

Role of Aluminum in Meeting Future Federal Fuel Economy Regulations

Harry Siegel

Sapa Extrusions

on behalf of

The Aluminum Association's
Aluminum Transportation Group (ATG)

The Aluminum Association's Aluminum Transportation Group (ATG)



www.aluminumintransportation.org

U.S. Faces Stricter Fuel Economy Regs

- *April 2010*: the Obama Administration established regulation that, starting with 2012 model year vehicles, requires automakers to reduce fleet-wide greenhouse gas emissions by approximately 5% every year and strengthen fuel economy each year, reaching an estimated 34.1 mpg for the combined industry-wide fleet by model year 2016
- *October 2010*: the Obama Administration announced next steps toward establishing tighter fuel economy and emissions standards for 2017 through 2025 model-year vehicles

The Virtuous Weight Cycle: Enabler for Meeting CAFE Standards



Reinvest



Mass
Reduction

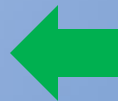


Downsized
Powertrain

- Improved fuel economy
- No sacrifice of safety or function



Cost
Savings



Secondary
Weight

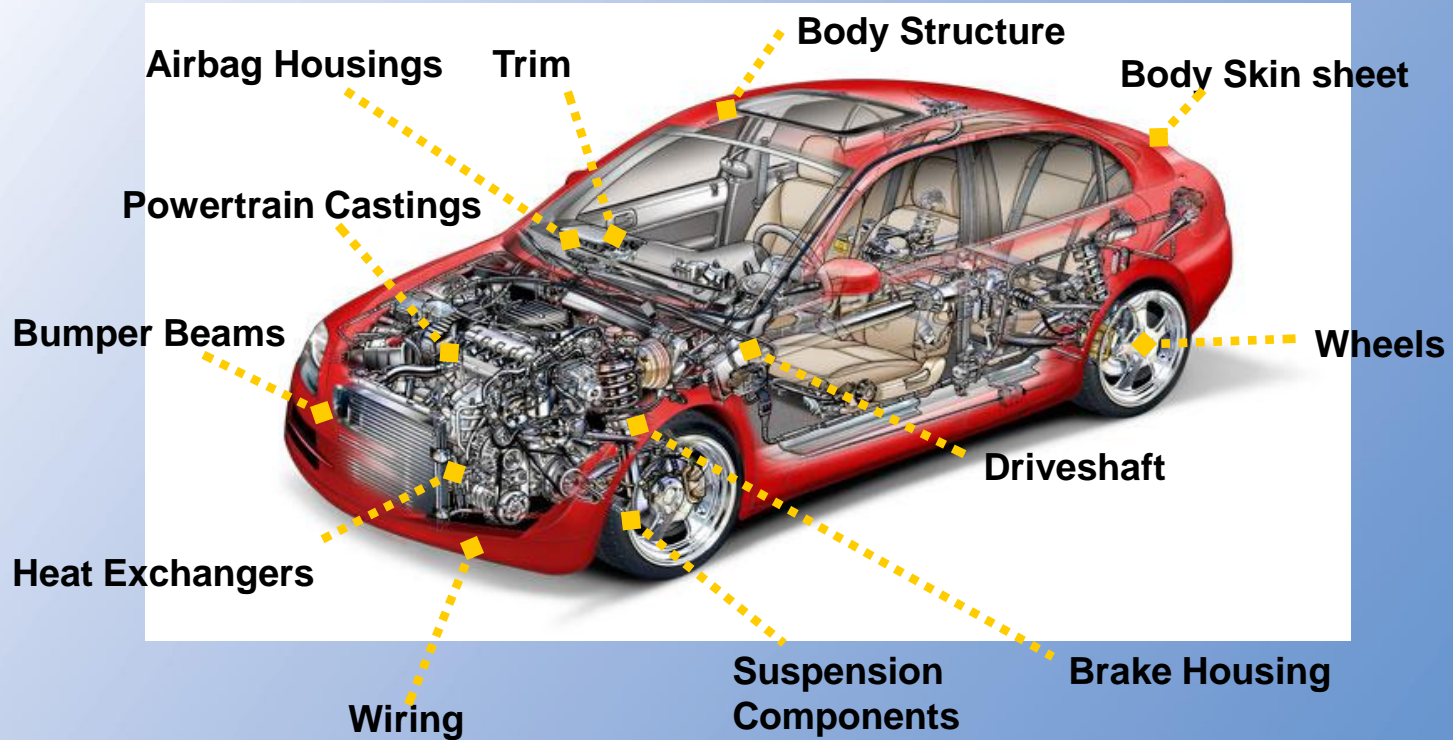


Automakers' Downweighting Plans

- **Audi:** Uses aluminum technology to achieve a 25% increase in body stiffness, while reducing weight by up to 20% in A8
- **BMW:** To use more aluminum to cut weight
- **Ford:** “I believe in 2015 and 2020, we will be more aluminum-intensive,” said Matthew Zaluzec, Ford Motor Co.’s manager for global materials and manufacturing research. “It may not be 100%, but it could be more than 50%.” – *The Wall Street Journal, March 2011*
- **GM:** To trim 500 lbs by 2016 and 1,000 lbs. by 2020
- **Jaguar Land Rover:** To construct all future vehicles with aluminum bodies
- **Nissan:** To reduce 15% of vehicle weight



