Understanding Shutter Speed

This tutorial looks at one of the key elements to taking a good photo: shutter speed. If your camera has mode settings that allow you to operate in manual or partially manual modes, this tutorial aims to help unravel the technical mysteries of working with shutter speed.

WHAT IS A SHUTTER?

Photography is basically the use of a camera to capture light. To do this successfully, a camera has a number of settings that can be adjusted to correctly expose the scene your eye is seeing and accurately record it. But first, let's look at the mechanics of a camera. "Shutter" is a term that has its roots back in film cameras where the shutter was basically a "curtain" that opened when the shutter release (the button you press to take a photo) was pressed, allowing the film behind the shutter to be exposed to light (see photo at right).

Digital cameras don't record images on film, but instead use an electronic sensor to process images before recording them on a picture card. But the operation of the shutter remains basically the same (see photo above). The length of time the shutter remains open during an exposure is determined by the **shutter speed** setting. Depending on your camera, this speed may be set automatically by the camera or manually by the operator.

WORKING WITH SHUTTER SPEED

When combined with aperture settings, the shutter speed greatly affects your image. While the aperture setting determines how much light is exposed on the sensor, the shutter speed determines how long the shutter remains open to expose the sensor to that light. Think of your eye lid. The shutter is basically a closed eye lid. When the shutter release is pressed, the eye lid opens and closes. By setting the shutter speed, you're telling the camera how long the eye lid remains open.

For our human eye, the longer the eye lid is open also means more light enters the eye. The same concept applies to a camera's shutter. Assuming all factors (like aperture and ISO) remain the same, the longer the shutter is open, the more exposure you get.

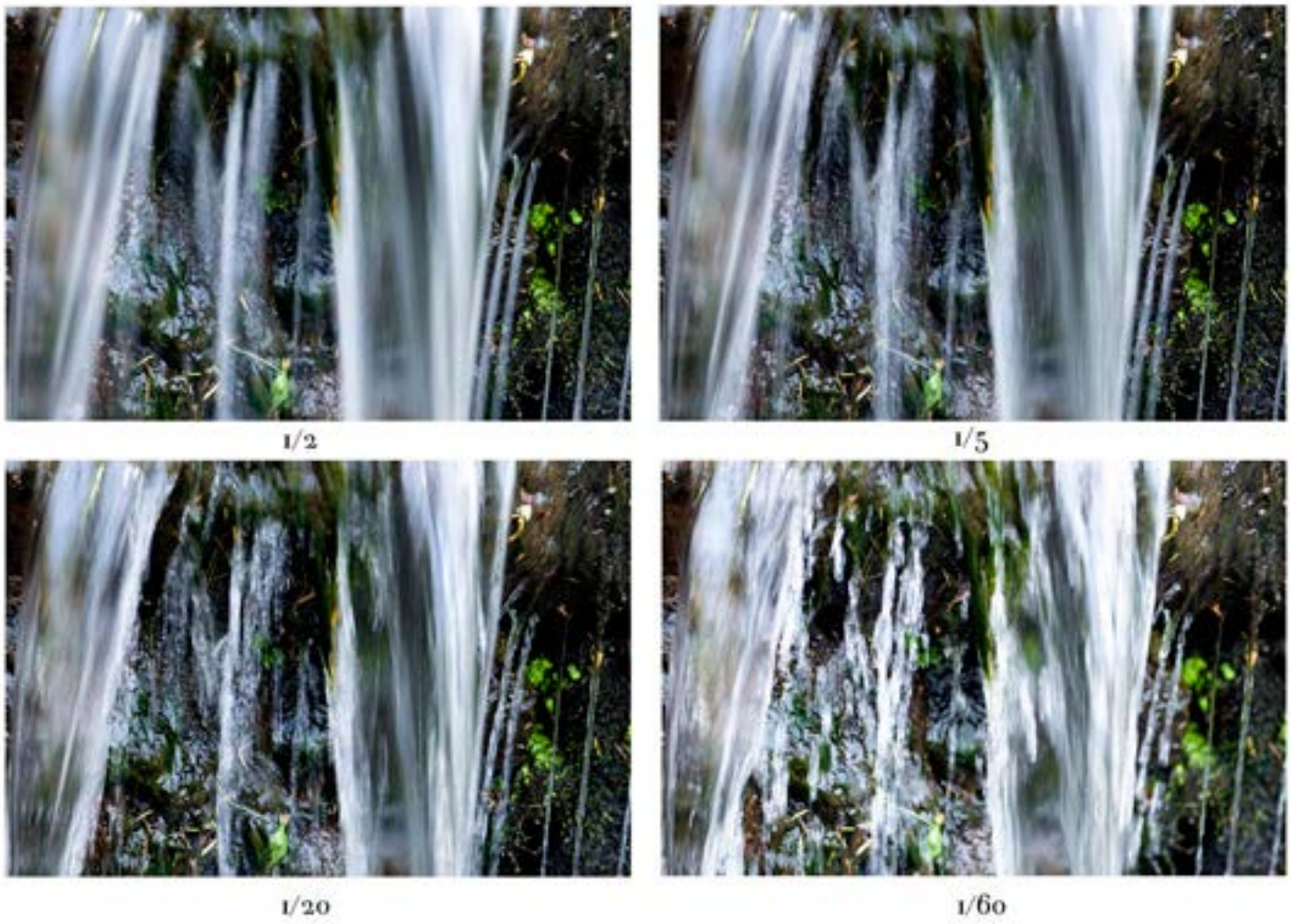
As we learned last month, while aperture controls depth of field - how much of an image is in sharp focus - the shutter speed you choose affects image sharpness and can have a dramatic impact on the appearance of moving objects. Very fast shutter speeds can be used to freeze fast-moving subjects, for example at sporting events. Very slow shutter speeds are used to intentionally blur a moving subject for artistic effect or to photograph a subject illuminated by very low ambient light conditions (i.e. without flash). The agreed standards for shutter speeds are: 1/1000 s, 1/500 s, 1/250 s, 1/125 s, 1/60 s, 1/30 s, 1/15 s, 1/8 s, 1/4 s and 1/2 s, although many digital cameras have many more than these. Camera shutters often include one or two other settings for making very long exposures, such as B (for bulb) which keeps the shutter open as long as the shutter release is pressed and T (for time) which keeps the shutter open until the shutter release is pressed again.

