FERROTRON
A MiNTEQ DIVISION

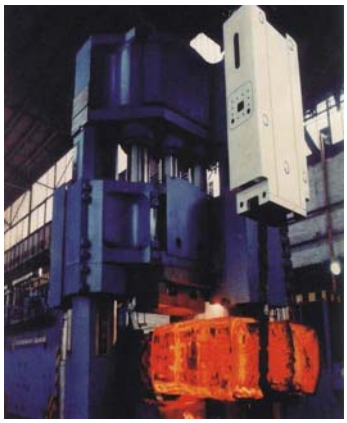
LaCam® FORGE

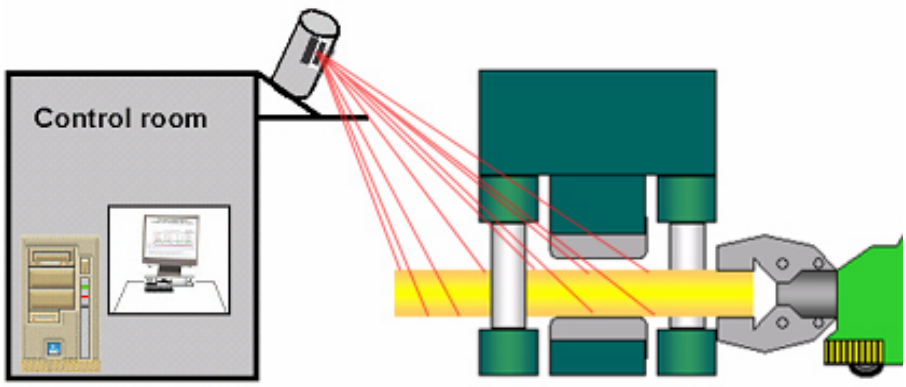
Measuring System

The LaCam® Forge measuring system is a new and innovative measuring system for Open Die Forging shops. It uses a three-dimensional eye-safe Laser Scanning System especially designed for hot surfaces and steel mill surrounding conditions. The distance measurement is based on a time-of-flight measurement using a pulsed semiconductor laser deflected in two directions. The heat radiation is measured and provides the possibility to measure the surface temperature distribution of the workpiece.

Setup

The Scanner Head (30cm height) is protected by a cooled housing that includes a movable protection cover. It can be mounted close to the forging dies in order to achieve an optimum view of the ingot.





Applications

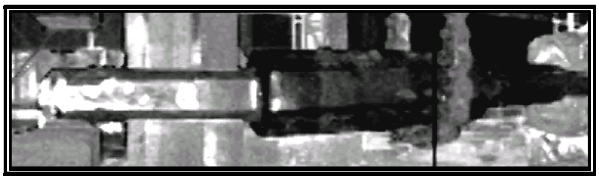
Before forging

- Surface Temperature Distribution
- Marking of separation lines on the ingot, e.g. for generator shafts with sections of different diameters

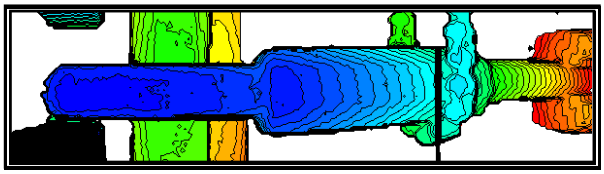
During forging

- Laser-based length measurement after each cogging pass without process interruption
- Process visualization software displaying consolidation zones of all previous strokes respective passes
- Bite shift optimization by operator-guided homogenization of setup point distribution

