

Streak Photography

Setup and Equipment

1. Connect a Sherline motion controller to a Mumford Rotary Platform.
2. Connect a Mumford Time Machine to a Canon 1Ds camera and the Sherline Rotary Controller (that controls the Rotary Platform).
3. Connect the Canon 1Ds via sync cord to a Profoto D4 studio strobe system (or good quality equivalent). I use a 2400 watt/second system so that I can shoot at f32, ISO 50 for maximum depth of field and minimum noise. You will get much better quality results if you have a strobe system that gives very consistent flash color and output. The Profoto D4 does this par excellence. (Thanks, Manny Minjarez of Pro Photo Supply for steering me to buy the Profoto D4.)
4. Connect a computer running Canon's Capture software via Firewire to the Canon 1Ds. While originally intended to drive the Canon 1Ds, it turns out the camera can drive it--namely when the camera is triggered by the Time Machine, the camera triggers the flash and then transmits the image to the computer for storage.
5. Then put the subject to be photographed on the motion platform, for example, a vase of flowers. Set up the Sherline controller to advance the platform 360/number of images. e.g. for 1,000 images, rotate the platform 360/1000 degrees (0.36 degrees) for each trigger received. Manually rotate the subject through a full 360 degrees, checking to ensure that there is no unwanted cropping of the subject.
6. Set up the Mumford Time machine to trigger once every seven seconds (a number determined experimentally to give time for the Canon Capture software to accept the image, and, of course for the Profoto strobes to re-cycle). Set the total number of images to be taken to be 1,000.
7. Take a seat and remain calm while 1,000 photographs are taken. It takes about 116 minutes to do this. If you are doing this at night, close the blinds and drapes because the bright flashes lighting up the neighborhood may alarm the neighbors. Ask me how I know.
8. Using Photoshop CS with Dr. Brown's Image Processor (free!), convert the Canon RAW images into JPEGs, applying the necessary color temperature and exposure compensation. It is easier to use the "open first image for corrections" strategy to achieve this.

Image Processing

Finally, I wrote a computer program that will process the resulting 1,000 JPEG files. (It was easier to find a Sun Microsystems class library that would read and write JPEG files than it was to find a class library that knows about Canon 1Ds .TIF files. Also, the use of JPEG means that I can correct the color temperature and/or exposure as the .TIF files are converted to JPEGs.) Thanks to my colleague Alan Purdy for his assistance with beating the Java class libraries into a pulp.

This program, named "streak," takes a given pair of pixel rows (e.g. 650, 651) from each of the 1,000 input JPEGs, creating a new image by writing each pair of pixel rows "down" the new image. For example, pixel rows 650, 651 from the first input image go to new image pixel rows 0, 1; pixel rows 650, 651 from the second input image go to new image pixel rows 2, 3, and so on.

Actually, "streak" generates a whole series of output images at a single sitting so I can then select the most interesting ones. On a 3.2Ghz Intel Xeon, with 2GB of RAM, converting the RAW files using Dr. Brown's Image Processor takes about two hours. (Alan is presently working on a version of streak that uses the free rawlib.jar class library -- thanks to the guys at www.through-the-lens.net -- so that we can read camera RAW files directly.) The streak program (recently optimized extensively by Alan), now takes about 30 minutes to create about 200 images, each made from different pixel rows down the image.

The big bugaboo is getting consistent lighting for each of 1,000 images. Any variation (such as if a strobe fails to fire, misfires, or fires late enough that the shutter on the 1Ds has already closed) requires careful adjustment using the Photoshop CS Camera Raw, and manually overwriting the JPEG created by Dr. Brown's Image Processor. That's where the Profoto D4 with Acute heads scores big-time. I did experiments with several different studio strobe systems (e.g. Speedotron), and found that the Profoto D4 stands head and shoulders above the other systems. The light output is amazingly uniform across 1,000 images, both in intensity and color temperature.

Part of the streak program deals with lighting inconsistency by sampling each pixel row and determining what light level is falling on the background (I use a projection screen so it has a nominal "white" value), then adjusting the R, G, and B, values to normalize the pixel row appropriately.

The final steps in image preparation involve Photoshop CS2. In general terms (that is, leaving out the details of feathering etc.), I create a background mask with the magic wand set to 14, non-contiguous. Then with the background color set to 240, 240, 240, I delete the original background and replace it with this uniform neutral grey. I then adjust the levels to optimize the image and perhaps boost the saturation about +5 to +10. Finally, I crop the image and using PixelGenius' PhotoKit Sharpener to do output and web sharpening for the print and the web images respectively.

I print the images on an Epson 4000 or an Epson R2400 using Enhanced Matte paper and using Epson's own profiles, which seem remarkably good compared to other profiles that Epson has put out in the past for, say, the Stylus 2000P.

References and Resources

The Mumford Time Machine <http://www.bmumford.com/photo/camctrl.html>

The Sherline CNC Rotary Table Controller <http://www.bmumford.com/rotary/index.html>

Review of the Canon EOS-1Ds http://www.dpreview.com/reviews/specs/Canon/canon_eos1ds.asp

Profoto D4 studio strobe system <http://www.profoto-usa.com/products/d4/d4.asp>

What's a watt-second? <http://photonotes.org/cgi-bin/entry.pl?id=Wattsecond>

Why use strobes? <http://webs.lanset.com/rcochran/flash/hotorstrobe.html>

Manny Minjarez <http://www.mannymanny.com/>

ProPhotoSupply <http://www.prophotosupply.com>

Dr. Brown's Image Processor http://www.russellbrown.com/tips_tech.html

RawLib for Java <http://www.through-the-lens.net/index.php?page=6>

PhotoKit Sharpener <http://www.pixelgenius.com/sharpener/index.html>