

Guest editorial of “Application of high strength steels in lightweight commercial vehicles”

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New and increasingly sharp laws for the reduction of emissions from commercial vehicles entered into force in the European Union since 1993 with the aim of substantially reducing pollutants and emissions from trucks and buses. Thereby the maximum levels for the emission of particulate matter (basically soot particles) as well as oxides of nitrogen (NO_x) have been subsequently lowered. To comply with these demands, commercial vehicle producers had to introduce new emission reducing technologies of which exhaust-gas recirculation (EGR), selective catalytic reduction (SCR) and diesel particle filters (DPF/ CRT) are vital. However, the implementation of such technologies in a commercial vehicle causes a weight increase that can be estimated to reach 300 kg. Practically this means that for instance the capacity of a bus would have to be reduced by four passenger seats unless the extra vehicle weight is reduced in other areas of the vehicle.

Unlike in passenger cars, maximum CO_2 emissions are not yet being specified by European regulations for commercial vehicles (see Fig. 1). CO_2 emissions (of course all other emissions) are directly proportional to the fuel consumption of the vehicle, which in turn can be reduced by higher efficiency in the powertrain, lower vehicle weight and improved aerodynamics.

However, what actually counts beyond the absolute emissions and efficiency of a commercial vehicle is its relative performance per ton of transported cargo. A lighter vehicle simply allows transporting more cargo respecting a given total admitted vehicle weight on the road. Accordingly, the emission per ton of transported cargo becomes less.

Improved design, better-performing materials and innovative manufacturing technology each by itself enable light weighting of vehicle structures and efficiency gains in the powertrain. However, the optimum benefit can only be obtained by a holistic approach involving all three approaches in a coordinated way. China Automotive Lightweight Association (CALA) was installed in 2008 to work out strategies of weight reduction in the automotive sector.

In November 2014 CITIC Metals and Companhia Brasileira de Metalurgia e Mineração (CBMM) organized a seminar in Beijing focusing on the “Application of high strength steels in lightweight commercial vehicles”. Around 90 experts from organization delegated by commercial vehicle producers, CALA, China Iron and Steel Research Institute (CISRI), steelmakers and supply companies participated to identify the opportunities and needs for producing lighter and more fuel-efficient trucks in China. Two facts emphasize the urgency of these activities:

- (i) About 20% of the Chinese vehicle fleet is commercial vehicles yet combusting more than 50% of the total fuel consumption.
- (ii) Chinese domestic trucks consume in average 20% more fuel as compared to European ones.

Since China has powerful steel industry equipped with most modern mills, it is the most obvious to explore the possibilities of modern high performance steels for achieving a better fuel efficiency of commercial vehicles. This does of course not exclude that other materials could contribute to achieving this goal as well.

In the subsequent contributions the most important information disseminated during the seminar is being reproduced and summarized. Thereby the following main topics are being addressed:

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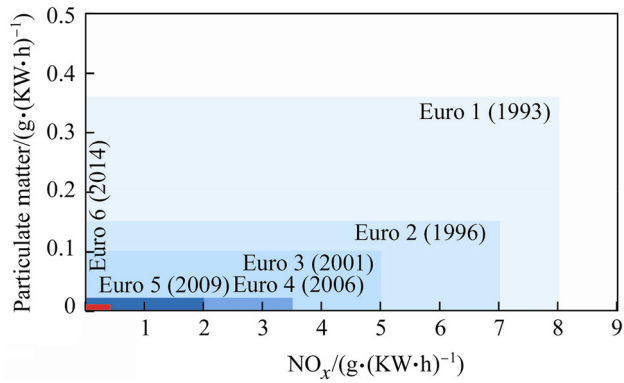


Fig. 1 Maximum limits for oxides of nitrogen and particulate matter emissions according to European emission standards level 1–6

- Innovative manufacturing technology enabling light weighting with steel in commercial vehicles
- Light weighting opportunities and material choice for commercial vehicle frame structure
- Application potential of high performance steels for weight reduction and efficiency increases in commercial vehicles
- Sustainable development of China's commercial vehicles

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