

# The Unicorn Bandits (Group 34)

## Inquiry and Analyzing

- A **design brief** (up to **3** sentences) that describes the team's process.
- **Research** from at least **5** different sources of information, include one non-Internet
- A **bibliography** in MLA format showing all sources researched.

## Developing Ideas

- The range of **design ideas** (a minimum of **3**) that the team developed.
- Your team's **final machine design choice** with clear justification.

## Creating the Solution

- **Photographic evidence** of your collaboration and creativity.

## Evaluating

- A **critical evaluation** of how well your team tested their design specifications to achieve the goal.
- A description of **changes** made throughout the design cycle process.
- A description of **how the machine could have been improved**.

## Design Brief

In this year design cycle challenge, we had to create a rube goldberg machine, with five set specifications. Which is, it must start and ends with dominoes, most of the machine must be in the confine area, there cannot be outside energy (water, fire, electricity and so on), it must have 3 actions and 2 potential energy source, lastly it must follow the theme. Besides this specifications, we also had to create our own, which will be listed below.

The design specifications that we created/given, help the process of designing this machine, since we must consider the specifications and follow it. This created several problems, since there was many ideas we wanted to pursue, but was thwarted because of the design specifications. This is a good thing and a bad thing, since it helps us have an idea of what we will make, but it also confines our imagination (which is good or bad depending on the idea). But after going through several designs and ideas we have got one that we pursue.

On the first day of DCC, we came together as a group, and wrote our ideas and designs. We then worked independently on our designs, and later on share it to each other. We then discussed the pros and cons of each design, and fixed each others ideas. After, we combined our designs in to our final plan. This plan was the basic outline of the machine, but we changed it several times during the design cycle to make it work.

The final designs is really complicated and hard to explain, but here is the basics. It starts of with dominoes that goes up a stairwell of books. After reaching the top, it drops a ball into a cup that is attached

to a pulley. When the cup goes down, it triggers a piece of wood, that drops the marble down the wedge into another cup. This then repeats until it reaches the top, where it release a marble down a ramp. As the marble travel, it drops another marble that travels down a shoot (the original marble is still going the ramp at this point). When that marble reaches the bottom, it hits some dominoes, which triggers a mechanism that pops a balloon. On the top, the original marble keeps going, and hit several small marbles, creating a little train of marble, as it reach the end, it drops a balloon filled with paint on to a stencil, which creates the sign KIS and CO'16.

Before reaching this final design, it took us many trials and test, and we had to go through the design cycle several times, before we could come up with the final one. The problems and successes will be clearly identified later on.

### **Our Own Design Specifications**

The machine must consist of different colored future boards, duct tape, balloons, marbles and etc.

The machine must have 3 different heights (high, medium and low).

The machine must consist of 2 simultaneous routes.

### **Research**

The different components to a rube goldberg machine:

#### **Wedge/Inclined Plane**

A wedge is used for rolling down an object. The force (gravity) pulls the ball down and the wedge, which is useful when wanting to transport something by itself without any other mechanism besides gravity

#### **Gear**

A gear is basically a wheel with cut teeth, these gears can interlock with other gears to make it move. Since when one gear moves, the tooth's moves the other gears.

#### **Pulley**

A pulley is a wheel with a groove that has rope hung around it. This is used to move a heavy object to move heavy load up a vertical axis (mainly).

#### **Lever**

There is many types of lever, but the mechanic of the lever is raise to raise an object, by using a piece of rod that is on a pivot, where one side is the weight, and the other is where the force is applied.

#### **Wheel/Axle**

The wheel is a cylindrical moving object that is used to move things from one place to another. This is achieved by putting an axle for the wheel to rotate. The wheel and axle is then attached to something, so

that things can be transported.

### Screw

A screw is rod with threads that spins around inside a hole that also have corresponding grooves. This allows to screw to move around, yet stay in position when not being rotated.

### Works Cited

- Francois, Carol, and Bronwyn Harris. "What is an Axle?." *WiseGeek*. Conjecture, 29 Oct. 2013. Web. 15 Nov. 2013. <<http://www.wisegeek.com/what-is-an-axle.htm>>.
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- "What is a Pulley?." *wiseGEEK*. N.p., n.d. Web. 15 Nov. 2013. <<http://www.wisegeek.org/what-is-a-pulley.htm>>.
- "wheel and axle." *The Free Dictionary*. Farlex, n.d. Web. 15 Nov. 2013. <<http://www.thefreedictionary.com/wheel+and+axle>>.

### Designs

We had several designs that we used to create our machine We had a design from each of the person in our group, but we also had a final one that was combined. We didn't really choose a final design, since we just put different design together, this made every happy and have a part of the rube goldberg machine that they will work on. The final design is also really rough, since it was hard to draw a design, when you don't know what materials we can access and how each material worked (the research didn't really help in understanding this materials).

The designs we had is really rough, and it is hard to understand by just looking at the picture, so here is an explanation of each of the design (the main 3). The first design (Fran), was the most complex design, since Mr Park told us that the tenth grader must have a much more complex machine. His plan

consist of pulleys and cups, which will bring the marble up to the top of the ramp. The second design (Putt), consist of dominos, he wanted to create a staircase of dominoes, which will make the domino goes up to the top. The third design (Felippa), consist of a can of spray color, which will be trigger to paint a picture. This idea later developed into a paint filled balloon, because it was too hard for us to think of mechanic for painting with a spray bottle.

All of these design were later integrated together, to create something that was unique and innovative. We believe that the way we created different designs was a great idea, since it helped us reached a machine that consist of many things. We believe that the final design meets all of the design specifications, since it we developed our design to fit the design specification perfectly.

### **Photographic Evidence of the design**

All of the photos can be found on our page on the DCC website. This is included in the end of the video (if Fran is correct).

### **Evaluation**

There is many things we can reflect about, since we went through the design cycle several time (more than most people) since we wanted to design thing that was much more complicated and innovative. Let's start of at the beginning. At the beginning we created a plan that was much different than the final, this was because we created something that didn't really follow the design specifications. For example adding a fan or something with a motor. This then was thwarted, since we found out that we couldn't. We then have to change our plans and ideas to meet the design spec. After creating a plan, all of the days consist of trials and test. And most of these consist of fails attempt. This was not a big problem for us, since we were expecting this, and by failing we knew where to improve and fix. Throughout the week, we had to change our plans during the test, since some parts didn't work, this mainly consist of the pulleys, since it used the most complex parts.

The end result for our group was mediocre. We didn't really have a complete successful run, but we were close. And we were proud of it, when it did. We believe that if we got an extra day, we would have made the rube goldberg machine flawless, since the parts that needed to be improve was known, and took too much time to fix it on the day. This part was the pulley releasing mechanism. This was because, we didn't have time to cut the wood, and we had to find another way of solving this problem which didn't work so well. This is the main part we would like to improve and was the part that was really unfortunate, this is because it was something that could have been fixed, but we didn't have enough time to complete it. Beside this, we would like to make the over aesthetic of this machine much more pleasant, since it is filled with duct tape, broken pieces, and rand strings everywhere.

Overall, we believe that we have made this machine relate to the picture well, since we believe that

it is something spectacular and looks impossible to pull out. There was many things that we interpreted, but we believe it was this, since we were the finale and want to create something awe like. As a group, I believe that we did well. Maybe we weren't the most talented, but we used our skills and use it to our advantage in completing this project. We believe that we could work better as a team if we stuck on task more, and we organize the different workload better. This will make it easier, and so that we don't have to write the essay hours before the final due date 9 pm (Fran is trying to finish everything on time, #typicaldccforfran).