APPLICATION NOTE

Process control by non-contact temperature measurements in forging applications

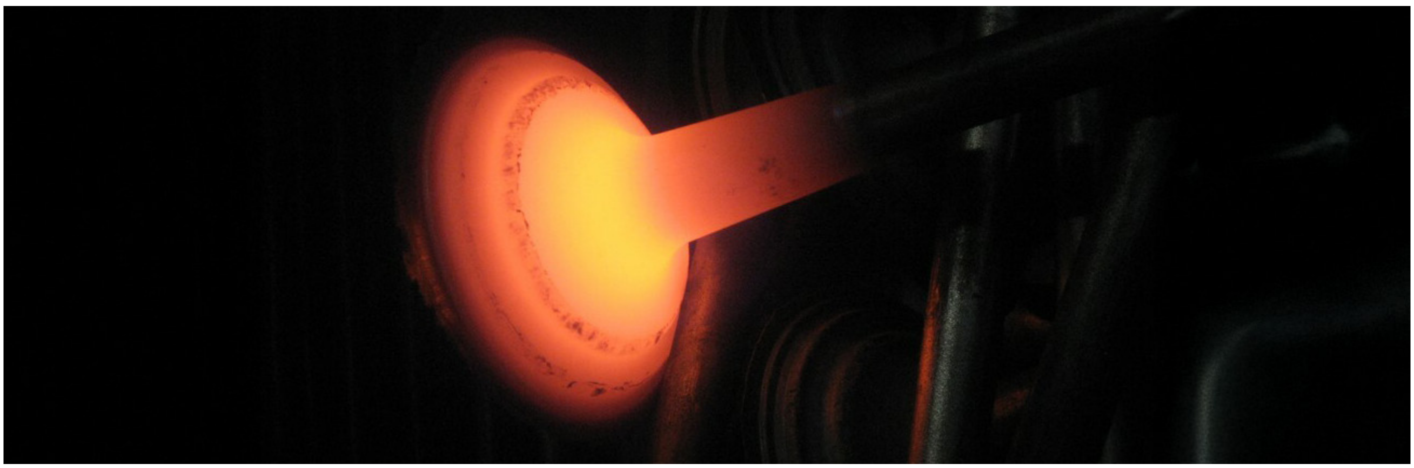
There are two main forging processes used in industry: drop forging and press forging. Accurate temperature monitoring is vital in both scenarios. In this guide, we take a closer look at the processes, the challenges, and how non-contact temperature measurement solutions can improve production quality, efficiency and process control.

See degrees differently.

DROP FORGING

Drop forging uses a forging hammer to produce parts, tools and fittings at high and very high volumes. Before hammering, parts are heated in a gas-fired furnace or an induction furnace. Once hot, each part is quickly counted, its temperature measured with a pyrometer, and the data is documented. Any parts outside of the desired temperature range are usually redirected to a separate container.

Fast, reliable temperature measurement is vital in defining the number of good and bad parts. Getting this data wrong can lead to unnecessary scrappage costs from wasted raw materials, and increased production waste from reworks and energy inefficiencies. Plus, higher tooling costs due to premature die wear.



