THE KEY ROLE THAT E-FLUIDS CAN PLAY IN ACHIEVING CONSUMER EXPECTATIONS

Richard Pearson, Senior Advisor EV & Mobility, bp, describes the range of Castrol ON e-Fluids and explains how they support faster charging, longer range and greater durability.

E-FLUIDS CAN HAVE AN IMPORTANT IMPACT

Electric vehicles need e-Transmission fluids, e-Thermal fluids and e-Greases to keep them running reliably, safely and efficiently.

At Castrol, we are combining insights gained from vehicle manufacturers, component suppliers, and consumers, with advanced technical solutions to continually improve our e-Fluid products, while also pioneering performance testing that goes beyond the standard requirements.

Electric motors in EVs are already operating at efficiencies up to:

97%

Castrol ON

THE IMPACT OF TECHNICAL ADVANCES IN E-FLUIDS IS MANIFESTING ITSELF IN THREE IMPORTANT WAYS:

1

Go further[1]

A lot of the R&D investment in EVs is currently focused on improving the performance of batteries and other core components. But the gains in vehicle efficiency from e-Fluid technology are key to making EVs more useful to a wider range of customers. Since electric motors in EVs are already operating at efficiencies up to 97% (compared to a peak efficiency of around 35% for most internal combustion engine (ICE) cars), there is limited scope available to increase the energy conversion efficiency of the motor itself and so the advances in range available from Castrol's low-viscosity e-Transmission fluids, via reducing losses in the drivetrain system, are playing an important role in improving vehicle range.

There's a significant challenge of greasing bearings of EV core components, such as electric motors. With ICE vehicles, grease is applied to areas that don't have a very high electrical potential. With EVs, the grease has to perform in a highly-charged electrical environment. Importantly, greases need to enable low-friction operation of the motor bearings while withstanding high electrical potential, high temperature, and high shear rates experienced in state-of-the-art high-speed electric motors. Castrol ON's advanced e-Greases play a critical role in improving e-motor and transmission efficiency and, together with Castrol ON's low-viscosity e-Transmission fluids, extend the range of EVs.

2

Charge faster[2]

Battery durability is key to making repeated fast-charging possible. To enable 400km of range to be added rapidly to an electric vehicle requires a very high charging power and advanced battery thermal management performance to keep cell temperatures within a range that does not damage them.

This is where e-Fluids come in. Castrol ON's advanced dielectric thermal management technology combats the increased thermal stress of ultra-fast charging. Using direct cooling of battery cells, tabs, and connectors increases heat transfer from these components to the e-Thermal fluid and can help reduce the maximum temperatures which the cells reach during ultra-fast charging. Limiting the temperature level reached by cells reduces the impact of high-power charging on the battery lifetime. The fluids have a low viscosity, strong electrical insulation, and a high flash point to protect against breakdown and ignition.

3

Last longer[3]

In addition to helping extend the range of EVs, e-Transmission fluids help protect gears and extend the life of the drivetrain system. The demands on e-transmissions can be more severe than conventional transmissions, with very high input torque delivered at low speeds. The desire to increase power density by integrating electric motors and transmissions into a single unit is leading to so-called 'wet e-motors'. Here, the transmission fluid also performs the task of the e-Thermal fluid and electric insulator for the electric motor, which adds significantly to the fluid formulation challenge due to the dual fluid performance requirement of protecting the transmission gears against high contact pressures and maintaining low electrical conductivity of the fluid so that it can insulate and cool the electrical components of the motor directly.

At Castrol we are developing e-Transmission fluids that cool motors and protect the gears while maintaining the required di-electrical properties and component compatibility to allow electronics to function correctly over their lifetime. Wet e-motor e-Transmission fluids are helping motor designers to increase performance levels and improve durability.

The development of EV technology is on a rapid trajectory. Every year new hardware innovations come to market that make significant contributions to increasing vehicle range, reducing charge time and extending the life of the drivetrain system.

Castrol ON e-Fluids are playing an active role in enabling this technology revolution.

RICHARD PEARSON IN THE DRIVING SEAT: QUICK FIRE QUESTIONS

What do you think is the biggest stumbling block to mainstream EV adoption?

The trade-off between range, charge-time, and vehicle price.

What year do you think we'll achieve mainstream EV adoption?

Personally, I think that by around 2027-2030, a quarter of all new vehicle sales in the EU will be battery electric vehicles (BEVs).

Castrol e-Fluids benefits are demonstrated in bespoke testing and development. Go further[1], charge faster[2] and last longer[3].
[1] vs mass market EV factory fill fluid. [2] vs indirect cooled battery system. [3] vs standard EV-transmission fluid.

CONTACT US

Want to find out more? Use the details below:

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To learn more about Castrol ON e-Fluids visit: www.castrol.co.uk/e-Fluids

ABOUT CASTROL

Castrol provides the oils, fluids and lubricants the world needs, for every driver, every rider and every industry. It's more than just oil. It's liquid engineering.

The world of transport is going electric and e-fluids have a vital role to play. EVs play a key part in the mobility revolution and the pathway to decarbonising transport. Castrol's e-Fluid expertise extends across land, sea and even space.

IN SPACE

Castrol e-Fluids help leap NASA's $820 million InSight Mars Lander working in the unforgiving conditions on the Red Planet.

AT SEA

Castrol e-Fluids support equipment used in the transfer of power from an engine or electric motor to a propeller or thruster.

ON LAND

Castrol ON has developed a range of e-fluids to meet the needs of vehicle manufacturers. From transmission e-fluids, which are inside many EVs already on the road, to e-Greases and e-Thermal fluids, these fluids enable electric vehicles to run smoothly, efficiently and stay cool.

Developments include Castrol's lowest viscosity e-transmission oil, designed for efficiency, durability and reliability. Castrol is partnering with major manufacturers to ensure its lubricants deliver what drivers want: to go further on a single charge, enable longer life of transmission and component parts, and ensure long-lasting battery health.

As EVs continue to evolve, Castrol's best brains are not only defining the fluids, but the way the fluids are defined: pioneering unique testing and monitoring methods, driving efficiency and economy going beyond the standard requirements of the fluids, taking consumer insights and engineering technical solutions; advancing technologies that will lead to breakthroughs for the transport of tomorrow.

To find out more about Castrol **please visit www.castrol.com**

CREDITS

Driving the EVolution: Achieving the world's first truly mainstream electric vehicle is based on interviews with industry experts, commissioned by Castrol, designed by Castrol and Man Bites Dog.

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