



vision
without
limits

**FOUNDRIES & STEEL
PRODUCTION**

CANTY

PROCESS TECHNOLOGY

BUFFALO

DUBLIN

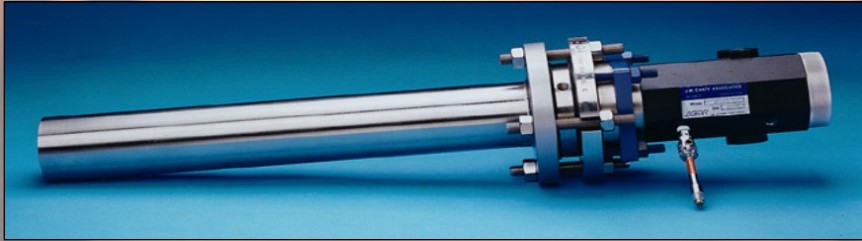
THAILAND

CANTY

High Temperature Cameras

CANTY High Temperature Cameras are ideal for demanding applications involving visual inspection or verification in extreme temperature environments. CANTY High Temperature Camera Systems feature a fused glass seal standard equipment with every model. This unique seal provides an impenetrable safety barrier to protect the camera electronics from the harsh process environment and preventing hazardous vapors from escaping into your plant.

UltraTemp™ Insertion High Temperature Cameras

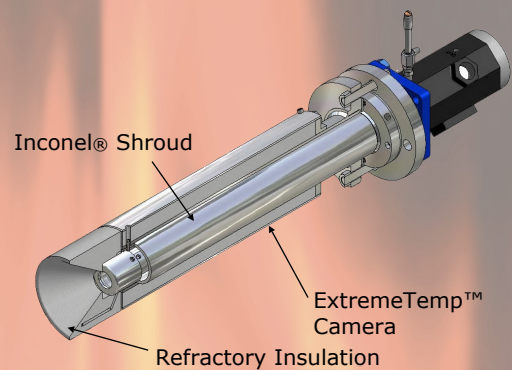


- Air is used for cleaning
- Can purge with any gas
- 2000°F [1090°C] or 2500°F [1370°C] models
- High temperature furnace package
- 12"-36" models available to insert thru refractory wall
- High quality quartz optics
- Disposable, protective quartz shield
- Auto electronic iris
- Non-blooming CCD camera
- CCD temperature readout to prevent overheating

ExtremeTemp™ Furnace Cameras

Designed for the extreme 3000°F [1650°C] maximum temperature requirements of furnaces, the ExtremeTemp™ Furnace Camera combines the a CANTY UltraTemp™ Camera with an Inconel® sleeved high temperature refractory jacket. The assembly is inserted thru an opening in the fire brick, providing a remote view into the furnace.

- 3000°F [1650°C] max. rating - ExtremeTemp™ furnace lens
- High quality quartz optics
- Auto electronic iris
- Disposable, protective quartz shield
- Non-blooming CCD or Ethernet cameras
- Cooling air required



UltraTemp™ Flush Mount High Temperature Cameras

- Ideal for applications where combined refractory and nozzle length are <4" [102mm]
- 2000°F [1090°C] process temperature / 1300°F [700°C] at lens
- 3" 150# ANSI or 80 mm 16 bar DIN flange mounting options
- Includes protective quartz shield and spray ring assembly
- Heartbeat available

HighTemp™ Surveillance Cameras

- View and measure level, width
- Optional mounting stands available
- High accuracy
- Remotely mounted - direct line of sight
- Ambient temperatures to 200° F
- Ethernet connectivity
- Includes high temperature insulation, glare filters
- Optional mounting stands available



Water Cooled Camera Jacket

- Ideal for applications where instrument air is unavailable
- Effectively cools camera housing and acts as an insulatory barrier against ambient heat
- Highly efficient and minimizes cooling costs



CANTY ThermalVision™ System Applications

CANTY provides continuous temperature measurement by using multiband wavelength imaging pyrometry. With the advancement of CCD technology, multiband measurement has several advantages over 2 color (2 wavelength) pyrometers:

- Product temperature measurement is integrated over a broader range of wavelengths, which minimizes variance in emissivity.
- VIS (Visible spectrum) between .4 - .7 micron allows a wide range of materials to be measured without recalibration or adjustment to emissivity.

With the use of VIS, NIR and IR wavelengths, the proper ThermalVision™ camera can be selected to provide the most accurate temperature measurement range available. CantyVision™ software provides a SMART temperature measurement in addition to molten level tracking, object position and temperature measurement specific to an object or process.

Calibration is performed to ASTM standard, providing for accuracy and repeatability of +/- 1°C.



