

AUTO ALUMINUM OFFERS GREATER WEIGHT REDUCTION POTENTIAL THAN STEEL



“Aluminum can safely cut vehicle weight without reducing vehicle size.”

Randall Scheps
Chairman, Aluminum Transportation Group



Aluminum use in the automotive sector has increased steadily for the past four decades and this study makes clear the environmental and safety advantages of the high-strength, low-weight material have yet to be fully realized. The study, conducted by the Institut für Kraftfahrzeuge at the University of Aachen for the European Aluminium Association, analyzed the stiffness and strength relevance of 26 automotive components to assess the further potential or limits of weight reduction for both steel and aluminum. The findings provide evidence that there are many more opportunities for the use of aluminum compared to steel to further reduce vehicle weight. And, reducing vehicle weight is key to cutting carbon emissions and improving fuel economy. This study demonstrates that it can be done using aluminum while maintaining – if not further improving – vehicle safety.

KEY TAKEAWAYS

- ▶ Aluminum can reduce vehicle weight by 40 percent, compared to only 11 percent for high-strength steel
- ▶ Nearly 10 percent further improvement in fuel economy or an additional 2.7 MPG is possible over a typical auto today
- ▶ Reducing vehicle weight is key to cutting carbon emissions and improving fuel economy, while maintaining safety

KEY FINDINGS FROM THE STUDY

- ▶ In key automotive components aluminum can reduce vehicle weight safely by as much as 40 percent, compared to only 11 percent for high-strength steel.
- ▶ The reason the potential weight reduction using high-strength steel is so small, is that nearly 40 percent of the parts analyzed simply cannot be made thinner regardless of the grade of steel used. If high-strength steel were to be used to downweight these parts, their stiffness would actually be reduced and the car’s performance would suffer, whereas, aluminum could be used without reducing stiffness or causing the car’s performance to suffer.
- ▶ The potential for automotive aluminum downweighting varies and options include maintaining a steel body with aluminum closures, hang-on and mounting parts, hybrid or multi-material designs for the body and full aluminum body.



Based on the Aachen study and other data on the benefits of aluminum, the Aluminum Association’s Aluminum Transportation Group was able to make calculations related to lifecycle CO₂ emissions and fuel economy improvements.

- ▶ There is potential for approximately 525 pounds of additional weight savings based on the study’s analysis (40 percent).
- ▶ Nearly 10 percent further improvement in fuel economy or an additional 2.7 MPG is possible over a typical auto today.
- ▶ This weight reduction could create life cycle CO₂ emissions savings of 3,600 kg (Note: This includes the full lifecycle net of material production impact, which assumes 23 percent secondary weight savings).

FIGURE 1: WEIGHT SAVINGS TRANSLATE TO FUEL ECONOMY IMPROVEMENT

