

**O 23. RECYCLING TECHNOLOGIES OF ALUMINIUM ALLOYS IN ALBANIAN
INDUSTRY**

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ABSTRACT: The increasing rate of aluminum use and its alloys in recent decades has highlighted the problems of its relationship with the environment. Aspects of reuse or recycling, and ecology in general, have become increasingly important, conditioning the design of each product from the outset. Utilization of technological waste, on the one hand, and scrap of obsolete products, on the other hand, often requires modification of traditional production processes (of primary aluminum), and even the design of new technologies, mainly scrap recycling. Ensuring the necessary purity of the product obtained from the rewriting, at a reasonable cost and without harming the environment, remains one of the strongest challenges for these technologies. Their effectiveness, consequently, is conditioned to a large extent by the processes: preparation, collection, disassembly, cleaning, sorting, chopping and briquetting of scrap. Although seemingly simple, these processes require careful design and rigorous implementation of technical discipline. It is in these last two aspects that we think that more attention should be paid to the manufacturers and processors of aluminum alloys in our country.

Keywords: *Ecology, aluminium alloys, recycling technologies, technological waste, environmental protection*

INTRODUCTION

Recycling is a major consideration in continued aluminium use, representing one of the key attributes of this ubiquitous metal, with far-reaching economic, ecological and social implications. [ISWM; Kevorkjjan, V.,] The increasing use of aluminium and its alloys has made it increasingly sharp the problem of the respective environmental impact, related to all the stages of processing raw materials, production of alloys and semi-finished products, product realization final and their use until obsolescence. This issue, often referred to as the "Life Cycle", in the broadest sense of the term includes (giving even primary place) issues of reuse / recycling of raw materials, semi-finished products and obsolete products, as well as those for the treatment of aluminium waste, generated in each of the above stages. The objectives of sustainable development are precisely in the industry of those countries that are in development, meets the needs of people in need. "Sustainable development" is less result of consumption and underdevelopment required. [ISWM;]

The goals of aluminium recycling are to further improve the properties of the aluminium material in optimizing production and further development of production. Specific properties together (such as low density, high strength, high electricity and thermal conductivity, excellent resistance to corrosion) provide useful products that bear the mark of aluminium. In industry it is done mixing aluminium with additives, investments of trading partners and contributions given to foreign countries for the development of economically underdeveloped regions, especially in those countries that are in industrialization. [alu.org; ISWM; Kuchariková, L.,]



Figure 1. Map of Albania with technological waste of industrials zones

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RECYCLING TECHNOLOGIES OF ALUMINIUM

The aluminium recycling industry, including both refiners and remelters, treats and transforms aluminium scrap into standardised aluminium. Refiners and remelters play integral roles in aluminium recycling but they, in turn, depend on other crucial links in the chain. Indeed, without the collectors, dismantlers, metal merchants, scrap processors who deal with the collection and treatment of scrap, they would not be able to fulfil their roles. [ISWM; Kuchariková, L.,]



Figure 2. Structure of the Aluminium Recycling Industry [world-aluminium.org (alu.org)]

The essential purpose of all waste regulations is the protection of human health and the environment from the harmful effects caused by collection, transportation, processing, storage and waste treatment. Directive 2008/98 / EC (Directive Waste Framework) provides a new approach on waste management based on prevention of negative impacts of waste generation and administration on human health and the environment, as well as aiming to limit waste production, as well as promoting the use of waste as a source by recycling and recovery. [alu.org; ISWM; Kuchariková, L.,] Another technical point important of aluminum scrap and aluminum alloys related to human health and environment is that they do not corrode but simply oxidize on the surface and creating a thin protective layer, not emitting into the environment.



Figure 3. Waste management separation [ISWM]

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RECYCLING OF ALUMINIUM AND ALUMINIUM ALLOYS IN ALBANIA

Currently in Republic of Albania there are several companies that produce Aluminum and Aluminium alloys, such as Everst sh.p.k, Alumil sh.p.k. and some other minor companies. Regarding the process of aluminium and aluminium alloys recycling in this paper we focused on the Everest sh.p.k company, which has a state of art technology regarding the recycling process and has implemented the process in full compliance to the national and international standards.

