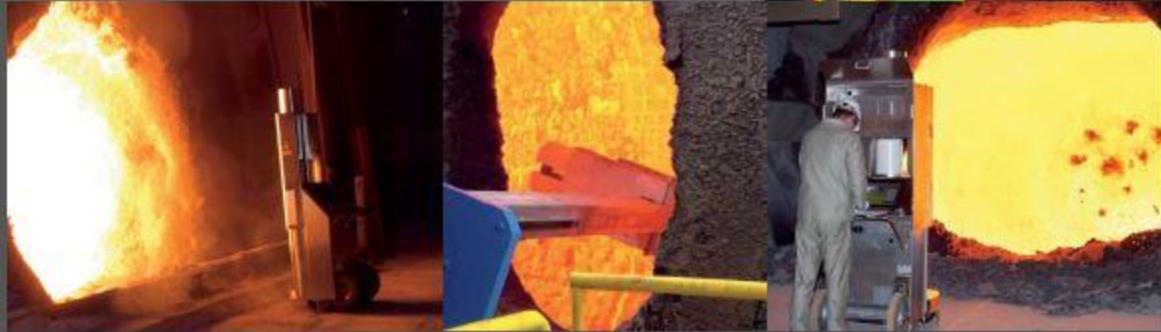


LaCam[®] - 4th Generation

LaCam[®]

FAST, ACCURATE, RELIABLE
LASER SCANNER FOR HOT
SURFACE APPLICATIONS



3D Laser Profile Measurement in Hot Vessels and
Transport Ladles.

- Increases Safety
- Reduces Cost
- Extends Refractory Life
- Optimizes Processes

The LaCam[®] Family

LaCam[®] - M

Fixed installation for:



Mobile version
for converters
and ladles



converters



ladles



EAFs



Torpedo ladles



open die forging plants

LaCam[®] - M4 mobile version



LaCam[®] - CI Laser Scanner Profile Measurement in Hot Converters

FERROTRON

sold more than 270 laser measuring units world wide

(170 mobile versions and 104 fixed versions)



3D Laser Profile Measurement

- Increases Safety
- Reduces Cost
- Extends Refractory Life
- Optimizes Processes

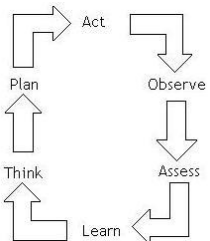
Benefits



- 1) Safety**
- Minimize dangerous and expensive break-outs



- 2) Extension of vessel life by**
- Accurate measurement of refractory lining
 - Visualization and measurement of high wear areas
 - Optimization of vessel brick lining
 - Trend analysis and forecast of vessel lining life (accurate planning of downtimes)



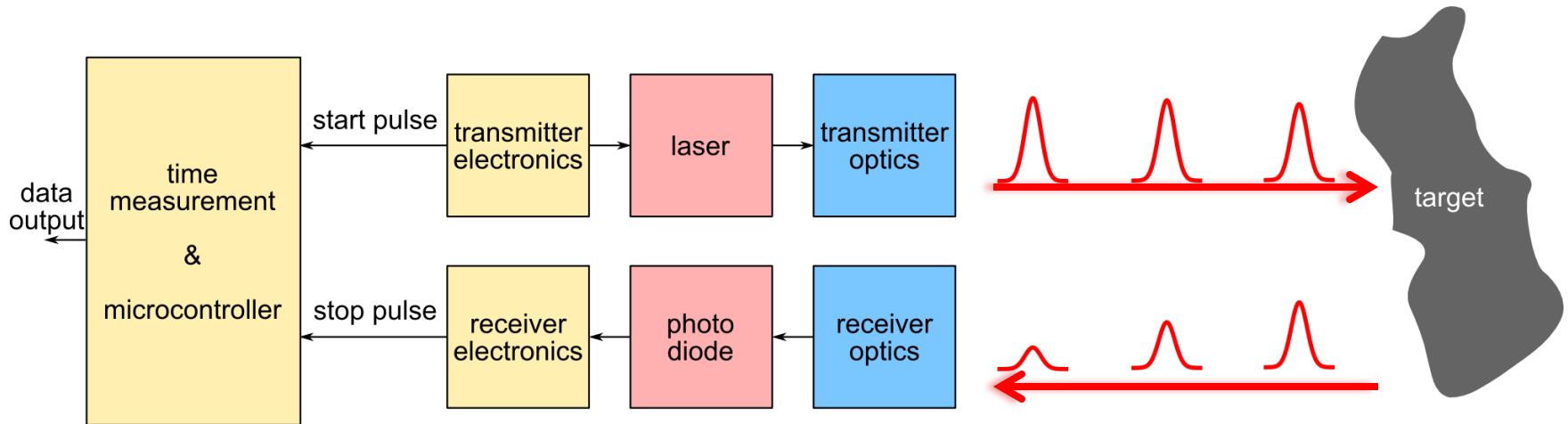
- 3) Process Control, Maintenance**
- Bath level measurement for determination of „Freeboard“ and optimized control of RH degasser
 - Control of gunning material selection and consumption
 - Optimization of sandfilling for taphole
 - Temperature measurement of lining-surface with high density (3D)

Technical details

Depending on application up to 4 million measuring points are achievable with a scan of 30 seconds due to a laser repetition rate of 300 KHz and an extended vertical viewing angle of 110°. The smallest laser beam size of 3 mm is offering the highest resolution and best accuracy. This allows improved joint and edge detection in ladles and other vessels.



