Digital Photography for Model Railroading

by David King

Background

People have been capturing images for quite some time now using various medias. At first the images were captured by sketching, drawing or painting. Then the early days of photography were born with Daguerreotype and progressing to silver nitrates on paper, glass and even tin plate, later this moved to cellulose acetate of as it is more commonly known as print film and slides. We have seen the sheer number of images explode as the media became more friendly for the average person. This has never been more true than it is today with the advent and variety of digital cameras that are now everywhere. We use them more and more since we find them on our computers, in our phones, small point and shoots and even full blown professional versions.

One thing that has occurred due the huge growth in the number of images is that the average quality of these images has lowered. This is mostly due to the fact that the majority of the people haven't taken the time to learn how to capture a better image and secondly this has occurred because people just don't think of what they are doing as it has become part of everyday life. It only takes a few short steps to become a better digital photographer. Let us get started.

What is the Image for?

This is a question you need to ask yourself before you even take your camera out of your pocket or out of the camera bag. Is the image being used for documenting, is it going to be used on the internet, is it going to be printed in the newspaper or magazine, or is it possibly going to be used as a high art image in a calendar or hung on the wall? All of these are valid questions and need to be considered right away. If you don't take the time to ask yourself this question them you will most likely capture a snapshot and not a photograph.

I could go into each of these uses in detail but we can't cover that in just the hour that we have so let me get started by looking at just three of the possible uses, internet, magazine and calendars. Each has some differences and some commonalities. We will start with what is common.

Commonalities

All images need to be free from distractions. What I mean by this is that we should not include items that draw our eye away for the focal point of the image. This is easier said than done as you will some see. Staging your image is important because we need to do as much as possible to capture the image well when we press that shutter or we will end up with many hours of post processing the image, I'll talk more about this when I go through the work flow.

When setting the scene on a layout we need to have a good look using the camera to see what the camera sees and not everything at once. A camera has a limited field of view and is unforgiving in what it captures. Your eyes and brain are much more forgiving and this works against us when we are trying to capture images to share with others. If a large dust bunny is in the scene our brain will tend to ignore it but the camera will capture every fiber of that dust bunny. The same applies to cobwebs, dust, glare, missing foliage, front edges of the layout, seams in the backdrop and unwanted shadows. This is only the start of the list. As you may now start to see is that the image starts to be created well before the press of the shutter.

Next you should be considering the angle that image needs to be captured. What I'm referring to is perspective. Most of us walk around a layout or a model and view if from the bird's eye or helicopter view. This is only natural as we tend to be standing up and don't crawl around as a matter of habit. This creates images that are unrealistic and generally are not as pleasing to view. We need to get much lower into the scene so that we are viewing the image from a more realistic angle. This can be awkward as it is not always easy to get ourselves or even the camera into the best viewing spot. We are much larger than the subject we are trying to capture.

The third thing to consider is the lighting. In our world we only have one sun outside so all of the shadows are in one common direction and so it should be on a layout when capturing the image. Fortunately for most of us we are going to be capturing images of our layout or that of people we know so it may be possible to arrange a time when this is the main purpose for being there. I would not suggest this be done on an operating night or an open house if the layout is that far along. Unlike capturing images outside we have much more control over the environment. You may need to turn off most or all of the lighting over a layout to set the scene. This will also mean that you might be required to bring your own lighting so that you have full control, you get to play God here. Also you will need to watch out for unwanted shadows that fall on backdrops, buildings, windows or other places that create distractions. As well as one main source of lighting you may require fill lights, lights of lesser intensity used to eliminate shadows or improve the contrast, or reflective cards, typically white cards used to reflect the light from the main light onto dark areas.

The last of the common elements is to use your camera to the fullest it can be used. A large misconception in the digital world of photography is that you need lots of pixels, well this is just not true. A three megapixel camera may capture a more pleasing image than a 21 megapixel camera if it is done correctly. Use the whole sensor! Your camera has a sensor in it that is used to convert light data into bits to be processed inside the camera and later viewed or manipulated on a computer. A three megapixel image that has been captured utilizing the complete sensor will yield a higher quality image than only using 10% of the 21 megapixel image or in other words about two megapixels. To utilize the full size of the sensor you will need to decide capturing the image in either portrait or landscape mode. Any cropping of the image results in a loss of pixels.

