Steel Market Development Institute

FACT SHEET

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Advanced High-Strength Steel Benefits

As fuel economy and performance standards increase, so does the need for new and improved materials. While there are a number of competing low-density materials for automotive applications, none offer the complete package – strength, lightweighting, affordability and sustainability – of steel. The global steel industry is meeting this need through the development of new advanced high-strength steel (AHSS) grades. The unique metallurgical properties and manufacturability of AHSS provide high value to the automotive industry in meeting increasingly stringent requirements.

Benefits of AHSS

- **Strength** – with its unique properties and processing flexibility, AHSS is a high-value asset to automakers as they look to increase occupant protection.
- **Lightweight** – combining AHSS with new manufacturing processes enables engineers to apply thinner steels to produce lighter-weight parts, while maintaining or improving strength and other performance properties. The recent FutureSteelVehicle project introduced more than 19 new grades of AHSS and achieved a mass reduction of 29 percent.
- **Sustainable** – steel is 100 percent recyclable and the most recycled material globally. The life cycle assessments of automobiles demonstrate that AHSS vehicles are the lowest-emitting vehicles, when compared with vehicles using alternative materials.
- **Affordable** – steel provides high value to automakers looking to achieve mass reduction, while engineering studies show low-density materials like aluminum cost $2.75 or more per pound saved. Most manufacturing plants are equipped with the technology and machines designed to use steel; eliminating the costly retooling necessary to use other materials.

Steel versus Alternative Materials

- AHSS is available globally, simplifying platform designs and reducing automakers cost of production.
- Steel has a low environmental impact compared to other structural automotive materials.
    - Automakers are becoming more aware of the environmental penalties of switching from steel to alternative materials and this will factor into future material choices.
    - According to case studies published by WorldAutoSteel, efforts to lightweight with aluminum to reduce fuel consumption resulted in an increase in total greenhouse gas emissions. Tailpipe emissions may be slightly reduced around 3-5 percent for aluminum, but the manufacturing phase is nearly 40 percent higher in CO_2 emissions.
    - The use of AHSS can reduce a vehicle's structural weight in the body and chassis by as much as 29 percent and has less total life cycle CO_2 emissions than other automotive materials, according to the WorldAutoSteel FutureSteelVehicle study.
    - Many structural composites are not considered recyclable, while recyclability is one of steel's clear benefits.
    - Commercially available 1,500 MPa ultra high-strength steel grades are three times stronger than 7000 series (or up to 500 MPa based on sheet components) aluminum grades. These aluminum advances only meet the strength of steel grades introduced in the 1980s.