To: Sarah Oman
From: Team F7
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Subject: Testing Proof

In order to test the engineering requirements the following tools and machines must be used. The testing procedures are used to verify that engineering requirements meet the targeted values stated in the ER section.

Range of Ball and the Distance between target and slingshot

The range of ball can be measured with a metric units tape measure. The ball will be launched and the distance measured to the nearest millimeters. A tape measure of at least five meters in length will be needed, with a resolution of 4-5 metes.

Figure 1 and 1.1: Range and Distance of the Ball

as shown in the figure 1 and 1.1 the engineering requirement has been met because it came with the 4 to 5 meters long.

Height of Ball

The ball height can be measured through a scale. A simple scale available in the market can do this, by just throwing the ball towards the target and measure the distance in the sky. We can detect the most accurate distance by recording it by the high-speed video cameras.

Figure 2: Height of Ball

Angle of Projectile

The projectile angle can be determined through the Semi-Circle scale by placing it on the horizontal axis. This can easily measure through the scale available in the market.

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Figure 3: Angle of Projectile

The angle of projectile cannot exceed 45 degree to be sure to hit the target.

Energy Transmit

It can calculate through the elastic force apply by the rubber band or can determine by finding the velocity of ball. We can detect the most accurate velocity of the ball by recording it by the high-speed video cameras. After that we will measure the kenotic energy.

The elastic energy equation is:

Elastic Potential Energy Formula

$$U = \frac{1}{2} k x^2$$

U – potential energy of spring in joules
x – string stretch length in m
k – spring force constant N/m

Figure 4: Elastic energy equation [1]

According to the elastic energy equation the energy that rubber band or can determine is 12.4335 J

Sharp Edge

Any sharp edge can harm the children so the product must not have sharp edges. Like every wall must have round edges. Edges can calculated through the scale, which is available easily in the market.
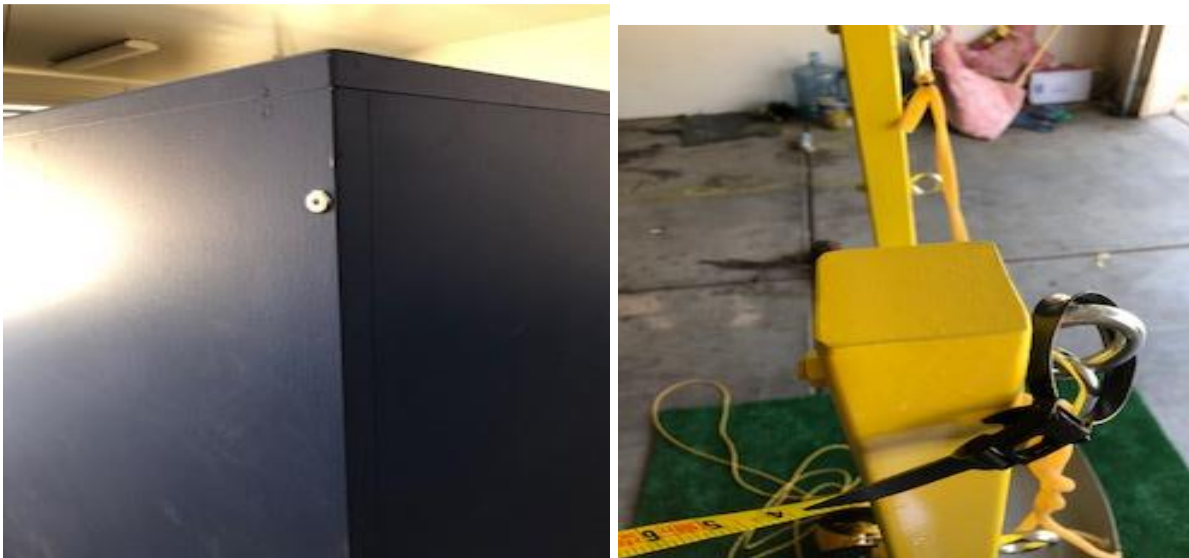

Figure 5 and 5.1: No Sharp Edge

Weight of Target

As the target will hang on the wall so the weight of that target is basically weight of target. Weight can measure through the scale easily available in the market.

Figure 6: Weight of Target

As shown on Figure 4 the target weight was 0.198 kg.

Number of Targets

Count the number of targets.

Figure 7: Number of Targets

Distance between target and slingshot

Distance will measure through the measuring tape which available in the market.

Figure 8: Distance between target and slingshot

The distance between target and slingshot is 4.1 meter.