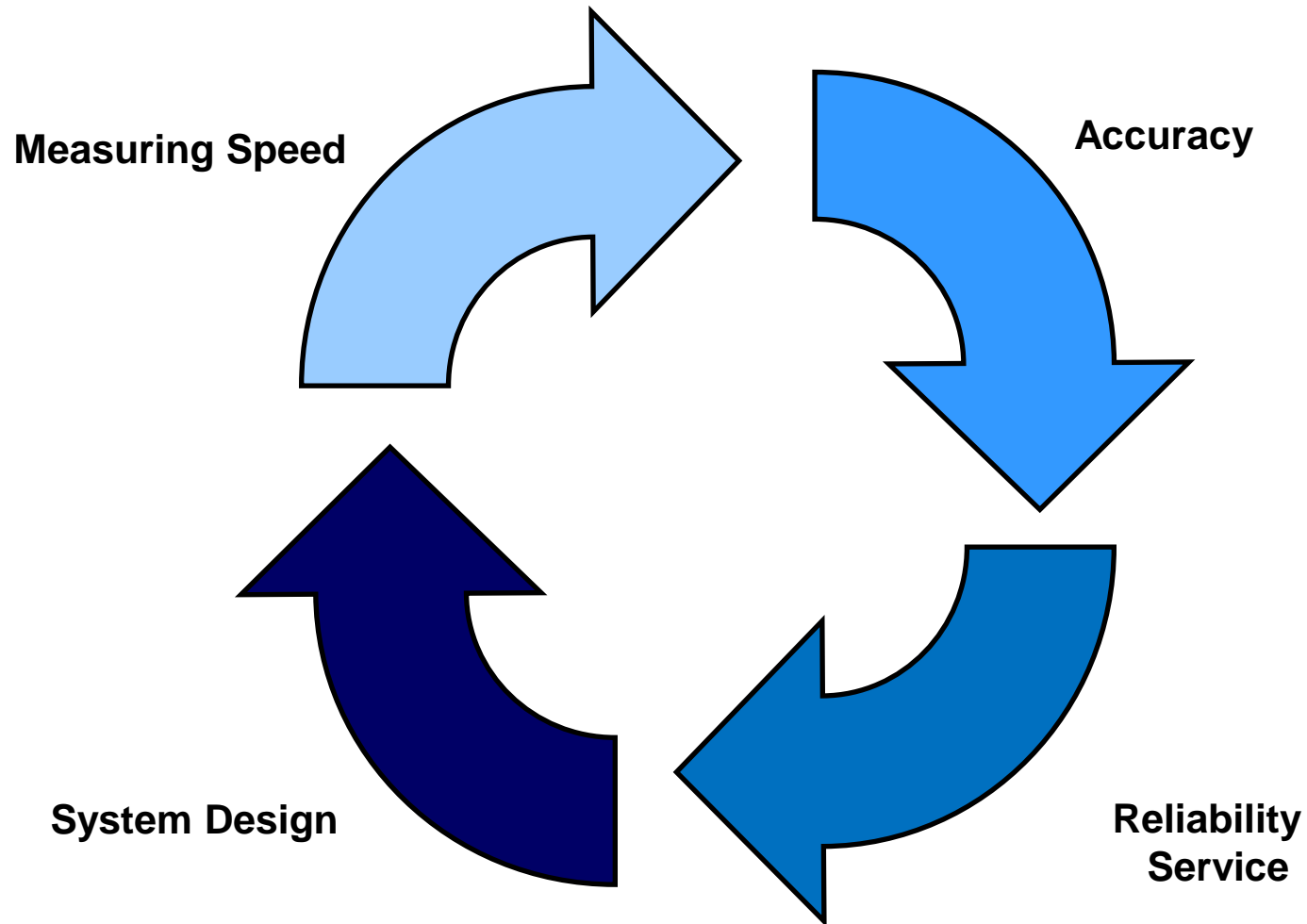
Principle Time-of-Flight Measurement



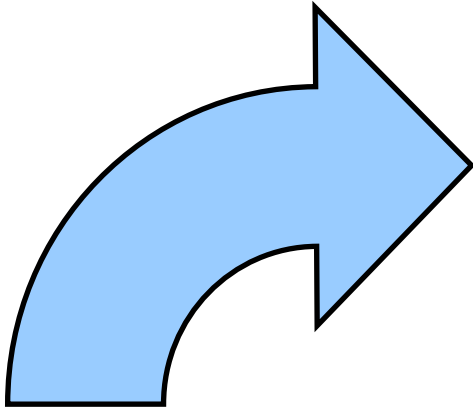
- short laser pulse in a highly-collimated beam is sent in well-defined direction
- pulse is partially and diffusely reflected by target(s)
- receiver gathers backscattered optical signal (echo signal) and converts it into electrical signal
- receiver electronics detects target(s)
- time between start pulse and stop pulses is measured and gives range

LaCam[®] 4th generation

introduces new upgrades offering the best performance for our customers:



Measuring Speed

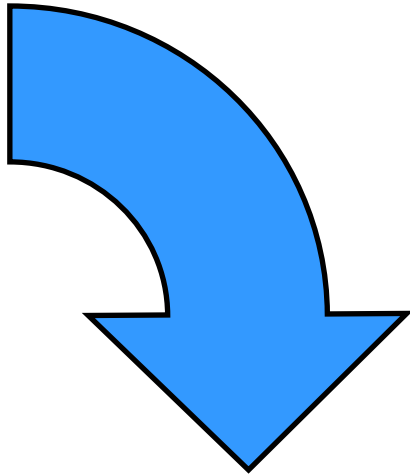


- Reduced over all measurement time due to intelligent positioning methods
Immediate Positioning System (IPS) (Patent)
- Significant reduction of measurement time due to
Instant Result Scanning (IRS) (Patent)

Benefits:

- Fastest lasercanner for hot surfaces on the market
 - Laser Pulse Repetition Rate of 300 Khz
 - Scan Rate: 135,000 Measuring Points/sec.
 - Total time for one scan: less than 10 sec. (Scanframe 110° X 80°, 880,000 MeasuringPoints/Scan)
 - 4 Million measuring points within a scan of 30 sec. → extreme high point density
- Results available and monitored after each single scan
- Ability to decide after each scan if areas of interest are already measured (no need to continue with additional scans)
- Echo digitization with full waveform analysis measurements are less sensitive to smoke and dust influence this leads to improved measuring results

Accuracy, Positioning



- Highest available accuracy, due to the use of latest laserscanner-technology and one scanner for positioning and measurement

- Precision: +/-2 mm
- Angular pointing accuracy: 0.0005°
- Min. Angle stepp width: 0.0024°
- Beam Diameter: 3 mm

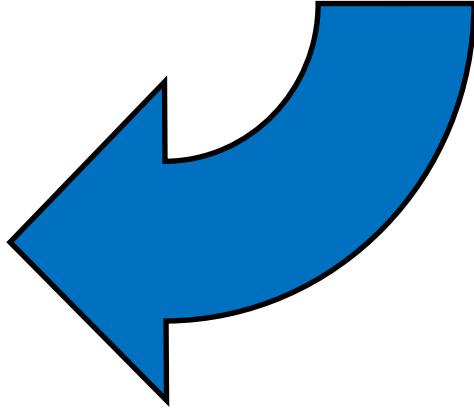
Advantages in Positioning compared to competitors:

no additional errors based on:

