



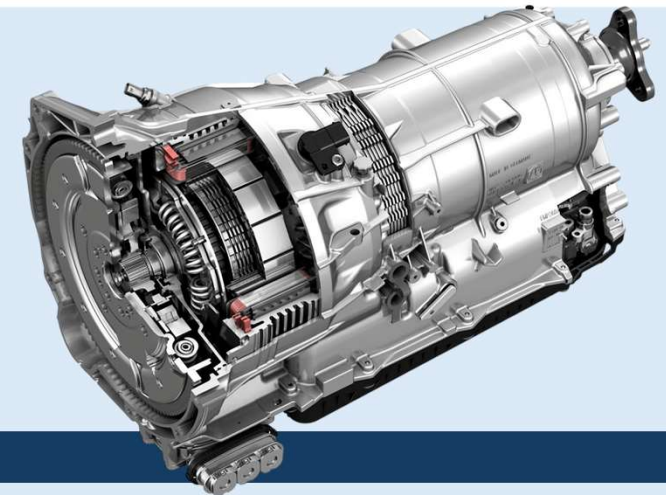
AUTOMATIC TRANSMISSION

**1VD-FTV Toyota 4.5-litre and 1GD-FTV Toyota 2,8-litre
engines in the 70 Series**

At (TMS) Tactical Mobility Solutions, we enhance tactical superiority through advanced driveline technology. Our Automatic Transmission Solution provides unparalleled efficiency, dynamics, and strategic advantages for modern military and defence operations, ensuring your fleet remains at the forefront of technological capability and mission readiness across diverse and challenging environments.

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Advanced Driveline Solutions for Tactical Mobility



ENHANCING TACTICAL SUPERIORITY

Tactical Mobility Solutions (TMS) is proud to offer the TMS ZF 8HP90 Automatic Transmission with Optional Hybrid Electric Drive Integration, an innovative eight-speed automatic transmission that stands as a direct testament to our strong partnership with ZF Friedrichshafen AG, a globally renowned leader in driveline, chassis, and transmission technology from Germany.

This collaboration has culminated in the development of a military-specification variant of the 8HP90 automatic gearbox, engineered as an Original Equipment (OE) product specifically for heavy-duty applications of the Toyota Land Cruiser 70 Series and exclusively available through TMS.

Our unique relationship with ZF positions TMS as the sole provider of this unparalleled transmission solution, reinforcing our unwavering commitment to delivering exceptional, dependable, and high-performance products to our valued customers and partners.

OUR EXCLUSIVE COLLABORATION WITH ZF FRIEDRICHSHAFEN AG

TMS Tactical Mobility Solutions' direct engagement with ZF Friedrichshafen AG, a globally renowned supplier of driveline, chassis, and transmission technology, affords us a unique and significant advantage within the industry. Through this strategic collaboration, we have committed substantial resources and expertise to develop an exclusive military-specification (mil-spec) variant of the 8HP90 automatic gearbox which also has the option of integrated Hybrid Electric Drive. This bespoke transmission has been engineered to meet the demanding requirements of the Land Cruiser 70 Series vehicle within military applications.

This extensive development process has resulted in the co-creation of an original equipment (OE) gearbox, ensuring uncompromising reliability, exceptional performance, and unwavering support directly from the ZF Group. This collaboration underscores our profound commitment to delivering the highest standards of quality and performance to our clientele.

OUR EXCLUSIVE COLLABORATION WITH ZF FRIEDRICHSHAFEN AG

Furthermore, our direct partnership with ZF guarantees an exclusive and assured supply chain, capable of meeting the demands of any contract size. This provides our customers with unparalleled peace of mind, confident that their vehicles are equipped with a transmission specifically engineered to withstand the rugged conditions and demanding challenges inherent in military applications.

With the robust backing and comprehensive expertise of ZF, a company with a proven track record across diverse sectors including automotive, rail, marine, defence, and aviation, we are proud to offer a product that consistently exceeds expectations and establishes new industry benchmarks. This enduring partnership with ZF reinforces our unwavering commitment to providing our customers with best-in-class solutions, underpinned by the distinguished expertise and formidable reputation of one of the world's foremost transmission technology suppliers.

THE IMPERATIVE FOR INNOVATION IN DEFENCE MOBILITY

Modern warfare necessitates vehicles that are robust, powerful, agile, fuel-efficient, and capable of operating across diverse and challenging terrains. Traditional driveline systems often present significant limitations in several key areas:

- **Fuel Logistics:** High fuel consumption increases supply chain vulnerability and operational costs.
- **Acoustic Signatures:** Loud powertrains can compromise stealth and tactical surprise.
- **Environmental Footprint:** There is a growing global emphasis on reducing emissions, even within defense operations.

