



vision

without

limits

GLASS INDUSTRY

CANTY

PROCESS TECHNOLOGY

BUFFALO

DUBLIN

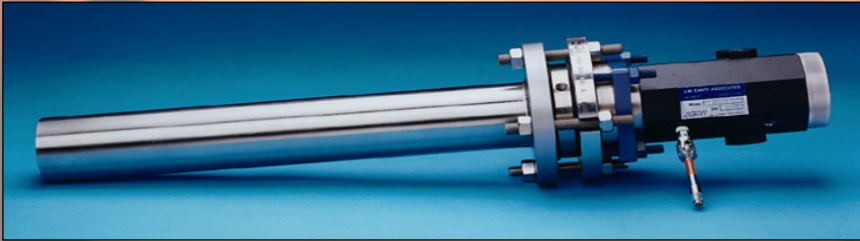
THAILAND

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

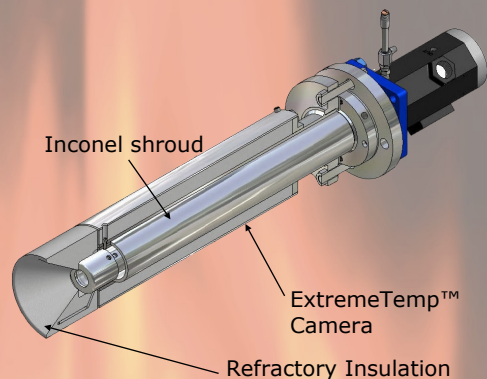


- No cooling air required. Air is used for cleaning only
- 2000°F [1090°C] or 2500°F [1370°C] models
- High temperature furnace package
- 12"-36" models available to insert thru refractory wall
- High quality quartz optics
- Disposable, protective quartz shield
- Auto electronic iris
- Non-blooming CCD camera

ExtremeTemp™ Glass Furnace Cameras

Designed for the extreme 3000°F [1650°C] max. temperature requirements of glass furnaces, the ExtremeTemp™ Glass 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

HighTemp™ Surveillance Cameras

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



Water Cooled Camera Jacket

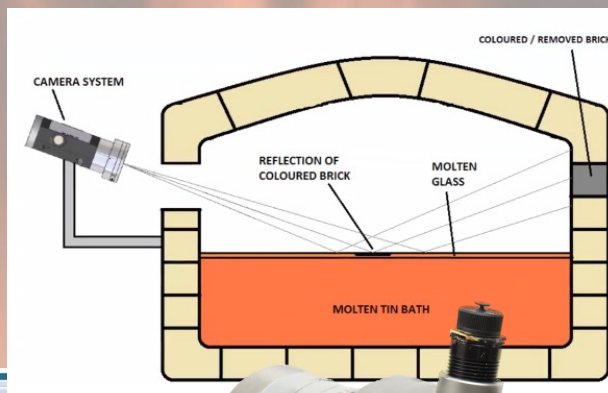
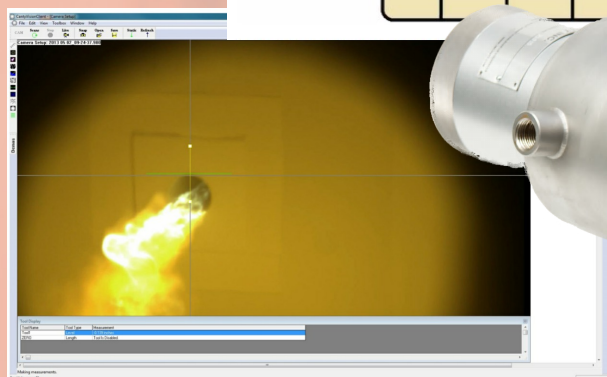
- Ideal for applications where instrument air is unavailable
- Effectively cools camera housing and acts as an insulatory barrier against ambient heat
- Highly efficient and minimizes cooling costs



Molten Glass Level

The CANTY Molten Glass Level system consists of a high temperature surveillance camera, mounted to view the surface of the molten glass through an opening in the wall. On the wall directly opposite the camera, a reference point is created, often by simply removing a brick from the wall, or boring a hole through it. The position of the reflection of this reference point on the surface of the glass relative to the fixed mount camera, 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.



