

# Know Thy Pads

by Sarah Merrow

**The premier task for a flute pad is to close its tone hole, again and again, without leaking air, for countless renderings of Bach sonatas, Khachaturian concertos, or Nutcracker ballets. When a pad isn't doing the job, your flute technician looks for clues and asks questions, and the very first question informs all the others—what kind of pad do you have on your flute?**

**T**hese innocuous cushions affect the quality of your sound, your technique, and ultimately, your musicality. Here, I'll explore only those commonly used on high-end flutes, but there are pads made of felt, cork, natural or synthetic leather, gold, silver, plastic, shape-retaining foams, and other substances. Different materials feel different under your fingertips, respond differently to your breath, wear differently over time. Combined with stability—how effectively and for how long pads avoid leaking and remain well-adjusted to linked keys—these factors can lend your playing an aura of confidence, or of vulnerability.

You see why flutists can be as obsessed with pads as oboists are with their reeds, and the choice of pads should not be made inadvisedly or lightly. As in marriage, there's as much emotion as knowledge involved. Also as in marriage, you have to live with the consequences of your decision.

## Know Your Animal

All pads imitate the archetype, the fingertip on a hole. Finger-like, pad surfaces have to be just tacky enough to cling ever-so-lightly to the tone hole so that air does not escape, allowing the vibrating air column to resonate clearly and cleanly. And they must coordinate with the mechanism, up to three tone holes needing to seal with one light key touch.

Traditional flute pads are made of pressed or woven wool felt, backed with cardboard, and wrapped with two layers of "goldbeater's skin." Naturally a translucent white, goldbeater's skin isn't gold—it's the outer membrane of a cow's large intestine, and named for its traditional use in Asia: to keep separate the layers of gold pounded into extremely thin leaves. Less than a half-thousandth of an inch thick, it's strong and tear-resistant, and feels smooth. At the same time, it breathes, stretching and contracting in response to moisture levels—that is, to intermittent onslaughts of saliva. One side of its seemingly smooth surface is covered with



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microscopic hooks—think of the sueded side of leather—imparting to it a “grabby” quality that makes a seal with the tone hole's metal rim.

Many high-quality felt pads used today are made in northern Italy by Pisoni Pads, a company started by Luciano Pisoni in 1974. When you call the company, it's not certain you'll reach someone who speaks English, but fortunately, several suppliers in the United States stock them in a variety of densities, diameters, and thicknesses. Before Pisoni, flute makers and technicians usually made their own felt pads, and some still do, permitting them to adjust pad specifications to a particular instrument, flute model, or customer's preference.

Like so much about the Böhm flute, the humble felt pad hasn't changed all that much in the past 100 years. Once, while renovating a Rudall Carte flute made in 1905, I sliced into an ancient pad and found nothing surprising beneath its crusty brown exterior, not even a moth bite, just the fibers of a durable material that had marked time gracefully. Remarkably, the highly indented pads, skins intact, still covered the tone holes, and every note on the flute played.

Long lasting, felt pads adapt to any flute. Of course, they swell with playing, some keys more than others; balancing the F, F<sup>♯</sup>, and B<sup>♭</sup> key linkages to perform flawlessly, for example, requires understanding the way these pads wax and wane

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with the tides of moisture. It takes lots of experience, and even some geeky fastidiousness, to make them work, a quality more esteemed when instrument-making was a craft passed down from masters to apprentices.

But the very features that allow the versatile felt pad to endure have also frustrated some technicians and driven engineers to invent more rigid synthetic pads. Used on many new flutes and to repad certain well-built older instruments, synthetic pads typically sit atop a "stabilizer," a flat disc of aluminum or plastic that fits into the base of the cup.

Two popular brands of synthetic pads, JS and Straubinger, share the characteristic of being not-felt, and thus less affected by moisture. Their most undebatable virtue is *flatness*—when paired with carefully machined, equally flat tone holes, major leaks seldom develop. However, minor leaks are more noticeable than with felt pads, and their physical rigidity makes them unsuitable for use on flutes with imperfect tone holes, or on many fine, old-world instruments whose acoustic personalities "sing out" best with felt.

JS pads, made for flutes and saxophones in California by Jim Schmidt of JS Engineering, depart from the goldbeating legacy, but *do* contain real gold. The shell of the pad is plastic, which holds a thin cushion of ultrasuede, topped with a waterproof gold film that is both beautiful and, in my experience at least, quite durable.

David Straubinger of Indiana invented the Straubinger pad for flutes, clarinets, and piccolos, and sells them to instrument makers and technicians around the world. The pad unit is composed of a supportive plastic shell containing a synthetic cushion, wrapped with goldbeater's skin. In recent years, Straubinger pads have become standard offering on several brands of new flutes. Their ubiquity is owed not only to their stability, but also to manufacturers' concern with cost-effectiveness. A factory set up to install machine flat pads into flat-bottomed key cups, which in turn descend onto perfectly flat tone holes that are neither too sharp edged nor too broad faced, makes for efficient finishing.