The innovations TMS offer directly address these critical challenges, paving the way for the next generation of tactical mobility using the Land Cruiser 79 Series platform.

ROBUSTNESS & RELIABILITY FOR THE BATTLEFIELD

The ZF legacy is built on a culture of innovation and a commitment to quality, which directly translates to the rigorous demands of military applications and aligns seamlessly with the values, objectives, and culture at TMS Tactical Mobility Solutions.

- **Proven Reliability:** Millions of vehicles worldwide rely on ZF's driveline technology, demonstrating a level of reliability crucial for mission-critical operations where failure is not an option.
- **Efficiency & Dynamics:** ZF products are engineered for maximum efficiency without compromising performance. This results in improved range, faster response times, and superior maneuverability for tactical vehicles.
- **Paving the Way for Future Mobility:** ZF's continuous innovation, including pioneering work in electrification, ensures that your fleet will remain at the forefront of technological capability. Their components are designed to integrate seamlessly with emerging trends such as hybrid and electric propulsion, which is vital for future-proofing defense assets.

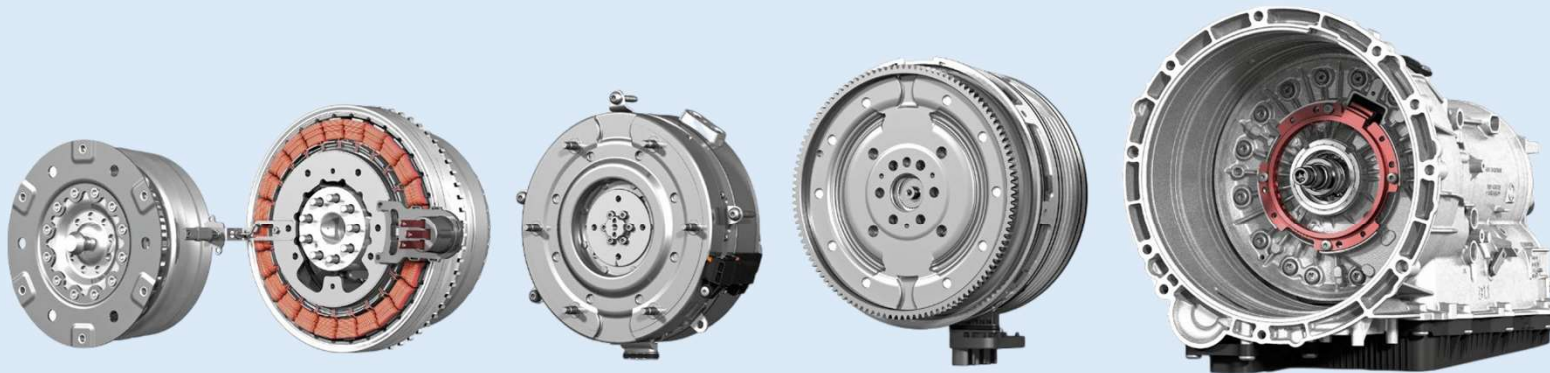
A CORE SOLUTION FOR TOYOTA LC BASED PLATFORMS

The TMS ZF 8HP 90 8-speed Automatic Transmission with Hybrid Electric Drive Options designed for the Toyota Land Cruiser and exclusively available through TMS is a cornerstone of adaptable and efficient driveline solutions, ideally suited for a wide range of platforms based on the Toyota Land Cruiser base.

- **Unmatched Versatility:** Designed for rear and all-wheel drive concepts in longitudinal designs, the TMS ZF 8HP 90 offers unparalleled flexibility. Its modularity ensures a tailored solution for diverse operational requirements, ranging from light tactical vehicles to heavier armored personnel carriers and logistics trucks.
- **Electrification Readiness:** The TMS ZF 8HP90 Automatic Transmission fully supports the integration of mild, full, and plug-in hybrid powertrains, offering a cost-effective path to electrifying existing or new vehicles using the TMS ZF 8HP90 Transmission. This capability is crucial for reducing fuel dependency, enabling silent operations, and enhancing overall energy efficiency.
- **Compact Integration:** Despite its advanced capabilities, the TMS ZF 8HP90 with or without Hybrid Electric Drive maintains a consistent installation space, simplifying integration into existing vehicle architecture.

