Evaluation of Alternative Materials for BIW Design

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Mercedes-Benz Strategy

• Provide the world’s best high-end automobiles

• Maintain industry leadership in technology and design

• Maximize profits while delivering consumer and environmental benefits
Motivations for Change

- Maintain profitability
- Meet environmental mandates
  - Recycling laws
  - Fuel efficiency
- Balance the competing mandates while still achieving profitability
  - Increased fuel efficiency leads to decreased recyclability

Body In Weight Design Proposal

- Production volume: 50,000 per year
- Materials Selection:
  - Aluminum Roof
  - Steel Quarter Panel Inner
  - SMC Quarter Panel Outer
  - Aluminum Floor
### Base Case Comparison

<table>
<thead>
<tr>
<th></th>
<th>New Design</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Weight</td>
<td>2685.6 lbs</td>
<td>-425.4 lbs</td>
</tr>
<tr>
<td>BIW Cost</td>
<td>$2128</td>
<td>-$221</td>
</tr>
<tr>
<td>Mileage</td>
<td>23.1 MPG</td>
<td>+1.5 MPG</td>
</tr>
<tr>
<td>Recyclable Material</td>
<td>66.2%</td>
<td>-3.4%</td>
</tr>
</tbody>
</table>

The table above shows the comparison between the new design and the base case in terms of weight, BIW cost, mileage, and recyclable material content.

### BIW Cost vs. Vehicle Weight

The chart illustrates the relationship between the BIW cost and the vehicle weight, with data points plotted across a range of weights and costs.

[Chart showing the relationship between BIW cost and vehicle weight with data points.]
Sensitivity Analysis: Production Volume

Sensitivity Analysis: Al Prices
Design Conclusions

- Increased fuel efficiency with a slight reduction in recyclability
- Robust results protect company from the unexpected
- Maintains profitability
- Preserves technological edge

Extras

Change in Profit with Changing Al Prices

<table>
<thead>
<tr>
<th>Change in Profit per Vehicle ($)</th>
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<tr>
<td>Materials Selection Case #</td>
</tr>
</tbody>
</table>

- Al at $1.10
- Al at $1.50
- Al at $1.75
Extras

Changes to Yearly Profits with Production Volume

Materials Selection Case #

Recycle % and Change in Profit per Vehicle ($)
Extras

Recycling Percentages by Case

Materials Selection Case #

Thoughts

• Revamp current recycling/fuel efficiency laws
  – Counterproductive
  – Provide Mercedes-Benz with a clearer objectives

• Require a standardized way to calculate recycling percentages
  – Expectations too high for total car
  – Reasonable for body in white