

NHTSA Mass-Size-Safety Symposium: Engineering and Market Realities



Scott Schmidt
Senior Director
Safety and Regulatory Affairs
May 13, 2013

May 7, 2013



Our Goal

2

Assure a comprehensive Midterm Review, using the most current available data, of factors that impact 2022-2025 MY standards, including mass reduction capabilities and related safety impacts.

Top-Tier Issues for Automakers

3

- **Substantial Mass Reduction Requires Comprehensive Vehicle Platform Redesign**
- **Potential for Real-World Safety Effects from Significant Fleet and/or Segment Mass Reductions Must Continue to be Investigated and Understood**
 - **Protect the Current Safety Trend**
 - **Complete Fleet Safety Evaluation Studies**
 - **Expand Statistical Analysis to Include More Realistic Scenarios of Potential Mass Reductions for Various Vehicle Sizes and Types**

Periodic Review of Safety Impacts

4

- **Periodic Reviews Should Fully Assess the Following:**
 - **Potential Mass Increases Associated With Future Safety Requirements and Voluntarily Provided Equipment**
 - **Potential Safety Impacts of Mass Reduction, Particularly for the 2017-2025 and Beyond Vehicle Fleet that will be Affected By:**
 - ✦ **Timing and Influence of Advanced Crash Avoidance Technologies**
