

ENVIRONMENTAL ASSESSMENT OF LIGHT WEIGHTING SOLUTIONS FOR AUTOMOTIVE COMPONENTS: RESULTS, TRADE-OFF AND CHALLENGES FROM REAL CASE STUDIES

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In the last few decades, the automotive industry is facing the most deal with sustainability programs due to the increase of legislate limits on CO2 emissions and vehicle recyclability rate. Consequently, decisions on products design and development go together with environmental considerations, by starting to look for the employment of lighter materials, thus reducing vehicle mass weight and therefore fuel consumption and CO2 emissions during the dominant operation stage of a vehicle's life cycle. To tackle this problem many of today automotive components are made of alternative materials like plastics, polymer composites, lighter metals which should lead to weight reduction with the same mechanical performances. Magneti Marelli® designs and produces hi-tech systems and components for the automotive sector representing a significant contribution on vehicle mass weight with a roughly 15% portion of incidence. So, in accordance to the environmental regulations, the Company has started to get involved into sustainability programs by focusing attention on the environmental impact of its products. In particular since 2012 Magneti Marelli has included in its mission the "improvement of environmental and energy performances of products and relatives processes during their whole life cycle, through innovative methodologies that assess the potential impacts in a quantitative way", in this way highlighting the importance of meeting the increasing stakeholders' expectations and their requests for transparency in results' communication.

This work addresses the main outcomes stemmed from the several LCA studies carried out over different components in terms of materials and technologies production allowing a wider environmental conscious related to the usage of different materials and manufacturing processes.

Results showed that the materials employed offer the major contribution on the total impact especially for raw materials extraction and production and for the vehicle use phase, with a further substantial difference connected to the use of virgin instead of recycled materials.

The main discussed points will be: i) the trade-off between production phase and use phase impacts; ii) End-of-Life analysis at component level beside the ISO 22628:2002 for the whole vehicle; iii) critical analysis and selection of environmental indicators significant for the automotive sector.

Keywords Automotive sector, Life Cycle Assessment, vehicle component, Sustainable Manufacturing, Design for Environment, composites, light weighting