Reflection Image



Distance Image

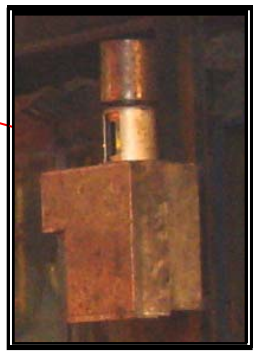


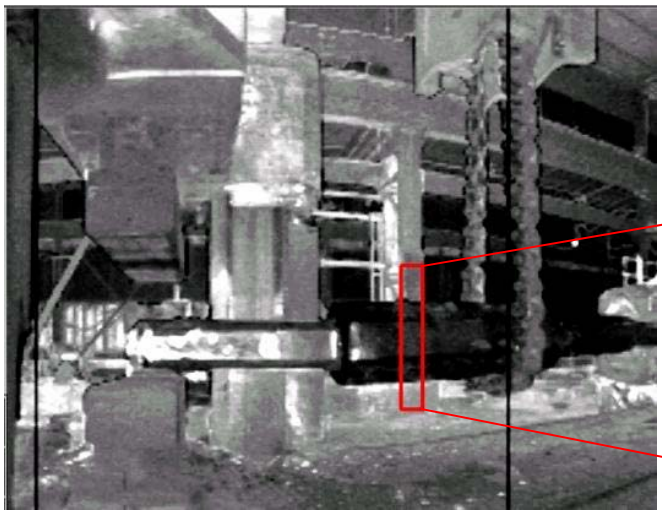
After forging

- Final dimension control
- Straightness measurement
- Tracking of process data for Quality Management

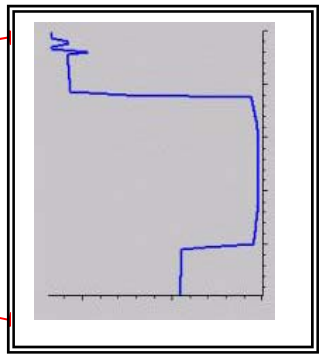
Final Dimension Control

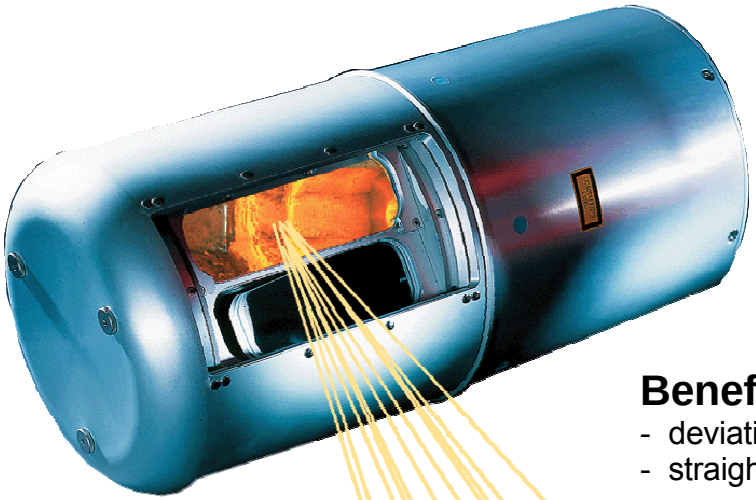
Workpiece with LaCam® system head in the background





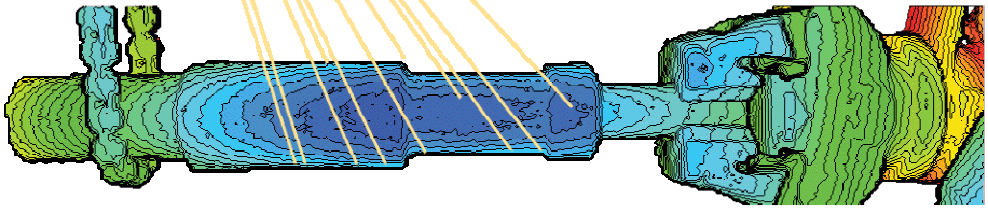
LaCam® system scan of generator shaft applying 3D-image processing



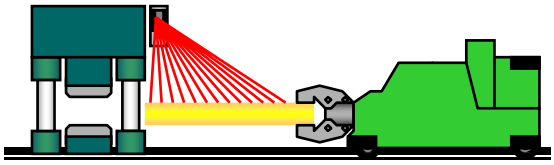


Benefits of shaft measurement

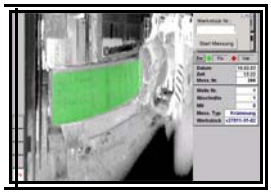
- deviation of co-axiality
- straightness and diameter measurement