- second laser for positioning
- reflecting targets
- additional surveying measurement by a third party company

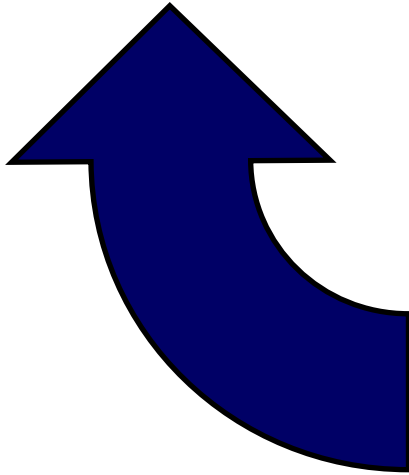
High flexibility in choosing structures for positioning due to multiple positioning methods (patented)

System Design



- **Active water cooling allows unlimited use**
no down times between measurements required
- Sturdy construction and the multi-wheel cart-design enables an easy movement of the LaCam[®] - M
- Extended vertical viewing angle of 110°
- Permanent network access and remote access (also wireless)
- Safety: Overhead protection for operator against skulls or debris
- Integrated Pyrometer (optional)
Benefit: allows temperature maps and tuyere status determination
- Operation mode: Battery or AC-power 85V – 265V
Benefit: enables operator to perform measurement (even if the battery is not fully charged)

Reliability, Service



- **Reduced temperature stress on mechanical and electrical components due to active water cooling**
- **No need for maintenance of positioning system (extra targets)***
- **User-friendly due to modular setup**
- **Active cooling system is monitored on-line**

- Service teams available world wide, Minteq provides infrastructure in more than 40 countries.
- Experienced manufacturer of laser-profile measuring equipment with more than 270 sold units world wide.

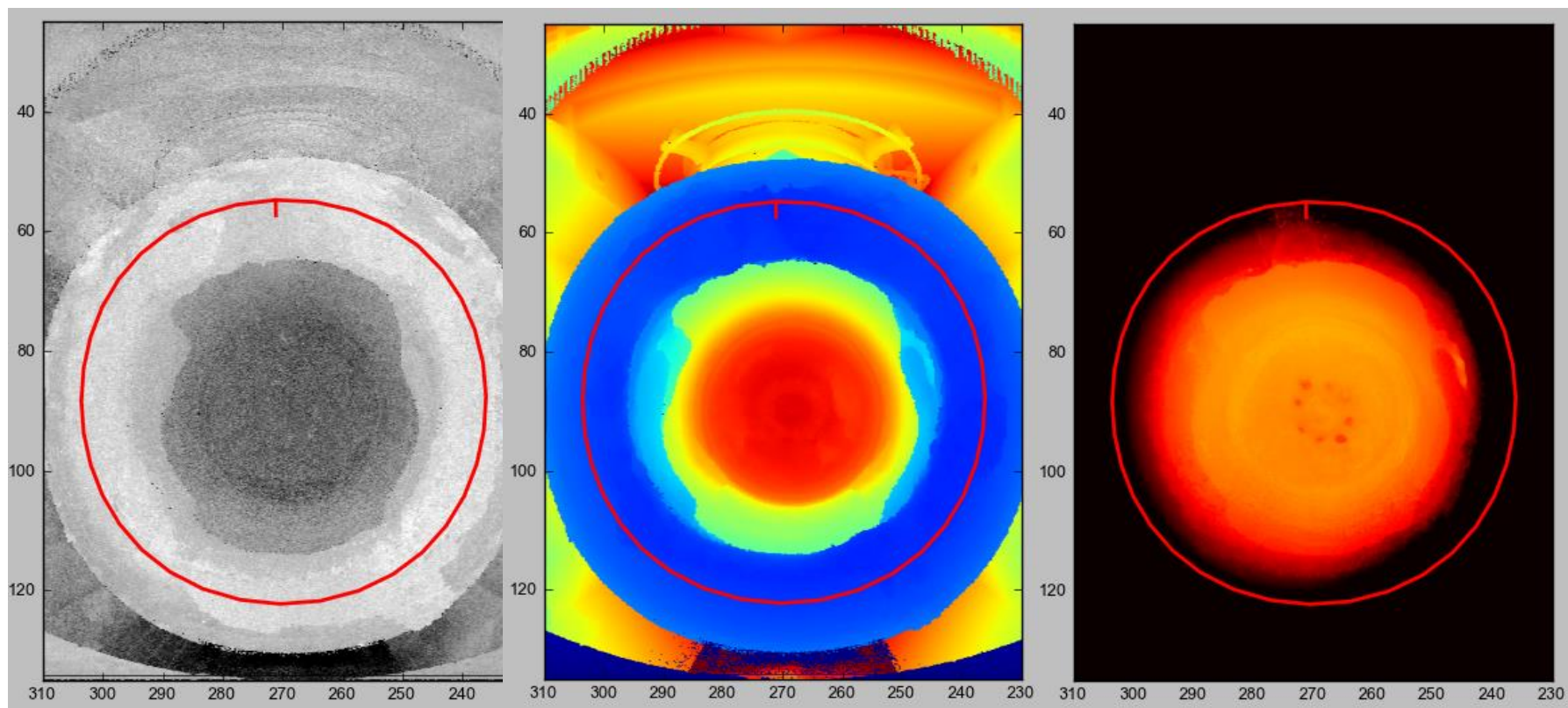
**Competitor uses additional reflecting targets (which have to be cleaned) and a second laser for positioning which increases the overall error rate*

