In conversation with...

Andreas Osbar *is Vice President; Transformation at Castrol Germany, GmbH, He recently spoke at Lubricant Expo on the topic of the global picture for lubricants and how sustainability targets are impacting the sector and its end users.*

What is your opinion on the market modal shift to EVs?
We believe that electric vehicles will be the dominant technology for passenger cars in future – the question remains not if, but how quickly that transition will occur.

There are three main factors driving the shift:
Firstly, the evolution of national and regional vehicle emissions legislation in many markets. The European Union, for example, requires a 100% reduction of tailpipe CO_2 emissions from new cars and vans by 2035.

Secondly, automotive manufacturers are imposing self-mandates on production of zero emissions vehicles (ZEVs) and national / regional internal combustion engine vehicle (ICEV) bans or mandates for 100% ZEV sales are being introduced.

Manufacturers such as Mercedes-Benz, Jaguar and Volvo Cars are reporting they are set to become all-electric companies in the next decade.

And, thirdly, we see consumers wanting to make the switch. In a recent Castrol-funded survey, *Switching on the rEVolution*, 53% of respondents globally said they are considering an EV for their next vehicle and 99% of current EV drivers would consider an EV for their next purchase.

What will be the different lubricant challenges this presents i.e. the difficulties with higher temperatures in EVs and cooling solutions?
EV fluids need to lubricate, protect and cool the e-motors, transmission, battery and electronics in an EV. To fulfil these requirements, we have developed e-Transmission fluids, e-Coolants and e-Greases to keep EVs running safely and efficiently.

There are three types of e-transmission:
1. Dry (lubricating and cooling the electric transmission);
2. Wet (lubricating and cooling transmission, while cooling the e-motors);
3. Multispeed Wet (that needs to offer protection for gear shifting mechanism whilst providing lubricating and cooling functions)

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 e-motors and transmissions into a single unit is leading to so-called wet e-motors being used in some higher performance applications. Here, the transmission fluid also performs the task of being the coolant for the electric motor. This adds significantly to the fluid formulation challenge.

We are developing driveline e-Fluids within our Castrol ON range that cool e-motors and protect the gears, whilst maintaining the required di-electrical properties and component compatibility to allow electronics to function correctly over their lifetime. These products are helping motor designers to increase performance levels and improve durability and we have had some success: two-thirds of the world's major car makers use Castrol ON EV fluids as part of their factory fill.[1]

[1] Based on LMCA data for top 20 selling OEMs (total new car sales) in 2021. Used by these OEMs as part of EV factory fill

Another focus area for Castrol are e-Coolants which manage temperatures within batteries; they can reduce the maximum temperatures reached within the battery cells as well as temperature variations between cells during ultra-fast charging. A dielectric fluid is a non-conductor that can be used directly within the battery systems to provide more efficient thermal management than an indirectly cooled system.

This enables ultra-fast charging to be sustained for longer and protects against battery cell degradation. As charging power increases, one of the next big challenges will be to sustain longer charging times at 300kW, for example. This would give drivers the convenient fast charge they are seeking. Current technology may only sustain 300kW charging for a short time (say, 10 minutes).

Are Castrol looking at lubricant formulations for hydrogen vehicles on the back of the UK hydrogen strategy from August 2021?
As presented in the bp energy outlook 2022, we anticipate hydrogen being a significant share of the energy vector mix for mobility. In particular, we're predicting this to be in the heavy-duty road sector with hydrogen fuel cell electric vehicles (FCEV) being the dominant technology, particularly in Europe.

The implementation of fuel cells for mobility applications will likely be alongside some battery storage to assist with transients and an electric drivetrain. Many of the lubricant and thermal management 'e-fluid' solutions that we're developing for EVs can be equally applicable. There is also a thermal management requirement for the fuel cell stack.

While we anticipate FCEVs to become the dominant technology for road haulage in Europe, hydrogen internal combustion engine powertrain is an alternative technology and may become more prevalent in other regions and/or off-highway applications. Castrol has an expert understanding of lubricant formulations and experience of how lubricants perform in hydrogen combustion engines. As we actively monitor the emergence of this technology, we have demonstrated the suitability of some of our current lubricants for this application.

Do you see the global market beginning to diverge between Western Europe/ Northern America on adoption rates of EVs and the African and Indian markets on commitment to ICEs and emissions regulations?
Europe and North America are establishing net zero targets and EVs are integral to achieving zero emissions in road transport. Regulation, technology, infrastructure, manufacturing capability and, most importantly, consumer pull are already underpinning growth for electric and electrified vehicles.

The uptake of electrification on the African continent could well be through two or three wheelers and fleet vehicles at first. Buses and taxis are common modes of transport in Africa and there are plans to increase electric bus fleets in some cities. At national level, some countries have already introduced incentives in the form of duties or VAT reduction, rebates, or subsidies to encourage private EV ownership.

India has pledged to cut its emissions to net zero by 2070. Some cities and urban areas may have an accelerated trajectory though, for example, Mumbai plans to be net zero by 2050.

Therefore, the pace of electrification may differ in Africa and India from Europe and North America as a whole. We expect that we are likely to see the market growing in urban areas first and then across nations as regulation, technology, infrastructure, manufacturing capability and, most importantly, consumer interest increase with time.

What is your view on the International Fluids Consortium and the drive from Far Eastern manufacturers to ultra-light 0w8 viscosities? And do you see the adoption of these in Europe over time?
We are aligned with some concepts of the International Fluids Consortium (IFC), that include simplifying the lubricant industry specification landscape and introducing new tests quickly to address contemporary market issues. To achieve these benefits, it is likely that the other industry bodies would need to consolidate with the IFC, and a broad range of OEMs would also need to come onboard. At present, however, we see some organisations talking about next generation

specifications (e.g. GF-7), and so IFC has the potential to add to the specification landscape, rather than simplifying it. We will watch with interest as the IFC develops.

0W-8 viscosity grade is seen as a route to improving engine efficiency in the Japanese market and led to the introduction of the GLV -1 specification. This viscosity grade is currently used in certain new engines in the domestic market. These are low specific power output engines with short oil drain intervals.

However, in Europe, most engines are based on down-sized boosted technology and these have very high specific power output. They have been designed from the outset with higher viscosity grade oils. The oil drain interval requirement is also significantly longer, around 30,000km. New investment is therefore necessary to re-engineer the current range of internal combustion engines, or develop new ones, to take advantage of ultra-thin 0W-8 grade oils.

Do you think a Bharat VII might spell the end of ICE vehicles in Indian city centres if India follows the lead of Europe in Euro 7?

In India, the top two or three OEMs in each space across trucks, cars and bikes command close to 80% of the market share (source: SIAM). None of those companies have declared that they will stop producing ICE yet. At the moment, electrification has had a slow take-off; BEVs are expected to reach around 10% in 2030 (according to Schaeffler India).

Needless to say, there will likely be more focus on fuel economy and CO_2 emission regulation in the Indian market in the future, which would drive OEMs to use lower lifecycle carbon fuels like CNG and biofuels to meet the new standards. It is likely that ICE vehicles will remain even after Bharat VII but will be governed by more stringent regulations.

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