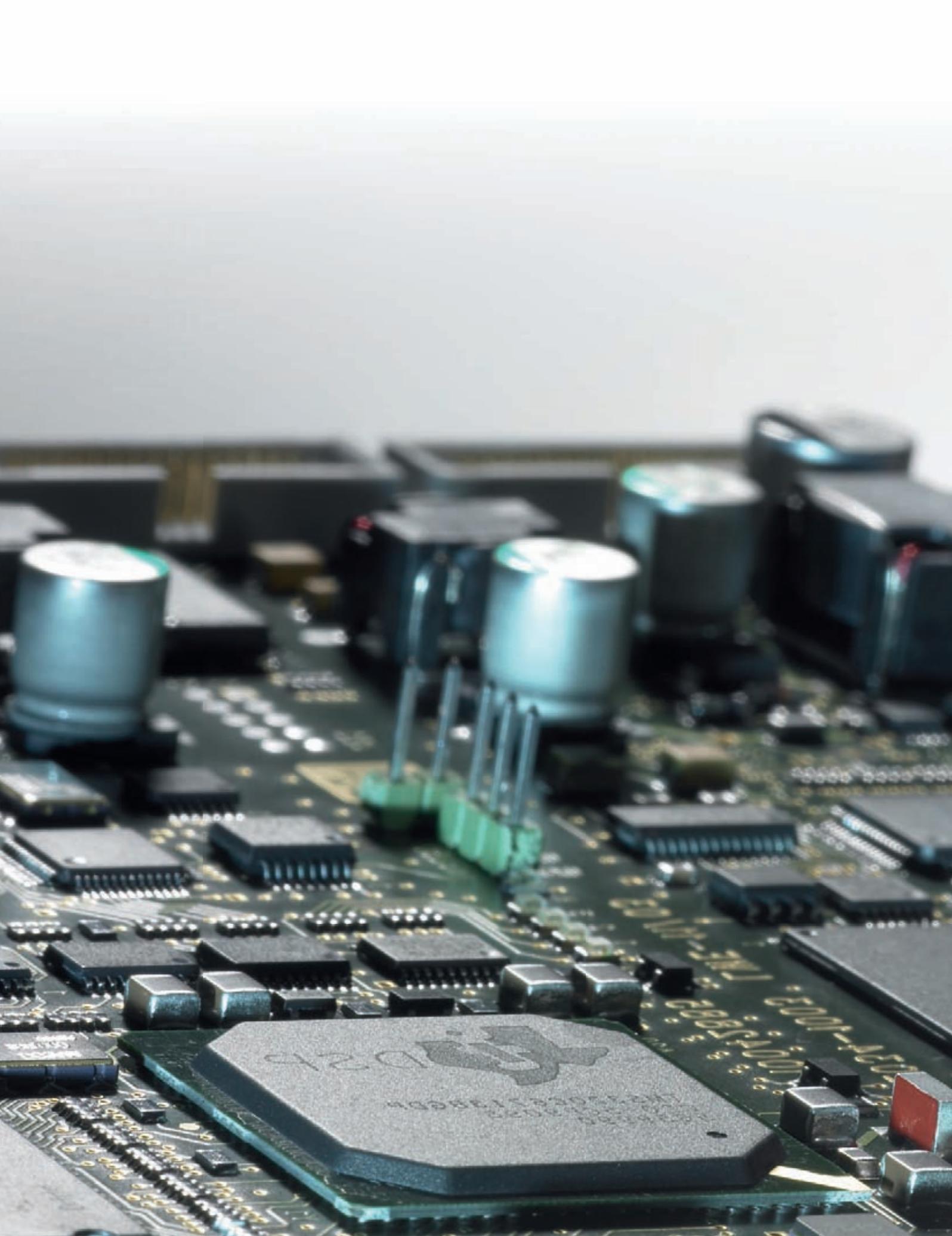


# Liebherr Electronics



# LIEBHERR





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# Liebherr for Liebherr

Aviation, traffic engineering, mining, home appliances, the offshore industry or port equipment: Liebherr products stand for top quality and reliability all around the world. This is in part due to the performance of their electronics. For this core competence, Liebherr relies on state-of-the-art technology developed internally. Liebherr-Elektronik GmbH in Lindau, Germany, develops and manufactures high-grade electronic sub-assemblies and components.

