

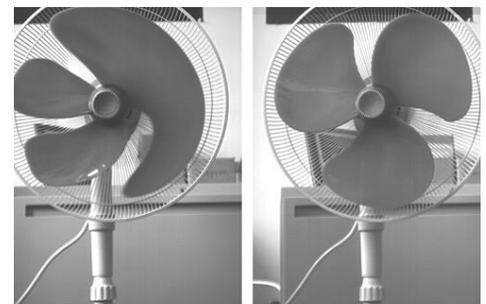
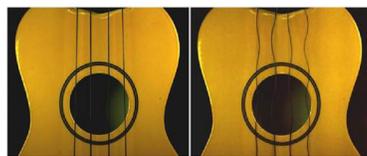
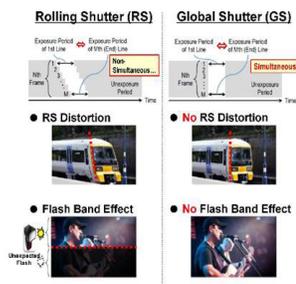
Global Shutter vs. Rolling Shutter: What's Better for Your Production Line?

By Danielle Osman

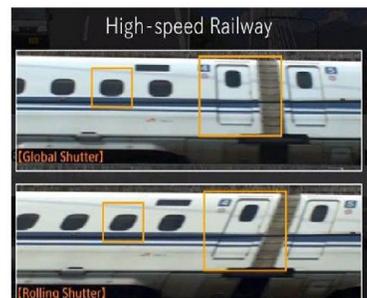
Problems occur on manufacturing machinery in a split second, yet they can be extremely difficult to fix, cause hours of downtime, and create lots of excess waste. Manufacturing workers will often be tasked with trying to determine the root cause of timing issues, jams, stops, underfill, overfill and many other issues that can occur in the blink of an eye. The list of probable causes can be quite lengthy and involve some serious detective work, in addition to the man hours spent trying to fix the issue.



Production line stoppages and unplanned downtime can often be caused by faulty equipment, jams, misalignments, or machinery needing re-adjustment, as well as many other possible solutions. The proper high speed camera with the correct shutter can mean the difference between spending hours trying to solve the issue versus identifying the problem in seconds, and restoring the machine to normal production immediately.



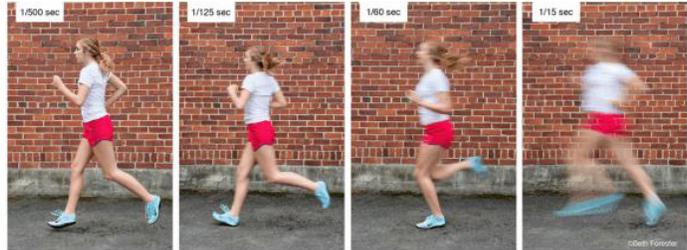
When first comparing high speed camera systems, the initial criteria to compare that come to mind are likely frame rate and hard drive / buffer size. However, shutter is equally important when trying to capture intermittent issues, and it is essential when troubleshooting lines speeds that require more than 250 frames per second. Using the correct shutter for applications is imperative because without the right shutter, the high speed will cause a distortion effect, thus defeating the point of trying to capture clear, high-quality video.



There are 2 different types of shutters to consider during your high speed camera purchasing process: a rolling shutter and a global shutter. A rolling shutter captures an image by using a process in which it repeatedly scans either vertically or horizontally – not all of the parts of the image are recorded at the same time, but when you review the footage it is displayed as one entire image. The issue that occurs with rolling shutter comes into play with very fast moving production lines because distortions can be seen.

With a global shutter, the entire image is captured at the same time with no chance of distortion. Rolling shutter can cause images to look skewed, blurry or warped – all of which are not helpful when trying to troubleshoot an issue.

In most instances, shutter is just as important as frame rate. Given similar specifications, the global shutter equipped image sensor is much more expensive than a rolling shutter sensor. This is what differentiates professional video cameras like Hindsight camera technology from consumer grade sports cameras like GoPro and integrated smart phone cameras such as the iPhone. Both GoPro and iPhone employ tiny low cost rolling shutter image sensors.

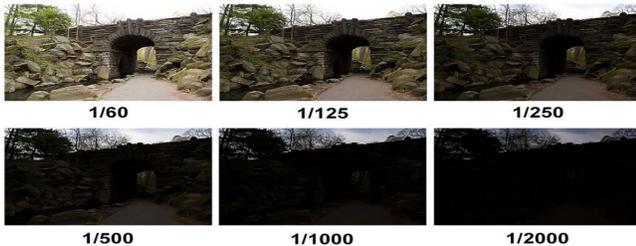


Shutter speed has to be at least as fast as the video frame rate. Shutter speeds are usually written as 1/x seconds, where x is equal to or greater than the frame rate.

You cannot have a frame rate of 1,000 Frames per Second with a shutter speed slower than a 1/1000 of a second. Which means the image sensor is exposed for one millisecond (1 mS).

But exposing the image sensor for shorter and shorter periods of time also reduces the amount of light hitting the image sensor.

Shutter Speed Adjustment Sequence



Light gathering power is a function of pixel size and sensitivity. This is why Hindsight cameras employ a large format 1.4” image sensor which has pixels that are fifty times (50X) the size of the iPhone and GoPro sensor pixels.

The entire 20/20 Hindsight product line is designed and engineered with CMOS images sensors. By choosing to use a CMOS image sensor, it enables all of the Hindsight cameras to capture video using a global shutter.

The choice to use a CMOS image sensor and a global shutter was made with the Hindsight customers in mind that have fast applications and with no room for distortion or downtime.