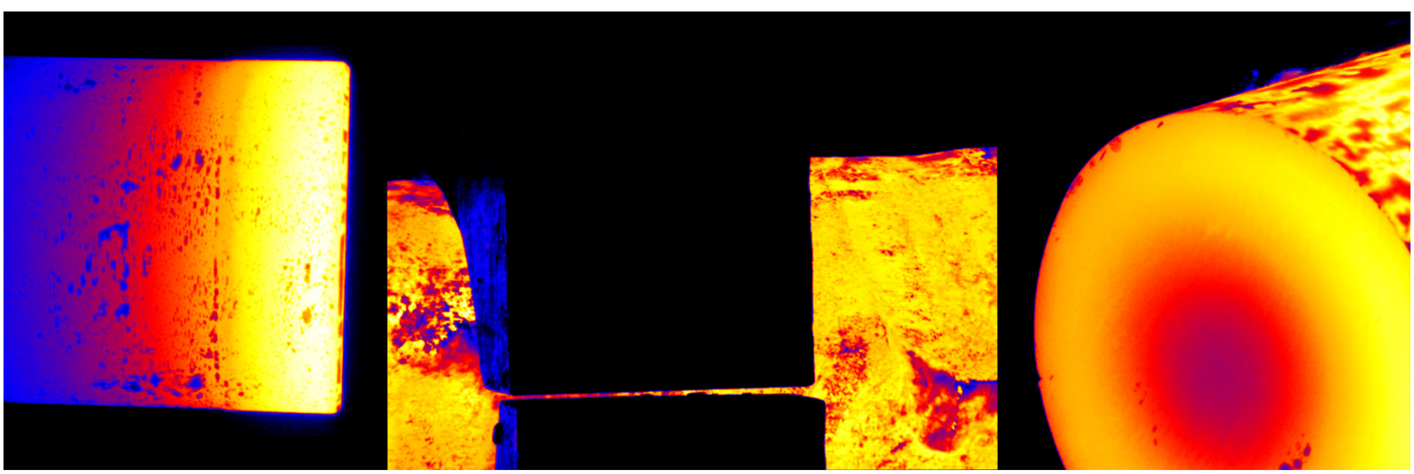
PRESS FORGING

Large parts, such as rolls or shafts, are created in press forging processes. During this process, these parts get heated up to the forging temperature several time. To prevent structural or press damage, materials must be kept within a specific temperature window. This requires constant monitoring with a SPOT+ pyrometer, scanner or thermal imager to detect hot and cool areas. If the parts become too cool, they need to be returned to be reheated – driving up costs, reducing productivity and preventing damage to the part and tools.

SOLUTIONS FOCUS

SPOT+ PYROMETERS

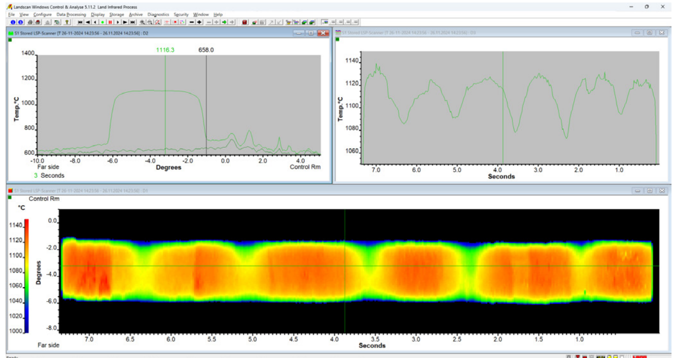
Maximise drop forging efficiency with SPOT+ Pyrometers. This cost-effective range provides rapid, precise temperature measurement of small or/and fast moving parts at the furnace exit or forging press input. So you can ensure your semi-finished parts are at the optimal temperature for perfect forging every time.