Actual VIS ThermalVision™ Camera measuring rod
Temperatures 750°F [400°C] - 2865°F [1575°C]

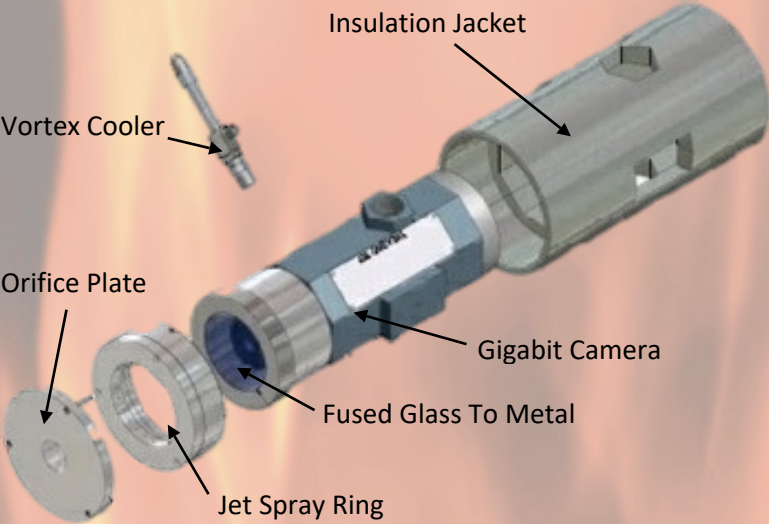
Spectrum	Temperature Range
VIS	750°F [400°C] - 3630°F [2000°C]
NIR	570°F [300°C] - 1830°F [1000°C]
IR	32°F [0°C] - 750°F [400°C]

*For reference only

The HighTemp™ surveillance camera used for these applications features fused glass barrier with a water or air cooled jacket for protection of the electronics.

A positive gas (air/nitrogen) flow over the lens through the cameras spray tube ensures the view remains clear at all times, while this is not always needed for every application it is recommended to keep the lens clean in these environments.

The high resolution Gigabit Ethernet camera captures the images from the process, and transmits them in the real time to the control room where the Vector Control Module analyzes the image to detect stones and digitally outputs alarms.

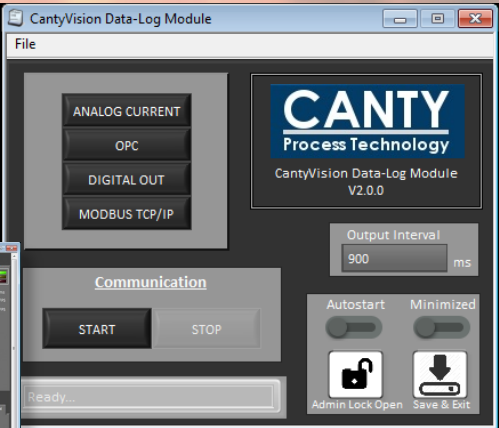
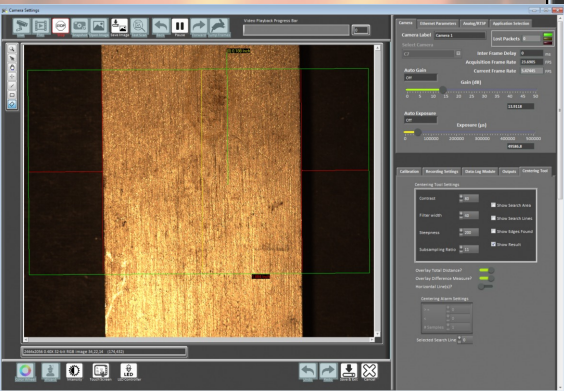


Vector Control Module



The Vector Control Module (VCM) is a small fanless solid state embedded processor that has CANTYVISION™ software pre-installed. It is designed to keep project costs low and to also eliminate the need for a computer. Since the VCM has analog outputs, there is no need for an additional analog output module purchase*. The operator screen makes it simple for operators to see what is going on real time with visual verification.

The VCM has OPC or 4-20mA outputs to a PLC or DCS for complete control. The VCM comes with the ability to have full administration controlled passwords and permissions. This compact design and cost effective system is easily setup and has a customizable screen. Access to technical support can be obtained with Internet connection.



- Supports up to six cameras
- OPC outputs
- Up to eight analog 4-20mA outputs
- Link to technical support (when Internet connected)
- Digital IO
- Four USB Ports
- Four serial ports
- CantyVision™ Software installed
- Full administrative control embedded operating system
- Fan-less solid state vision control system

Molten Level & Slag Measurement

The CANTY Molten Level system consists of a high temperature surveillance camera, mounted to view the surface of the molten glass through an opening in the wall or in the furnace wall. On the wall directly opposite the camera, an interface between the molten metal and the wall is monitored and analysed. This interface is directly related to the molten glass level.

CantyVision™ software is configured to track the position of this reflection with **accuracy to 0.001" (0.025mm)**. A cross-hair is displayed on the operator screen image at all times, to allow the user to visually verify what point is being tracked by the software. Control outputs are available to the DCS via OPC, 4-20mA and Modbus TCP/IP.