 - ✦ **Potential Further Enhancements in Crashworthiness**

Important Safety Studies

5

- **NHTSA to Track/Study Real-World Safety Trends as More “Mass Reduced” Vehicles Enter the Fleet**
- **Estimate the Best Balance Between the Rate of Mass Reduction and Potential Impact on Real-World Safety**
- **NHTSA to Conduct/Complete the Follow-on Studies Referenced in the 2012-16 Rulemaking and Apply Them to the 2017-2025 Rulemaking**

Additional Safety-Related Study Recommendations

6

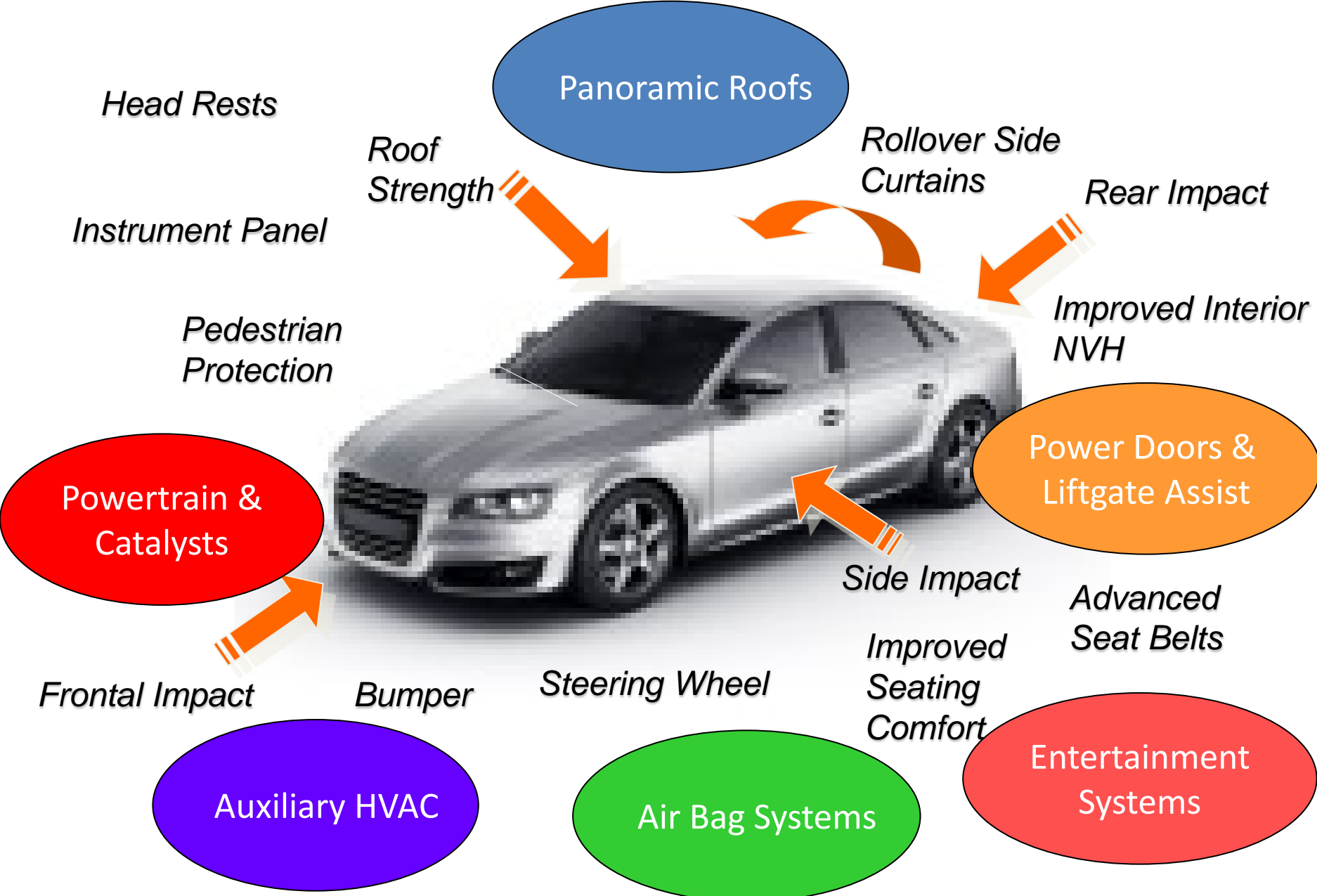
- **The NHTSA Statistical Analysis Estimates Mass Safety Effects for 100 Pound Increment Mass Reductions**
 - However, if Extensive Mass Reductions Occur, it is Unlikely to Occur Uniformly in the Manner Described in the NHTSA Report
 - Focusing Only on Estimating the Potential Effects of Extensive Mass Reductions Using a Step-function Approach (i.e., increments of 100 pound mass reduction for each and every vehicle), Does Not Account for Varying Levels of Possible Mass Reductions Across Vehicle Types for the 2017-2025 and Beyond Fleet
- **NHTSA Should Expand Their Statistical Analysis to Cover A Wider Range of Potential Mass Reduction Scenarios (including more realistic vehicle size and type specific mass reduction assumptions).**

