LumaSense offers a broad selection of solutions for metal processing, including:

- High-resolution thermal imagers
- Ultra-precise single point pyrometers
- Single color and ratio pyrometers
- 2-wire pyrometers
- Temperature switches

- Developed specifically for high-temperature applications in the steel and primary metals industries
- Proven reliability in severe production environments
LumaSense Technologies’ Steel Industry Solutions

IMPROVE YOUR PROCESSES WITH BETTER MEASUREMENTS

Today’s increasing quality standards and higher energy costs demand more accurate and consistent temperature control in the steel making process.

With more than 50 years experience in temperature measurement, LumaSense Technologies is an industry leader in process monitoring for all areas of steel manufacturing. Our MIKRON thermal imagers and IMPAC pyrometers provide the steel industry with cutting-edge technology, ease-of-use, and dependability for monitoring critical parameters for productivity and product quality. These solutions are used throughout the steel manufacturing process, where accurate temperature monitoring is required for improved control.

**Optimize Energy Consumption and Output**

Steel manufacturing consists of high temperature manufacturing steps that use significant amounts of energy. Processes such as coke oven heating, continuous casting, furnace reheating, hot rolling, forging, sintering, and annealing are becoming more and more expensive. With energy prices at all time highs, the cost of doing business has significantly increased. Steel facilities need the right tools to ensure they optimize energy usage across their facilities. LumaSense addresses these needs by providing the most accurate measurements in the industry, enabling steel facilities to maximize their output. Without this level of accuracy, operators are forced to reheat more often than necessary, wasting valuable time, money and energy.

WE KNOW STEEL APPLICATIONS...

COKE OVENS, WHARFS, AND RAW MATERIALS TRANSPORT

Coke is the most important raw material for the blast furnace in terms of operation and hot metal quality. Accurate temperature monitoring ensures that the raw materials have achieved the right characteristics. Detection of hot spots during the rail car transport or wharf quenching can reduce safety risks and prevent damage to equipment, such as conveyor belts.

**Key Benefits**

Our IMPAC IGA 315-K and IS 8 pro portable pyrometers offers extremely accurate temperature measurements in coke ovens prior to push. The focusable optics and compact design provide easy operation and data capture during the measurement process.

The MIKRON MC320 Series is used to automatically monitor rail cars, cooling wharfs, and edge-to-edge on a transfer belt to detect true hot spots. LumaSense’s software and related I/O systems allow for automated process monitoring to reduce equipment downtime.

**Key Products for this Application**

- Pyrometers: IS 8 pro, IGA 315-K
- Thermal Imagers: MC320 Series
**STOVE DOME, BLAST FURNACE**

Temperature measurement and control are required for maintaining correct operation of the blast furnace. Stove domes contain the gases used to heat the blast furnaces and also house the waste gases.

These gases can reach temperatures up to 2600 °C and are extremely volatile. Historically, manufacturers have used expensive thermocouples to measure the air and refractory wall temperature, but thermocouples degrade and fail frequently under the harsh conditions.

**Key Benefits**

LumaSense’s cooled and purged instrument enclosures provide the highest level of protection in the industry. In comparison to thermocouples, LumaSense’s thermal imagers and pyrometers will last longer and provide reliable and accurate measurements. These solutions are made specifically to withstand the extremely harsh environments found in the steel industry.

For refractory or wall measurement, the MIKRON MC320 Series’s accuracy and 76,800 points of measurement allow operators to detect the smallest refractory breaks before they cause costly downtime. LumaSense’s BoilerSpection™ system solution can be used for through-flame temperature measurements.

**Key Products for this Application**

- Pyrometers: IS 6 Advanced, IGA 6 Advanced, ISR 6 Advanced, IS 8 pro, etc.
- Thermal Imagers: BoilerSpection, MC320 Series, MCS640

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**LADLES & TORPEDO CARS**

Routine inspection of metal components such as ladles, torpedo cars and other refractory equipment is required to maintain the integrity of these components and prevent serious accidents. Engineers need tools to monitor what’s happening within these vessels.

Ladle pre-heating is used to keep the refractory brick from cracking when the hot molten steel is poured into a ladle. Pre-heating also prevents the molten metal from hardening when it hits a cooler area of the refractory. This process can take up to 22 hours to complete.

