Mechanical Ice Scraper

Silver A
The Product

- A hand-held, motorized, ice scraper
Product Context

- 133 million drivers in regions that are exposed to icy weather
- Current Ice Scraper models
  - Slow, flimsy, and uncomfortable to use
- Market Research: Auto-parts Stores
  - Contact: Justine Sheffield, Autozone (Somerville)
Major Risks

- Testing
  - Making Ice
    - Liquid Nitrogen
- Improved Effectiveness
  - Heating
  - Vibrating Mechanisms
Heated Ice Scraping

- Method: Heat then scrape
- Commercially Available Model
  - Electrically heated
  - Insufficient power
- Butane Torch
  - Effective when directly applied
  - Ineffective when used to heat blade
  - Safety Issues
Ultrasound

- Diathermy Muscle Therapy (1–3 MHz)
  - Heats ice but does not break it
  - Very Expensive
Linear Actuation

- Components from Reciprocating Saw
  - Drive-train
  - Casing
Linear Actuation: Testing

- First Test (with Saw Motor)
  - Cracked ice but stalled—Not Enough Torque
- Second Test (with Drill Motor)
  - Did not crack ice—Not Enough Speed
- Final Test (with Corded Drill)
  - Effective but used 110 V wall–socket
Description: Powered ice scraper
Intended Customer: Drivers in colder areas of the U.S.
Market: Automotive accessories

<table>
<thead>
<tr>
<th>Customer Need</th>
<th>Design Attribute</th>
<th>Engineering Specification</th>
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<tbody>
<tr>
<td>Lightweight</td>
<td>Weight</td>
<td>Less than 3 lbs</td>
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<tr>
<td>Comfortable to hold</td>
<td>Handle Diameter</td>
<td>Less than 2 in.</td>
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<tr>
<td>Quick Clearing Time</td>
<td>Time</td>
<td>Less than 5 minutes for hard rime</td>
</tr>
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<td>Thorough clearing of the windshield</td>
<td>Percentage of Windshield</td>
<td>90%</td>
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<tr>
<td>Easy to store</td>
<td>Size</td>
<td>4”x4”x18”</td>
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Future Work

- Reduce power requirement
  - Experiment with different blade geometries
    - Blade profiles
    - Multiple blades
- Explore power options