

# ZF

## ZF Shapes the Autonomous, Connected and Electrified Future for City Buses and Coaches



ZF's new Commercial Vehicle Solutions (CVS) division has sent a clear message of support to city bus and coach manufacturers as well as fleet operators worldwide with its expanding suite of advanced systems and solutions.

In addition to setting a new industry benchmark in bus transmission system performance and efficiency with the unveiling of EcoLife Coachline, ZF's expanded

technology portfolio delivers significant advantages for all types of coach applications. Leveraging the synergies and enhanced capabilities of CVS, ZF is meeting the current safety and efficiency needs of coaches while bringing the sector's autonomous, connected and electric future ever closer.

### Driving Coach Efficiency to the Next Level

ZF's Commercial Vehicle Solutions (CVS) division has set a new industry benchmark in coach transmission system performance and efficiency

with the recent unveiling of EcoLife CoachLine. The second generation of its proven six-speed automatic transmission, EcoLife CoachLine is suitable for coach applications, whether operating in a city, inter-city or even a challenging, steep mountain track. It offers advantages for customers including outstanding passenger comfort and significant fuel savings of up to three percent, compared to the previous generation.

*“Environmentally and economically smart, EcoLife CoachLine sets a new standard of transmission performance, efficiency and*

*driving comfort for even the most demanding coach applications, from city streets to mountain roads,”* said Dr Jochen Witzig who is responsible for transmission systems at ZF’s Commercial Vehicle Solutions division.

*“Given the continued predominance of traditionally internal combustion engine powered buses in public transport and long-distance travel world-wide, it is vital that we focus on delivering ever-higher levels of fuel efficiency to help reduce emissions. EcoLife achieves this and so much more,”* added Dr. Witzig.

Fuel savings of up to three percent over the previous generation EcoLife are possible thanks to EcoLife CoachLine’s innovative start/stop function which saves fuel during the entire transmission service life.

The powershift transmission has an optimal gear ratio spread, from 3.36 to 0.59. This is powerfully combined with a particularly high level of

mechanical efficiency, ensuring that the vehicle always operates in the optimum engine speed range.

Further enhancing driver comfort, effortless gear shifting has been enabled using ZF’s TopoDyn Life software controls. Using driving resistance-dependent shift controls, the programme ensures the right gear is always selected as the topography changes. The hydrodynamic torque converter with standard torsional damper enables high input torques to be achieved at relatively low engine speeds. The key benefits of this include noise reduction as well as lowering fuel consumption.

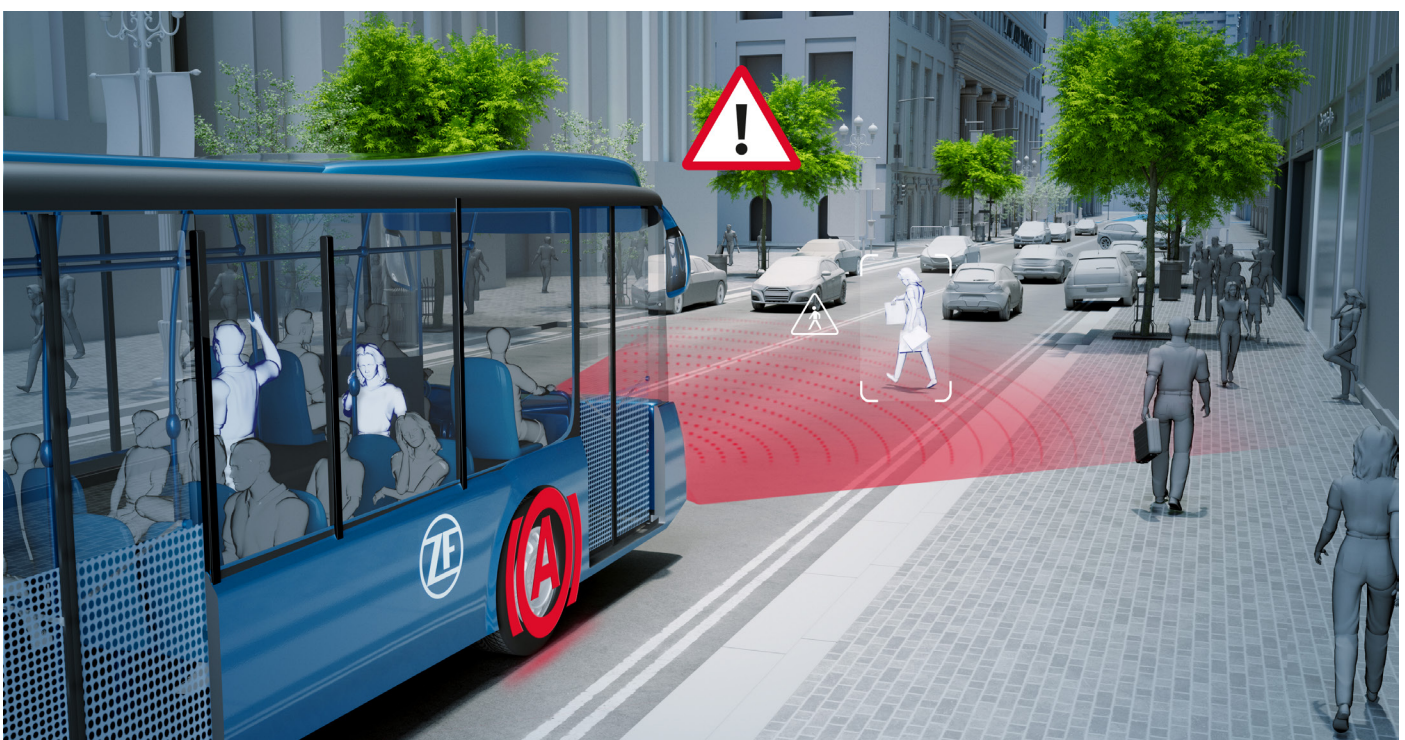
An innovative, integrated primary retarder and dual cooling set-up enables the highest level of braking power to always be available – even at low speeds. The dual cooling system features a large retarder heat exchanger and an integrated transmission heat exchanger. This ensures longer retarder braking and greater retarder availability