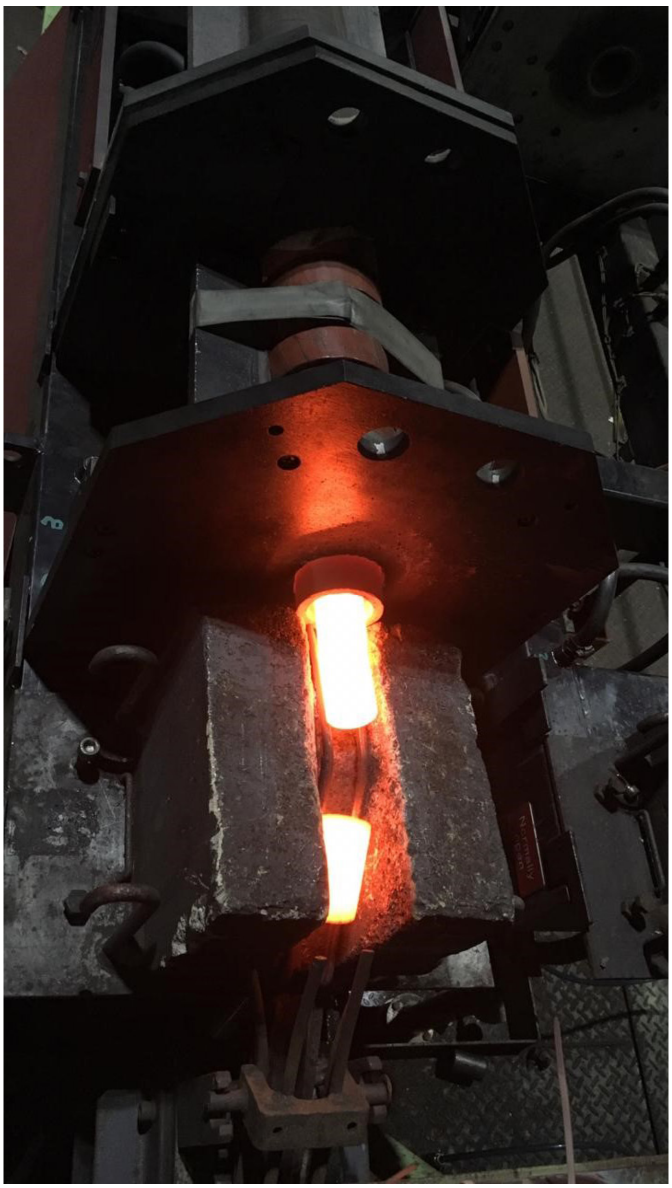


SOLUTIONS FOCUS

LSP-HD LINESCANNERS

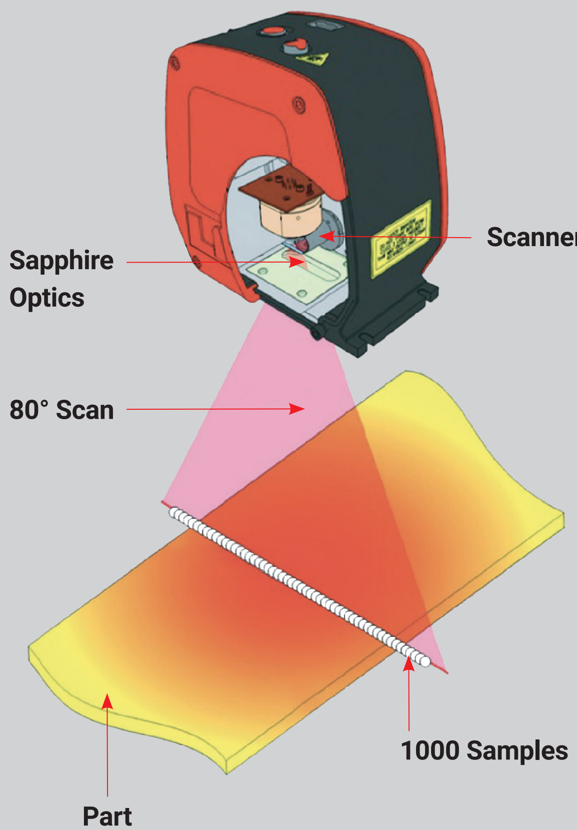
Prevent costly defects and achieve consistent results with the LSP-HD range. Delivering homogeneous temperature profiles and full thermal images of moving parts, these scanners enhance efficiency by automatically mapping up to 14 measuring zones per part. They can also track part width and position for complete process oversight.





LSP-HD Linescanner

Temperature profile of the LSP-HD scanner detects the part's hot-spot along the scan line with up to 150 Hz.



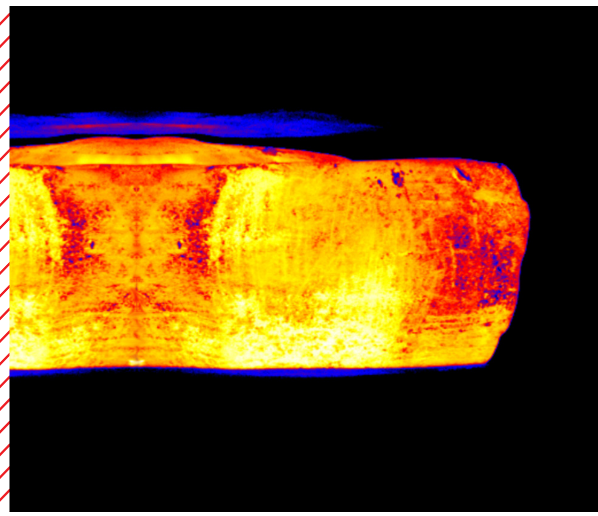
SOLUTIONS FOCUS

NIR-2K AND MWIR-640 THERMAL IMAGERS

Achieve comprehensive process control and superior quality with NIR-2K and MWIR-640 thermal imagers. Unlike single-point pyrometers, they continuously monitor the entire part and process, including critical hot and cold zones that could otherwise be missed.

