ZF's Intelligent Electro-Platform Moves the Rinspeed "Snap"

- The Intelligent Dynamic Driving Chassis (IDDC) sees, thinks and acts
- ZF's IDDC enables automated and emission-free mobility in the future
- ZF combines innovative chassis systems, electric drives and environmental sensors with hardware and software to create the "Skateboard", an autonomous driving platform

Friedrichshafen, Germany. With its Intelligent Dynamic Driving Chassis (IDDC), ZF offers a versatile platform for autonomous electric vehicles. As well as being a good example of supporting ZF's zero emissions philosophy, IDDC also embodies ZF's vision, meaning that it can enable vehicles to 'see, think and act'. This is achieved using environmental sensors, intelligent control units and connected mechanical systems. With IDDC, a "Skateboard" forms the basis of Rinspeed's latest urban mobility concept, Snap. It integrates hardware and software within the driving platform ("Skateboard") and can be flexibly detached from the passenger cabin ("Pod").

"Urban transport of tomorrow will be emission-free locally, will move autonomously and will adapt to the most varied requirements with great flexibility. Our IDDC delivers the necessary technological and functional requirements required for this to the table today," says Torsten Gollewski, Head of Advanced Engineering at ZF.

The IDDC is all-electric with excellent maneuverability, and can navigate its way through the city without a human driver and, in theory, even without a passenger cabin. This is ideal for vehicle concepts like the Rinspeed Snap, where the driving chassis from ZF is intended to be used 24/7 in continuous operation. In contrast, superstructures called "Pods" – mobile or stationary cabins for people or goods without a

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steering wheel – are constantly being changed, according to current requirements.

mSTARS: Axle, drive and steering system in one

A core element of the IDDC is the mSTARS modular rear axle system (modular Semi-Trailing Arm Rear Suspension). The Active Kinematics Control (AKC) rear axle steering is integrated here: ZF raised its maximum steering angle to 14 degrees for the Rinspeed Snap. The electric motor and power electronics are positioned inside the axle to drive the vehicle efficiently. In contrast to the usual electric axle drive, which has 150 kW of output, Snap has a smaller output of 50 kW. It is systematically designed to achieve maximum distance, relatively low speeds and withstand endurance stress for urban car sharing.

EasyTurn: Front wheel turning radius is unique

The front axle of the IDDC is equally innovative. The system, called EasyTurn, enables an expansive steering angle of up to 75 degrees, which it achieves via interaction with ZF's modified electric power steering. Classic solutions allow a maximum angle of 50 degrees. Therefore, thanks to the AKC on the rear axle, the Rinspeed Snap can nearly pirouette on the spot, which is a huge advantage in terms of agility in crowded city centers. Like the other components in the IDDC, the integrated brake control (IBC) from ZF is electrically driven in the Snap conceptThis technology is also one of the prerequisites for automated and autonomous driving.

Sensor technology: Monitoring the vehicle's surroundings

ZF has integrated hardware and software into the chassis so that the IDDC can detect its surroundings even without the "Pod". ZF has provided a sensor cluster which d is configured for autonomous driving in cities. It consists of radar systems, LIDAR technology, which ZF developed jointly with Ibeo Automotive Systems, and camera systems. This enables 360-degree environmental detection for both long-range and short-range applications at virtually all typical city speeds and in all light and weather conditions.

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ZF ProAI: Artificial intelligence for autonomous driving

In the future, data from all components, systems and sensors in the IDDC as well as from car-to-x communication will all be analyzed and processed together on a central supercomputer called ZF ProAI, developed in cooperation with NVIDIA. The computer will process data in real time and will use it to help instruct the actuators. ZF ProAI will control all longitudinal and lateral control functions and, if applicable, vertical control functions as well. The high-performance control box will also utilize artificial intelligence and deep learning capabilities, which are additional key factors for ensuring the advanced development of autonomous driving.

Captions:

1.1 – 1.3) Autonomous electric vehicle platforms for urban environments: The Intelligent Dynamic Driving Chassis (IDDC) from ZF is ideal for pioneering vehicle concepts such as the Rinspeed Snap.

2) For active steering of the rear wheels, the ZF mSTARS rear axle system brings a complete electric drive and AKC tracking alignment to the IDDC in modular format.

3) EasyTurn by ZF: The innovative design of the front axle together with electric power steering means that the front wheels can be turned at angles of up to 75 degrees.

Image: Rinspeed; 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 around 137,000 with approximately 230 locations in some 40 countries. In 2016, ZF achieved sales of €35.2 billion. ZF annually invests about six percent of its sales in research & development – ensuring continued success through the design and engineering of innovative technologies. ZF is one of the largest automotive suppliers worldwide.

ZF allows vehicles to see, think and act. With its technologies, the company is striving for Vision Zero – a world of mobility without accidents and emissions. With its broad portfolio, ZF is advancing mobility and services in the automobile, truck and industrial technology sectors.

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