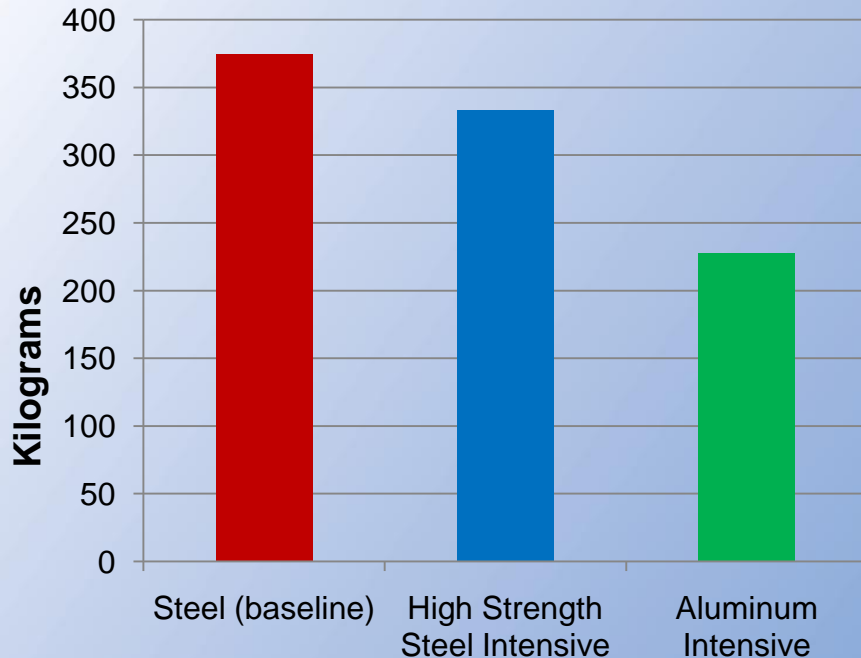
Existing Aluminum Applications



- Today's vehicle contains about 10% aluminum by weight
- Many vehicles in the U.S. fleet use 400-500 pounds of aluminum
- Worldwide content is projected to grow to 28-30 billion pounds per year – up from the current 16-17 billion pounds – between now and 2020
- More than 95% of automotive aluminum is recycled

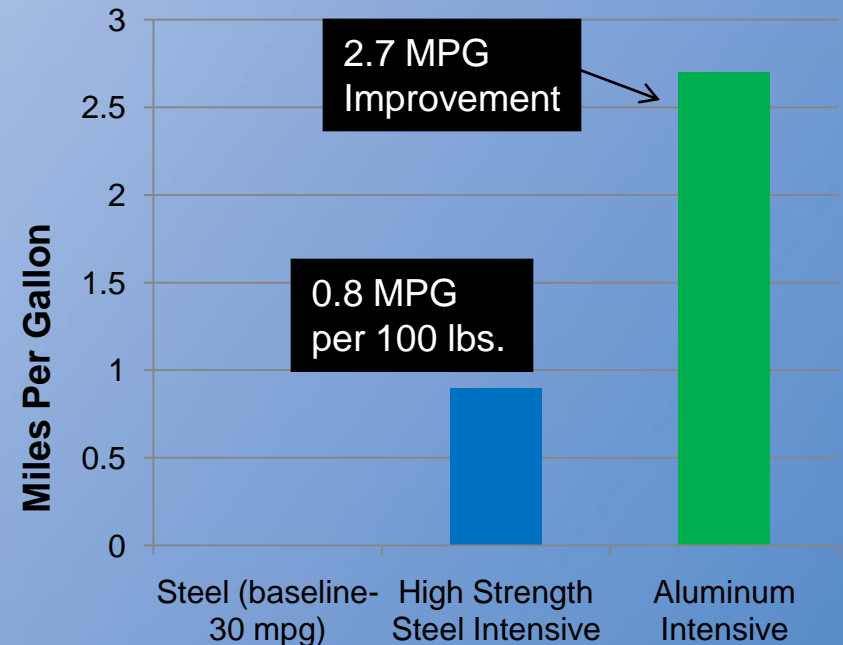
Weight Savings Translates to Fuel Economy Improvement

Mass of Body-in-White



Source: ika - University of Aachen and the European Aluminium Association (EAA)

