Walking excavator uses J1939-linked hydraulics

Company
Linde Hydraulics
Grossostheimer Str. 198
DE-63741 Aschaffenburg
Tel.: +49-6021-150142-0
info@linde-hydraulics.com

Abstract
The Swiss excavator manufacturer Menzi Muck has unveiled the first model of its next generation walking excavator series at the Bauma trade fair in Munich (Germany). The hydraulics in these construction machines are configured as a complete system of Linde Hydraulics components, including the electronic control unit ECU. A J1939 network links the control system devices.

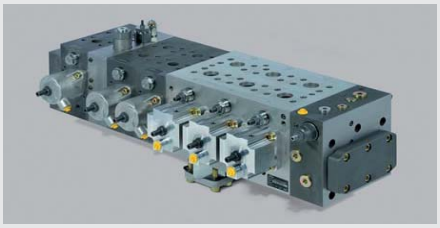
Walking excavators — also known as spider excavators — are construction machines that move forwards on four wheels, which are connected to the undercarriage by legs. These legs can also be used to adjust the track width and the height of the vehicle over a wide range of dimensions, ensuring that the machines remain highly flexible and can be adapted to the surrounding conditions, both in drive mode and work mode, when the stabilizers on the legs are extended. This means that they are ideally suited for working in locations such as very steep slopes or in streams. An appearance on German TV show "Wetten, dass..?" in 2006 showed how flexible these machines can be. The impressive video is still available on YouTube and shows a walking excavator from Menzi Muck climbing over a 5-m concrete block - using the bucket as additional support - and proving just how appropriate the name "spider excavator" is.

Joint development at a high level

During the development of its walking excavator series the machine builder worked in close collaboration with Linde Hydraulics and Girtec, the Linde Hydraulics system partner based in Switzerland. Together, the companies developed a hydraulic system that utilizes the benefits of the Linde Synchron Control (LSC) and not only meets the ▷

Electro-hydraulic load-sensing system

At the Bauma 2013, Linde Hydraulics revealed - almost 30 years after introducing load sensing with the Linde Synchron Control system – the latest development of the LSC system for mobile machines. The LSC+ combines the characteristics of the tried-and-tested control system with the additional advantages of electronic control. The electronics identify the operator's intentions and set pump and valves to the highly dynamic or fine control range, depending on the requirement. The supplier offers the LSC+ as a complete system, including the electronic control connectable to J1939-based networks. A monoblock valve system, which was developed especially for the LSC system, takes on the hydraulic control functions.



The hydraulic monoblock valve system with electric piloting

Industrial Computing Architects

30 years of experience in industrial computer systems

Janz Tec AG, has been one of the leading manufacturers of electronic assemblies and complete industrial computer systems since 1982. The company describes itself as *Industrial Computing Architects* and develops embedded PCs, industrial computers and industrial communication according to customer requirements.

Good communication is very important nowadays – not just in real life, but also in machines, plant and complex industrial applications from a wide range of inds-tries. This applies especially if error-free transmission of data is required due to more and more compact construction and the necessity for more performance in the case of distributed systems. For this reason, Janz Tec AG also places great value on innovative and sophisticated technology in the industrial communication business sector. The InCom products developed in-house enable the control systems for your machines, plan and systems to be kept at the highest level.

With 30 years of experience in the market, Janz Tec AG is capable of meeting individual customer requirements at any time – this starts as early as the concept phase, continues through the develop-ment and production of the components up to series delivery.

janztec
Industrial Computing Architects

Janz Tec AG · *Industrial Computing Architects* · Im Doerener Feld 8 · 33100 Paderborn · Fon: +49.52 51.15 50-0 · www.janztec.com

demanding requirements of the movements of a walking excavator, but also enables additional functions to be implemented. The J1939-based in-vehicle network connects all electronic devices.

Supply via tandem pump unit

At the core of the hydraulic system is a tandem pump unit. A load-sensing regulating pump of the HPR 105-02 E1L type for the open circuit supplies the working hydraulics with hydraulic fluid, while an HPV 75-02 E2 variable displacement pump for the closed circuit drives the traction motors.

The open circuit is controlled via a LSC monoblock, in which three directional control valves are integrated in a single cast housing. The pressure relief function is also integrated in the monoblock, and special functions can be implemented using an intermediate plate. The valves have a flow-optimized design and feature integrated pressure compensators and pressure copiers.

The special features of the LSC system include its "social load sensing" capability. This is a special kind of volume flow regulation for superimposed movements, which are frequently required for walking excavators. The relevant functions are supplied as required depending on how the driver moves the joystick, even if the requested flow volume exceeds the maximum possible pump flow rate. In this case, the available flow volume is divided amongst the actuators depending on their requirements.

