

A framework of integrated recyclability tools for automobile design

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ABSTRACT

Automobiles are major transportation choice for society around the world. Automotive industries in many countries mostly are one of the drivers of economic growth, job creation and technology advancement. Although automotive industry gives promising return, problem of managing disposal at the end of automotive's life is quite challenging. Automobile is a very complex product that comprise of thousand components made from various materials that need to be separately treated. In addition, short supply of natural resources has provided opportunities to either reuse, remanufacture or recycle automotive's components. End of Life Vehicle (ELV) Directive launched by European Union mandated that recyclability rate of automobile must reach 85% by 2015. The aim of this legislation is to minimize the impact of end of life vehicle, contributing to prevention, preservation and improvement of environment quality and energy conservation. Vehicle manufacturers and suppliers requested to include these aspects at earlier stages of the development of new vehicles, in order to facilitate the treatment of vehicles at the time when they reach the end of their life. Therefore, the automobile industry has to establish its voluntary action plan for ELVs, and has numerical target to improve ELV recycling rate, reduce automotive shredder residue (ASR) landfill volume, and reduce lead content. Many innovative approaches in improving recyclability have been implemented, but still called out for more intelligent solutions which integrate recyclability evaluation in product development stage. This paper attempts to review some of current innovative approach that used to improve recyclability and introduce a framework for integrated recyclability tool to improve product recyclability throughout its development phase.

KEYWORDS:

End of Life Vehicle; disposal; product life cycle; ELV Directive; recyclability.

REFERENCES

1. Kanari, "End-of-Life Vehicle in European Union", Journal of Metal, Mineral and Material Society, Vol. 55 No. 8, pp. 15-19, 2003.
2. "OICA website", Available : <http://oica.net/category/production-statistics/>
3. J.A , Pomykala, B.J. Jody, E. J.Daniels, , and J.S.Spangenberg, "Automotive recycling in the United States: Energy conservation and environmental benefits", Journal of Metal, Mineral and Material Society, Vol 11, pp. 41-45, 2007.
4. J. A. S Williams, S. Wongweragiat, X. Qu, J. B. McGlinch, Bonawitan, J. K. Choi, and J.Schiff, "An Automotive Bulk Recycling Planning Model", European Journal of Operation Research, Vol. 177, pp. 969-981,2007.
5. S. Kumar and V. Putnam, Cradle-to-cradle: Reverse Logistic Strategies and Opportunities Across Three Industry Sector, International Journal of Production Economics, 2008.