Liebherr Electronics offer a broad basis combined with inter-sector know-how. Customers do not only benefit from innovations developed for companies belonging to the Liebherr Group, but also from synergy effects of lessons learned from other industries. For example, the extremely demanding safety concepts in the aviation sector lead to valuable impulses for other application fields.

Liebherr offers complete solutions which integrate all the required components, from the operating and display unit to input and output modules as well as high-performing software and hardware in a single system.

One partner, one stop.





© Hawker Beechcraft

© Bombardier

# Litronic®

Litronic® is the central crane control and management system developed by Liebherr. It guarantees precision, safety and accurate crane operation using the most up to date software and hardware.

Modular and open system architecture allows quick implementation of new requirements or changes resulting from practical experience. Compatibility with other systems opens up unlimited application possibilities for diagnosis, operation and process data recording.

CRANE CONTROL SYSTEM

DIAGNOSIS SYSTEM

POWER MANAGEMENT

COMMUNICATION SYSTEM

LITRONIC

INFORMATION SYSTEM  
ENGINE MANAGEMENT  
SAFETY SYSTEM  
MACHINE DATA RECORDING



# Pactronic®

As the cargo handling industry is evolving, so are the needs for efficient, cost-effective cargo handling equipment and increased handling performance. In addition, no manufacturer can reject the demand for sustainable, environmentally sensitive operation and the call for low-emission cargo handling equipment.

Liebherr Pactronic® stands for Power by Accumulator and Electronics. The system is characterized by an energy storage device, which is added to the drive system as a secondary energy source. The Liebherr Pactronic® hybrid drive is an integrated approach to meeting the needs of the industry. Charging of the accumulator is done by regenerating the reverse power while lowering the load and using the surplus power from the primary energy source. This results in substantially higher hoisting and lowering speeds. Not only is the crane's efficiency increased but also the turnover (+30 %). In addition, the crane's fuel consumption is significantly reduced (-30 %). This is achieved by fully utilizing the reverse energy and surplus power within the system.

## Operational Advantages:

- 30 % more turnover
- shorter vessel docking times
- reduction of total cost of ownership

## Environmental Advantages:

- 30 % less fuel consumption
- 30 % less CO<sub>2</sub>
- 30 % less exhaust emissions

## Structural Advantages:

- designed service life is equal to that of the crane
- just visible inspection every 10 years
- 100 % recyclable





# Cycoptronic®

Liebherr Cycoptronic® is a synonym for accurate and sway-free load motion. Cycoptronic® automatically initiates dynamic counterbalancing movements and equalizes transverse and longitudinal sway of the load while operating at maximum speed, thereby anticipating the effects of any possible load including wind.

The sensor system constantly sends information from gyroscopes attached to the ropes to the Litronic® system which in turn calculates possible sway. The angular measurement, from the gyroscopes, guarantees reliable operation during any weather conditions and operation without any interferences from environmental influences (e.g. dust, rain etc.).

Cycoptronic® is the perfect addition to the drive system especially in combination with Pactronic®. In terms of accuracy, safety and increased handling performance these two systems complement each other perfectly.

## Key Advantages:

- Exact motion of load without sway
- Target velocity of load up to maximum
- Enhanced turnover
- Easy, stressless & safe crane operation





