


LaCam[®] - M 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

LaCam[®] - M4 mobile version



3

LaCam[®] - M4 Laser Scanner Profile Measurement in Hot Vessels and Transport Ladles

FERROTRON

sold more than 260 laser measuring units world wide

(165 mobile versions and 99 fixed versions)



3D Laser Profile Measurement

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

Benefits



1)

Safety

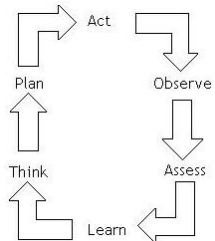
- Minimize dangerous and expensive break-outs



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)



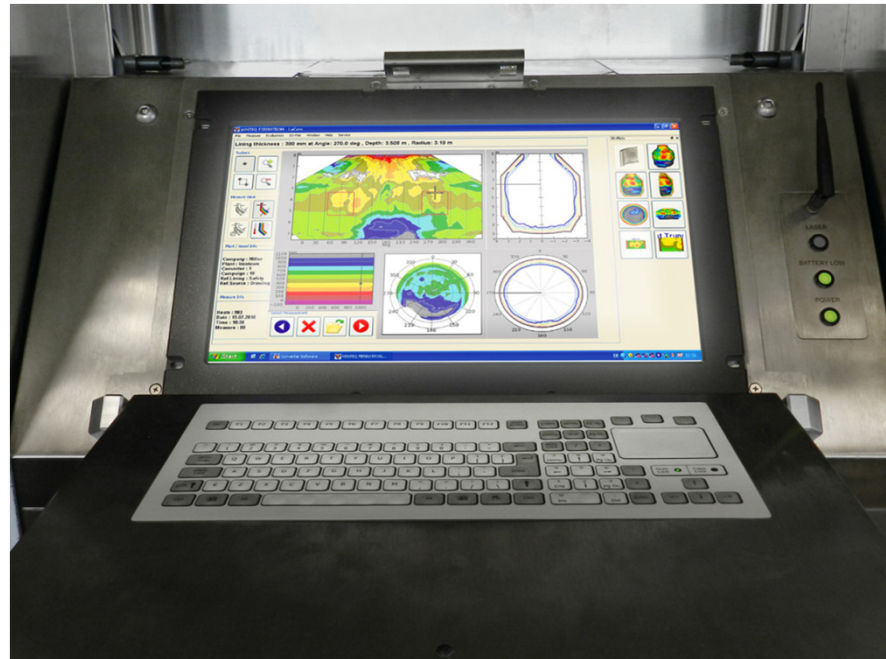
3)

Process Control, Maintenance

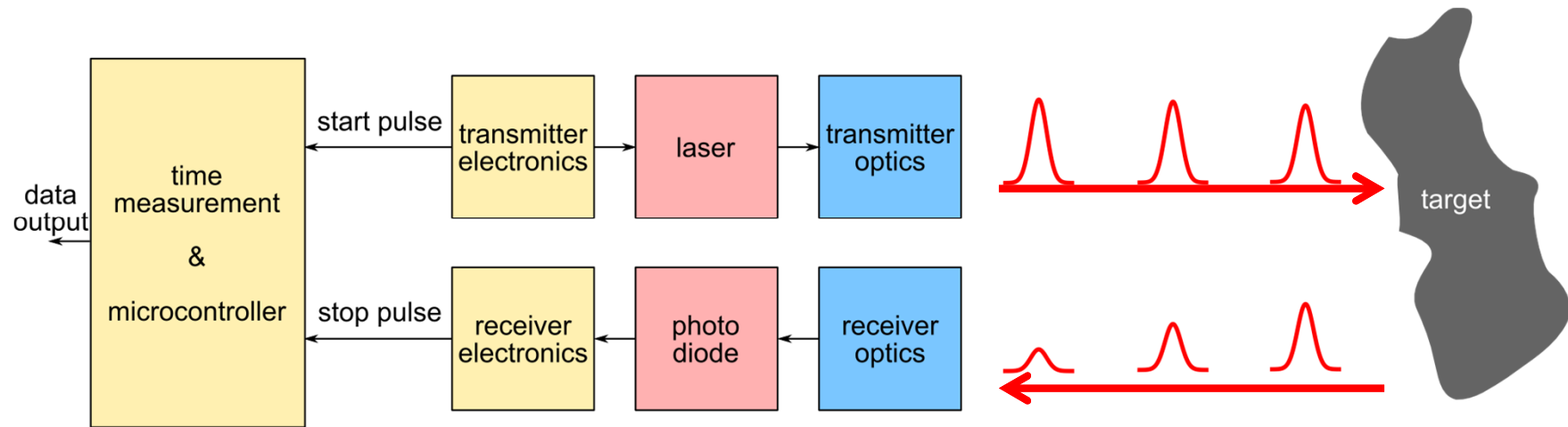
- Bath level measurement for optimal lance positioning
- Improved control of slag splashing and slag coating practices
- Control of gunning material selection and consumption
- Optimization of tapping angle

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.



