Performance Testing
Briley Helix® Chokes

Revised January 2016
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Briley Helix® choke tubes look great — but do they work?

One glimpse of a Helix® choke tube and I was a buyer. “Wow!” I said to myself, “That’s really beautiful! I can just see it in action — the wad getting a precisely-calculated optimal degree of spin from the blades of that perfectly-machined helix. I can almost feel the way pellets (which magazine writers tell me have been over-populating my patterns’ cores) are finally being spun out to where they can do some good!” I was enthralled by its look, the perfection of its machining, and the glitter of its appearance. “How shiny!” “How alluring!” I felt like a northern pike spotting his first Dardevle!

Does it throw a monkey wrench into the Gaussian theories and will they have to be modified to account for what may come to be called the “Helix® Effect?”

It was a couple of days before the Optima Helix Modified and Extra Full tubes for my Beretta 391 arrived, and a week or two before the pattern-reading program Shotgun-Insight had wrung the truth out of them, but it was almost winter already, and it’s hard to get fired up about patterns when it’s too cold to shoot. I needed a spark plug.

Skeet Shooting Review comes to the rescue.

The April issue held just the motivator I had been waiting for. Nick Sisley's article, “Briley’s New Helix Chokes,” (pages 14 and 15), tested the performance of the chokes with respect to two variables. I have the data to do the same, so we can compare our results. Did we test in the same way? Did we get the same result? That’s what this report is about.

What people are saying about Briley Helix chokes.

There have been four threads about Briley Helix chokes on Trapshooters.com in recent months, and the comments run at least three-to-one against them. Only one negative post was based on experience with the product:

“I bought a Briley Helix choke for my K-80 and get MUCH BETTER hits using an Extended Titanium LIM (2+) choke from Kreighoff.”

There were many, many negative comments by people who apparently hadn’t ever tried or tested them. Representative posts:

“My money is on “gimmick.” I suspect they will pattern no better, and probably no worse, than any other choke.”

“Directional cuts in a choke tube to effect shot pellets is sales hype.”

“There’s a sucker born every minute.”

The positive posts are all based on experience; these are typical:

“I didn't not believe them at first, but I went and patterned them against standard Briley chokes of the same constriction at various distances and the shot was almost perfectly evenly distributed throughout the whole pattern with the Helix.”

“I patterned it against my Briley EX Full at 40 and 50 yards. I did notice that there was a more even coverage with no holes. I patterned 1 1/8 and 1 1/4 loads and it was pretty obvious that the Helix choke pattern was more evenly covered.”

“I found them to break the targets more evenly rather than ink balls or chips... They work for me.”
Why Nick Sisley’s article deserves our attention.

According to Skeet Shooting Review, Mr. Sisley has been writing for the magazine for almost thirty years. He's a prolific contributor to various shooting magazines and has authored eight books. He knows what he is talking about, and that's a big plus for a shotgun writer, in my book.

In this article, he is careful to contrast his “impressions” with the more labor-intensive level of certainly, “proof,” and details what would be required if one were to try to establish the latter. He is talking about the asserted ability of Briley Helix chokes to move pellets from the core to the outside of the pattern. He writes: "To prove this would take the shooting of a tremendous number of patterns and not only counting the pellets on the paper but also the pellets in the outer portion separately and comparing these findings with lots of patterns shot with so-called normal chokes—screw-in or fixed. I'm certain that Briley has done that testing in designing Helix chokes."

While I think this is a serious exaggeration of what would need to be done, it does introduce and defend the fact that he is just going to do his tests the way everyone else does them; he's going to look at the patterns and come up with the most accurate characterizations he can. He shoots “10 or so” patterns (which is way, way more than most people do) and tells us what appear to be the results and what his impressions are. He is appropriately modest about the certainty of his findings. He's not going to indulge in any of the absurd exaggerations we read all the time online and in other magazines. His work will demonstrate what an experienced and careful pattern-reader can do by eye and I'll bet it's as good as can be done can by anyone given the limitations that eyeballing patterns entails.