Using the same camera Slag can be monitored and output based on concentration. This way operators or anyone controlling the system can either skim off the slag or decide what action to take based on the current amount on the surface.

High Accuracy • **Non Contact** • **Low Maintenance** • **Visual Verification**

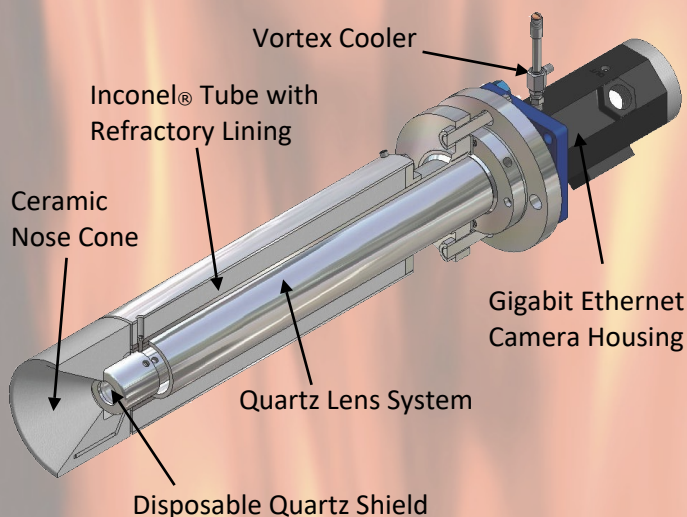
Imaging VS Dipping Probe

- Imaging provides continual read out multiple times per second. Platinum dipping is a mechanically slow reading.
- Imaging is a non contact technique so there are no issues with loss in measurement sensitivity due to coating issues.
- There is no regular maintenance / re-calibration required with an imaging system, whereas the dipping probe needs to be changed / reworked and then re-calibrated at short intervals.

Imaging vs Nuclear Level Measurement

- Imaging is an order of magnitude accuracy better than nuclear level.
- Imaging avoids the health & safety issues of nuclear.
- Imaging avoids the cost issues associated with having a nuclear source at site (perception, insurance costs, source disposal costs)
- An on-site dedicated nuclear specialist is not needed with imaging.
- With imaging you can take an instantaneous reading or time-averaged reading.

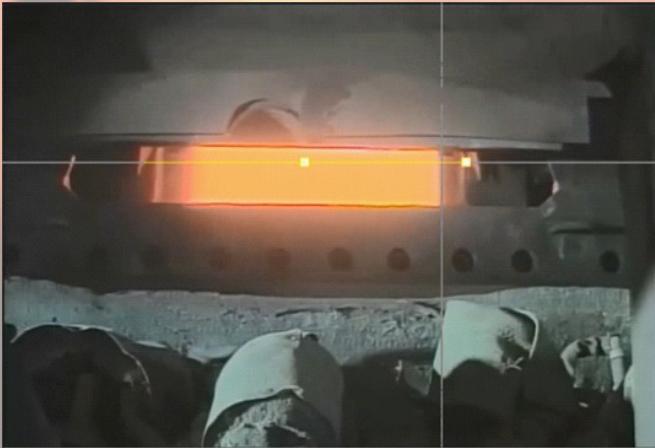
ExtremeTemp™ Camera System



Imaging vs Laser Level Measurement

- Imaging is a direct measurement with a one time zero drift calibration
- Laser based systems can be difficult to install / align / calibrate, and require regular re-calibration to function correctly.
- Total cost of ownership is reduced with imaging due to reduced maintenance and reliable long-term readings.
- Laser based instruments have a single generator and target receiver without any visual display that is given by an imaging system. A visual display aids in ease of calibration.
- Imaging systems are easy to support in the field by in-plant or local technicians.
- CANTY has hundreds of purchased systems that have been installed by plant personnel with full factory support.
- Laser instruments typically require factory field service visits.

Steel Mill



Width & Centering

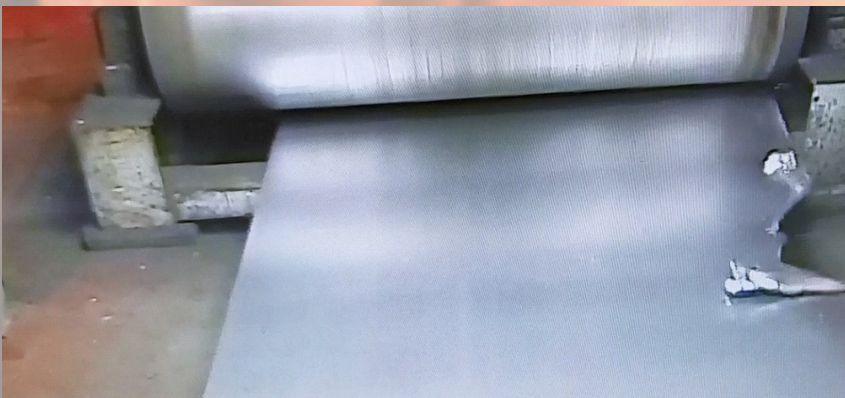
- CANTY cameras can easily detect the width of rolled or plate steel and output that directly into the control system
- CANTY cameras can tell the control system if the strip is centered or if it is biased to one side or the other.