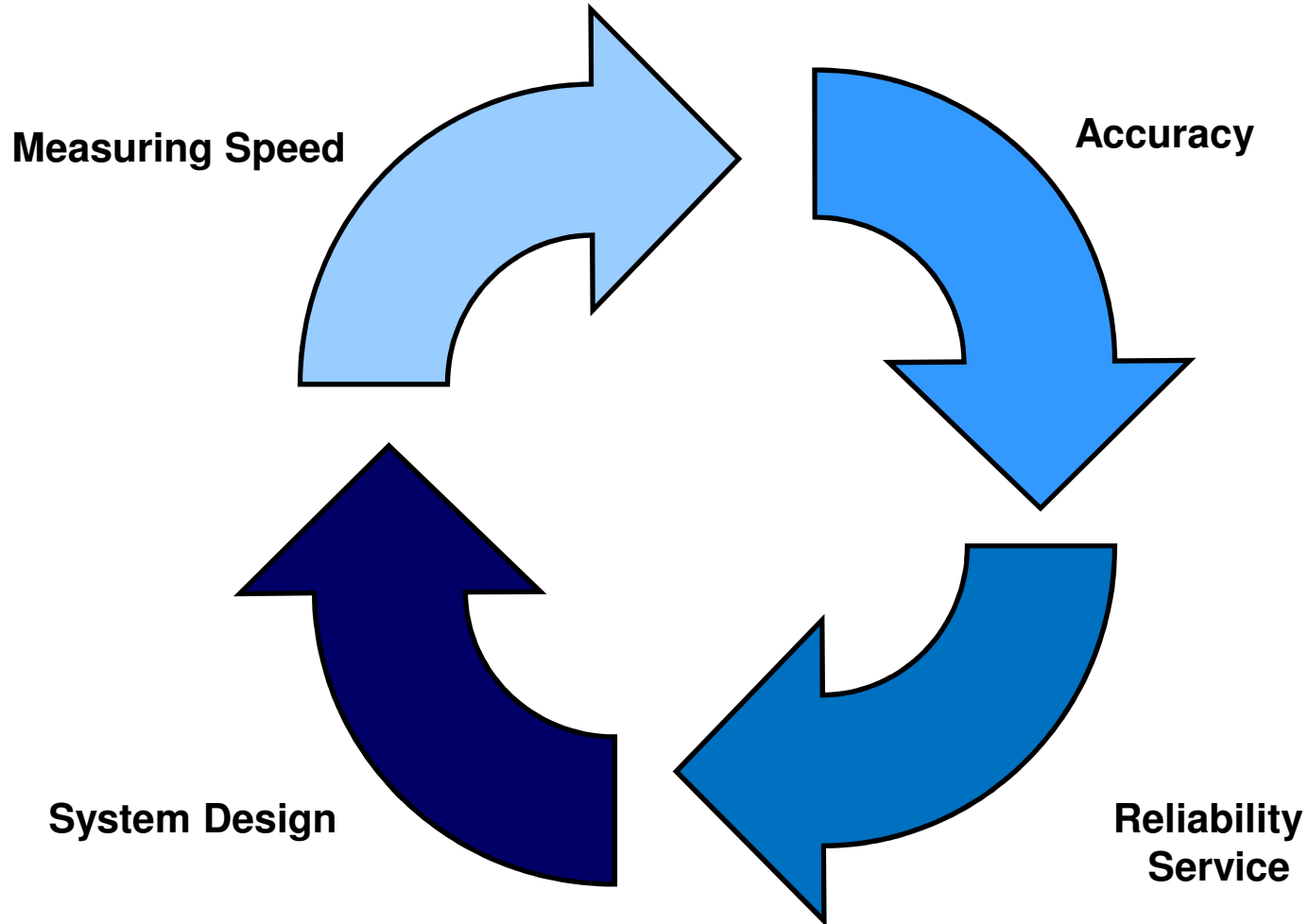
Principle Time-of-Flight Measurement



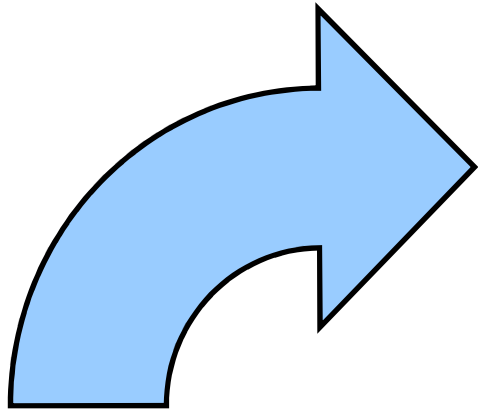
- short laser pulse in a highly-collimated beam is sent in well-defined direction
- pulse is partially and diffusely reflected by target(s)
- receiver gathers backscattered optical signal (echo signal) and converts it into electrical signal
- receiver electronics detects target(s)
- time between start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

LaCam® 4th generation

introduces new upgrades offering the best performance for our customers:



Measuring Speed



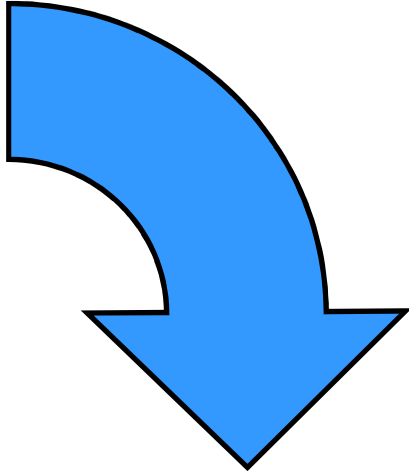
- Reduced over all measurement time due to intelligent positioning methods
Immediate Positioning System (IPS)
- Significant reduction of measurement time due to
Instant Result Scanning (IRS)

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 laser scanner-technology and one scanner for positioning and measurement



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

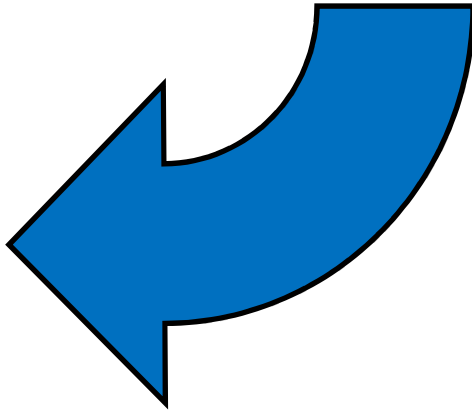
Advantages in Positioning compared to competitors:

no additional errors based on:

