PITTERI VIOLINI

NEW ENERGY-EFFICIENT TECH CUTS OPERATING COSTS WHILE REDUCING EXHAUST EMISSIONS TO ZERO

Pitteri Violini and Parker have combined their expertise in agricultural machines and motion and control technology to develop an electric fruit-picking tractor. This project is the first step in a journey of transitioning the sector from legacy fossil fuel energy sources to a sustainable future.

> "While there remains an economic gap between an electric application and one driven by an endothermic engine, the road to decarbonisation has been mapped out, and there will be an increasing demand for zero-emission machinery. Pitteri Violini, will be at the side of small-to-medium domestic manufacturers, supporting them in the transition to increasingly sustainable applications thanks to Parker and its broad product portfolio."
>
> Pitteri Violini

CHALLENGE:

REDUCE CARBON EMISSIONS OF AGRICULTURAL MACHINES

The transition from diesel to electric agricultural machines is hindered by battery capacity limitations, the need for simplicity to accommodate unskilled workers, and design challenges, particularly for compact machines like fruit-picking tractors.

SOLUTION:

PARKER ELECTRIC MOTOR, COOLING & IQAN CONTROL AND DISPLAY SYSTE

Parker Hannifin and Pitteri Violini collaborated to select these components based on the functionality and mechanical configuration of the tractor, aiming to replace the diesel engine without altering the original design.

BENEFITS:

REDUCED EMISSIONS AND NOISE POLLUTION

The electrified fruit-picking tractor cuts operating costs by 80% without affecting machine availability and it significantly reduces noise and exhaust emissions, enhancing operator comfort and health while preventing fruit contamination.

Sustainable machines for the agricultural sector

The global population relies on the agricultural sector for food security, making efficient and sustainable production vital for human life. Organic farming with integrated pest management is a focus area for the industry. At the same time, fuel forms a substantial portion of the sector's operating costs and the pollutants emitted by these machines are harmful to operators and can contaminate plants, leaves, flowers, and fruit.

Pitteri Violini is a leading supplier of components, engines, and end-user machines for the construction and agricultural sectors. Known for its quality, originality, and excellent design features, Pitteri Violini has been making self-propelled machines for more than ten years. Its pioneering fruit-picking tractor already offers self-levelling features for fruit picking in mountains and hills. Electrifying this machine builds on its tradition of customer service and innovation to create sustainable machines for the agricultural sector.

Parker Hannifin, global motion and control technology company with 100+ years experience in developing technology, supplied several components for the electric fruit-picking tractor, along with extensive design and consulting services. The highly efficient GVM motor and GVI inverter allowed Parker to design a solution that meets the requirements of operating for a complete shift without the need for recharging.

The initial phase of this project was a direct replacement of the diesel power generation with an electric equivalent. However, future models of this machine will optimise the machine and offer even greater benefits.

Meet the Challenge

As with the migration of any heavy machinery, the limit of battery capacity often hinders the migration from diesel-powered engines to electric motors. Agricultural machines operate at long distances from the main farm infrastructure making it impractical for them to be recharged during a working shift. Any loss of time for recharging also significantly reduces the productivity of the operation.

The fruit-picking tractor was the ideal candidate for electrification due to its small size and lower power demand than other machines.

The electric technology behind the fruit-picking tractor

Parker selected specific electric components with the functionality and mechanical configuration of the fruit-picking tractor in mind. It was a requirement of Pitteri Violini to maintain the mechanical configuration of the original ICE tractor, and the GVM motor and GVI inverter were critical to achieving this objective. The prototype version of this machine meets the primary objective of replacing the hydrocarbon energy source with electricity but also lays the platform for optimisation in future models.

A collaborative approach

Parker and Pitteri Violini collaborated on the fruit-picker's electrification by analysing the performance of the ICE machine and the datasheet of the diesel engine. Hydraulic flow and pressure data were converted to energy, which formed the basis for selecting the GVM motor and GVI inverter - a very high-efficiency solution. The minimum battery capacity was specified based on the power consumption data from the GVM and GVI and the requirement to meet the tractor duty cycle requirements.

Business results

The electrified fruit-picking tractor is delivering outstanding results in terms of exhaust emissions and noise, including:

- Operating costs lowered by 80%. This massive improvement has been achieved without compromising on machine availability. The electric fruit-picking tractor runs for 12 to 14 hours after charging for eight hours at 220 to 380 volts.
- Noise levels around the machine have dropped from 80 dB to just over zero. This has made an immediate change to the comfort and risk of long-term hearing loss to operators
- Exhaust emissions have been reduced to zero as there are no fossil fuels used on the machine. This means that operators are no longer exposed to harmful CO2 gases and particulates, and fruit is free of contamination.

Based on the success of this project, Pitteri Violini plans to electrify ten fruit-picking tractors each year. The program will also be extended to other machines so that the entire