Technics: Measuring Channels

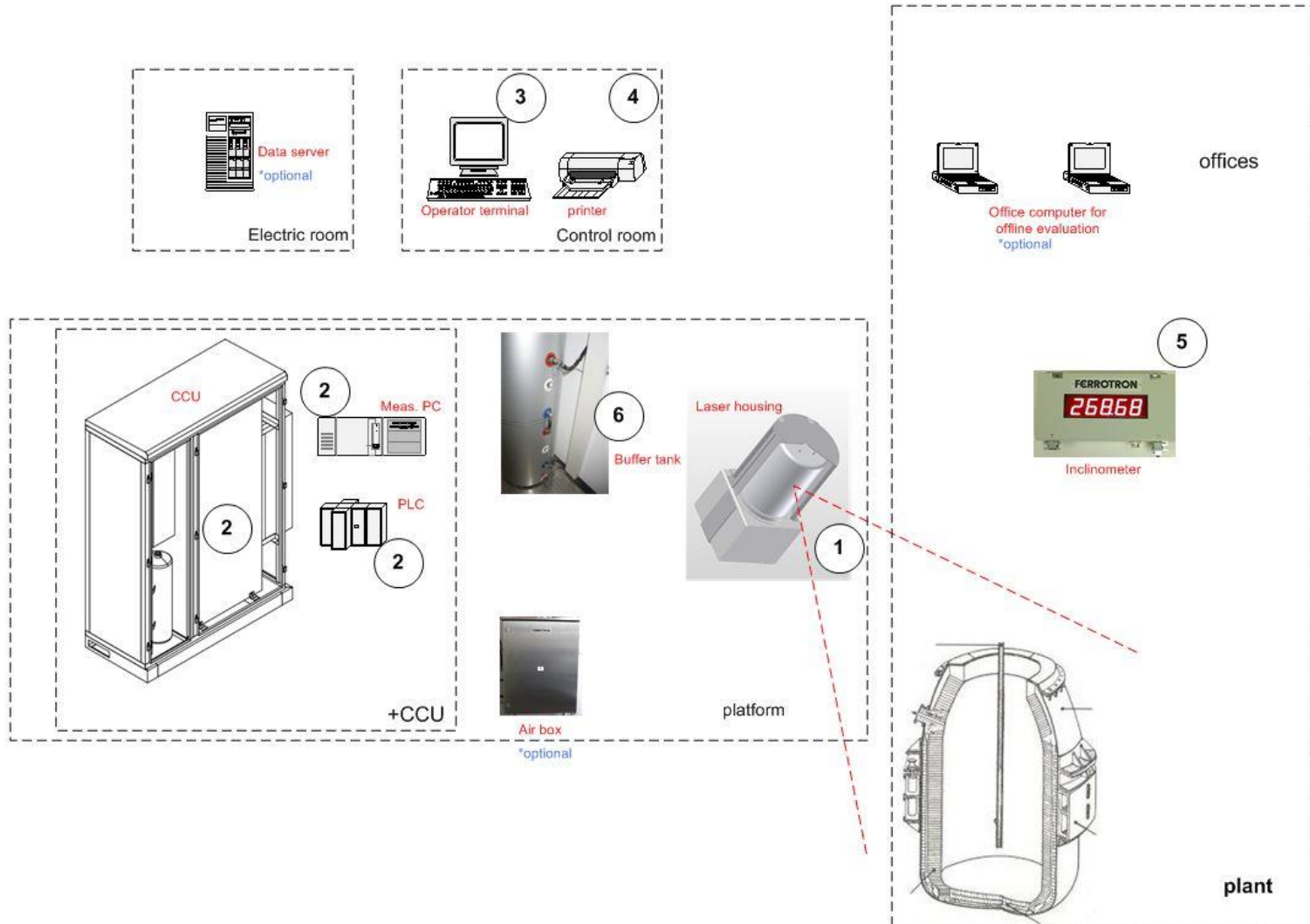
Amplitude

Distance

Temperature



LaCam[®] CI System Overview

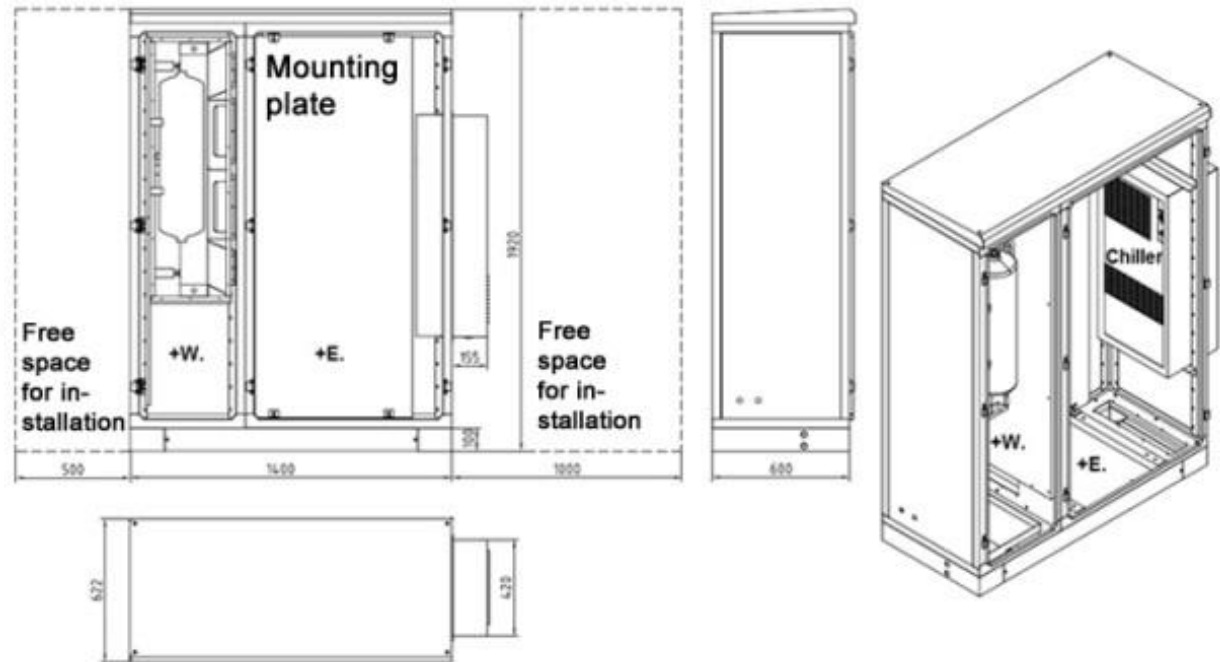


Our research is your *advantage*