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

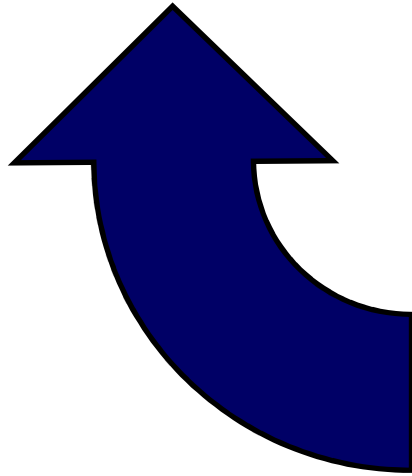
High flexibility in choosing structures for positioning due to multiple positioning methods (patented)

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

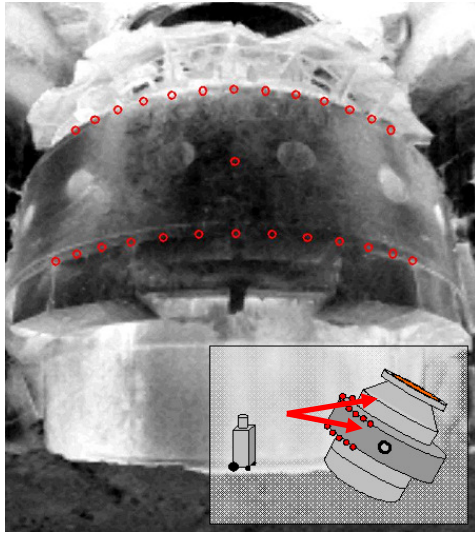


- **Reduced temperature stress on mechanical and electrical components due to active water cooling**
- **No need for maintenance of positioning system (extra targets)***
- **User-friendly due to modular setup**
- **Active cooling system is monitored on-line**

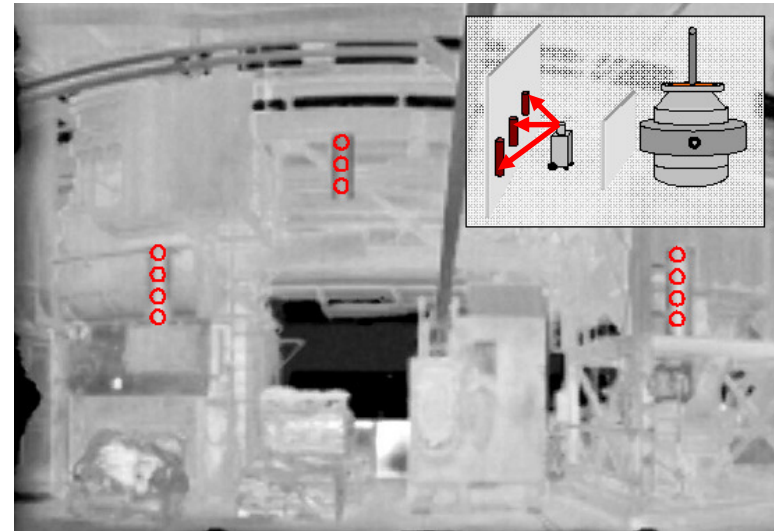
- Service teams available world wide, Minteq provides infrastructure in more than 40 countries.
- Experienced manufacturer of laser-profile measuring equipment with more than 260 sold units world wide.

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

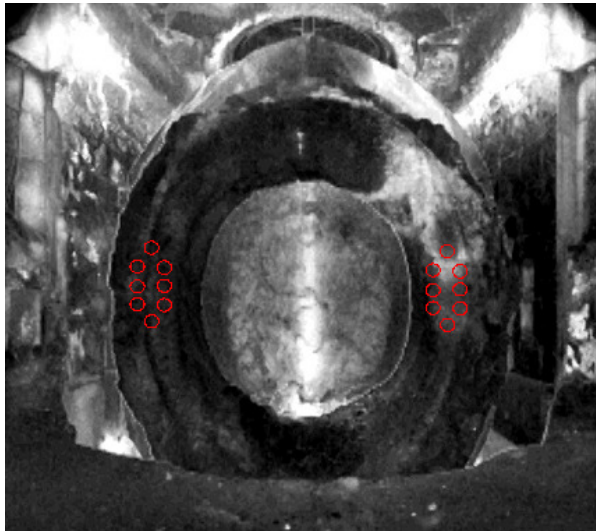
Versatile methods for fast positioning: IPS



Trunnion ring as **permanent** structure,
IPS-Frontscan



Cylindrical structures in the back of LaCam®
as **permanent** structures, IPS Backscan



