for energy conservation or lowering the carbon footprint. "We've just made things bigger, adding more horses or mules, then larger engines, now over 1,000 hp. in some models."

He explains that electricity saves energy and optimizes performance. Wasted energy consumption, including hydraulic pumps, belts, pulleys, chains and transport sections, is eliminated in the Linttas threshing process.

"Electric drives on each shaft, each with variable speed drives, help tune the threshing and grain separation process for optimal energy use and the highest performance," Krieg says. "We achieve the tuning using sensors and machine learning algorithms."

Grain separation can be precisely adjusted on the fly.

"Another big reason for electric is machine simplification and ease of repair," he says. "From the outset, we considered the 'right to repair.' Because we only use off-the-shelf components and add self-diagnostics, plugs and sockets, the operator can diagnose and repair problems guided by the software diagnostics. An electric harvester is cheaper to purchase, repair, and easier to update when new technology comes along."

Battery solutions are generally considered feasible for smaller agricultural machines (up to 100 hp.) but not for equipment as large as a combine on broad-acre farms. The Linttas Electric Harvester is hybrid-electric, using a single diesel engine running at optimal speed to drive an onboard generator and supply electrical energy.

"Since it's always performing at optimal levels due to the machine learning (artificial intelligence) and an infinitely adjustable grain separation process, the engine is expected to last longer and use up to 30 percent less fuel than a traditional combine," Krieg says.

Eventually, the pair hopes to upgrade the diesel engine, replacing it with a hydrogen-powered alternative when such engines and fuel distribution systems become readily available.

"Right now, we're aiming at a lower carbon footprint for the life of our units. Our diesel-electric solution saves energy and is simple to operate and repair."

Krieg and Lucas have patented the electric machine but have yet to start manufacturing it. They're open to producing the combine with an industrial partner who supports their design concepts and aspirations.

The commercial production timeline depends on investment and collaboration. The pair are poised to enter an agreement with a research partner for the final concept simulation and modeling, which they estimate will take 12 months. They hope to use that modeling to optimize their design and develop the control algorithms before entering into a manufacturing agreement in 2026.

"We know what we're developing will forever change how machinery is designed," Krieg says. "We recognize the industry may see this technology as a threat to their business models, so we're thrilled to get this to market but not by rushing headlong. We won't partner with anyone who doesn't share our ideals regarding sustainability and the 'right to repair.' This technology isn't pie in the sky. We know it works based on nine years of real-world experience."

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New Technology Supports Biologicals Until Deployment

Meristem Crop Performance offers farmers a new form of pest control with its patented liquid bio-capsule technology.

One of the biggest challenges with using biologicals has been keeping them viable until the point of use.

Meristem's specially designed Bio-Capsules store microbes in a sealed compartment until needed. They sit on top of 2 1/2-gal. jugs, and when ready for deployment, a plunger breaks the foil and releases the microbes into the insecticide.

The system keeps microbes separate, alive and vigorous, providing a dependable method of ensuring a high concentration for effectiveness. Combining biologicals with conventional synthetic treatments opens new possibilities for pest control.

Meristem founder and CEO Mitch Eviston explains that many biofungicides and bioinsecticides haven't been available to farmers simply because viability is challenging. "Now, for the first time, live beneficial microbes can be kept in a separate compartment on top of a jug and mixed with synthetics at the point of use," he says.

Meristem points to the multiple benefits of its technology.

- The microbial technology can be added to any liquid application for all-season flexibility.
- Liquid Bio-Capsules offer faster EPA registration as co-pack regulatory strategies drive them. This means more localized, cost-effective and specific remedies for any production challenges.
- The unique technology tackles the issues of keeping microbes and biology alive in the field, delivering more bang for the buck.

"With our patent-pending liquid Bio-Capsules, farmers can conveniently pair dry soluble with liquids to bring new options to their sprayer applications throughout the season when applying crop protection, micronutrients, PGRs (plant growth regulators), and other liquid applications," Eviston says.

"Now, for the first time, live beneficial microbes can be kept in a separate compartment on top of a jug and mixed with synthetics at the point of use," Eviston says.

"It expands the entire playing field."

Contact: FARM SHOW Followup, Meristem Crop Performance, 489 Village Park Dr., Powell, Ohio 43065 (ph 833-637-4783; www.meristemag.com).

Electrical power generation data from the panels and their various placements is being gathered to determine any output differences due to time and season.

Research Trial Monitors Solar And Farm Production

By Bruce Derksen, Contributing Editor

Rutgers University-New Brunswick is in the early stages of an agrivoltaics research and demonstration project assessing the relationship between solar energy generation and feed and livestock production. The goal is to investigate the potential benefits of solar energy in densely populated areas where land is shared with farming and livestock.

The Rutgers Animal Farm is hosting the initial project effort. There are 378 vertical bifacial solar panels facing east and west along north and south rows. Vertical panels generate electricity whether the sun hits the panel's front or rear.

A 3-acre grassy field contains three randomized production blocks. Panel rows are spaced at 20 and 40-ft. intervals, with either 2 or 4 ft. ground clearance. Electric wires are hung along the panels to prevent animals from interacting with them while still allowing space for grazing beneath.

"The output from the panels throughout the day is performing as expected," says Assistant Director and Agrivoltaics Program Lead David Specca. "It's interesting to see the electrical production curve as the panels catch the eastern morning and western afternoon sun."

The University selected Sunzaun, a vertical solar system developed by Sunstall Inc., for the Animal Farm portion of the research project.

A small group of beef cows began grazing among the panels in the fall of 2024.

Forage biomass measurements were gathered before and after the cows entered the blocks to determine if the panels impacted production in any way.

"The behavior of the animals is important to us," Specca says. "Further in the project, the cows will be fitted with GPS devices to monitor their movement and behavior, assessing whether they like the shade from the panels or tend to avoid them."

This data is hoped to shed light on the potential impact the different spacing and heights have on forage growth, beef performance and behavior.

Electrical power generation data from the panels and their various placements is also being gathered to determine any output differences due to time and season.

"Eventually, we'd like to see if this type of vertical bifacial system will work or affect other crops like vegetables and nursery crops," Specca says.

Additional University locations in Upper Deerfield and Pittstown, N.J., are completing similar research using single-axis tracker solar panels with pivot points 8 ft. above the ground over staples, vegetable crops and hay.

Several organizations and associations, including the Department of Energy, the N.J. Agricultural Experiment Station, the N.J. Board of Public Utilities, state appropriations, and other federal and state agencies, are funding the 7.4-million-dollar project.

The research trial is expected to continue over three more years.

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