

***LaCam<sup>®</sup> - LI laser profile measuring unit***  
for non-contact measurements of refractory linings in  
metallurgical reaction and transport vessels

**Technical scope of supply**

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***LaCam<sup>®</sup> - LI refractory lining measuring system (ladle installation)***

New laser profile measuring system based on a laser scanner of the new generation.

The LaCam<sup>®</sup> series profile measuring system has been developed for non-contact measurement of refractory linings in metallurgical reaction and transport vessels.

***LaCam<sup>®</sup> - LI refractory lining measuring system (ladle installation)*** is a model of the LaCam<sup>®</sup> series profile measuring systems. This new system generation is designed for installation at ladle metallurgical processes.

The graphical user-interface permits detailed investigations of the wear development as well as automatically printed reports of the measurements.

The ***LaCam<sup>®</sup> - LI refractory lining measuring system (ladle installation)***, including laser measuring head and the appropriate coupled electronic units, is stationary-installed at the ladle measuring stand and can be remoted from the control room. Connection to a control and measuring unit, as well as to an optional workstation, is realized by a local computer net.

If measurement is necessary, start and monitoring of results will be made at the operator desk (console and monitor). After automatic scanning of the surface, the results are available within a few seconds on all PCs connected to the net.

The ***LaCam<sup>®</sup> - LI refractory lining measuring system (ladle installation)*** determines:

- Residual brick thickness of the refractory lining.
- Wear of the refractory lining.
- Wear speed of the different refractory materials.
- Volume of ladles.
- Bath level for optimal lance positioning.
- Deformation of ladles.

Furthermore, the ***LaCam<sup>®</sup> - LI refractory lining measuring system (ladle installation)*** enables:

- maximizing ladle life time.
- control of gunning material consumption.
- specific application of gunning material.
- area dependent optimization of lining material quality.
- trend analysis and forecast of the durability of ladle lining.

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**Specifications****1. Laser measuring system**

Principle of measurement	single shot time-of-flight
Real number of range points per frame	200,000
Measuring time per frame	20 s
Measuring range	2 – 25 m
Accuracy	± 5 mm
Resolution	1 mm
Max. surface temperature	1700 °C

**Technical data of the scanner (Laser measuring head)**

Vertical scan angle	80° fixed
Horizontal scan angle	0° - 345° selectable (80° standard)
Laser wavelength	0.9 µm (near infrared)
Cooling of the head	internal cooling system
Laser safety class	class 1 laser product (total system is eyesafe)

**2. Control and operator unit**

The control and operator unit reads-in the measuring data of the laser measuring head and controls it. The distance between control and measurement unit and laser measuring head is dependent on the local situation.

For each laser measurement system, one control and measuring unit is designated. A measurement can directly be made at this unit or via remote control from a workstation at the control room. Furthermore, all measurement results are represented and can be evaluated. A modem for remote service is also included.

**Industrial-type computer**

CPU Pentium<sup>®1</sup> P4/3GHz (latest model)  
512 MB RAM, PC 400  
3.5" floppy disk drive, DVD-RW  
Harddisk 80 GB (latest standard)  
VGA 64MB, AGP  
network connections, 100 MBit  
Ethernet

<sup>1</sup>A registered trademark of Intel Corporation.

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<b>Display unit</b>	TFT 17"
<b>Operating system</b>	WINDOWS <sup>®</sup> 2000 Professional <sup>2</sup>

### 3. Additional resources

If the necessity of additional resources for determination of position and angle is observed during pre-engineering, then these resources will be included in the scope of supply.

### 4. Engineering

For self-reliant mounting, instruction details will be furnished to the customer prior to commissioning:

- Construction of the mechanical components.
- Wiring/cable plans for all connections.
- Position of the requested air and water connections.
- Plans for the mounting of the single components.

Execution of the above instructions is the exclusive responsibility of the customer. Ferrotron Technologies GmbH assumes no responsibility or liability.

### 5. Documentation

The documentation of the unit will be threefold, which will be given to the customer when the unit is placed into operation. The documentation includes the technical description of the system, an installation description, as well as the description of the software installed. A documentation on data CD is also included in the scope of supply.

The following components are included:

- Operating systems for all units.
- Installation disks/CD ROM of the system software backup "Image" of the hard drive.

### 6. Software

The system package of LaCam<sup>®</sup> refractory lining measuring system (ladle installation) includes all software needed for operation of the unit (measuring and evaluation software, Windows 2000<sup>®</sup> Professional<sup>2</sup>, all as licensed original versions).

<sup>2</sup> A registered trademark of Microsoft Corporation.

## LaCam<sup>®</sup> - LI Laser Profile Measurement System for ladle installation

LaCam<sup>®</sup> - LI refractory lining measuring system (ladle installation) fixed installation at a ladle tilting stand



Installation at Thyssen Steelplant in Duisburg, Germany

LaCam<sup>®</sup> - LI refractory lining measuring system (ladle installation) fixed installation for ladle seats



Installation at Corus Steel Plant, Aldwarke, UK