REUSING SOLUTION FOR USED ALU CANS

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ABSTRACT

In this paper we present a R&D project for the reuse of aluminium beverage cans. Aluminium can market grows in the recent years. Aluminium can be recycled as often as necessary without any loss in quality. Recycling saves 95% of the energy. But reusing can save more, as it is higher on waste hierarchy. We compare reuse and recycling in this paper. For reusing aluminium cans we identify obstacles and problems and after that present a unique solution with technical and manufacturing details. The paper also presents some key business model issues.

INTRODUCTION

The European can market has grown with 4%, almost 63 billion beverage cans filled in 2014. The canned soft drinks market enjoyed particularly strong growth during 2014, with fillings up by 5% across Europe.[1] The ongoing development of Eastern European markets, such as Hungary and Poland, helped contribute to this growth.
Recycling aluminium cans have several good reasons from technology and from environmental point of view. The first reason is that aluminium is considered as an "energy battery"; it takes lots of energy to convert the raw bauxite to alumina and from that to the metal form of aluminium. This energy input is practically stored in the metal which can be re-melted unlimited times in furnaces with relatively low level of new energy input. Thus aluminium can be recycled as often as necessary without any loss in quality. Recycling saves 95% of the energy needed for primary production. [2]
The second reason is the flexibility of aluminium recycling. The best would be to produce new cans from the used ones (can2can), however molten aluminium frequently travels to manufacturing facilities for getting processed into something very different than cans (car and machine parts, other packaging, construction materials, etc.).

There are several business models and technology for the recycling of aluminium cans. Some countries run deposit system where a certain amount paid by the consumer is used to motivate them to bring back empty cans. These systems use automated machine so called Reverse Vending Machines (RVMs) to take back used cans from the consumers. Deposit systems are quite complicated and expensive systems especially for the retailers and consumers however provide very high collection ratio.

Considering the waste hierarchy there is an even better approach than recycling. It is reuse. Nevertheless there has been no significant attempts made to reuse aluminium

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beverage cans due to the technical limits, characteristics of aluminium cans (namely light weight, rigidity).

REUSE VS. RECYCLE

According to the waste hierarchy reuse is better than recycling. Reuse is simply the act of using an item again and again in its original form. Reusing items eliminates the need to reprocess materials (whether it is for disposal, or for recycling). Reusing can save more.
The following figure shows the differences and obvious advantages or reuse compared to recycling.

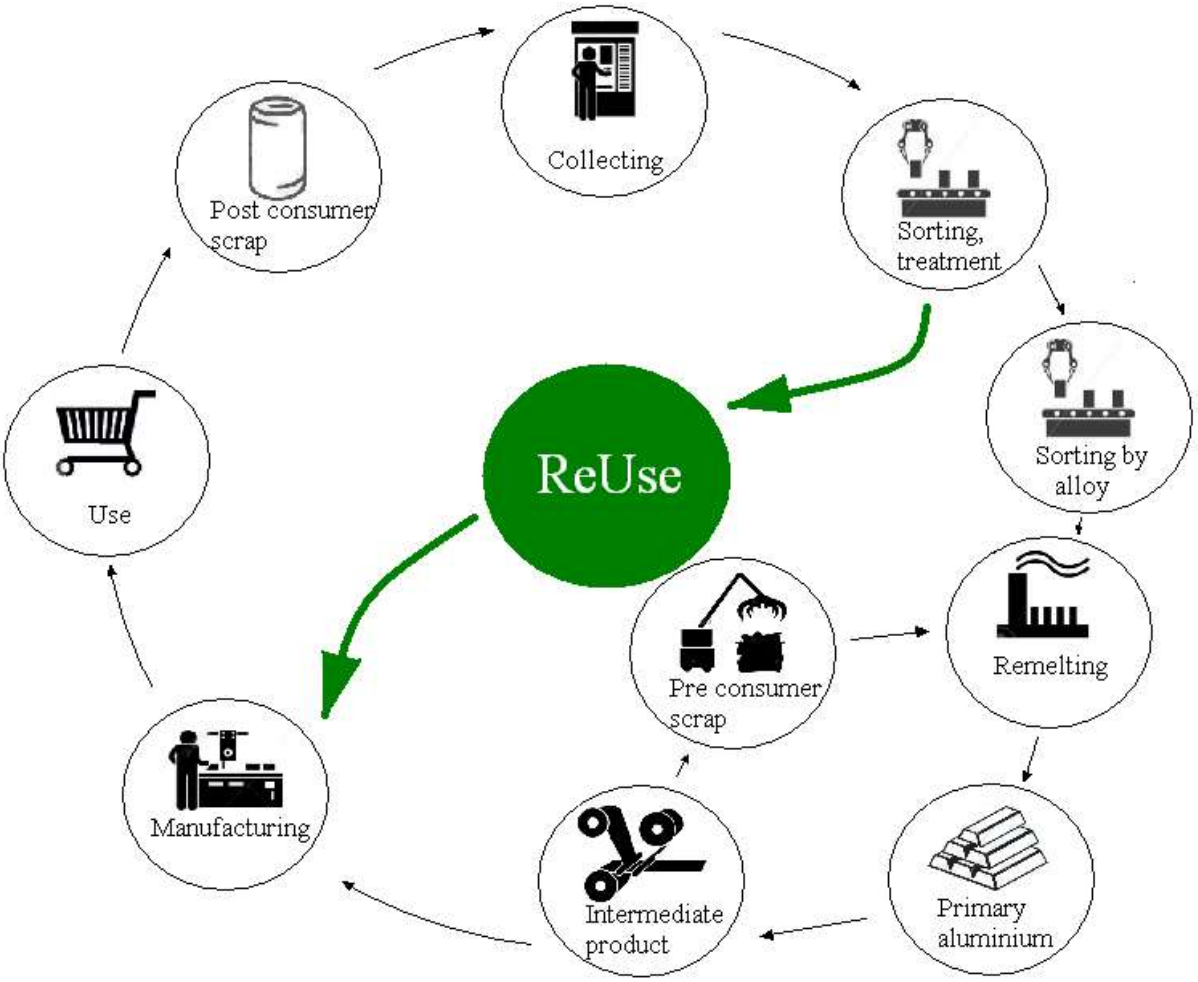

Figure 1. Recycling and Reuse processes

In 2006 Returpack began developing a special aluminium can Voluntary Take Back Machine (VTBM) as well as a recycling collection system. The goal of this project was to develop a highly effective aluminium can collection system through an automated

