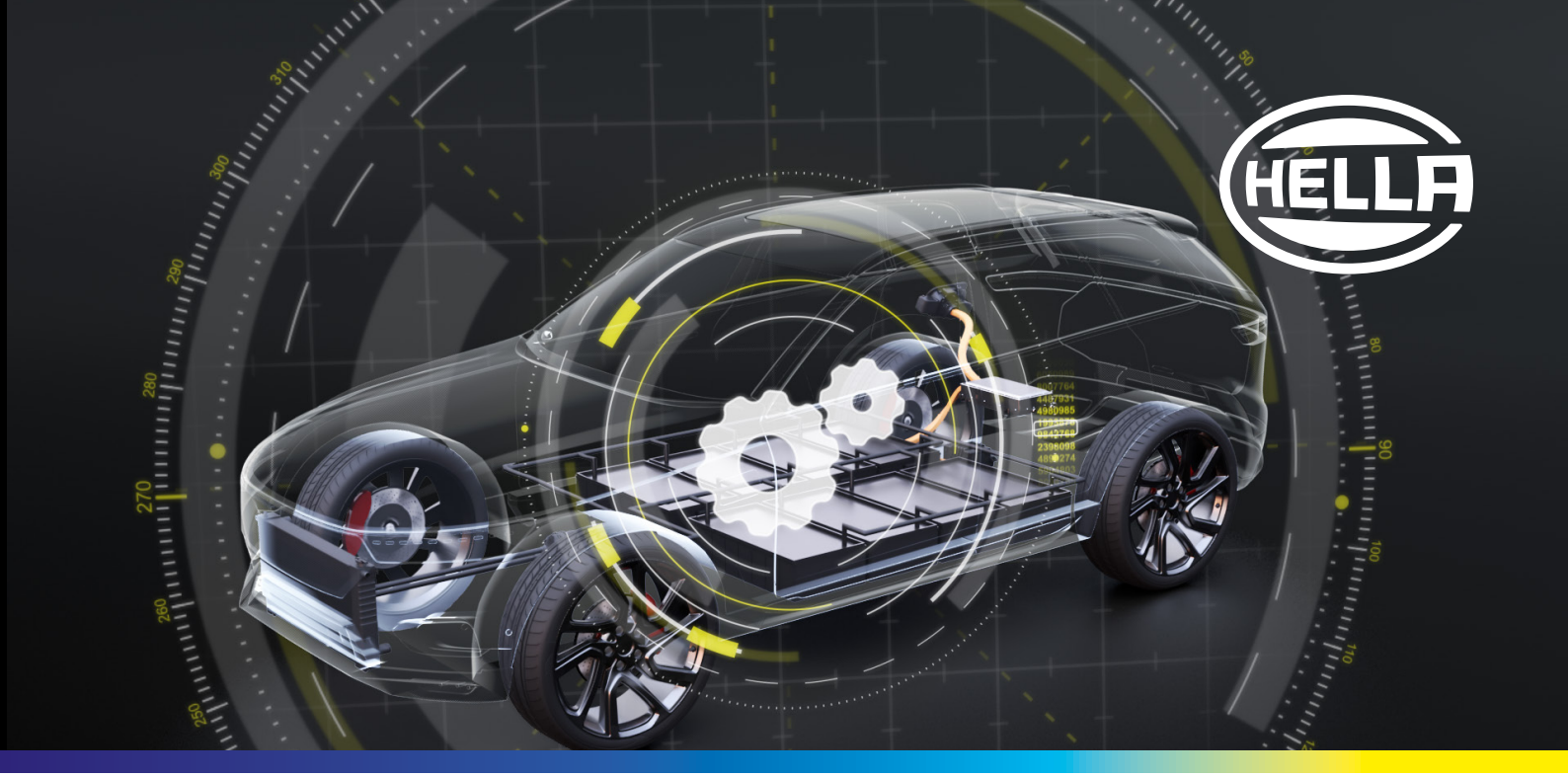


On the road to high-voltage

Realising the potential for high-voltage automotive electronics

Political and social change in recent years has made the transition to electromobility inevitable. Where once electronic components in cars were used to merely support the driving experience, they are now increasingly providing it.

The automotive industry is now faced with the mammoth task of making the electric drive an experience that works for everyone, where people can travel further on shorter charges. But one of the most pressing challenges of making this a reality is the integration of high-voltage electronics. Voltages between 200 and 800 volts in cars are currently the most common, with the trend moving towards the latter.

