



Laser Contouring System (LCS)

Mobile Contouring
Fast, Accurate, Reliable Refractory Profiling



PROCESS METRIX

A VESUVIUS COMPANY

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In 2014 Process Metrix was purchased by Vesuvius and is now a wholly-owned subsidiary of Vesuvius. This partnership leverages the world-wide presence of Vesuvius with the technical capabilities of Process Metrix to bring world-class measurement solutions to the steel industry.

The mobile Laser Contouring System (LCS) by Process Metrix rapidly measures lining thickness in the BOF, EAF, AOD, Q-BOP, or ladle environment. The LCS combines high-speed, laser scanning technology with a robust mechanical platform and easy-to-use software. Using Process Metrix new 300 kHz Anteris* laser scanner, millions of contour points comprise each measurement, providing incredibly detailed surface and feature resolution in less than six minutes.

The Mobile Platform

Two principle objectives are emphasized in our mobile platform:

- **SPEED**
- **SIMPLICITY**

Fast measurement times are achieved with Process Metrix Anteris laser scanner coupled with our industry-leading, laser-based localization system. This system automatically measures system position eight times per second and reports position information directly to the on-board computer. A Wi Fi transmitter continuously broadcasts the vessel tilt to a receiver located in the mobile system. Together, the laser localization system and RF link enable fast, error-free measurement of the vessel lining thickness profile.



Anteris System

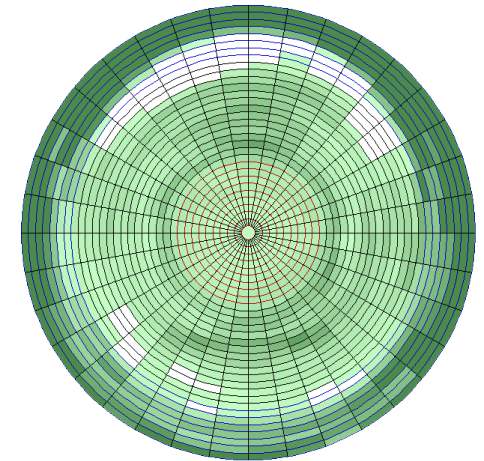
Speed

Measurements are initiated with a single tap to the system's touch screen. The operator need only enter a heat number for file naming; the LCS software does the rest! Single measurements can be made within 20 seconds. An entire map of the vessel interior consisting of 4-6 measurements and 1 million+ data points can be completed in less than four minutes.

Features

The LCS-mobile system also incorporates the following features:

- PMC's Anteris laser scanner, purpose-built for the molten metals industry
- Fan less PC, with Wi Fi
- Industrial 15" Touch Screen,
- Three USB, one Ethernet (RJ-45) front panel ports,
- Three hours of on-board battery power,
- Smart battery charger for optimal battery management,
- Two-axis on-board inclinometer,
- Battery or mains-powered inclinometers for wireless converter tilt measurement,
- Pull-up electronics tray for easy servicing,
- Retractable heat shielding,
- Optional Wi Fi-enabled tablet-PC controller for remote operation.

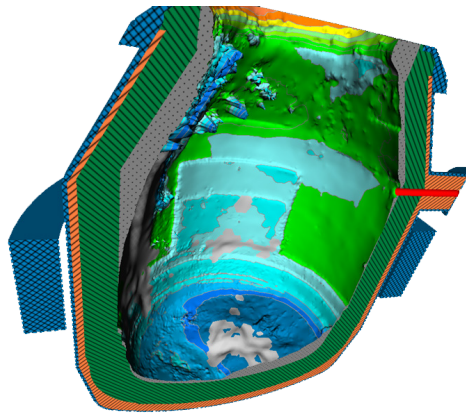


LCS' innovative completion grid. Vessel cone outlined in blue, barrel in black, bottom in gray. Darker shading indicates more data in that sector

Feature-Rich System

From our purpose built Anteris laser scanner to our intuitive software, the LCS Mobile System includes features that make the system safe, reliable, and user friendly.

Developed by Process Metrix specifically for this application, the Anteris laser scanner has a 3.6mm laser beam diameter that provides detailed measurements of the refractory surface. Purpose-built software automates data acquisition, making the system easy to use. Turn it on, start the measurement, and enter a heat number. It's that simple!



3-D Wall Contour of BOF Lining
Thickness Measured with LCS
Instrument

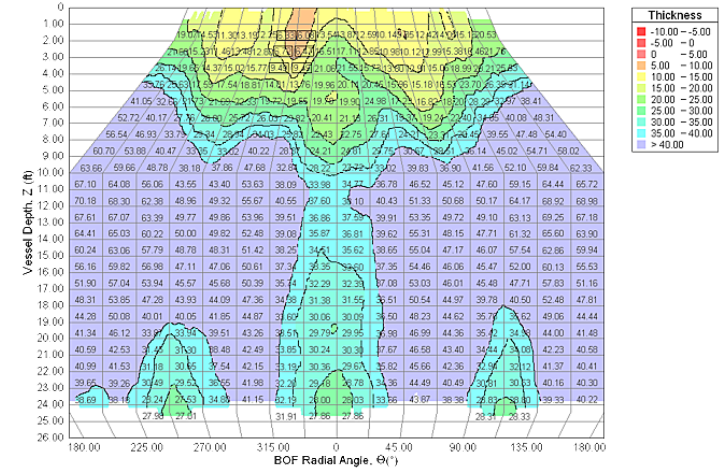
A Wi-Fi-enabled tablet PC configuration is available that leaves the unit in the heat load while you control it from a safe, remote location. Our innovative completion grid (depicted on previous page) illustrates the sections of the vessel that have and have not been measured. The vessel profile is displayed automatically within five seconds after acquisition. Bath height, based on input values of charge weight and density, is also overlaid on each data view.

A high degree of output customization is available to tailor the view definitions to the needs and preferences of the user. Two-dimensional radial slices (as shown above), wall contours (as shown on next page), bottom contours, and tabular output formats are standard. Zoomed views of problem areas can be pre-defined and automatically applied to every measurement. A plot of bath height as a function of charge weight is available as is a complete suite of integrated wear rate analysis tools. Automatic data transfer to your refractory gunning robot is also supported. Our report generator automatically prints all of the views to hardcopy, .pdf or .jpg formats.

Uncompromising Support

Process Metrix provides a preventive maintenance plan designed to keep your system operating at peak performance. Should a failure occur, a Process Metrix certified technician can always be reached around the clock through our dedicated service/support line. If on-site support is required, a Process Metrix certified technician can normally

be on site within 48 hours. Remote support via internet through a cell phone modem (included in our standard service contract) or VPN connection affords fast, seamless parameter changes, data review, and software upgrade from any remote location.



Contour plot of lining thickness in a converter. Red shading indicating problem areas needing attention

Mobile LCS System Specification

- Lining thickness Accuracy: 6 mm (average)
- Measurement speed: 120 kHz (TDS-300)
- Measurement time: 4 min, 4-5 scans
- Battery life: ~3 hours
- Field of View: +65, -45° vertical, 360° horizontal
- Optional integrated two-color pyrometer for surface temperature measurement
- Scanner Safety Class: 1
- Measurement range: 2-25m
- Converter inclinometer accuracy: 0.1°
- Instrument inclinometer accuracy: 0.05°.





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