TMS ZF 8HP90 AUTOMATIC TRANSMISSION WITH HYBRID DRIVE

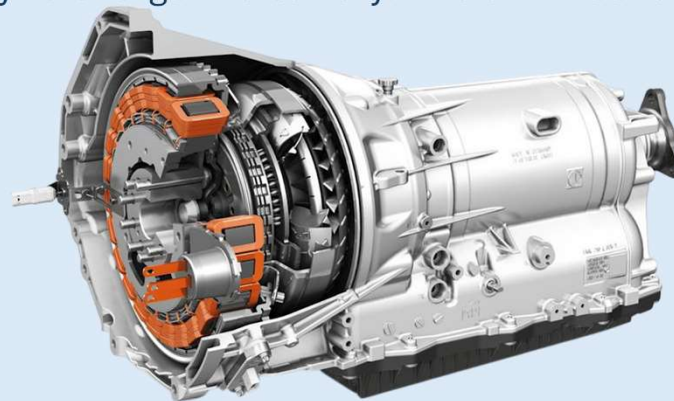
- **Hybrid Drive - Modular Electrification Options:** The TMS 8HP90 Transmission with Hybrid Drive options cover the entire range of requirements, including mild, full, and plug-in hybrid variants, ensuring cost-effective electrification of model platforms due to a high percentage of identical parts and parallel hybrid design.



HYBRID DRIVE

TMS ZF 8HP90 AUTOMATIC TRANSMISSION WITH HYBRID DRIVE

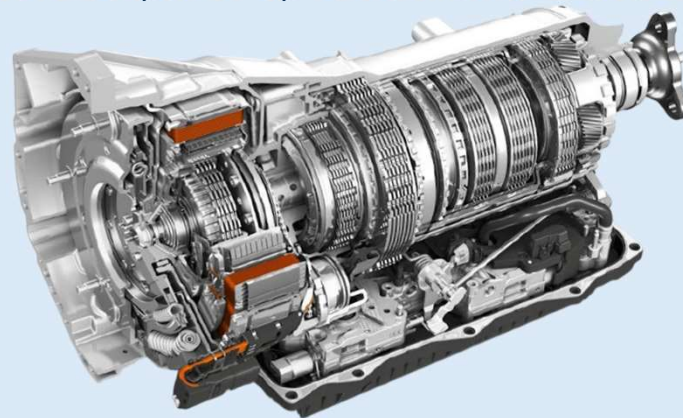
- **Mild-Hybrid (Up to 15 kW Electric Power):** Ideal for light duty applications and fuel reduction. It provides a "boost function" for agility during moving off and acceleration. The electric motor, housed between the combustion engine and transmission, produces up to 15 kilowatts and over 200 Newton meters of torque. Additional efficiency comes from the start-stop function, which automatically switches off the engine when the vehicle stops and smoothly restarts it when the accelerator is pressed (optional). The electric motor also helps the combustion engine operate within its optimum efficiency range, positively impacting fuel consumption and CO2 emissions. During braking, the electric motor acts as a generator, recuperating energy to charge the battery. It is all-wheel drive compatible and suitable for 48V on-board supply systems.



HYBRID DRIVE

TMS ZF 8HP90 AUTOMATIC TRANSMISSION WITH HYBRID DRIVE

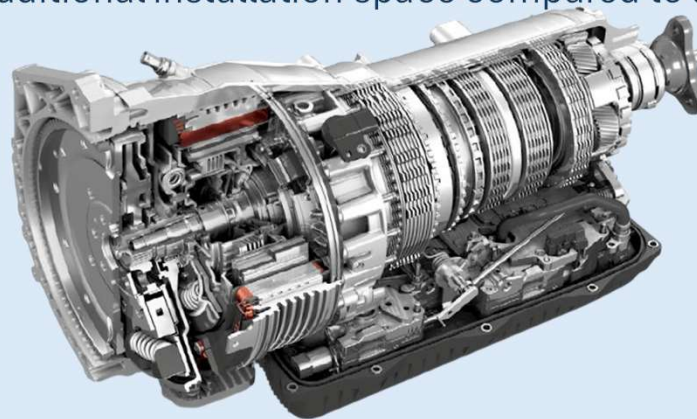
- **Full-Hybrid (Up to 40 kW Electric Power):** Offers all functions of the standard transmission plus electric drive advantages. It enables efficient long-distance travel, powerful acceleration, and all-electric capability for short journeys. A separating clutch allows the combustion engine to be completely decoupled from the driveline, substantially reducing fuel consumption. Vehicles can operate all-electrically when moving off or over short distances (up to 5 km electric range). The electric motor, clutch, torsional dampers, and hydraulics are space-savily fitted within the basic transmission, replacing the torque converter. It is all-wheel drive compatible and features an integrated electric pump (IEP). The electric motor has a maximum output of up to 40 kilowatts and maximum torque of up to 230 Newton meters.



