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Aluminum recycling to generate Didactic Material in the Career of Industrial Engineering

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Abstract

A this paper describes the importance of designing educational materials to help the development of practices that the students in the Industrial Engineering Institute of Technology Iguala and require aluminum material and the creation of earth to melt. Contributes to instruction, education and training on how to do this, because recycling aluminum cans consumed on campus and make them work materials reduces costs for the purchase was made and somehow generation waste on campus, with activities that promote skill development and learning for understanding, identifying, testing and management of processes and heat treatments. Conducive intellectual processes where the student deduct and analyze activities which are not purely theoretical and have the opportunity to conceptualize from the observed.

Teaching materials, aluminum, Reuse, Industrial Engineering, Students

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1. Introduction

Aluminum cans are the most frequently recycled materials, this is because it is cheaper and less energy to recycle aluminum, can be cut into pieces of the same size, clean and compress in blocks for recycling. This project aims at the student to have a focus on practical activities that promote the development of skills and learning for the understanding, identification, experimentation and management of processes and thermal treatments such as smelting, in such a way as to foster intellectual processes where The student deduces and analyzes activities that are not merely theoretical and have the opportunity to conceptualize from what is observed.

1.1 Justification

It is very important that the student adopts permanently and necessary the collection and recovery of renewable disposable products such as aluminum, that is, that recycle, that he understands the importance of generating his own resources with processes such as foundry to obtain material Premium and at the same time the application of their knowledge in the different changes of form that can come to present.

These activities are aimed at minimizing the costs of obtaining raw materials and contributing to the environment, as we recycle used cans and save space in order to minimize the use of electrical energy to produce new cans, or Whether or not virgin materials are used.

1.2 Problem

The knowledge obtained by the student gives certainty that the manufacturing processes in the use of aluminum can not only be theoretical or out of reach if not obtained easily, simply and mainly practical.

Aluminum, although it is very large in our planet, it is very expensive to extract it, if we recycle aluminum we will have a saving in the cost of energy, besides that it is a material that does not lose properties after several recycling processes, therefore, we will be able To merge the pieces elaborated in the Industrial Engineering practices as often as necessary and to reprocess the same material with another type of design that more appropriately adjusts to the need of the practices in relation to what is intended to be develop with respect to the thematic contents of each subject in question.

1.3 Hypothesis

Through the application of aluminum recycling will have both academic and economic benefits.

1.4 Objectives

1.4.1 General Objective

Design didactic material to carry out internships in the Industrial Engineering Career by recycling the aluminum cans with a suitable heat treatment.

1.4.2 Specific objectives

- Development of skills in students in the handling of processes and thermal treatments.
- The application of knowledge in the different shape changes of the raw material.
- Minimize costs for material acquisition and contribute to the care of the environment reducing to some extent the generation of urban solid waste in the Institution.

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2. Theoretical Framework

The most common element occupying the third place in the earth's crust is aluminum and the second most used material, very strategic because it is very light, impermeable to moisture, gases, light and odors. After occupying the aluminum cans they are very ideal to preserve food only once, are discarded.

It costs much its exploitation in the social aspect, energy and especially in the environmental environment since in collecting the cans of this material they have to be converted into ingots by means of the process of casting and later in sheets of aluminum giving the transformation of the material Raw material in industrial processes that lead to the consumption of large quantities of electrical energy and at the same time contamination by the residues of oxides and silicates called "red muds".

One of the most complex problems for large cities is the disposal of their wastes, especially those that have a significant environmental impact. Nowadays the term "recycling" is called the process whose objective is to convert waste into new products to prevent the use of potentially useful materials, reduce the consumption of new raw material, reduce energy use, reduce air pollution Through incineration) and water (through landfills) by reducing the need for conventional waste systems.

Recycling is the process by which waste products are used again, we can also say that it is a 'process where waste materials are collected And transformed into new materials that can be used sold as new products or raw materials. Another definition is: "It is a process that aims at the recovery, directly or indirectly, of the components that contain the urban waste.

The advantages of recycling include a reduction in the volume of urban solid waste, a reduction in energy expenditure, a buffering of environmental damage, the adoption of new values by providing a different lifestyle with more awareness and commitment to the environment planet.

3. Research Methodology

3.1 Type of Research

The methodology used in this research is a process of change of form taking into account the ease of recycling that has the aluminum that we occupy as it is the cans of that material since this raw material is discarded quickly and is presented in large quantities in the Urban solid waste flow.

3.2 Theoretical Methods

The analytical-synthetic method is used because the problem to be analyzed is divided into several parts and then integrated according to the Top Down design.

3.4 Software Development Methodology

It should be noted that the shape-shifting process begins in the collection of the raw material (aluminum cans) mainly those that are obtained in the plant and later are extruded or compressed to facilitate that they occupy less space in the crucible where Placed to move to the next stage of casting. This next stage called casting will depend exclusively on the design of the piece to be made. According to the design of the piece to be manufactured depends the mold to be used in the casting of the foundry, to satisfy the needs in the correct teaching of the development of the practice.

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Once this cycle is completed, it comes into play the operational control that consists firstly in weighing each of the cans knowing that its weight is 13.7 grs and melting a quantity of 35 cans you get a ingot of 3 x 3.5 x 0.75 Inches with an average weight of 470 grs and a reduction of 9.5 grs. It is extremely important to know that a kilo of aluminum is made up of approximately 65 cans and knowing this fact we can with more reason build several permanent molds as required.