High Accuracy • Non Contact • Low Maintenance • Visual Verification

Imaging VS Platinum Dipping Probe

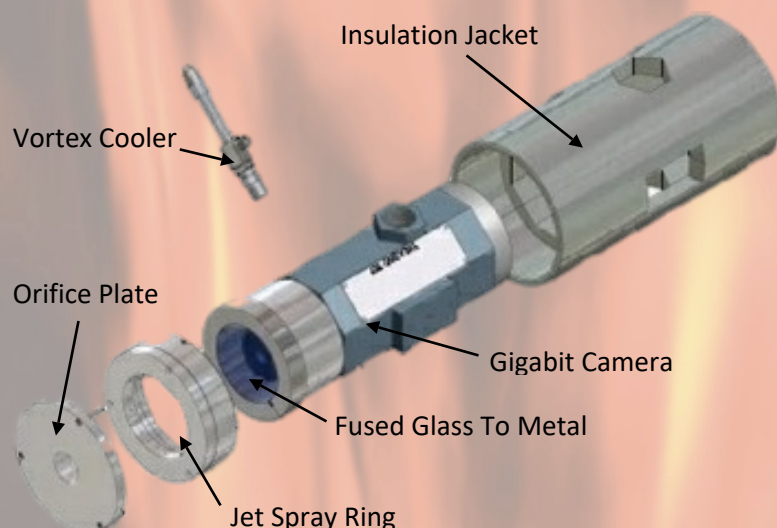
- Imaging provides continual read out multiple times per second. Platinum dipping is a mechanically slow reading.
- Imaging is a non contact technique so there are no issues with loss in measurement sensitivity due to coating issues.
- There is no regular maintenance / re-calibration required with an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

Imaging vs Nuclear Level Measurement

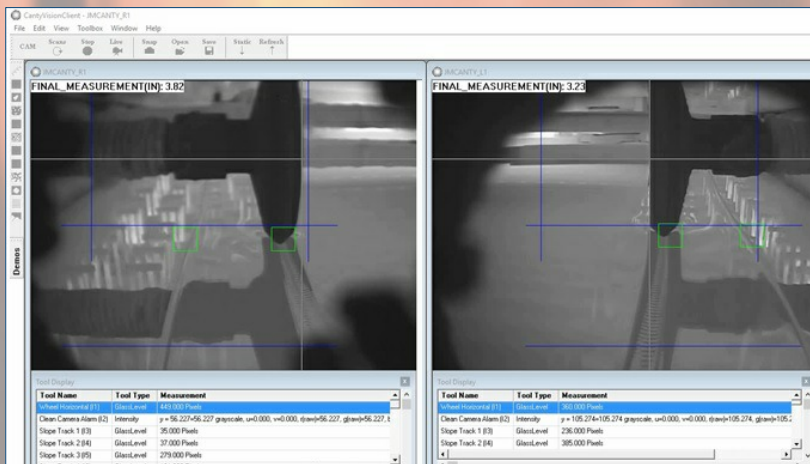
- Imaging is an order of magnitude accuracy better than nuclear level.
- Imaging avoids the health & safety issues of nuclear.
- Imaging avoids the cost issues associated with having a nuclear source at site (perception, insurance costs, source disposal costs)
- An on-site dedicated nuclear specialist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

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.



Float Glass Gripper

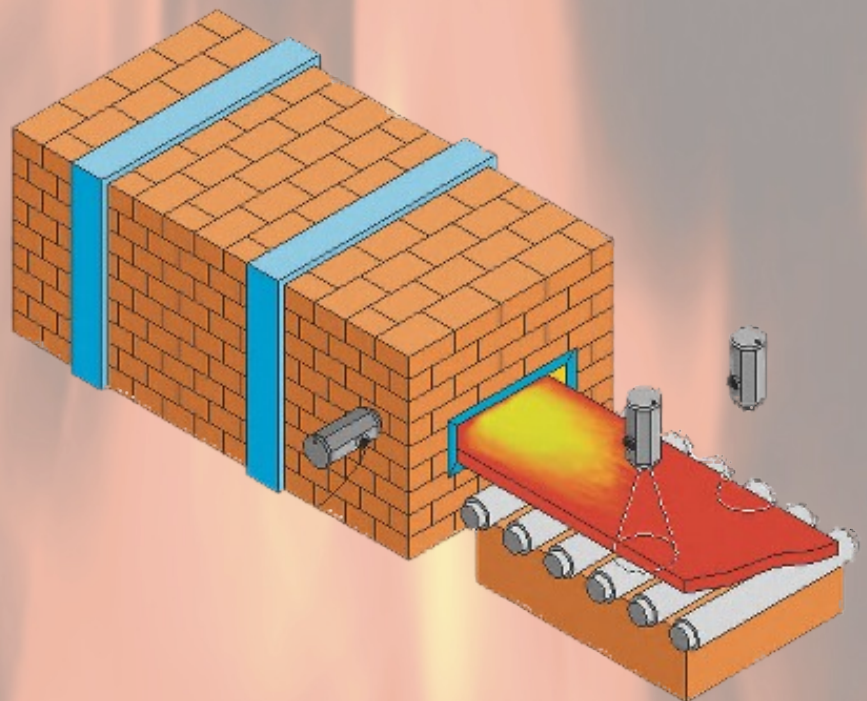


A pair of high temperature cameras are mounted on either side of the float glass line, and positioned to provide a constant view of the gripper wheels as they draw the glass sheet from the tin bath. Constant visual monitoring, and gripper wheel positional measurement supplied by CautyVision™ software provides greater control, and allows the gripper to operate closer to the glass edge, which minimizes waste and maximizes production.

