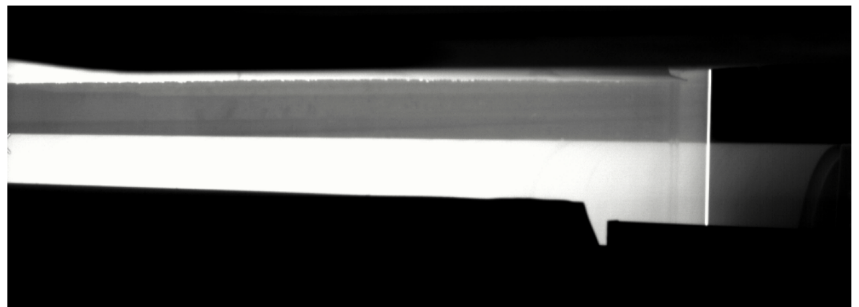
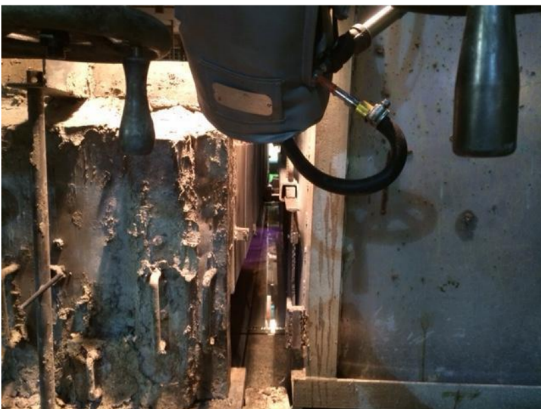


Glass Width Visual Inspection Measurement

This visual inspection system designed by JM Canty Inc. uses two high resolution GigE (gigabit Ethernet vision) cameras enclosed in an IP67 temperature resistant full metal/jacketed housing cooled by either water or air. Cameras come with a fully adjustable mounting bracket to allow for optimal camera positioning. Cameras are powered by PoE (power over ethernet) through a direct connection back to a Vector Control Module (embedded image processing system) with variable outputs for system control (analog, modbus, OPC).

How it Works

Two cameras are positioned across from one another mounted between 45° and 65° looking in towards the glass edge. Lighting is not necessary due to the optimized wavelengths utilized by the Canty GigE cameras. Canty uses an advanced algorithm to calibrate the cameras due to the perspective based image. A dot grid calibration tool can be used where a single snapshot is taken of the grid in order to preform a perspective based calibration. This allows for very accurate tracking as the glass edge moves closer or further away from the camera. Gross and total glass width are automatically measured by subtracting the current measurements from each camera from a total width.

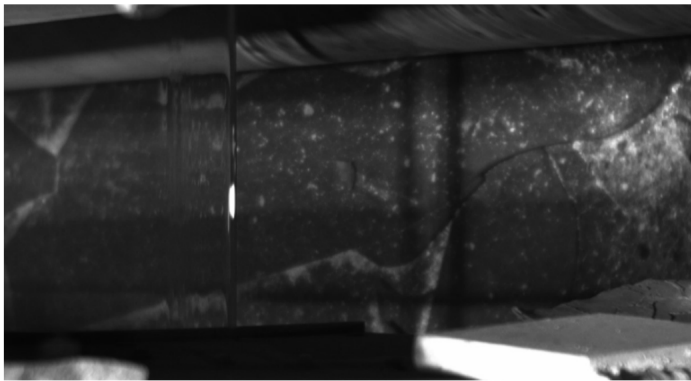


Canty Advantage

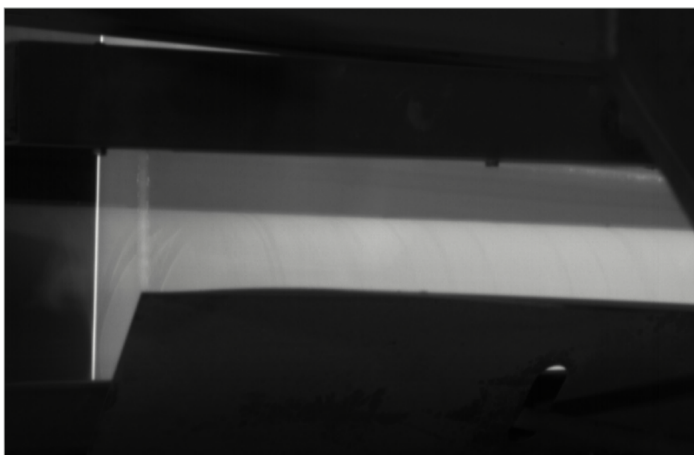
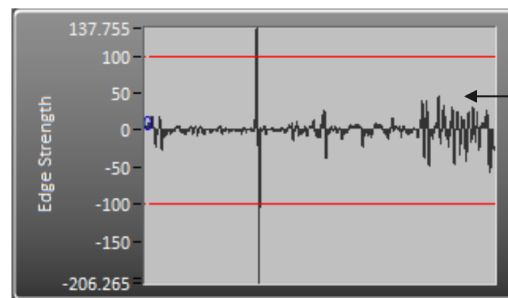
The Canty Glass Width Visual Inspection Measurement has been optimized over years of testing in glass plants around the world. Some of these advantages are:

1. Canty cameras are mounted outside of lehr and not directly above. Many cameras look top down in order to get a better visual on knurl which can be very hard to see and track using lighting and reflection. Cameras mounted directly above glass can see temperatures 50% to 70% higher than mounting just outside of this area. Higher temperatures decrease the lifespan of a cameras and decrease performance resulting in grainy or distorted images.

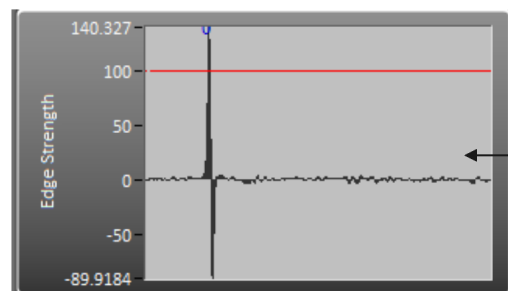
2. Canty cameras do not need additional lighting. Canty has selected camera sensors that work in a very specific wavelength range in order to optimize the contrast seen by the knurl and glass edge while also excluding areas within image that are not being tracked or that could cause interference with tracking. The cameras used by Canty are also designed to withstand higher temperatures and still give extremely high image quality at over 50 frames per second!



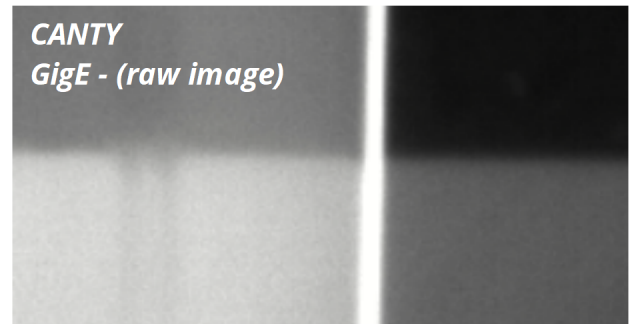
The image to the left is taken with a standard camera and lighting. The glass therefore looks completely transparent and adds significant signal noise due to reflections below the glass. The knurl is also very hard to see and measure.



The image to the left has been taken with a Canty camera optimized for glass edge measurement. The graph below shows the strength of the edges along a line going from left to right on the image. This is what is used to detect the primary glass edge. Notice there is little to no noise.



3. Cauty software has been developed over many years of real in process testing providing optimized edge and knurl detection algorithms. Glass edges and knurls are easily detected due to the high quality camera images provided. Many systems use IP cameras and the main disadvantage there is that the image is compressed at the camera before being sent to the image processing system. This results in poor tracking quality due to compression artifacts.



The images above demonstrate the difference between a IP camera and a GigE camera. The image on the left is compressed resulting in a pixelated and distorted looking image, while on the right there is no distortion.

System Payback

Cost Savings \$ - Cauty systems save costs through a reduction in energy.

We all know the scrap glass is fully recycled and not lost; however the energy to remelt the glass and the additional wear and tear on the furnace are significant. For example, if you are running 100-inch width (2500 mm) and you are running 10 inch scrap (5 inch per side); if you reduce that down to 5 inch scrap (2.5 inch per side) you have a 5% reduction in energy for the production of the glass sheet that day and every day. Let's assume your furnace energy bill is 2 Million dollars for the quarters furnace operations; you save \$100,000 dollars per year on energy alone, plus the reduction in your overhead depreciation on the furnace! In addition you can run at a higher throughput. This and the CANTY level control to control the thickness have a payback with days of installation.



Conclusion

The Cauty system has been developed and tested over many years to provide a highly accurate and reliable gross/total glass width measurement. The hardware used is specifically optimized for this application and is easy to install and set up. Software measures glass edge, inner/outer knurl and has a simple 1-step calibration using dot grid calibration target. VCM provides a simple plug and play option with camera hardware and allows for various industrial communication outputs as standard.