Some readers may feel let down by the lack of an “example” pattern with circled pellet holes and pellet counts and so on such as we used to see before everyone moved on to simulations which don't require you to go outside. But they never meant much; patterns vary so much, not only in overall percentage but more specifically in the random fashion in which they distribute their shot on the interior. A single example does not demonstrate anything in particular and is little help if any at all.

It is Nick's experience and his years at the top of his profession that make this article so valuable. It lets us make the comparison he introduced earlier — “pellet-counted proof” vs. “a good eye for patterns” without worry that our comparisons are unfair, since the “eyer” is neither inexperienced nor careless.

We will compare Helix with conventional chokes and also compare pellet-counting with “by eye” pattern reading.

The rest of this report will have two intertwined investigations:

- Do Briley Helix chokes do anything that a similarly-constricted conventional choke do not?
- How much work do you have to do to answer that question? Is it really as daunting a task as we have been led to believe?

While the results of the first test apply only to Helix chokes themselves, the second, the comparison of “scanning by eye” to counting the pellets, applies in all pattern-analysis cases and we will learn the relative value and difficulty of each approach.

You will be involved.

As we go through the SSR article, you will be able to take part in the analysis. I will coach you on what to look for and occasionally ask you to put that advice to work judging how some patterns appear to you and which choke most likely produced them. You may want to keep paper handy to jot down some notes, since how and why you made your choice is as important as what the choice was.
SECTION 1
PATTERN EVENNESS

Trap patterns are “hot in the center.”

Mr. Sisley sums it up well: “Many chokes produce patterns that have a great deal of density in the pattern center, i.e., a higher percentage of pellets striking in the pattern center compared to the pellets striking the outer position.” That’s the whole idea of patterns which are called “hot in the center.” It’s not the absolute number of central pellets, but rather the ratio of pellets in the center of the pattern to the pellets outside in the “annular ring,” the space between the 20-inch inner circle of the pattern and the outer 30-inch circumference.

The Briley Helix tube promises to “thin” the center and move pellets “out.” It’s not clear from the Briley website how many pellets we can expect to get moved or how far out they will be sent but that’s what we are here to find out, right? So let’s get to work, doing it “by eye,” the way the article’s author did, though he just had big sheets of paper to look at, not the handy condensed versions below. In the patterns below, the largest circle is 30 inches, the concentric smaller circle is the 20-inch densest part of the pattern, and the smallest circle is the point of aim.

Mr. Sisley answers very cautiously in the affirmative. “With the few patterns I shot through regular screw-in chokes compared to patterns I shot through Helix chokes, I have to say that Briley appears to have something here.” That is as tepid a product-endorsement as I can imagine, but I think it is appropriately conservative given the method he used to find out. Is he right? We’ll never know; we don’t have access to the patterns he used in his test. But we have patterns of our own, and when all this over, we will know and will be able to say (at least as far as this experiment in concerned), “Yes” or “No” to the experimental question with none of the wariness we’ve just read.

When you were scanning those six patterns I’ll bet many of you were thinking “Honestly, I can hardly tell, once I’ve decided, whether I’ve gotten it right or wrong. I wish there were a way to turn “visual” hot centers into “numerical” ones and take the uncertainty of judgement out. Isn’t there an objective system that can answer the question without all this guesswork? There is, and it’s next.

Answer to the quiz. The top row of patterns was made by the Helix choke.

A Quiz:

Using “hot centers” as a criterion, and accepting, provisionally, that Helix patterns are less “hot,” decide which of the patterns at the lower-left of this page were shot using a Helix Extra Full tube and which using a conventional Briley Extended Extra Full choke. Is “A,” for example, a Helix pattern? How about “B?” And so on through each of the others.

OK, that’s obviously too hard, so I’ll tell you that the three patterns in each row were shot with the same choke, in fact, they are shots 1, 2, and 3 in two patterning series of ten shots each. One row is Helix, the other conventional. Go back and look again; decide what you think and write it down with a couple of comments about why you chose as you did.

The correct answer is at the bottom of the page; check later to see if you got it right — but keep the paper, because later we are actually going to find out if you were right!
There are no “even” trap patterns.

