J. DENNIS THOMAS

THE ART AND STYLE OF PRODUCT PHOTOGRAPHY

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Since his father, James Thomas, first introduced him to photography over 25 years ago, it has been J. Dennis Thomas's obsession. He is also passionate about teaching others about photography and photographic technology.

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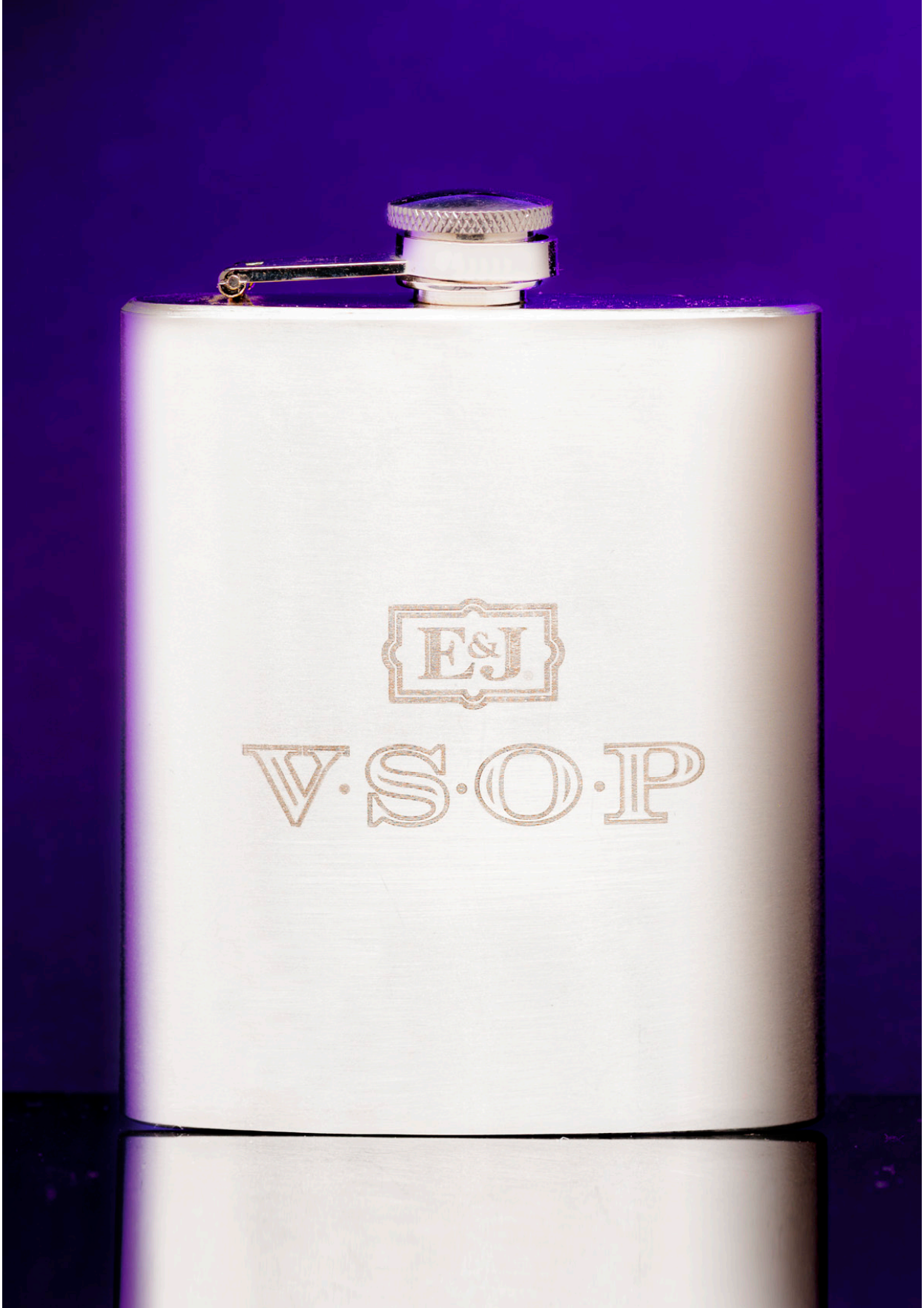
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CHAPTER ONE

CHOOSING THE ESSENTIAL EQUIPMENT

In this chapter:

- Cameras
- Standard Lenses
- Special-purpose Lenses
- Tripods
- Background Equipment

Product photography generally requires more equipment than other types of photography. In fact, illustrative product photography is one of the more expensive types of photography. It requires a substantial investment in incidental equipment, such as lights and modifiers, stands, backgrounds, special-purpose lenses, and more. Be prepared to create a budget and set aside money to purchase the necessary equipment. You could probably spend your life savings acquiring gear and never have exactly what you need for every shoot. However, there are many ways to tackle any subject, so even with a minimal amount of equipment, a superb image can be created.