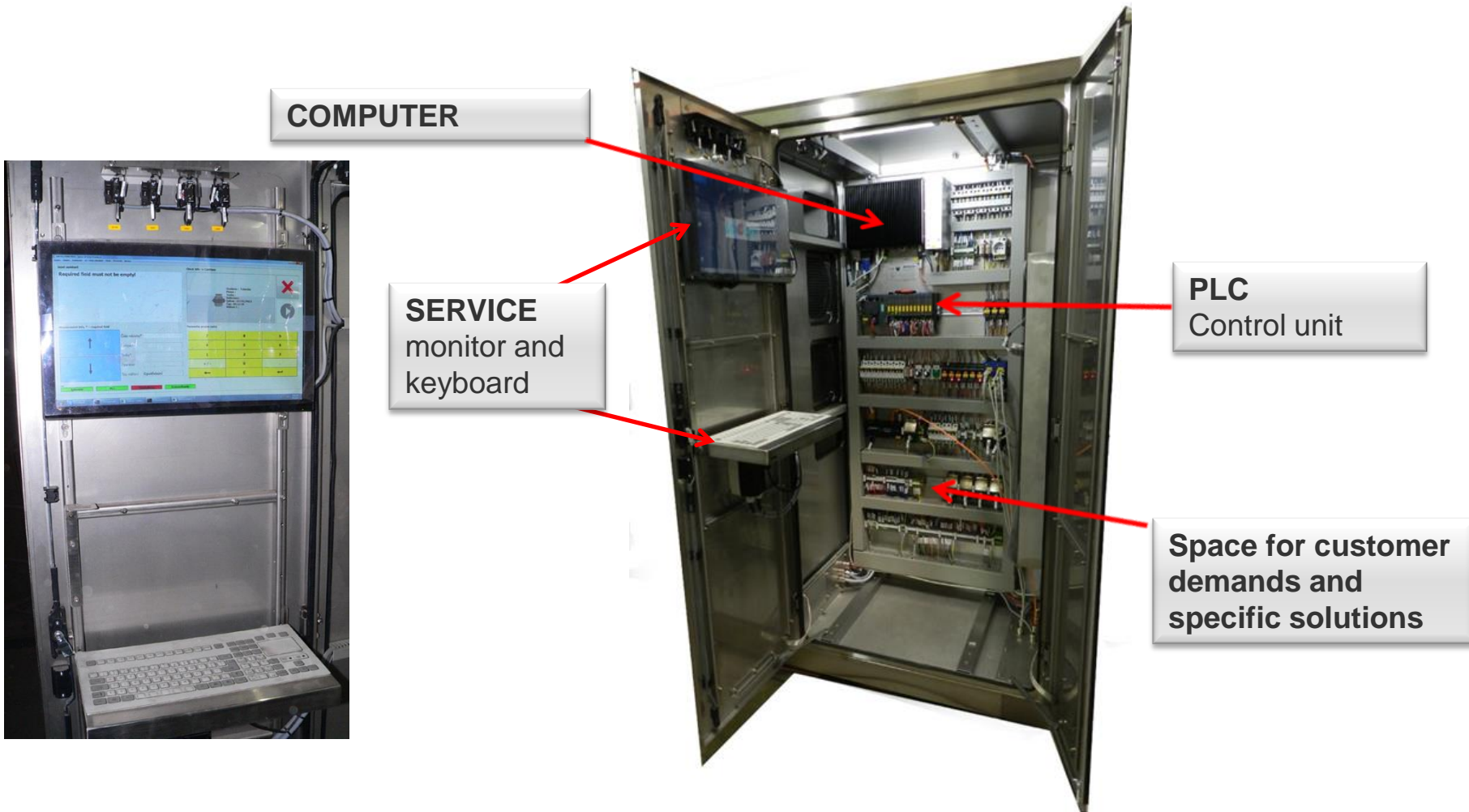
The ALL in ONE solution



Cabinet integrated with
Cooling unit, chiller, electronic
parts and space for extra customer
solutions and demands