Differences

As I mentioned at the beginning it is import to know what you are going to use this image for once it has been captured. Different final uses have different needs. If the need is to upload this image onto the internet or just view it on a computer screen the resulting final image will only be of a relatively low resolution. What that means is the the image will be viewed on a device, computer screen, that displays 72 dots per inch (dpi). So an image that is 1600 pixels wide by 1200 pixels high will be 22.2” wide and 16.6” high when viewed on a monitor that is set for 800 x 600 resolution. This would be a large image on the internet and it is less than 2 megapixels in size. A more realistic size of image for use on the internet would be 576 pixels by 432 pixels, 8” by 6” or 250,000 pixels.

The next level of image would be for use in newspapers. If you happen to be capturing an image for a news article they will need to be able to print it out. In this case you may not know what the final image size will need to be but you can help them out by using all of your sensor. The newspapers tend print in resolutions of 75 lines per inch (lpi) to 120 lpi which is 150 to 240 dpi. The newspaper is a slightly higher dots per inch rate than a computer monitor. So that 1600 by 1200 pixel image from earlier could be printed from 10.6” by 8” to 6.6” by 5”. Still not bad but maybe a little small for the front page.

Next would be a printed magazine ranging from newsstand items to high art magazines. Their needs will vary depending on the printing process used. Most magazines print from 250 dpi for newsstand items to 600 dpi for high art. The range is very large and your 1600 by 1200 pixel image will vary greatly in this range. At the 250 dpi end your image would be 6.4” by 4.8” and at 600 dpi it would be 2.6” by 2”. As you can see in order to have a full page image printed in a high art style magazine that is 8” wide and 10” high would need an image of 4800 pixels by 6000 pixels or 28.8 megapixels. Very few of us have the equipment needed to make an image that large, but thankfully very few magazines ask for this level of image.

A more likely size of image would be of that used in a calendar like the one produced by CARM that prints at 300 dpi. The image used is about 10” wide by 7.5” high resulting in a final image of 3000 pixels by 2250 pixels or in other words just under 7 megapixels. Many of todays cameras produce images in the 8 to 12 megapixel range making them very useful.

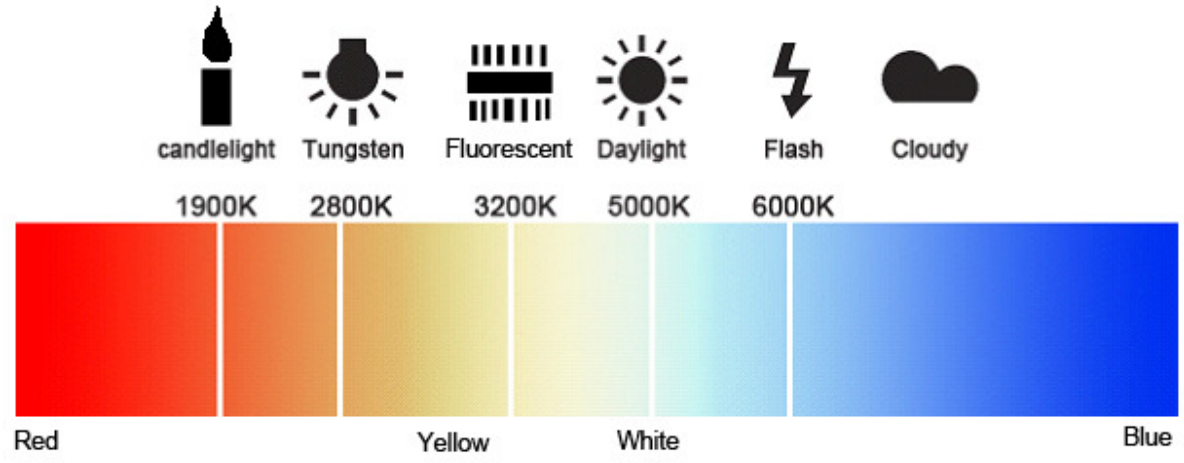
Technical Considerations

There are many technical considerations that need to be thought about when capturing these images and you really need to consider them and know how to use these features on your camera. Most cameras including the point and shot styles that many or most of us have will have the following features and we will look at each of these.