**Key Benefits**

LumaSense offers a 3.9 µm spectral response pyrometer that can be mounted on top of the pre-heat ladle lid to view through the flame and down to the bottom of the refractory for accurate temperature measurement. This is a much more accurate and reliable solution relative to expensive thermocouples that chronically burn out. A more accurate and responsive temperature measurement can reduce ladle pre-heat time and reduce cost.

Consistent monitoring of the exterior of a steel ladle with the MIKRON MC320 Series thermal imaging system enables the operator to quickly determine if the ladle’s refractory needs to be replaced. The engineer is therefore able to predict when a ladle can be reused or should be replaced, which can save thousands of dollars to rebrick the ladle. Finding hot spots also reduces the possibility of molten metal breaking through a torpedo car, which could damage surrounding equipment and lead to loss in production and affect worker safety.

**Key Products for this Application**

- Pyrometer: IPE 140/39
- Thermal Imagers: MC320 Series, MCS640
SLAG DETECTION & POURING STREAM MEASUREMENTS

When liquid steel is tapped from a basic oxygen (BOF) or electric arc (EAF) furnace, it is advantageous to minimize the quantity of slag carried over into the ladle. Measuring the pouring stream average temperature during the pour can be a challenge with the presence of slag and oxidation.

Previously this has been done by visual observation of the tapping stream or by the use of electromagnetic induction coils mounted onto the furnace. However, neither of these methods has proven to be entirely reliable.

Key Benefits

LumaSense Technologies supplies complete systems designed specifically for this application. Our MIKRON thermal imagers provide a controlled field of view, aimed at a specific region of the pour as it exits the furnace. Our pyrometer solutions can monitor the pouring steam under varying widths and determine the average and maximum temperatures.

The highly precise detectors in our process thermal imaging cameras and pyrometers detect the variances in the signature radiance of the molten pour. When the signature percentage reaches a preset limit the pour can be terminated. By limiting the pour precisely, a minimum amount of slag is introduced. The length of the pour is also maximized allowing for more workable product for a given amount of energy.

Key Products for this Application
- Pyrometers: ISR 12-LO/GS, IS 8-GS pro
- Thermal Imagers: MC320 Series, MCS640

CONTINUOUS CASTING

Continuous casting is the process where the molten steel is cooled and solidified into billets or slabs. The core is still usually molten with a hard outer shell. Molten metal is transferred from the ladle into a tundish, where it is slowly tapped into the casting machine. The mold in which the steel slips into is water cooled. The operator’s challenge is to keep the steel within the channel and control the cooling rate. This can be difficult due to variations in the tundish temperature.

Key Benefits

Our infrared thermometers accurately measure cooling requirements of slabs, billets, or blooms to ensure product uniformity and provide equipment operators with immediate temperature information that is critical to the cooling process.

IMPAC pyrometers and MIKRON thermal imagers monitor the temperature as the molten metal pours down the mold. LumaSense offers very specific pyrometers and accessories to address the harsh environment surrounding in the casting area. This includes steam, high temperatures, and harsh water spray. The pyrometers and imagers need to stay clean and cool in this area. The temperature readings help the operators control the speed of the process and the amount of cooling sent through the mold. This helps the quality of the slab and billets.

The MIKRON MCS640, with its accurate hot-edge detection imaging and temperature profiling capabilities, can control continuous casting processes better than any other imaging method.

Key Products for this Application
- Pyrometers: ISR 12-LO, ISQ 5-LO, IS 50/055-LO plus, IS 8 pro
- Thermal Imagers: MCS640
Infrared sensors measure strip and sheet temperature so that rolling mill stands can be efficiently set to match the steel’s temperature. Sensors can be used to detect the presence of hot metal and accurately time the roll stand operation.

Pyrometers can be used to measure the roll temperature as water cools the roll during the quenching process. Steam is an issue with this application, requiring special spectral responses to accurately measure system temperature.

**Key Benefits**

The MIKRON thermal imagers and IMPAC pyrometers are ideal solutions to ensure uniform temperature and keep the slab within its working temperature range. They can selectively control the quench zones so that only the higher temperature part of the slab is quenched to the maximum extent allowed, resulting in greater working time. Ratio pyrometers help to minimize the effect of steam interference.

