Mechanical Shredder

Engineering Analysis

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November 13, 2014
Overview

• Design Concept Review
• Chosen Design Concept
• List of Parts and Materials
• Mechanism Design
• SolidWorks Drawings
Introduction

• Team continued with design concepts previously chosen and did analysis on plausibility of system.
• Potential gearing system was developed and an on-market paper shredder was chosen to retrofit for project.
• System drawn in SolidWorks to show designed system.
• Price estimate was done for the system components.
Customer Needs Review

• The Customer needs a paper shredder that is completely mechanical, portable, environmentally friendly, and can compete with an electric paper shredder

• The group will be limited to a budget of $100 for our designs and the system has to fit within a 5ft³ volume

• Paper shredder must shred 10 sheets per feed, 36 pages/minute, and shred paper, CD’s and Credit Cards
Concept Generation Review (Design 1)
Concept Generation Review (Design 2)
Additional Requirements

• Find an electric paper shredder to purchase and retrofit for project
• Shredder must have option to be wall-mounted, or stand on its own.
• Handle preferably on front face of shredder.
Chosen Product

- AmazonBasics 12-Sheet Cross-Cut Paper, CD, and Credit Card Shredder
- Current Price on Amazon: $54.99
- 8.9 x 12.5 x 15.7 inches
- System ~1.01 ft³
- 4.8 Gallon Bin
Existing Mechanism

FIG. 11
Electric Paper Shredder Patents [2][3]
Mechanism Design
SolidWorks Drawings
## List of Parts and Prices

<table>
<thead>
<tr>
<th>Parts</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>AmazonBasics 12-Sheet Cross-Cut Paper, CD, and Credit Card Shredder</td>
<td>$54.99</td>
</tr>
<tr>
<td>5 Steel Ball Bearings</td>
<td>~$6.00 each*</td>
</tr>
<tr>
<td>2 Molded Nylon Plain Bore Bevel Gears</td>
<td>~$4.00 each*</td>
</tr>
<tr>
<td>2 Molded Nylon Plain Bore Spur Gears</td>
<td>~$10.00 each*</td>
</tr>
<tr>
<td>1 Aluminum Crank Handle</td>
<td>~$20.00*</td>
</tr>
<tr>
<td>1 3/8” Diameter Hardened Shaft</td>
<td>$4.45</td>
</tr>
</tbody>
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Total: $137.44

*Estimated prices for components from McMaster.com [4]
Conclusion

• Retrofitting paper shredder with bevel system is plausible, but not enough information at the current time about the product.

• Estimated cost of system goes over budget to meet all customer requirements, so some negotiation will need to be done.
References