Cameras

If you're reading this book, I'm going to assume you're serious about delving into the realm of product photography. You can search the web to find out which cameras are best for photographing products. You will find everything from recommendations for ultra-high-end, medium-format cameras all the way down to some folks who claim you can shoot great product photographs with a camera phone. While many camera phones produce decent-quality images, unless you're posting an ad on craigslist, I wouldn't recommend using one as your main camera. There are many camera options, including compact point-and-shoots, digital rangefinders, digital single-lens reflex cameras (dSLRs), and the most recent trend, mirrorless interchangeable lens cameras.

Product photography requires a camera system that can be versatile and flexible. So, while a good compact camera, like a Canon G1X or Nikon P7800, can certainly create perfectly usable product photographs, if you plan to do this type of photography with any regularity, you will be limited in what you can accomplish. The next step up is the mirrorless interchangeable lens camera. Because you can purchase different lenses (including macros) for these cameras, you can do a little more with them. This is a good option if you are doing many simple product shots for online sales, such as an eBay store or Etsy. However, there may be features that you need that aren't included on these types of cameras, like the ability to control off-camera flashes, limited lens selection, and other features that I cover later.

So, if you're serious about making a go at product photography, you need the most flexible camera with the features that you need to accomplish the job, like the Nikon D7100 shown in Figure 1.1. The dSLR camera is not only the best tool for the job, it is also the most economically feasible.

dSLR cameras come in many different forms, from basic entry-level to top-of-the-line, professional models. While it's not necessary to buy the flagship model with all the bells and whistles, be sure that your camera has all the features that you need right now, as well as features that you may want in the future. If you're making an investment in a camera system, you don't want to find yourself buying another new camera two months down the road because the one you initially bought doesn't do what you need it to do.

FIGURE 1.1 The Nikon D7100 is an inexpensive, yet very capable camera for capturing highly detailed product shots.

Here are a few important features to consider when investing in a dSLR for product photography:

- **Full-frame versus crop sensor.** For product photography, I don't see one format having a huge advantage over the other. Full-frame cameras are generally more efficient in low light, but product photography is almost always well lit so that it largely depends on your lens choice. When using a macro lens or shooting close up, a crop sensor camera can have a bit of an edge due to its increased depth of field. However, when using a perspective control or tilt/shift lens, a bigger sensor allows for an increased area for more drastic adjustments.
- **Resolution.** As you probably know, you measure a camera's resolution by the number of pixels on the sensor. The more pixels the sensor has the better the ability to capture fine detail in an image. For most general applications, such as web use or small printing in magazines I usually find that a resolution of between 10-14 megapixels is plenty. For product photography, however, I recommend using a higher-resolution sensor of 16-24 megapixels in order to capture the most detail possible. The 36-megapixel D800 is a great

camera for shooting high-end products where the best image quality is of the utmost importance. If you're shooting for a high-end company that wants the highest resolution and finest image quality to make large reproductions, more megapixels is better. Keep in mind that higher-resolution sensors also require higher-quality lenses to take full advantage of the resolution.

- **Optical low-pass (OLPF) filter.** Also known as an anti-aliasing filter (AA filter for short), these are filters placed in front of the sensor to intentionally create a fine blur in order to prevent artifacts, such as aliasing and moiré, from appearing in images that contain fine repeating patterns, such as silk or feathers (this appears as jagged edges or a rainbow-like pattern). Recently, camera manufacturers have started forgoing blur filters on new, higher resolution cameras because they are less necessary with higher resolutions. The D800E was the first dSLR with effective removal of the OLPF, and more recently, the Nikon D7100 and Pentax K-5 IIs were both released without an OLPF. As of this writing, Canon has not offered a camera with this option. A camera without an OLPF allows more fine detail to be resolved, but if you will be photographing mostly fabrics and materials that have more propensities for moiré and aliasing, you may want to go with a camera that has an OPLF. For most general subjects, I prefer a camera without an OLPF filter. There are software options that can aid in removing aliasing artifacts for the rare times it is an issue.

