

HDR (High Dynamic Range) Images

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Using digital photographic tools allows us far more control over photographs than we had using traditional tools. With film, especially slide film, we knew that we couldn't capture more than a few stops of exposure without either over or underexposing parts of the picture. Using a graduated neutral density filter was a convenient way to compress the range of the exposure, but it really only worked on a straight horizon.



Figure 1: An (exaggerated) example of a grad filter used on an inappropriate image.

A view such as the one above would not work well with a grad filter, primarily because of the irregular boundary between the bright and dark parts of the scene. However, a digital camera gives us a whole new set of possibilities for producing this picture so that it expresses the scene as we remember it or wish it to be seen.

The current technique for producing high dynamic range photos is to take more than one picture of the scene, optimizing the exposure in each shot for a different part of the scene, then to combine these shots into one finished product.

Photoshop CS2 has the ability to automatically combine identical pictures of different exposures to produce a picture with optimum exposure throughout. Of course, you have the ability to decide what is the optimum exposure.

You can also do this combining activity manually, sometimes with better results than Photoshop can give you. Here are the steps to follow for both techniques.

Pictures Used in Presentation



Figure 2: Three shots, each at a different exposure, optimized for one particular part of the scene. All the shots are in perfect register.

At the shoot

You have to plan your photos in order to successfully use either of these techniques. Here are some steps to follow.

- The most important step is to shoot from a tripod. Each photo you take must exactly align with each other photo.
- If you are shooting JPGs, set your white balance to some specific value other than automatic. If you are shooting RAW, this step is optional because you can set this later in the processing stage.
- Take a series of photos, changing the exposure of each to properly expose all parts of the scene. It is best to change exposure by varying the shutter speed, not the aperture, so the depth-of-field stays constant. Be very careful not to bump or move the tripod during the exposures.
- The number of exposures depends on the different brightness values in the scene. Taking more shots than you need is preferable to missing the one that gets the exposure right on.
- Try to get about a one-stop difference between shots.

Tip: Take a picture with your hand covering the lens before and after the group you intend to use for your finished photo, so you remember which photos go together in a group.

Back at your computer

- If you took your shots in RAW format, process them prior to starting the HDR merge process.
- Make sure that you set the white balance and any other controls the same for all of the pictures. Do not try to adjust for exposure on each of the photos; just make sure that the part of the scene you were exposing for is correct.
- Leave the pictures in 16-bit mode (if your camera produces that mode), as you want to get as much range from the individual photos as you can.
- Process the individual photos to some format other than RAW (PSD is best, TIFF is fine. Don't use JPG).

Using the Photoshop Method

Set up the image

- In Photoshop, go to the **Automate** Menu and click **Merge to HDR**.
- Select the images you want to use (you can browse for them) and click **OK**.
- Photoshop will present you with a Merge to HDR window.
- The thumbnails on the left side of the screen show you which of the photos have been included in the merge. You can remove any you don't want in the final merge by un-clicking the check box next to them.
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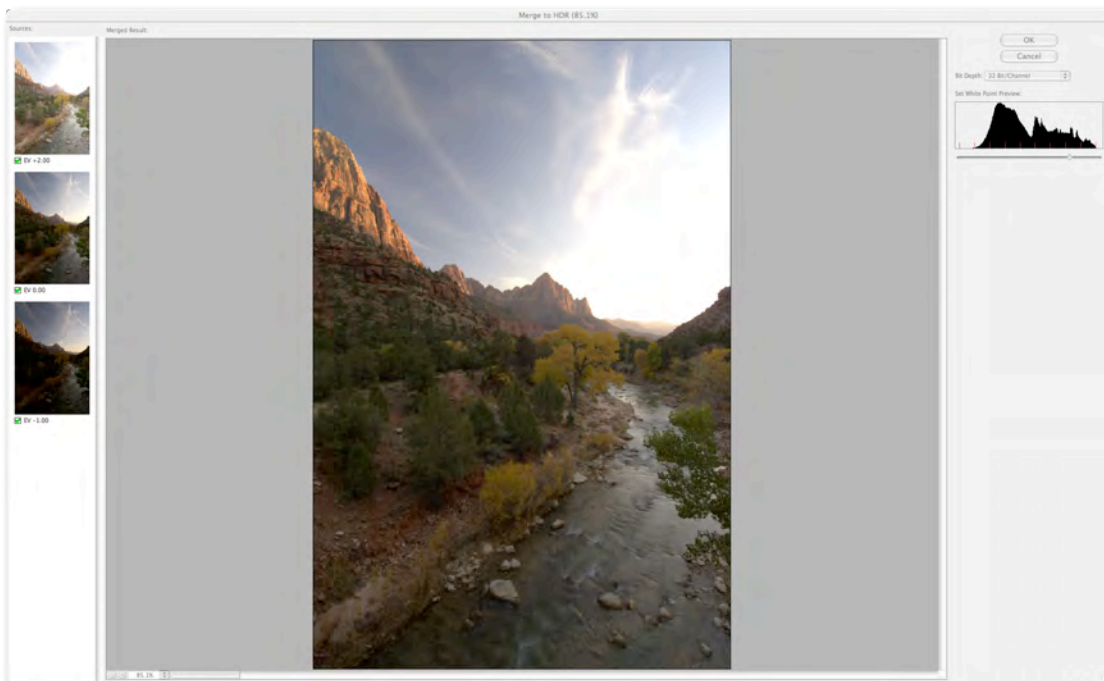


Figure 3: The Merge to HDR screen, showing thumbnails of the included photos, and a histogram of the composite shot.

