



*This Unmanned Ground Vehicle developed by Robotics Plus was launched in California in October*

## Hybrid autonomous vehicle developed in NZ wins favour in US

*Autonomous multi-use agricultural vehicles designed and built by Robotics Plus in the Bay of Plenty are operating in North American orchards and vineyards, following a successful launch at the International Forum of Agricultural Robotics (FIRA) in California in October.*

Elaine Fisher

**“We were really pleased with the response our Unmanned Ground Vehicle (UGV) received at FIRA,” says Robotics Plus co-founder and chief executive Steve Saunders.**

The UGV attracted much interest for its innovative design as a multi-use modular vehicle and because it is a hybrid.

Steve says the horticultural industry isn't ready for all-electric vehicles yet. “People loved our hybrid design because it enables the UGV to operate for extended periods without the need to recharge.

“One big North American orchard operates 296 tractors. If they were all electric, just imagine what its charging station parking lot would look like. If the tractors were operating implements, they would need recharging every three to four hours.

“Our hybrid UGV has a Tier 4 diesel generator and all it does is generate electricity for the electric drive motors.”

The vehicle uses a range of technologies, including LiDAR (light detection and ranging) and vision systems to sense the environment and to optimise tasks, including the intelligent and targeted application of inputs such



*Dr Alistair Scarfe, co-founder and chief technology officer of Robotics Plus*



*Robotics Plus co-founder and chief executive Steve Saunders*

as sprays. Growers will be able to rotate multiple tools on the platform for tasks such as spraying, weed control, mulching, mowing and crop analysis.

While the UGV costs more than an orchard tractor, Steve says it saves labour costs and improves efficiencies. "A fleet of ten of these vehicles could be operated by just two people; one using a tablet to monitor the fleet from a ute or office, and another person to drive a nurse truck to replenish the spray tanks or remove obstacles should the UGV encounter any in the orchard.

"For our first commercial release of 20 machines in 2023, we will be working closely with key customers to manage the UGV's integration into their operations before we scale up production."

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Steve says the machines, which represent the fifth generation of autonomous vehicles designed by Robotics Plus, will eventually be available for New Zealand growers.

"North America is likely to be 75 percent of our market. We have focused on solving technical problems in the global agricultural industry to create the scale needed to build efficiencies, so we can then offer these solutions to New Zealand growers at appropriate price points. We are

super proud to be doing this in New Zealand, and design, manufacturing and pre-assembly of the UGV will continue to happen here."

Robotics Plus has strong partnerships both in New Zealand and the United States. "We have been able to test a couple of our machines on a Hawke's Bay vineyard before trialling them in vineyards in Napa County so we can learn about the different environmental challenges the machines will need to meet."

The Robotics Plus team of 104 people worked alongside growers, researchers and best-in-class technology suppliers to deliver the unique modular design for the multi-purpose UGV.

The innovations behind the machine have been informed by Steve's own experience as a grower and horticultural contractor, and by working closely with growers in New Zealand and the United States.

"We have been building relationships to understand the pain points the industry is facing and find solutions which make economic sense in terms of return on investment. One of our customers in the United States is a fifth-generation grower with 10,000 acres of apples. Working with these clients to solve problems is about trust and partnership."

Robotics Plus has been working to develop robotics for the horticultural industry since 2009 when Dr Alistair Scarfe, co-founder and chief technology officer of Robotics Plus worked on an autonomous kiwifruit harvesting machine as his PhD project from Massey University.

“We could see the pain points ahead for the industry, including labour, and decided to invest in the future – which isn’t normally done well in New Zealand. We tend to wait until the pain point becomes big enough before looking for solutions. Those solutions take time to build.”

Alistair says the hybrid electric diesel UGV delivers outstanding performance. “Electric drive motors give superior torque and control, while the diesel generator means the vehicle can operate for extended periods. Fuel consumption is minimised by electrically driving all systems, including tools. Regenerative braking and high-capacity batteries also extend efficiency and range.

“The vehicle’s lightweight design and intelligent all-wheel-drive system, with independent wheel motors to ensure grip and control, significantly reduces ground compaction to protect the soil,” he says.

The first application for the technology is intelligent spraying, a system which varies the flow rate to ensure spray efficacy while reducing inputs.

The highly manoeuvrable UGV has a small footprint and unique steering configuration, incorporating electric steering and independent motors, which increases productivity, allowing significantly more ground to be

covered than machines which turn on every second row or greater, depending on row configuration. The UGV can be deployed in a range of applications in various crop types with a minimum row spacing of 1.8m (6ft).

The vehicle has been designed from the ground up to be modular and easy to service. With no hydraulic, gearbox or differential fluids to be managed, operators can easily keep their vehicles running if a part fails by simply swapping out modules when needed. All of this is designed to reduce downtime and complexity for growers.

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Robotics Plus has partnered with best-in-class technology suppliers, including Yamaha Motor Company, Autonomous Solutions Inc, and Croplands, to significantly increase the robustness and support for the product in a demanding environment such as agriculture. ●

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