MEDIUM-FORMAT CAMERAS

In most high-end, professional product photography studios, you find a medium-format camera system. Most medium-format cameras have backs that attach to them, and much larger sensors and higher resolutions than a typical dSLR. Lenses for medium-format systems are also of the very highest quality. In short, for the ultimate in image quality, high-end product photographers in the advertising business use medium format.

Medium-format cameras provide the ultimate in image quality because the sensors are larger. This means they can resolve even finer detail than a dSLR. A larger sensor also means larger pixels (up to 80MP so far) which allows better light-gathering capabilities, which translates into a wider dynamic range. This kind of detail is needed for high-end advertisements that may be reproduced life size, or even larger.

Although medium-format camera systems, such as Hasselblad, Leaf, and the Leica S series, offer the best image quality, they do so at an astronomical cost. A simple medium-format camera with a digital back *without* a lens can cost upwards of $20,000.

While a medium-format camera is a great option for product photography, it's not really a necessity. However, it is something you may want to consider in the future.

- **Wireless flash triggering capability.** Most high-end cameras lack built-in features to wirelessly trigger off-camera flashes. Some cameras, such as the Nikon D800 and D7100, and Canon the 7D, offer the option of wireless TTL flash control using the built-in flash and dedicated camera flashes. This is a very convenient and affordable option to get into wireless flash lighting. Cameras such as the Nikon D3X and Canon 1D series require an optional commander unit. If you're on a limited budget (or even if you're not), this built-in wireless flash option is a great feature.

Standard Lenses

Lenses are arguably the most important part of your camera system. As I mentioned previously, in product photography a camera with higher resolution is preferable to capture the minute details of your subject. Also, with high-resolution cameras, the need for a lens that can complement a high-resolution sensor is of the utmost importance.

ZOOM VERSUS PRIME LENSES

A zoom lens covers a range of focal lengths, whereas a prime lens only has one focal length. For general photography, zoom lenses are preferable. They are versatile and can be used for just about any subject, including products. Zoom lenses are made up of many lens elements that move within the lens barrel enabling the lens to cover a range of focal lengths. In addition, there are two types of zoom lenses: Fixed aperture and variable aperture. A fixed-aperture zoom lens retains a constant aperture throughout the entire zoom range, while a variable-aperture zoom lens has an aperture that gets smaller as you increase the focal length. Professional zoom lenses have faster fixed apertures of about f/2.8, whereas consumer-level zoom lenses usually have variable apertures that can be much slower than higher-end lenses (generally from f/3.5-5.6).

For the most part, variable-aperture lenses lack the quality you need for high-end product photography. If you're looking for a zoom lens to do your product photography, I recommend buying a fixed-aperture professional zoom lens.

For product photography, I prefer prime lenses to zoom lenses. Prime lenses are smaller and generally sharper than zooms. Because product photography is done mostly in a studio or controlled environment, a zoom lens isn't the necessity that it can be for other types of photography in which you may face an unpredictable or changing environment.

WIDE-ANGLE LENSES

As the name suggests, wide-angle lenses give you a wide field of view allowing the photographer to capture more of the scene. Wide-angle lenses range from the ultra-wide, 12mm up to the moderately wide 35mm in full-frame (from about 10-24 on APS-C crop sensors). There are lenses as wide as 8mm, but these are fisheye lenses, which aren't corrected for distortion and create vastly distorted images. There is nearly no use for this type of lens in product photography.

In general, wide-angle lenses aren't commonly used in product photography. Product photography is generally done in medium to close proximity to the subject in order to fill the frame with the subject, and the propensity for wide-angle lenses to create perspective distortion and converging lines when close to a subject is a mostly undesirable trait for products.

The obvious difference that wide-angle perspective makes in an image is shown in Figure 1.2. In the top image, the camera was photographed using a longer, 70mm lens. As you can see, it appears normal. The lines are straight, and everything appears to be sized proportionately. However, in the image below, the same camera was photographed with a wide-angle lens of 17mm, and the camera appears distorted. The lines appear to be converging. The side of the subject closest to the lens appears to be much larger than the side facing away from the lens. The camera's lens is also misshapen, causing it to look more oval.