Temperature Control

A CANTY high temperature surveillance camera is mounted to view the metal and give real time temperature control of the steel before it is cooled and rolled. In the visual range cameras don't have the problem with emissivity that IR instruments do. Also because of the patented spray ring the view is kept clear and does not get effected by dirt and dust buildup to give erroneous readings. Visual verification of the steel is provided to the operator as well as a 4-20mA or OPC output to a PLC or DCS for complete automated control.

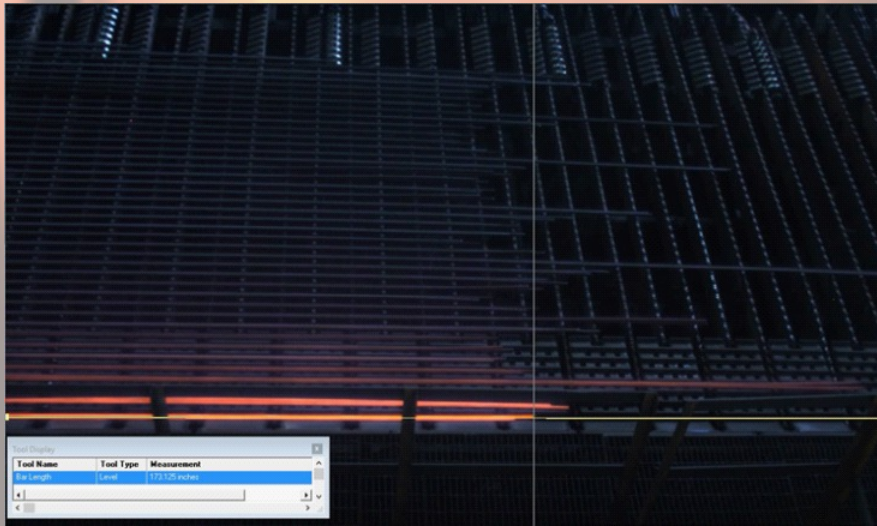


Strip Edge & Tear Control



- CANTY Cameras can detect smooth vs wavy edges. Wavy edges can cause problems downstream that can easily be prevented if the proper correction is taken in time.
- CANTY Cameras can detect tears/holes in the strip. Tears and holes can cause problems downstream, including hours of downtime. CANTY can alarm and measures can be taken to correct this issue before it is to late and an outage is required.

Long Steel



Rebar Length

- CANTY can measure Rebar length using cameras to within 1/8"
- Currently it takes two people with radios to get a rough estimation of how long the rebar is, they base their readings off markings on the wall every 8 - 12 inches.

Rebar Cobble Detection

- A Cobble in rebar manufacturing is when the rebar comes out of the guide during production.
- It is very dangerous to the workers.
- It can ruin equipment.
- A cobble needs to be detected and removed as soon as possible in order to restart production of rebar.
- CANTY cameras can detect a cobble as soon as it happens and can trigger an alarm to alert workers and help maintain a safe working environment.



Billet Measurement



Processed Image, Billet row 3 & 4 running. Notice software reading billet length as it moves from the left to right on screen.

Operation:

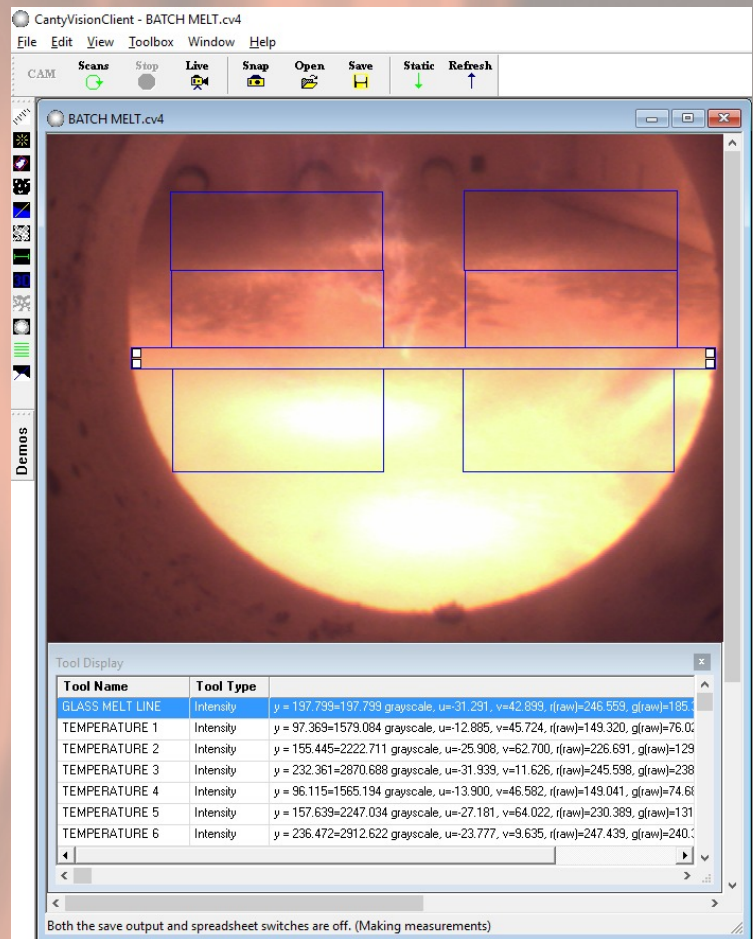
System will send raw measurement signal from Cauty Vector Control Module. Customer will take raw measurement signal input through OPC, 4-20mA, or Modbus TCP/IP. When billet reaches desired length customer will output a cut signal on a specific billet.

