THE KEY TO LIGHTER, STRONGER TRUCKS AND SUVS

Steel Market Development Institute

www.autosteel.org
About Steel Market Development Institute

✧ A business unit of the American Iron and Steel Institute
✧ SMDI’s Automotive Market program is led by the Automotive Applications Council (AAC) with the member companies shown below. AAC works with the automotive industry and federal partners to conduct research, provide technology transfer and promote steel-intensive solutions in the marketplace
✧ AAC conducts projects in the following areas:
   ✧ Steel-sponsored research under the AAC
   ✧ Automotive, steel and DOE-sponsored research under Auto/Steel Partnership
   ✧ Global steel research in partnership with WorldAutoSteel
   ✧ Product-specific research with the Bumpers Group, Long Products Market Development Group, Strategic Alliance for Steel Fuel Tanks and the Wheels Task Force
Challenging Conventional Thinking, Yielding Amazing Results

✧ Meeting new fuel standards will require **disruptive, talented engineering**.

✧ OEMs should choose steel as their partner to achieve **54.5 mpg by 2025**.

✧ With more than 20 grades of advance high-strength steel (AHSS), the automakers can achieve **significant weight savings at a much lower cost** and with little-to-no changes in infrastructure when compared to other lightweighting materials.

✧ Automakers that choose AHSS for their lightweighting goals will **have far more cost effective manufacturing**.
Why Steel in Automotive?

- **Lightweight**: AHSS can reduce a vehicle’s structural weight by 39% compared to mild steel.

- **Safe**: With its unique properties and processing flexibility, AHSS provides the best possible occupant protection.

- **Affordable**: Mass reduction with steel can be achieved at the lowest possible cost.

- **Sustainable**: Steel is continuously recycled into new products, preserving natural resources for future generations and can cut total vehicle life cycle CO₂ emissions.
More Reasons to Choose Steel
Lightweight

- FSV objective: develop optimized AHSS body structures for four proposed 2015 to 2020 model-year vehicles: battery electric and plug-in hybrid electric for A- / B-Class vehicles; and plug-in hybrid electric and fuel cell for C- / D-Class vehicles.
  - Achieves 39% mass savings
  - Uses 97% HSS and AHSS
  - Uses nearly 50% GigaPascal steels
  - Enables 5-star crash safety rating
  - Reduces total lifecycle emissions by nearly 70%
  - Reduces mass and emissions at no manufacturing cost penalty
  - Offers near-term production-application solutions
Mass reduction with steel can be achieved at the lowest possible manufacturing cost, while engineering studies like NHTSA’s Honda Accord Study (2012) show low-density materials like aluminum cost over 6 times more per pound saved than AHSS for vehicle mass reduction.

Repair and insurance costs are more affordable in steel vehicles than in cars and trucks manufactured with alternative materials.
AHSS is available globally, reducing automakers cost of production.

Steel-intensive designs can be implemented on global vehicle platforms, enabling car companies to keep costs low.
To measure the environmental impact of a product, it is essential to look at Life Cycle Assessment:

- Manufacturing;
- Use (driving); and
- End-of-life (recycling).

The LCA approach puts the lowest-emitting vehicles on the road.

Making aluminum from raw materials generates five times more manufacturing emissions than making steel.
Sustainable

- There is an abundant amount of recycled steel available (more than 80 million tons per year) to manufacture new steel products.
  - Steel is continually recycled. For many generations, steel goes from one product to the next without loss of quality.
  - Steel is easily and affordably recycled because it is magnetic.
- Aluminum is not recycled across products. Very little automotive sheet is available from recycled vehicles.
Consumers trust steel...

- According to SMDI's recent market research survey of 3,000 U.S. truck and SUV owners, manufacturing of vehicles using AHSS increases overall automaker opinion / brand equity in the mind of the consumer. Contributing factors included steel’s reputation for safety, performance and fuel efficiency.

- Knowing a vehicle is made from steel increases confidence in the consumer.

- Steel contributes to a lower cost of ownership to consumers compared to use of competing materials.
CRASH REQUIREMENTS

1990
FMVSS 214 Side
1994
FMVSS 216 1.5X GVW
1997
FMVSS 201 Side Pole
2003
USNCAP 35MPH Front
2006
IIHS Side Higher, Heavier Barrier
2012
IIHS 25% Narrow Offset Front

1991
FMVSS 208 30MPH Front
1995
IIHS 40MPH 40%
2000
SINCAP 38.5MPH Side
2003
FMVSS 301 50MPH 50%
2006
FMVSS301 55MPH 70%
2009
FMVSS 214 Dyn. Side Pole
2011
FMVSS 216 3.0X GVW

THE KEY TO LIGHTER, STRONGER TRUCKS AND SUVS

Trusted
The Road to the Future
The Road to the Future

✧ North American vehicles on the road today contain nearly 15 percent AHSS, and that number is growing.

✧ SMDI and its member companies are working closely with OEM engineers on new vehicle advanced development projects, challenging conventional thinking when it comes to steel and helping them realize their weight reduction targets with AHSS.