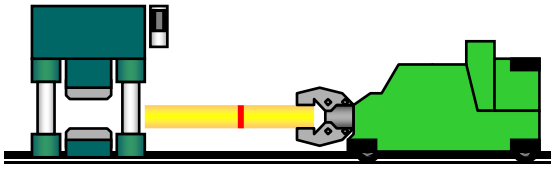
Straightness Measurement

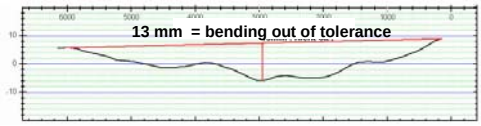


1) Measurement of workpiece after forging

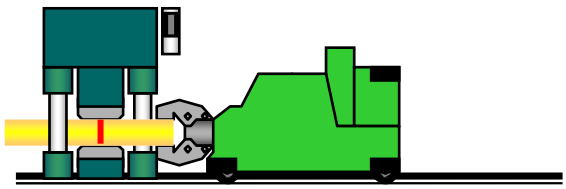


2) LaCam® automatically identifies the workpiece

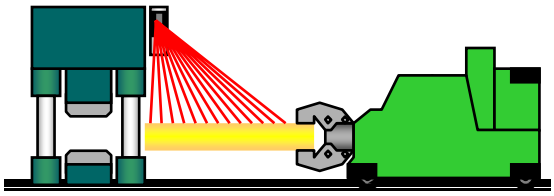




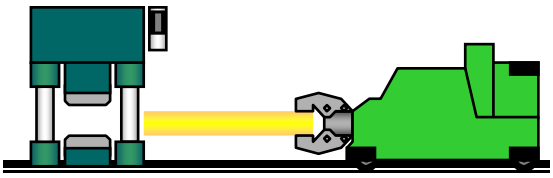
3) Flatness out of tolerance detected and corrective action proposed

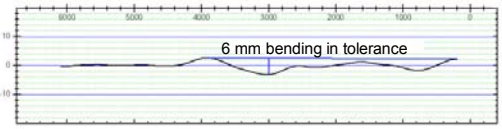


4) Corrective action carried out



5) Measurement of workpiece after corrective action



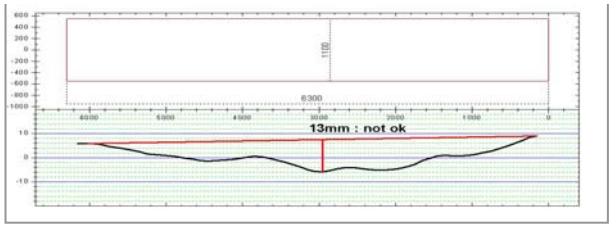


6) Flatness within tolerance→ready for next process step

FINAL STRAIGHTNESS REPORT

Steelplant : Buderus
Meas. Type Bending
Workpiece: XXX
No. of Sections: 1
Date: 1 0/02/03
Time: 14:09
Meas. No. 267

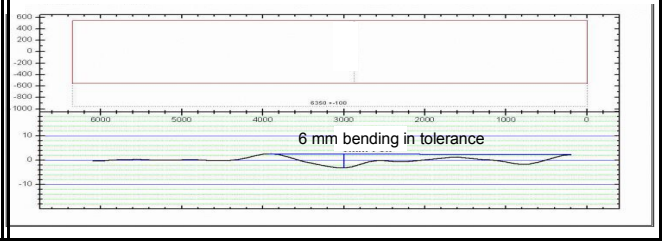
Workpiece Geometry:
Length: 6300 mm
Width: 1100 mm
Bending: 13 mm (tolerance: 10 mm)
Direction: Rolling Mill
at Position: 2950 mm



Bending out of tolerance

Steelplant : Buderus
Meas. Type Bending
Workpiece: XXX
No. of Sections: 1
Date: 0/02/03
Time: 14:16
Meas. No. 268

Workpiece Geometry:
Length: 6300 mm
Width: 1100 mm
Bending: 6 mm (tolerance: 10 mm)
Direction: Rolling Mill
at Position: 3000 mm

