VISION ZERO- A STEP CLOSER TO SMART & SUSTAINABLE MOBILITY

Mamatha Chamarthi

ZF is consistently pursuing the goal “Vision Zero” – mobility with zero accidents and zero emissions. With its technologies, ZF has the tools to help make driving a vehicle safer and cleaner in the future.

A lot has changed in the automobile industry since the time of horses and carriages. It is facing one of its biggest and most important transitions till now, which comes to be called as smart mobility. Smart mobility in simple terms is a way to move people and goods using new technology that is faster, cleaner, more accessible and less expensive. It is about striving toward frictionless, automated and personalized travel on-demand. This trend is growing tremendously among the industry players and is here to stay. With its demand increasing, the next phase that we will look upon would be an innovation of specialization which will bring in full autonomous vehicles and models, changing the face of the industry. The concept of sustainable mobility brings in an intelligent, integrated, and dynamic system that represents a meaningful change from today's vantage point of linear trips and single-occupancy vehicles. Sustainable Mobility draws on the lines of innovative work ability in vitality and energy efficient vehicles and low-carbon powers, and also the lab's broad transportation data analysis and modelling tools. Making mobility more sustainable translates into transport systems that are more accessible, efficient, safer, and climate responsive.

The automotive industry is undergoing a disruptive transformation, driven by the need for environmental protection, increased connectivity and autonomous driving. At the same time, comfort and safety remain at the heart of occupants’ concerns.

These days ‘Vision Zero’ is auto industry’s new buzzword. ZF has laid its own stricter foundation for Vision Zero. The first thing it did was to narrow the original definition of Vision Zero. The long-term goal is to prevent all crashes, regardless of the type or severity. In addition, ZF has added a further and equally ambitious goal from the “zero” concept, namely a world in which cars and trucks no longer produce emissions. The only way to achieve both simultaneously is with all-electric and autonomous mobility.

Ultimately, human failure can only be ruled out when the computer is in control all the time everywhere. Currently, humans cause roughly 90 percent of all traffic accidents and are therefore primarily responsible for approx. 1.25 million traffic deaths annually around the world.

No doubt that the road toward the long-term goal of Vision Zero will be long and arduous. ZF developers have already completed the first important stage in this journey with advanced technologies and new approaches: ZF innovations focus on intelligent mechatronic systems which are offered from a single source and which contribute considerably to a mobile world without emissions and accidents.

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 centers 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.

Getting in shape for the future

Precisely because the vehicles of tomorrow will be operated electrically and autonomously, they are extremely complex, which is why ZF is working hard on rapidly closing existing knowledge and technology gaps. In spring 2015, the company therefore acquired TRW Automotive, a U.S.-based competitor that specializes in safety technology, and integrated it into the ZF Group as its Active and Passive Safety Technology Division. Today, this new division develops and produces intelligent braking systems, cameras and environmental sensors as well as occupant safety systems such as seatbelts and airbags. The Group's activities reach considerably further back to the future field of hybrid technology. As early as 2008, ZF opened Europe's first production facility for manufacturing hybrid modules for passenger cars in Schweinfurt. Since the beginning of 2016, a separate division, the E-Mobility Division, has been devoted more intensely than ever to the development and sale of hybrid modules, plug-in hybrid drives and all-electric drive systems.

At the same time, ZF has been advancing its digitalization strategy across all areas and divisions. Everywhere in the vehicle, electronics and electrification are transforming previously passive components into intelligent, active systems. Examples of this include intelligent damping systems or a cleverly combined front and rear axle steering system. At the peak of this development is artificial intelligence, or AI, which interconnects all the systems. In vehicles equipped with artificial intelligence, computers can independently gather experiences and learn from them. This capability is the key to autonomous driving . In a cooperative partnership with computer specialist Nvidia, ZF is in the process of getting the Nvidia supercomputer ready for use in the car.

Achieving more through partnership

Nevertheless, the systems described above represent only a few of the puzzle pieces that make up the big picture, known as the " ZF Vision Zero Ecosystem ". ZF has been consistently expanding this system by entering into partnerships with highly specialized companies or by purchasing shares in technology companies that are relevant for ZF's interests. In 2016 alone, ZF announced the market launch, together with Nvidia, of ZF ProAI, the world's first control unit with artificial intelligence and invested in the company Ibeo, which is a lidar and software specialist. Not only that, ZF also acquired shares in the company Astyx, which is an ultra high-frequency radar manufacturer. Moreover, the company entered into a strategic partnership with Faurecia, a vehicle interior design specialist, to create the cockpit of the future. In addition, the strategic cooperative agreement entered into in June 2017 with Hella, a manufacturer of sensor

technology, improved our position as a complete system supplier for modern assistant systems as well as for autonomous driving functions.

With its all-electric powered innovation vehicle called the “ Vision Zero Vehicle ”, which ZF recently unveiled to the public, the company has demonstrated that the technology of the future can already make a difference today in terms of greater safety and efficiency . This family van comes with safety functions that represent a giant step on our long journey toward the company's vision of zero accidents and zero emissions. It is a concept car completely packed with innovative driving and safety functions that are essentially based on intelligently networked and readily available systems from ZF. These features and functions enable this unique vehicle to operate in either assisted or automated mode. The fact that the innovation vehicle is a family minivan is part of the concept's appeal because parents are particularly sensitive to safety and environmental issues.
Vision Zero – at ZF, this concept goes even further than a world without accidents. ZF has developed its own goal inspired by the "zero" concept, which pushes the envelope and is equally ambitious: a world in which vehicles no longer produce any emissions. This goal can only be achieved if all means of transport are powered by electricity. Therefore, ZF offers solutions for electric drives in almost all segments – from inner-city micromobility with bikes to drive solutions for electric buses. Four examples:

1. Cooperative project for developing microcars

ZF wants to play a part in shaping the growing market in electromobility and microcars. Therefore, ZF is planning a cooperative project with the companies Magura, BrakeForceOne (BFO) and Unicorn Energy. With this, the company aims to redefine electromobility in the micromobility sector with two, three and four-wheeler vehicles.

2. People and cargo movers

Autonomous, connected and therefore incredibly flexible **e-shuttle vehicles** will become increasingly important in urban hotspots in the future. To this end, ZF is working on a joint venture with e.GO Mobile AG. The aim of the new joint venture "e.GO Moove", based in Aachen, is to develop, produce and distribute an autonomous people and cargo mover.

3. mSTARS is the new star at ZF

Another highlight is the new, modular **mSTARS rear axle kit** (**m**odular **S**emi-**T**railing **A**rm **R**ear **S**uspension). The new module with multi-link rear suspension includes an electric motor, transmission, differential and power electronics. With mSTARS, ZF customers can respond extremely flexibly to various market requirements with just one body variant. These requirements could be for hybrid vehicles, vehicles driven by fuel cells or battery-powered vehicles as well as the classic all-wheel module. ZF has already integrated the axle into its Vision Zero Vehicle and shows how quickly the change to high-performance electric or hybrid cars can be made. At 150 kilowatts (corresponds to around 204 HP), the electric motor offers more than enough power for all your day-to-day automobile needs – with zero local emissions.

4. Electric Traction for City Buses

ZF has launched the **electric portal axle AVE 130** for driving buses. Two water-cooled asynchronous traction motors sit on each wheel. The maximum torque amounts to two lots of 485 newton meters when firing up from a standstill. Due to the gear ratio, there is also an output torque of 2 x 11,000 newton meters on the wheels – no other electric drive for city buses currently provides this. This enormous traction is sufficient for powering even fully loaded articulated buses using one electrically driven axle alone.