The production of recycled Aluminum billets in Everest Company in Albania for achieving the requested chemical composition of wrought alloys made from recycled aluminium is realized by melting the aluminum scrap and enriching it with pure Aluminum which generally comes from ingots. Aluminium alloys that are producing with recycling technological waste are: A6005, A6060, A6061, and A6063. Production of recycling Aluminium alloys or mixing ratios (scrap with pure material) in this case would depend on the alloy of aluminum that would be produced. Depends on the chemical compositions of aluminium alloys which will produce it will depend and the amount and type of additives (pure additive elements) that would be added to a mixture for producing for achieving their standard concentration. For the production of certain alloys or even those of use in general the company refers to the relevant standards (*SSH EN 573-5:2019*) or customer requirements.



Figure 4: Aluminium Scrap (a) Ingot of pure Aluminium (b) (*Everset sh.p.k Company in Albania*)

For Aluminum Recycling in Everest Company in Albania the following steps are as described below:

1. the materials are loaded/added in the melting furnace
2. after the material is melted and the chemical composition is adjusted, the furnace is unloaded in the form of tickets.
3. the next process is to cut the billets in standard length and place them in baskets for the next process.
4. inserting the billets in the homogenization oven.
5. remove from Homogeneity and place in the Cooling Oven.
6. then it is stored or sent directly for production.

From an environmental point of view, aluminium recycling is ecologically advantageous if the environmental impact of the collection, separation and melting of scrap is lower than that of primary aluminium production. [alu.org; ISWM; Institute of Statistics,]



Figure 5: Aluminium Recycling equipments technology in Everest industry in Albania

CONCLUSION

In this study we have presented the recycling of aluminium alloys in Albanian Industry, in Everest company and their technology of recycling and production of the recycling billets of Aluminium Series 6060,6061,6063,6005,6082. The increasing rate of aluminum use and its alloys in recent decades has highlighted the problems of its relationship with the environment. Aspects of re-use or recycling, and ecology in general, have become increasingly important, conditioning the design of any product from the outset. [ISWM; Kuchariková, L.,]

Aluminium can be recycled over and over again without loss of properties. [alu.org; ISWM] The high value of aluminium scrap is a key incentive and major economic impetus for recycling.

Already this design relies heavily on life cycle analysis and sustainable development concepts.

These concepts are based on the search for new solutions, focused mainly on:

- extending the life of raw material resources,
- reducing energy costs and keeping climate change under control,
- facilitating the mass of products / details to save energy,
- optimization of technological processes, aiming at the most rational use of material and energy,
- increasing the recirculation rate,
- minimization of losses,
- minimization of harmful emissions.

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REFERENCES

- <https://aluminium-stewardship.org/stay-informed/international-aluminium-institute-iai-alucycle/>
<https://www.world-aluminium.org/> (alu.org)
https://infrastruktura.gov.al/wp-content/uploads/2018/12/ISWM-Investment-Albania-Draft-SEA-Study-20181126_English.pdf
Strategic Environmental Assessment for Preparation of the Sector Study for Investment Demand in Integrated Solid Waste Management (ISWM) in Albania; Draft Sea Study
Kevorkjjan, V., The recycling of standard quality wrought aluminum alloys from low-grade contaminated scrap, JOM (The Journal of The Minerals, Metals & Materials Society (TMS) Vol.62, pg.37-42.
Kuchariková, L., Tillová, E, Bokůvka, O., 2016 Recycling and properties of recycled aluminium alloys used in the transportation industry, DOI: 10.20858/tp.
Suprpto., W., 2019 Effect recycled aluminium structures of metallurgical and melt efficiency; IOP Conf. Series: Materials Science and Engineering 494 012085
Dhoska, K., Markja, I., 2019, Recycled tire rubber modified bitumens for improving the quality of the road constructions in Albania, International Scientific Journal “Trans Motauto World”, 4 (1), 34-35.
Institute of Statistics <http://www.instat.gov.al/en/>
Ministry of Environment <http://www.mjedisi.gov.al/>
N.Gega, S Caslli, I Markja, 2012, Application of Advanced Techniques for Improving the Environment protection from Steelmaking Consequences in Albania, Materials Science and Technologies- Romat 2012; ISSN 2285 – 7133, ISSN-L 2285 – 7133; Section 4, pg. 61;
Dhoska, K., Markja, I. and Pramono, A., 2019, Analysis of recycled tire rubber modified bitumen in Albania for quality of the road construction, IOP Conf. Ser.: Mater. Sci. Eng., 673, 012126.