Calibration:

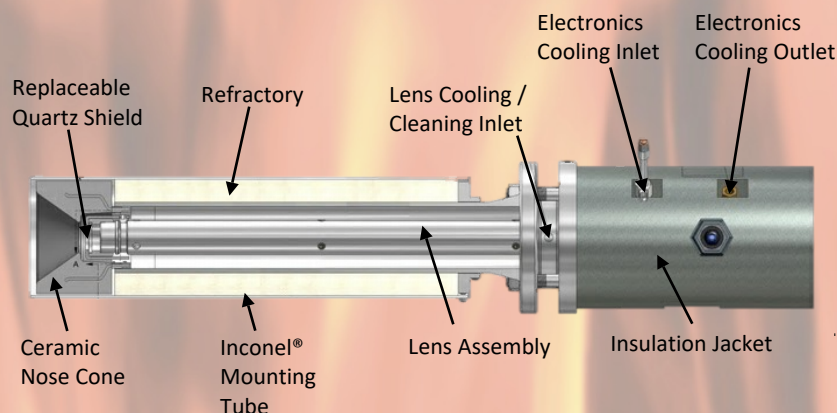
System will need to be calibrated while system is down. Access to bed and ability to lay out measurement references will be necessary. Calibration should only need to be performed if camera is moved.

Smelting Furnace

An ExtremeTemp™ camera is installed in the smelting furnace to allow for continuous visualization of the process conditions from the control room. CantyVision™ image analysis software can be configured to measure level and process conditions within the furnace. The Vector Control Module sends a continuous signal to the control system for automated control of the input product feed rate, and avoids sending un-melted product downstream. Multiple measurement points can be configured on the one image, with measurement outputs available individually, or as an average of all the measurement points.



- Rated for temperatures up to 3000°F (1650°C)
- High quality quartz optics in Inconel® shroud
- Gigabit Ethernet Camera technology
- Spray tube lens cooling and cleaning
- Disposable protective quartz shield



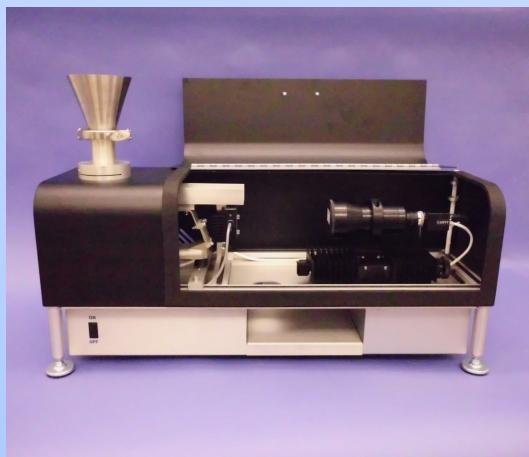
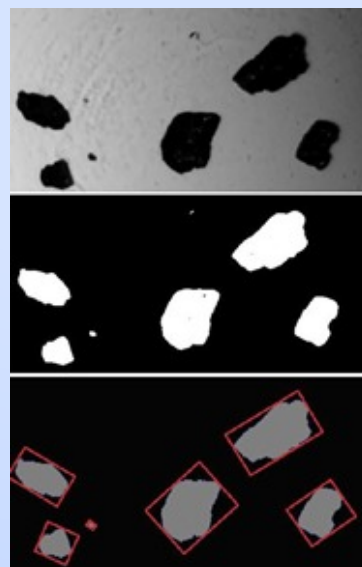
Solids Particle Sizing

Meets ASTM Standards • Powder Metal / Pellets • Iron Ore
Particle Size from 10µm to no upper limit*

Size and shape analysis of dry particles or pellets, is performed by the range of Cauty SolidSizer™ equipment. The product to be analyzed is fed into the system hopper, where the built in material handling system separates the particles into one even layer, and transports them into the analyzer's measurement zone.

