2008 Hunting Sight Evaluation

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Introduction

Today's archery marketplace has many new and innovative hunting sights. Sights aid the archer in orienting the bow and allowing for a consistent point of reference. Most sights have common features such as pin(s), aperture, sight bracket, elevation and windage bracket. While these common features can be extended across most sights, there are functional differences that normally boil down to the amount and method of adjustment, positioning of components, and clamping mechanisms. Products that have streamlined designs, aesthetic camouflage patterns, and simplistic features may be appealing to many consumers. But one must ask himself "what do I really need from a hunting sight." Understanding needs and how the sight will be used will allow the consumer to map out a product that fits their shooting style.

Considerations

When purchasing a new hunting sight, some of the items of consideration are as follows:

- Adjustability
- Craftsmanship/Workmanship
- Durability
- Performance Features

Adjustability

A sight is typically considered an "interactive product" that performs and operates with involvement from the user. Varying degrees and methods of adjustment are incorporated into the numerous sight designs available today. If an archer has a tendency to continually tweak his or her equipment, the focus may need to be on "ease of adjustment" through the use of tool-less or micro adjustment mechanisms. A trade-off for this functionality manifests itself in the form of product weight and cost due to the additional hardware components and complexity of the assembly. Because of this, others may stick to the more simplistic sight designs that don't offer the same adjustment features but still meets their needs. The adjustability of the sight needs to fit the shooter.

Craftsmanship/Workmanship

A manufacturer's attention to detail defines the quality of the product, which manifests itself in the area of craftsmanship and workmanship. This is one of the main items that can be assessed straight out of the package. A product that can boast good looks with absence of defects or machining / finish blemishes, is not only aesthetically pleasing to the consumer but also shows attention to detail and quality. Visual inspections allow the consumer to become more familiar with a product, voice any questions, concerns, or comments about the product as well as make an assessment of the overall visual quality.

Durability

One the archers' greatest concern of a product is how it will "stand-up" over normal use and time. An archer demands the most out of his or her equipment, and expects that equipment to be reliable in any environment. Manufacturers have not only had to design products to withstand varying climatic conditions but also have to consider the high amount of energy that is created when a bow is fired. This energy manifests itself as shock and vibration and is transferred into the sight through the bow's riser. For a sight to be regarded as being dependable it must remain intact and maintain desire settings in all situations. The sights numerous components and interdependencies create for a reliance on effective designs that exemplify integrity and vigor. An archers' fear of malfunctions or failures of any component can be reassured with taking the time to evaluate the overall quality and design of the sight system.

Performance Feature

Fiber optic thread is a key area of performance for a given sight. Fiber optics acts as a reference that is geared toward enhancing the archers' ability to aim at their target. There are distinct differences among certain sights that have the potential to impact light transmission of the fiber optic thread. Some of these differences can be found in fiber location, number and extent of bends within the fiber, overall length of the fiber, and surface area of the fiber exposed to the ambient light. Regardless of those differences, the amount of ambient light available and visible are the main aspects that allow the archer to focus on his or her pins and target. Preferences may vary significantly amongst fiber optic pigmentation and degrees of light emittance, but better decision can be made in organic lighting environments. Overall, the use of certain materials will differentiate products in this regard, the consumer should take the time to help investigate in detail all aspects of material used and review if the design is suiting to their needs.

The Tests:

Adjustability

Objective

The objective of the adjustability test is to provide insight into the amount of adjustment that a given sight has. This criterion was focused on the following areas: adjustment with two (2) or less screws, calibrated pin/elevation/ windage adjustment, reference numbers for pin/elevation/windage adjustment, micro pin/elevation/windage adjustment, micro click pin/elevation/windage adjustment, toolless pin/elevation/windage adjustment, distance of pin/elevation/windage adjustment, 2nd & 3rd axis adjustment (reference figure 1), sight bar range and number of adjustments, ease of adjustment in relationship to number of tools required and number of screw locations for locking the system down.

Figure 1: third axis verification procedure

Craftsmanship/Workmanship

Objective

The objective of this test was to focus on the craftsmanship and workmanship as it relates to the quality of the product. The evaluators went through a systematic process to analyze each component and feature. The assessment of the products within this criterion are focused on the following areas: pin alignment (reference figure 2), pin alignment after adjusting elevation approximately 3/16", tooling marks on all components, scuffs and/or paint chips, laser and/or sticker references, axis alignment, amount of tools provided for adjustments.

