Musings On The Mouthpiece

The Eternal & Incomprehensible Laws Of The Universe

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I think it is universally agreed among saxophone designers and players alike that the mouthpiece is the one component of the saxophone which most influences the tone and playing characteristics. I believe it is also agreed than no single component of the saxophone is subject to more misunderstanding, confusion, and marketing hype. Hopefully, by the end of this article, you will be able to select the appropriate mouthpiece for your saxophone and your playing style with a bit more savvy, and be a little less subject to the extravagant claims of the mouthpiece makers.

LAWS OF THE UNIVERSE

Before we get too far into the discussion of what makes a mouthpiece work and why different configurations have entirely different sounds and response characteristics, here are a couple of things you should always keep in mind:

(1) Some mouthpieces are simply not going to work on some horns, because the math is wrong. Remember that the neck of your saxophone is a truncated cone. The volume of missing portion of the cone can be easily calculated (if you didn't sleep through high school geometry, as I did) and should be compared to the volume of the tone chamber of the mouthpiece. The farther these two numbers deviate, the less the likelihood that the mouthpiece will work.

(2) "The Eternal and Incomprehensible Laws of the Universe" dictate that every change in the design of a mouthpiece intended to resolve a given playing issue will have an equal and adverse effect on another playing issue.

(3) There is a very significant variation in the cut and design of the various brands of saxophone reeds available on the market today, and a brand of reed which does not give good results on one mouthpiece may very well give spectacular results on another. For that matter, it is not a bad idea to try several reeds from any given box when evaluating a mouthpiece, as consistency is not a generally accepted attribute of most cane reeds on the market today.

I've listed a glossary of the common terms associated with mouthpiece design (see graphics box below). Of course, there is some variation in usage around the world, but these are generally accepted and will be used throughout the technical explanations given in the balance of this article.

THE IMPORTANCE OF THE BAFFLE

Anyone who has spent any amount of time making or refacing mouthpieces will tell you that the single most important factor in mouthpiece design is the baffle. The baffle is where the wave is initially shaped, and this initial shaping controls the sound that is ultimately produced by the saxophone. Baffles come in four basic varieties: straight, rollover, stepped, or concave. Each type has its own unique set of playing characteristics.

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GLOSSARY OF MOUTHPIECE TERMS

Baffle: The area of the mouthpiece directly behind the tip rail.
Body: The solid portion of the mouthpiece.
Beak: The front part of the mouthpiece held in the mouth.
Bore: The rear-inner portion of the mouthpiece that fits on the neck of the saxophone. It usually extends a bit further into the mouthpiece than the neck does.
Break: The point where the reed is no longer tangent to the side rails.
Chamber: The open area in the interior of the mouthpiece between the floor and the bore.
Chamfer: The beveled edge around the window.
Facing Curve: The curve starting at the break and ending at the tip rail
Facing Curve Length: The distance from the break to the tip of the mouthpiece
Floor: The inner portion of the mouthpiece behind the baffle and before the chamber.
Frontal Rail: The very tip of the mouthpiece and contact point for the reed.
Inner Side Walls: The walls on the inside of the mouthpiece, extending from the floor up to the side rails.
Ramp: The underside of the table. It starts at the back of the window and slopes down into the chamber of the mouthpiece.
Shank: The entire outer portion of the mouthpiece just behind the table which holds the mouthpiece onto the neck.
Side Rails: This is where the reed seals on each side of the window.
Table: The flat portion of the mouthpiece that the reed sits atop.
Throat: The area where Chamber transitions to the Bore.
[illegible]ening: The distance between the reed and frontal rail
[illegible]very tip of the mouthpiece, this is where the end of the reed seals.
[illegible] of the mouthpiece extending between the tip rail and the table, between the two side rails.

Straight Baffle

The "Straight Baffle" is just that: it extends from the tip back to the chamber in an even plane. The very first saxophone mouthpieces used this design, and its use was common up through the 1930's. The straight baffle produces very even tone and good response in all registers. The tone tends to be somewhat dark, and this style baffle is best used on mouthpieces with a somewhat closed tip opening. It is also well suited to soprano and sopranino mouthpieces in that it helps reduce the shrillness often associated with the upper register of these instruments.

Rollover Baffle

The "Rollover Baffle" has a slight "bump" just behind the tip rail. Following the bump, the baffle straightens out. This design has a bit more edge and projection, and gives the player a greater range of expression. The rollover gained popularity in the 1940's and is still in common usage today. Great care must be exercised in the design of the rollover, as too much will result in blowing resistance and shrillness. Too little rollover will not obtain the desired effect. This type baffle works best with a somewhat large chamber, which balances the overall tone.

Stepped Baffle

As the trend in saxophone tone began to favor brighter sounds during the 1960's, the "Stepped Baffle" came into common usage. This design features an initial straight section which has a very pronounced angle which forms a wedge inside the mouthpiece. The stepped baffle is quite bright and cutting in its tone, and is well suited for use with amplified instruments. The response is quicker that with other baffle types, but the available tone colors are limited. It's a bit of a "one trick pony", but it does that trick very well indeed! This type of baffle has a great following among rock players.

