

ZF-TERRASTEER: Strong Design

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- **User benefit: less consumption thanks to weight reduction and increased efficiency**
- **Vehicle manufacturer benefit: multitude of options due to modular design**

With the brand-new ZF-TERRASTEER the vehicle manufacturer receives a modularly structured axle system which can be easily adapted to the customer's requirements using the options available.

At the production start of the ZF-TERRASTEER three tractor models in the power range between 90 HP and 230 HP will be available, these are the axles TSA 09, TSA 11, TSA 20 and TSA 23 (Fig. 12 and 13). There are also further axles under development replacing the present axle generation AS-3000.

Reduced consumption thanks to improved efficiency

With the ZF-TERRASTEER steering axle lower operation costs can be achieved thanks to improved efficiency, which is a result of the following factors:

- Application of performance optimized and friction reduced roller bearings
- Application of low friction oil
- Weight savings with strength optimized housing concept
- Increased power density
- Losses due to splashing oil are additionally minimized by covering the bevel gear set – as an option

The use of lube-for-life bearings as well as extended oil change intervals is ensuring low maintenance expenses. High steering angles of up to 55 degrees provide better tractor manoeuvrability.

Thanks to the high quality sealing concept of the ZF-TERRASTEER these axles are predestined for extreme operating conditions like the application in rice fields.

Modular Design: High Flexibility and Low Costs

In addition to operating cost savings the modular design of ZF-TERRASTEER offers the vehicle manufacturer more flexibility when selecting the requested functions. Due to the high-level modularity of the axle the selected options can be integrated smoothly and cost-efficiently. The following options are available:

1. Differentials:

a) Limited slip differential

High traction force even on difficult terrain. Locking effect available at any time without user intervention, noticeable relief for the driver.

b) Hydraulic dog clutch lock

100 percent lock for difficult working conditions

c) Hydraulic multi-disc differential lock

Optimum traction in any operating situation due to activation of the powershiftable multi-disc lock.

d) Limited slip differential with additional multi-disc lock. Higher locking value by activation of the multi-disc lock possible.

Also, options c) and d) can be integrated in a driveline management system.

2. Steering Angle Sensors:

A steering angle sensor can be included if required. The sensor is integrated into the axle where it is protected. This provides the necessary information for the application of automatic track guidance systems and driveline management systems.

3. Oscillation:

For axle suspension the vehicle manufacturer has the choice between centre and above-centre oscillation.

Above-centre oscillation enables higher pendulum angles and therefore improves the stability of the tractor in uneven terrain. Centre oscillation facilitates the connection between transmission and axle.

4. Suspension:

The axle with standard oscillatory suspension can be supplemented with a hydro-pneumatic suspension. The appropriate mountings can be integrated into the structural parts. Concepts for the further development and

tuning of hydro-pneumatic suspension with customers are available.

5. Brake Option:

Brakes are optionally available on request. The low maintenance wet multi-disc brakes in the wheel heads provide more safety at high travel speeds with lower power losses.

ZF: Global design, local support

ZF has been active in the field of axle production for more than 50 years. Ever since more than 1.5 million tractor steering axles for the global market have left the assembly line. As an independent supplier of complete systems ZF has extensive expertise, thereby assuring unlimited practical capability of ZF products in tractors of all performance classes. Together with the development locations in Passau (Germany), Sorocaba (Brazil) and Shanghai (China) application engineers are working worldwide to listen to customer specifications, to achieve optimum product allocation and to coordinate the delivery in compliance with customer requests for their production sites.

Source: ZF Friedrichshafen AG