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Smoke Flow

The main purpose of the image is to capture the flow phenomena of a thick textured smoke. In this case pouring from a balled up piece of toilet paper. With this, I looked to capture the common flow transition of smoke, laminar to turbulent flow. The image was taken in a small controlled space surrounded by black boards. The boards were set to enclose the light, create a smaller set. This helped to ensure the smoke plume was full enough. The light source would be positioned to expose the flow in the most detailed way possible.

In the image, the smoke plume seems to move from a laminar flow stage to a turbulent flow stage very rapidly. At the base we can see a more controlled flow (laminar), which very quickly transitions to a more chaotic flow (turbulent). Here, I believe the rapidity of the flow's transition is due to a minor cross-circulating air flow in the room that the image was taken from. The image makes this rather clear as the smoke plume is angled towards the upper left of the image. The air current was so minor that I personally could not feel it moving, but the light matter of the smoke was affected and, as a result we see a dispersion that takes a very elegant form.

The source of the plume is just a piece of toilet paper. When balled up, the paper doesn't engulf in flame, it burns slowly giving off a thick plume of smoke.

This only happens for a short period of time. The ball will only smoke at its peak for about 30 seconds. So it's necessary to have your camera ready. Then, in order to capture the flow in the most intriguing state, I needed to place the lighting equipment in the most appropriate position. Here, I found that backlighting would bring out the best of the flow. For lighting, I chose the flashlight app on the iPhone and placed the phone in the back right corner of my "black box". This allowed the light to travel directly through the flow of the smoke. The camera would now be able to focus on the intricacies of the smoke's flow.

The photograph taken was captured on the Canon Rebel XTi , at a distance of 7 inches from the ember and smoke flow. The frame captured an area of about 7in x 4in. The original image resolution reading is 3888 × 2592 px. With only one light source (iPhone) in the entire room the lighting was low. With this, I had to choose an f-stop that would let enough light in to appropriately capture the flow. So, I chose F-stop 4, which allowed enough light from the phone but not too much. A focal length of 30 allowed me to get the proper focus on the smoke, this is what gives the smoke its detail. Lighting is also altered by the camera's ISO setting. Here it was set to ISO 400, which acted as a middle ground to balance the rooms overall darkness with the iPhones bright direct light. Also, it provided a shutter speed that enabled me to capture the flow before dissipating. After photographing the image, I took it into Photoshop for some post-editing. Here, I made some simple lighting adjustments to bring concentration to the flow. First, I darkened the floor panel to counter any over

exposure, which meant the smoke would be brightest area in the image. Then, I increased the vibrancy of the smoke and the ember in order to bring out any subtle colors. With both of these steps I hoped to give a wide range of contrast to the image.

The final image reveals the rapid transition from laminar flow to turbulent flow due to a slight cross current in the air. As the smoke changes to turbulent, it takes on the form of an expanding plume with crossing flows, which spread in a thick manner. The flow intended was captured, but in a slightly different manner than intended. I didn't plan for the cross circulation in the room, but I feel it was beneficial to the final image result. I think it would be interesting to reproduce the image in a perfectly calm environment to see whether the plume would flow differently.

