

# What effects do changing the f-Stop in a lens or camera have on the resulting image ?

## *Basics*

Changing the f Stop in the settings of a lens will either let more light in or reduce the amount of light getting in, though the lens to the sensor or film.

However, fully opening or fully closing the aperture in the lens has detrimental effects on the resulting image.

If you close the lens down fully, ie the highest f-stop that the lens will allow, the light coming in though the lens will be detracted off the edges of the Iris (another name for the aperture). This detraction can be thought of light not following the normal path though the lens and being diverted off at uncontrolled angles before it reaches the sensor. The light not following the normal path will soften the resulting image on the sensor. It will often lose contrast as well as definition.

If you fully open up the lens you will get a similar result, but for different reasons, the light in this situation is almost unrestricted, but it will now be able to hit the insides of the lens barrel and also cause a softening of the image. Again, not what we want, contrast and definition lost again.

So, in order to get more control over the resulting image, stay away from the extremes of the setting of the lens with respect to the f-stop. Two stops down from each end would be enough.

But to get the BEST from a particular lens, you should, if at all possible, be using the lenses “sweet spot”, a setting where the diffraction from the aperture and lens barrel is at its least, a setting where you should get the most contrast in the resulting image.

If you don't have the data for your particular lens (found on the box you bought the lens or on the maker's web-site), you can often guess from f8 to f11 should do.

A question that may be asked is why would you have a lens that can be set at, say f1.4. Well in certain circumstances where you absolutely must get an image, this is your only option and “some” of the limitations of contrast and sharpness can be mitigated by image processing software. But I would be increasing the ISO setting on a more modern camera as the noise created by the sensor is less than a few years ago, and more controllable. A sharp, grainy image is better than a soft image.

By having a “fast” lens, one with a small f-stop number, you are more able to get an image where some lenses will give in and not allow you to get an image at all.

## *More advanced.*

When you change the f-stop there is one side-effect, other than changing the amount of light getting to the sensor, and that is Depth of field (Dof)

The amount of Dof that you get from an f-stop, is inversely proportional to the f-stop, and is dependant on the distance you are focused on and the lens you are using. This has nothing to do with make but has to do with if its 50mm or 200mm or whatever.

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The use of the Dof is an artistic effect (in most cases), where you would use the Dof to isolate an element of the image, someone standing in front of a cluttered background, where a small Dof, that is large enough to get the person in focus, and throw the background out of focus. Called “differential focusing” and is very effective. Compact cameras have great difficulty in getting this effect naturally, without the help of software, and in software, needs to be done with great care, otherwise it will look clumsy and not natural.

To the other extreme, is a landscape photographer would use the largest Dof he/she can get away with, to try to ensure that most if not all of the elements in the picture is in focus. They would focus about 1/3 the way into the landscape, and use the Dof coming from the small aperture to get an in-focus image. This is called the hyper-focal distance, but discussion of this is outside the scope of this document.