West Virginia University

Presents

Creation of a Catapult

Vivid

Consulting

Introduction

- Eight groups received an assignment to create a catapult that would hit a bulls eye 3 meters away.
- Our group tied for second to last place in the initial competition with a score or 100 points.
- With this revised catapult, we can keep our heads high as we take part in the design competition and compete with some of the finest that West Virginia University has to offer.
- We have made it a point to keep the design simple, safe, and effective because that is what we know you the consumer is interested in.

Vivid Consulting Associates

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Rules and Regulations

- Dimensions: cant exceed 0.46 meters X 0.46 meters X 0.46 meters.
- No weight limit
- Cannot be a ballista type catapult
- Must be 3 meters away
- Try to hit the bulls eye that is located .53 meters off the ground

Target

- 100 Points!!
- Our goal is to hit the bulls eye of a target 3.0 meters away and at a height of 0.53 meters with a golf ball. The bulls eye is worth 100 points, the second ring 90, the third 80, the fourth 60, and the outer worth 50.

History of Catapults

Throughout history, humans have applied innovative ideas and designs to devices for throwing weapons.

- Slings to overcome the limitations of human arms
- Hunters and soldiers devised the bow and arrow to improve aim and velocity
- Finally, major advances in power and accuracy were achieved with the design of machines called *catapults*.

Why catapults?

- Gave attackers unbalanced advantage over defenders
- Allowed for support fire over the large walls usually placed by defenders, thereby making sieges easier

Evolution of Catapults

Figure 1: Ballista

Ballista

- Developed shortly after 200 B.C.E.
- Designed to hurl rocks and arrows long distances

Figure 2: Onager

Onager

- Developed around fourth century C.E.
- Designed to throw greater ranges and over objects with arc

Figure 3: Trebuchet

Trebuchet

- Developed at the end of the six century C.E.
- Designed with power and range in mind

The Prototype

- Very simple onager design.
- Some safety issues (proximity to arm, inconsistency with projectiles)
- $$ Not very cost efficient, as other groups spent less for a more polished product. $$

Success and Failures

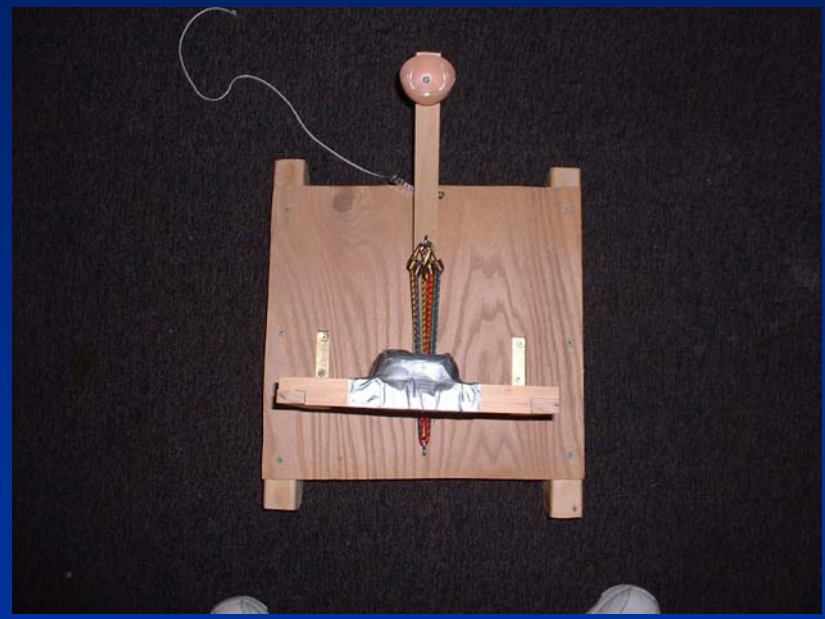
Successes

- Few and Far Between!
- Sporadically Hit the Target
- “Adjustable” Power
- The “H” Stop provided an adequate stopping point
- Provided an excellent foundation for our revised catapult
- With a score of 100 points, gave us much room to improve!