Float Glass Width

A CANTY high temperature surveillance camera is mounted over the outer edges of the float glass ribbon as it exits the annealing lehr. Multiple cameras connect back to the Vector Control Module where CautyVision™ analyzes the image for continuous position and width.

An edge detection algorithm is utilized to detect and constantly track both the outer edge of the glass ribbon, and the inside of the knurl line on the glass surface, providing complete control.



Outer Glass Edge Tracked
by CautyVision™
(note cross-hair position)



Inner Knurl Edge Tracked
by CautyVision™
(note cross-hair position)

Everything between the outer edge of the glass ribbon, and the inner edge of the knurl, is cut off as waste and resent to the batch furnace to be reprocessed. Therefore, tracking the position of both edges allows the operator/control system to optimally position the knurl wheel, to maximize production and minimize the amount waste, while also ensuring the gripper wheel does not lose its hold on the glass surface.

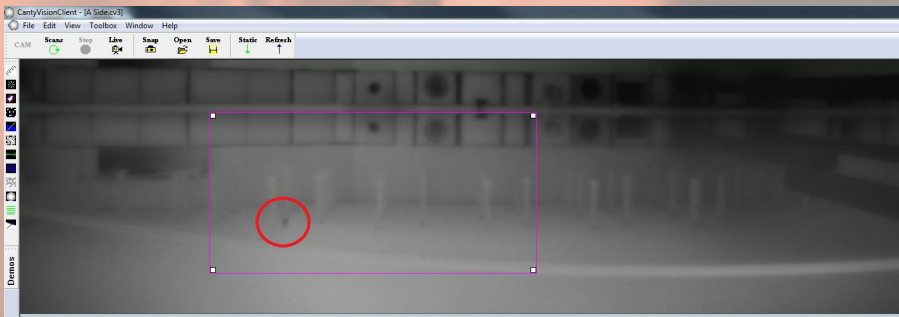
Stone Detection



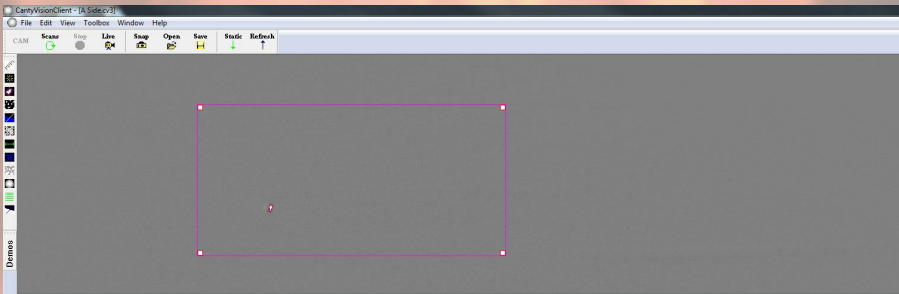
On a float glass line with glass coating taking place, an ExtremeTemp™ camera is mounted in the upper region of the tin bath, to not only provide an unrivalled view inside the process, but also to automatically detect the presence of foreign objects (stones from refractory, insulation etc.) on the glass surface. If undetected, these foreign objects move downstream where they can become lodged on the coater, and cause scratches and imperfections on the glass as it passes by.

The images retrieved by the camera system are processed using unique CantyVision™ software. A particular algorithm is employed which detects objects above a defined size, moving in a defined linear direction. The detailed detection parameters ensure there are no false alarms, while ensuring that all legitimate foreign objects are detected.

Once a detection is made, a signal can be automatically sent to the control system via OPC, 4-20mA or Modbus TCP/IP, to temporarily raise the coater until the object has passed underneath and normal production can resume.

