ZF: TAKING THE AUTOMOTIVE INDUSTRY AHEAD

*In this exclusive interaction with **Huned Contractor**, ZF India's Country Head Suresh K V elaborates about how the company's engineering prowess is helping usher in an automotive revolution across the globe*

As a leading component manufacturer and technology innovator, ZF has a significant presence in both the automotive and non-automotive businesses in India. With corporate headquarters at Chakan, Pune, ZF has a wide manufacturing footprint in India across 16 locations. The company operates in India through two wholly owned subsidiaries of ZF and five joint venture partners. The consolidated resource strength of the group is 12,000, including JV partners. Its products include: active and passive safety systems, steering systems, clutch systems, axle drives and chassis components for passenger cars; steering systems, transmissions and chassis systems for trucks; steering systems, transmissions and axles for off-highway applications; gearboxes for the wind turbine industry

Additionally, ZF Group also supplies high-end technology products, such as transmissions, axle drives and suspension components for luxury and high-performance passenger cars and buses in India. Other applications of ZF products include rail, aerospace, marine and armoured vehicles. A strong local mechanical design and application engineering team supports the local OEMs on product development. The India Technology Centre (ITC) in Hyderabad, launched in 2017, is one of the main pillars for digitalization for ZF in India and globally. The ITC, dedicated to electronics and embedded software, is working on developing software for autonomous driving functions. Excerpts from the interview:

What have been the latest engineering innovations by the company in the passenger, commercial and multi-utility car segments, as introduced across the globe?
ZF regularly integrates its innovative products into vehicles in order to show how creatively ZF engineers are already implementing tomorrow's mobility functionalities into the vehicles of today. In recent times, we have developed many ground-breaking technologies for passenger cars, commercial vehicles, off highway vehicles and multi-utility vehicles. These include:

- ZF Advanced Urban Vehicle: With this product, ZF is demonstrating the potential inherent in intelligently networking individual chassis or driveline and driver assistance systems, and is presenting an exemplary solution for urban individual transport in the compact and subcompact segments. The vehicle is equipped with ZF Smart Parking Assist and ZF PreVision Cloud Assist.
- ZF Innovation Truck: It can automatically avoid obstacles in an emergency, autonomously stay on track, and maintain distance from the vehicle in front. It takes control when maneuvering at the ramp. The ZF Innovation Truck 2016 is full of innovative advanced driver assistance systems that currently do not exist in any other commercial vehicle.
- ZF Innovation Tractor: For the first time, ZF has included an off-highway application in their innovation prototypes with the Innovation Tractor. It has features like fingertip maneuverability, easy connection of implements and the ability to overcome any gradient, even with a tractor-trailer combination, thanks to the additional electric drive unit.

- ZF eAMT: With eAMT (electrified automated manual transmission) technology, ZF has developed an innovative concept for the hybridization of front-transverse vehicles by integrating its electric axle drive system (eVD) and an automated manual transmission (AMT) into one system. The transmission actuator and the electric rear axle operate together with intelligent interaction – this results in the eAMT concept no longer experiencing tractive force interruption. The electric motor bridges the gap in accelerative force of the AMT due to its design. In addition to the hybrid functions of electric drive, recuperation and boost, eAMT also features electric all-wheel drive. ZF software regulates the networking and coordination of the internal combustion engine, electric motor and automated transmission.
- ZF ProAI: This is a processor developed specifically for automotive applications. We supply ZF ProAI as a system that can built into a vehicle, updated via the Cloud, and upgraded with additional functions throughout the lifetime of the vehicle. Series production of the new ZF ProAI system is scheduled for 2018. The key concept here is 'automated operations', based on the realisation that an electronic component capable of handling the stresses and strains found in passenger cars is also ideal for use in products in other industries. ZF ProAI will have the capability to understand in real time what is happening around a vehicle, precisely locate itself on an HD map and plan a safe path forward. The solution will meet automotive-grade standards to function when exposed to extreme temperatures, moisture and dust.
- eSync Alliance: ZF has joined the eSync Alliance, a multi-vendor initiative for over-the-air (OTA) update and diagnostic data solutions that could potentially save the automotive industry billions of dollars each year. The alliance is based on eSync system, a platform combining both cloud and in-car components. The platform was originally developed by Excelfore to provide secure transactions with electronic end devices installed in vehicles. In addition, the system works as a shield against threats from outside the vehicle. It also provides a two-way communication enabling software and firmware updates over-the-air, and collection of real-time diagnostics and telematics data from end devices in the vehicle.

What has been the customization carried out for the Indian automotive market?
In 2017, India was the fourth fastest growing economy in the world. The automotive industry, which is experiencing extremely rapid change, is playing a large part in this. It already contributes around 7% to the gross domestic product, and this figure is trending upwards. India's government wants to both promote this development and ensure that it is sustainable. In doing so, it is confronted with two main problems: as people are increasingly drawn to the cities thanks to the industrial boom, air pollution there is extremely high. In addition, the number of victims of road accidents is extremely high. As a technology company, ZF is optimally positioned to help India overcome these challenges.

