

CASE

Name:JP Marvin

Title Doorstop

Problem

What is the problem you are trying to solve? Build a door stop from materials provided.

Requirements

What requirements have you determined are needed to solve the problem? Wood, metal and concrete must be used in the design of the product. The doorstop cannot move when the force of the door is applied.

Solution

What is your solution for the problem? Describe your prototype. Our design is a wedge. As a simple machine, an inclined plane satisfied our needs to stop the door from moving.

Materials for Prototype

- List the supplies need to construct the prototype. Wood, concrete and metal pieces. 2x4 @.40 lf, the board is 6" long (½ foot) the cost is \$.20, concrete@\$120/yard (1/1000 of yard@ \$.012), and bb's @ \$1.75/350 (\$0.005/bb). Total cost is .20+.01+.005=\$.215 (21 cents).

Procedure for Building Prototype

1. List the steps for constructing your prototype here. Secure a 2x4x6 pine block. Mark the block to a height of 1 ½ inches from one corner on the end of the board. Make another mark 6" down the board from the corner. Cut the board into a block that is 11/2 by 6" long. Dado a groove ½" wide and 2 ¼ long down the edge of the board. Use a band saw to cut the board at a diagonal from the 1 ½ mark to the 6" mark. Tape the surfaces next to the groove to protect them and to help hold the concrete in the groove on the end of the board. Fill the groove with a 1:2:2 concrete mixture. Skreet and level the concrete mixture. Add bb's to the center of the concrete in uniform spacing and set them at half their height.

Test and Evaluation

Explain how you will test your prototype to determine if it meets your criteria. The doorstop will be placed under the door and the door will be placed against the stop. The test will be to see if the door or the stop has movement.

Analysis and Results of Tests

Explain your results of testing your prototype. Be descriptive and complete in your discussion. We placed the doorstop against the door and evaluated whether the doorstop or the door moved. It did not. We then proceeded to pull on the door while the stop was in place. The door moved slightly and then the stop caught hold.

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Conclusion

Based on the results, what inferences can you make? Describe how your prototype did or did not meet your set criteria. What were possible sources of error? What new design problems or solutions arise based on your results?

Based on our results our door stop worked well. The durability of the concrete nested in the would might be of a concern as it may loosen up with the board acting as a slip form if too much force is applied to the stop. The dado cut may need reshaped to better support the concrete. Further testing needs done to check the durability of the stop.