- White Balance Setting
- Manual Focus
- Aperture Setting
- Speed Setting
- Self-Timer

White Balance

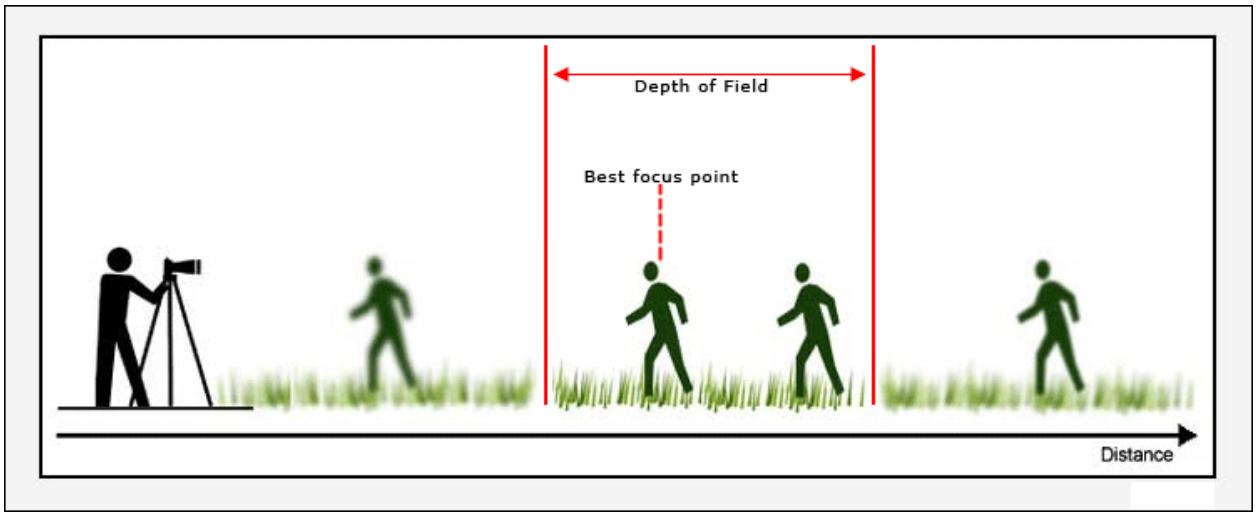
Setting the white balance will result in images that true to the colours that our eyes see. The camera that you are using most likely has something call Auto White Balance (AWB) but this is not the best setting for us to use. The AWB will try to determine how to adjust the colours in the image to best meet what has been programmed into the camera. The AWB usually does a good job in outdoor scenes, gardens, wide shots in gymnasiums, and at sporting events but does a poor job when it comes to close-ups or custom lighting. Remember earlier I talked about controlling the lighting we use and also the need to control the type of lighting. You should try not to mix different types of lights together, as an example don't use both tungsten and fluorescent lighting in the same scene. Using just one type of lighting will improve your white balance. Many cameras will let you select between tungsten, fluorescent, daylight, cloud, etc. Each of these settings will vary the colour hue in the camera by internally adjusting the Kelvin temperature used. Some camera even let you set the Kelvin temperature setting directly. Daylight would be a setting of about 5000 - 5500 degrees and tungsten light would be about 2800 degrees. Just in case you were wondering candle light is about 1900 degrees.



