

# Auto Exposure or EDR?

## **Introduction**

Phantom cameras feature two methods of automatic exposure control. Auto Exposure and Extreme Dynamic Range (EDR) provide two different modes of exposure control to give the user flexibility in rapidly changing lighting conditions. These two features are mutually exclusive; therefore, the application will dictate the appropriate method to use.

Auto Exposure adjusts the overall exposure of the field of view based on the light level measured within a user defined area of interest. The user needs simply to input a gray scale level in the Options dialog window, click-drag a box in the image around the area containing the desired exposure, and check the Auto Exposure box to enable. Auto Exposure is beneficial when the overall lighting changes dramatically during a recording. As the lighting changes, the camera automatically adjusts the shutter speed to maintain a constant light level in the defined area.

EDR is a user defined, secondary shutter, applied on a pixel-by-pixel basis, based on the light intensity measured at the pixel site. When the light intensity reaches saturation in a group of pixels, the user defined EDR exposure time is applied to only those pixels overriding the global exposure time. The non-saturated pixels are not affected and employ the original global exposure time. EDR is especially useful for applications where a concentrated, high intensity light source enters the scene.

## **Auto Exposure Applications**

Auto Exposure is most useful in constantly changing lighting conditions. Cloud movements can affect exposure by two to three f/stops. To use Auto Exposure most effectively, it should be set using the longest acceptable exposure time with the lens stopped down. Once enabled, open the lens iris to the widest aperture. The camera will automatically increase the shutter speed to compensate for the additional light. When set in this manner, the user allows for either a brightening or darkening of the overall lighting while maintaining a good overall exposure.

Applications that benefit most from Auto Exposure include:

- Outdoor Ranges where cloud cover is present
- Object tracking where the background changes dramatically
- Object tracking where the target enters or leaves a shadow
- Tests where a high intensity light source adds additional illumination to the area of interest during the recording.

## **EDR Applications**

EDR is especially effective where “hot spots” do, or potentially, exist. By selecting an EDR exposure time that is one-half to one-quarter of the global exposure time, the user can reduce the number of saturated pixels within the scene. This allows the user to extract data from an area where otherwise, the data are lost due to over exposure. The surrounding pixels remain unaffected and are exposed normally. Traditionally, users had to choose between exposing for the bright areas and underexposing the rest of the scene, or exposing for the overall scene and sacrificing the data in the overexposed areas. With EDR, a good exposure is possible for both simultaneously within the frame.

Applications that benefit from EDR include:

- Rocket engine plume analysis
- Missile and spacecraft launches
- Ordnance testing where a fireball is present
- Ballistics testing where muzzle flash is present
- Recording of objects with highly reflective surfaces
- Any scene where “hot spots” are present

Keep in mind that the ratio of the EDR exposure to the global exposure will affect the overall image quality. As the ratio increases, the contrast will be reduced resulting in a “flatness” of the image. At very high ratios (greater than 3:1) the image will display noise that appears as graininess in the image. For some applications reduction in image quality may be unacceptable. However, the effect of EDR in capturing valuable data that would otherwise be lost due to saturation, may be deemed worth the degradation in overall image quality.