The ALL in ONE solution userfriendly and easy to maintain

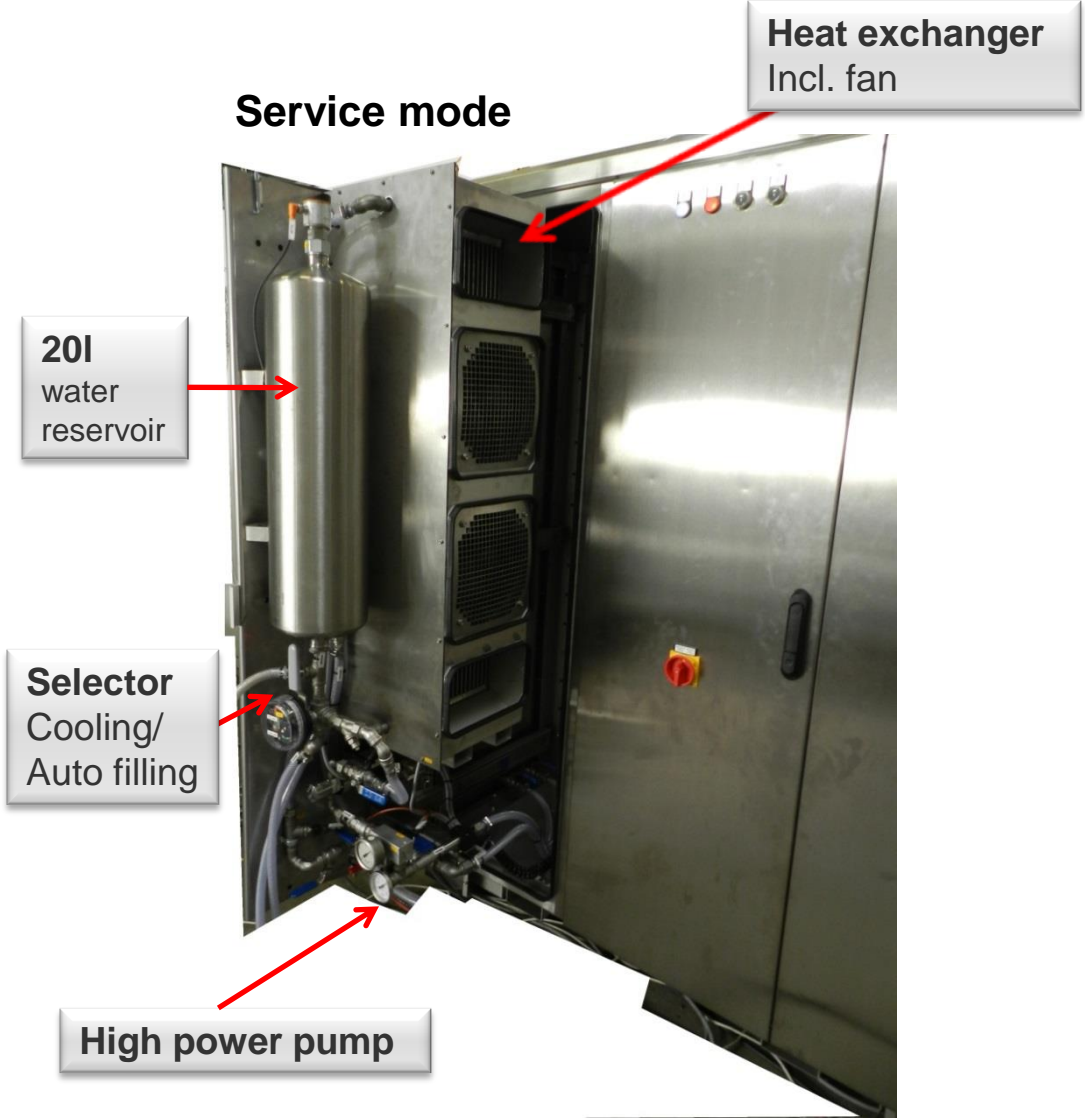


The ALL in ONE solution userfriendly and easy to maintain

Operation mode



Service mode



Heat exchanger
Incl. fan

20L
water
reservoir

Selector
Cooling/
Auto filling

High power pump

LaCam[®] fixed installation

The LaCam[®]-System is equipped with a guided system which allows to measure the whole vessel with multiple scans in a minimum of time. The operator is able to inspect the evaluated data simultaneously in different plots on one page.

Program 1: bottom and lower part of the vessel,
(measurement will cover 60% of the converter)

less than 10 sec*

Program 2: bottom, lower part of the vessel, impact area and tapping area

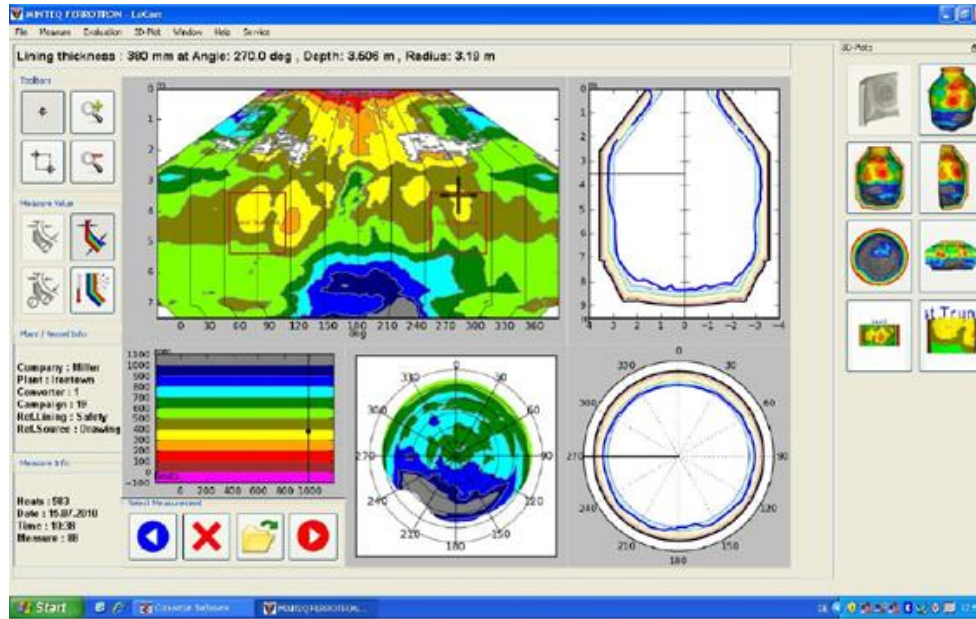
48 sec*

Program 3: full converter

1 min 21 sec*

* Example for a total measuring time in fully automated operation under „normal“ conditions

19 Graphical User Interface and 3D for converter Application



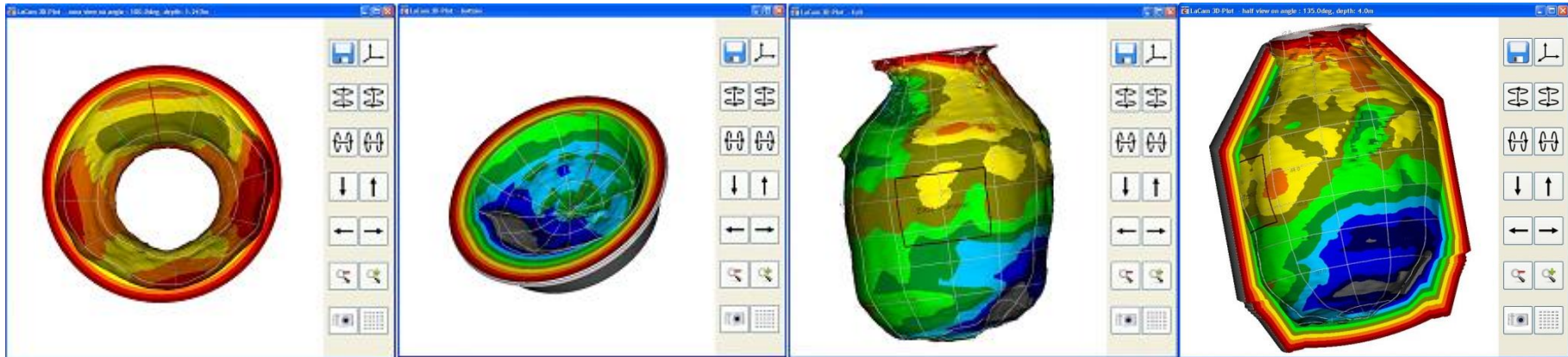
Software features

- all relevant information on one page
- any user action will show the requested data in all plots simultaneously
- powerful 3D-grafics allows viewing the refractory lining from all perspectives