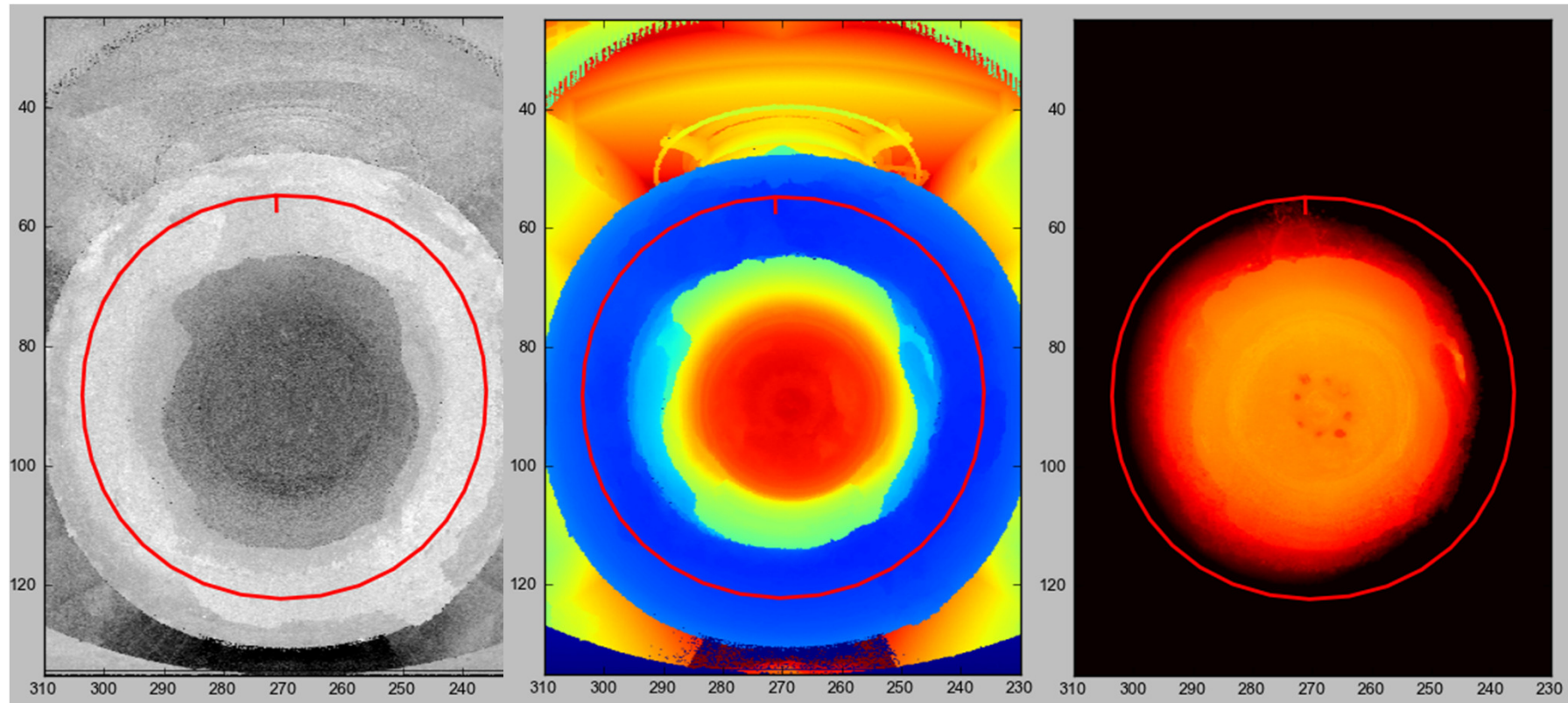
The mouth of a converter as **temporary** structure,
IPS-Wearscan

Technics: Measuring Channels

Amplitude

Distance

Temperature



The LaCam® Family

LaCam® - M

Fixed installation for:



Mobile version
for converters
and ladles



converters



ladles



EAFs



Torpedo ladles



open die forging plants

LaCam® - M 4th generation



Ultra fast scanner
mounted in a cooling
and protection hood

Wide screen
for operation

**Film covered
keyboard**
for additional data
input and control

Handles
Adjustable for height

Additional protection
against heat and little rock fall (tapside)

Frame	stainless steel
Dimensions	
- Movement	740 x 1560 x 900mm
- Measurement	740 x 2255 x 900mm
Power supply	system for line-independent stand by operation of approx. 5 hours
LEDs	showing the status of battery, power and laser
Mobility	two-wheel axle with leak proof tyres, one or two rotating front wheels for easy movement
Operating system	latest Windows® version

