



ZF Aftermarket training makes automotive workshops fit for high-voltage technology

- **Tailor-made training concepts to suit individual business needs**
- **Blended learning approach reduces employee absence**
- **'High-voltage experts' are qualified for work on all types of electrified vehicles**

Electrified vehicles in Germany now total more than 400,000 – a number which will grow rapidly. More vehicles - particularly hybrid but also battery electric models - are reaching an age where owners want to have service and repairs carried out by independent garages. However, without the correct training, workshop employees are not allowed to touch an electric or hybrid vehicle by hand; a rule which even applies to simple maintenance work on conventional vehicle systems. High-voltage training by ZF Aftermarket, consisting of coordinated e-learning and practical hands-on training, ensures optimal learning success with significantly reduced attendance times and thus lower costs.

The generally recognized regulatory basis for this rule comes from the German Statutory Accident Insurance (DGUV). It can be found in DGUV Information 200-005: 'Qualification for Work on Vehicles with High-voltage Systems'.

The DGUV distinguishes between two basic applications:

- Work in development and production before start of production
- Work on series vehicles (intrinsically safe or not intrinsically safe)

Usually only the latter point is relevant for car dealerships. The DGUV has identified three areas for which differing training regulations apply and for uniformity, has determined that a teaching unit (TU) is equal to 45 minutes.



The three areas are:

1. Operating vehicles: This includes activities which the driver himself could also carry out. As well as refuelling a vehicle and changing consumables, simple service work such as changing a wiper blade now requires a basic level of training in high-voltage systems.
2. Non-electrical work: More extensive training (0.5-2 TU) is required for mechanical work and repairs to the 12-volt vehicle electrical system and the 48-volt components of modern hybrid cars, as the components could have been damaged during the process.
3. Electrical engineering work: This involves troubleshooting, removal and installation of high-voltage components. For these, automotive mechatronics technicians require training of at least 8 TU (theoretical part) plus 4 to 8 TU of practical experience. This applies to so-called intrinsically safe vehicles (usually passenger cars). Work on non-intrinsically safe vehicles (such as commercial vehicles or vehicles involved in accidents) requires a minimum of 40 TU of training if the employee already has previous electrical engineering knowledge in the automotive field (such as training as a mechatronics technician). (The level of training here equates to ZF HV Expert Level 2.) Work on live high-voltage components (e.g. replacing battery cells) requires additional qualifications (Equating to the forthcoming ZF level 3. Explained in more detail later).

Expert knowledge at first hand

This all shows the level of training commitment necessary. Electric drivelines are vital in the move towards a reduction in traffic emissions. In line with its strategic position as a true leader of future mobility, ZF offers training solutions for all vehicle segments.

By employing a blended learning approach of on-line and classroom training, ZF Aftermarket significantly reduces employee downtime and therefore reduces cost. A two-part course will equip a delegate with the ZF 'high-voltage expert level 2' qualification needed to carry out electrical engineering work on vehicles. Entry requirements are competency based, after passing an initial exam.



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As the theoretical parts are taught via e-learnings, the classroom training - including practical exercises - takes only three days. Corresponding to the expert for high-voltage systems level 2 according to DGUV-Information 200-005, this qualification will enable delegates to:

- replace components
- troubleshoot
- switch the HV system on and off

Level 3 – coming soon

In December 2019 ZF's 'high-voltage expert level 3' training course will be introduced, which will focus on working with live high-voltage components. Delegates will learn how to replace battery cells and handle accident vehicles whose protective measures no longer work. Assuming the workshop design is suitable to deal with the highly volatile nature of this work and protective measures such as clothing are in place. Level 3 training is suitable for companies that carry out car body work on electric vehicles which have been involved in an accident, or repair damage where the absence of voltage cannot be guaranteed and those wanting to be considered electrical experts and, for example, carry out live work for other car dealerships.

Responsible for the high-voltage training program at ZF Aftermarket, Rolf Hildebrand explains: "Technological development offers interesting growth potential for garages, which can only be used if they are prepared for it! Our blended learning training concept ticks all the boxes. In a way, participants not only receive their driving license from us, but we also teach them how to drive."

Caption:

ZF Aftermarket's high-voltage training courses optimally combine e-learning with interactive practical training.

Photo: ZF



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ZF Friedrichshafen AG

ZF is a global technology company and supplies systems for passenger cars, commercial vehicles and industrial technology, enabling the next generation of mobility. With its comprehensive technology portfolio, the company offers integrated solutions for established vehicle manufacturers, mobility providers and start-up companies in the fields of transportation and mobility. ZF continually enhances its systems in the areas of digital connectivity and automation in order to allow vehicles to see, think and act.

In 2018, ZF achieved sales of €36.9 billion. The company has a global workforce of 149,000 with approximately 230 locations in 40 countries. ZF invests over six percent of its sales in research and development annually.

With integrated solutions and the entire ZF product portfolio, the ZF Aftermarket Division of ZF Friedrichshafen AG guarantees the performance and efficiency of vehicles throughout their life cycle. Its combination of established product brands, digital innovations, customized products and services, and a worldwide service network has made ZF a sought-after partner and number two in the global automotive aftermarket.

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