Colorado Science and Engineering Fair

2024 Team Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: How to Maximize Your Ballista's Performance in Three Easy Steps

Team Leader's Name: Stephen Rigsbee

Team Member 1: Lance Refior

Team Member 2:

School and City: Alamosa High School, Alamosa

Sponsor's Name: Matthew Relyea

Category: Engineering (ENGR)

Division: Senior (9th - 12th grades)

Abstract (250 words or less):

This project demonstrates the mechanical potentials of torsion energy. Although a ballista has limited applications today, the principles it uses to store energy in the form of torsion and release that energy are used in modern devices. With the research of torsion energy being limited, we built a ballista and investigated how various components of the ballista, such as arm length, launch angle, and the number of rope loops to store torsion power, affect the maximum distance an arrow can launch.

Our findings revealed that the type of rope (twisted or braided) had minimal impact on performance. However, we observed that shorter arm lengths were optimal for maximizing performance. Additionally, we confirmed that the launch angle significantly influences the maximum distance achieved. Furthermore, we discovered that increasing the number of rope loops enhances power, albeit at the expense of reducing the amount the ropes can be twisted. Each additional loop resulted in roughly a quarter increase in distance an arrow is launched.

We hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. We also attest that the above properly reflects our own work.

Team Leader's Signature: Stephen R. Date: 3-4-24

Team Member 1's Signature: Lance Refior Date: 3-4-24

Team Member 2's Signature: Date:

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with your Finalist Verification/Permission Form. A signed copy of this form must be included in your notebook.