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

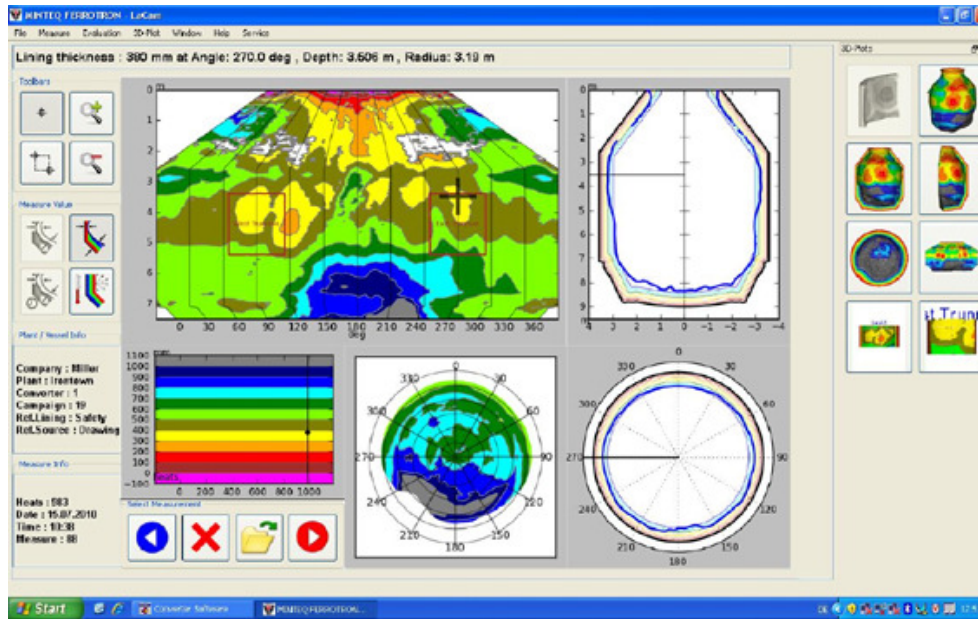
48 sec*

Program 3: full converter

1 min 21 sec*

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

17 Graphical User Interface and 3D for converter Application



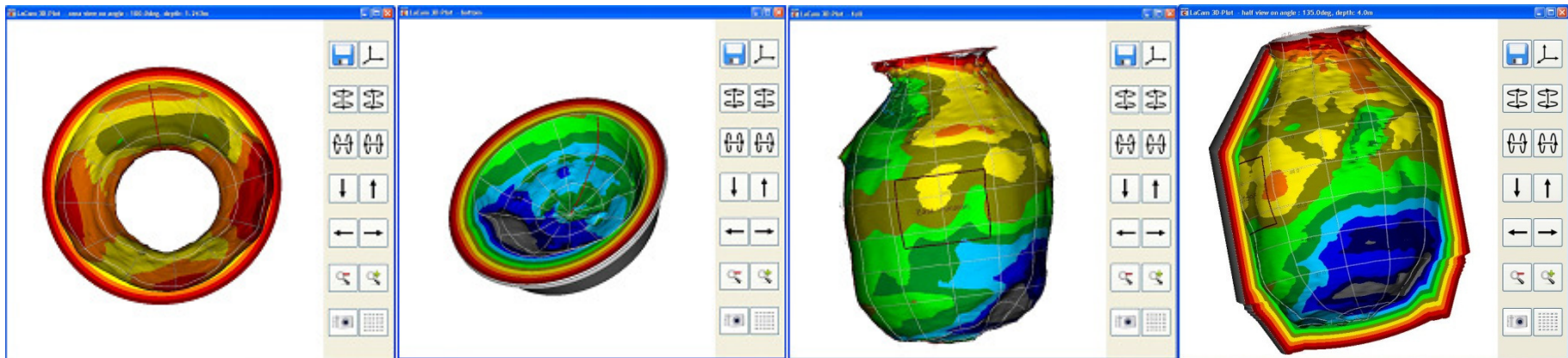
Software features

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

