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Off-highway Is Going Electric

The off-highway sector is still largely unaffected by the shift towards electric power. Almost all construction and agricultural machines are powered by diesel engines. The compelling arguments for diesel engines are that they offer a high amount of power and torque while also being fuel efficient. Because of the high-power density of diesel fuel, the machines are self-sufficient and can be used far away from any kind of infrastructure – as yet, modern battery storage systems lack sufficient capacity for this. So, do electric vehicles make sense for the off-highway sector?

Even though it is unlikely that an all-electric tractor will plough the fields for hours in the foreseeable future, electrification offers great potential for increasing power, optimizing efficiency and lowering operating costs. It is not a question of whether electrification makes sense but rather of how technologies can be intelligently combined. Dynamic applications, in particular, are well suited to a hybrid system. If the diesel engine is operating in the partial-load range, the load point can be increased by the generator function of the electric motor. This allows the combustion engine to run within a more efficient operating range while generating electrical energy, which is stored in a lithium-ion battery. If the machine operator demands maximum power, the electric motor assists the combustion engine, making use of the energy that was stored earlier. Because of this boost function, the machine is more dynamic and achieves the same system performance as a pure combustion engine with the same power output. It is also possible to downsize the combustion engine, which directly results in greater efficiency. Further potential lies in using electric power for power take-offs, such as sowing machines on tractors. The voltage of the vehicle's onboard electrical system must be raised to 48 or 400 V so that the energy can be safely transferred between the electric motor, the battery and the power take-off. Doing without the mechanical power transmission further increases efficiency.

While the electrification of power take-offs can be applied irrespective of the power category, the hybrid or all-electric drive is currently suitable for smaller applications. Depending on the application, it will be possible in future to select the optimum combination of conventional and electric drive components. As a result, we will be transformed from an engine manufacturer to a provider of complete drive systems. Developing the necessary expertise is essential for this. Deutz has ensured this by acquiring Torqeedo, a specialist in electric drive systems, as well as expanding company resources, and is currently electrifying its engine range. The aim is to improve efficiency and operating costs significantly while also lowering emissions. This is something that will benefit both customers and the environment.