

Depth of Field and the Aperture

The aperture is the main determinant of depth of field when using a camera. Open the aperture up and you will get less, close it down and you will get more. The question is: Why do you get more depth of field with a small aperture? To simplify things I will only be looking at the object side of the camera for this discussion. The same concepts apply on the object side as they do on the image side, so I will omit the image side for now.

Before we can get going, we need to define the circle of confusion in relation to the object side of the equation. We started by defining the circle of confusion in terms of the image. For a typical Nikon DSLR the circle of confusion is about 0.02 mm and the detector is about 23.6 mm wide. That translates into about 1/1200 of the width of the detector. To translate this to the object side you just need to know the width of your field of view and divide by 1200. This can also be written in terms of magnification as

$c(o) = c/m$ (where $c(o)$ = object side circle of confusion, c = circle of confusion, m = magnification)

As magnification goes down (i.e. The field of view enlarges) the $c(o)$ proportionally enlarges. As the magnification increases the $c(o)$ proportionally decreases.

