Introducing... Passat 14
“Drivers Wanted”

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Volkswagen Vision

• Performance: FUN and Sporty!
• Brand Image: Increase marketshare
• Environment
• Safety
• Longevity
• Dependability
Passat 14 Characteristics

- High End VW Vehicle: About $22,000
- New BIW: testing new materials
  - Roof: Aluminum
  - Inner: Steel
  - Outer: SMC
  - Floor: Aluminum
- Same powertrain
- Same As It Ever Was…only sportier, sleeker, more fuel efficient by design

Advantages of Passat 14

- Improved power and performance
- Improved fuel economy
- Improved emissions profile
- More labor-intensive than all-metal BIWs
- Higher recycling profitability
- Acceptable cost of production
Manufacturing the Passat 14

- New BIW concept: trade off between weight and cost
  - BIW cost vs all-steel is 20% more
  - Decrease 50% in weight (see diagram)
- Production scale: 150,000 cars/year
- Improvement potential of productions cost of aluminum and smc
Diagram Explanation

- Plastics: ASPP, AAPP: not ready yet
  - Floor in plastic
- ASPS and AAPS:
  - Smaller benefit in weight savings
  - $50 less than model 14, difference to be reduced
  - Not as labor intensive
- Restricts recycler profits

Passat 14: ASPA

- 2 heavy parts in Al
- 1 complex stamped part, replaced by molding
- 1 small part w. complex stamping: steel
On the learning curve, but still a challenge

- New materials but existing processes
  - Aluminum: from Audi engineers and technicians Audi A8
  - SMC: mastered with the new Beetle, fender.
- 3 different materials: joining and painting
- Experience in:
  - design & manufacturing
  - marketing and selling
  - maintaining and repairing

Designing for the Environment

- Material team in environmental processes
  - upstream for emission with material industry
  - downstream reuse of material: reducing the variety of polymers
- Design team for easier disassembling
- Research collaboration with Audi and main German dismantlers and shredders
Environmental Priorities

- Fuel economy
  - Appeals to our market
  - EU goal of 5.1 L/100km by 2005, 2010
- CO₂ emissions reduction
  - Bound by our emissions obligations to government
  - Reduce 25% of CO₂ emissions by 2008
- Recyclability
  - EU proposal to increase recyclability
  - 85% in 2005 and 95% in 2015
  - New material choices will stimulate recycling industry

Fuel Economy and Emissions

- BIW weight reduction helps us meet Year 1 reduction of 4% in CO₂ emissions
- Fuel economy will also drop by ~0.5 liter/100km in the first year
Continuous Improvement

- Reduction of BIW weight is first step in continuous improvements
- Plan to target other areas of vehicle design and manufacturing

Recycling Profile of Passat 14

- Slightly less recyclable than current all-steel BIW, with current recycling system
- Much more profitable for shredders
- Encourages industry growth and improved shredder efficiency
Recycling Comparison

<table>
<thead>
<tr>
<th>BIW Option</th>
<th>% Recycle/Reuse</th>
<th>% Change in Non-Recycled Materials</th>
<th>Recycler Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passat 14</td>
<td>71.3%</td>
<td>+1.6%</td>
<td>$31.51</td>
</tr>
<tr>
<td>All Steel</td>
<td>74.2%</td>
<td>-</td>
<td>-$9.88</td>
</tr>
<tr>
<td>All Al</td>
<td>72.6%</td>
<td>-3.5%</td>
<td>$43.32</td>
</tr>
</tbody>
</table>

Current Recycling Obstacles

- Ineffective recycling and materials industries
- Current technologies and economics
  - Do not support 80% reuse/recycling of any car
  - Low dismantler/shredder efficiencies, largely because of low steel value
Potential for Short-Term Gains in Recycling

• Improve shredder efficiency (metals) from current 90%  
  – Increasing efficiency to 95% increases R/R to 73.7%

• Recycle all fluids  
  – Improves recycling by another 6.3%  
  – Improves recyclability rate of ASR  
  – Shredders profit from less “hazardous” material

Regulatory Proposals

• Certificate system that makes owners responsible for cars
• Regulation of OEMs unnecessary because of recycling profit and because of research efforts
• No OEM responsibility for cars built prior to directive
• No constraints on used car exports (before end-of-life)
Funding Proposals

• *Fund three areas:*
  – Research
  – Steel-worker retraining
  – Tax breaks for recycling industry
• *Gasoline taxes*
  – Burden falls on those whose cars weigh more
  – Encourages emissions gains

Research Proposals

• Government/Industry Research Collaborative
  – *Short Term Goals:* Increase shredder efficiencies, improve fluid recycling, and improve dismantling
  – *Longer Term Goals:* Improved SMC/ASR recycling
Passat 14: Future of VW & Germany

• Breaking new ground:
  – Reduced emissions
  – Reduced gasoline consumption
  – More automotive jobs
  – Sustainable recycling