High Dynamic Range (HDR) Photography
By Tony Mistretta, Nov. 12, 2009

Why HDR? Dynamic range (DR) refers to the range of brightness levels found in an image. We often encounter scenes that have more dynamic range than digital cameras are capable of recording. The human eye can see a range of about 14 exposure values (EV, also known as f-stops), whereas most digital cameras can only record a range of about 8 EV in a single capture. The result is an image that contains far too much contrast, with black shadows at one end of the scale and blown highlights at the other.

HDR takes several photos taken at different exposures and blends them into one image, preserving the shadow detail from the highest exposure and the highlight detail from the lowest exposure. The results can sometimes look dramatic, surreal and even cartoonish (it can be way overdone), but also can be made to look quite natural.

Advantages:
- Enables you to create an image from a high contrast scene and preserve highlight & shadow details
- Great for landscapes and indoor scenes with windows
- The results can be absolutely amazing

Disadvantages:
- You need a tripod. You can try to improvise without one, holding your camera as steady as possible, but for best results you should use a tripod.
- If there is movement during your multiple exposures, due to wind or for any other reason, you will have "ghosting" in your final image.
- The results can sometimes look unnatural, which some people don't like. On the other hand, some people like this effect.

Recommended Image Capture Method:
- Use a tripod and wired shutter release to capture your multiple images
- Shoot in RAW mode to capture the most information and image depth
- Use the lowest possible ISO to limit image "noise" – however, beware of wind movement on longer exposures
- Set your camera on aperture priority and automatic exposure bracketing, +/- 2 EV if your camera offers this setting. This will keep your aperture constant and vary the shutter speed to achieve the exposure bracketing.
- Take 3 photographs in rapid succession, one at 0 EV, one at -2 EV, and one at +2 EV. The reason to shoot in rapid succession is to minimize movement or "ghosting" within your image.
- If your camera does not allow +/- 2 EV automatic exposure bracketing, you can set each exposure manually.
- Alternatively, you may take 5 exposures at -2, -1, 0, +1 and +2 EV
- In a very high dynamic range scene, you may need to take 5 exposures at -4, -2, 0, +2 and +4 EV
- In the lightest photo of the sequence, the darkest shadows should be at least in the mid-tones part of your histogram. Similarly, in your darkest photo, the brightest highlights should be well away from the right edge of your histogram. If this is not the case, you will have to add one or more photos taken with longer or shorter exposure times.
- You can also create a pseudo-HDR image from a single RAW file that is processed at different exposure levels. While this is not a true HDR image, it can be made to look a lot like one. And a tripod is not needed for this!

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Software:
- Photomatix is the most commonly used and highly rated software. You can get a free trial download, and then after the trial period the purchase price is $99, well worth the price in my opinion. http://www.hdrsoft.com/
- Photoshop CS2, CS3 & CS4 have HDR photo-blending capability
- Photoshop Elements v.8 (the latest version) has HDR photo-blending capability
- There are a number of other software programs, including some free ones! See http://wiki.panotools.org/HDR_Software_overview for a summary of their features and capabilities. Or just try searching for "HDR software"

How the software works: Photomatix (the latest version 3.2.6) is a stand-alone program, but it can be configured as a plug-in to Lightroom Export and/or to Photoshop with additional software. There are several different ways to use the program. You can start with your camera-generated RAW files, and Photomatix will convert them for you, but they recommend that you use your own separate RAW conversion program to generate tiff or jpeg files first, and import these into Photomatix.

Then you have an option of either "Generate HDR Image" or "Exposure Fusion". Exposure fusion is the easiest and simplest. It simply blends the images, has a natural look and doesn't create much noise. The result, however, may look flat and lacking local contrast.

"Generate HDR Image" will combine the images and create an HDR image file, which then must be tone-mapped. You may save the HDR image file to try tone mapping it in different ways. There are two methods of tone mapping. "Details Enhancer" does a great job with details, but may also emphasize any noise that your image may have. Haloing can also be a problem, but this can be minimized with the light smoothing options. "Tone Compressor" can create a more natural-looking result, but does not bring out the shadow & highlight details as well as Details Enhancer. You can try both options at once because they are on separate tabs of the same user interface. Both options have several different parameter slider controls to tweak your image and the results can be seen immediately in the preview window as you play around with these. Different images will look better with different settings. When you're done tweaking, click on the "Process" button, and voila, there you have your result, which you may save as either a tiff or jpeg file.

I usually take my Photomatix created HDR images and work on them more in Photoshop, using curves and sometimes Topaz Adjust or Nik filters to bring out more contrast, color saturation and details. Selective burning and dodging, healing and cloning may also be desired. Noise reduction is often best done with a specialized noise-reduction program.

Get Inspired: There is a wealth of HDR photography reading material and examples on the Internet. Some of it can be very technical, but try not to get too bogged down with understanding all of the underlying scientific principles. The best way to learn is to get out and play!

A good (and humorous) HDR tutorial: http://www.stuckincustoms.com/hdr-tutorial/