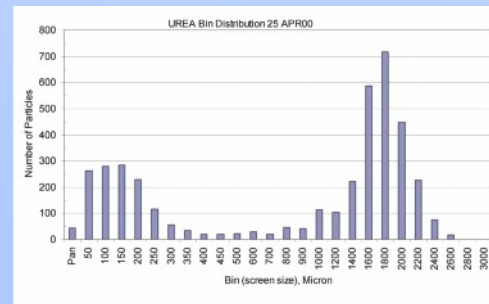
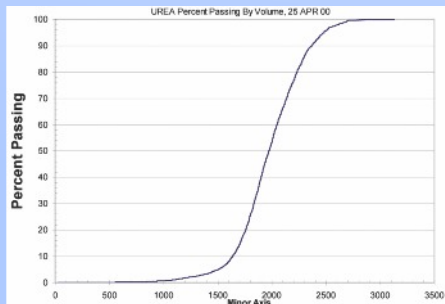
Within the measurement zone, the particles pass between a high intensity LED light source and camera, which captures high resolution images 2D images.

These images are then binarized, and by analyzing the number and position of the image pixels, a full particle **SIZE** and **SHAPE** distribution.



Lab or Industrial (At-Line) Systems

**CORRELATES
TO SIEVES!**

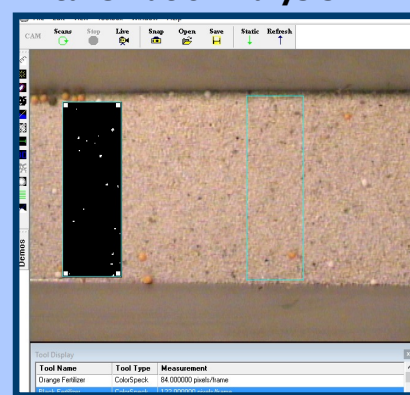


BLACK SPECK or **COLOR SPECK** detection is available as an add on to a particle size and shape analyzer, or as a stand alone system. This uses a camera system with controlled front lighting system for accurate color representation within the captured images. Multiple measurement zones can be configured to allow for detection of particles of different colors within the same product.

Contaminant Detection - Mixture Ratio Analysis

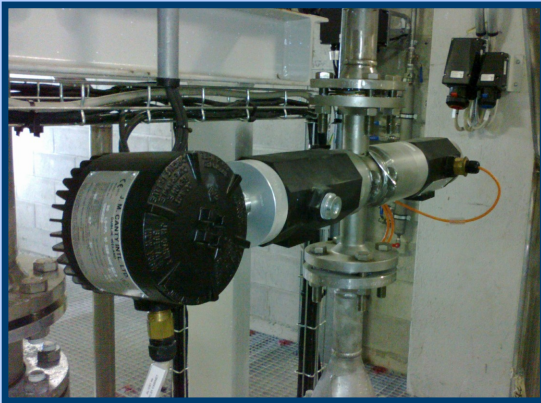


Color Particles Detected



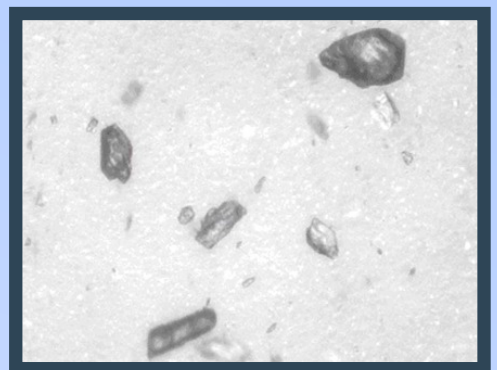
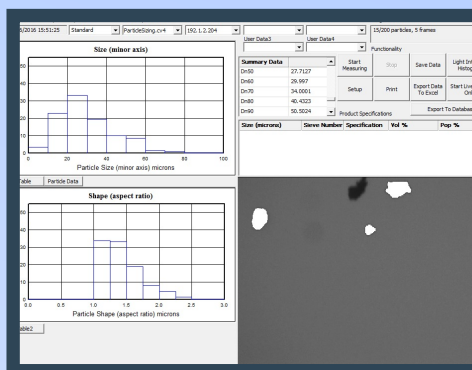
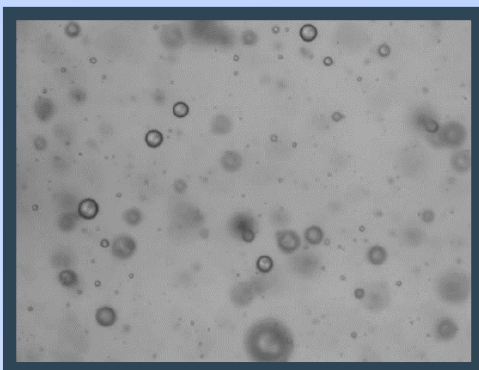
Black Particles Detected