As a product shot, the image on top is more desirable because it appears natural to the casual viewer. As an artistic photo, the image on the bottom is perfectly acceptable, but for advertising, it would probably not be used except under special circumstances. Both images were lit by a Nikon SU-800 controlling a Nikon SB-900 Speedlight. The Speedlight was placed camera right and fired though a Profoto 1-foot × 1-foot × 3-foot softbox. A silver reflector was used camera left for fill light. The flash exposure was set to TTL.

However, wide-angle lenses are sometimes used creatively if the photographer desires to make the product appear different or unusual. Below are a couple of ways in which wide-angle lenses can be used creatively:

- **Photograph the product up close.** Using a wide-angle lens to photograph a product close up creates a perspective distortion that causes the subject to appear larger in relation to objects in the background. This also creates the illusion that the product is in some way superior.
- **Photograph the product at an unusual angle.** Using odd angles creates atypical converging lines that can add an interesting twist to an otherwise lackluster subject. This is a great way to draw a viewer's attention to an image.

FIGURE 1.2 Here, you can see the effect perspective distortion has on a subject. Exposure: ISO 200, f/16, 1/250 second, Nikon SU-800, Nikon SB-900 Speedlight, Nikkor 28-70mm f/2.8D AF-S at 70mm (top image), Sigma 17-35mm f/2.8-4 DG HSM at 17mm (bottom image),

NORMAL LENSES

A normal lens has a field of view that closely approximates human eyesight. This range comprises a fairly small portion of a lens range (from about 35-60mm on full-frame, or 24-35mm on APS-C crop sensors). However, these are very commonly used focal lengths because normal lenses visually render products in a way that is familiar to viewers and makes products easily recognizable.

Familiarity makes viewers feel comfortable with the product, which can put them at ease psychologically. This is ideal for many subjects, although it can sometimes appear so common that it causes a lack of interest in the viewer. Using dynamic lighting is a good way to draw viewer attention.

Figure 1.3 shows a crystal perfume bottle photographed with a normal lens to show the lines as they appear in reality. This shot was lit with a Smith-Victor 200ix FlashLite shot through translucent Plexiglas for a black line glass look (see Chapter 8).

FIGURE 1.3 This photograph was taken using a normal focal length. Exposure: ISO 100, f/16, 1/250 second, Nikkor 28-70mm f/2.8D AF-S at 50mm, Smith-Victor 200ix FlashLite.

A good normal zoom lens, such as a 24-70 (17-50 APS-C on crop sensors), is invaluable. This focal length is very useful because it allows the most versatility, going from moderately wide to short telephoto. If you can only invest in one professional-quality lens, this is my recommendation. A normal zoom can allow you to experiment with your angles and perspectives quickly and easily, especially if you are shooting handheld.

SHOOTING FROM A LOWER ANGLE Shooting a product from a lower angle makes it appear large and/or commanding. Sometimes referred to as a *majestic* shot, it is used to make the product appear superior.

TELEPHOTO LENSES

Telephoto lenses have longer focal lengths to make a subject that is farther away appear closer. Telephoto focal lengths range from about 70 to 200mm in full frame (55-200 on APS-C crop sensors). There are telephoto lenses with much longer focal lengths, but using a focal length longer than 200mm is usually very impractical, and generally, unnecessary in product photography.

Telephoto lenses are quite useful in product photography. They allow you to stand back from the subject and get a pleasing view of it, free of the perspective distortion that occurs when you shoot a product at a closer distance.

Just as wide-angle lenses produce perspective distortion, telephoto lenses produce their own special distortion called *compression distortion***.** Compression does exactly what it implies: It compresses and flattens the appearance of the subject. This is beneficial for subjects that have extreme depth because the compression allows you to achieve more depth of focus on the subject, while also providing an easy way to achieve shallow depth of field in the background if desired. This also makes elements that are farther apart appear to be closer together.

OEM VERSUS THIRD-PARTY LENSES

One thing to consider when buying lenses is whether to go with the OEM (Original Equipment Manufacturer) or third-party (a company other than the original manufacturer) lenses. For most high-end lenses, the only real option is the OEM. However, for mid-priced lenses, third-party companies offer some pretty good deals, especially for prime lenses.

