

High Tech Steels Aid Auto Safety, Economy

by Ross Raybin

There's a reason they call Superman "The Man of Steel." It's because he's sturdy, tough and unbreakable.

So it's no surprise that steel would be the material used in vehicles to help protect us on the road. Yet the metal does much more than just protect. These days it also offers increased performance, affordability and less greenhouse gas emissions.

"It's the fastest-growing light weight material," said David Anderson, senior director of the auto app program at the Steel Market Development Institute (SMDI) in Southfield.

According to Anderson, the metal is constantly evolving and being improved to fit the needs of today's society. Over the years it's undergone significant reinvention to meet the strict demands of the auto industry.

According to a report from SMDI, the percentage of steel used in vehicles over the past 30 years has grown from approximately 55 percent to 60 percent today.

The main reason for the increase is advancements in steel, including new Advanced High Strength Steel (AHSS) grades.

AHSS offers unique metallurgical properties and processing capabilities that allow automakers to meet industry requirements, all while keeping the cost low.

"Steel has a long history so there's lots of knowledge with how to use it and manufacture it," said Anderson, "This is what keeps the cost low."

Through programs such as SMDI's Future Steel Vehicle project, more than 20 new grades of AHSS have been introduced.

According to Ron Krupitzer, vice president of automotive applications at SMDI, steel continues to be the material of choice for automakers because it's one of the strongest materials in the world today.

Aside from its safety functions and affordability, the metal also offers reduced greenhouse gas emissions.

By developing new, lighter grades of steel, vehicles don't weigh as much and, therefore, don't burn as much fuel. Also, according to Anderson, the way the metal is manufactured has been changed to help cut back on gas emissions. "The development of AHSS is important because it will help automakers meet CAFE (Corporate Average Fuel Economy) requirements in 2017 and 2025," said Anderson.

Over the years, the types of steel used to produce components for vehicles has evolved from low to high strength to advanced high strength.

Some of the AHSS grades include:

Dual Phase (DP), Ferritic-bainitic (FB), Complex phase (CP), Martensitic (MS), Transformation-induced plasticity (TRIP), Hot-formed and Twinning-induced plasticity (TWIP).

These grades were achieved through a more complex microstructure and controlled cooling process than more conventional steels.

Each has its own strengths. For example, DP steel, which is used in beams and other structural components of a vehicle, is good for crash energy absorption. FB steel performs well under dynamic load conditions and CP steel has a high energy absorption and resistance to deformation and good durability.

So it's not just one grade of steel but several types that are used in the production of today's vehicles to make them as safe as possible.

The 2013 North American International Auto Show in Detroit featured several award-winning vehicles produced with AHSS.

The 2013 North American Car and Truck/Utility of the Year award winners, the Cadillac ATS and Dodge Ram 1500, feature extensive amounts of AHSS.

The 2014 Jeep Grand Cherokee was named best-in-class fuel economy and uses the steel.

General Motors introduced what they've dubbed the "strongest ever" 2014 Chevy Silverado 1500 full-size pickup. The truck features AHSS main rails and cross members for reduced mass and improved strength.

The new Cadillac ELR incorporates AHSS to conserve weight and help strengthen the vehicle.

Other vehicles from Kia, BMW, Hyundai and Mercedes-Benz also used AHSS in their products.

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