

Rear-axle steering for simple construction machines

Mobil Elektronik (Germany) shows at Bauma 2019 (hall 3, stand 115) its Ehla Plus steering system for rear-axes. The supported steering modes can be controlled via CAN.

□

Auxiliary rear-axle steering system with safety functionality (Photo: Mobil Elektronik)

For many years, electrohydraulic steering systems for rear-axes are in use in commercial vehicles and complex construction machinery. They are applied primarily to ensure compliance with the legal requirements. Without a steered rear-axle the legally defined minimum turning circle cannot be achieved. In addition to compliance with legal requirements, complex construction machines such as mobile cranes, however, have to meet very requirements for maneuverability, which can only be met by electrohydraulic auxiliary steering. Steering modes such as crab steering, manual steering intervention, or automatic rear swing out suppression are state-of-the-art. Rear-axle and front-axle powering are completely decoupled.

□

Typical 6-axle mobile crane by Tadano Faun using the Ehla auxiliary steering systems (Photo: Mobil Elektronik)

Simple construction machines, such as 2-axle loaders, usually have hydrostatic front-axle steering (e.g. Orbitrol) and often already rear-axle steering. However, this is purely hydraulically and is only be switched on manually on the construction site. It is obvious that application possibilities and flexibility, as well as operating comfort are limited.

Mobil Elektronik has committed itself to provide for these simple vehicles the same features that are already standard in mobile cranes. The Ehla Plus system enables to change the steering mode at any wheel position. The synchronization of the axles with each other, as of Ackermann, is done automatically. The auxiliary steering system complies with the requirements of ECE R79 Annex 6, so that it can be approved for use on public roads. This can be interesting even for smaller construction machines or even be an important prerequisite if these drive a lot on public roads.

The steering system monitors constantly itself. System faults are detected and the driver is informed accordingly. The controllability of the vehicle is always ensured via a defined fallback level. Assistance features of the steering system increase driving stability and thus driving safety.

□

The Lintrac tractor by Lindner Traktorenwerk uses the Ehla Plus steering system (Photo: Mobil Elektronik)

The supplier has revised some parts of the Ehla Plus system to make this system also attractive for smaller, 2-axle vehicles. The housing is now IP6K9K-rated meaning it can be mounted outside the cabin, where extreme conditions prevail due to dirt, water, and salt. Due to the re-designed hardware and software architecture, a safety performance level (PL) e (ASIL D) can be achieved. In addition, the hydraulic components were reviewed. The result is a compact proportional hydraulic unit, in which all necessary valves are integrated. This results in less tubing, fewer parts, and less assembly time.

Besides steering modes such as all-wheel steering, crab steering or manual steering of the rear axle, the product support the automatic rear swing-out suppression. This is of benefit when driving around obstacles. This mode prevents the rear of the vehicle from swinging out when maneuvering by means of the rear-axle turning later than the front axle. This cannot be achieved with a purely hydraulic steering system.

In contrast to purely hydraulic steering, the use of electronics in the form of the safety steering computer makes it possible, that the individual steering modes as well as the entire steering system can be adjusted to the respective vehicle type or to special customer requirements just by parameters. This means that regardless of wheel-bases, tire sizes, and wheel loads, the parts to be installed, such as steering cylinder and steering lever arm, are always the same. The steering modes can either be selected via a control panel, or alternatively via an existing terminal in the vehicle, which is connected to the safety steering computer via CAN.

□

Auxiliary rear-axle steering system architecture (Photo: Mobil Elektronik)

The automatic hydraulic centering and locking of the rear-axle in straight ahead position, when driving on public roads ensures optimum directional stability with minimum tire wear. This is an advantage that is particularly relevant for rental vehicles. The hydraulic supply for the rear-axle steered is provided from the vehicle's power unit. The rear-axle steering is hydraulically and mechanically completely decoupled from the front-axle steering. In addition to driving comfort and safety advantages, this also offers cost benefits. The hydrostatic steering (Orbitrol) of the front-axle can be designed correspondingly smaller with regard to the steering power to be produced.

[hz](#)