A number of companies manufacture lenses. Some of the top include Sigma, Tamron, and Tokina. Right now, Sigma is producing the best lenses of all the third parties — some even rival the OEMs, but at a much lower cost.

Third-party lenses used to have the stigma of being shoddy, cut-rate optics, but those days are gone. Third-party lenses definitely offer a viable alternative to the higher-priced OEM offerings. One thing to keep in mind, however, is that OEM lenses usually command a higher price on the used market.

Figure 1.4 shows the effect compression distortion can have on two images with the same setup. The only things that changed were the focal length of the lens and the camera's position to keep the subject a similar size in the frame. The image on the left appears as it should. The candle on the left was closest to the camera and appears proportionally larger than the candle on the right, which was set further back, so it appears smaller.

In the image on the right, the candles appear to be nearly the same size, which causes the composition to lose any sort of appearance of depth. If you want to show depth in an image, a telephoto lens is not the best choice. If you want to compress depth and make things looks closer to each other than they really are, a telephoto lens is a good choice. I recommend using a telephoto lens when photographing a single subject, and a wide normal to short telephoto lens when photographing a group of subjects.

FIGURE 1.4 The effect of compression distortion on a group of products. Exposure: ISO 200, f/16, 1/250 second, Nikon SU-800, Nikon SB-900 Speedlight, Nikkor 28-70mm f/2.8D AF-S at 50mm (left image), Nikkor 80-200mm f/2.8D AF-S at 200mm (right image).

Special-Purpose Lenses

As you may surmise from the name, these types of lenses are used for special purposes. They perform functions that regular lenses cannot and are used to achieve specific effects. These types of lenses also come in different focal lengths, from wide-angle to telephoto, and all of them are prime lenses due to the specialization of the design properties. These lenses are generally a little more expensive than the standard kind, but as I mentioned previously, you get what you pay for. If you need a special-purpose lens on a regular basis, I advise that you invest in a high-quality one. If you use special-purpose lenses infrequently, it may be a good idea to rent one for your project.

MACRO

Macro lenses are specially designed for capturing fine detail. A true macro lens allows you to magnify the subject to at least a 1:1 ratio. What this means is that the image projected on the sensor as it comes through the lens is the same size as the actual subject. Some lenses allow magnification of up to a 5:1 ratio, which means the projected image is five times the size of the actual image.

Some manufacturers of inexpensive zoom lenses tend to stretch the definition of the term macro when it comes to marketing lenses. These lenses usually only provide a magnification of 1:2, or half size, or sometimes, even a little less. Sometimes, 1:2 is all you need however so only focusing close enough to achieve a half size image isn't necessarily a bad thing.

A decent macro lens is a necessity for any product photographer. Macro lenses are used to photograph small subjects and make them appear much larger. Macro lenses can also be used to isolate a small facet on a larger subject. I advise beginners to try a close-up filter or a reversing ring before purchasing a macro lens. However, for high-end product photography, a dedicated macro lens is a good investment because, at some point, you *will* need a macro lens.

Figure 1.5 shows an image of a relatively small keychain photographed with a macro lens. The lens highlighted the smaller details, such as the texture of the leather and the brand embossing. The lighting for this figure was done with a Nikon SU-800 controlling a Nikon SB-900 Speedlight through a Profoto 1-foot × 1-foot × 3-foot softbox. The flash was set to TTL +2EV at camera right, with a reflector at camera left for fill light.

FIGURE 1.5 Macro shots are used to highlight the tiny details of small objects. Exposure: ISO 800, f/16, 1/250 second, Pentax 50mm f/4.0 Macro-Takumar, Nikon SU-800, Nikon SB-900 Speedlight.

Macro lenses come in a variety of focal lengths, from normal (50mm) to telephoto (200mm). Normal focal-length macro lenses tend to be more inexpensive, but they also have a closer working distance, which means that to get 1:1, you need to be right on top of the subject. This can be a problem when working with external light. If the camera lens is right on top of the subject, it can block the light and not allow you to expose the image properly. Longer focal-length lenses allow you to put some space between you and the subject, allowing light to be cast on to the product without interference. I find that a focal length of about 90 to 105mm is an ideal focal length.

PERSPECTIVE CONTROL/TILT-SHIFT

A perspective control/tilt-shift lens, shown in Figure 1.6, is a special type of lens. It allows the photographer to control perspective by shifting the lens to reduce converging lines, and to tilt the plane of focus to control the depth of field more accurately.