Some of the earlier citations notwithstanding, all real trap patterns are “hot in the center,” that is, there are more pellets per square inch in their centers than at their peripheries. That is their universal characteristic, and they vary only in the degree to which they are “hot,” that is, how much denser the center is than the edge. Using a full choke at 40 yards, you will find most patterns to be at least twice as dense in the inner 20-inch circle as in the outer 20- to 30-inch ring.

Central thickening

On the left is a Helix data sheet produced by Shotgun-Insight, a pattern-reading & analysis program you can find at shotgun-insight.com. In the large box is the pattern; each dot is a pellet. The larger circle is the whole 30-inch pattern; inside it is the smaller concentric 20-inch circle. The smallest circle is the point-of-aim.

The horizontal and vertical “bell-shaped” curves on the sides of the pattern illustrate the relatively greater concentration of pellets in the center of the pattern than at the edges, both up-and-down and side-to-side. The height of the columns matches the pellets-counts found in the area above or beside the curves. They are not perfectly smooth curves, but the message they carry is undeniable. This is a Helix pattern and it is plenty hot in the center. But how hot is it and does it differ, in general, from equal chokes with no helix?

We can’t carry around a bundle of papers with bar graphs and curves like that on them and hold them up to the light and see how they compare; we need a single number which will characterize each pattern and tell us where it lies on the “hotness” continuum.

Over the years, a number called “central thickening” has proved useful in comparing patterns. It’s a simple ratio of the pellet-percentage in the central area to pellet-percentage in the periphery. Let’s look more closely at the data for this pattern and run through the calculations.

In the table above, the column under 10” Dia. first lists the percentage of the 488 pellets in this load which appear in the inner 10-inch diameter circle, and then, below that, the pellet count. 10-20 is the next ring, percentage above, pellets below; 20-30 the next. The column labeled “Total” is not the sum of the earlier ones, but rather the total number of pellet holes in the paper.

To calculate the central thickening of this pattern, we sum the percentages in the 10” circle and the 10”-20” ring (16.2%+34.2%=50.4%) and divide that by the percentage in the 20”-30” ring (27.0%) and get 1.87, a typical value for full chokes at 40 yards.

For a fuller discussion of central thickening, see the TERMS EXPLAINED link on claytargettesting.com.
Central thickening varies unpredictably shot-to-shot.

When you took the earlier quiz you might have noticed that the patterns in the same row, that is, shot through the same choke tube, did not look particularly similar. To be sure, they were all hot in the center, but how hot and in what direction — that did not look very consistent.

That's because it's not consistent. The patterns' inner and outer ratios, the central thickening, changes with every shot. Put yourself into pattern-scanning mode and imagine how you would keep track of the real data as they came in:

We are going to have to organize the data better to see for sure what's happening, but it doesn't look good for Helix choke theory. One way of organizing it is to rearrange the data from the lowest to the highest numerical value disregarding the order where each pattern appeared — first, middle, or last — since a pattern's order in the 10-shot string is irrelevant. The graph on the next page pictures the same data as this one, but systematized so you can see what's going on.
As you see, in this test the Helix choke produced patterns which were hotter, \textbf{not} more evenly distributed, than the conventional choke I compared them to. But there is a caution, and that is that the difference is statistically “non-significant.” That means we have to treat this result with caution. Let’s go no further than “This experiment provides suggestive evidence that the patterns from the Helix choke exhibited more central thickening — that is, were “hotter” — than patterns from the conventional choke, the opposite from what we were led to expect.”

You may wonder how much larger the differences would have to be to earn the rating “significant.” In this case, increasing the average difference from 0.14 to 0.21, a 50% increase in the difference between the results would be required.

\textbf{Test repeated with modified chokes}

One way to resolve questions about non-significant results is to get more data, by either replicating the test or doing another one which bears on the same question. We have such a second test, in this case comparing the results of a Modified Briley Helix with a second Modified choke, a Carlson. Both have 0.020 inch restrictions, and Carlsons have proven to be the equals of Brileys in other tests, so let’s see what we get.

As you see, in this test the Helix choke produced patterns which were hotter, \textbf{not} more evenly distributed, than the conventional choke I compared them to. But there is a caution, and that is that the difference is statistically “non-significant.” That means we have to treat this result with caution. Let’s go no further than “This experiment provides suggestive evidence that the patterns from the Helix choke exhibited more central thickening — that is, were “hotter” — than patterns from the conventional choke, the opposite from what we were led to expect.”