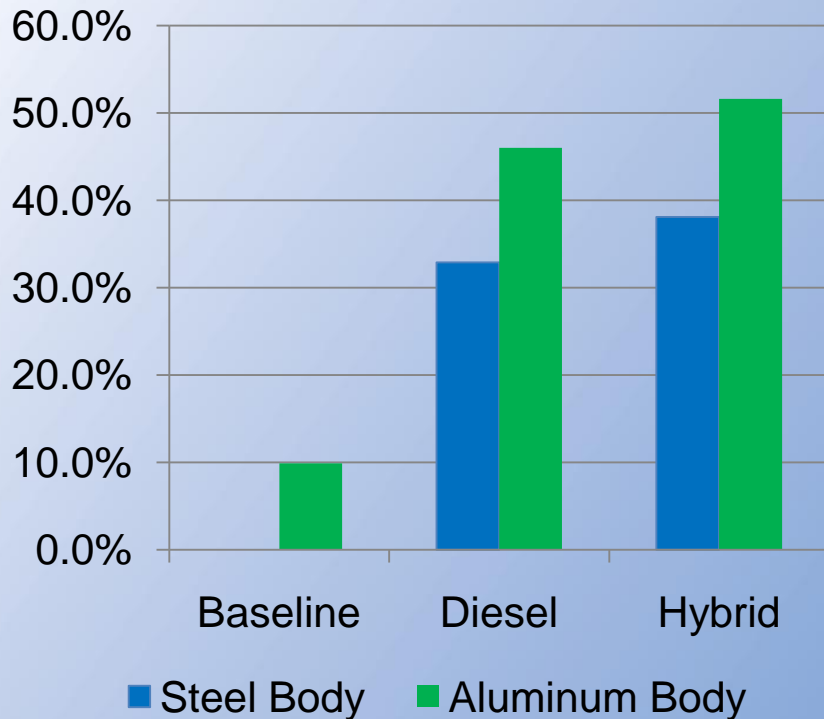
Fuel Economy Improvement



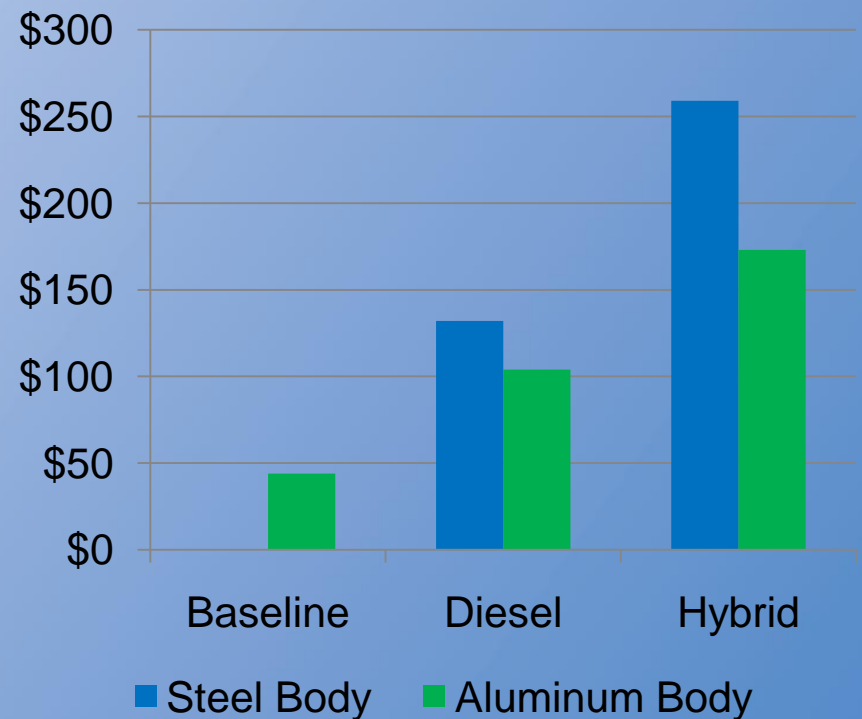
Source: Aluminum Association calculated based on ika mass reduction data; assumes 23% secondary weight savings

Downweighting Creates Value – Advanced Powertrains

Percent Increase in MPG



Cost per 1 MPG Increase



PEV and PHEV Study

\$3 Battery Cost Savings Per \$1 Invested in Electric Vehicles

Objective:

- Evaluate the impact of vehicle weight reduction on electric vehicle performance, range and battery size

Results:

- Reduced battery cost: **\$900 - \$1,950** (@ \$750/KWh)
- EV weight reduction potential: **19%**
- 10% mass reduction: **4 - 6%** reduction in battery size
- Expected aluminum structure cost premium: **\$630**

20% reduced vehicle mass yields a 20% range increase

Time for Down Weighting is Now

- A necessity in the holistic approach to meeting U.S. and global regulations without sacrificing safety or functionality
- The only fuel saving technology that complements advanced powertrains
- Offers more CO₂ and fuel savings than other materials
- Transition can happen faster than alternative powertrain breakthroughs while preserving U.S. jobs

Thank You



www.aluminumintransportation.org