



QUANTITY AND RECYCLABILITY OF Fe - METALS AT THE END-OF-LIFE VEHICLES IN REPUBLIC OF SERBIA

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Abstract:

The growth of the world's population has determined the need for faster, simpler and easier communication. Due to such communication, along with modern social - economic and industrial development, the number of vehicles has largely increased. At the end of life, vehicles represent a potential threat to the environment. This paper gives a statistical view of the number of registered vehicles by brands in Serbia. The amount of Fe – metals by vehicle dismantling, and the possibility of their recycling is shown. It was pointed out the necessity of harmonization of our laws which regulates this area with the laws of the EU, as well as the need for implementation of appropriate ISO standard in the Republic of Serbia.

Key Words:

Statistic data, ISO standard, Fe-metals, recyclability

1. INTRODUCTION

In order to minimize the impact of vehicles disposal on the environment, the End-of-Life Vehicles Directive (2000/53/EC) aims to promote the collection, reuse and recycling of their components. Generally speaking, there are few problems if the vehicles are disposed and not recycled, like occupying the landfill space, potential leakages of fuel and motor oil into water recipient and soil, emissions of volatile compounds, and possible fires. Some of the components are classified as harmful or either hazardous to the environment. Those problems are still present in recycling operation, if the dismantling operations are not handled by regulations, and this means that all fluids (oil, fuel, windshield washer fluid, anti-freeze, brake liquids, etc), batteries, and other nonmetal parts should be extracted. In Serbia, the recycling business is present but the most of them are recycling just one sort of material or car parts. For now, the new products are being exported and some of these parts, like batteries, are reused. Fuels are being sent to oil refinery, tires are used in cement industry in combustion processes, but shredder dust, textiles, car seats, glass and some other parts are being landfilled. [2]

2. THE STATISTICS OF REGISTERED CARS IN SERBIA

According to data from project “Razvoj integrisanog i održivog sistema reciklaže motornih vozila na kraju životnog ciklusa u Srbiji”, in Serbia are 1.534.658 registered passenger vehicles in 2008. [3]

In Serbia, almost one third of total population owns „Zastava” (31%), followed by „Opel” (18%), „Volkswagen” (16%), „Lada”, „Fiat” and „Reno” (7%). [3]

3. AMOUNTS OF FE-METALS AND RECYCLING POTENTIAL BY VEHICLE DISMANTLING

The car is a product of high complexity for whose benefit in the production is used more than hundred different technologies and that are built around 15 000 parts. Car parts are produced from different materials. The total weight of the current passenger car is represented by iron and steel.

The European Union Directive said that the acquisition of vehicles at the end of the life cycle of vehicles and parts should be organized by the state. It is necessary to provide storage and the space to be made by the treatment of spent vehicles and their components.

International Standard ISO 22628 in 2002 very clearly define the issue of recycling of passenger vehicles, which is not the case in Serbia where there is no standard for this. ISO 22628 also defines and recyclability rate (percentage by mass of the new vehicle potentially able to be recycled, reused or both), and recoverability rate (percentage by mass of the new vehicle potentially able to be recovered, reused or both), as shown in the figure 2. [2, 4]

	Recovery		Undefined residue
(Component parts) Re-use	(Materials) Recycling	(Materials) Energy recovery	(Materials)
Recyclability rate ^a			
Recoverability rate ^a			
Vehicle mass			

Figure 2. Material distribution of the total mass of vehicles for the further treatment [4]

Almost a third of passenger cars in Serbia are the brand “Zastava” (which is about 511.553 vehicles), which presents models “Koral”, “Skala” and “Florida” by one-third (approximately 170.517 vehicles). [1, 3]m

Potential for recycling Fe-metals from vehicles “Zastava” is calculated by the following formula:

$$\text{Number of vehicles from particular model "Zastava"} \times \text{vehicle weight} \times \text{percentage of Fe-metals in vehicle} \times \text{rate of recyclability}$$

Table 1. Recyclability potential of Fe-metals in "Zastava" vehicles [1]

Model of Zastava car (Fiat Auto)	Number of vehicles	Vehicle weight [kg]	Percentage of Fe-metals [%]	Rate of recyclability [%]	Fe-Metals recyclability potential [kg]
Koral	170.517	807	73.6	62.0	62.792.926
Skala	170.517	835	75.0	62.0	66.207.488
Florida	170.517	950	73.6	62.0	73.919.801
Total					202.920.215

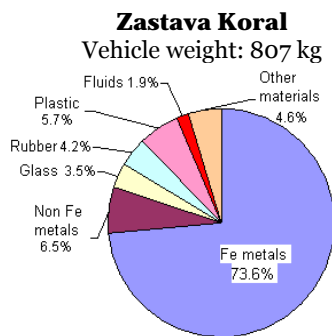


Figure 2. Participation of different types of material in the Zastava Koral [1]

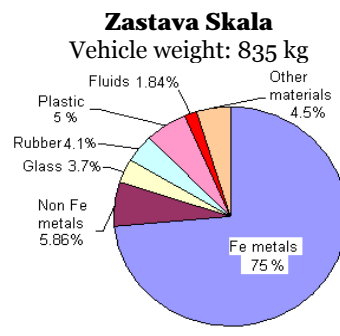


Figure 3. Participation of different types of material in the Zastava Skala [1]

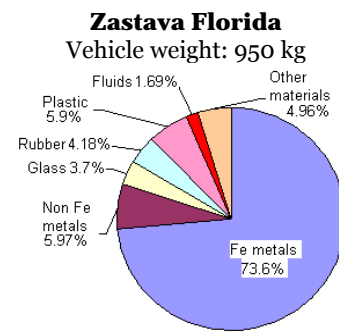


Figure 4. Participation of different types of material in the Zastava Florida [1]

4. CONCLUSION

In this analysis is shown the potential for recycling Fe-metals only from vehicles brand “Zastava”, which makes one third of the total number of registered passenger cars in Serbia (according to data for 2008. yr.). The remaining two thirds are foreign vehicle manufacturers with much greater potential for recycling, because they are more massive and have higher rate of recyclability. Serbia has significant capacity for processing Fe-metals, so vehicles for recycling are an important resource.

For accession Serbia to EU, it is necessary to enact a law that regulates this area, and harmonize it with EU legislation. [1, 3]

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