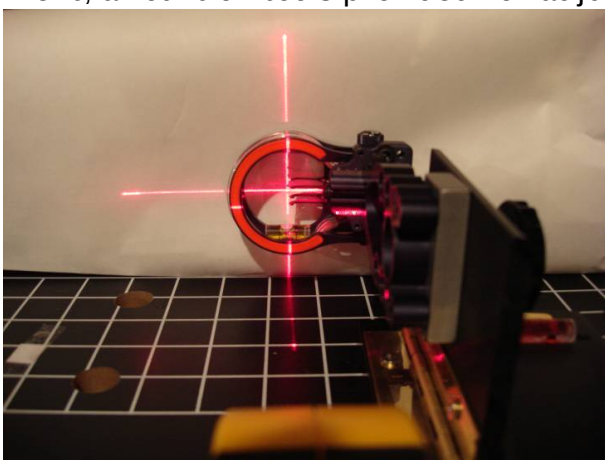

Figure 2: laser tool pin alignment procedure

Vibration Analysis

Objective

The objective of this test is to see if a sight maintains its setting at a constant vibration for a specified duration. The test is preformed to detect movement as well as changes in sound output characteristics. The major components such as elevation bracket, windage bracket and pins are marked and assessed for movement at the end of a two (2) minute cycle. The time-frame, frequency and amplitude are setup consistently for each sight and equates to approximately 6,000 shots.

Procedure

Each sight is examined for material grade of screws and receptacles, as well as thread pitch. Also, if a sight uses lubricants these are noted and used in a calculation to determine torque values. The proof and yield strengths are considered and used as part of the calculation of recommended/maximum torque values. All screws are tightened using information from ANSI standards and Machinery's Handbook. Each sight is mounted to a fixture that is constructed of 6061-T6 aluminum and is marked at specific locations on the windage brackets, elevation brackets and pins. The fixture is then mounted to the shock/vibration table (reference figure 3). The fixture is checked each time for bolt tension. Each sight is exposed to two (2) minutes of vibration cycling. The evaluators listen for changes in pitch and loudness during the specified period; this change could be resultant of loosened components. Any changes throughout the analysis are recorded and the sight is inspected at the end for any movement. If the components loosen, the screws/bolts are retightened with maximum torque values and rerun through the test.

Assumptions

An assumption is made that the frequency and amplitude range that are produced are indicative of most severe output during the shot.

Figure 3: shock/vibration table

Fiber Durability

Objective

The objective of this test was to measure of strength of the fiber optic thread. The evaluators also have noted the depth of the fiber, which is measured from rear of the aperture to the fiber. Also, the team noted if the aperture contained cutouts.

Procedure

Each sight was attached to a fixture that is mounted to a motorized test stand (figure 4). A force gauge is attached to the test stand and provides the load at failure (lbs). The force gauge pulls at a measured point on the fiber. The force gauge is attached at the central point of the fiber (each fiber is approximately .029), which is determined from the point the fiber enters into the aperture to the end of the pin head (central point). The gauge pulls at a constant force over time. Ten (10) pull samples are taken from each sight. The maximum and minimum samples collected are removed when calculating the average load force. The remaining samples to remove or break the fiber were averaged.

Assumption

A rate of approximately 20 inch/sec is indicative of speed that would be experienced when pulling on a fiber. The central point is the most likely place a fiber would experience outside forces. Ten (10) pulls provide an adequate sample size for this analysis.

Figure 4: motorized stand with force gauge

Fiber Illumination

Objective

The objective of this test was to measure light emittance. The test considered the lighting that would be experienced in midday and evening/morning conditions. The test did not take into consideration artificial sources such as LEDs.

Procedure:

Each sight is mounted to a test jig, which ensures the consistent orientation of each sight relative to ambient light (Figure 5). An enclosed photocell is used to measure the emittance of the different fiber colors (each fiber is approximately .029" in diameter). The photocell enclosure ensures that the photocell remains at a constant distance from the fiber end. To minimize light scattering and reflection, the photocell is positioned perpendicular to the fiber end. An additional reference photocell is used to measure ambient light from the full spectrum lighting setup, which is controlled to mimic both midday and evening/morning conditions when measuring each fiber optic thread. The ambient lighting conditions are measured through the reference photocell at approximately the same time the coupled photocell gauges the fibers light emittance.