Concave Baffle

The "Concave Baffle" lacks much of a following outside the world of classical performers. This style baffle has a small indentation immediately behind the tip rail, and produces a very dark tone which lacks projection. A small bit of concavity is sometimes added by mouthpiece refacers when a client reports that their mouthpiece is producing too bright a tone for their needs.

FINAL SHAPING IN THE CHAMBER

After the sound wave has been initially shaped by the baffle and prior to its entering the bore leading to the neck opening, it undergoes final shaping in the chamber. This is the last place that the sound is influenced by the design of the mouthpiece. Understanding how the chamber does its job is easy: it's all about the relationship of the size of the chamber relative to the size of the bore.

Large Chamber

In a "Large Chamber," the chamber is larger than the bore. This was the desi used on the original Adolph Sax mouthpieces, and was commonly used up through the 1930's. The wave spre

initially, and is then compressed by the smaller size of the bore. For best results, the walls of the chamber should be smooth and rounded in order to assure a turbulence free transition into the bore. Mouthpieces with a large chamber tend to play with a somewhat dark sound and favor the lower register. Today, large chambers are often found used in conjunction with a rollover baffle, which tends to add a bit of tonal color.

Medium Chamber

"Medium Chamber mouthpieces came into vogue in the 1940's. In this design, the chamber and bore size are roughly equal. This adds a degree of brightness and increases projection. Response is generally even throughout the range, and intonation is consistent between the registers.

Small Chamber

In the 1960's, the need for a saxophone mouthpiece which would project over amplified instruments became apparent, and the result was the "Small Chamber." In this configuration, which has been carried by some makers to notable extremes, the chamber is smaller than the bore and serves to compress the wave before allowing it to expand into the neck opening. Saxophone mouthpieces with small chambers are loud and bright, with a large amount of projection. There is a price to pay, of course, and these mouthpieces are sometimes accused of having a shrill tone and of being lacking in response in the lower tones.

FACING CURVES, TIPS, TABLES, RAILS, WALLS, WINDOWS

It's not enough that our saxophone mouthpieces have that elusive sound we are seeking. They must be configured and made in such a fashion that they meet our playing and performance needs as well. Players often have specific issues which need to be addressed in their mouthpiece selection process.

Facing Curve

The "Facing Curve" more than any other factor determines the way the mouthpiece responds to the player. Now I am going to choose to save the discussion of which type curve works best for a future article. The math of the facing curve is probably the most controversial subject among mouthpiece designers, with some favoring an even arc of a circle, some favoring a parabolic curve, and others applying algorithms previously used only on Mars. The important thing to know about the facing curve is that is must be absolutely even on both rails, not close, but absolute. For the purpose of our discussion here, we're going to assume that the facing curve is even on both sides of the mouthpiece and of an agreeable arc and concern ourselves only with the effects of the length of the curve.

Short Curve

A "Short Curve" tends to favor the upper notes at the expense of the lower tones. This may be attributed to the fact that the thicker part of the reed is not allowed to vibrate as freely. There are often significant control issues as well. Short curves tend to be free blowing.

Long Curve

The "Long Curve," as one might reasonably expect, tends to favor the lower pitches at the expense of the upper ones. It also has tendency toward blowing resistance, although the notes can generally be bent and orally colored to a greater degree than is possible with a shorter curve. Long curves are often successfully used on high baffle or small chamber mouthpieces where they give good results in overcoming the wave compression inherent in those designs.

Obviously, a compromise facing curve length is going to work best for most players. It is worth keeping in mind that your needs may differ from the norm, and you shouldn't hesitate to experiment with different facing lengths to obtain the best possible personal results for your playing style.

Tip And Side Rails

The width of the "Tip and Side Rails" might be best expressed as "smaller is better." That being said, remember that we agreed that improvements in one are may have a detrimental effect on another area. This is the case with the width of the rails. Narrow rails give significantly improved articulation and quicker response, but at the expense of control. It is also widely held that narrow rails serve to brighten the tone to a degree. Of particular concern is the width of the tip rail. If it is too narrow, chirping and other control issues can result. If the tip rail is too wide, the tone and projection will be significantly deadened.

Window & Walls

The size of the "Window" is generally agreed to play a role in the overall level of response of a mouthpiece, with a larger window yielding a more vibrant and complex tone. The shape of the "Walls" of the mouthpiece can serve to increase the volume of the chamber if they are concave, and the edge of the window under the table should be chamfered to a rather sharp edge in order to avoid a vertical surface which would cause turbulence and result in increased blowing resistance.

Body, Shank & Beak

Increasing the mass of the "Body" and "Shank" will favor lower overtones and help reduce shrillness. Decreasing the thickness of the "Beak" will significantly improve projection and quicken response.

Hopefully, you now have a better understanding of mouthpiece design and theory. Needless to say, there's a little more to it that what space has permitted me to present in this article, and I promise to share more in future issues of *Saxophone Journal.* §

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