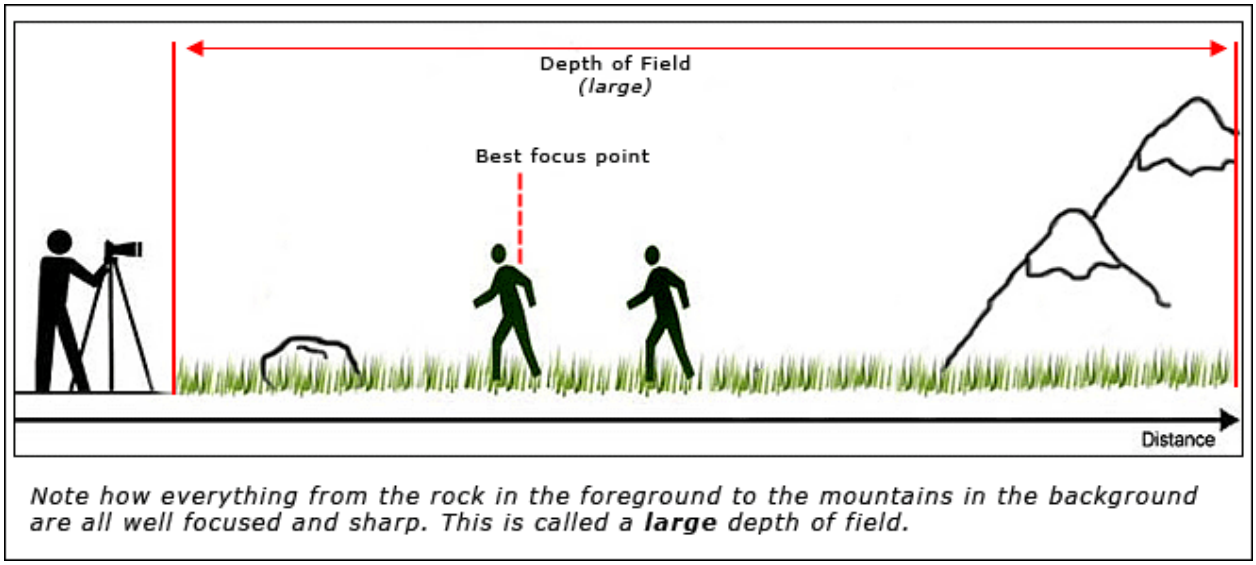
Manual Focus

Using the manual focus will result in improved images as you will be able to set the optimum focal point. Ideally we would like to have everything in the image to be in sharp focus but this not always possible so we must compromise when capturing the image. When capturing images where the camera lens is close to the subject the range of focus or as it is more commonly called the "depth of field" is the range of distance that is in focus. The sharpest focal point will be 1/3rd of the way into this range with the

balance of 2/3rd of the area behind the focal point. The depth of field can be increased to improve the focal range by using some of the other features I will mention shortly. Again by precisely choosing the optimal focal point we can control what is in focus and what is out of focus in the image.



In this example the depth of field is very narrow. This would happen with a setting such as f2.8.

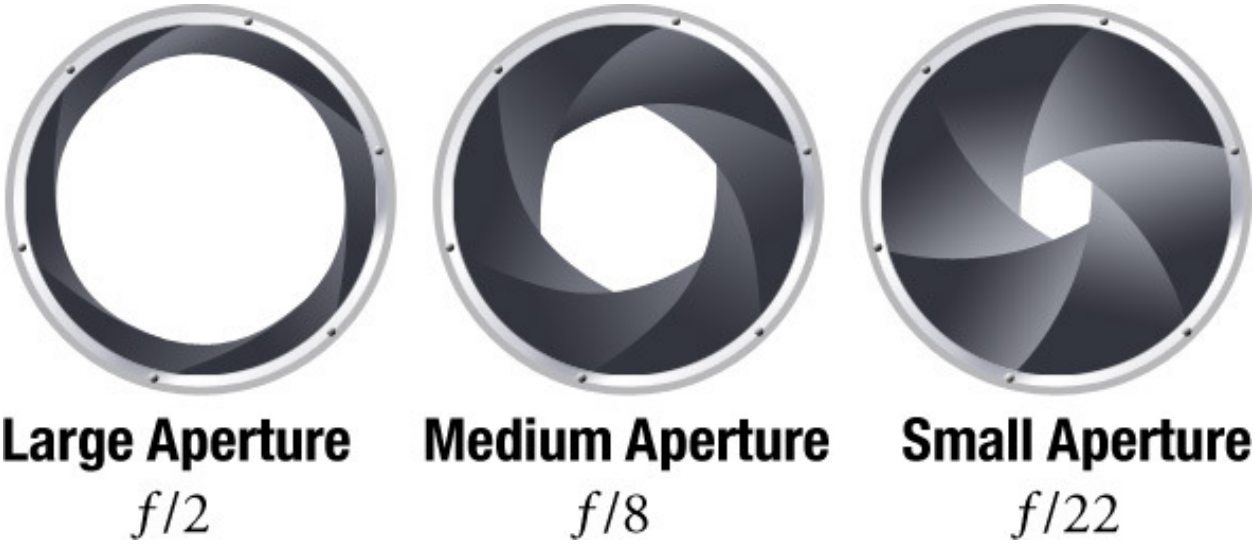


In this example the depth of field has been increased largely by closing down the aperture setting to a much higher number such as f8.0 or more.

Aperture Setting

The aperture setting in your camera is used to determine the quantity of light that is going to reach the sensor at any given moment. The less the amount of light will reach the reach the sensor the greater the range of focus, depth of field, will be in the image. What happens here is that the sensor needs to take more time to record an image so that each pixel on the sensor can gather enough light to properly expose the image and