When cutting steel slabs, there is a flow of slag which may solidify as burrs on the underside of the slab. The removal of these burrs is critical and the deburring system may occasionally slip over the burrs which are sometimes extremely flat. Current visible systems have not been proven reliable for residual burr detection.

**Key Benefits**

The use of the MIKRON MC320 Series thermal imaging system ensures residual burr detection after the slab-cutting process. It allows users to accurately detect temperature differences between slab and burrs through the use of 76,800-pixel high-resolution cameras.

In addition, this solution allows for camera installations that are highly configurable in harsh industrial environments. It also ensures continuous high quality to assist in avoiding costly customer complaints.

**Key Products for this Application**

- Pyrometers: IS 8 pro, ISR 12-LO, ISR 320 ISR 6 Advanced, IS 12, etc.
- Thermal Imagers: MC320 Series

**Key Products for this Application**

- Thermal Imagers: MC320 Series

Users can also transfer data to a higher level control unit for removal of bad slabs from the process (using digital or analog output modules and TCP/IP protocols).
Annealing is a controlled heating and then cooling process that changes the metal’s characteristics. It is often a relatively slow process requiring significant energy. Inaccurate temperature measurement, non-uniform ovens, or poorly sealed furnaces lead to added costs and reduced quality.

**Key Benefits**

MIKRON thermal imagers and IMPAC spot pyrometers can be used to accurately monitor both product temperature and furnace temperature. Thermal imagers and multiple spot pyrometers are used to control uniformity inside furnaces with zone control. Use MIKRON thermal imagers to investigate door seals and external insulation to find leaks and other sources of heat loss which negatively impact energy usage. The MIKRON thermal imagers combine unparalleled accuracy and ease-of-use.

**Key Products for this Application**

- Pyrometers: ISR 12-LO, ISQ 5-LO, IS 50/055-LO plus, IS 8 pro, IS 6 Advanced, etc
- Thermal Imagers: MCS640, MCS320

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**MIKRON Process Imaging**

**MCS640 (640 x 480)**

The MIKRON MCS640 is a short wavelength infrared (SWIR) thermal imager with digital signal processing. This imager is designed to accurately measure temperatures between 600 and 3000 °C, with minimal interference from temperature reflections on the object. Excellent spacial and temperature resolution will provide outstanding images, allowing users to gain new insight into their processes.

**MC320 Series (320 x 240)**

The MC320 Series is a cost-effective, high performance non-contact infrared imager that serves a broad range of process monitoring applications. The unique design produces superior images and temperature measurement (±2 °C) for both long and mid-wave applications.

**Enclosures, Accessories and Software**

Our advanced enclosures are specifically designed to protect the instruments in harsh, high temperature steel environments. The enclosures allow for remote monitoring of temperatures in real time, and for image data to be transferred from one or more cameras to a single PC. The units are insulated and cooled to protect the temperature measurement device and to maximize efficiency, while ensuring safe continuous operation. Our LumaSpec™ software programs offer high-speed real-time data acquisition and leads the industry for image analysis capabilities.

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**Service and Support**

The mission of the LumaSense services organization is to deliver consistent world-class customer support so you can focus on your business. Our highly trained customer care agents, engineers, scientists, and PhDs are ready to help with:

- Technical and product support
- Order, shipment, repair, and parts
- Field services including installation and maintenance
- LumaServ™ extended warranty and maintenance agreements.
We Know Steel Applications...

**SINGLE-COLOR PYROMETERS**

With over 50 years in non-contact temperature measurement, LumaSense Technologies offers the industry’s broadest selection of pyrometers with features designed specifically for high temperature steel processing. Short wavelength (near infrared) provides higher accuracy measurements demanded for precise process control. Below are examples of single-color pyrometers available in the LumaSense portfolio.

**Series 6**
The Series 6 is a state-of-the-art series with versions available for most applications. Compatible with LumaSense’s extensive line of protective jackets and enclosures make it suitable for the harsh steel processing environment. Versions are available with through lens sighting, laser sighting, and video sighting. Measurement range: 250 °C to 3000 °C.

