Pleather vs. Leather: A Tale of Two Couches

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ME222: Design for Sustainability
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Pleather

Leather
What are the components of the couches?

Note: difference between leather and pleather couch lies only in material on the surface.
Where does pleather come from?
Pleather Manufacturing

Blow film extrusion

PVC and PU made into a film

Calendering

PVC/PU film combined with cotton and material passed between rollers to make surface shiny

Cooling
Where does leather come from?

- sulferic acid
- detergent
- animal hide
- water
- tannin
- chromium

four manufacturing steps (see next slide)

- leather
- landfill

- air pollution
- sulfides

- water pollution
- chromium

- aluminum
Leather Manufacturing

Trimming/Liming

- Remove hair and proteins

Tanning

- Soak in solution to alter color and texture
- tannin
- chromium

Washing/Drying

- Loosen fibers to make flexible
- Vacuum dryer

Cutting/Sewing
## Analyzing Impact: Pleather Couch

<table>
<thead>
<tr>
<th>Material or Process</th>
<th>Weight (lb)</th>
<th>Okala Impact Factor</th>
<th>Total Impact (millipoints)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feathers</td>
<td>negligible</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Plywood</td>
<td>42.67</td>
<td>280/lb</td>
<td>11947</td>
</tr>
<tr>
<td>Particle Board</td>
<td>42.67</td>
<td>130/lb</td>
<td>5547</td>
</tr>
<tr>
<td>Fiberboard</td>
<td>42.67</td>
<td>89/lb</td>
<td>3797</td>
</tr>
<tr>
<td>Polyurethane Foam</td>
<td>4</td>
<td>33/lb</td>
<td>132</td>
</tr>
<tr>
<td>Polyester wadding</td>
<td>0.75</td>
<td>130/lb</td>
<td>97.5</td>
</tr>
<tr>
<td>Polyester fiber filling</td>
<td>0.5</td>
<td>130/lb</td>
<td>65</td>
</tr>
<tr>
<td>Steel</td>
<td>1</td>
<td>25/lb</td>
<td>25</td>
</tr>
<tr>
<td>Oak</td>
<td>3.75</td>
<td>5/lb</td>
<td>18.75</td>
</tr>
<tr>
<td>PVC</td>
<td>1.7</td>
<td>15/lb</td>
<td>25.5</td>
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<tr>
<td>Polyurethane</td>
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<td>33/lb</td>
<td>11.649</td>
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<tr>
<td>Cotton</td>
<td>1.1556</td>
<td>17/lb</td>
<td>19.645</td>
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<tr>
<td>Film blow extrusion</td>
<td>2.053</td>
<td>0.6/lb</td>
<td>1.23</td>
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<tr>
<td>Calendinging</td>
<td>3.21</td>
<td>3.1/lb</td>
<td>9.95</td>
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<tr>
<td><strong>Total materials and processes</strong></td>
<td><strong>141.2</strong></td>
<td></td>
<td><strong>21697</strong></td>
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11,206 miles

= 1.34 millipoints

Transportation

Frame/cushions

PVC, PU, cotton
# Analyzing Impact: Leather Couch

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<td>18.75</td>
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<tr>
<td>Leather</td>
<td>5</td>
<td>9/lb</td>
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<td>Total materials</td>
<td>141.2</td>
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<td><strong>21674</strong></td>
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11,016 miles

= 1.32 millipoints

Materials

Transportation
Pleather vs. Leather: First assessment

Taking into account materials, processes, and transportation:

Pleather couch impact = **21698 millipoints**
- Fabric impact (pleather) = 56.8 millipoints

Leather couch impact = **21675 millipoints**
- Fabric impact (leather) = 45 millipoints

At first glance, it seems as though leather is the better option...
Other Considerations

- Cows for leather couch, but not pleather

\[ \times 5 = \]

Each cow emits 6137 L of CO\(_2\) per day

\[ = 122 \text{ tons CO}_2 = \]

Car emission per year

\[ \times 31 \]
Other Considerations

• Maintenance
  – Need to clean leather couch more often using toxic, acidic solutions
  – Pleather cleaning only requires wet cloth

• Lifetime
  – Pleather lasts for 200,000 double rubs, or 54 years
  – Leather lasts for 100,000 double rubs, or 27 years
  – Leather more prone to cracking and sun damage

When other factors are considered, PLEATHER becomes the more sustainable choice!
Why buy leather?

- Main buyer: homeowners
- The allure:
  - Volume/presence in room
  - Luxury
  - Comfort
  - Cool feeling on skin
- The downfalls:
  - Sticky when hot
  - Hard to clean, especially in crevices
Alternative Design

- Bamboo frame design
  - Resembles futon
  - Easy to disassemble
  - Requires less leather/pleather
  - Cleaning is easy
  - Durable

Check out our sketches!