HYBRID DRIVE

TMS ZF 8HP90 AUTOMATIC TRANSMISSION WITH HYBRID DRIVE

- **Plug-in Hybrid System (Up to 90 kW Electric Power):** Combines the range of a combustion engine with locally emission-free electric drive. This highly integrated system provides all-electric ranges of up to 50 kilometres and a top speed of 120 km/h (74.5 mph) in all-electric mode. The electric motor has a peak output of 90 kilowatts and up to 250 Newton meters of torque. Benefits include an integrated starting element that fits the available space, an integrated electric pump (IEP) reducing load on the on-board supply system, water or transmission oil cooling for the electric motor, and a separating clutch with low drag loss that decouples the electric drive from the combustion engine to increase electric range. It requires only 30 millimetres of additional installation space compared to a conventional transmission.



HYBRID DRIVE

TMS ZF 8HP90 AUTOMATIC TRANSMISSION

- **OE Design:** As an Original Equipment (OE) component, the TMS ZF 8HP90 guarantees seamless compatibility and enhanced overall vehicle performance, meeting stringent industry standards.
- **Heavy Duty Torque and GVM Handling:** The TMS ZF 8HP90 excels in torque and GCWR capacity, designed to efficiently manage 100% duty cycle at 1000 Nm of torque and 11-ton GCWR for superior performance in challenging conditions.
- **ZF Engineered Software:** With bi-directional communication with the ECU the TMS ZF 8HP90 is designed and optimised to correctly match the output torque, performance and characteristics of the 1VD-FTV Toyota 4.5-litre and 1GD-FTV Toyota 2,8-litre.
- **Bi-Directional Torque Communication:** The TMS ZF 8HP90's two-way communication system with the ECU ensures precise gear selection based on real-time torque data. This enables the transmission to reduce engine torque when required, for correct clutch control and timing, ensuring smooth shifting and long-term durability.
- **Torque Converter:** The torque converter has been correctly tuned by ZF for the 1VD-FTV Toyota 4.5-litre and 1GD-FTV Toyota 2.8-litre.

TMS ZF 8HP90 AUTOMATIC TRANSMISSION

- **Adaptable Cooling:** The system intelligently manages cooling oil for optimal performance across varying operational pressures, ensuring reliability in extreme temperatures.
- **No Bellhousing Adapter Required:** The TMS ZF 8HP90 has no need for additional bellhousing adaptors to mate to the 1VD-FTV Toyota 4.5-litre or 1GD-FTV Toyota 2,8-litre.
- **No Flex Plate Adapter Required:** The TMS ZF 8HP90 torque converter and flex plate are precision-engineered for seamless inter-compatibility by ZF.
- **No Output Shaft Adapter Required:** The TMS ZF 8HP90 output shaft is manufactured to suit the 70 Series transfer case input.
- **Efficient Cooling:** The TMS ZF 8HP90's superior cooling system is correctly designed in accordance with ZF required flow rates and thermostatic parameters.
- **Optimized Low Range Shifting:** The TMS ZF 8HP90's low-range shift tables enhance off-road performance and torque handling dynamically.

TMS ZF 8HP90 AUTOMATIC TRANSMISSION

- **Automatic Torque Converter Lockup:** The TMS ZF 8HP90 features automatic lockup across all gears, enhancing overall performance, efficiency and driver experience.
- **Stainless-Steel Oil Sump:** The oil sump on the TMS ZF 8HP90 utilizes a stainless-steel pan for additional strength and robustness.
- **Automatic Tow Mode Detection:** The TMS ZF 8HP90's tow mode detection optimizes transmission settings for enhanced towing performance.
- **Advanced Control Systems:** The TMS ZF 8HP90's advanced control systems, such as predictive shift control, provide unparalleled responsiveness and intuitive operation.
- **Gear Ratio Matrix:** A comprehensive ZF programmed gear ratio table ensures accurate gear shifts and efficient power transfer in line with mechanical design.
- **Seamless Downhill Lockup:** the TMS ZF 8HP90's downhill lockup engages automatically, improving stability during steep descents.

TMS ZF 8HP90 AUTOMATIC TRANSMISSION

- **Key Optimisations:** The 8HP incorporates several key optimisations , including a larger transmission ratio spread of 7.81, multidisc separation of brakes for precision control , an optimised cooling system, functional development of Stand-by Control (SBC) , main pressure reduction as required , and gearshift point optimisation,

