

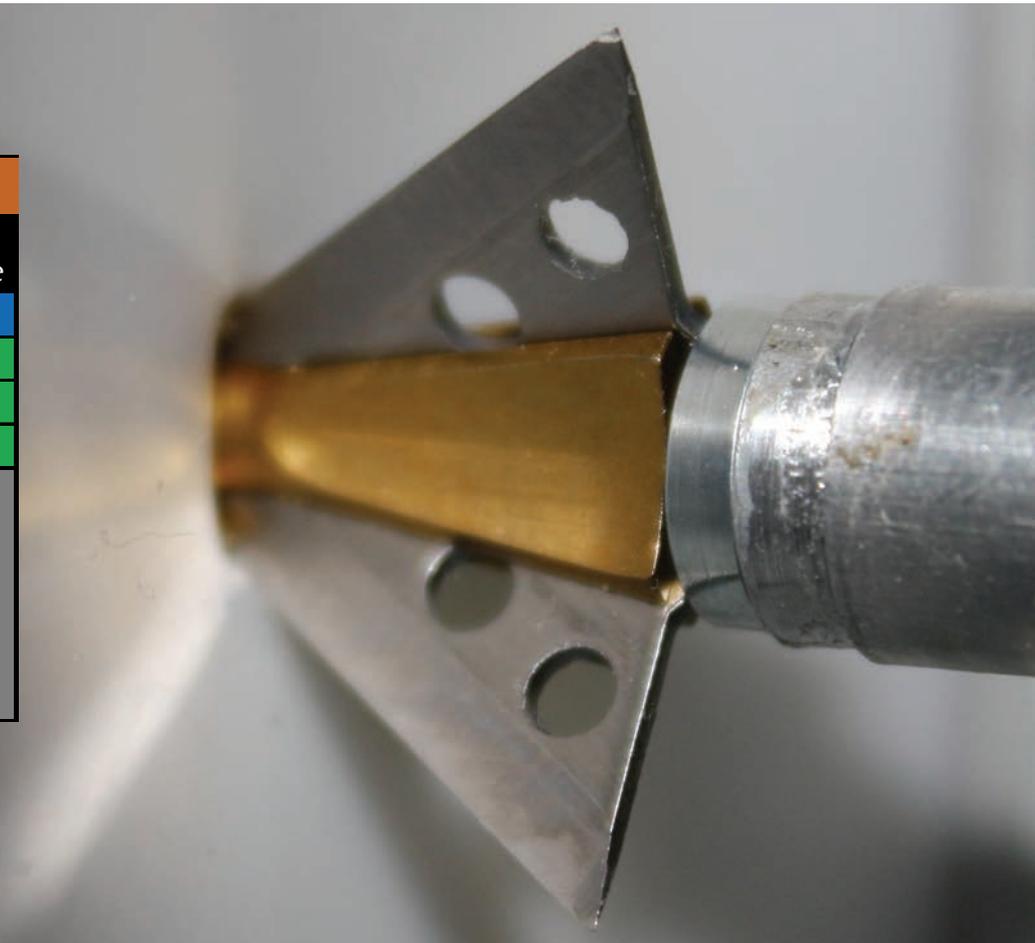
# Scientific Broadhead Test

By Jon Teater

Rocket Broadheads, at one time an entity of Trophy Ridge and now it's own brand as part of the Bear Archery family, arrived on the scene many years ago. The brand is best known for its expandables and of them, the Meat Seeker is the one being promoted most heavily. The company shows off their product line in their most recent print ads. They boast sharpness in the advertisement with a chainsaw that is converted to a "broad-saw." If you look closely the broad-saw includes a multitude of broadheads. One of those broad-

heads is the Ultimate Steel we just completed testing. The company will continue to push their flagship product this year - the Meat Seeker, but the Ultimate Steel is a impressive fixed blade broadhead.