Related Issues for the Midterm Review

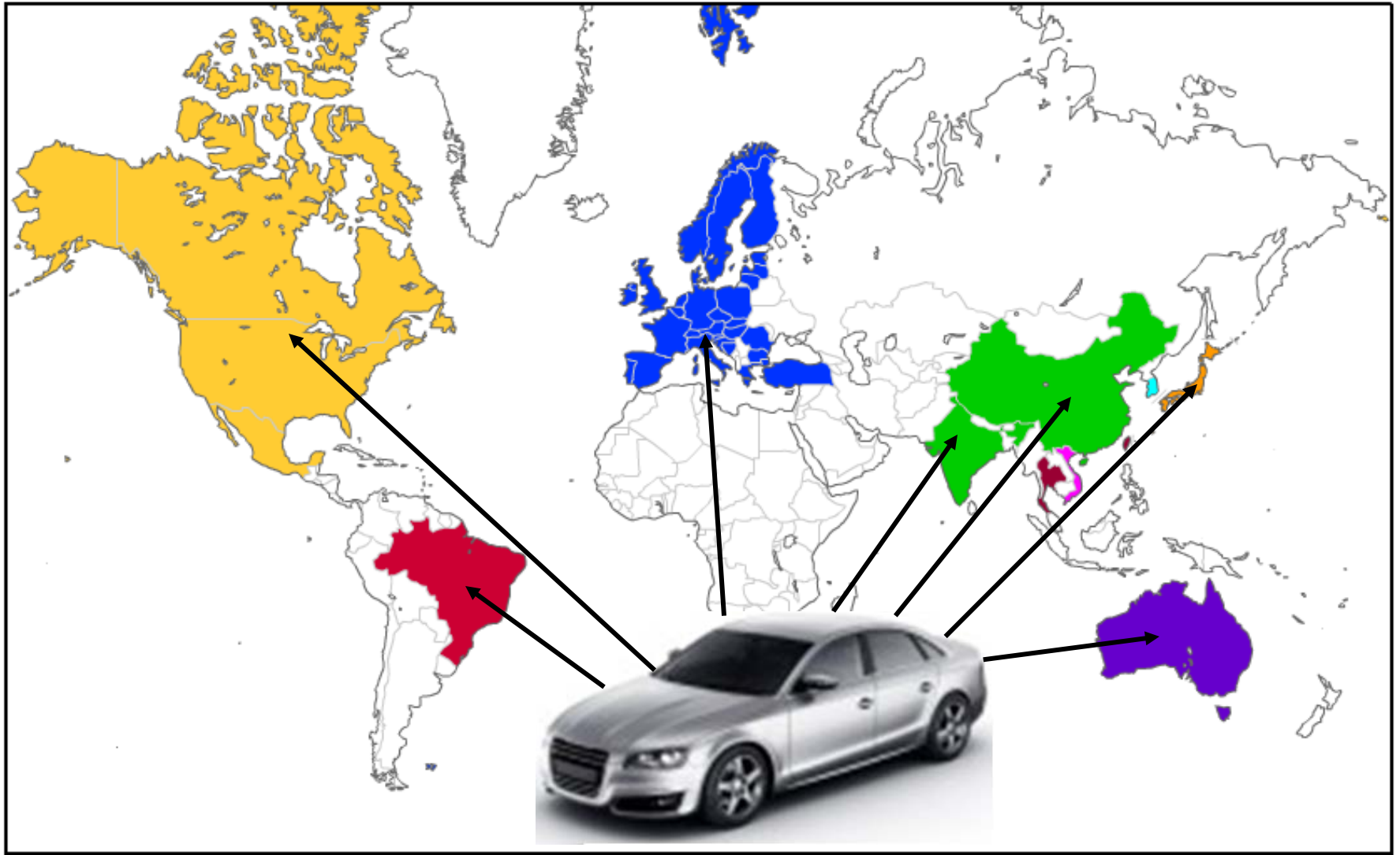


- The midterm review should also consider the most up to date data available on the following mass reduction topics:
 - Baseline fleet assumptions, including mass reduction elements that have already been implemented
 - Maintenance of performance objectives, NVH targets, functionality
 - Lightweight material availability and cost
 - State of manufacturing techniques and assembly processes
 - Durability and serviceability
 - Projected fuel economy benefits
 - Customer acceptance/willingness to pay

Factors that Contribute to Mass Increases



GHG/FE Global Requirements



Engineering global vehicles to meet new, often conflicting, requirements in different markets is a growing challenge for auto manufacturers.

Scalability Concerns



Beyond what may be technically feasible for weight reduction on an individual vehicle, the following are critical factors that must be factored in when scaling up to high volume production with lighter weight materials:

