worldsteel ASSOCIATION

WorldAutoSteel

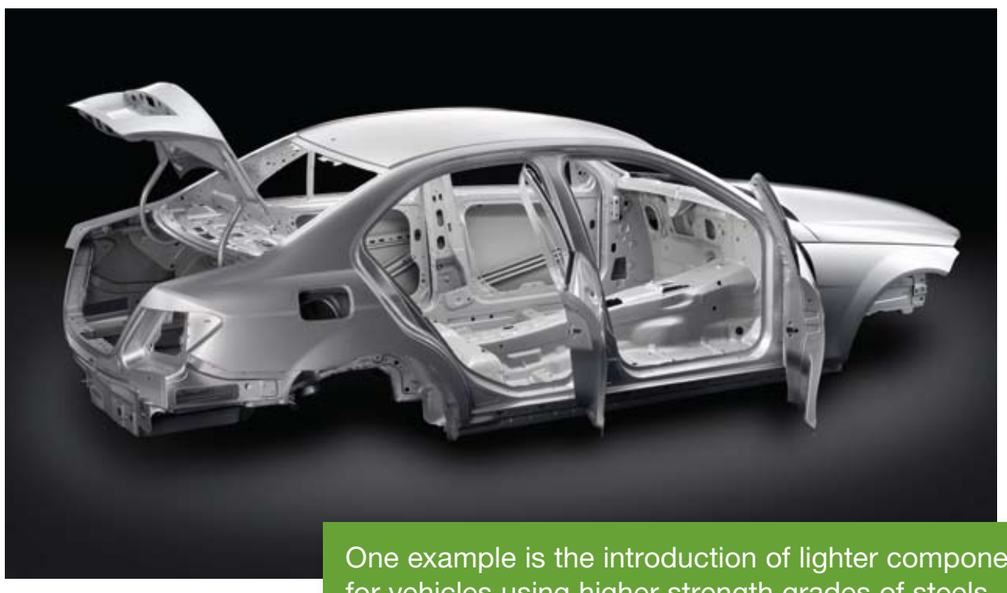
USING STEEL TO REDUCE GREENHOUSE GAS EMISSIONS

As the consensus builds for comprehensive reductions in greenhouse gas (GHG) emissions across international boundaries and industries, there is a growing need to understand the role that materials play in achieving a low-carbon society.

The steel industry has made significant reductions in its energy use and is committed to take positive action to achieve further reductions in CO_2 emissions.[1] Through the use of its products the steel industry also helps other sectors tackle the problem of rising GHG emissions.

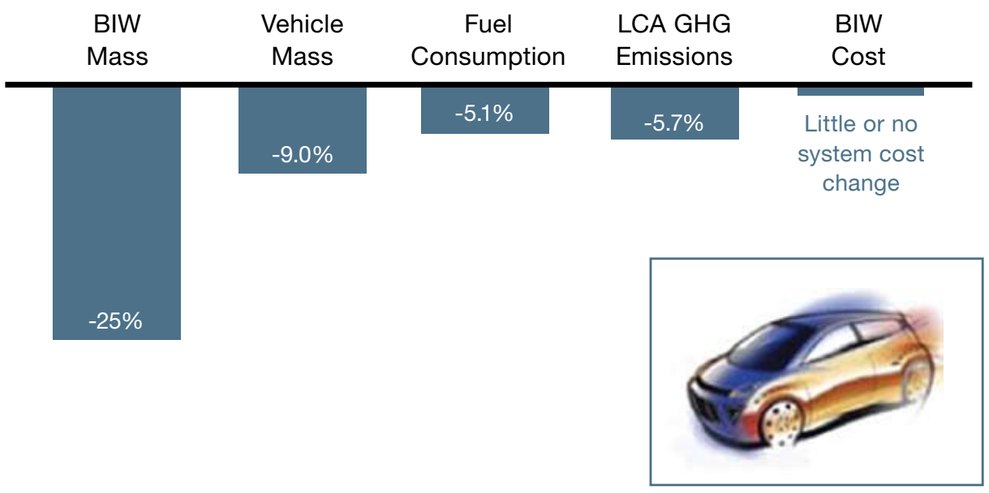
NEW STEEL GRADES IN VEHICLES

New grades of Advanced High-Strength Steel (AHSS) have replaced conventional steels for a vehicle's body structure or body-in-white (BIW), resulting in typical weight savings of 25%.[2] This corresponds to an estimated total vehicle weight reduction of 9%, with an impressive reduction in fuel consumption.



One example is the introduction of lighter components for vehicles using higher strength grades of steels.

AHSS vs. Conventional Steel



AUTOMOTIVE GHG EMISSIONS

Active legislation relevant to the automotive sector has focused on the need to reduce use phase (tailpipe) emissions during the driving life of vehicles, and this is commonly achieved through mass reduction. However, tailpipe emissions do not tell the complete story, and competitive materials selected for use phase emissions reduction may not be the optimum choice for reducing overall energy use and the impact on the environment.

THE LIFE CYCLE BENEFITS OF AHSS

Life Cycle Assessment (LCA) has been adopted by the steel industry as a means to comprehensively evaluate material choices, and their effect on life cycle GHGs. Major automakers are also adopting LCA as a tool for design and material selection decisions. LCA models developed by the University of California at Santa Barbara have enabled comparisons of automotive materials and their associated GHGs across all phases of the vehicle life cycle.[3] From these models, we have determined that:

- For every 1 kg of AHSS used in the vehicle there is a total life cycle saving of 8 kg CO_2 equivalents.
- If all vehicle bodies produced globally were fabricated with AHSS the annual emissions savings is estimated to be 156 million tonnes of CO_2.
- Material choice becomes more significant for vehicles using advanced powertrains and fuel sources.

OTHER STEEL SOLUTIONS

The use of AHSS in vehicles is just one example of where steel is contributing to a reduction in the use of fossil fuels. An efficient transport infrastructure is also heavily dependent on steel bridges and rail networks to reduce transport times and distances without compromising fuel consumption.

Renewable energy technologies, such as wind turbines, benefit from the strength of steel to reach heights where there are greater wind speeds and, as a consequence, produce more wind power.[4]

- Energy used in the construction of a wind turbine is typically recovered within six to nine months of the turbine operating.
- The weight of steel towers has been reduced by 50% over the last 10 years.

CONCLUSIONS

- Life cycle thinking needs to be applied when it comes to material selection decisions based on reducing GHG emissions.
- The use of steel will play an important role in contributing to a low-carbon society.

References

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