Liquids Particle Sizing

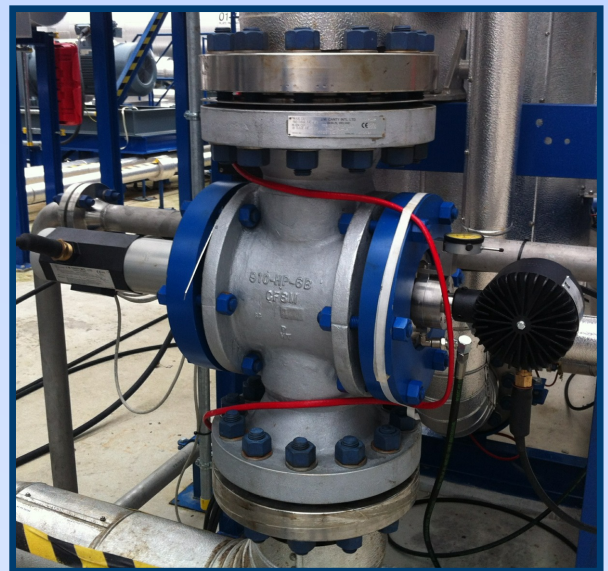


The liquid slurry to be analyzed passes through the analyzer flow cell, which incorporates a microscopic camera, and high intensity back lighting system. High resolution 2D images are captured and sent to CantyVision™ software for realtime analysis. Each particle is measured under a range of size and shape parameters including major axis, minor axis, area, perimeter, aspect ratio circularity and equivalent circular diameter, to provide a truly comprehensive particle characterization. The imaging principle allows for visual verification of any results, and aids the user in developing a greater understanding of their process or product.

Particle Size from 0.7µm to no upper limit* • Particle Shape • Particle Concentration



Various options are available for pipeline (in-line or at-line), vessel and off-line (lab) measurement, all of which include fused glass technology allowing for use on **HIGH PRESSURE & HIGH TEMPERATURE** applications.



Automatic Dilution

The CANTY Automatic Dilution System uses a 0- 1/2" variable insertion measurement gap. This insertion is made possible by the Fuseview™ sight glass, which allows the optical fused pieces to be located in the center of the fluid stream, which is unique to the CANTY system. The fused glass seal contains no gaskets, ledges, or steps allowing the highest velocity, representative sample and keeps the sensor clean, even in the harshest of environments. The fused glass seal location keeps the sensor in line with the process temperature to avoid product build up due to thermal change. The image processor can be configured with multiple zone sensing on the image of the fluid. The results from the zones can be compared to base line values for reliability and alarm on detection of a problem.



Fuel/Lube Oil Particle & Water Analyzer

The presence of solid particles and water in lubricating and hydraulic oils can be problematic as they increase wear of moving parts, clog system filters and promote corrosion throughout the system. Detecting solids and water in these oils is crucial in managing the operation of equipment and enhancing its effective life cycle. Knowledge of particle shape, in addition to count per mL, enables the user in many cases to assess the type of particulate present and its cause which can assist in pinpointing future points of system failure and preventing them.

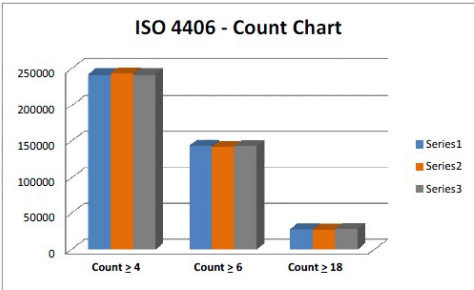


Fuel/Lube Oil Analyzer

- Measuring Principle as per ASTM D7596 & D8049**
- Data reporting to ISO 4406
- Detects and discerns solids, water and air in oils - back scatter and obscuration devices cannot determine shape and therefore count water and air as solid particles.
- Visual Verification
- Ethernet Connectivity
- Intuitive Software Interface
- Measurement to 0.7 um
- Eliminate defoamant/antifoam error in readings taken with laser instruments**



