Nik HDR Efex Pro

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High **D**ynamic **R**ange

- What is dynamic range?
- The difference between the brightest and darkest points in an image.
- Usually measured as a straight ratio (Contrast Ratio) or in Stops (Exposure Value) where 1 stop = 2 * contrast ratio

Why does Dynamic Range Matter?

- The dynamic range of typical everyday scenes often exceeds the dynamic range capabilities of the image recording system

Component	Dynamic Range	Stops
Typical scene (Interior with window)	100,000:1	16.5
Human eye	1,000,000:1 (or more)	22.6
Best DSLR Sensor (Nikon D810)	28,500:1	14.8

Why does Dynamic Range Matter

- Output devices have even lower dynamic ranges

Component	Dynamic Range	Stops
Best LED screens	2000:1	11
Printer	200:1	8

A Typical Example

Steps to Produce an HDR Image

- 1. Make multiple exposures of the same scene using different exposure levels
  - Use a tripod if possible
  - Three exposures (-2, 0, +2 EV) usually produces good results
  - Keep ISO and aperture constant and vary shutter speed
  - Use Auto-Exposure Bracketing if your camera supports this

Steps to Produce an HDR Image

- *Remaining steps are done using post-processing software, in camera or out*
- 2. Auto Image Alignment
  - Not necessary if all images were shot on a tripod
  - Relies on well defined vertical/horizontal edges in the image
- 3. De-ghosting
  - Required where something has moved during the time that the multiple exposures were taken
  - Uses one of the exposures as a static reference source for the moving elements

Steps to Produce an HDR Image

- 4. Exposure Blending
  - Merges the source images pixel by pixel to select the best detail at each location.
  - The resulting image has a dynamic range equivalent to the combined dynamic ranges of all the source images eg 14 +4 = 18 stops.

Steps to Produce an HDR Image

- 5. Tone Mapping
  - Compresses the dynamic range down to a level that can be handled by an output device while still preserving the full range of detail from the HDR image.
  - Most HDR software applies two levels of tone mapping:
    - Global tone mapping reduces all pixels according to their intensity. Tends to result in very "flat" looking images
    - Local tone mapping will convert pixels of the same intensity to different values depending on their relationship to surrounding pixels. This adds "pep" to the image.
    - Most HDR software provides the user with control over the local tone mapping logic. Sometimes grossly misused!

HDR Image – Global Tone Mapping only

HDR Image — Locally Tone Mapped

HDR Images - Other Examples

- Gustave Le Gray – Brig on the Water 1854

- HDR Tutorial