Puzzle Design Challenge

Reese Winn

Engineering - 2
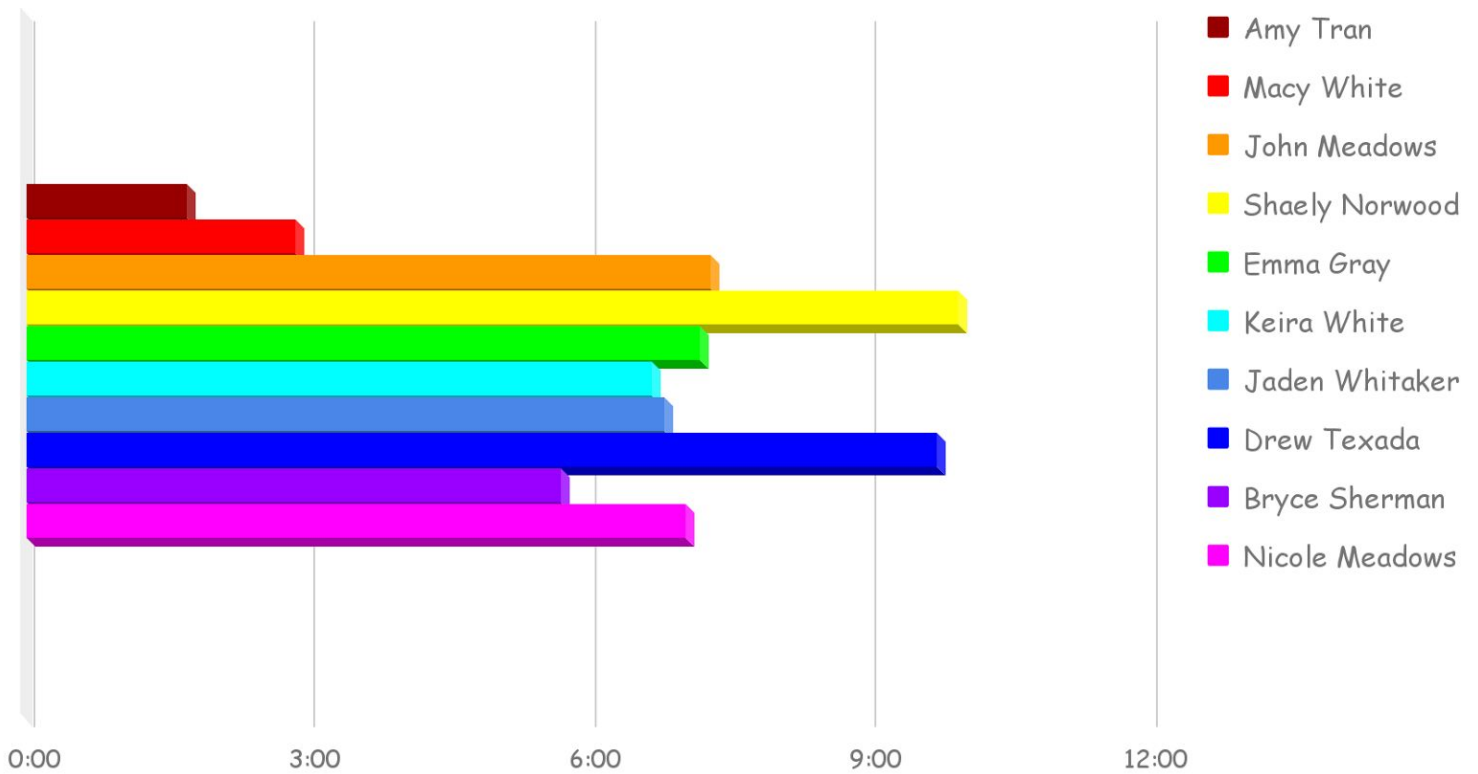
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C. Isaac, Instructor

Hello my name is Reese Winn, I am 14 years old and go to Ted Polk Middle School. I was given a simple task to create a desk toy out of ¾'' wood cubes. I decided to make a puzzle cube which was constructed of 27 ¾'' cubes and is 3'' by 3'' by 3''. This some what challenging cube is made up of 5 parts, 2 sets of 6 cubes and 3 sets of 5 cubes. Each piece is unique to create a challenging but fun toy. From the graphs below you will see I got variation of times.