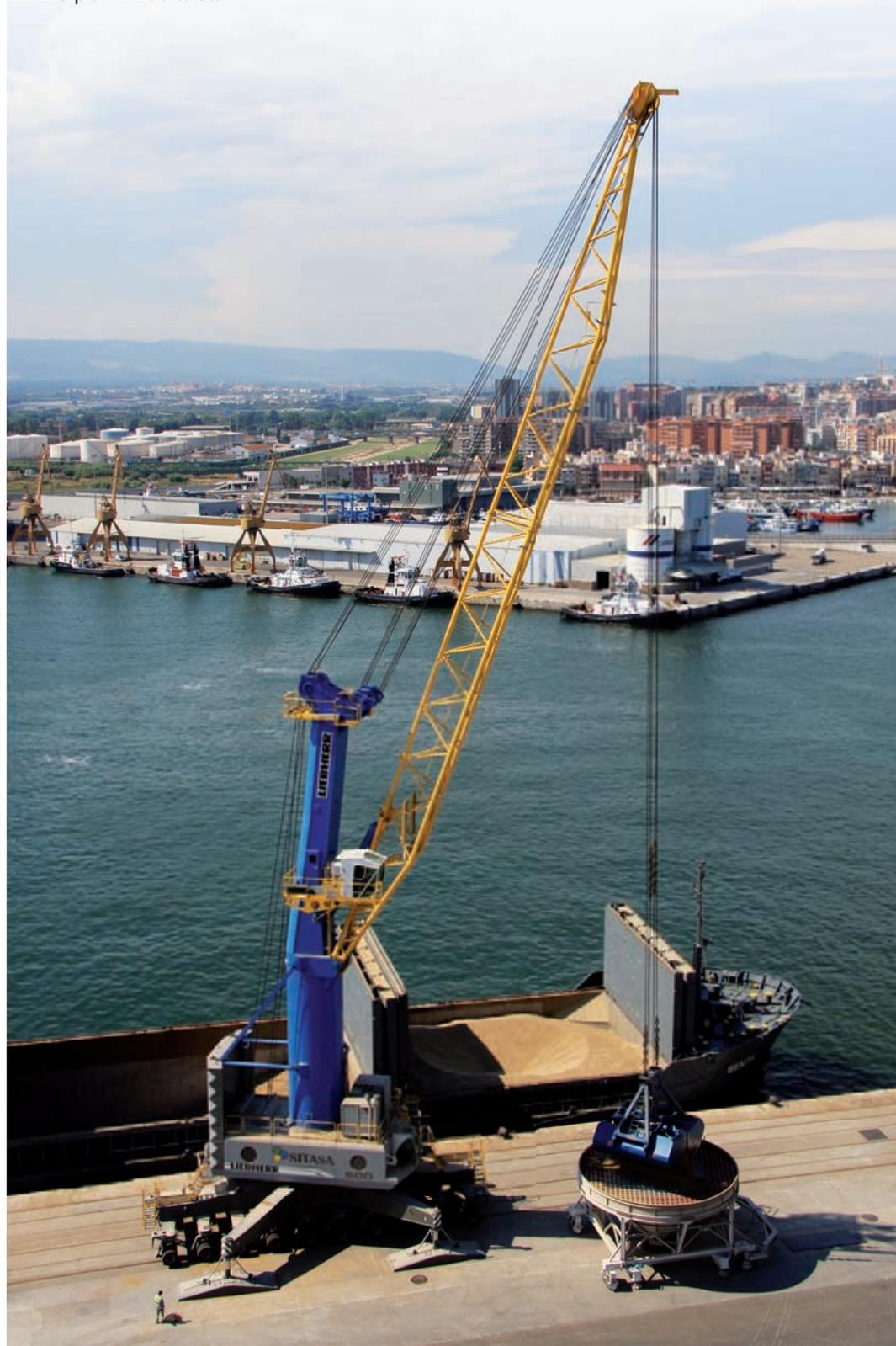
# Teach-In

Teach-In is a point to point control for semiautomatic operation which pilots the crane to predetermined loading and unloading points. After the (un)loading points have been set, the crane moves between them with the highest possible speed. If one of the Teach-In points is reached, the crane automatically stops without any load swing, thus eliminating the time-consuming task of positioning the load at the (un)loading points.



### Key Advantages:

- Ease in defining target positions
- Automatic steering to target points
- Crane motion can be stopped at any time
- Jib head and load are always within the permitted area
- No spillage of bulk material



# Sycratronic®

**Sycratronic®** (“Synchronizing Crane Control System”) allows two Liebherr Mobile Harbour Cranes to be operated simultaneously by one crane driver for improved speed, capacity and safety.

Another add-on feature is the Dynamic Anti-Collision System **DACS®**, controlling the simultaneous operation of crane motions, so ensuring best possible performance and preventing collision between the cranes and/or defined fixed obstacles.

In line with Sycratronic® Liebherr has developed another innovative add-on feature for heavy lifts. The **Vertical Line Finder** is a control assistance feature which assists the operator in avoiding side pull of the load caused from the long distance between operator and load or asymmetric centres of gravity.