Failures

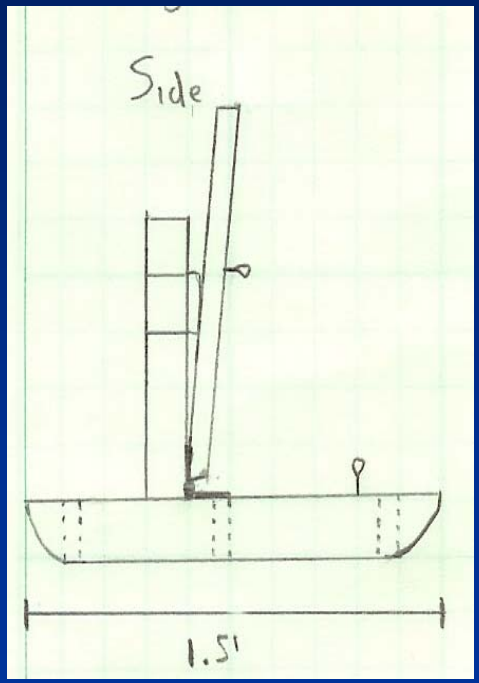
- No Triggering Mechanism
- Power not harnessed adequately due to movement or the entire body after release or the launching mechanism
- Base not stable or heavy enough
- Springs stretch out~ Accuracy and Precision suffer after initial few shots
- The score of 100 points was a shame to ourselves and our peers. Back to the drawing board we went!!

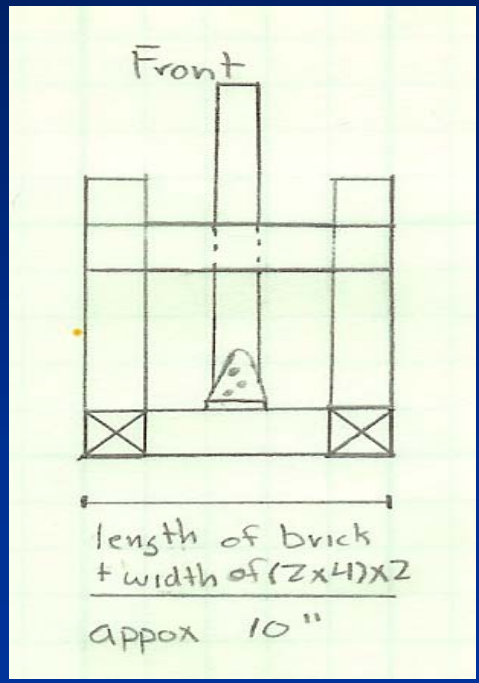
The Revision

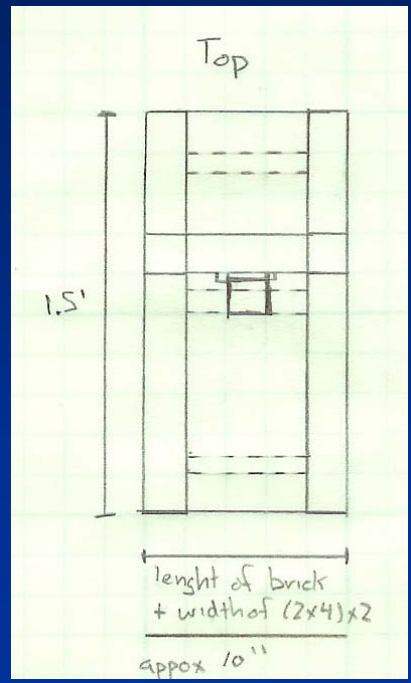


- New and improved base
- New power system
- New trigger assembly
- New padded stop

Designs and Sketches







Design and Building Process

Total cost: $ 15.89

Time spent building: 4 hours

Time spent testing: 1 hour 30 minutes

Parts:

- **2 – 16.5” 2x4’s**
- **3 – 10” 1X3’s**
- **1 – 13.75” x 14.75” sheet of 0.5” plywood**
- **4 – 10” mini bungee cords**
- **1 – Easter egg**
- **1 – U chain coupler**
- **1 – Shoulder hook**
- **2 – Eye hooks**
- **2 – L brackets**
- **3 – Bricks**
- **1 - Washcloth**

Improvements

- With a trigger mechanism, launching is now easier and safer
- The projectile holder allows for more accuracy and greater precision
- Adjustable power system allows for incremented power adjustments
- Padded arm rest reduces wear and tear from everyday use
- Designed to fit snuggly over three bricks for greater stability
- Adjustable feet in the front allow for minor height adjustments
- **Overall greater accuracy and better structural integrity**

Test Footage

Conclusions

- As we have proved through this presentation, we have learned from our mistakes and eliminated them in our revised design. We are now able to put out a product that is cheap, competitive, safe, and reliable for the consumer. We now open up the floor for the discussion and any questions you may have!!