The physical challenges of charging less and travelling further come down to the size and weight of cables at lower voltages. For more power to travel through low voltage cables quickly, vehicles need more of them. However, these cables are stiff, heavy and take up valuable space. High-voltage electronics increase the possibility for e-vehicles to drive the greater distances now demanded by the market. These cables are smaller and pack less density, thus bypassing the larger amounts of cable needed to meet power demands at lower voltages.

Manufacturers are starting to see the benefits of adopting high-voltage components as they shift away from finite metals like copper. But the trade-off for Original Equipment Manufacturers (OEMs) is safety, and finding new ways to make this technology safe for the consumer is their biggest challenge.

THE CHALLENGE

Integrating high-voltage tech

High-voltage technology takes safety requirements in vehicles to new levels. OEMs and engineers are now adapting their safety protocols to accommodate these new conditions, and to complicate matters further, electrical safety laws and regulations tend to vary substantially from region to region. But, evolved sets of regulations, such as SAE, are now beginning to emerge.

Developers of high-voltage components now need to be innovating in numerous areas, such as electrical and mechanical engineering to easily and effectively implement high-voltage tech into electric vehicles.

New approaches are also required in the packaging of components for electromobility. This applies not only across energy management but also thermal management. Utilising space intelligently within e-vehicles will be crucial in their success going forward. This is even more important for hybrid vehicles, where internal combustion engine components still need to be considered.

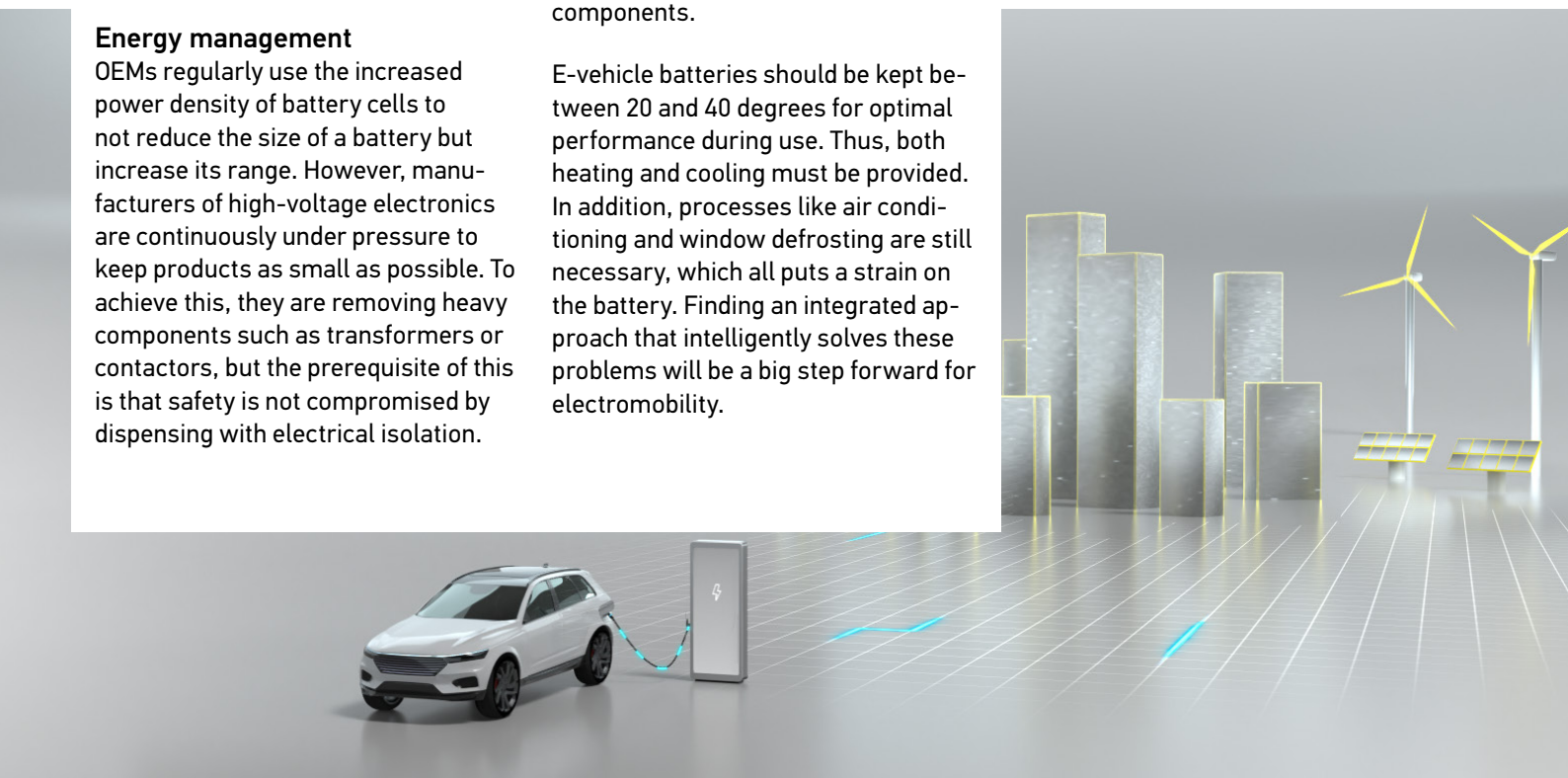
Energy management
OEMs regularly use the increased power density of battery cells to not reduce the size of a battery but increase its range. However, manufacturers of high-voltage electronics are continuously under pressure to keep products as small as possible. To achieve this, they are removing heavy components such as transformers or contactors, but the prerequisite of this is that safety is not compromised by dispensing with electrical isolation.