Converter inside

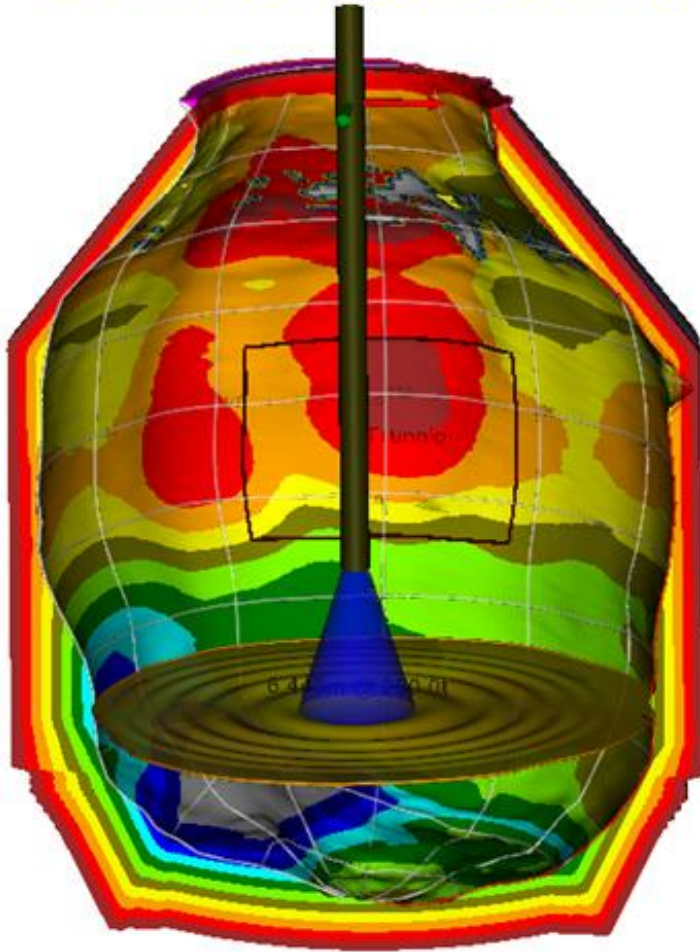
Converter bottom

converter outside



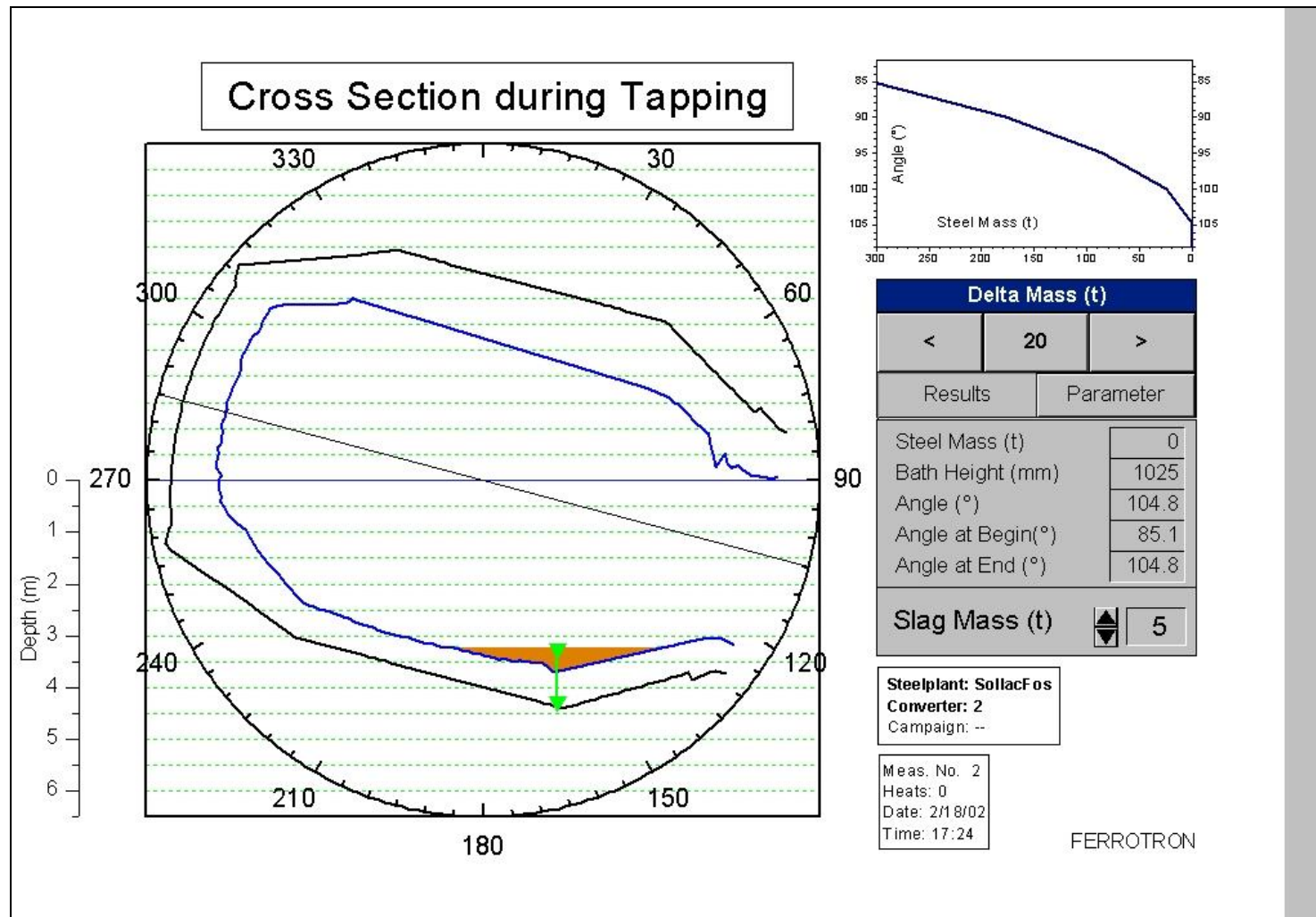
20 Software features – presentation of measurement results:

Bathlevel Conv

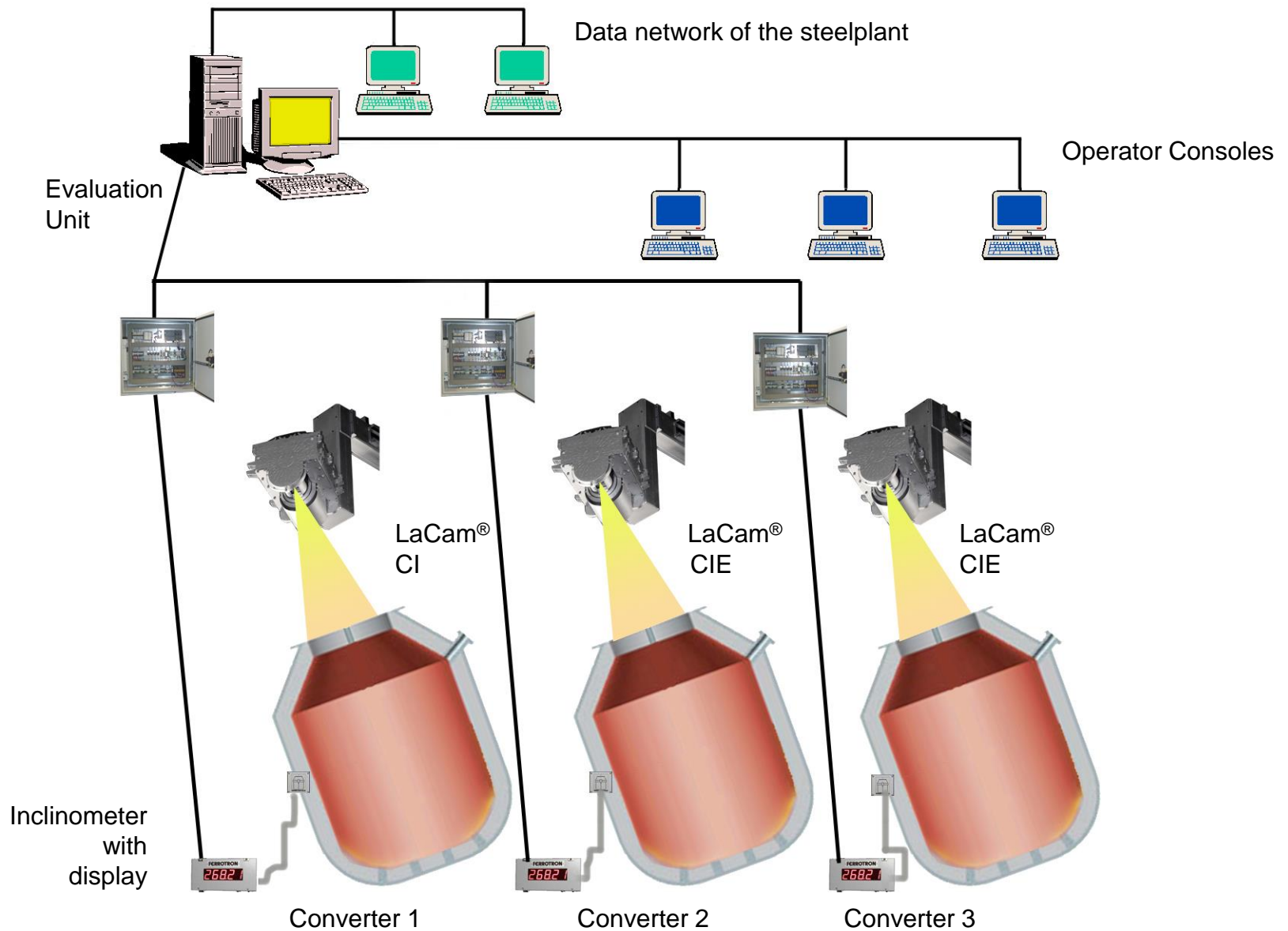


- 3D representation of the measured lining surface
- Lining thickness indicated by colour
- Calculated bath level displayed as a surface

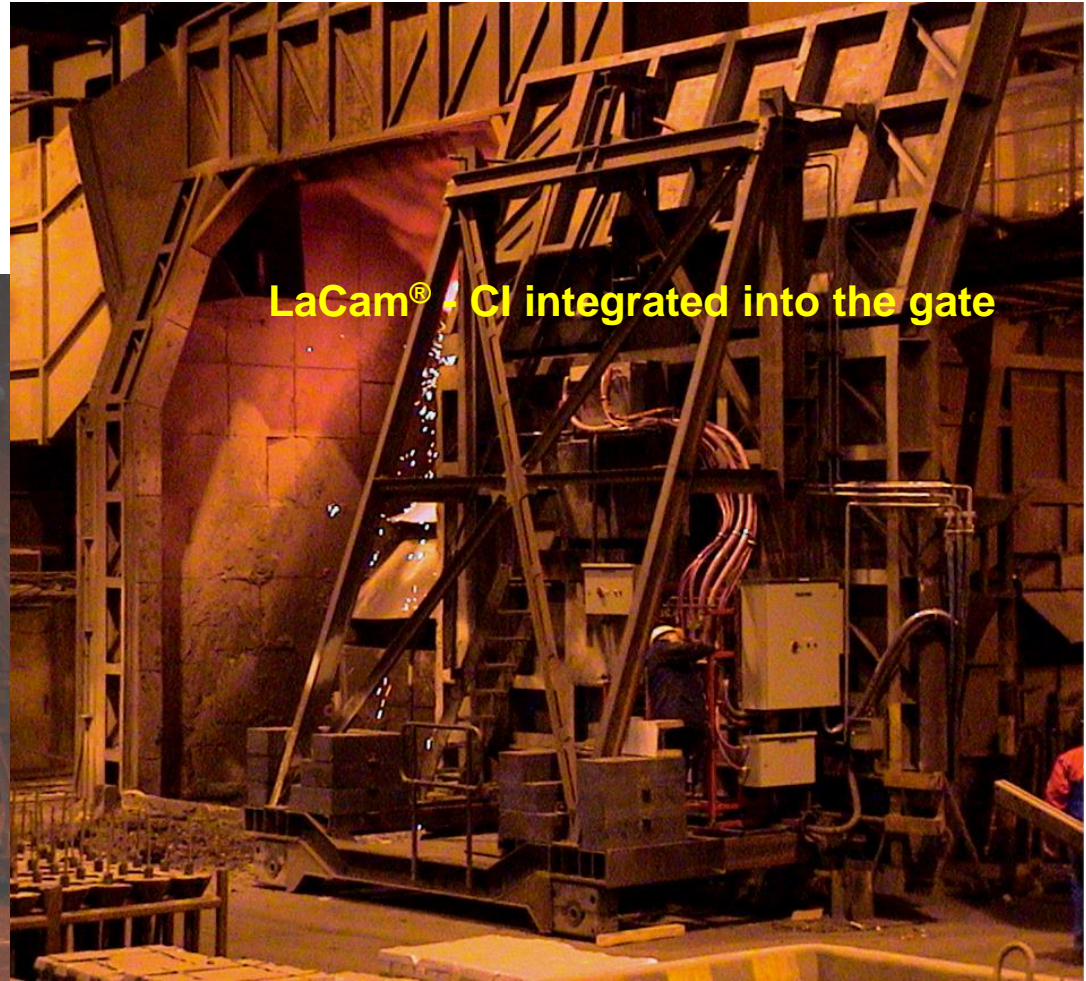
Tapping angle depends on remaining steel melt



LaCam[®] - CI/CIE, fixed Installations for Converters



Example for LaCam® - CI/CIE, fixed Installations for Converters



Thank you!

