Objective

Team Accurate: Drill Right

General Need For Product

Certain drilling situations make the use of pilot holes impossible, which poses safety risks to users. Current market lacks a low cost support system option.

Market Size

- Primary users: Construction contractors in the Maryland area
- Secondary users: Home owners who want to perform simple drilling tasks accurately

Design

Operation

- Base is a stabilizer to stand or kneel on
- Vertical supports hold drill bit guide support and allow the guide to move at angles between ±45°
- Drill bit guide fits into the support and is interchangeable based on bit size
- Drill bit guide has a small clearance between wall and drill bit to prevent catching

Tradeoffs

- Cut at any angle desired
- Design for Assembly

Satisfaction of Customer Requirements

Design provides increased accuracy, stability, and safety during drilling, is low weight, user friendly, and is universal to all drills.

Prototype and Testing

A center mark and circle was drawn onto the concrete as a target
An attempt to drill exactly on target was done without and with the support
Deviation from the target hole was measured

Testing Results

D: Drop Test
Time to Start Hole (sec):
Hole Deviation (in):

Test Results and Future Work

Design Process Summary

Identified a need for a drilling support system through customer surveys
Selected a final design utilizing a HOQ and AHP
Satisfied customer needs by addressing their requirements in design

Future Work

- Obtain customer feedback
- Customer test trials
- Product lifecycle tests
- Increase angle capability to any angle specified by the user
- Patent product

Mechanical Engineering Design Day

December 6, 2011

Concept Generation

Box - Final Concept

- Base plate with vertical supports that rotate a bit guide support
- Pros: Increased accuracy and grip strength, and decreased vibrations
- Cons: Cannot change bit guide due to size

Reason for Final Design

- Addresses the needs of the market
- Lowest cost of manufacture

Con: Cannot change bit guide

Patent search provided an overview of existing products
Customer surveys gave specific targets for product success based on customer requirements
Prototyping and testing helped visualize concepts and address design flaws

Table 1: Design Criteria Weights

<table>
<thead>
<tr>
<th>Criteria</th>
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<tbody>
<tr>
<td>Force of user</td>
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<tr>
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Team Accurate: Drill Right

Force of user

Weight

Torque

Normal Force

Friction Force

Figure 1: Free Body Diagram System without product

Figure 2: CAD illustration of design

Figure 3: Testing with an accelerometer. Performed without and with product

Figure 4: Other tests performed included noise and time to start hole

Figure 5: Final Prototype

- Drill guided down track toward surface
- Pros: Damp lateral vibrations and universal to all drills
- Cons: Heating issues and cannot overcome torsion vibrations

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