- **Material Availability**

 - Including new material uses and potential green chemistry concerns

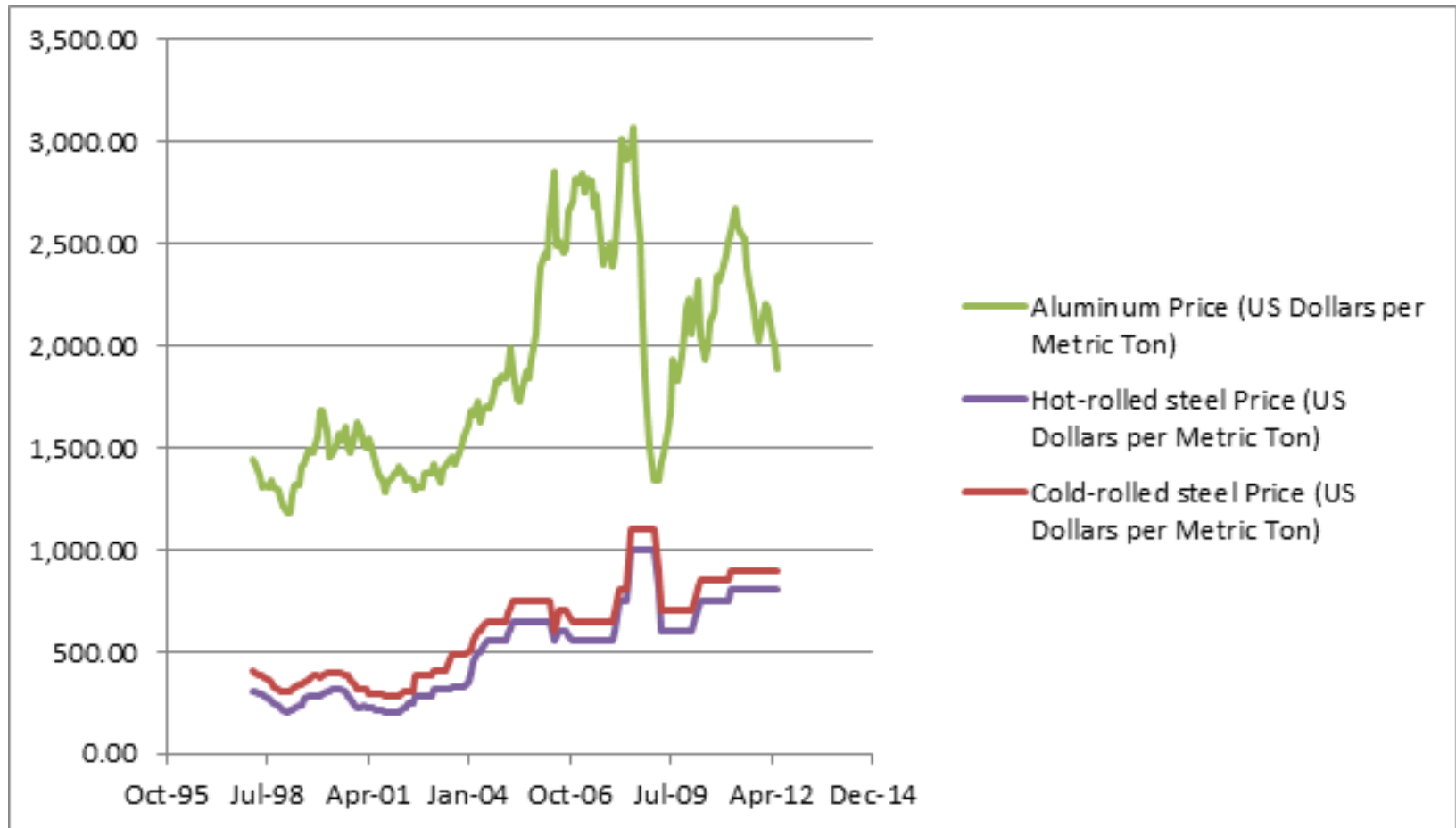
- **Infrastructure Capacity/Readiness/Investment for:**

 - Raw materials (sheets, castings, ingots, etc.)

 - Vehicle component manufacturing (stamping, extruding, casting, joining, etc.)

The state of these elements dictates overall material affordability.

Material Price Volatility



Material price volatility is a challenge for long term product planning.

Material Challenges



For specific materials, the following challenges must be overcome to achieve substantial impact for vehicle light-weighting on high volume products:

- Advanced High Strength Steels Manufacturability and Alloy Development
- Aluminum Feedstock Cost, Manufacturability, Improved Alloys
- Magnesium Feedstock Cost, Corrosion Protection, Improved Alloys, Manufacturability
- Carbon-Fiber Composites Fiber Cost, High Volume Manufacturability, Predictive Modeling, Recycling and Joining

Recent Mass Reduction Studies: Concerns Beyond Safety



Recent studies (EDAG, FEV, ICCT) suggest that mass reductions of 18-23% are feasible/possible at either no cost or cost savings. Many of the individual solutions appear feasible, but...

- A large number of the suggested solutions have already been incorporated into current designs of existing programs, i.e. many individual reductions are already in the baseline fleet.
- Some of the proposed mass reductions violate the assumptions that functionality, performance or safety should not be degraded.
- For some proposals the performance/functionality constraints could not be evaluated.
- An integrated vehicle solution for mass reduction is missing for each of these theoretical laboratory-based studies. A “systems” approach is necessary to determine feasibility.

Alliance Members

