*Environmental Engineering and Management Journal* xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

*"Gheorghe Asachi" Technical University of Iasi, Romania*


# A COMPARATIVE LIFE CYCLE ASSESSMENT OF COMPOSITE BUMPER AND ALUMINUM TURBO INTAKE USED IN THE AUTOMOTIVE INDUSTRY

**Yasemin Öztürk[1], Ernam Öztürk[1*], Ahmet Kılıç[2]**

*[1]Department of Environmental Engineering, Faculty of Engineering, Aksaray University,68100, Aksaray, Türkiye*
*[2]Department of Environmental Engineering, Faculty of Engineering, Sakarya University,54050, Sakarya, Türkiye*

## Abstract

Two life cycle assessment (LCA) studies comparing an aluminum alloy turbo intake pipe and a plastic matrix composite bumper present. The aim is to determine the potential environmental effects of these two materials of aluminum and plastic origin used in the automotive enterprise. Creating waste scenarios at different rates decided the best waste scenario according to the results of the LCA model. Inventory analyses, waste scenarios, and evaluation processes in the system are carried out with software called SimaPro 7.3.2, produced per the ISO 14040 Life Cycle Assessment Standard. The most damaging effect for the turbo suction pipe occurred in the foundry, which is the production stage, and for the bumper, the most negative impact occurred in pressing. In the waste scenarios of both materials, the most advantageous waste scenarios have the highest reuse rate and minimum environmental impact. Reusing parts is essential for the environment to ensure the best disposal of pieces produced for the automotive industry.

*Key words*: automobile industry, ISO 14040, life cycle assessment, SimaPro 7.3.2

*Received: July, 2023; Revised final: April, 2025; Accepted: April, 2025*

[*] Author to whom all correspondence should be addressed: e-mail: ernamozturk@duzce.edu.tr; Phone: +905069039543