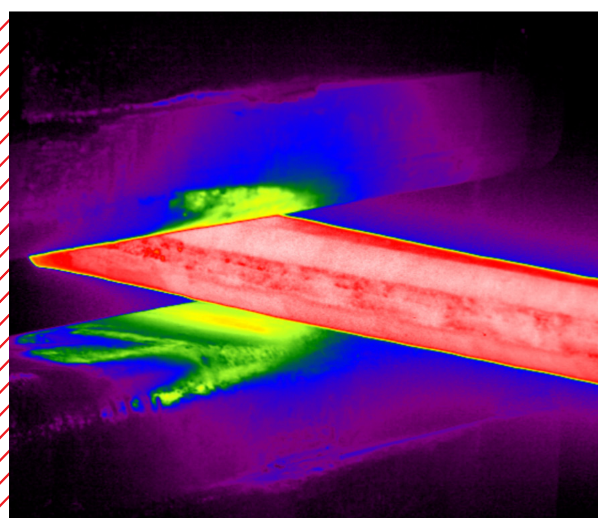
You can also experience effortless process control with 24/7 remote viewing of your production and temperature data. The NIR-2K (3 million pixels) offers a temperature range of 600 to 1800°C/ 1112 to 3272°F, while the MWIR-640 (>300,000 pixels) covers 500 to 1800°C/932 to 3271°F, both fully radiometric calibrated for precision. These solutions support a wide range of applications, including heat treatment, forging, and forming.

NIR-2K



NIR-2K IN PRESS FORGING

MWIR-640



MWIR-640 IN PRESS FORGING

TEMPERATURE MEASUREMENT SOLUTIONS IN FORGING APPLICATIONS

DEVICE	MEASURING PRINCIPLE	USAGE	BENEFITS
SPOT+ Pyrometers	Fast point temperature measurement, combined with time-based temperature peak picking to detect each part temperature separate and to eliminate possible influences eg. by scale.	Usually/traditionally used in drop forging applications at the furnace exit, at the part slider (enabling ejecting bad parts) or at the forging press. In all of those applications the part is moved past the pyrometer spot.	• Cost effective solution • Preferred for small and fast moving parts • ON-board I/O for ejecting bad parts • Autonomous operation • Remote access
LSP-HD Linescanners	Fast temperature-profile measurement at a very high homogeneity, detecting a full thermal profile per part automatically.	Usually used for bigger semi-finished parts exiting the furnace. Providing a thermal profile or a thermal map with moving parts in up to 14 different zones across the temperature profile of the part to be able to infer to heating zones or furnace variances.	• Provides a high-homogeneity temperature profile across the whole part at up to 150 lines per second (150 Hz) • With moving products (semi-finished parts), per part a complete thermal map is monitored and captures • The scan line can be divided in up to 14 free configurable measuring zones • Autonomous operation or software/database based operation possible • ibaPDA compatible
THERMAL IMAGING	Full Radiometric temperature measurement in a thermal image, continuously monitoring the full part in progress, eg. in press forging applications.	Widely used and recommended for press forging applications, particularly where larger components such as rolls or bars are forged for further processing. The system provides full-image analysis to continuously and safely detect hot spots on moving parts during the forging process, enabling precise temperature control. Even heavily scaled surfaces can be reliably measured, ensuring accurate and safe hot-spot detection.	• Continuous full image view to the forging process • Enabling remote process monitoring an control • Detecting variable hot spots on the forged parts and controlling the process (usually hotter material come to the outside while forging, while the surface continuously builds up scale) • Parts of different sizes can be measured without aligning the camera • Autonomous operation • ibaPDA integration (in 2025)