The Ultimate Steel consists of three blades. The broadhead comes in three weights (75, 100 and 125 grain) and is designed to create a 1 inch cut as it slices through game. To no one's surprise, the broadhead is constructed from steel. Steel is the norm on many broadheads of today because of its immense strength and durability. On the surface, the



Rocket Ultimate Steel Broadhead Test by Jon Teater

## ArrowTrade Scorecard

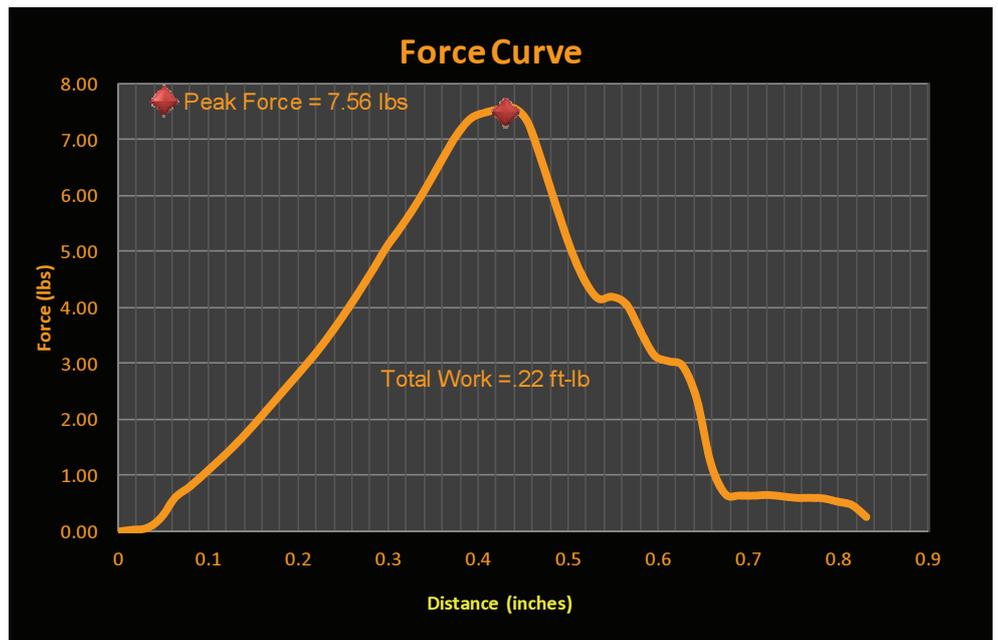
Evaluation Criteria	Score
Craftsmanship	Blue
Design Integrity	Green
Performance	Green
Sharpness	Green

Note: The ratings are based on the following color codes:  
 Blue = exceptional,  
 Green = above average,  
 Light Green = average,  
 Yellow = marginal,  
 Red = unacceptable

## Weight Measurements

	Broadhead 1 (Grains)	Broadhead 2 (Grains)	Broadhead 3 (Grains)	Average Weight (Grains)
Package 1	97.2	97.2	97.4	97.3
Package 2	97.5	97.9	96.9	97.4
Package 3	97.4	97.2	97.3	97.3

The photo shows an extreme close up of the head being driven through the polymer test medium. As this chart shows, weights of the heads we sampled were reasonably close, though all were under the stated 100 grain weight by our test scale.



Above left, the broadhead tip and ferrule are coated with titanium nitride, also used on drill bits for its hardening and friction-reducing properties. Above, the force draw curve shows a gradual rise to the peak, very different from the signature of the Grim Reaper Hades (see at right) as detailed in our November, 2011 test report.

product exudes an orange tinge. The tinge, a titanium nitride coating, is present on the tip and shaft. This coating is typically on many industrial-grade cutting tools (i.e. drill bits), and the benefits are great.

Rocket Broadheads are designed and advertised to take various game animals. The Ultimate Steel is geared towards animals ranging from Grizzlies to Hogs. A broadhead that is marketed to such an array of animals will not only impress customers, but should help boost sales.

### Test Overview

The test performed on the Ultimate Steel is separated into three parts. First, the product is evaluated for quality purposes. Next, the broadhead is pushed through polyethylene (poly) sheeting and the amount of work required and peak force is measured. Thirdly, the Ultimate Steel's ability to take a direct hit into wood is documented.

