

Lighten up!



Honda's 2009 Insight hybrid uses AHSS and HSS for the body structure, rather than a high proportion of light metals, in an effort to balance cost, safety, and weight. While the all-new Insight could be lighter, Honda is banking on hybrid propulsion, aerodynamics, and interactive controls to help encourage more fuel-saving driver behavior, rather than extreme mass reduction.

Automakers and suppliers accelerate their efforts to reduce vehicle weight by engineering them for greater use of lighter, stronger materials.

by *Lindsay Brooke and Harry Evans*

Weight reduction is again a priority across the industry, as strict new regulations push for greater vehicle efficiency/CO₂ reduction in the U.S. and Europe. From the smallest fasteners to entire vehicle architectures, engineers are wringing excess ounces out of new components and systems, while looking for new ways to lighten up existing designs.

The benefits of lightweighting correlate directly to greater fuel economy as well as to improved vehicle dynamics. Studies have shown that every 10% reduction in vehicle weight can yield 5 to 8% greater fuel efficiency. Dropping 150 lb (68 kg) on average gives an extra mile of driving range per gallon of fuel consumed. In terms of its effect on carbon emissions, reducing vehicle weight by 220 lb (100 kg) brings a CO₂ reduction of up to 12.5 g/km.

Automakers have made mass reduction part of their vehicle development strategies going forward, while ensuring no sacrifices in safety or durability. **Nissan**, for example, has pledged to slash average vehicle curb weight by 15% through 2015. **Ford**, as part of its corporate goal to boost fleet fuel economy 40% by 2020, aims to reduce vehicle weight by 240 to 750 lb (109 to 340 kg),

depending on the model.

A daunting task for every OEM will be dealing with "mass creep"—the tendency to make each new-generation model heavier than its predecessor. Mass creep is caused by adding new features, safety equipment, and emissions-control content. Consumers also expect new models to be larger and more commodious than the ones they replace.

"Offsetting extra pounds added by new features definitely is a challenge," noted Matt O'Leary, Chief Engineer on Ford's 2009 F-150. He said it takes great attention to detail to achieve mass parity between vehicle generations. Genuine mass reductions are a tougher task, one that O'Leary's team accomplished. The F-150 base model, for example, arrived approximately 100 lb (45 kg) lighter than the equivalent '08 model even though it is larger and better equipped.

Last year's all-new **Mercedes-Benz** C-class sedan was that company's first new model that was not heavier than its predecessor, despite growing in size and feature content. Ditto for the current **Mazda2**, which last year came in 220 lb (100 kg) lighter than the previous model.