Average Time Solved

Legend:
- Amy Tran
- Macy White
- John Meadows
- Shaely Norwood
- Emma Gray
- Keira White
- Jaden Whitaker
- Drew Texada
- Bryce Sherman
- Nicole Meadows

X-axis: 0:00, 3:00, 6:00, 9:00, 12:00

Design Process

DEFINE: What is the problem that Fine Office Furniture is currently experiencing? What are some of the effects? The consequences? Are there any constraints?

Fine Office Furniture is having a bit of a problem. They are having these ¾ " cubes practically being thrown away made of a very expensive wood. They have notice that they're losing money and don't know what to do. I have no constraints that will prevent me from doing this.

GENERATE CONCEPTS: What is the solution to the problem that Fine Office Furniture is currently experiencing? Brainstorm ideas.

I've decided to make a puzzle cube which will be constructed of 27 ¾" cubes, that will be 2¼'' long, wide, and tall.

DESIGN A SOLUTION: Think about what you would need to accomplish your idea? What materials? Time? Money? Put your pen to paper and create a rendering of your solution.

To accomplish this cube i'm going to need 4 basic things, the cubes, a pencil, paper , and last of all my brain.

BUILD AND TEST: Build your idea. Does this solve your problem?

This idea will solve the issue Fine Office Furniture is having.

EVALUATE SOLUTION: Does this work long term? Or is it only a temporary fix? It it not worth it to continue? Does it take too much time or money?

This cube should be a long term the only way it wouldn't is if people think that a desk toy would not be purposeful. This project does not take much time it took me 2-3 days to create all the drawings, 10-15 minutes to build, and 20-25 to build and paint it.

Conclusion Questions

1)Why is it important to model an idea before making a final prototype?

It is important to model an idea before making a final prototype because if you make a mistake on the design that you created you will be able to fix it before your product is final. So you will be able to make a model and make many adjustments to your product before, which will make your final product become that much better than your original idea.

2) Which assembly constraint(s) did you use to constrain each piece of the puzzle to the assembly such that it did not move? Describe each constraint used and explain the degrees of freedom that are removed when each is applied between two parts. You may wish to create a sketch to help explain your description.

I used notched constraint to put my pieces next to each other and make them stay stuck so they do not move. There are not degrees of freedom because I made all the pieces on each side to a certain degree to make them hold together.
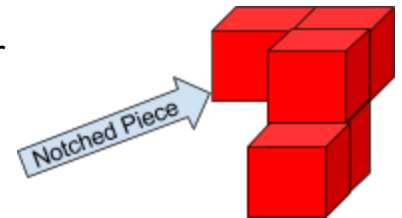
3) Based on your experiences during the completion of the Puzzle Design Challenge, what is meant when someone says, "I used a design process to solve the problem at hand"? Explain your answer using examples from the work that you completed.

It means that they defined the problem, which is that the company wanted to make use of the excess scrap blocks of wood that are costing them money. Then it means that the person did some research about how to solve this problem, for example the cubes were ¾". Then I began to create possible solutions for 4, 5, or 6 piece pieces. Then I created a 2 possible puzzle cubes, which would be a prototype. Then I fixed small mistakes that I found in my work, then I redesigned it because i had to make sure everything piece stayed the same color. After I made my changes to my cube, I created my final product/design which would be my current puzzle cube right now.

Summary

From the results I showed above I think it was quite hard and also people said it was hard or they struggled with it. The average time combined was 6:32 but, I also showed the averages for different ages. I believe my cube provides a good degree of difficulty, my times can show that, only one person had under 2 minutes. No one made it over 10 minutes which means it hard but is easy enough that anyone can solve it. I have to say i would probably just make sure my cubes were more flush with each other because some cubes were not even.