

10-2013/November 2013

## **Shift in Motion - Linde Hydraulics introduces an innovative propulsion system for mobile machines with high conversion range**

**Linde Hydraulics' Shift in Motion (SIM) combines a stepless hydrostatic drive with an electro-hydraulically actuated and synchronized standstill manual transmission. This traction drive system allows comfortable gear changes while in motion. Thus, Linde Hydraulics provides manufacturers of mobile machines a new degree of freedom for their machine layout at low costs. This particularly applies to the performance and ergonomics as well as the energy consumption along with the speed and noise level reduction of traction drives. SIM is ideal for all applications with high power requirements in the working mode and high speeds in the transport mode. Examples can be found in harvesting , municipal and forestry machinery. Linde Hydraulics introduces a system based on SIM-technology drive system on the Agritechnica 2013.**

High tractive efforts in the working mode and high maximum velocities in transport or transfer mode are the requirements that manufacturers and operators expect from the drivetrain of mobile machines today. These requirements can be met through a wide array of traditional technological concepts ranging from simple manual transmissions (shifted at standstill), powershift or highly sophisticated complex powersplit CVTs transmissions. Each of these concepts comes with specific advantages but also with inherent system disadvantages as well as cost differences when compared to the other solutions.

As a specialist for hydraulic and electric drive systems Linde Hydraulics commits to this challenge for optimal solutions – taking the trend towards higher performance while reducing energy consumption, emissions, installation space and costs into account.

The result of an intensive and consistently market-oriented development work at Linde Hydraulics is the traction drive system Shift in Motion (SIM). The technology combines the cost and space advantages of a manual gearbox with the advantages of hydrostatic drives, including electro-hydraulic control logic to a multi-stage drivetrain that can shift gears in motion similar to a traditional powershift transmission. Essentially, SIM is a continuous variable hydrostatic rotating drive consisting of a pump and a motor which is mounted on a standard manual transmission. The system is additionally equipped with a hydraulic shift actuator.

In the SIM concept the electro-hydraulically synchronized gear change is jerk-free. The actual switching operation in the standstill manual transmission is initiated through a actuator which is also controlled electro-hydraulically. Synchronization shifting logic are controlled by an electronic driving control and are monitored at all times. Optionally, it can be set up with a manual drive mode selection as well as an automatic or fixed gear preselect mode.

SIM systems can shift gears noise- and jerk-free within 500ms due to the established hydraulic and electronic components by Linde Hydraulics.

SIM is especially suitable for vehicles that often change between working and transport modes, regularly requiring high tractive efforts and high maximum velocities. Due to the significantly enhanced conversion range of the drive system various driving strategies in terms of performance and ergonomics, energy consumption, rotating speed and noise level can be realized. In contrast to traditional drive systems with a comparable range of functions, the cost and space advantages of manual transmissions apply.



## Pressemitteilung. Press Release.

In order to minimize a vehicle manufacturers' implementation effort, SIM was designed by Linde Hydraulics as a propulsion system that can be installed on customary standstill manual transmissions without design changes: While the machine manufacturers select a gearbox of their choice, Linde Hydraulics supplies the essential SIM components and aligns them with application specifics and customer preferences accordingly. These are – in addition to the high-pressure pumps and motors of HPV-02 and HMV-02 series – the SIM control valve for the transmission actuator as well as the electronic drive control.

Linde Hydraulics has already supplied machinery manufacturers of various applications types with SIM for testing purposes. The feedback has been solely positive: Manufacturers have been praising the increasing freedom of design when it has come to varying vehicle layouts. The test drivers on the other hand particularly have been valuing the driving performance and comfort along with the low noise emissions during synchronization.

Linde Hydraulics presents SIM to broad audience for the first time at Agritechnica 2013.

### – About Linde Hydraulics –

Linde Hydraulics is a global developer and supplier of modular drive systems consisting of hydraulics, electrical engineering and electronics. As a leading technology provider in the field of high pressure hydraulics, the systems produced by Linde Hydraulics set the standard in terms of significantly reducing fuel consumption and CO<sub>2</sub>. The product range comprises hydraulic pumps and motors, valves, electronic controls, peripheral devices, rotary drives and electric motors. Linde Hydraulics is the development partner and supplier of a number of reputable manufacturers of mobile work machinery, including construction, mining, agricultural, forestry and municipal utility machines, as well as manufacturers of industrial machinery.



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The company, which was founded in 1904, is based in Aschaffenburg. Around 1400 employees work at four production sites in Germany and at the subsidiaries in Europe, the US and China. Linde Hydraulics is represented in more than 50 countries by a strong network of around 60 sales and service partners. In North and South America, as well as the Asia Pacific region, Linde Hydraulics is also drawing on the sales network of Eaton Hydraulics.

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Please find the below shown photo in high resolution available to download on the Linde Hydraulics website [www.linde-hydraulics.com](http://www.linde-hydraulics.com) in the „News & Infoservice“ section at the end of the press release.

Picture number: H194\_67\_BX  
Picture caption: Gear shifter control valve



Picture number: H MV\_H182\_548\_B  
Picture caption: H MV variable displacement motor with E6 control



Picture number: HPV\_H180\_083\_B2

Picture caption: HPV variable displacement pump with E2 control



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