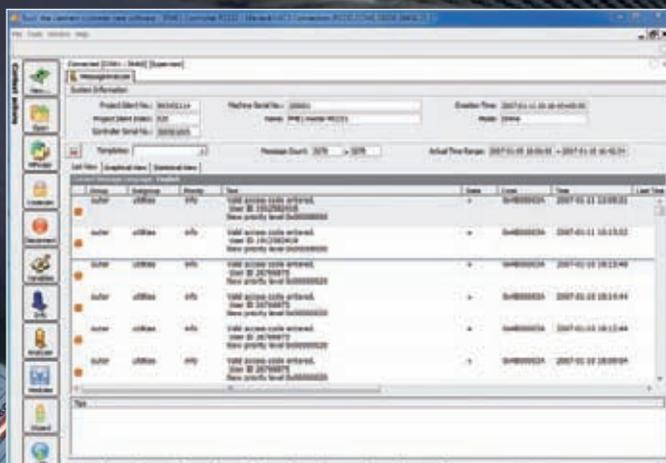
# SCULI

SCULI is a comprehensive diagnostic tool for Liebherr machines. Based on an application framework the system offers different features and resources for Liebherr-specific software plug-ins, which have a uniform appearance, structure and handling.

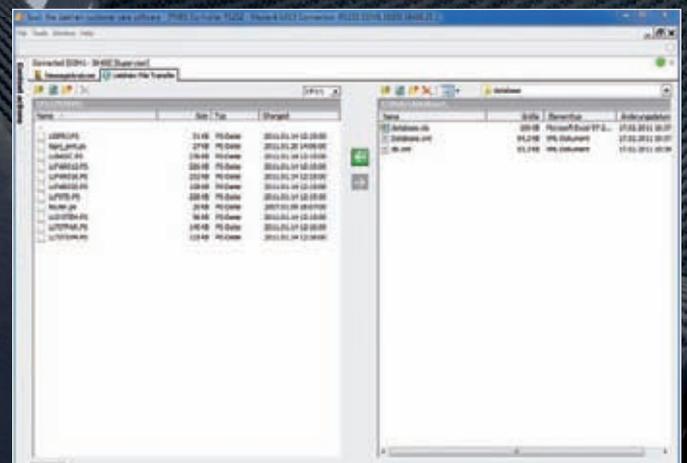
All information saved in the database assists the technical department in solving problems arising in practice. The system suggests possible solutions, which facilitate fault finding as well as service and maintenance. The basic function of the system is the connection with the central control unit of the crane. Access is established via serial interface, ethernet or modem.

## Key Advantages:

- Quick file transfer
- Ease in checking input and output signals of CAN-Modules (Editor)
- Analyser for messages from the central control unit
- Search function for the message-database



Analyser for message from the central control unit



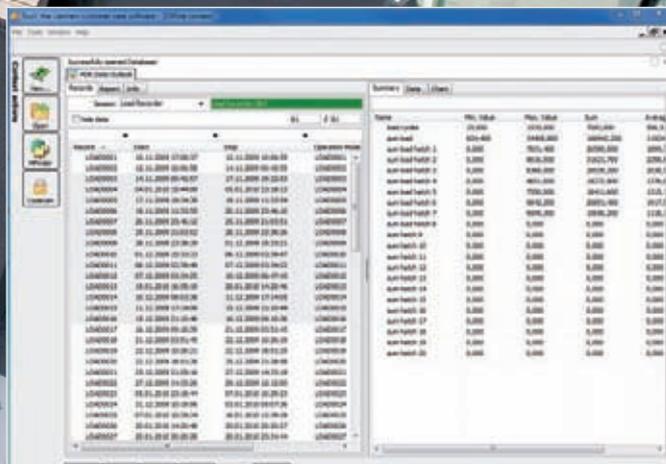
File transfer

## SCULI PDR (Process Data Reporting)

By means of “SCULI PDR” data from the “Load Recorder” (cycles, average load, maximum load, interval duration, operating time, etc.) are transferred to a database, where the information can be analysed with PDR or alternatively with other tools such as MS Excel.