✧ We have convinced many front-line engineers that they want to Choose Steel First in their designs.
Development Projects: GM/Chevy Impala

A/SP Front Lower Control Arm Project

- **Cold-Stamped AHSS Clamshell Design Solution:**
  - Matches weight of forged aluminum baseline.
  - 34% lower cost at 250K vehicles/year.
  - Lower total life cycle greenhouse gas (GHG) emissions than aluminum baseline.

- Potential for as many as 2.5M additional vehicles to follow suit.
- More importantly, it’s helped engineers realize that anything is possible if they challenge conventional thinking.
Other Successes

✿ The 2014 **Chevy Silverado** incorporates AHSS in the A- and B-pillars, roof rails and rocker panels.

✿ Features a roll-formed steel pickup box, which is lighter, stronger and more durable than traditional stamped steel boxes used by major competitors.
Other Successes

✧ The 2013 RAM 1500 incorporates a newly designed frame that applies various steel grades, including an array of AHSS.

✧ Hydroforming is used for some of the sections to provide dimensional accuracy.
Other Successes

- Auto/Steel Partnership projects
  (roof strength, passenger compartment, front end)
- Wheels, bumpers, fuel tanks at lower weight than alternative materials
The Steel Solution i AHSS on the Road

Acura MDX
RAM 1500
Ford Escape
Ford Mustang
Chevy Silverado
VW Golf
Spark

THE KEY TO LIGHTER, STRONGER TRUCKS AND SUVS

Steel Market Development Institute
The Steel Solution - AHSS on the Road

Acura MDX
RAM Truck
Ford Mustang
Ford Escape
VW Golf
Spark
Chevy Silverado

Lighter, Stronger Trucks and SUVS
The Future of AHSS

- 3rd generation AHSS grades are being developed to create higher strength and formability choices for carmakers.
The Future of AHSS

- The steel and automotive industries are researching new applications for steel, defining local material properties for specific manufacturing strain paths, and generating fatigue and corrosion resistance data to improve modeling predictions, vehicle performance and cost benefits.

- In the past 10 years, new steel innovations have proven to reduce component mass by nearly 25% and more recent studies have increased the mass savings to 39% versus traditional mild steel benchmarks.
The industry is working to improve processing methods for AHSS with the development of unique, high-tech approaches to manufacturing parts from new steel grades.

Stamping and tooling operations are being examined, as well as joining strategies and models for formability, to enable the easy transition of new grades to existing stamping, joining and assembly processes.
Will the Industry Pass the Test?

We’re thinking ahead to 2025 …

✧ We want our OEM customers to achieve their strategic fuel economy goals.

✧ We’re working together to help ensure they will do it with steel.
Building a Sustainable Future
Steel is the most recycled material — more than aluminum, paper, glass, copper and plastic combined!

88% of all American steel ends up recycled into new products.
Automotive recycling rates (ratio of tons of automotive steel recycled versus automotive steel used for new vehicle production) can reach more than 100% in any year.
AHSS helps reduce greenhouse emissions, without compromising safety, performance or affordability.
Footprint Definition

**Footprint**

*Defined at 49 CFR § 523.2 and in NHTSA’s test procedure*

**Track width** (in) = Lateral distance between the centerlines of the base tires at ground, including the camber angle (rounded to nearest 1/10 in.)

**Wheelbase** (in) = Longitudinal distance between front and rear wheel centerlines (rounded to nearest 1/10 in.)

**Footprint** (ft²) = \[
\frac{\text{track width (in)} \times \text{wheelbase (in)}}{144 \text{ (in}^2/\text{ft}^2)}
\] (rounded to nearest 1/10 ft²)

**Base Tire** = Tire specified as standard equipment by a manufacturer on each vehicle configuration of a model type.

*This is a work of the U.S. Government and is not subject to copyright in the United States; it may be used or reprinted without permission*
Implications of the Footprint Approach

✧ The footprint method replaces the old weight-class method.

✧ Each vehicle platform will need to improve in fuel economy every year.

✧ Car companies cannot succeed by selling more smaller vehicles, because small car MPG requirements are higher.

✧ The footprint method puts a higher value on mass reduction than the weight-class method.
Summary

✧ AHSS helps automakers achieve their weight reduction goals and, because they require little to no changes in infrastructure, they achieve these goals at a lower manufacturing cost and with a lower total carbon footprint when compared to alternative materials.

✧ Consumers know and trust steel. Vehicles using AHSS grades increase the overall automaker brand opinion and equity in the minds of consumers.

✧ AHSS offers automakers the ability to meet future regulations and return the highest value to their shareholders. Material selection is a business case decision, and that’s why the future in this market is very good for steel.
THANK YOU!

Connect with us:

@SMDISteel
Facebook.com/SMDISteel
Youtube.com/SMDISteel

autosteel.org
FOR MORE INFORMATION

Visit: autosteel.org

Contact:

Ronald Krupitzer  
Vice President, Automotive  
248.945.4761  
rkrupitzer@steel.org

Tina Sullivan  
Vice President, Franco PR Group  
313.567.5028  
sullivan@franco.com

David Anderson  
Senior Director, Automotive  
248.945.4764  
danderson@steel.org

Jennifer Greenfelder  
Communications Manager  
248.945.4767  
jgreenfelder@steel.org