That said, musicians have additional criteria to consider.

### Sound and Feel

Our artistic perceptions are formed by the physical relationship we have with our instruments.

Lovers of the traditional felt pad say it's the warm, colorful timbre they prefer to the bright ring of a flute with synthetic pads. Straubinger pads tend to sound a little brighter than JS pads, placing the JS pad in the middle, sort of, of the instrument's light-dark sound spectrum. One of my colleagues calls the sound of JS pads "creamy," and asserts that they reflect the

dark end of the flute's sound back into the tube, whereas Straubinger pads seem to enhance the upper partials. Synthetic pads, some think, render the flute more resonant and responsive. Some players need that; others don't. I've heard many flutists describe the pleasure of "shaping" the woodwind-like sweetness that traditional felt pads can foster.

Felt pad people want to feel the cushion, to appreciate the bottom of the key stroke. With Straubinger pads you're up or you're down; the closing of a key seems suddenly quick, which synthetic pad people say helps their technique. JS pads feel a little more like traditional pads, again offering a middle road. Whether scientifically verifiable or not, the serious player will experience these as real distinctions.

### The Life Cycle of the Common Pad

The majority of problems I see in my work—chronic leaks, fussy adjustments, noisy pads—could be eliminated if the original padding job had been better, and the flute regularly serviced. But ultimately, every flute will need a set of new pads.

Preparing a flute for them can be tricky. The instrument should be pristine, the mechanism well oiled. The padder makes sure each tone hole is flat, level with the cup, with a smooth, rounded edge. He or she checks the shape, condition, finish, and positioning of French bushings, pad washers, screws, and spuds (the threaded pillars in the center of closed hole cups) customizing them to the type of pad being installed. Only then does the padder reach for a pad.

All pads need a firm base on which to sit, normally a stabilizer or a stiff shim. Felt pads should fit snugly into the cup. A tight fit provides stability and keeps moisture from sneaking under the pad, undermining its seat. Synthetics must be handled more delicately and should drop into place, large enough to fill the cup, but easily removable for shimming. Because here moisture can enter the gap between pad and cup wall, only mylar plastic shims should be used; paper is not stable when wet. Both felt pads and synthetic pads are then levelled in relation to the tone hole, using whole and partial shims affixed to the stabilizer or base shim.

A newly padded flute has to be played in. Synthetic pads do shift during the break-in period, but not as much as felt pads, which need more time to settle. Frankly, the more time the customer can tolerate, the better. The desired outcome is stability: firmly held pads that need only occasional shimming, coordinated by a mechanism that precisely transmits movements of linked keys along the flute via rods, pivots, pins, and clutches. Both felt and synthetic pads can be stabilized, their flatness controlled and maintained, albeit with slightly different techniques.

How to keep your pads in good shape? Cultivating a light touch not only improves your technique; it preserves stability in both the mechanism and pads. On traditionally padded flutes, heavy fingers effect changes in the linked adjustments between keys, and the pad skin can become prematurely worn at point of contact. Overcompression (and overdrying) of Straubinger pads can lead to skins splitting at pad edges, or shift the seat of the pad stabilizer if it's not glued down. Clamping down wears the metal mechanism unevenly, causing "play," which destabilizes pads over time.

Of course, swab out the flute after playing and store it in its case. This helps maintain a consistent humidity, and keeps mechanical parts free of dirt and dust. Avoid touching pads with your polishing cloth, and don't drag paper across them in an effort to cure stickiness, the best solution for which is prevention. Sugar in the saliva seems to be an agent, so consume nothing sweet before playing. Use unsweetened toothpaste, and rinse thoroughly before blowing into your flute.

Felt pads lose stability because wool felt becomes stiffer and less responsive to shimming over the years, and also shrinks away from the inner edge of the cup. The temptation is to replace compromised pads a few at a time; they're

cheap, and, heck, maybe the other pads look OK. But old pads respond to moisture differently than new, throwing off the balance of mechanical adjustments as they shrink and swell at different rates. For this reason, your technician may recommend repadding the whole flute if three or more pads need replacement.

### **Stalking the Optimal**

Here's a provocation, especially if you've just spent your life savings on a new flute: a factory-born flute, superbly padded, will sound better than a custom-built flute, poorly padded. In other words, the famous flutemaker's hard work on the stringing bench is only as good as the padding that follows. What's more, once any flute, new or old, is finished and playing well, it may not yet be quite *optimal*.

This optimizing of a flute's response isn't the same as "fixing" a problem—nothing's bent, dented, loose, or broken. But there's a superb *something* still waiting to be revealed in the sound. Your padder may be able to help you find it.

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