Lab InFlow™ - Fuel/Lube Oil Analyzer

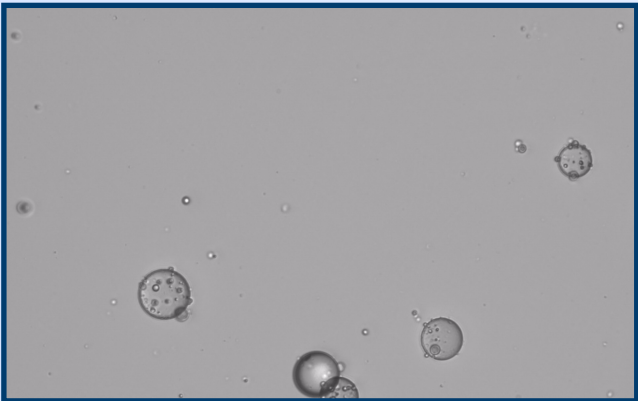


ISO > 4	ISO > 6	ISO > 14
25	24	22
25	24	22
25	24	22

Count & size data output

Data reporting to ISO 4406

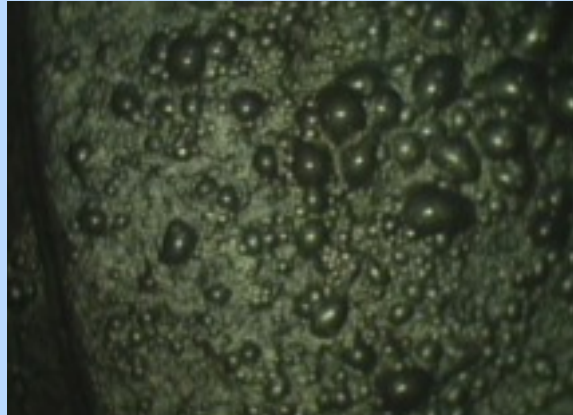
Combining the latest in CCD/CMOS Ethernet camera technology, with CANTY fused glass technology, high intensity lighting, and CANTYVISIONCLIENT software, the system provides real time particle analysis of solids, water and air bubbles in lubrication oils. The method involves flowing the lubricating or hydraulic oil between a microscopic camera and high intensity light source. The captured images are then analyzed by the CANTYVISIONCLIENT software, where the suspended particulate is analyzed under a number of different parameters to provide size, shape and concentration data. As per ASTM D7596, particles are classified under sliding / cutting / fatigue wear, nonmetallic particles, fibre particles, water droplets & air bubbles to provide a comprehensive understanding of the condition of the fluid, and indicate where and how possible failures are likely to occur.



Additional Mining Products

Floatation

Within the flotation tank, monitoring of the froth characteristics at the surface is highly critical in order to optimize yield of the mineral. CANTY provides a modular camera light combination unit to provide a remote continuous view and control by detection of froth bubble size, velocity and stability.



Thickener Clarifier



To analyze the performance of the thickener/ clarifier, CANTY provides a direct inline color, turbidity and percent solids analyzer, to analyze the fluid discharged from the clarification process, in order to determine if it is within specification. Combining CANTY's imaging, fused glass and lighting technologies, the color of the liquid can be analyzed on a number of color scales (YUV, RGB, Lab), which can be taken as a direct measurement, or related to a specific NTU or FTU turbidity value. The image analysis software has the ability to filter out any air bubbles from the analysis, meaning only a true color / turbidity measurement is performed on the fluid. For immediate detection of any problems within the clarifier, CANTY supplies an immersion turbidity / color and percent solids analyzer that can be mounted at various immersion depths to monitor the fluid.

Crusher

In order to monitor crusher performance, CANTY provides Industrial SolidSizer™ or 3D RockSizer™ image analysis systems, which determine if the mining aggregates outputted from the crusher are the correct size and shape. The systems can be run at line through the use of a sweep sampler, or offline as laboratory instruments. In order to know the quantity produced from the crusher, it is important to have an accurate volume measurement. Traditionally, volume belt scales are used, but there can be significant time spent on maintenance of this equipment due to the nature of how the measurement is performed. The CANTY Volume Flow system is a non-contact visual measurement of the product area profile on the end of the conveyor. This area measurement can be combined with the velocity of the belt (separate measurement required) in the operators control system, to provide an accurate volume flow measurement.



**CANTY'S GOAL IS TO PROVIDE EQUIPMENT TO ENHANCE PROCESS CONTROL
AND YIELD. WE ACCOMPLISH THIS BY DESIGNING, MANUFACTURING, AND
SERVICING THE FINEST EQUIPMENT IN THE WORLD.**

Some of Our Valued Customers:

AK STEEL
ALCOA
ALLIED ALUMINUM
ARCELORMITTAL DOFASCO
FREEPORT MCMORAN
GERDAU
HESTEEL
KENNECOTT
NEWMONT
NORTH AMERICAN STAINLESS
NUCOR STEEL
RIO TINTO
U.S. STEEL
VALE

Applications:

MOLTEN LEVEL
SLAG MEASUREMENT
STEEL MILL
WIDTH & CENTERING
TEMPERATURE CONTROL
STRIP EDGE & TEAR CONTROL
REBAR LENGTH
REBAR COBBLE DETECTION
SMELTING FURNACE
TUNDISH TEMPERATURE
BILLET LENGTH
BILLET ALIGNMENT
CRUCIBLE CAMERA
POUR CAMERA
REHEAT FURNACE CAMERA

AND YOU!!!



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