Adjust the Exposure

- Slide the little control under the histogram to the right of your image all the way to the right. The image will become darker and flatter looking.
- Select 16 Bit/Channel for Bit Depth, and click **OK**.
- After some calculations in Photoshop, you will see a HDR Conversion dialog box.
- Four methods are presented in the drop down Method list: Exposure and Gamma, Highlight Compression, Equalize Histogram, and Local Adaptation. You want to use Local Adaptation, so select it. Your picture will probably look awful! But wait...
- Adjust the Black Point with the left dot on the histogram by moving it to the start of the data.
- Adjust the White Point with the right dot in the same way.

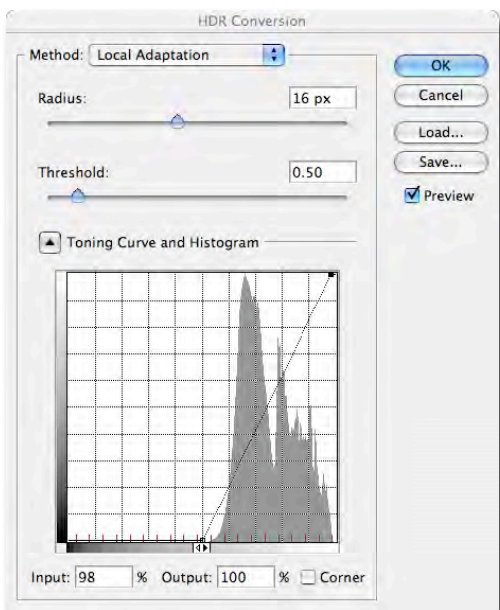


Figure 4: The Local Adaptation dialog box.

- Now adjust the curve to increase contrast to your liking.
- Adjust the Radius slider so that the curve affects more or less area than where the actual curve runs.
- Now adjust the Threshold to lessen any halos that have appeared from increasing the Threshold.
- Click **OK** when you are satisfied with the resulting image.
- Now you have a balanced image to adjust in Photoshop using your favorite methods and tools.

Using the Manual Method

This method usually works best with two images, however, if you need more pictures in order to cover the dynamic range, do two at a time, using the following steps.

- Open the images in Photoshop.
- Pick one image. It doesn't matter which one. Select the Move tool (v), and move all the other images on to it (as layers) while holding the Shift key. This does a pin-register, keeping the images in perfect alignment.
- After transferring the image, you can close the one you transferred from.
- If you placed the darker one on top of the lighter one, you are going to want to allow the lighter one to show through in certain areas. If you did it the other way, you're going to allow the darker one to show through. We'll do this with masks.
- Click the Layer Mask adjustment layer button at the bottom of the Layers Palette.

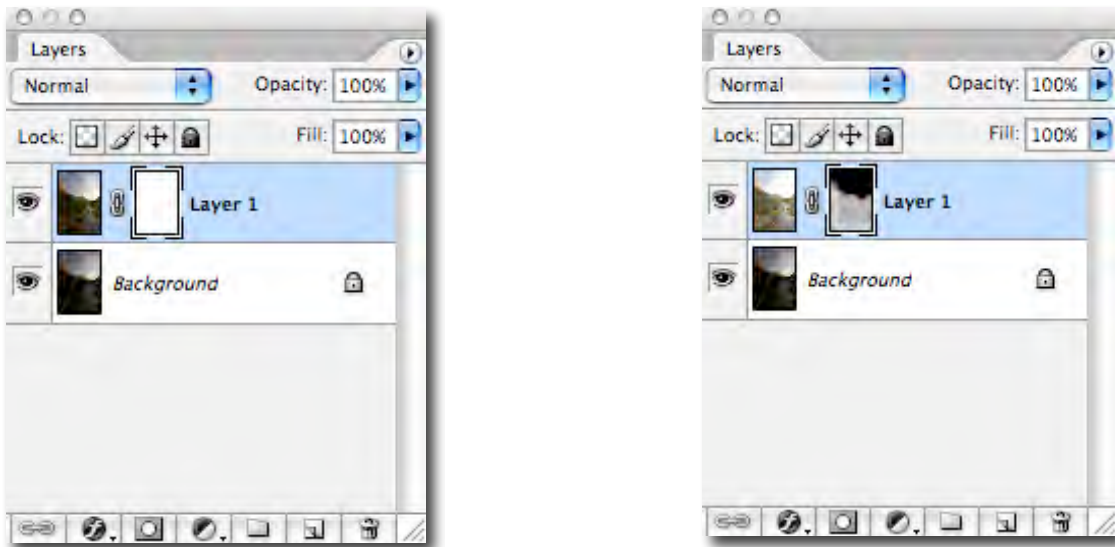


Figure 5: Adding a mask to allow selected parts of one layer to show through to the other.

- With masks, use White to Reveal, Black to Conceal. Make a determination whether you want to paint to allow the lower layer to show through, or paint to conceal.
- If you want to paint to reveal, first fill the mask with black (make black the background color, and press Command-Delete (Alt-Delete)).
- Assuming you did this, make white your foreground color, press B for the brush tool and select a fairly large soft brush.
- Start painting on the mask, using a low opacity (about 10-20%) to start allowing the lower layer to show through.
- Follow this method until you get the desired exposures.

The Finished Picture



Figure 6: HDR merge done manually

References

Use these references to get a more detailed look at what you can do with HDR images.

1. *uptospeed: Photoshop CS2*, by Ben Willmore, Copyright 1995 ISBN: 0-321-33050-1
2. *How to Wow: Photoshop for Photography*, Second Edition By Jack David and Ben Willmore, Copyright 2006 ISBN 0-321-35750-7