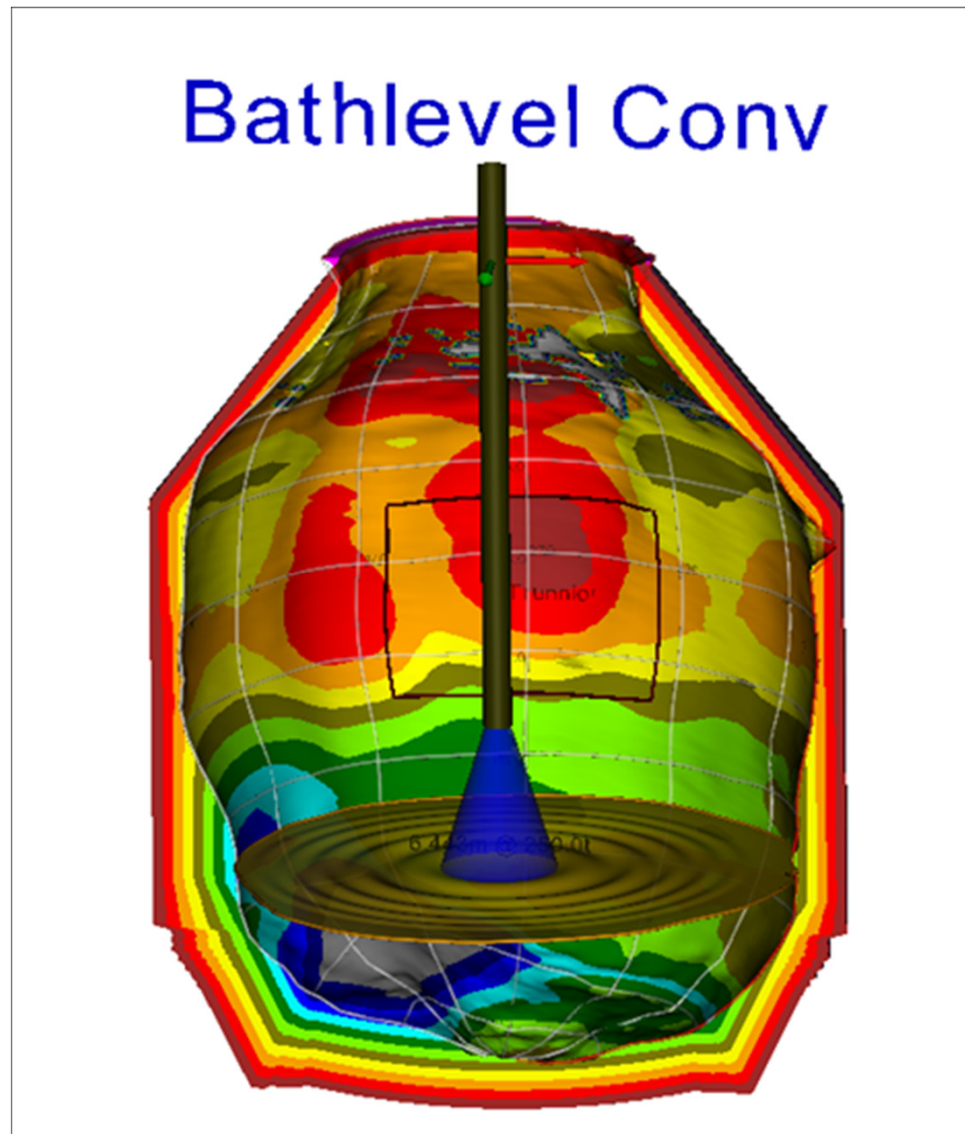
Converter inside

Converter bottom

converter outside

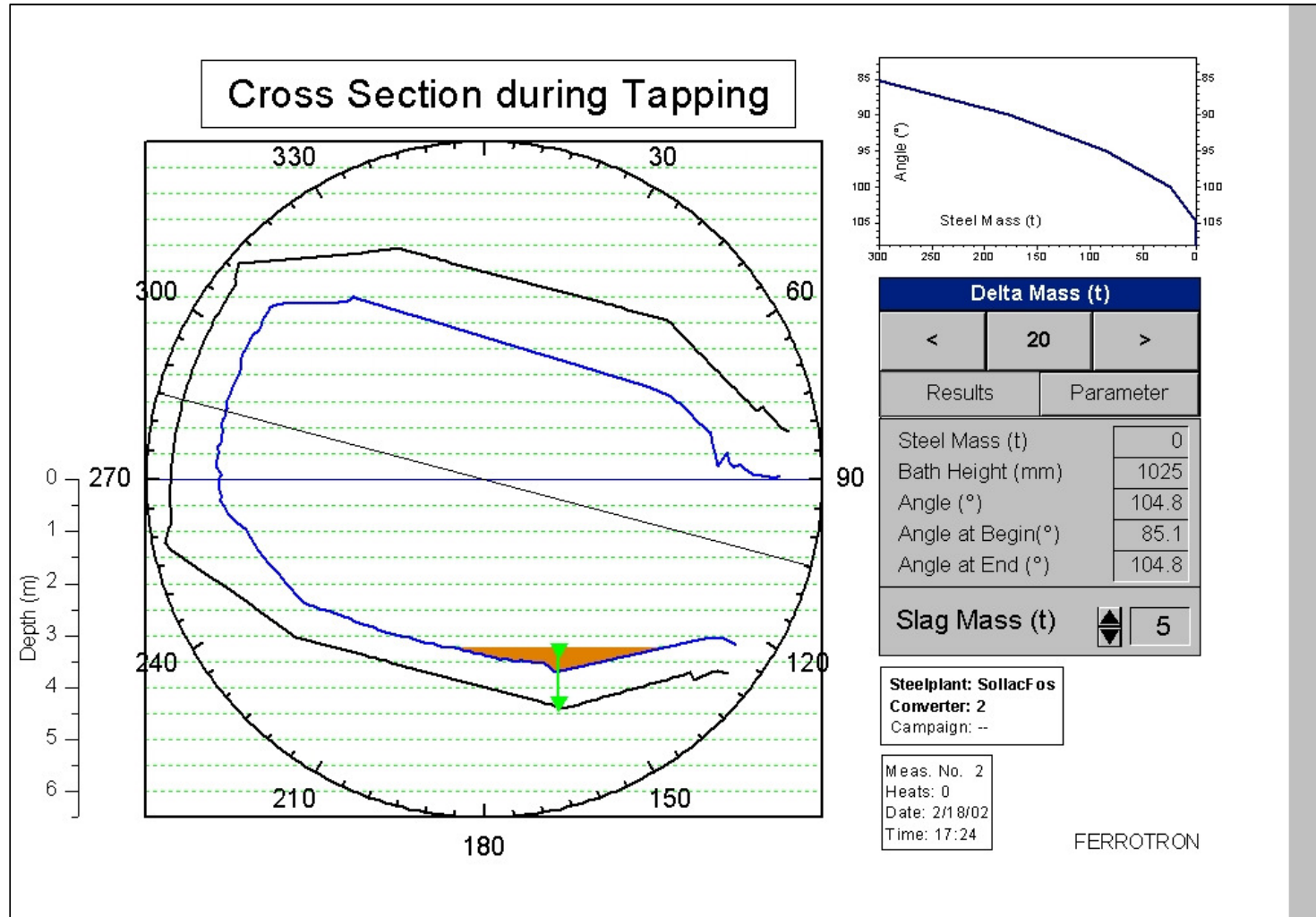


18 Software features – presentation of measurement results:

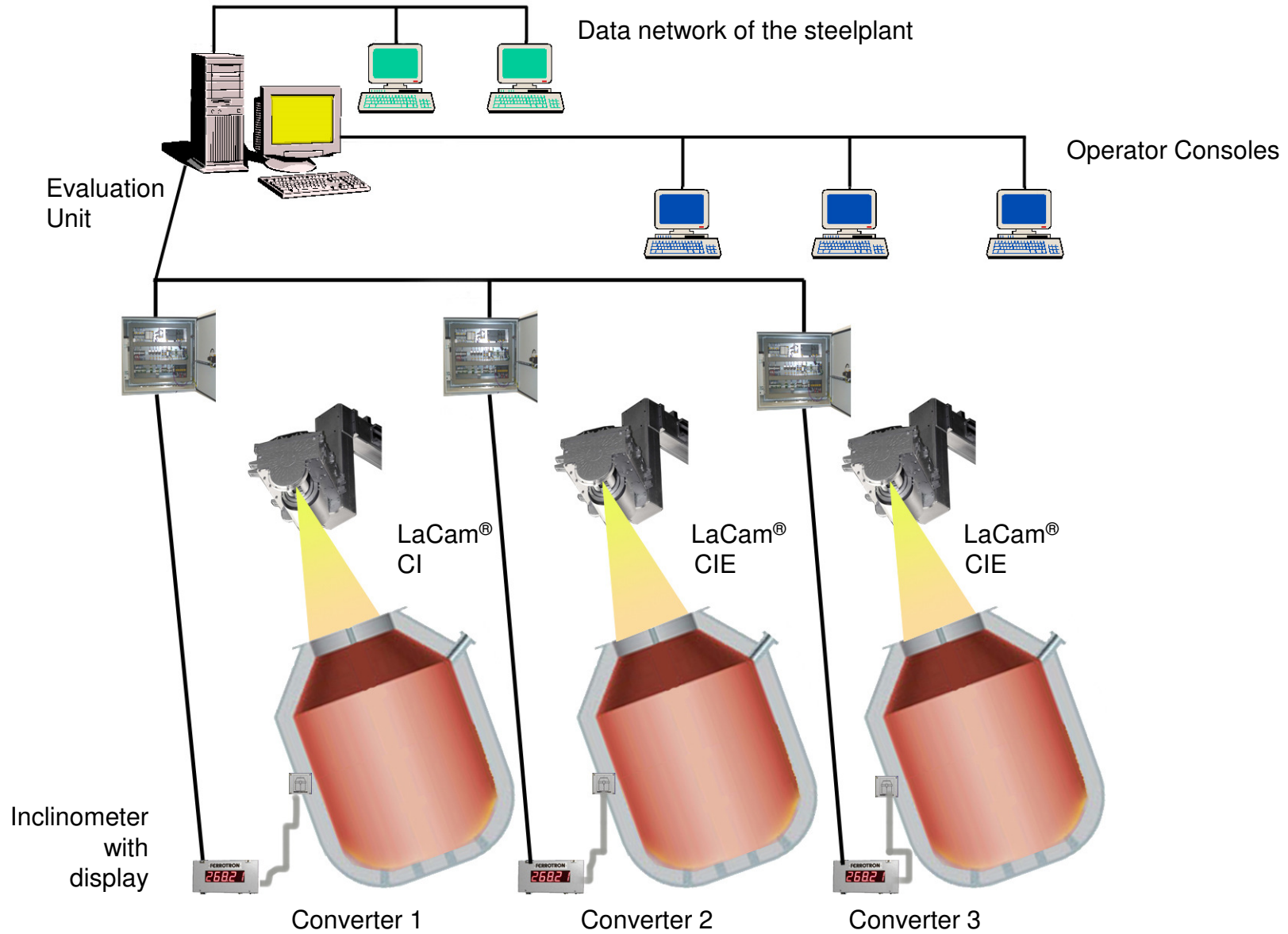


- 3D representation of the measured lining surface
- Lining thickness indicated by colour
- Calculated bath level displayed as a surface