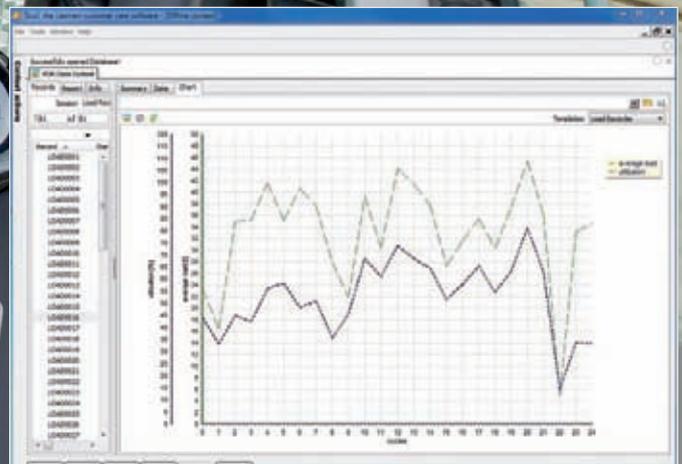
### Key Advantages:

- Turnover control (t/h)
- Load cycles analysis (cycles/h)
- Machine capacity utilization



Name	Min. Value	Max. Value	Unit
turn-load	0,0000	2000,000	kg
turn-load hatch 1	0,0000	2000,000	kg
turn-load hatch 2	0,0000	2000,000	kg
turn-load hatch 3	0,0000	2000,000	kg
turn-load hatch 4	0,0000	2000,000	kg
turn-load hatch 5	0,0000	2000,000	kg
turn-load hatch 6	0,0000	2000,000	kg
turn-load hatch 7	0,0000	2000,000	kg
turn-load hatch 8	0,0000	2000,000	kg
turn-load hatch 9	0,0000	2000,000	kg
turn-load hatch 10	0,0000	2000,000	kg
turn-load hatch 11	0,0000	2000,000	kg
turn-load hatch 12	0,0000	2000,000	kg
turn-load hatch 13	0,0000	2000,000	kg
turn-load hatch 14	0,0000	2000,000	kg
turn-load hatch 15	0,0000	2000,000	kg
turn-load hatch 16	0,0000	2000,000	kg
turn-load hatch 17	0,0000	2000,000	kg
turn-load hatch 18	0,0000	2000,000	kg
turn-load hatch 19	0,0000	2000,000	kg
turn-load hatch 20	0,0000	2000,000	kg

SCULI PDR



Load cycles analysis

# LiDAT®

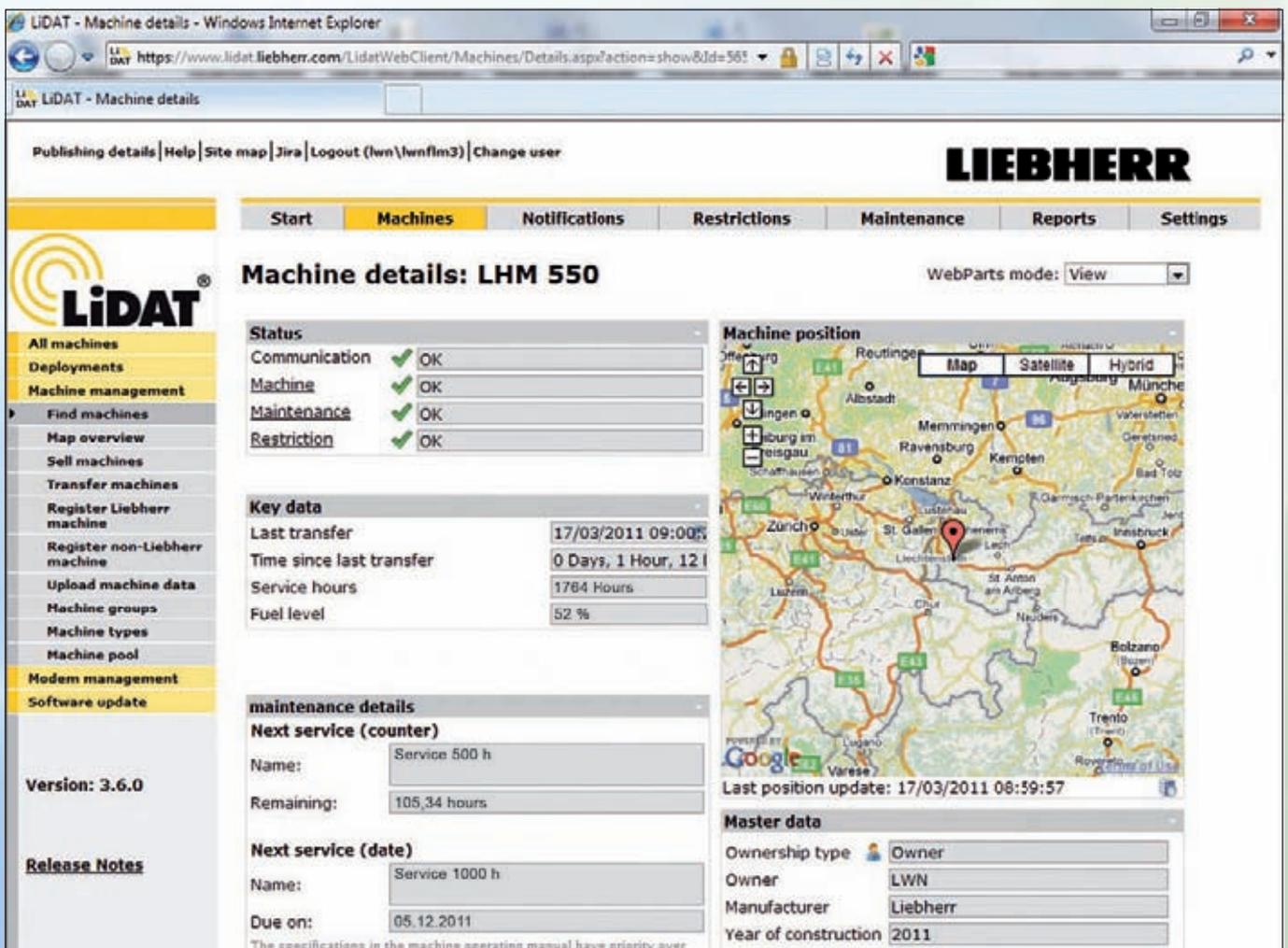
LiDAT® is a tailored telematic and fleet management system for Liebherr machines as well as for other manufacturers' units. Based on state-of-the-art data transmission technology, LiDAT® provides information on the location and operation of the customer's machines, enabling efficient equipment management, optimal operation scheduling and remote supervision.