The ingot that is extracted could be marketed to manufacturers of aluminum parts, but it is not our purpose given that our project is focused on the obtaining of didactic material. The casting of the material is carried out in an open hearth furnace which we construct with a partition that is a refractory material, using a long stem torch and a 1.5 inch diameter nozzle, obtaining a combustion at a temperature of 800 degrees Celsius sufficient To melt aluminum since this element has a melting point of 650 degrees Celsius in a crucible of three kilos capacity. The casting is done using iron tongs in a permanent mold called a chaponer that was previously lubricated with automotive burned oil.

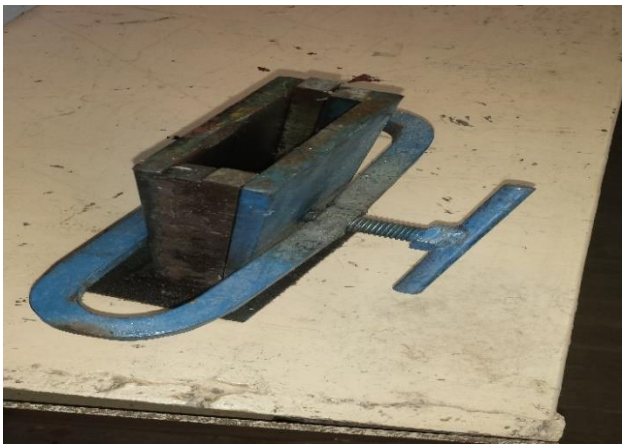

Figure 1 This is the permanent mold or chaponera for the emptying

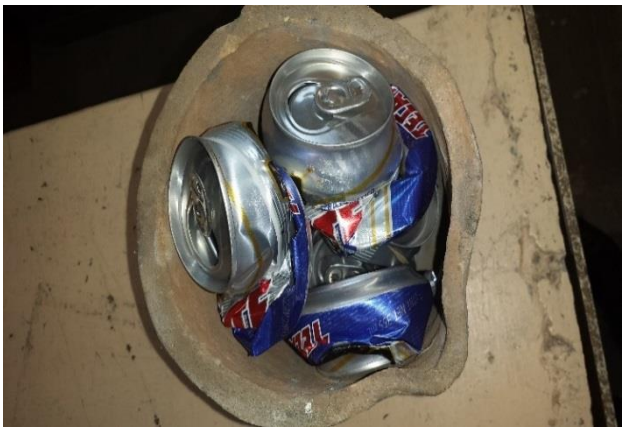

Figure 2 Clay pot for casting

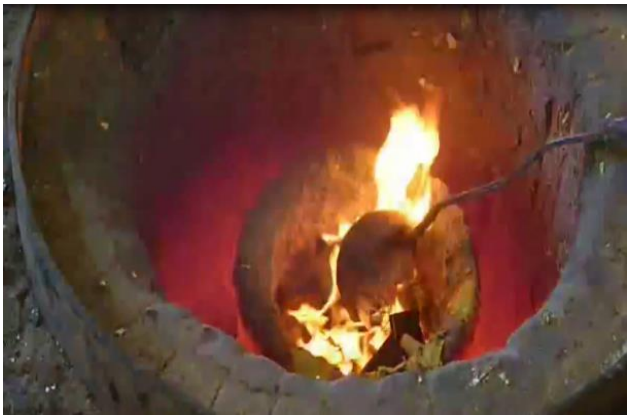

Figure 3 Cast aluminum cans to a Temperature of 700 °C

4. Results

The results obtained in this project show that after having applied the shape change process an aluminum ingot is obtained as shown in figure 4 and that this one is occupied as didactic material in the manufacture of pieces that serve as sustenance to enrich The teaching-learning process with a lower cost than it costs in the market and that within the student's knowledge also includes having a more responsible participation with respect to their environment and respect for the environment given that it performs at the same time Sensitization and promotes a reduction of waste and makes it a material of great utility to develop the practices within their professional preparation.

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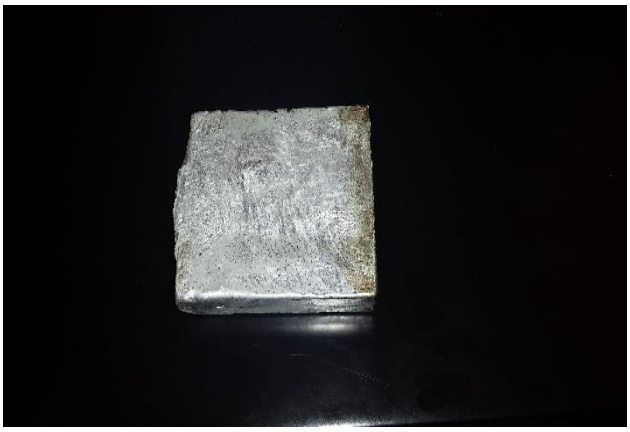

Figure 4 Aluminum ingot as teaching material

5. Conclusions

With the implementation of the process in the area of Industrial Engineering takes a better preparation in the students and becomes aware of the importance of waste recycling as a new way of adopting these values and take them to the practical field by setting an example of doing Its own material minimizing costs and reducing urban solid waste in environmental matters.

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