If a shutter speed is too slow for hand holding, a camera support - usually a tripod - should be used. Image stabilization, a feature in modern digital cameras, can often permit the use of slower shutter speeds, however, it should not be used on tripods.

CREATIVE USE OF SHUTTER SPEED

Shutter speed is one of several methods used to control the amount of light recorded by the camera's digital sensor or film. Slower shutter speeds are often used to suggest movement in a still photograph of a moving subject, while excessively fast shutter speeds can cause a moving subject to appear unnaturally frozen. For instance, a running person may be caught with both feet in the air with all indication of movement lost in the frozen moment. When a slower shutter speed is selected, a longer time passes from the moment the shutter opens until the moment it closes. More time is available for the camera to record the subject's movement. A slightly slower shutter speed will allow the photographer to introduce an element of blur, either in the subject, where the feet which are the fastest moving element in the frame, might be blurred while the rest remains sharp; or if the camera is panned to follow a moving subject, the background is blurred while the subject remains sharp.

The exact point at which the background or subject will start to blur depends on the rate at which the object is moving, the angle that the object is moving in relation to the camera, the distance it is from the camera and the focal length of the lens in relation to the size of the digital sensor or film. When slower shutter speeds, in excess of about half a second, are used on running water, the photo will have a ghostly white appearance reminiscent of fog. This effect can be used in landscape photography.



Above: These four images show the effect of various shutter speeds when photographing moving water.

These three images demonstrate the various effects achieved when using shutter speed to creatively photograph water.

Above right and above: Slow shutter speeds were used to give the water in these two images a ghostly white appearance like fog.

Left: A fast shutter speed was used to freeze this water droplet.

Zoom burst is a technique which entails the variation of the focal length of a zoom lens during a longer exposure. In the moment that the shutter is opened, the lens is zoomed in, changing the focal length during the exposure. The centre of the image remains sharp, while the details away from the centre form a radial blur, which causes a strong visual effect, leading the eye into the centre of the image.

So, what shutter speed should I use? The following list provides an overview of common photographic uses for standard shutter speeds:

- 1/2000 s and above: Used to take sharp photographs of fast subjects, such as athletes or vehicles, under good lighting conditions and with an ISO setting of up to 800.
- 1/2000 s and 1/1000 s: Used to take sharp photographs of moderately fast subjects under normal lighting conditions.
- 1/500 s and 1/250 s: Used to take sharp photographs of people in motion in everyday situations. 1/250 s is the fastest speed useful for panning; it also allows for a smaller aperture (up to f/11) in motion shots, and hence for a greater depth of field.
- 1/125 s: This speed, and slower ones, are no longer useful for freezing motion. 1/125 s is used to obtain greater depth of field and overall sharpness in landscape photography, and is also often used for panning shots.
- 1/60 s: Used for panning shots, for images taken under dim lighting conditions, and for available light portraits.
- 1/30 s: Used for panning subjects moving slower than 48 km/h and for available-light photography. Images taken at this and slower speeds normally require a tripod or an image stabilized lens/camera to be sharp.
- 1/15 s and 1/8 s: This and slower speeds are useful for photographs other than panning shots where motion blur is employed for deliberate effect, or for taking sharp photographs of immobile subjects under bad lighting conditions with a tripod-supported camera.
- 1/4 s, 1/2 s and 1 s: Also mainly used for motion blur effects and/or low-light photography, but only practical with a tripod-supported camera.
- B (bulb) (1 minute to several hours): Used with a mechanically fixed camera in astrophotography and for certain special effects.

Above: Slow shutter speed combined with panning the camera can achieve a motion blur for moving objects. Details (Rollercoaster): Shutter Priority; Auto WB; f/25; Exp 1/20 sec; ISO 200; Exposure Compensation +3.

Above: Sparklers moved in a circular motion with an exposure time of 4 seconds. This is an example of Light painting.

Above: Images taken with a lower shutter speed invoke a visual sense of movement. (Pool shot: Exposure time 3 seconds.)

Above: A slow shutter speed and a tripod were used to capture these light trails.

Above: A fast shutter speed will freeze action.
Details (Bucket): Action Mode; Auto WB; f/9, Exp 1/1600 sec; ISO 400
Right: A Bulb exposure captured these dramatic star trails.