With LiDAT®, all the most important machine data can be viewed at any time from any internet-able device. Depending on the selected type of subscription you select, data are updated several times a day for the customer and can be accessed at any time using a web browser or are directly transmitted to his ERP system.



## Key Advantages:

- Maintenance planning according to customer's schedules
- Teleservice for quicker response
- Comprehensive information and reporting of machine data
- Analysis of possible misuse or safety relevant incidents within one report
- Fully automated integration of LiDAT® data into the customer's ERP system



The screenshot displays the LiDAT web application interface in a Windows Internet Explorer browser window. The page title is "LiDAT - Machine details". The browser address bar shows the URL: <https://www.lidat.liebherr.com/LidatWebClient/Machines/Details.aspx?action=show&Id=561>. The page header includes navigation links: "Publishing details | Help | Site map | Jira | Logout (lwn\lwnflm3) | Change user" and the "LIEBHERR" logo. Below the header is a navigation menu with tabs: "Start", "Machines", "Notifications", "Restrictions", "Maintenance", "Reports", and "Settings". The main content area is titled "Machine details: LHM 550" and includes a "WebParts mode: View" dropdown. The interface is divided into several sections:

- Status:** A table showing the status of various components:
 

Communication	✓ OK
Machine	✓ OK
Maintenance	✓ OK
Restriction	✓ OK
- Key data:** A table showing key operational data:
 

Last transfer	17/03/2011 09:00
Time since last transfer	0 Days, 1 Hour, 12
Service hours	1784 Hours
Fuel level	52 %
- Maintenance details:** Two sections for service counters:
 

<b>Next service (counter)</b>	
Name:	Service 500 h
Remaining:	105,34 hours
<b>Next service (date)</b>	
Name:	Service 1000 h
Due on:	05.12.2011
- Machine position:** A Google Maps view showing the machine's location in the Stuttgart region of Germany. The last position update is noted as "17/03/2011 08:59:57".
- Master data:** A table showing ownership and manufacturer information:
 

Ownership type	Owner
Owner	LWN
Manufacturer	Liebherr
Year of construction	2011

A sidebar on the left contains the LiDAT logo and a navigation menu with options such as "All machines", "Deployments", "Machine management", "Find machines", "Map overview", "Sell machines", "Transfer machines", "Register Liebherr machine", "Register non-Liebherr machine", "Upload machine data", "Machine groups", "Machine types", "Machine pool", "Modem management", and "Software update". The version number "Version: 3.6.0" and a link to "Release Notes" are also visible in the sidebar.

# Liebherr-Werk Nenzing GmbH



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