

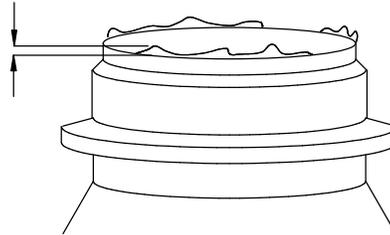
Color Filters to Reduce Optical Crosstalk

When you have two or more views of a single object, sometimes the light for View #1 can interfere with View #2, and vice versa. Such interference or crosstalk can often be reduced or eliminated with appropriate color filters and light sources. The following example is specific, but the basic principles may be applied broadly.

Problem:

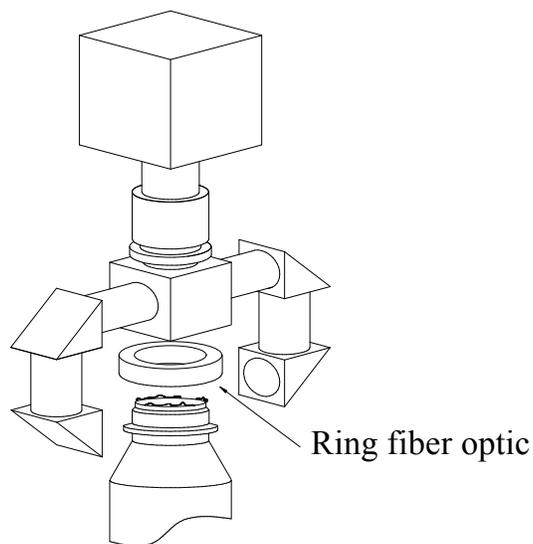
- On-line measurement of the flash height above the finish rim of plastic bottles.
- The bottles may tilt slightly as they come down the conveyor.
- Incidentally, keep the size and cost of the system down.

Flash height above finish

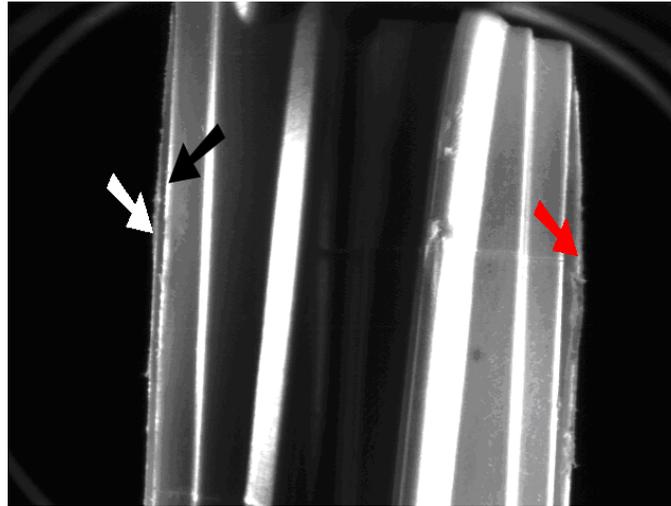


Possible Solution:

First, use an Adjustable Field Splitter™ (AFS) to allow a single camera to get two opposed views of the bottle at a single station. This saves space and cameras. A ring light provides good, even illumination.



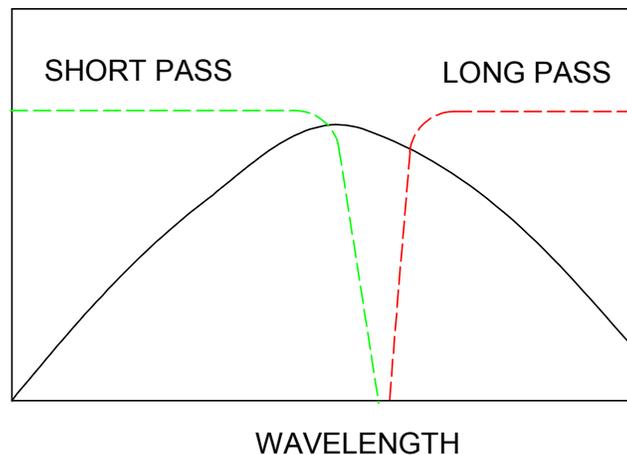
Unfortunately, the flash from one side of the bottle can appear in the image of the opposite view, especially when each view must have a long depth of field to accommodate the bottle mouth curvature. The following split view image illustrates this.



The left side of the image shows the top of the bottle as nearly vertical, somewhat ragged bright edges. The leftmost edge (white arrow) is actually at the far side of the bottle. It's seen because this View #1 has the bottle tilted toward it. This condition means that the system does not properly identify the near side edge (black arrow). View #2 on the right side only shows one edge (red arrow) because the bottle is tilted away from it. [NOTE: The red arrow edge is the same as the white arrow edge, just viewed from opposite sides.]

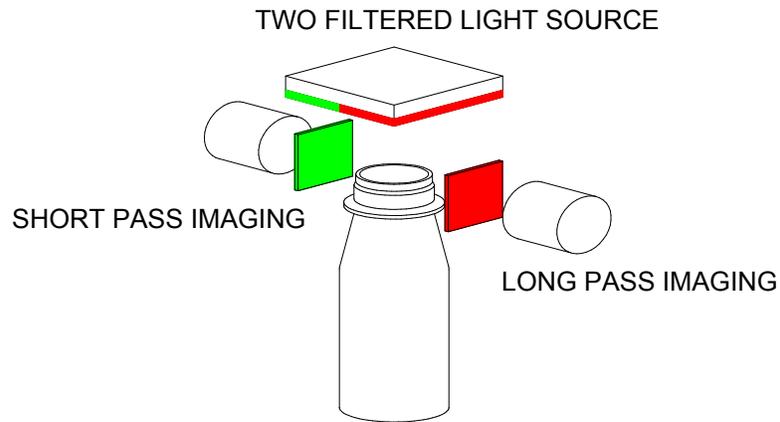
Improved Solution:

Use non-overlapping color filters in front of the light source and each camera view to eliminate crosstalk. Here's what we mean by non-overlapping.



The black curve is the unfiltered light spectrum, or alternatively the camera spectral response. Either way, a short pass filter only lets shorter wavelengths through. A long pass filter only lets longer wavelengths through. The end or cut-off points of the two filters should not overlap each other, or overlap only slightly.

Here's the physical set-up, with filters in front of the light source as well as in front of each view.



The result? The proper near side edge is seen for View #1 on the left! Admittedly a faint amount of light is still observed from the far side. One easy further improvement might be to place a simple vertical baffle or light blocker along the border between the two different colors of the light source. Nevertheless, there's already enough distinction to make the proper inspection.