FIGURE 1.6 The Nikon 24mm f/3.5 PC-E perspective control lens.
Image courtesy of Nikon

Perspective control or *shift* is most commonly used in architecture photography to reduce the effect of converging lines of large buildings caused by the need to tilt the camera up to fit the building into the frame. This causes the sensor plane to be off-axis from the building plane, which makes the building appear to tip backward. You've likely seen this effect many times, where the bottom of the building is very large and the top is much smaller. To control the perspective, the lens is shifted so that it can record the upper parts of the building without tilting the camera up. This allows the sensor plane and the front of the building to be on the same axis.

Because product photography deals with much smaller objects than architectural photography, the perspective control isn't a much-used aspect of the lens. If you do encounter some perspective distortion, it can be fixed using image-editing software. One way to effectively use shift is when shooting highly reflective subjects or even mirrors. You can avoid having the camera reflected in the subject by placing the camera lower than the subject and shifting the lens up to capture the image without being seen.

Tilt is the more useful feature of these specialized lenses. Tilting the lens gives the photographer more control over the depth of field by adjusting the plane of focus, so that it isn't limited to the same axis as the sensor plane. Controlling the plane of focus allows the photographer to increase the depth of focus of a product while still using a relatively wide aperture. Using a standard lens requires a very small aperture to increase depth of field. Smaller apertures, while increasing the depth of field and allowing more of the subject to be in focus, also have the detrimental effect of softening the image due to diffraction. In product photography, having the highest image quality is very important; therefore, using a tilt-shift lens is sometimes a better option than stopping down to the minimum aperture and hoping for the best.

PERSPECTIVE CONTROL/TILT-SHIFT LENS NAMING CONVENTIONS

The naming conventions of lenses are different relative to each manufacturer, which can be somewhat confusing. Nikon's current perspective control lenses are all designated PC-E, which stands for Perspective Control–Electronic.

The term *electronic* is used to describe the aperture, which is controlled electronically by the camera. Nikon's earliest lenses, known simply as PC, required the photographer to open the aperture for focusing, and then manually close down the aperture before taking the photo. Nikon's early PC lenses were exactly as denoted: perspective control. The lenses only allowed shift movement, so the lens always remained at the same axis as the sensor plane. Nikon's current PC-E lenses allow both shift and tilt.

Canon designates its lenses as TS-E (Tilt/Shift–Electronic). Similar to Nikon, the *electronic* moniker refers to the electronic opening and closing of the aperture diaphragm. Since Canon began making tilt-shift lenses, it has offered both tilt and shift on its lenses, as opposed to Nikon's first generation of shift-only lenses.

Figure 1.7 shows a set of images taken with a Nikon perspective control lens (the same as a Canon Tilt/Shift lens). Both were photographed wide open to exaggerate the depth of field. The image on the top was shot straight-on with no adjustments to the lens. Notice the distortion and the shallow depth of field that leaves only a little in focus. The image on the bottom was taken with the lens tilted right 5 degrees. The depth of field, although shallow, has been adjusted so the diagonal line of crayons is all in focus on the same plane. Notice that the distortion has also been corrected.

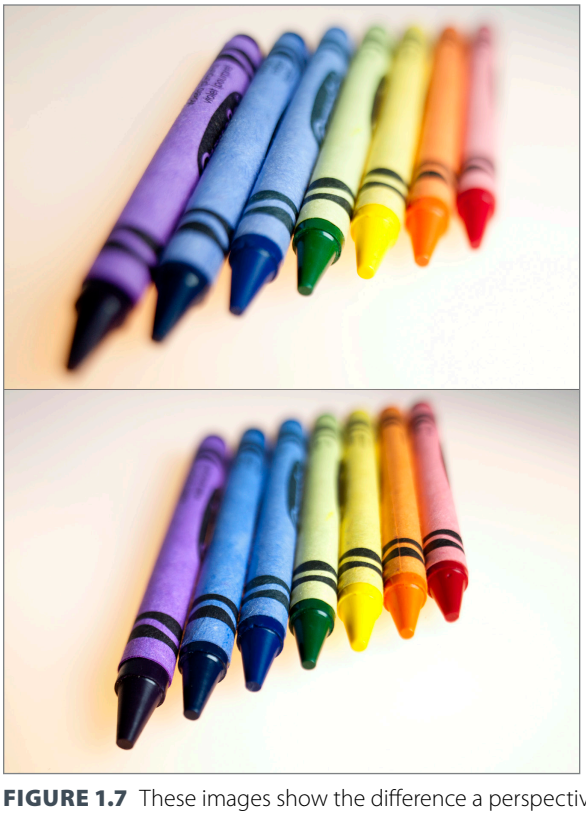

FIGURE 1.7 These images show the difference a perspective control lens can have on a subject. Exposure: ISO 200, f/3.5, 1/250 second, Nikkor 24mm f/3.5 PC-E.