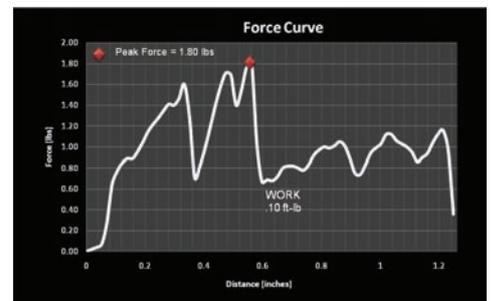
Please note that the test methods used in this test provide measurable numbers that are exclusively related to broadheads alone. In addition, I am of the opinion that testing done on animals is the most relevant method of evaluating the penetration of an entire arrow. However, it's difficult to replicate such tests, which are destructive and take years to compile. Therefore, this test has been tailored to measuring characteristics that will affect penetration, and is done in a manner that offers reliable and repeatable results.

### Inspection

Rocket Broadheads provided three packages of their Ultimate Steel model. Much can be said about products that weigh close to their advertised weight. As shown in

the table each head is carefully weighed. All heads were fairly close in

weight to one another. The broadheads were not far from the 100 grain threshold. After weighing the product, I meticulously reviewed all components for any obvious flaws/defects. The tip, blade, body collar and threaded shaft were pristine. The orange luster of the broadhead is eye-catching, and I was very impressed that the Ultimate Steel had little to no machining marks. One of the most important features, the blades, were extremely sharp and presented no nicks or burrs. The blades are maintained within their slots with a collar and an insert-like component while in the package. The blades are well supported and contained after installing on an arrow. However, it takes a little practice to install the broadhead. I suggest using gravity to support the installation process. Your best bet for the installation is to position the broadhead vertically (tip down) and hold the broadhead by the chisel tip. Overall, I believe the broadhead represents high quality from a visual aspect and the sharpness of the blades is exceptional.



### Penetration Force

A broadhead is a critical piece of the puzzle when it comes to penetration. The mechanical advantage that a broadhead creates is essential for cutting and slicing a path through game. In a hunting scenario, the broadhead will make contact with soft tissue and bone as it travels through an animal's cavity. As the broadhead travels through the cavity it will meet resistance. A broadhead's ability to pass through a material with ease

(or minimal force) due to cutting features/characteristics (i.e. sharpness, profile, number of blades, etc.) may result in an increase in the projectiles "penetration potential."

This portion of the test is static; therefore, the dynamics of shooting an arrow from a compound bow into a medium is not present. A broadhead will ideally make most of its contact against skin and soft tissue as it enters and moves through an animal. It is rather difficult to find a material that is readily available and comparable to tissue. With that said, I evaluated several materials and did research comparing various materials based on factors such as elongation, impact resistance, tensile strength and tear strength. The decision was made to use poly sheeting, which may be odd to some. However, it has several properties that are more comparable to tissue than various rubbers.

As with most tests it is difficult to remove all the variables. In this test I have minimized the variables by testing the broadhead independently of the arrow and other forces (i.e. momentum). The test starts with the use of a rigid fixture. The fixture includes sophisticated equipment (a load cell) that records the amount of force (in pounds) it takes to penetrate a medium. Three layers of the mentioned sheeting are compressed in a holding fixture. The broadhead travels through the sheeting within the holding fixture through the use of a linear slide and stepper motor. The motor is designed to control the speed and limit the distance that the broadhead will travel.

A force curve is recorded as the Ultimate Steel broadhead penetrates the medium. The graphical representation details the resistance at each stage of penetration through the sheeting. The graph comparison indicates peaks and valleys at different stages during penetration. There is one primary resistance point as the broadhead traveled through the medium. At the spot just after the chisel tip and starting at the blade the broadhead reaches its highest resistance point; this is not surprising based on the broadhead's design. The peak force and total work is somewhat higher as compared to the products previously evaluated. First off, this is not necessarily negative, at least as it relates to penetration through material, but we will discuss this a bit more in the integrity portion of this article. The broadhead maintains fairly steady resistance as it enters the sheeting. Because of the length of the chisel tip, and stilted transition to the blades, more work is required to get the broadhead through the sheeting. The other tables detail the average amount of work and

