Metallic Material Trends in the North American Light Vehicle

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Ducker Worldwide Introduction

Ducker Worldwide is a market intelligence, transaction advisory and strategic consulting firm driven to help you achieve your most ambitious growth goals.

What We Do

Market Intelligence and Research
Strategic Consulting
Transaction Advisory and Diligence

Ducker Facts

53  Year history
150  Team members worldwide
275  End-use markets served
32  Languages spoken
88  Countries were we have experience

Access to a Global Footprint

Industry and Sector Experts

Transportation (Automotive and CV)  Building Products & Materials  Heavy Equipment & Capital Goods
Industrials & Raw Materials  Aerospace  Healthcare Device & Services
Steel in the News

The steel industry is innovating at a monumental scale, working close with OEMs

“Tesla's Gen 3 Sedan To Be Steel-Bodied, Have 'Realistic' Pricing”
- Motor Authority – July 2014

“Steel to play a key role in meeting 2025 mpg targets”
- Automotive World – July 2014

“Advanced high-strength steels will offer more than sufficient light-weighting opportunities to automotive companies in the next decade, and from 2021-2025”
- World Steel Dynamics – October 2014

“The first serially produced vehicles to utilize the new (gen 3) steel will roll off production lines in 2017, ...already undergone formability and weld-ability tests with global carmakers...”
- Arcelor Mittal – April 2014
Automotive light weighting efforts at the OEMs have been accelerated due to the emissions and MPG requirements mandated by the government.

**Historic and Proposed CO2 Levels**

- 1975: 567 grams/mile
- 2008: 370 grams/mile
- 2025: 163 grams/mile

**WardsAuto Fuel Economy Index**
- August 2014: 25.4 mpg

*Source: Ducker Analysis*
A Plan Forward: Weight Reduction

Ducker believes that additional weight reduction will be required to meet the compliance levels.

A Curb Weight reduction of 460 pounds per vehicle is needed to meet the 2025 CO2 compliance levels.

Source: Ducker Analysis
To reduce the 2025 curb weight by 12% or 460 pounds compared to 2008, the required weight reduction by vehicle segment is shown below.

Source: Ducker Analysis
OEM and Vehicle Segment Driven Material Choice

Given an OEMs mix of vehicles offered for sale in the US, the use of AHSS or Aluminum become strategic in nature: use the best materials for the weight savings required.

The new advanced grades of steel are cost effective solutions for weight savings.

OEMs recognize the incremental costs associated with the use of aluminum for weight savings.

Source: Ducker Analysis

HSLA = High strength, low-alloy steel | AHSS = Advanced high-strength steel | UHSS = Ultra high-strength steel
Steel Content

Objective

• 2013 / 2014 Flat Rolled Steel Content with a core focus on AHSS for the North American Light Vehicle

Scope

• Steel content to encompass the light vehicle Body-in-White, with additional emphasis to also have specific metrics around bumpers, sub-frames, wheels, and suspensions
• The results are inclusive of over 80% of the vehicles produced in 2013 / 2014
• Similar to the 2011 Study, steel shipment data was utilized for data triangulation
Steel Content

Results

• The 2013 North American light vehicle is estimated to have an average of 1,615 pounds of flat rolled steel

  • Although lighter than 2010, the total is slightly greater than what we had expected and may be attributed to the mix difference of production vehicles in 2010 vs. 2013 (greater share of SUV and PUP) as well as by some delays in new vehicle launches

• The 2013 average light vehicle content of flat rolled steel versus the 2010 flat rolled content per vehicle for body structures, closures, door beams, bumper beams, suspensions, sub-frames and wheels in pounds per vehicle has changed as follows:

<table>
<thead>
<tr>
<th>2010 vs. 2013 Average Net Change in Steel Content by Grade in Pounds / Vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild Steel</td>
</tr>
<tr>
<td>▼ 110.3</td>
</tr>
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</table>

Source: Ducker Analysis
Steel Content

Steel is the content leader for both hoods and suspension sub-frames & engine cradles. Aluminum is a compelling alternative for some closure parts like hoods.

2009 vs. 2013 vs. 2015(e) Hoods

- 2009: Steel 77.7%, Aluminum 22.3%
- 2013: Steel 65.0%, Aluminum 35.0%
- 2015(e): Steel 52%, Aluminum 48%

2009 vs. 2013 vs. 2015(e) Sub-Frames / Cradles

- 2009: Steel 97%, Aluminum 3%
- 2013: Steel 95%, Aluminum 6%
- 2015(e): Steel 91%, Aluminum 9%

Source: Ducker Analysis
Steel Content

Steel was the preferred and nearly exclusive material utilized for doors and deck lids until 2013. There are some vehicles that use aluminum, magnesium or thermoplastics, however volumes remain low.

Source: Ducker Analysis
Crash management systems along with suspension components continue to be dominated by steel; however, are considered pendulum parts due to historical material utilization swings.

Source: Ducker Analysis
AHSS Content

AHSS continues its growth trajectory with approximately 254 pounds per vehicle in 2014, surpassing our estimates in 2010 for 2014 by over 20 pounds per vehicle (prior 2014 estimate was 232 Pounds)

Source: Ducker Analysis
Material Content as Share of Curb Weight

Ferrous material in its various forms together with aluminum make-up over 70% of the materials mix in the average 2013 light vehicle.
Mild steel share declined as compared to 2010. However, total steel content increased as the share of *B&C materials for high strength, AHSS and UHSS increased.

Source: Ducker Analysis
AHSS and UHSS together account for nearly 15 percent of the flat rolled steel content within the average 2013 vehicle. UHSS content doubled in three years.

**2010 Flat Rolled Steel Content**
- UHSS, 2%
- AHSS, 8%
- HSS, 23%
- BH, 6%
- Mild, 59%

**2013 Flat Rolled Steel Content**
- UHSS, 4%
- AHSS, 11%
- HSS, 30%
- BH, 8%
- Mild, 47%

**1628 Net Pounds per Vehicle**

**1615 Net Pounds per Vehicle**

Source: Ducker Analysis
HSS, AHSS and UHSS utilization shares grew from 2010 for all OEMs surveyed for their vehicles produced in North America. The cadence of vehicle launches can impact year to year shares.
AHSS Forecast

The 2014 average AHSS use in North American produced light vehicles is 254 pounds and expected to nearly double to 483 pounds by 2025

Source: Ducker Analysis
The Right Materials for the Right Applications

As we continue the march towards the 2025 mandates there are many unknowns as to what the materials mix will look like.

Source: Ducker Analysis
This concludes our report. Thank you.

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