A 100% ELECTRIC TRACTOR

Novum Tech and Parker Hannifin: a close partnership for the future of agricultural electrification

BCS (Bonetti, Castoldi, Speroni), named after its founders, is an Italian industrial company specialized in the design and production of agricultural tractors, tillers, mowers and haymaking equipment. Federico Soresina, BCS product development and after-sales service manager, collaborated with Novum Tech to electrify a tractor using Parker Hannifin motors and pumps.

Novum Tech is a French start-up founded in 2020 in Goncelin, Isère, near Grenoble. It specializes in the manufacture of lithium-ion batteries and the electrification of off- and on-road machines, both new and retrofitted, including agricultural, public works, materials handling and other special-purpose machines. Novum Tech is a Parker distributor partner, certified CMEC (Certified Mobile Electrification Center).

Mickaël Robert, CEO and CTO of Novum Tech, began electrifying the BCS tractor almost a year ago, resulting in the first 100% electric tractor, the e-Vanguard.

The tractor's base is identical to the diesel model, simplifying the production line and keeping costs under control. This lightweight tractor features an optional reversible driver's seat. Equipped with a 40 kW electric powertrain, it retains the typical characteristics of isodiametric tractors, maintaining the same dimensions as the traditional version and being fully compatible with existing equipment.

CHALLENGE

Electrify a combustion tractor at a controlled cost, while maintaining low voltage, which limits power.

SOLUTION

Two motors NX8M are installed because of the low voltage: the first, at the rear and connected directly to the gearbox, manages traction. The second, located at the front and connected to the pump, manages the hydraulics for the implements and power steering, incorporating effective temperature management through natural and liquid cooling.

BENEFITS

The dual-motor solution improves performance while controlling costs, maintaining optimal traction and hydraulic function. The electric tractor operates 7 dB quieter than its diesel counterpart, eliminates CO2 emissions, and is ideal for urban applications with reliable operational range.

Clearing technical hurdles

"One of the challenges of this transformation was to maintain a low voltage of 48 volts," explains Mickaël Robert" which limited us in terms of power.

The first prototype came out after six months. This was followed by a fine-tuning phase of equal duration, and the addition of options such as an air-conditioned cabin. "Having the engine at the front made things easier in terms of integration," notes Mickaël Robert. The adaptations involved modifications to the hood while retaining the mechanical transmission. "We had to work particularly hard on power regulation and temperature management of Parker NX8M motors dedicated to mobile machines. We are among the first to use them at these power levels.

Novum Tech also modified the size of the mechanical interface on the traction motor. Romain Bernollin, Industrial Automation Sales Manager from Parker, nevertheless points out: "Modifications must not deviate too much from catalog products for better cost management."

Solution

Mickaël Robert: "We decided to implement two NX8M motors because of the low voltage: one for traction, the other for hydraulics to manage tools and power steering. This opens up more possibilities than with the internal combustion model. A single motor would have required a higher voltage.

Romain Bernollin adds: "These motors are designed for maximum power density, and they can be cooled by natural convection.

Their performance can be increased with the addition of liquid cooling, which is necessary in some cases of low-voltage motors, as seen in the e-Vanguard tractor."

The hydraulic pump associated with the hydraulic motor also comes from Parker Hannifin: a PGP.

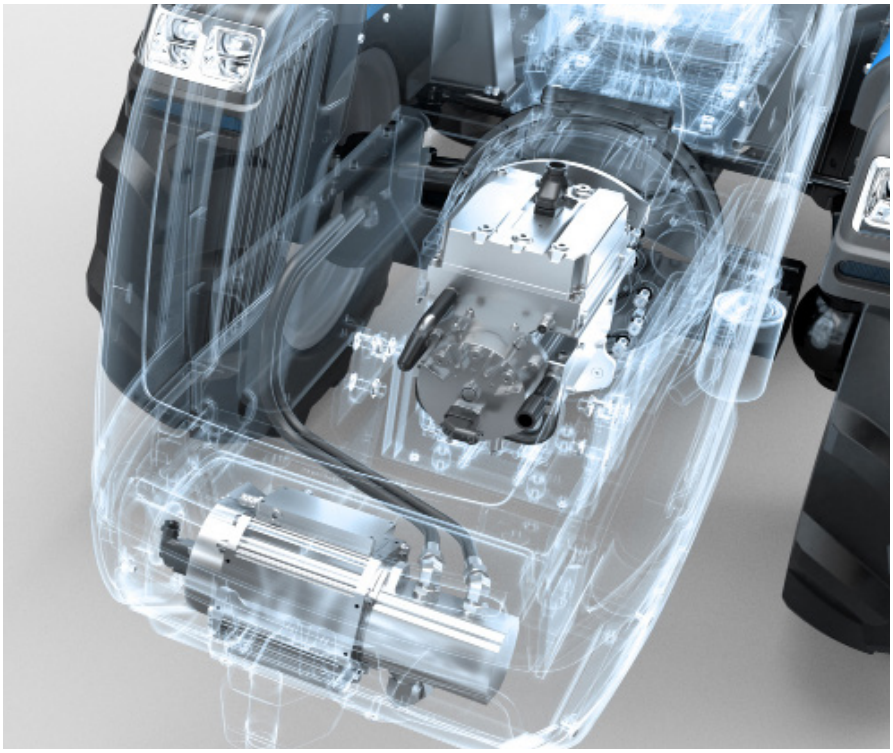
The result fully satisfies BCS, which plans to electrify other machines: "We also manufacture power tillers, professional mowers and special machines for haymaking. We're planning to electrify our lawnmowers for use by town councils. We're also working with Novum Tech to develop a tractor equipped with a third engine to simplify transmission," notes Federico Soresina, BCS product development and after-sales service manager.

Autonomous and silent

Close collaboration between Novum Tech and Parker Hannifin has enabled BCS to obtain a highly versatile tractor, with various versions: high on wheels for lowland work, low for mountain work to lower its center of gravity and avoid tipping over. A wide range of implements can be attached to the PTO. Its autonomy depends on its use: "it varies from a few hours for intensive work to a full day for towing a trailer", explains Federico Soresina. He adds: "in an urban environment, green services only work a few hours a day on small surfaces. The electric tractor is ideal for this purpose. A truck transports it from one point to another.

Another advantage is the low noise level. The decibel level of the electric tractor is 7 dB lower than that of its internal combustion counterpart, and 9 dB lower while driving: "one customer is particularly interested in this feature, as his vineyard is located next to a campsite."

The third advantage is the absence of CO2 emissions, making it a preferred solution for greenhouse work, tunnel work and all enclosed areas. A model with hoops instead of a cab has been developed for greenhouses.



"After 5 years of collaboration, we know Parker well and use many motors and products from their range. We can collect extensive data from their design office, allowing us to innovate and propose customised solutions."

Mickaël Robert, CEO and CTO Novum Tech.

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