– important features given that coaches frequently operate for longer periods on steep mountain tracks and over greater distances. Effectively reducing the strain on the vehicle’s service brakes and protecting against overheating, the dual cooling system also extends oil change intervals by up to 480,000km. Overall, the numerous improvements lead to higher energy efficiency, CO2 reduction and improved TCO.

Additionally, EcoLife CoachLine increases the digitalisation of servicing and maintenance to help not simply predict breakdowns but to prevent them from happening. Providing predictive maintenance and preventive service packages, maintenance and repair costs are reduced, required work more easily planned and vehicle uptimes enhanced.

## Advancing City Safety

Taking its systems and components

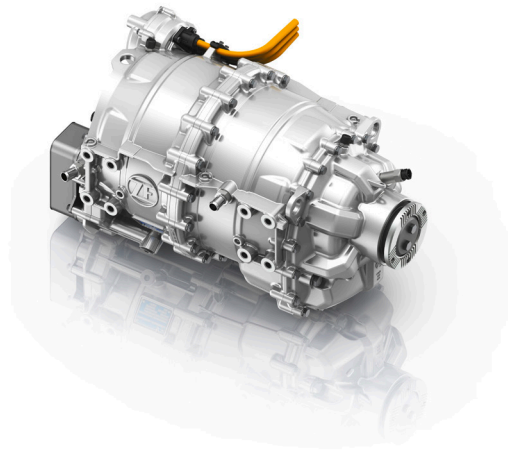




expertise to the next level, ZF has developed its first Collision Mitigation System (CMS) specifically designed for city buses. The pioneering system offers active braking to help avoid frontal collisions with other road users, including vehicles, bicycles and pedestrians. The system also helps counter the adverse impact of braking momentum on passengers. Helping reduce the risk of accidents and injuries both inside and outside of the bus, the solution is the industry's first original equipment manufacturer-independent CMS specifically engineered for city bus applications. The system is compatible with both electric and internal combustion engines. Having already secured business wins from leading bus OEMs, ZF will initially launch its City Bus CMS in Europe and, ultimately, plans to roll the system out worldwide.

*“Leveraging ZF’s wide-ranging competencies to develop a pioneering solution connecting radar and camera with a central processing unit and braking system, City Bus CMS represents a clear proof point of the Group’s Next Generation Mobility strategy,” said Philipp Helmich, Head of Vehicle Dynamics Product Lines with ZF’s Commercial Vehicle Solutions division. “The system addresses the clear and pressing demand from manufacturers and their customers for ever-higher levels of safety in city traffic.”*

*“In addition to providing advanced, integrated safety for road users as well as the driver and passengers of both electric and traditionally fuelled buses, we are extending ZF’s advanced driver assistance systems leadership in trucks and coaches to the important city bus market*



*segment. Utilising advanced braking system technology is fundamentally important for safety and autonomous driving, with complex city bus applications providing an interesting and valuable use case,” added Helmich.*

Offering significant value for OEMs and fleet customers, ZF’s city bus CMS represents a major step in enhancing bus safety for passengers and road users alike. Helping mitigate hazardous traffic situations in the complexity of an urban environment requires sophisticated situational analysis, including advanced object detection and classification. Building on ZF’s extensive safety systems expertise, ZF’s City Bus CMS draws on its latest OnGuardMAX technology for heavy trucks – with specific features and functionalities that are tailored to city bus applications. Combining the data from its state-of-the-art camera and radar provides continuous analysis of the traffic situation. If an impending collision is detected, the system can issue a forward collision warning (FCW) and automatically apply the brakes to help mitigate or avoid an accident.

Combined with ZF’s advanced braking capabilities that are precisely calibrated with the vehicle’s speed and weight,

the adverse effects of sudden braking on passengers can also be minimised. With seamless interaction between ZF’s ADAS and braking system, brake pressure is carefully applied across the braking cascade making passengers less likely to be jolted and put off-balance.

## CeTrax: Efficient Central Drive Electrification for Buses

Successfully tried and tested by many manufacturers, ZF’s CeTrax is a purely electric central drive that can be used in buses. The system can also be integrated into existing vehicle concepts with a conventional driveline layout. This allows manufacturers to convert their model range to local zero emission propulsion without having to develop completely new platforms.