Assumptions:

It is assumed that each sight is exposed to the same conditions based on the controllable variables. It is assumed that the diameters of all fiber threads are identical. It is also assumed that fiber characteristics are consistent for each sight; therefore, similar or identical wavelengths are produced by each individual fiber pigment. The test utilizes cadmium sulfide photocells to measure light; the evaluators allow the photocell to settle for a minimum of 30 seconds between measurements.

Results:

A ratio of the photocell outputs for each color is calculated versus ambient light. Each colored fiber should be analyzed separately because of the different wavelengths emitted. The calculation: measured midday or evening/morning resistance divided by measured fiber thread resistance in midday or evening/morning light= Light Emittance Ratio.

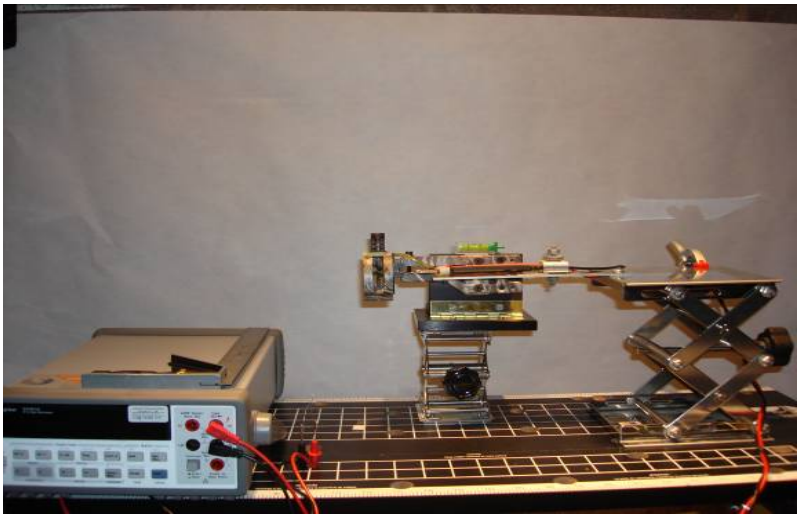

Figure 5: light emittance setup

Conclusion

Investigating the attributes and capabilities of the product that are found to be compatible with the consumers needs is paramount. A products ability to meet archers' requirements with well-made features adds value and makes for a better purchase. The product offering's value and its relationship to price is many times a major driver in the purchase decision. Budget minded archers may decide that he or she does not need all of the latest gadgetry, while other archers may view these capabilities as "essential". Either way, the amount and type of features offered by a given sight can play a vital role in assisting better shooting, but may add to the expense of the product. If price plays a significant role in purchasing a product try to compare the features systematically. A product that is well designed and hits on the key areas (as determined by the individual archer) can help to create a better shooting experience.

Equipment Used

Craftsmanship/Workmanship and Adjustability

- Mitutoyo Micrometer
- 3rd axis leveling device
- Laser Tool

Fiber Illumination

- HP Multimeter HP34401A
- Qty two (2) leads
- Qty two (2) CDS Photocells
- 3rd axis leveling device
- Elevation Stands
- Full Spectrum Lighting with dimmer

Fiber Durability

- Chatillon LTCM-100 Test Stand
- Imada Force Gauge DPS 11R 11lbX.01lb

Vibration Analysis

- Precision Instruments Torque Wrench
- MB Dynamics Model SS250 Amplifier
- Hewlett Packard 3325A Synthesizer
- Hewlett Packard 3325A Synthesizer
- MB Shock/Vibration Table
- Quantum Timer

Special thanks to:

ORIGINAL Brite Site

Thanks to Mike LePera for providing the sight leveler

www.britesitetuner.com

We would like to thank the manufacturers and sponsors who provided sights and test equipment for this evaluation; without them and their support, this evaluation never would have been possible.

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The evaluators have no affiliation with any of the participating manufactures. In some cases not all criterion could be fully evaluated due to assembly requirements or lack of components; the absence of components or assembly does not infer that this should be a requirement of a product. Note that the criteria outlined in this evaluation were deemed important factors for consideration; due to either budgetary or time limitations only these areas were evaluated.