As well as batteries, chargers also have numerous requirements to meet. Depending on the available infrastructure, charging is carried out with direct or alternating currents. Sometimes the shortest possible time is needed to charge a battery, or alternatively it needs to be done gently overnight, taking into account the capacity of the power outlet. As well as this, it's also important to consider the power density of the battery. To enable these different scenarios, every electronic component must be able to cope with the different energy loads delivered at various speeds.

Thermal management
Thermal management works hand in hand with energy management. New approaches to thermal management in e-vehicles must now also be considered by the industry. Internal combustion engines only require cooling, while conveniently providing waste heat for heating the passenger compartment. But electric vehicles require conditioning, because not only the passenger compartment needs to be conditioned but also the electronic components.

E-vehicle batteries should be kept between 20 and 40 degrees for optimal performance during use. Thus, both heating and cooling must be provided. In addition, processes like air conditioning and window defrosting are still necessary, which all puts a strain on the battery. Finding an integrated approach that intelligently solves these problems will be a big step forward for electromobility.

"In order to easily and effectively implement high-voltage tech into electric vehicles, developers of high-voltage components now need to be innovating in numerous areas."



THE SOLUTION

HELLA automotive technology

Unlike other companies, HELLA provides a broad portfolio of components across both automotive electronics and thermal management. HELLA is now leading the way in the electric vehicle market, where power demand and thermal challenges are even more difficult to solve.

Our broad range of technologies helps OEMs on their electrification journey, from servicing hybrid cars through to fully electric vehicles. As a market leader in building intelligent battery sensors and DC/DC converters, HELLA technologies are developed using highly efficient components that have been optimised through years of experience in the industry. And to provide the best technology possible, we have forged numerous partnerships with other companies to ensure components are always delivered at an affordable price.

Every OEM has one or more e-vehicle product lines in its portfolio. The decision of whether to use a supplier's standardised module or a specially developed solution depends heavily on a company's development philosophy. It's why HELLA pursues a multi-track strategy for its high-voltage electronics. This way, components can be assembled from a system of existing modules and promptly integrated into vehicles via plug and play integration.

Our range of available modules is constantly growing. If OEMs require additional functions or have special requirements like packaging, our team of developers are readily available for individual implementation. HELLA has already formed strategic partnerships with battery specialists Farasis Energy and Evergrande to ensure high-voltage components can always take advantage of the latest chemistry in power storage.

Discover how HELLA's high-voltage electric components can help you revolutionise the electric driving experience.

GET IN TOUCH

If you're looking to explore the potential for high-voltage technology, talk with our team at:

E. social.media@hella.com

Energy and thermal management experts

Across energy and thermal management, HELLA develops a wide range of electronic components. Its second-generation Battery Management System (BMS) is already being utilised by numerous OEMs globally with other products now being widely adopted.

Battery Management System
Complete Li-Ion Battery Management System from one supplier - including electronics.

12V Lithium-Ion Battery
Low-voltage battery for 48V and HV architectures that's durable, lightweight and compact.

High-voltage DC/DC converter
One-size-fits-all 800V solution for both 400V and 800V charging.

High Density Onboard Charger
Innovative technology that leads to minimal size and weight (supports 400 and 800V charging).

Coolant Control Hub
Simplify and centralise increasingly complex cooling circuits while simultaneously increasing efficiency.