Size of Ball

Size of ball can calculate easily by the scale. It can be measure by the circumference of ball and through the formula to calculate the radius of the ball.
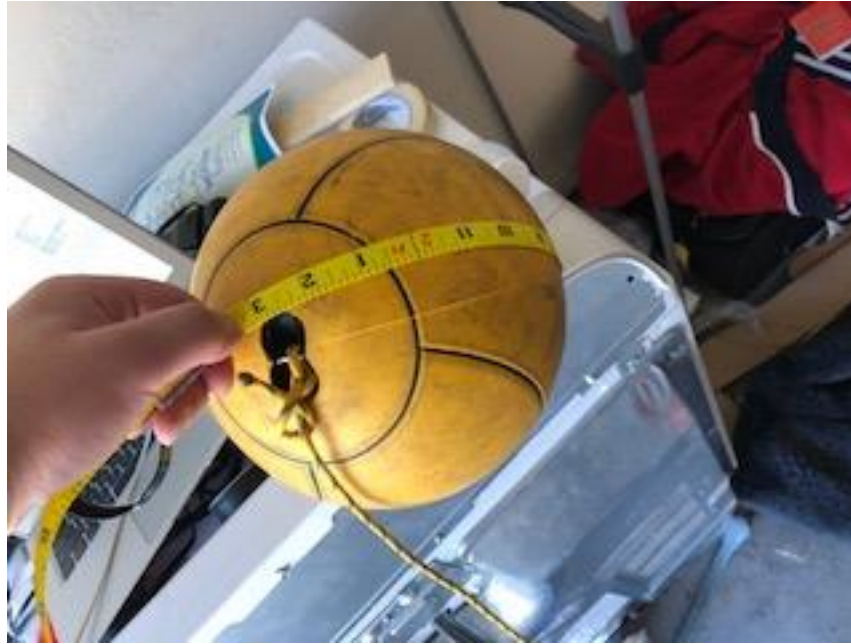
Figure 8: Size of Ball

The size of ball is 0.20701.

Size of Target

Target size will also measure in the same way as the ball.

Figure 9: Size of Target

The sizes measure as follows: XS = 5" x 8", S = 6" x 9", M = 7" x 10".

Length of Rubber Band

Rubber band length will also measure through the scale easily.

Figure 10: Length of Rubber Band

The length of rubber band is 2.4 ft. as shown in Figure 8

Front Wall Size

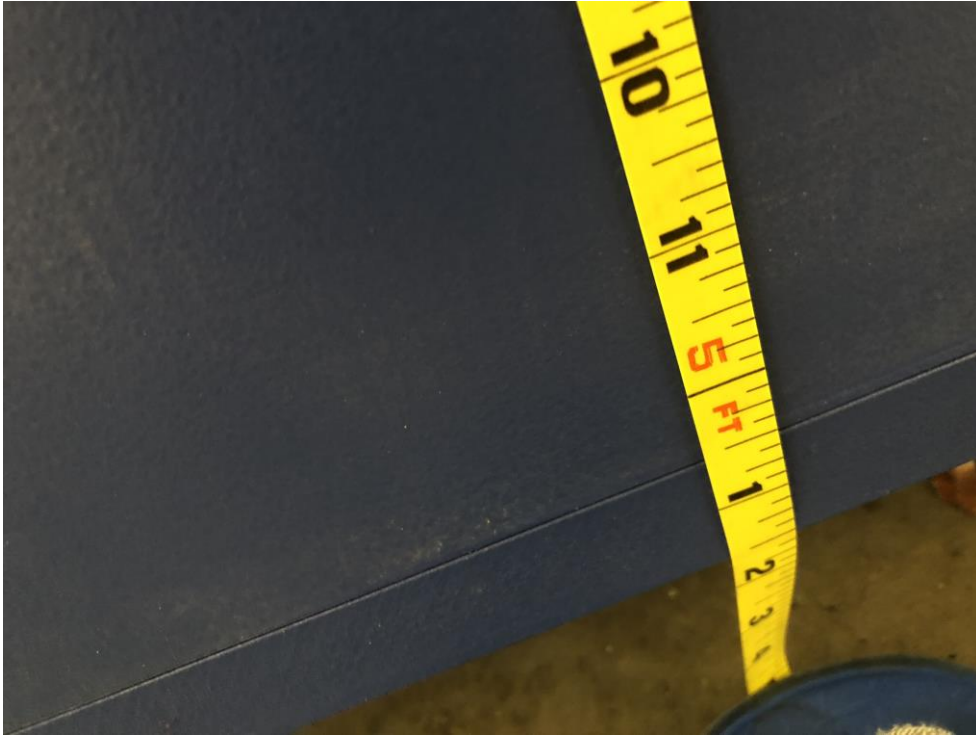Size of wall can calculate through the measuring tape, simply measure the length and width.

Figure 11: Front Wall Size

The front wall size is 1.58496x 1.58496 meters.

Reference

[1] Ncalculators.com. (2018). Elastic Potential Energy Formula & Calculator. [online]

Available at: https://ncalculators.com/mechanical/elastic-potential-energy-

calculator.html.