



## Handling the Distribution Volume: ZF's Intelligent Technology Supports Increasing Delivery Demand

- **The delivery truck that finds its own parking space: Autonomous driving functions make a courier's work easier**
- **Zero emissions: The all-electric drive of the Innovation Van reduces air and noise pollution in city centers**
- **Right place, right time: Cloud-based algorithm calculates the ideal route for both courier and customer in real time**

**Hanover/Friedrichshafen. Rapid growth of online commerce has put parcel delivery firms in a tight spot: By 2021, the number of parcels delivered each year is expected to surpass the four billion mark – in Germany alone and increasingly, consumers prefer to determine when and where they receive their parcels. The electrically driven Innovation Van utilizes ZF's comprehensive expertise in automated driving to the requirements of the logistics sector – using a smart algorithm that takes into account customer requests in real time and calculating the most efficient delivery route.**

According to estimates by the German Association for Package and Express Logistics, significantly more than 3.3 billion parcels and packages were delivered throughout Germany in 2017 alone, with a continuing upward trend. A mammoth task for delivery services: A daily ratio of 200 parcels is nothing unusual for couriers. On average, they have two and a half to three minutes to make each delivery. This includes time for parking the vehicle, walking to the front door and waiting for the door to be answered before physically delivering the parcel – every additional action counts. In 2016, ZF's future study had already identified the issue of last mile logistics and took a closer look at the challenges couriers face during the last mile to the customer. The Group is now unveiling a concept vehicle for logistics service providers. "Our Innovation Van is an extensive solution tailored to the requirements of the delivery sector," said Gerhard Gumpoltsberger, head of Innovation Management at ZF. "In order to meet the wide range of challenges of inner-city deliveries, we called upon our entire range of



competencies – from autonomous driving and electromobility right up to networking within a smart support system.”

### **The delivery vehicle on a virtual leash**

The Innovation Van is equipped with level 4 autonomous driving functions. The delivery truck is designed to independently maneuver through urban surroundings, stay on course even if roads do not have lane markings, recognize both traffic lights and road signs and react to sudden hazardous situations. In addition, it can recognize and avoid obstacles such as vehicles double parked. The tablet-based remote control is particularly helpful for a courier: If two addresses are so close that the best delivery route is on foot, the Innovation Van follows the courier as if on a virtual leash. If there is no parking available outside an address, the courier can send the vehicle ahead to the next stop, where it will look for a parking space on its own.

### **See, think, act and zero emissions**

With its broad technology portfolio, the Innovation Van distinctly illustrates the Group's "see. think. act." claim. The entire ZF sensor set, consisting of camera, radar and lidar sensors, helps to ensure that the delivery truck is completely aware of its surroundings at all times. The ZF ProAI central computer is capable of assuming control, processing the data generated by the sensors and enabling the vehicle to react appropriately to complex situations. In addition, intelligent mechatronic systems, such as the electric power steering and the integrated brake control (IBC) can reliably carry out the central computer's instructions. The electric axle drive system for passenger cars and light commercial vehicles is responsible for the purely electric and locally emission-free drive.

### **Smart algorithm directs parcels along the best route**

To be able to find the most efficient delivery route at any time, the Innovation Van accesses a cloud-based support system. Data for each package on board the vehicle is stored, such as destination and preferred time of delivery, along with other information, such as the shelf life of perishable goods. “The algorithm takes this information,



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adds parameters such as traffic conditions or energy consumption and calculates the ideal delivery sequence in real time," explains project manager Georg Mihatsch. "Basically, the parcel itself finds the best way to get to the customer – and the vehicle follows." The parcel courier receives this information via mixed reality smartglasses. This allows them to review all relevant data.

**The freedom to choose when the parcel arrives**

The consumer also benefits from the support system in the Cloud: The app not only enables them to track the parcel's route, but also to change delivery data at short notice. This allows consumers to easily redirect parcels to a particular neighbor at any time, or to push delivery time back if they are delayed by something unexpected. This benefit is also of value to the courier: Instead of waiting in vain for the doorbell to be answered and possibly having to come back the next day, the courier can move on to the next delivery.

Captions:

- 1) Just-in-time parcel deliveries for less hassle in daily delivery life: Intelligent concepts by ZF help bring couriers and customers together at the right place, at the right time.
- 2) Cloud-based support for couriers: A Data Lens in the ZF Innovation Van provides information about the customer's availability.
- 3) Tomorrow's mobility available for delivery vehicles today: The ZF Innovation Van's autonomous driving functions contribute to making parcel deliveries more efficient for a secure future.
- 4) A possible delivery scenario using the ZF Innovation Van: The courier leaves the driverless van in a space where parking is prohibited. Whilst the courier delivers the parcel, the van can independently look for a place to park. If passers-by should step into its track in the process, the van can perform emergency braking and is able to avoid other obstacles. The van can then send its location to the courier's data glasses.



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- 5) With its Innovation Van, ZF demonstrates its entire range of competencies – from autonomous driving and electromobility right up to networking within a smart support system."

Images: ZF

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**ZF Friedrichshafen AG**

ZF is a global leader in driveline and chassis technology as well as active and passive safety technology. The company has a global workforce of 146,000 with approximately 230 locations in some 40 countries. In 2017, ZF achieved sales of €36.4 billion and as such, is one of the largest automotive suppliers worldwide.

ZF enables vehicles to see, think and act. The company invests more than six percent of its sales in research and development annually – in particular for the development of efficient and electric drivelines and also in striving for a world without accidents. With its broad portfolio, ZF is advancing mobility and services for passenger cars, commercial vehicles and industrial technology applications.

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