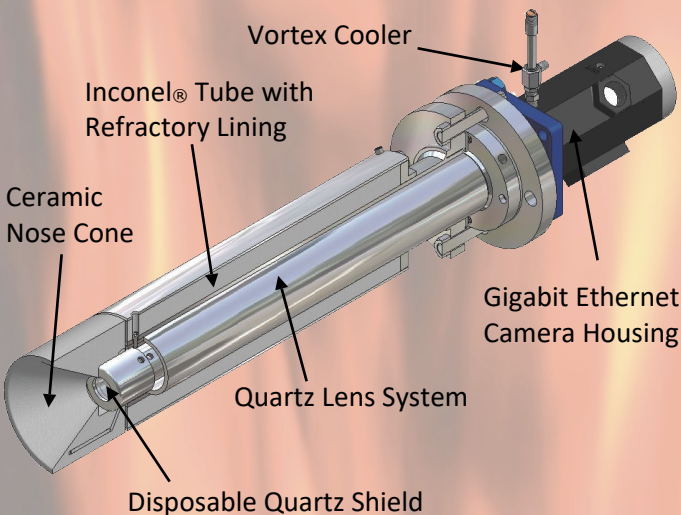


Stone Present on Glass Surface (circled in red)



Stone Detected within Measurement Zone by CantyVision™ Software

ExtremeTemp™ Camera System



The ExtremeTemp™ camera used for this application features high quality quartz optics encased in an Inconel® shroud, which allow for process temperatures up to 3000°F (1650°C).

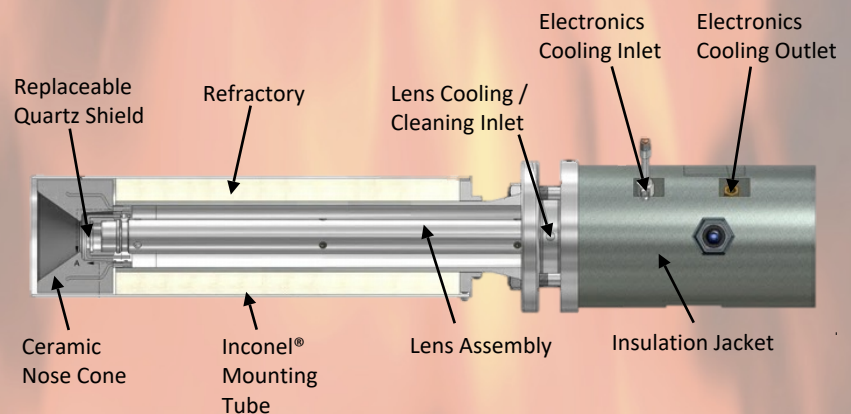
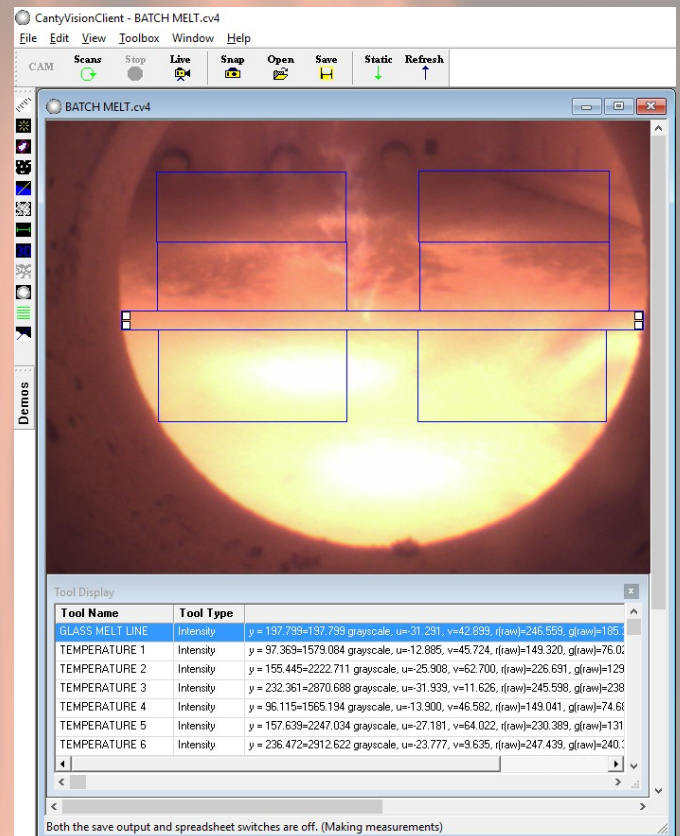
A positive gas (air/nitrogen) flow over the lens through the cameras spray tube ensures the view remains clear at all times, while a disposable and easily replaceable quartz shield protects the tip of the lens from any abrasion damage.

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.