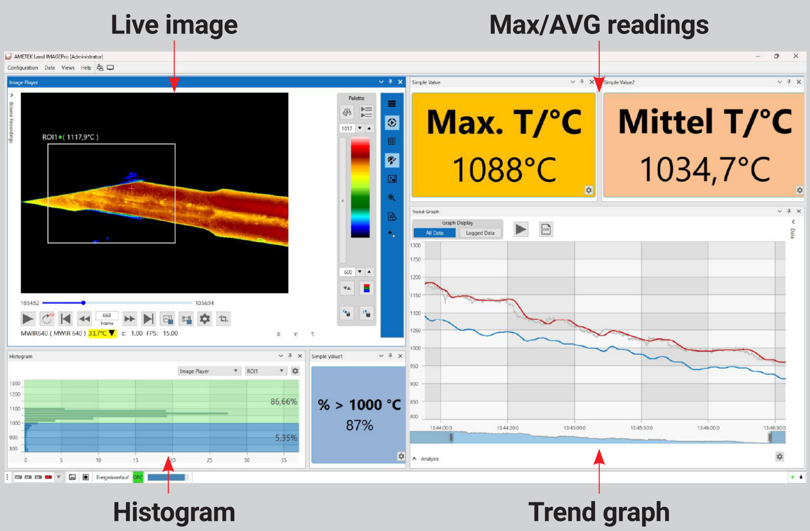
FORGE SMARTER, NOT HARDER

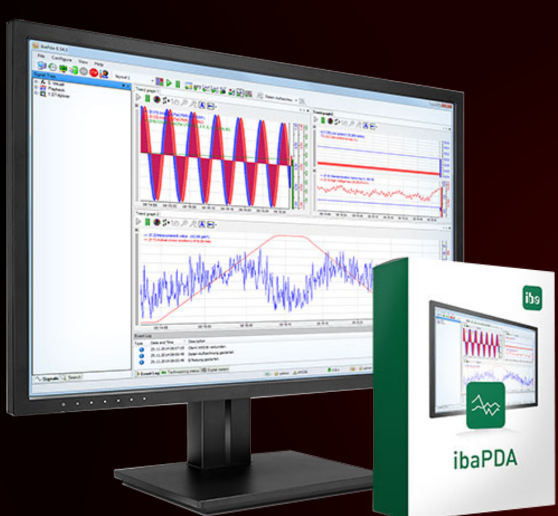
Gain real-time, actionable insights or completely automate your forging process with the MWIR-640 or NIR-2K. This thermal imager has an integrated web server and three on-board I/Os for f temperature, camera and alarming outputs. Easily configure and monitor your system from any standard web browser on your network.

You can also enhance all LAND imagers, including the NIR-2K, with ImagePro thermal imaging software. This includes advanced process monitoring, precise temperature measurement, comprehensive alarming, thorough documentation, and broad digital and analogue connectivity.

ImagePro thermal imaging software

Configureable UI of the ImagePro image processing software (example)





Maximise data insights with ibaPDA integration

ibaPDA (Process Data Acquisition) interfaces with all LAND measurement solutions for seamless compatibility with your existing iba databases. This comprehensive, cutting-edge software provides broad connectivity to acquire and record all types of critical process data across your entire plant.

FIND OUT MORE ABOUT IBAPDA'S CAPABILITIES:
www.iba-ag.com/en/ibapda

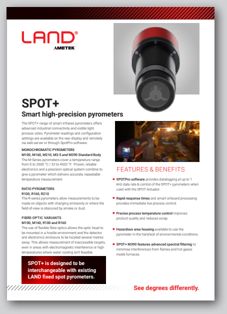
Non-contact temperature monitoring for forging applications

AMECARE®
PERFORMANCE SERVICES

Our global service centres provide after-sales services to ensure you get the best performance from your system. This includes technical support, certification, calibration, commissioning, repairs, servicing, preventative maintenance and training. Our highly trained technicians/engineers can also attend your site to cover planned maintenance schedules and repair emergency breakdowns.

ADVANCED TEMPERATURE MEASUREMENTS

SPOT+


LAND
SPOT+
Smart high-precision pyrometers
FEATURES & BENEFITS
See degrees differently.

FAST SPOT TEMPERATURE MEASUREMENT

Get high precision, advanced IIoT connectivity and visible light process video with the SPOT+ family.

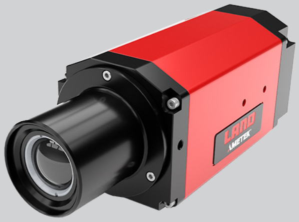
CYCLOPS


LAND
Cyclops 055L
Portable industrial pyrometer
FEATURES & BENEFITS
See degrees differently.

PORTABLE TEMPERATURE MEASUREMENT

Easily take measurements in multiple locations and verify on-line readings with this portable pyrometer.

MWIR-640

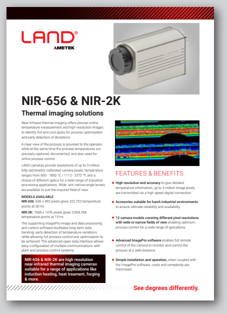



LAND
MWIR-640 390
Thermal imaging solutions
FEATURES & BENEFITS
See degrees differently.

SMART THERMAL IMAGING

Get full temperature measurement with a choice of different optics and lenses with this smart mid-wavelength thermal imager.

NIR-2K


LAND
NIR-656 & NIR-2K
Thermal imaging solutions
FEATURES & BENEFITS
See degrees differently.

HIGH RESOLUTION THERMAL IMAGING

Capture accurate thermal imaging up to 3 million measurement with this integrated solution.

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We are fully committed to Quality Assurance. See all our accreditations at **AMETEK-LAND.COM/QUALITY**

MARCOMS_DOC-00297 PROCESS CONTROL FORGING APPLICATION NOTE REV 2 EN.