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High efficiency – zero emissions

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Linde P250 tractor with fuel-cell drive waiting in the wings

The fuel-cell tow tractor presented by Linde Material Handling at the CeMAT 2008 is the second vehicle with this type of drive.

However, unlike the truck unveiled in 2000 featuring fuel-cell drive, this vehicle is on the brink of prototype maturity for small series development. Over the next seven years, Linde MH plans to send a total of 50 successive industrial trucks with hydrogen technology for a broad range of field tests. For selected customers, the intention is that the vehicles will be tested in multi-shift use over a period of 800 hours. With over 20,000 operating hours, data regarding service life can be recorded and measurements can be taken regarding the vehicle's wear and energy consumption. The German government is supporting the field testing with funds from the "National Investment Programme for Hydrogen and Fuel-Cell Technology" set up in 2006.



On the brink of prototype maturity for small series development is the Linde P250 tractor with fuel-cell drive.

The advantages of fuel-cell technology are manifested as high efficiency with zero emissions. Splitting hydrogen molecules releases electrical energy, with the only by-product being pure water. Fuel cells work cleanly, quietly and extremely efficiently.

Hydrogen-operated fuel cells offer just as much potential for the future as hydrogen drives, because they are powered by an inexhaustible reservoir of "green" energy sources, such as sun, water, wind or biomass as well as industrially generated hydrogen.

Fuel cells consist of two electrodes supplied with hydrogen and oxygen. The electrodes are separated by a layer called the polymer-electrolyte membrane, but if they are connected with an electrical conductor, electrical current is generated. The current generated by the hydrogen supplies an electric motor that drives the tractor. Since emissions are reduced to zero with this technology, hydrogen fuel-cell vehicles are also suitable for use in the sensitive food industry. In addition, there is no need to charge batteries for several hours; instead, it only takes around five minutes to fill the tanks with pressurised gas (350 bar), which can then be stored for a long period of time. The fuel-cell solution even eliminates the safety risk that comes with using battery acid.

The P250 tow tractor exhibited and demonstrated in action at the trade fair has a continuous output of 10 kW and a maximum output of 30 kW, as well as a voltage of 80 V and a traction force of 5000 N. The vehicle was developed in collaboration with experienced partners as a solution that can meet the challenges of day-to-day operation and contribute towards environmental protection efforts by significantly reducing fuel consumption in the medium term.

According to Udo Herrmann, Head of Pre-development at Linde Material Handling, the aim of the field testing being carried out until 2015 is to involve customers from an early stage; this will enable the company to collate important experience right from the prototype phase, incorporate the results into the next development process and pave the way for series production. "We carry out tests and optimisation measures in day-to-day conditions", says Herrmann.

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27.05. - 31.05.2008
CeMAT 2008, Hanover

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