

## **ZF optimizes driveline for telescopic handlers**

- **2 HC 85 – New continuously variable hydrostatic drive for telescopic handlers with special benefit for agricultural application**
- **OPTISTEER – Improved axle steering kinematics**

**With the 2 HC 85 (fig. 13) transmissions and the optional ZF-OPTISTEER, ZF offers a driveline for telescopic handlers which enables a more precise driving and working with reduced fuel consumption and tire wear.**

**The continuously variable transmission 2 HC 85 has been specially designed by ZF for construction machinery and is also used in telescopic handlers now. The hydrostatic drive is suitable for vehicles up to 10 metric tons and is fitted with 2 crankshaft radial piston motors. This helps to raise efficiency while fuel consumption goes down noticeably.**

**Moreover, vehicle speeds from 0 up to 50 km/h can be passed through in a continuously variable manner and without tractive effort interruption. This is why the ZF drive is especially suitable exactly for telescopic handlers used in agricultural applications, which often have to cover longer distances.**

**As an option, MULTISTEER 3000 axles may be enhanced by being fitted with ZF-OPTISTEER technology. An additional joint in the tie rod decreases the steering angle error by more than 50 %. The result is a tire side force that is up to 40 % lower, thus reducing tire wear to a minimum.**

### **Continuously variable hydrostatic drive 2 HC 85 Features and advantages:**

- Hydrostatic transmissions up to vehicle weights of 10 tons
- Equipped with 1 or 2 crankshaft radial piston motors, which increase efficiency and consequently reduce fuel consumption

- Vehicle speeds up to 50 km/h
- Enhanced driving comfort, continuously variable without gear shifts
- No tractive effort interruption – this leads to higher work output
- Low starting speed due to an electronically controlled driveline management
- Power control ensures optimized Diesel engine speed even for operation under load. An optimum speed range of the Diesel engine in terms of consumption is always ensured for electronically controlled engines

A very precise maneuvering when loading and unloading plays a key role in all fields of telescopic handler application. This is possible at full traction throughout the entire speed range thanks to the hydrostatic transmission 2 HC 85. The complete accelerator pedal play can be used for exactly positioning the vehicle by selecting the desired driving range.

### **Integrated crankshaft radial piston motors**

As compared to other hydrostatic driveline solutions with bent-axis axial piston motors, ZF installs crankshaft radial piston motors.

Essential features of this crankshaft radial piston motor are:

- Wide range of displacement variation
- Compact design
- Variable displacement down to zero, integrated in the crankshaft
- Speeds up to **2,500 rpm** with high pressure
- High starting torque
- High efficiency
- Low noise level



### **MS-T 3000 optionally available with ZF OPTISTEER**

The steering axle line MULTISTEER 3000 has been specially designed for telescopic handler application and is well-established in the market. ZF now offers the new product development OPTISTEER for this axle line. This technology considerably improves the steering kinematics in the 4-wheel steering system and ensures a perfectly aligned drive concept.

#### **Features and advantages:**

- ZF OPTISTEER
  - optimizes steering geometry by an additional joint in the tie rod
  - reduces steering angle error by more than 50%
  - reduces tire side forces by at least 40%, thus lowering tire wear
  - reduces stress in the driveline and as a consequence also fuel consumption
- Low speed wheel brake:
  - less power loss through lower differential speed in the brake
  - less fuel consumption
  - higher brake capacity at a lower temperature level
- Cylindrical roller bearing in final drive:
  - less power loss and hence less fuel consumption
- Open differential w/HASR multi-disc DiffLock
  - reduced power loss
  - improved efficiency



Key distinguishing features of these telescopic handlers are their flexibility and maneuverability. This versatility is due to the intelligent driveline technology by ZF.

Easy handling is ensured by transmissions and axles offered by ZF as a complete driveline. The telescopic handler can be quickly fitted with shovel, fork, grab, working platform and other mounted implements for doing the most varied jobs. This variety of possible applications is highly appreciated particularly by users in the agricultural sector and gets even more valuable by ZF driveline technology.

Fig.:

13.) Continuously variable transmission 2 HC 85 for telehandler

Picture: ZF

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The ZF Division Off-Road Driveline Technology and Axle Systems specializes in the development and production of transmissions and axles for agricultural and construction machines as well as axle systems for buses and trucks. With 7,500 employees the division generated a turnover of 1.9 billion euros in 2008.

ZF is a leading worldwide automotive supplier for driveline and chassis technology with approx. 60,000 employees at 119 locations in 25 countries. In 2008 the Group generated a turnover of 12.5 billion euros. ZF is among the top fifteen companies on the ranking list of the largest automotive suppliers worldwide.