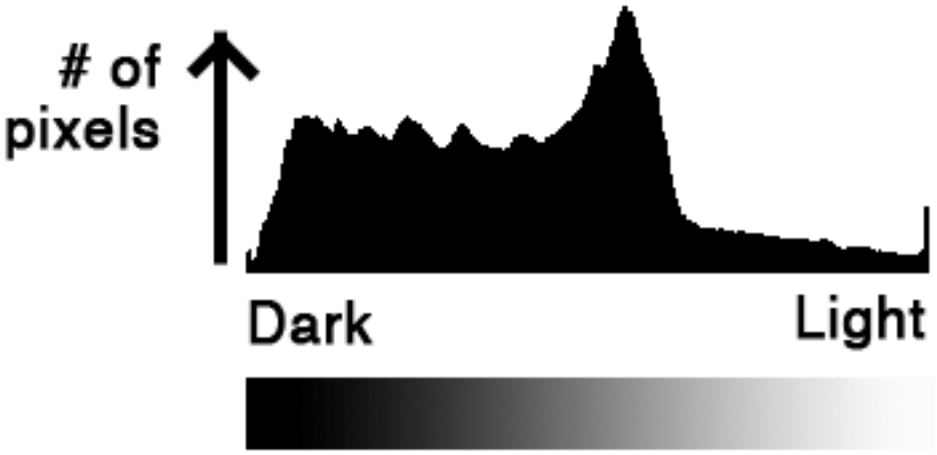
this increases the range that will be in focus. You can try this on your own be by closing one eye and placing your hand very close to your face to the point that your eye can no longer focus on your hand. Leave your eye lid wide open for this first part. Than squint your eyelid and you will see that your hand will then be in focus. This is the same principle that is used in the camera by setting the aperture. The numbering system used by your camera is the f-stop measurement. A small number such as f1.2 or f2.8 is used to represent a large opening, letting in a lot of light. A larger number such as f16 or f22 would represent a much smaller opening. Now don't be upset if the camera or camera/lens combination that you are using doesn't have this big of a range. My professional lenses when used on my pro digital SLR does have these types of ranges but my Canon G11 point and shoot camera only has a range from f2.8 to f8.0. Just use the highest or next to highest number that is accessible on your camera/lens combination.



Speed Setting

This is the next setting we should be concerning ourselves with in order to capture better images. The speed setting will need to be adjusted to a value that will result in the proper total quantity of light reaching the sensor in order to properly expose the image. What this means is we want enough light to properly illuminate the scene but not so much to cause what is referred to as blow-outs. Simply blow-outs are pixels that have been saturated to the point that they can no longer record any more light during the capturing process. These pixels will appear as pure white in the final image. There is no editing that can be done in the final post-processing to correct this shy of replacing the pixels with some other value. The opposite of a blow-out is a pixel or area of pixels that see no light. These would as pure black spots on an image. Similar to blow-outs there is no detail in these areas and these spots cannot be fixed in post-processing without replacing the pixels with some other value. In your image you will want to avoid having both pixels that are over exposed or not exposed at all unless this is the desired effect.

To aid you some cameras have a histogram that can be displayed on the view screen either when capturing the image or after capturing the image. This is a handy feature for this type of photography as you can adjust your settings so that the graph doesn't push itself towards the left edge, pure black, of the right edge, pure white, of the frame. Another feature of many cameras is a "highlight" setting that will flash on the areas of the image in the view screen that are blown-out.



Self-Timer

By now if you are trying out these features you have most likely noticed that the speed setting has been increased to a point you can no longer hold the camera steady during the whole exposure. This can be a problem anytime you increase the time to a setting of more than 1/60th of a second. But you may be saying that your camera has image stabilization or anti-shake so you can hold it steady for a much longer time. The reality is that you may not be as steady as think. When you review that image on the back of the camera it may look good but start increasing the image size so you can view it on a computer monitor or as a printed image and you may be not so pleasantly surprised. A tripod or some other stable surface maybe required to steady the camera enough to capture a sharp image. This may still not be enough since when we press the shutter release we are causing the camera to shake ever so little. Even this little movement could be enough to cause the captured image to be slightly out of focus. To take of this we need to do two things, first we need to turn off the image stabilization or anti-shake feature and than set the self timer mode. On many camera this will be a selection of 2 or 10 second delay. Either setting will give you plenty of time to press the shutter button and get your hand out of the way. he camera will do the rest.

Equipment that can be used

The choice of equipment can vary greatly and not everything listed here is required, this is just some of the equipment that I choose to use for basic model shooting.

Camera	Tripod
Lights, Clamp-on with Daylight Lamps	Reflective Cards, Paper
Green Painter's Tape	Light Absorbing Cards, Paper
Spare Batteries	Spare Memory Cards
Laptop Computer	All needed cables
Small Brushes	Extension Cords

Wrap Up

As a quick wrap up the workflow is as follows;

1. Decide how the image is to be used.
2. Compose the image to minimize the distractions.
3. Use the complete sensor.
4. Set the White Balance
5. Manually Focus the Scene
6. Set the Aperture
7. Set the Speed
8. Set the Self-Timer
9. Take the Shot
10. Review the Shot
11. Repeat the previous steps as needed.
12. Have Fun!