Tripods

One often overlooked but highly critical piece of equipment for just about any photography, including high-end product photography, is the tripod. Use of a tripod is very important in product photography. It keeps the camera stable, and it allows you to maintain the exact composition when you have to adjust the lighting in between shots.

Like just about everything in photography, you get what you pay for. Some photographers think they can get away with buying an inexpensive tripod, but in the end they end up frustrated. Cheap tripods are wobbly, easily broken, and not very versatile when it comes to composing an image using the tripod head. I recommend staying away from the cheap tripods you find at electronics stores and spending the extra money on a good, heavy-duty tripod. A good tripod will last you many years and save you countless headaches.

A good tripod generally has two sections: Legs and head. Each of these can be bought separately, although some come as a kit. Buying separately allows you to have a tripod that is customized to your personal needs. I do not recommend buying a cheap, all-in-one kit tripod, so I don't cover those options.

LEGS

Tripod legs are the bulk of the tripod. Obviously, this is what the tripod stands on. These come at many different price points depending on the material of which they are constructed. Carbon fiber tripods are very light and stable, but they are also the most expensive. Carbon fiber is also known to be very good at dampening vibration. Similar to the carbon fiber is basalt fiber, which is a little cheaper than carbon fiber and provides a light tripod for someone on a smaller budget.

Heavier options include the common aluminum legs, and less often, magnesium alloy versions. I prefer a nice, heavy aluminum tripod in the studio to hold my heavy cameras and lenses rock steady. The lightweight carbon fiber versions are nice for traveling, but I don't find that an ultra-light tripod gains you any advantage in the studio. The important thing is to make sure that your tripod can support the weight of your camera and heaviest lens. If your tripod flexes under the weight of your rig, then you need a heavier tripod.

Another consideration when buying tripod legs is the locking mechanism. Tripod legs are telescopic, usually having three to five sections. Most good, heavy-duty tripod legs have three sections, and the legs get thinner within each section. Tripods with more sections are less stable than their shorter counterparts. The sections are held in place by locking mechanisms.

The following are the two types of tripod leg locking mechanisms, each of which has its own benefits and disadvantages:

- **Lever locks.** Speed is the main advantage of this locking mechanism. A simple flip of the lever allows you to extend or retract the leg sections and lock them back down. The twist-lock versions take a little more effort to lock and release the leg sections. Lever locks are very stable but tend to loosen up after time. Lever-lock tripods usually come with a tool that allows you to tighten the locking mechanism.
- **Twist locks.** Twist-lock legs are more stable as long as you twist them with sufficient torque to lock them down properly. On the other hand, using too much force can make it difficult to unlock them.

I prefer lever-lock tripod legs because they are quicker and easier to adjust. Anything that saves me time is welcome to my workflow — even if it's something as simple as adjusting the height of my tripod.

HEADS

After choosing a good set of tripod legs, the next option is choosing the head. The tripod legs have a center column with a threaded mount that the head screws down to. These are made from different materials, including cheap plastic to high-end, metal alloys, such as magnesium.

There are many options for tripod heads, but many of them are intended for videographers. Selecting a tripod head for product photography is relatively simple. There are two tripod head options that offer a lot of control: Ball and pan/tilt. The *ball head* is a ball that sits in a socket and moves in a 360-degree motion. Ball heads come in a wide price range (from $13 to $1,000+), and a few different types. The most common is the simple ball and socket with a single knob. These are available with or without a quick-release plate. The cheaper ones come without the quick release, and the camera screws right onto the head. Unless you plan to leave your camera permanently attached to the tripod head, I don't recommend this type.

Regardless of the type of tripod head you choose, I recommend buying one with a quick-release plate because, as the name implies, it allows you to quickly attach and remove the camera.