You may wonder how much larger the differences would have to be to earn the rating “significant.” In this case, increasing the average difference from 0.14 to 0.21, a 50% increase in the difference between the results would be required.
The SSR author also gauged the pattern-spread of Briley Helix chokes. “My initial impressions with the 10 or so patterns that I fired have been that the effective pattern is slightly wider with Helix chokes.” Again, we won’t know if he is right about the patterns he looked at, but we have our own and can draw our own conclusions.

My own impressions have been that you can’t tell anything about pattern spread by looking, but let’s see how you do. It’s another quiz, again with one row of patterns (shots 8, 9, and 10) from one extra-full choke, another row from the other. Using “effective pattern width” as a criterion, which choke produced which row of patterns?

I’ll tell you right away, the top row of patterns was produced by the Briley Extended Extra Full choke, the lower by the Briley Helix Extra Full choke. Did you get it right? How? If there is any difference there, I can’t see it!

When Shotgun-Insight counts a pattern for you it adds several useful calculated parameters, one being “75% shot diameter,” a measure of pattern width. It describes the diameter of a circle which would contain 75% of the shot. The numerically-larger the figure, the more “spread-out” the pattern is. Typical values for full chokes at 40 yards are about 26 to 28 inches.

You shouldn’t accept the word of a purported pattern analysis tool without first seeing if it works. You wouldn’t buy a used car without taking it for a spin and running it through the gears; “75% shot diameter” should earn your trust before you count on what it’s telling you.

Experience tells us that higher pattern percentages generally lead to “tighter” patterns. The more pellets in the 30-inch circle, the more densely they are packed. It looks like “75% shot diameter” works as expected here.

We can provisionally accept that “75% shot diameter” is a measure of pattern width; now let’s see what it tells us about Briley Helix choke performance.
The Briley Helix Extra Full choke and the Briley Extended Extra Full choke produced patterns of the same width.

And the Briley Helix Modified choke and the Carlson Extended Modified choke — two choke tubes of equal constriction, 0.020 inches — produced patterns of the same width. Note also that the Modified-choke patterns average about 1.3 inches larger than the Extra Full ones, giving us even more confidence that we are using a measuring tool which “works.”

**EXPERIMENTAL QUESTION 2**

**Will Briley Helix chokes produce wider patterns than conventional chokes of equal constriction?**

The Briley Helix chokes did not produce wider patterns than similar conventional chokes.
Review and Summary

Using an article by Nick Sisley as a model, I tested two Briley Helix choke tubes, Modified and Extra Full, against two other extended chokes of the same constriction but conventional design. I shot 40 patterns and analyzed them with the program Shotgun-Insight, which is an absolutely necessary tool for this sort of task.

- Using “central thickening,” an objective numerical alternative to visual estimation of pattern “hotness,” I did not confirm Mr. Sisley’s assessment that Briley “appears to have something there.” Evaluating two tests together, I did not find any reliable difference.
- Using “75% shot diameter,” an objective numerical alternative to visual estimation of pattern width, I did not confirm Mr. Sisley’s impression that the Helix chokes produced “slightly wider” patterns. In neither of two comparisons was there any difference at all in pattern width.

CONCLUSION:
The tested Briley Helix® chokes performed well, but just the same as equally-constricted conventional choke tubes. The Helix feature had no effect at all on the patterns.

Acknowledgements

The author is indebted to many people who made this work possible, among them:
Cindy Thompson, editor & graphic designer, who shapes up my spelling, grammar, and general logical thinking.
Andrew Jones, whose program Shotgun-Insight makes it possible to shoot and count enough patterns to get something out of them and so makes the effort worthwhile. The added features such as 75% shot diameter and pellet-hit probabilities make the program a source of lifetime education.
Ron Baker, who gives my work a home on the web and supplied the heritage Daredevle packaging.
Metro Gun Club in Blaine, Minnesota, whose patterning facilities are the best I’ve ever seen. Their patience with me monopolizing that end of the trap line is much appreciated.