store based waste material management and reverse logistic processes. In 2015 there was over 170 RVMs in Hungary, and over 100 M pcs of alucan were collected. [3]

In the field of beverage containers reuse simply means refilling. However the current technical characteristics of aluminium cans heavily limits its ability to refill them. Cleaning before filling and keeping the shape of the lightweight cans intact (rigidity problems) are real obstacles to have a reuse system for beverage cans just to name a few barriers.

Based on the economic and environmental advantages of reuse our new project's goal is to develop a 'reusing line' beside the recycling.

NEW PRODUCTS

As we mentioned earlier the definition of reuse is simply to use an item again after it has been used. We will collect the undamaged aluminium cans separately from the crushed or damaged (unusable) cans. We will cut out the cover cup part of the aluminium can with special opening purpose machine developed by us. After a washing process we will fill the clean aluminium can with non-food materials (mostly household chemicals) and with a new label and a re-closable cap the new product will be marketable again.

RESEARCH AND DEVELOPMENT

The Reuse R&D project contains

- Modification of the aluminium can collection system (separate collection of undamaged aluminium cans without compacting thus keeping the shape of the collected intact cans)
- Development of the special purpose opener machine (cut out the cover cap part of the aluminium can)
- Development of the re-closable cap (see Figure 2.)
- Development of the washing – filling – label and cap machine

Table 1.
Defined problems and solution by project parts

Project part	Problem	Solution
Modification of the aluminium can collection system	Logistics problem because of the bulky volume of the intact aluminium cans Having intact aluminium cans	Volume limited separate collection box, modified logistic system (volume based route planning) Higher incentives for collectors
	The diameter of the several alu cans are	Flexible purpose opener, with adjustable knifes

Development of the special purpose opener machine	different (0,1-0,3 mm distance)	
	1M pcs / yr quantity – high quality requirement of the knifes	Mechanical shearing instead of cutting is possible because of the typical brittle material of the cover (5000 series Al alloyed with magnesium)
Development of the re-closable cap	The diameter of the several alu cans are different (0,1-0,3 mm distance)	Thermal expansion based fixing, or bonded version

The following figure shows some basic characteristics of the re-closable cup.

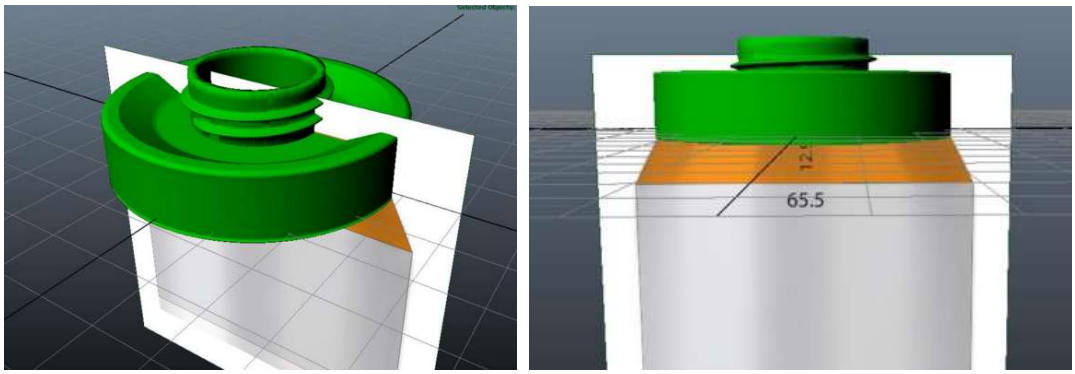

Figure 2.
Re-closable cap

IDENTIFICATION OF TARGET MARKET

In order to have a successful introduction to the market the target group should be identified. Based on market analysis the target customer group's members are mostly women, aged between 25-50, medium or high disposable income, have children, and open to ecological and environmental way of thinking. Secondary target market is the DIY community, who are using the opened cans quite often for manufacturing several interesting / innovative products. We will use selective distribution focused on hypermarkets and drugstores.

COMPETITIVE ADVANTAGE

On top of the obvious environmental benefits there are some business benefits as well. Reusing a well known shape can is much interesting for the environmental friendly

customers than buying a new one. The content of the can will also eco friendly (96% biological rapidly degradable contents). An eco friendly content in a reused aluminium can pack is a brand new product in the market.
Aluminium can as a packaging is premium quality thus quite expensive. Due to the reuse the cost of packaging (the aluminium container) can be significantly reduced.

CONCLUSIONS

As packaging issue is one of the most difficult waste issue to tackle, it is important to move from recycling towards reuse when it is possible. The established recycling schemes can be challenged and with the help of research and development big step forward can be made. Based on the fact that aluminium can markets grow it is time to develop reuse systems for the industry because reusing can save more than recycling. If we have a proper can collection logistics system in place we can modify it to collect intact cans. By developing the special purpose opener machine plus the re-closable can refilling of used but intact cans is a feasible option.

REFERENCES

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