Tapping angle depends on remaining steel melt



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

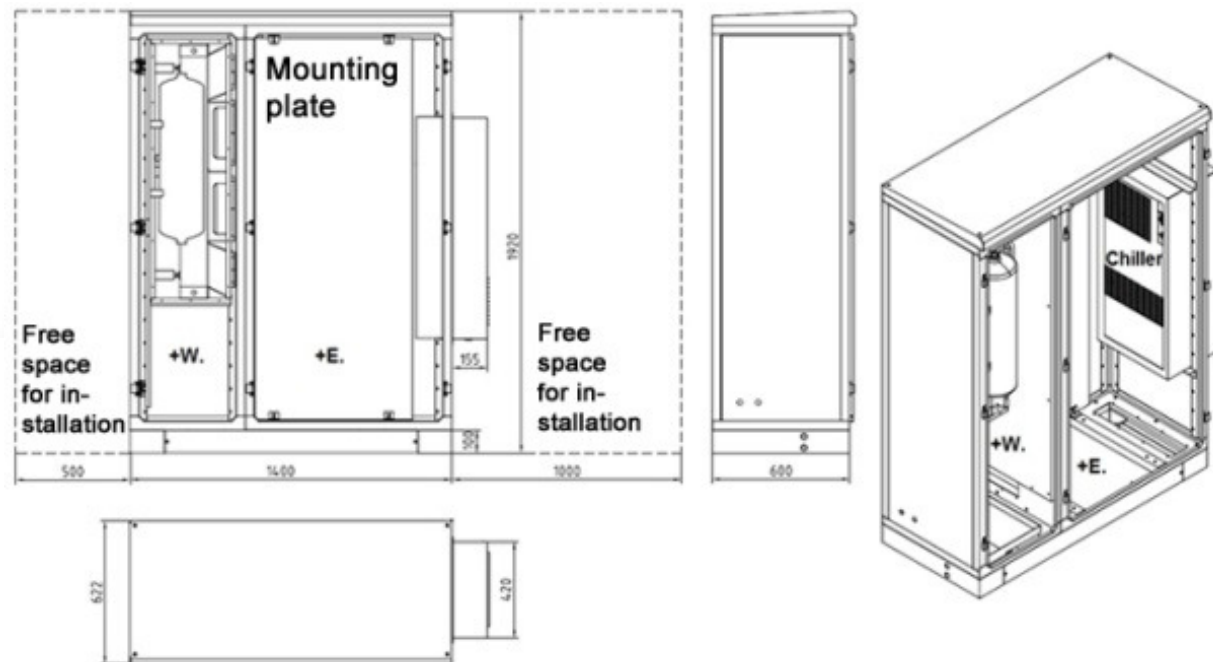


Our research is your *advantage*

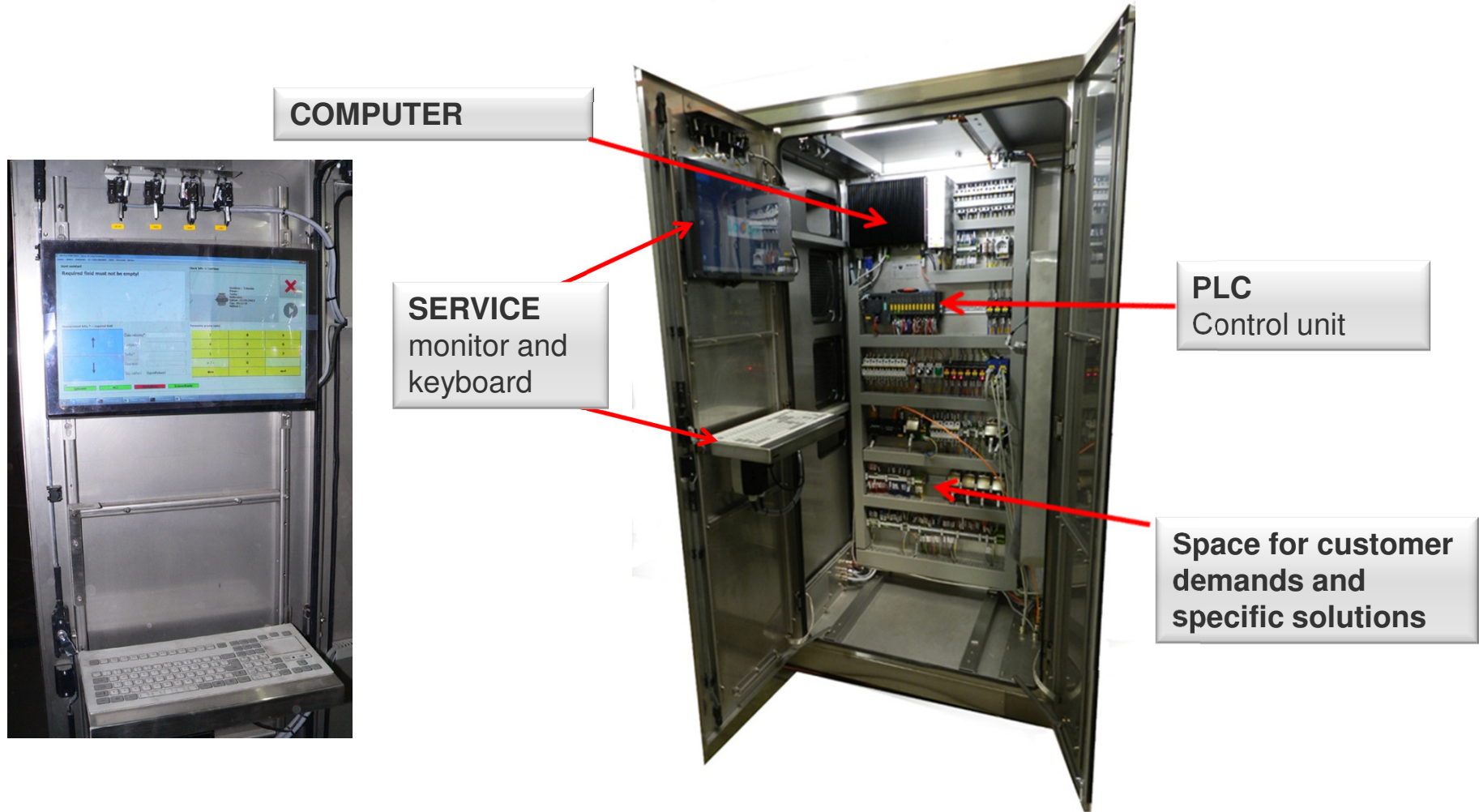
The ALL in ONE solution



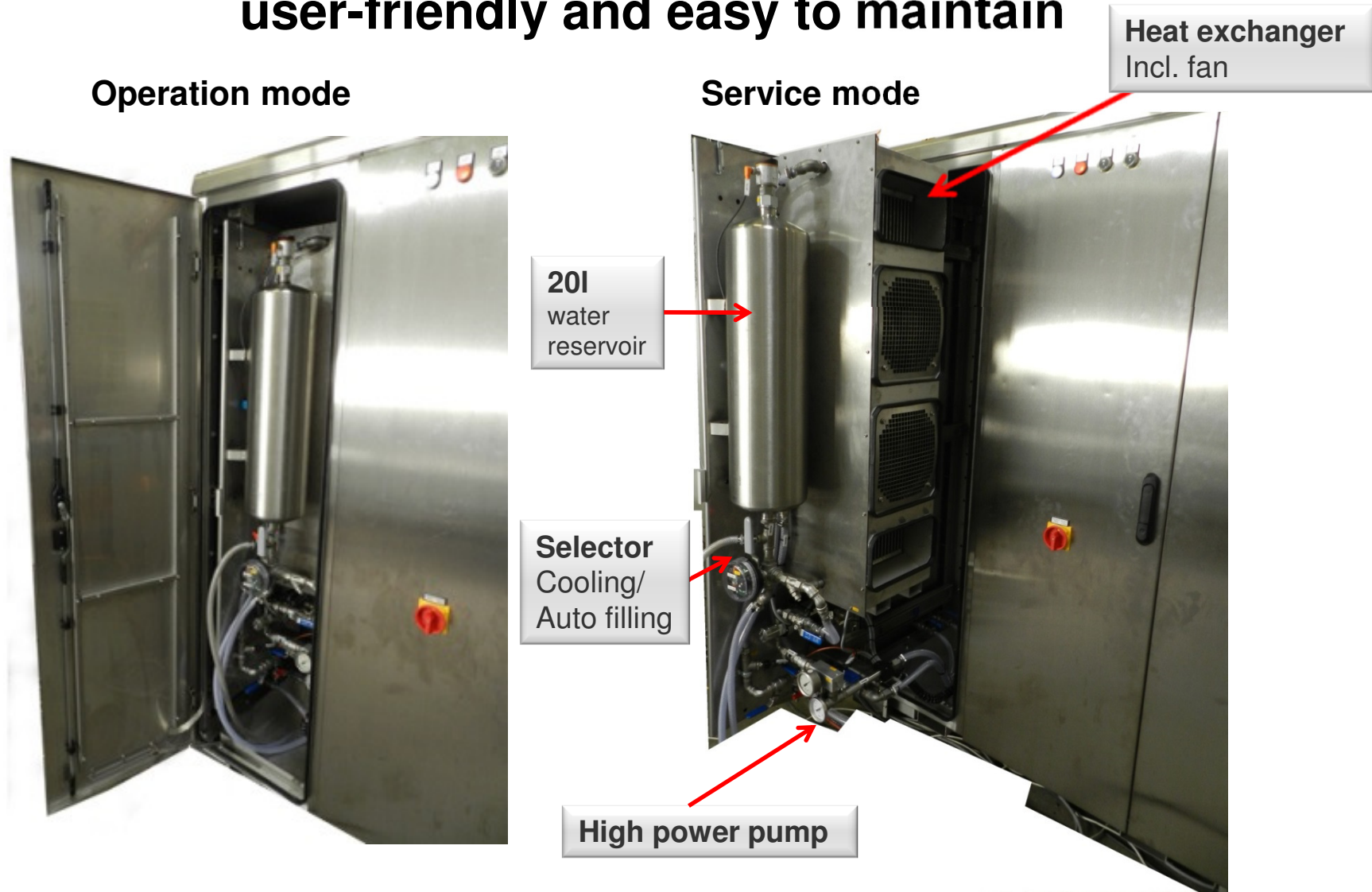
Cabinet integrated with
Cooling unit, chiller, electronic
parts and space for extra customer
solutions and demands



Our research is your *advantage* The ALL in ONE solution User-friendly and easy to maintain



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