**Series 50**
The Series 50 pyrometers provide a very fast response time (1 ms) and an optical fiber with compact optics for easier integration into equipment. The optical head and fiber can withstand ambient temperatures up to 250 °C. Also available are versions with extremely short wavelength (0.676 or 0.55 μm) for the measurement of molten metals high emissivity. Measurement range: 250 °C to 3500 °C.

**Series 140**
The Series 140 is a high accuracy pyrometer with focusable optics, an integrated user interface, and a variety of sighting options including laser, through lens, or video. Rugged enclosures with cooling and purging are available. Measurement range: 5 °C to 3500 °C.

**Series 320**
The pyrometers of Series 320 include the IS 320 and IGA 320, which are small and very fast digital pyrometers with fixed focus and LED targeting light. The low temperature version IGA 320/23 and IGA 320/23-LO can be used for temperature measurement on metals starting at 75 °C (IGA 320/23-LO: starting at 100 °C). Measurement range: 75 °C to 1800 °C.

Ideal for applications with steam, smoke, and dust, our two-color pyrometers are also designed to not only survive but also measure accurately in dirty, hot environments. Measurements are unaffected by dust and other contaminants in the field of view or by dirty viewing windows. In addition, the temperature measurement is independent of the emissivity of the object in wide ranges, and the measuring object can be smaller than the spot size. Below are examples of two-color pyrometers available in the LumaSense portfolio.

**TWO-COLOR (RATIO) PYROMETERS**

**ISR 6 Advanced**
Two-color, laser targeting or through-lens sighting with analog or digital output, focusable optics, and external display. Measurement ranges: 600 °C to 3000 °C.

**ISQ 5-LO**
Digital, accurate two-color pyrometer with fiber optics for non-contact temperature measurement. Measurement ranges: 700 °C to 3000 °C.

**ISR 12-LO**
Digital, highly accurate two-color pyrometer with fiber optics for non-contact temperature measurement. Measurement ranges: 600 °C to 3300 °C.

**ISR 320**
Small, stationary, digital ratio pyrometer for non-contact temperature measurement. Measurement ranges: 700 °C to 1700 °C.

**PORTABLE PYROMETERS**

**Series M90 Pyrometers**
Uses cutting edge electro-optical technology to provide focusable and through-lens sighting. The circular reticule defines precisely the target spot. Measurement ranges: -50 °C to 3000 °C depending on model.

**Series 8 pro**
High temperature short wavelength pyrometer for non-contact temperature measurement on metals. Real-time data logger with integrated graphical display. Measurement ranges: 250 °C to 2500 °C.

**IGA 315-K**
Handheld pyrometers designed specifically for requirements in coke applications. Internal data logger stores 2000 measurement points. Easy-to-use optics allow focus of a small spot size. Measurement ranges: 600 °C to 1600 °C.

Harnessing the Power of Your 6th Sense

Six Simple Steps to the 6th Sense


LumaSense illuminates our customers’ core generation, materials, and manufacturing processes with an invaluable 6th Sense to help detect, reduce, and ultimately prevent inefficiencies and unnecessary waste of energy, materials, and human capital. Utilizing this 6th Sense, resource-intensive global companies can hone their competitive edge at massive scale and directly improve their bottom line.

The 6th Sense is the power of perception beyond the five senses. Some refer to it as intuition, others say it is the ability to understand the subtle cause and effect relationship behind many events. LumaSense Technologies provides the sensors and solutions that awaken this 6th Sense in customers to allow them to efficiently optimize their processes.

OUR UNIQUE 6TH SENSE METHODOLOGY

01 UNDERSTAND
We listen to understand what you need and want, then document the scope of work required.

02 ANALYZE
We review your industrial process, analyze what needs to be done, and implement our Six Factor Formula for Efficiency.

03 DESIGN
We design the optimal and most cost-efficient process for you, employing a combination of sensors and software/automation.

04 VALIDATE
We validate that our solution meets your needs and that you can actually cost-effectively use this design.

05 IMPLEMENT
We provide you with a turnkey implementation, including training.

06 SUSTAIN
We verify our solution performs as specified now and for the long term and that you are satisfied with the results.

Upon completion, LumaSense customers gain an inexorable “6th Sense” that delivers immediate gains and progressive performance.