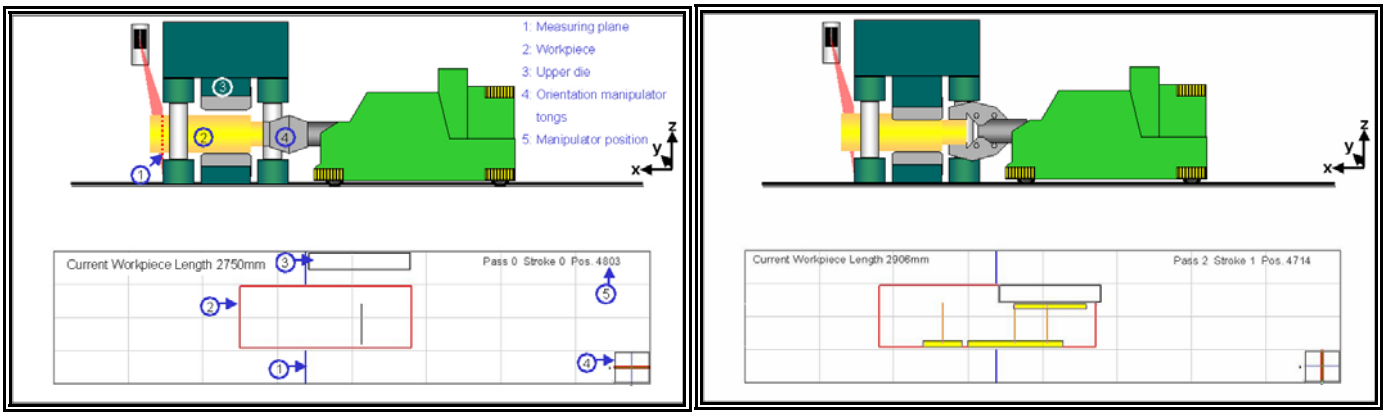


Same workpiece after machining based on LaCam® system evaluation results

Benefits of straightness control

- Reduction in straightening procedure for flat and round pieces
- Less bending rejects after reheat cycle due to optimized straightening during the forging operation
- No cool down time, no manual measurement, no reheating, no extra transport

Process visualization and bite shift optimization



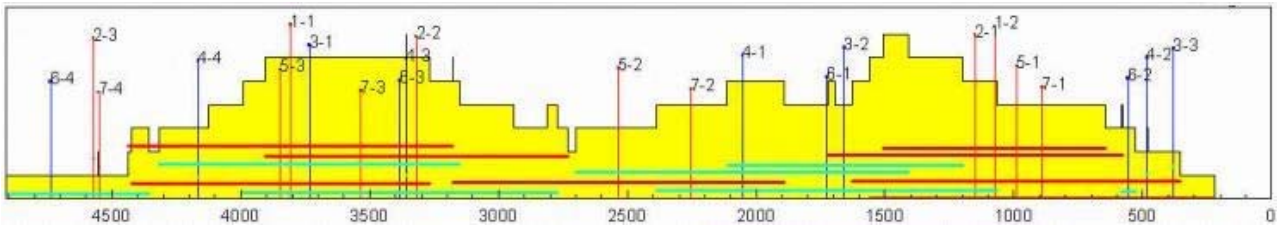
Online –Process visualisation

Length measurement by LaCam® system in Line-Scanning mode

Showing current consolidation zones, potential width and position of the oncoming stroke

Final Report

Displaying distribution of stroke positions and consolidation zones along the workpiece



Benefits of Online measurement

- Avoiding holes by controlled bite shift operation

Overall savings in:
- Production time
- Energy
- Forge capacity
- Furnace capacity (less reheating necessary)
- Raw materials

EN ISO 9001 - 2008
DNV
Certified Company

Minerals Technologies International, 640 North, 13th Street, EastonPA 18042, USA,
Phone: +001-610-2503022, Fax: +001-610-2503168

MINTEQ International GmbH, **FERROTRON** DIVISION,
D-47228 Duisburg, Dr.-Alfred-Herrhausen-Allee 24, Germany
Tel./Fax: +49-2065-4236-500 / +49-2065-4236-501, e-mail:ferrotron@minteq.com, www.ferrotron.com

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