# TopoDyn Life: A Continuously Variable Shift Program For All Route Profiles

- **The control software TopoDyn Life features a continuously variable shift program which always selects the ideal operating mode.**
- **The individual power requirement is determined depending on the route profile and all driving resistances.**
- **Optimally combined with ZF's automatic EcoLife transmission.**

**TopoDyn Life, the new topography-dependent control software guarantees the transmission's optimal operation at any point of the route. This is made possible by individual shift points which are calculated as a function of the respective road routing and driving resistances. TopoDyn Life, combined with the ZF EcoLife automatic transmission, is thus even more economical than the well-proven combination of TopoDyn and the ZF Ecomat transmission.**

City bus requirements are continuously increasing: In many places, emission limits have to be met, noise emissions must be reduced to a minimum and operating costs are to be kept as low as possible at the same time. Reducing fuel consumption plays a key role in this context: Less fuel not only means less costs but also less environmental pollution. The combination of the EcoLife automatic transmission and the topography-dependent shift strategy TopoDyn Life by ZF is a real breakthrough in terms of fuel economy. With TopoDyn Life, a control software specifically developed for the EcoLife, the transmission adjusts the shifting characteristics to the respective route profile during travel. The shift points are calculated considering the topography, current load and acceleration values as well as variable driving resistances, such as road surface or corner angles. If the bus is operated in the city, TopoDyn Life automatically selects the most economical shifting characteristics. Once the terrain becomes steeper, the

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software smoothly adjusts the selection of shift points to the current gradient in a continuously variable manner. This ensures that the engine runs in the ideal, that is the most economical operating mode at every point of the route.

**Topography-dependent shifting has already proven successful**
Numerous international tests with the TopoDyn and the ZF Ecomat automatic transmission have shown how much influence topography-dependent shifting actually has on fuel consumption: Combining economical transmissions with intelligent control units can lead to fuel savings of up to 19 percent. During travel, TopoDyn can choose from up to five shift programs with predefined shift points, which are selected depending on the current route profile and vehicle data, such as speed or load and acceleration values. By way of comparison, TopoDyn Life, the successor generation of the intelligent control software, features a continuously variable shift program. The benefit: The transmission does not change gears at shift points which are determined by the currently active program but calculates the power requirements independently and changes gears whenever the driving situation requires it. This way, TopoDyn Life and EcoLife manage to save another five percent in fuel consumption than the well-proven combination of ZF Ecomat and TopoDyn. On long uphill gradients, tractive force is pre-calculated: This pre-calculation ensures that shifting processes are only released if the vehicle speed does not drop as a consequence. Thus, potential gear hunting is prevented.

The topography is also considered when driving downhill. The stronger the downhill gradient, the more powerful the performance of the retarder (up to 3,400 Nm). This extends the life of the service brake, protecting it against overheating and wear.

**No additional components required**
In contrast to GPS-based or sensor-based systems, TopoDyn Life by ZF requires no additional components and provides the necessary information even in unknown terrain where GPS is not available.

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As the software does not require any interference by the driver, the driver does not have to be trained for this function.

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ZF is a leading worldwide automotive supplier for Driveline and Chassis Technology with approximately 60,000 employees at 125 production companies in 26 countries. In order to continue to be successful with innovative products, ZF annually invests five percent of its sales (2008: 697 million of EUR 12.5 billion) in Research and Development.

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