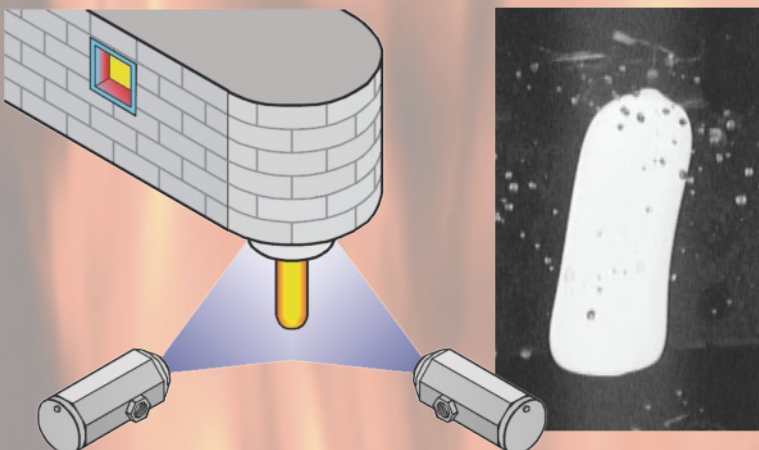
Batch Melting Furnace

An ExtremeTemp™ camera is installed in the batch melting furnace to allow for continuous visualization of the process conditions from the control room. CantyVision™ image analysis software can be configured to measure if unmelted sand has crossed the batch line 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



Glass Gob Analysis



Dual high temperature surveillance cameras are positioned close to the glass gob outlet to provide a constant visual from the control room.

CantyVision™ software can be configured to measure both the volume, and the temperature of the gob as it falls through space and into the container glass mold below.

Fiber Glass Pull Rate



A high temperature surveillance camera featuring a vortex cooling system, spray ring, orifice plate and insulation jacket, is mounted to view the molten glass stream as it exits the bushing, and passes into the fiberizer. The captured images are relayed to a PC in the control room which is running CantyVision™ software. The powerful image analysis software uses a number of measurement tools to provide measurement for



glass pull rate (lbs or kg per hour), glass temperature, glass strand width, and glass velocity.

Multiple cameras can be installed and connected back to the Vector Control Module for image processing. The CantyVision™ software allows for direct display of real time measurements on the operator screen, as well as providing a continuous signal to the control system via OPC, 4-20mA or Modbus TCP/IP. Visual verification of the parameters measured gives the operator the ability to check the measurements, and gain full confidence in the system capability.

BATT Length

CANTY cameras and software can easily detect the length and width of BATT. CANTY can also detect holes in the BATT. The readings can be done real time to determine if there is a problem with production and signals can be sent to the control systems.



Glass Pull Rate • Glass Temperature • Glass Velocity • Glass Width

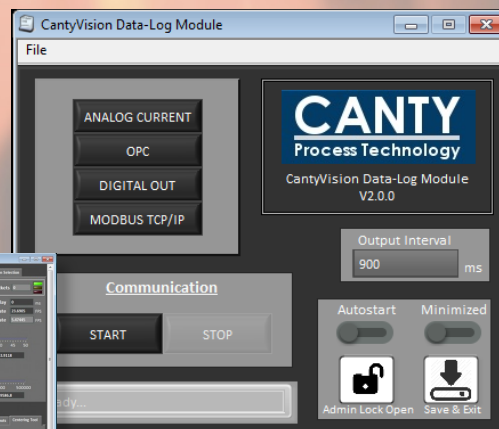
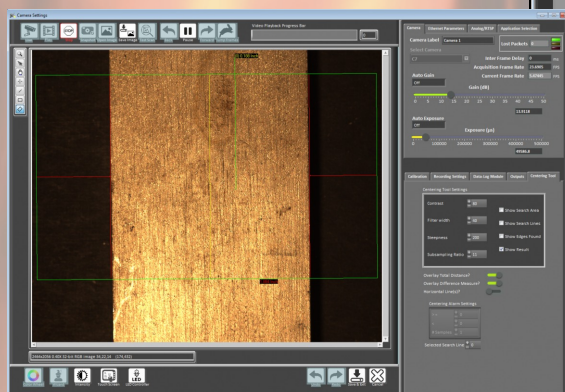
Vector Control Module



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



**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:

AGC
ARDAGH GLASS
CARDINAL
CORNING
GALLO GLASS
GUARDIAN
NSG GROUP
OWENS CORNING
OWENS ILLINOIS
PILKINGTON
PPG
SAINT-GOBAIN
SORG
TECO
VITRO
WORLD KITCHEN

AND YOU!!!

Glass Applications:

Molten Glass Level
Stone Detection
Glass Pull Rate
Width Detection
Gob Analysis
Batch Melt Detection



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