

Shadow-Image Marks on Color Films



THE BASIC PROBLEM

One very common form of minus-density marks on color negative films (plus-density marks on color reversal films) are shadow images. A shadow image is the result of foreign material either **on** (not in) the film emulsion or between the film and lens during exposure. The material blocks light from reaching the film in a small, localized area, resulting in a mark or spot in the image.

Although numerous materials can cause shadow images, the problem usually relates to camera maintenance and cleanliness. During normal camera use, dirt, dust, fibers, and other materials may accumulate in crevasses within the camera. As long as they remain out the optical path, they will not produce a problem. If subsequent camera handling dislodges these particles, they can enter the optical path and cause shadow images. For example, you can draw loose particles to the film surface while advancing the film. Winding film through the camera may generate a mild static charge that can attract small particles to the film surface. Particles on the surface during exposure result in sharp shadow images. Particles floating within the camera optical path, but not on the film, will cause unsharp shadow images.

35 MM CAMERAS

In 35 mm camera interiors, one common source of particles are film chips, which range from microscopic to significant size. 35 mm cameras use sprocket film-drive mechanisms. The sprockets often rub the edges of the film perforations, generating minute particles. Over-winding (attempting to advance the film beyond its limit at the end of the roll) can damage the perforations and generate larger particles. Any camera transport problems that result in torn perforations and damage can also generate particles.

Other sources of foreign material in 35 mm cameras include dirt and dust that can enter cameras when you change film and/or lenses.

When bulk loading film, reused magazines (cassettes) can contribute to the presence of dirt and dust in camera interiors. The plush pile used as a light trap in 35 mm film magazines can collect particles as the film is rewound, then re-deposit them on future rolls of bulk loaded films. Also with reuse, fibers from the plush pile can wear off and cause shadow images; in this case the shadow image may be fiber-like, rather than a spot.

MEDIUM-FORMAT CAMERAS

Cameras using 120 and 220 films have additional potential for shadow images. In addition to the opportunities for foreign matter to enter the camera during film loading and lens changing, many of these cameras have interchangeable backs. Each time you change camera backs or film inserts, the interior of the camera may become open to the environment. Whenever the camera is open, there is the opportunity for dust, dirt, and other foreign matter to enter the camera and produce shadow images.

Additionally, 120 and 220 films use backing paper for film transport. Wear at the edge of the paper can generate fine paper particles. This wear can occur as paper rubs camera edge guides or the edge flanges of film spools.

Any winding or tracking misalignment can increase wear on the edges of the paper. Paper tears can generate larger paper particles. Again, these particles can accumulate in the camera and be a source of shadow images.

Interchangeable backs require dark slides and light traps to facilitate changing backs. Light traps can trap foreign materials. Repeated insertion and removal of the dark slide can generate dust and dislodge loose fibers.

Regardless of the source, foreign materials may be attracted to the film surface during film advancing due to static charges.

OTHER ROLL-FILM CAMERAS

Other roll-film camera formats will have variations on the basic concerns noted above. Individual camera designs may also provide additional opportunities for particle collection and/or generation.

SHEET FILMS

Shadow images on sheet films can also result from some of the above factors. Because photographers often open sheet-film cameras in the working environment, the most common sources of shadow images are dust and dirt. Similarly, the light seals on the camera and film holders can collect foreign materials, and/or generate particles with wear. To prevent this from occurring, clean these areas regularly.

Shadow-Image Marks on Color Films

One common source, unique to sheet films, results from handling film after removing it from its sealed wrapper. Many photographers simply leave unexposed film in its three-part box without the protective wrapper when they anticipate using the remaining film shortly. Subsequent handling of the film box can result in film shifting within the box. The sharp edges of the plastic film base can wear on the paper lining of the box, generating dust and fibers. While it is less convenient, re-wrapping film tightly in the overwrap provided can help eliminate this source of dust and fibers.

THE ENVIRONMENT

As mentioned previously, the environment can be a source of the particles that create shadow images. We have all seen dust floating in the air in a beam of sunlight in a “clean” living room. Now imagine how much more dust is present in some working environments encountered by photographers. For example, industrial sites and busy roadsides have a high potential for dust and dirt that can enter an open camera.

PREVENTION

To minimize the presence of foreign material and resulting shadow images, take the following preventive actions whenever possible:

1. When loading film, changing lenses, changing camera backs, etc, open your camera interior only in the cleanest possible environment.
2. Clean your cameras, lenses (interior barrel and surfaces), and camera backs regularly. Although your equipment may look clean, chances are there are particles in hidden recesses that can float free during use. Shadow images from very small particles, not evident to the eye, could later show up on enlargements.
3. Keep your equipment in good working order. Tracking misalignments may generate particles from film, backing paper, or even the equipment itself.

4. Do not overwind 35 mm cameras. If overwinding or any transport problem occurs, clean the camera to remove particles that may have been generated.

Note: There are small vacuum tools on the market for cameras, computers, etc. These can reach into areas where a normal vacuum cleaner cannot clean. If the vacuum tool you use has fiber brushes, be sure that the fibers are firmly attached so they do not become sources of shadow images.

TREATMENT

Because shadow images are part of the recorded image, the only possible treatment for them is retouching of the film or print. As retouching is labor intensive and expensive, prevention is the best course of action.

RELATED ARTIFACTS

Other conditions that may be confused with shadow images include—

1. **Air bells.** Air-bell marks are caused by bubbles of air on the film during development. They tend to be rounder, softer edged, and larger than shadow images.
2. **Pinholes.** The term “pinholes” is sometimes used to describe minus-density marks such as shadow images on negatives. True pinholes are very rare and are actual holes in the film surface, as opposed to a mark where the surface is undisturbed and merely a photographic record as with shadow images and air-bell marks. The specific nature of pinholes may be evident only under a microscope. They may result from chemical splatters or other unusual conditions. Regardless of the source, they are extremely rare.

Kodak Professional