

What exactly does retrofit mean?

With electrified vehicles, terms and designations such as 'retrofit' are coming up and not everyone is familiar with them. STW explains the terminology. J1939 also plays a role in this.



(Source: STW)

Electrified vehicles are increasingly entering the market, be it due to stricter emission regulations, improved efficiency and controllability or a new green awareness among buyers. As a result, new terms and designations such as 'retrofit' are emerging and not everyone is familiar with them. In STW's electrical systems series (this article is part 1), the company explains the terminology.

Electrification is becoming part of our everyday lives: Charging parks are being created, battery cell research is being carried out and more and more often we see (but do not hear) an Audi e-tron or a Tesla Model 3 driving by. According to the German Federal Motor Transport Authority (KBA), 17,4 % of the registrations in June 2020 were vehicles with hybrid or electric drives.

However, a completely new development for electrification such as in the automotive sector is not always profitable. For vehicles with special superstructures, models with very small production quantities or projects with only one prototype as a demonstrator, there is also a different solution: Breathing new life into the existing diesel vehicle by removing the old combustion engine and installing a new, electric drive line.

This method – known as 'retrofit' – enables both an extended service lifetime and a more environmentally friendly operation of the vehicle in the future. In comparison to a new development, the retrofit is the significantly more cost-effective option. But the retrofit does not only score points in terms of purchasing costs. The entire J1939 environment remains unchanged, so that the typical drive line components such as brake management systems or chassis controllers can be retained and ensure functionally safe operation of the vehicle in accordance with the applicable standards (e.g. ISO 26262). This not only reduces the effort required for homologation of the overall system, but also eliminates the need to integrate components to fulfill these functions.

If the aim is to sell both an electric and a conventional version of the vehicle, the retrofit considerably simplifies the product maintenance effort, as many (sub) systems remain identical. With the Elias project, which was sponsored by Bayern Innovativ, a 44-ton MAN series tractor truck was converted into a battery electric vehicle through retrofitting. The companies involved in the project are Ansoerge Logistik as user, Toni Maurer as vehicle manufacturer, and STW as electronics provider for drives, energy management, and safety.

However, the aim was not just to convert the vehicle to an electric drive, but to preserve all driving and comfort functions. Elias fulfilled these requirements, explained STW. The electric truck features higher driving dynamics and lower noise emissions, the company said. Elias can cover 200 km when all four battery packs are integrated. If that is not enough, the vehicle can be charged with 150 kW at public DC charging stations.

Within the scope of the battery-electric truck Elias sponsorship project, STW developed special components for the retrofit, i.e. with standard interfaces for connecting to the conventional part of the vehicle. The controller, which behaves like a diesel engine via J1939, can be connected to the existing CAN structure. The electric motors, which are combined via summary gear, can be coupled directly to the manual transmission via an SAE 1 flange. All these features are combined in the Powermela.duo280 drive kit.

This drive package comprises two identical Powermela.c140 synchronous machines, a summation gearbox with speed and temperature sensors as well as already mentioned, a control unit with J1939 connection. The control unit's connection to the J1939 environment and the SAE1 flange allow substitution of the drive package for the combustion engine in an existing vehicle. The J1939 environment is compatible with the interface and user interfaces. The SAE1 flange can be combined with planetary gears or switch gears.



The Powermela.c140 with J1939 from STW (Source: STW)