ECU and joystick

The ECU for the walking excavator's hydraulics also comes from the Linde Hydraulics modular system. It maps the complete traction- and working hydraulics of the machine. The software developers at Linde have implemented some additional functions in the ECU, including the option to select pre-configured drive programs, such as an "eco mode" where the walking excavator operates in a particularly energy-efficient manner. The joystick, which the operator uses to operate the hydraulic functions, comes from Girtec. That means that virtually the entire hydraulic system, including the control electronics and man-machine interface, comes from a single source. ◀

Links

www.linde-hydraulics.com

www.menzimuck.com

Video of "Wetten dass...?" appearance

ECU with safety controller and J1939 interface

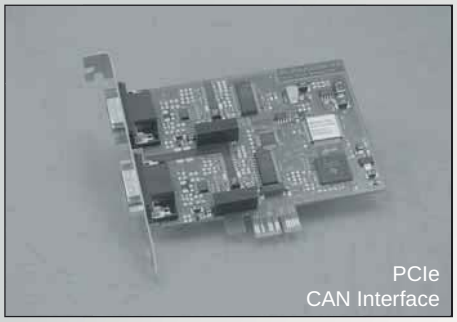
The Linc series of electronic control units for mobile machines provides safety functions up to performance level d (ISO 13849-1). The product by Linde Hydraulics is CAN-connectable and supports the J1939 application profile.

Core parts of the product are a function controller and a safety controller. Due to the redundant design, the unit can provide safety functions and thus is able to meet global legal standards for on-road machinery. The devices are used individually or combined, for hydraulic and electric drives, as well as combinations of both. Additionally to the drive components and the combustion engine, components such as sensors, joysticks and pedals can be integrated in the CAN-based control system.

Upon delivery, the control is preconfigured with the desired functions, machine characteristics and vehicle data.

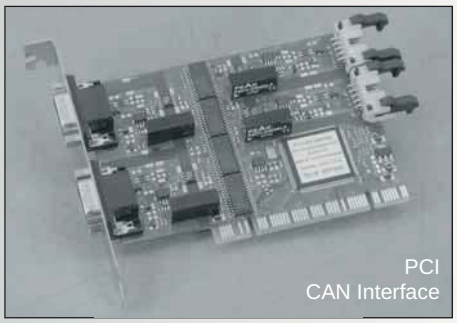
Linc 2 safety controller featuring CAN connectivity

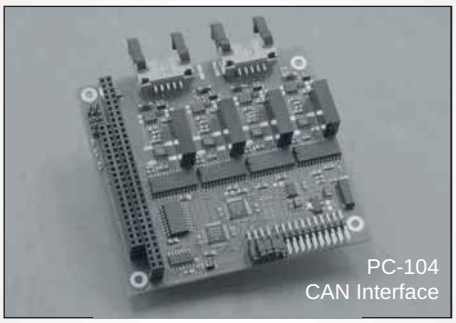
Single parameters can be configured via the LinDiag diagnosis software. The Linc 1 controller for electric drives and closed loop hydraulic propel drives features 10 digital inputs (4 pull-up, 6 pull-down), 6 analog inputs (0 V to 5 V), 4 current inputs, 3 frequency inputs, 4 digital outputs, and 7 PWM outputs. The Linc 2 unit provides 24 digital inputs (12 pull-up, 12 pull-down), 20 analog inputs, 9 frequency inputs, 8 low-side digital outputs, and 32 PWM outputs with current feedback.


PCIe
CAN Interface

USB
CAN Interface

NEW PRODUCT
PCI-104
CAN Interface


PCI
CAN Interface


PC-104
CAN Interface

Ethernet
CAN Interface

CAN Interfaces for Your Requirements

- Economical solutions for series applications
- Optimized for industrial applications
- Solutions for stationary and mobile use
- Software support for bus-analysis, measurement and control

www.ems-wuensche.com

EMS
Thomas Wünsche

Sonnenhang 3
D-85304 Ilmmünster
Tel. +49-8441-490260
Fax. +49-8441-81860

VISIT US AT:
SPS/IPC/DRIVES
Hall 8, Stand 421

Robust Epec Control System Products for Mobile Machinery

EPEC 4602 CONTROL UNIT

BASED ON 16/32 BIT PROCESSOR
MEMORY:
- FLASH 1,6 MBYTE
- RAM 112 KBYTE
- NON-VOLATILE: 8 KBYTE
- PLCOPEN APPLICATION MAX SIZE 768 KBYTE
- TEMPERATURE RANGE UP TO +85°C

EPEC 3606 CONTROL UNIT

BASED ON 16/32 BIT PROCESSOR
MEMORY:
- FLASH 1,6 MBYTE
- RAM 112 KBYTE
- PLCOPEN APPLICATION MAX SIZE 768 KBYTE
- NON-VOLATILE: 2 KBYTE
- TEMPERATURE RANGE UP TO +85°C

EPEC 6107 DISPLAY

BASED ON ARM CORTEX A9 PROCESSOR
MEMORY:
- FLASH 4 GBYTE
- RAM 256 MBYTE
- NON-VOLATILE: 512 KBYTE
- TEMPERATURE RANGE UP TO +70°C
- RESISTIVE TOUCH SCREEN
- WIDE VIEWING ANGLES AND HIGH BRIGHTNESS OFFERS AN EXCELLENT SUNLIGHT READABILITY

EPEC

CANopen | SAE J1939 | E17 | 100G | CODESYS | CE

EPEC OY | P.O. BOX 194 | FIN-60101 SEINÄJOKI | FINLAND | TEL. +358 20 7608 111 | WWW.EPEC.FI