The group has a portfolio of innovative and economical products. As far as customization for the Indian market is concerned, we already have a localized 9S1110 truck transmission and are manufacturing clutch systems in India. In addition, we will be launching nine-speed AMT for the Indian market. Apart from this, in 2017, we had also launched a localized electric park brake technology with our JV partner, Brakes India. We at ZF are learning to develop low-cost

products to cater to the demands and needs of the Indian market. We are also localizing our business and strategy.

What are the focus areas of the Indian research and development activities?
ZF's ability and courage to repeatedly create new groundbreaking products enables it to support its customers as they strive for uniqueness and technology leadership in their industries. Innovation and research and development are the growth pillars for ZF. The company annually invests more than 6% of its sales in research and development – ensuring continued success through the design and engineering of innovative technologies. Zukunft Ventures is the ZF corporate private equity unit focusing on investments in pioneering mobility technologies to master the challenges of tomorrows highly connected mobility. It is the mission of this ZF subsidiary, founded in 2016, to drive strategic change within the group by providing quick access to key technologies and thereby establish competences and knowledge required in this fast changing future.

Given that the automotive industry in India is poised for further growth, how is the company gearing up to introduce new products and enhance capacities?
The Indian automotive industry is set to undergo a huge transformation owing to BS-VI shift and electric vehicles. Complying with BS-VI emission norms by 2020 will help Indian companies to compete with global companies. ZF is one of the key global suppliers with economic strength and technological expertise to be at the helm of this change. Our transmission technology 9S1110 is already BS-VI compliant. We are engaging with our customers and working closely with OEMs to manufacture components customized for their products that comply with BS-VI norms. For local emissions-free transport vehicles, all-electric drives are the only option. In this regard, ZF supplies drives for passenger cars, trucks and buses as highly efficient system solutions, among them electric motors and power electronics.

In order to make vehicles equipped with combustion engines considerably more fuel efficient, ZF is a pioneer in the field that continues to rely on modular plug-in systems for vehicle hybridization. This means the electric drive can handle average daily driving distances on its own. Furthermore, ZF is not only making its transmissions, steering systems, braking systems and actuators more efficient through electrification, it is also making preparations for implementing autonomous drive functions. ZF is using intelligent technologies to make products cost-effective and eco-friendly. E-mobility is also a significant part of ZF's 'Vision Zero' – zero accidents and zero emissions.

Has the company implemented Industry 4.0 in its operations?
Digitalization is revolutionizing production and ushering in a new era – Industry 4.0. With the help of intelligent machines that communicate with each other and collaborate with us, we will become more efficient than ever. With its Openmatics telematics platform, ZF has already been actively involved in intelligent fleet management for several years. The platform has built-in Bluetooth smart technology and provides a continuous overview of trucks, agricultural machinery or freight of any kind. Using inexpensive Bluetooth tags, users can track a product's location, ambient temperature, possible damaging impacts and more.

ZF production sites engaged with the digital revolution some time ago. Take Saarbrücken, for example. In 2014, the plant launched a new milk-run system that delivers components for four-clutch modules to the final assembly line. Scanners capture the flow of materials from the warehouse to the assembly workstations in real time. The driver of the electric shuttle that regularly supplies the assembly line is kept updated by his mobile scanner's display, which informs him of current material levels and any route changes required – to fetch more parts from the warehouse, for example. This has enabled the plant to significantly reduce inventory levels, as well as the number of deliveries.

In India, the Brakes India plant, JV partner of ZF, implemented robot operations that has led to 200% increase in productivity. This system gives an option of running a third shift with minimum manpower deployment and helps reduce the capital expenditure for increasing capacity. The automated press lines with nine presses and end-to-end automation includes feeding the sheet metal to palletizing the finished components. Brakes India introduced robot automation in hazardous MIG welding operations for the fabrication of brake shoes. This has eliminated operator fatigue and has resulted in consistent output with superior quality. For electroplating and painting of components, automated transporters or automated conveyors are used instead of robots. Furthermore, the introduction of robot automation in assembly line which works in clean room atmosphere for Slip Control System (SCS) where robots are used for application of wet sealant in a contour and also for staking operation in multiple planes.

What have been the company's contributions to making automobiles safer, lighter and non-polluting?

ZF has a unique position in the industry with its expertise and product portfolio to enable vehicles to see, think and act. The catchy phrase 'See-Think-Act' summarizes concisely the company's leading theme. For example, ZF can interconnect cameras and sensor systems, such as radar or LIDAR, thus providing a 360-degree panoramic view (See). In addition, ZF develops, produces and connects the switching centres of the vehicle using a network of electronic control units (Think). And naturally, the company can connect mechatronic systems in the drive, chassis or steering system to create modern drive functions (Act). This makes vehicles not only safer, but improves their efficiency. Further, our 'Vision Zero' vehicle is not only paving the way toward zero accidents but also zero emissions and is aided in this process by an electric axle drive system with an output of 150 kilowatts that can power a mid-sized car comfortably and powerfully, thus making it eco-friendly.