### Force Test Broadhead 1 (Package 2)

Parameter	Peak Force (lbs)	Work (ft-lb)
1	7.56	0.22
2	7.65	0.22
3	8.15	0.23
4	8.14	0.22
5	7.83	0.23
<b>Average</b>	<b>7.87</b>	<b>0.22</b>

### Force Test Broadhead 2 (Package 2)

Parameter	Peak Force (lbs)	Work (ft-lb)
1	7.53	0.22
2	7.82	0.23
3	8.47	0.25
4	7.93	0.23
5	8.57	0.25
<b>Average</b>	<b>8.06</b>	<b>0.24</b>

peak force (lbs) the Ultimate Steel broadhead takes to penetrate the medium. To put the information into perspective, a field point takes approximately 10 or 11 pounds of peak force to penetrate the three layers of poly sheeting. Keep in mind that the cutting diameter of this broadhead is approximately 1 inch, much larger than a field point.

### Design Integrity

The theory behind this portion of the test is to evaluate the broadhead's ability to withstand damage upon impacting a dense material. A broadhead that ends up becoming damaged while impacting bone will suffer in penetrating because of an increase in resistance that ultimately occurs.

For this test, two arrows are tipped with Ultimate Steel broadheads and are shot by a compound bow into wood, at a distance of approximately 10 feet. The density of wood has some similarities to hard tissue (bone). Many tests consider plywood to be a good choice. I found there to be inconsistencies in plywood and decided on a premium pine that is nominally one inch thick (actual measurement .7665 inches). A product that can "survive" and is unharmed after penetrating wood should be considered well designed by most archers. One can assume that if the product is able to remain unscathed or only slightly blemished from this portion of the test, then the results in the field should be alike.

Bow Setup and Distance from Wood	Weight (lbs)	Draw Length (inches)	Arrow Weight (grains)	Velocity (fps) *
Compound Bow	60	29	481	253

As shown in the picture, the broadhead was able to support great penetration. In fact, this is the first time since I began testing that a broadhead passed all the way through the wood. In one instance, the only feature that stopped the arrow from going all the way through the wood was the fletching. The penetration of both broadheads was very similar, as both made it through the wood. As mentioned previously, the broadhead demonstrates a higher average peak force and total work in the resistance test. This perceived negative is really a positive as it pertains to penetration into harder materials like bone. The large chisel tip goes to work as it makes contact with the hard medium. It's designed to shed the material it comes into contact with and also creates a void for the remaining portion of the broadhead and arrow. Another interesting aspect of the design is the ferrule. The ferrule is scalloped, meaning it has material removed, which reduces surface area. Overall, the combination of a sizable chisel tip, sharp blades, robust components and reduced surface areas result in better penetration potential.



*Tests up to this point have shown the broadhead wedged in the pine board after being shot under the same conditions detailed at the bottom of these pages. That wasn't the case with this Rocket Ultimate Steel broadhead.*

### Conclusion

The Ultimate Steel is by far one of the better broadheads that have gone through the regimented, rigorous test. The compact head boasts innovation and its performance surpassed many notable products in the design integrity test. Some blade damage occurred during the integrity test; however, most archers tend to replace damage blades/broadheads after taking game so I have little concern that the damage will deter a potential consumer. The key components, such as the supporting collar, are essential for product durability. The Ultimate Steel blades are extremely sharp and demonstrated their cutting capabilities throughout the test. The package also included necessary hardware for installation and disassembly. In total, the package was well constructed, looked good and the product was ready to go right out of the box.

The main talking points with the customer begin with the broadhead's size. A smaller broadhead can lend itself to less wind planning and should maintain field point accuracy with maybe just a few minor tweaks. The big selling point for this broadhead is pass through potential. For those that are adamant that the best kills or tracking jobs require pass throughs then this may be the product for them. The design integrity proves this last point. Keep in mind that the broadhead includes a slightly smaller cutting diameter than most; however, I think bowhunters won't notice much differences in blood trails as long as a clean shot is made. Finally, for consumers that want a broadhead that can survive the elements and look good doing it, this product has increased component strength and "frictionless" surfaces due to the Titanium Nitride Coating.

Kinetic Energy (lb-ft)	Momentum	Distance to Wood (ft)
68.38	17.35	10

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