



## THINKING OUT-OF-THE-BOX TO DELIVER A CUTTING-EDGE SOLUTION

**In automotive manufacturing, efficiency and reliability are seen as essential qualities. During a project with a well-known Tier 1 automotive supplier, Voltaira contributed to the fulfillment of these requirements by leveraging its development expertise and out-of-the-box mindset. The result was a first-to-market solution, which brings substantial benefits in terms of reliability.**

The impetus for this project came from a need identified by the end customer, a global automotive manufacturer, who was using a vacuum-driven axle disconnect system in its all-wheel drive pickup trucks. The wheel-end disconnect system, developed by our Tier 1 partner, had been contributing to the efficiency of the Original Equipment Manufacturer's (OEM) vehicles for a long time by engaging and disengaging four-wheel drive directly behind the wheel hubs. However, to meet the increased durability and performance demands, the OEM wanted to replace the vacuum-driven system with a first-to-market, all-electric alternative.

Voltaira became the key player in this project when the OEM, recognizing our proven expertise with wheel speed sensor harnesses,

recommended us to provide a solution for the power supply and data exchange system. While the supplier had conceptualized a unique gear system for engaging the front-wheel drive, Voltaira's expertise in designing a robust and efficient wiring harness was essential in the success of this co-development project.

### OPTIMIZATION THROUGH INTEGRATION

At first, our Tier 1 partner provided the requirements only for a wire harness. Voltaira's team contributed to the development process utilizing their comprehensive know-how in product design, which resulted in a special harness solution integrating a PCBA, a Hall Integrated Circuit (IC) and an actuator for the supplier's gear system. This concept simplified the assembly process and achieved cost reduction on the customer's side. Based on the supplier's specifications, Voltaira designed the harness component, the main housing encapsulating the additional parts, and the retainer of the PCBA. We also collaborated directly with the OEM for the optimal integration of the PCBA, showcasing our ability to manage complex collaborative projects.

### CHALLENGES

- Increased durability and performance demand
- Deploy state-of-the-art technology in an electric axle disconnect system
- Managing a complex collaborative project together with the OEM and supplier



### SOLUTIONS

- 4WD hub harness integrating multiple components
- Advanced manufacturing technologies applied
- Design and development of a tailored manufacturing line
- Swift understanding and adaptation to customer needs



### RESULTS

- Successful delivery of a patented first-to-market solution
- Simplified assembly process
- Cost reduction
- Timely delivery





To ensure reliable performance in the toughest conditions, our team designed the 4WD hub harness with an IP69 rating for high water pressure resistance, while also ensuring dust, mechanical, and chemical robustness. The unique positioning of the PCBA on the front-wheel knuckle, with its constant exposure to temperature fluctuations and mechanical shocks, presented a challenge we confidently addressed. Voltaira applied its advanced manufacturing expertise, incorporating resistance welding, low-pressure over-molding, cutting-edge sealing techniques, potting, and press-fit pin technology to securely mount the PCBA and deliver a robust, high-performing solution.

Furthermore, our team designed a manufacturing line with a capacity to produce up to 1.2 million units of the patented 4WD hub harness annually. The entirely in-house developed semi-automated line also showcases our team's deep manufacturing expertise and commitment to excellence.

#### CO-DEVELOPING CUTTING-EDGE SOLUTIONS

The design and development of our all-wheel drive engagement harness strengthens Voltaira's position as a preferred co-development partner for automotive manufacturers and suppliers.

Our ability to swiftly understand and adapt to customer needs is reflected in the trust placed in us by the over 60 companies who count on Voltaira as a trusted strategic co-development partner.

The successful delivery of this patented solution is a remarkable addition to our portfolio of over 1100 automotive patents. It illustrates our out-of-the-box mindset, and the capability to provide cutting-edge technology to our customers during collaborative developments. At the forefront of this effort are our more than 450 engineers focused on developing the mobility solutions of tomorrow

With its potential application transcending the initial project, the 4WD hub harness represents a major accomplishment not just for Voltaira, but for the entire automotive industry.



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\*Illustrative (top) and Voltaira product images