

Where next for off-highway electrification?

IN THIS EXCLUSIVE INTERVIEW THE CEO AND FOUNDER OF FLASH BATTERY GIVES HIS INSIGHT INTO BATTERY MANAGEMENT, AI SYSTEMS AND THE CHALLENGES OF ELECTRIFYING LARGE INDUSTRIAL VEHICLES

▶ With vehicle electrification established as one of the major trends in the off-highway industry today battery manufacturers are at the forefront of innovation. At this year's iVT Expo in Cologne, conference manager Janet Diserens caught up with Flash Battery's CEO and founder Marco Righi to get his expert view on exactly what the future has in store.

In the next five years, what trends do you expect to transform the off-highway vehicle industry?

Looking to the future of the off-highway vehicle industry, electrification, automation and predictive maintenance are the main drivers of change that will take hold over the next five years.

Among the priority goals of OEMs and manufacturers, is the desire to optimise the efficiency of their machines. This is a goal that can find a concrete and viable solution only in electrification. Autonomous driving is already a reality for vehicles, and industrial machines will also enjoy the management and efficiency benefits introduced by the possibility of performing tasks without human intervention.

In the next five years, I expect the introduction of predictive maintenance. Many

steps have been made in remote connectivity and anomaly diagnosis. However, to date, systems are only reactive and not predictive. As technologies and data analysis evolve, off-highway vehicles will increasingly be able to predict upcoming faults and plan maintenance work in advance, reducing downtime and optimising operational reliability.



ABOVE: Flash Battery's portfolio of customised lithium batteries from 6kWh to over 300kWh

BOTTOM RIGHT: Marco Righi, Flash Battery CEO and founder

What barriers do the industry need to overcome to implement mass electrification of off-highway vehicles?

Compact small or medium-sized machines benefit most from electrification because they do not demand continuous use. Due to the specifications of current technology in terms of energy, volumes, costs and charging infrastructure, the full-electric conversion of large machinery still represents a significant challenge and is currently limited to a mere exercise in style.

When deciding to take the electrification path for one's industrial vehicles, the initial economic investment can be a significant barrier for many potential buyers. The primary difference in price between a lithium battery-powered vehicle, an ICE vehicle or a vehicle powered by a lead-acid battery, is the cost of the battery. However, it is imperative to set aside the concerns about the purchasing price and adopt a more all-encompassing strategy that takes the battery's entire useful life into account. Only from an accurate total cost of ownership comparison will it be possible to assess the long-term return of investment, considering the benefits

in terms of energy efficiency, maintenance and operating costs over the entire life of the vehicle.

As with any major change, resistance in this field is naturally expected. A collective effort is needed to spread the culture of electrification, highlighting its benefits and proper use, and encouraging its adoption. This is a process that must involve the entire electrified vehicle chain, from manufacturers and distributors to end users.

Your iVT Expo presentation was about artificial intelligence in lithium batteries. Can you tell us some key takeaways for the audience?

My speech illustrated how incorporating artificial intelligence in lithium batteries can help manufacturers make high-performance vehicles. Flash Data Center, the intelligent automatic remote control system by Flash Battery, uses artificial intelligence and machine learning algorithms to learn, store and process the operating data of each battery system installed (200 million logs). The software, integrated in a virtual environment with containerized architecture, recreates a digital twin of each battery, analyses its SOH 24/7 and enables OEMs to perform self-diagnostics, predictive maintenance and advanced data analysis of their battery systems. This improves machine performance and boosts productivity. iVT



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