Approaching a High Efficiency Wood Stove

Advancing Sustainable Wood Energy in Maryland
October 30th

Taylor Myers
Introduction

• Mechanical Engineering PhD Student

• Captain of the University of Maryland Wood Stove Team
The Competition

- Alliance for Green Heat
- *Popular Mechanics* magazine
My Team

- Very small
- Virtually no wood stove experience
The Wood Stove Problem
If you can’t beat them, join them

- How do rival technologies meet customer needs?

- Wood stoves can be adapted

Source: Bounce Energy
Control

- There is an optimal way to burn wood
- Sensors and feedback make for a better product
Fixed Orientation
Forced Air

Source: Wikipedia Commons
Smart Controller

Source: Raspberry Pi
Other Tactics

- Emissions
- Efficiency
- User Friendliness
Efficiency

Stack Heat Exchanger
### User Friendliness

#### ClearStak®

<table>
<thead>
<tr>
<th>Temperature Data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Out</td>
<td>177.08 °F</td>
</tr>
<tr>
<td>Stack</td>
<td>296.00 °F</td>
</tr>
<tr>
<td>Catalyst</td>
<td>460.00 °F</td>
</tr>
</tbody>
</table>

#### System Data

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Oxygen Level</td>
<td>14.80%</td>
</tr>
<tr>
<td>Status</td>
<td>IDLE</td>
</tr>
<tr>
<td>Run Time</td>
<td>21:7:32</td>
</tr>
</tbody>
</table>
Conclusions

Source: Poppins Chimney