DODOMA ALUMINIUM & GASES LIMITED

PRE - FEASIBILITY REPORT

O N

ALUMINIUM POTS

(FROM ALUMINIUM SCRAPS)

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ALUMINIUM POTS
(FROM ALUMINIUM SCRAPS)

[KAT/MSR/10172]J.C. 3850

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ALUMINIUM POTS
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INTRODUCTION

This project proposal has been made for the manufacture of Aluminium Pots from aluminium scraps. Different sizes and shapes of aluminium pots are to be produced for use in different applications sectors.

Aluminium recycling is the process by which scrap aluminium can be reused in products after its initial production. The process involves simply re-melting the metal, which is far less expensive and energy-intensive than creating new aluminium through the electrolysis of aluminium oxide (Al2O3), which must first be mined from bauxite ore and then refined using the Bayer process. Recycling scrap aluminium requires only 5% of the energy used to make new aluminium from the raw ore. For this reason, approximately 36% of all aluminium produced in the United States comes from old recycled scrap. Used beverage containers are the largest component of processed aluminum scrap, and most of it is manufactured back into aluminium cans.

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Advantages

The recycling of aluminium generally produces significant cost savings over the production of new aluminium, even when the cost of collection, separation and recycling are taken into account. Over the long term, even larger national savings are made when the reduction in the capital costs associated with landfills, mines, and international shipping of raw aluminium are considered.

Energy savings

Recycling aluminium uses about 5% of the energy required to create aluminium from bauxite; the amount of energy required to convert aluminium oxide into aluminium can be vividly seen when the process is reversed during the combustion of thermite or ammonium perchlorate composite propellant.

Aluminium die extrusion is a specific way of getting reusable material from aluminium scraps but does not require a large energy output of a melting process. In 2003, half of the products manufactured with aluminium were sourced from recycled aluminium material.

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Environmental savings

The benefit with respect to emissions of carbon dioxide depends on the type of energy used. Electrolysis can be done using electricity from non-fossil-fuel sources, such as nuclear, geothermal, hydroelectric, or solar. Aluminium production is attracted to sources of cheap electricity. Canada, Brazil, Norway, and Venezuela have 61 to 99% hydroelectric power and are major aluminium producers. The use of recycled aluminium also decreases the need for mining bauxite.

The vast amount of aluminium used means that even small percentage losses are large expenses, so the flow of material is well monitored and accounted for financial reasons. Efficient production and recycling benefits the environment as well.

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Products production using reverberatory furnaces

The scrap aluminium is separated into a range of categories e.g. irony aluminium (engine blocks etc.), clean aluminium (alloy wheels). Scraps are classified according to ISRI.

Depending on the specification of the required ingot casting, it will depend on the type of scrap used in the start melt. Generally, the scrap is charged to a reverberatory furnace (other methods appear to be either less economical and/or dangerous) and melted down to form a "bath". The molten metal is tested using spectroscopy on a sample taken from the melt to determine what refinements are needed to produce the final casts.

After the refinements have been added, the melt may be tested several times to be able to fine-tune the batch to the specific standard.

Once the correct "recipe" of metal is available, the furnace is tapped and poured into ingot moulds, usually via a casting machine. The melt is then left to cool, stacked and sold on as cast silicon–aluminium ingot to various industries for re-use. Mainly, cast alloys like ADC12, LM2, AlSi132, LM24 etc. are produced. These secondary alloys ingots are used in die cast companies.

Nowadays, tilting rotary furnaces are used for recycling of aluminum scrap, which give higher recovery compared to reverberatory furnaces (Skelner Furnace).

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Secondary aluminium recycling

White dross, a residue from primary aluminium production and secondary recycling operations, usually classified as waste, still contains useful quantities of aluminium which can be extracted industrially. The process produces aluminium billets, together with a highly complex waste material. This waste is difficult to manage. It reacts with water, releasing a mixture of gases (including, among others, hydrogen, acetylene, and ammonia) which spontaneously ignites on contact with air; contact with damp air results in the release of copious quantities of ammonia gas. Despite these difficulties, however, the waste has found use as a filler in asphalt and concrete.

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ALUMINIUM RECYCLING AND SCRAP MELTING: EQUIPMENT

A variety of furnaces can be used for melting aluminum. The choice of furnace depends upon the desired production rate, the quality and composition of the scrap aluminum to be melted, and whether a batch or continuous mode of operation is desired. Other factors influencing furnace selection are capital costs, refractory lifetime, and metal loss.Lindberg/MPH, Seco-Warwick, Frank W. Schaefer, and Gasmac (Canada) are reported to be the larges suppliers of aluminum melting furnaces. Other manufacturers are active in this market as well. For a complete list, click on the manufacturers database identified by the wrench icon at the bottom of the page.

Reverberatory

Reverberatory furnaces heat the aluminum to melting temperatures with direct fired wall mounted burners. The primary mode of heat transfer is through radiation from the refractory brick walls to the aluminum, but convective heat transfer also provides additional heating from the burner to the aluminum.

Reverberatory furnaces are available with capacities ranging up to 150 tons of molten aluminum. Typical aluminum reverberatory furnaces have melting efficiencies of 15%-39%. Recuperation can enhance reverberatory furnace efficiencies to 10-15% but also adds to maintenance costs.

The advantages provided by reverberatory aluminum melters is the high volume processing rate, and low operating and maintenance costs. The disadvantages of the reverberatory aluminum melters is the high metal oxidation rates, low efficiencies, and large floor space requirements.

Electric Crucible

Electric crucible furnaces are similar to gas-fired crucible furnaces, but utilize electric resistance-heating elements to heat the crucible and melt the aluminum. Like their gas counter part, electric crucible furnaces are small and are typically used when alloy flexibility is the most important.

Advantages provided by the electric crucible furnace is the near elimination of emissions and low metal oxidation losses. Disadvantages include increased fuel costs and size limitation.

Rotary

Rotary furnaces are used almost exclusively for reclaiming low grade aluminum scrap and drosses (dross: a mixture of aluminum and aluminum oxide which forms on the surface of molten aluminum. Dross can also contain fluxing agents added to the molten aluminum and other impurities. Dross can contain aluminum content of 35%-95%, depending on how the melt was achieved and the effectiveness of any fluxing agents added to the melt.) into aluminum.

The Furnace operates by rotating the charge through the furnace which comes in direct contact with a gas burner or with a refractory wall which was directly heated by the burner. Typical rotary furnaces have holding capacities of 2 to 5 tons and are usually charged with salt which acts as a flux to improve metal recovery and reduce aluminum oxidation.

The advantage provided by rotary furnaces is their ability to process dross and low-grade scrap which is difficult to process in other types of furnaces. The disadvantages are low efficiency, higher maintenance requirements, and considerable salt cake production which must be disposed of as a hazardous waste.

Electric Reverberatory

Electric reverberatory furnaces are used primarily as holding furnaces and are seldomly used as aluminum melters. These furnaces are refractory lined vessels using resistance heating elements mounted in the furnace roof above the hearth. These furnaces are used for smaller melting applications where limitations on emissions, product quality, and yield are of high priority.

Advantages over gas-fired reverberatory furnaces include low emissions, low metal oxidation, and reduced furnace cleaning. Disadvantages include high fuel costs, low production rates, higher capital costs, and frequent replacement of heating elements.

Tower

Tower furnaces are loaded from the top of a vertical tower with aluminum, and burners at the bottom of the tower melt the aluminum. The primary mode of heat transfer in tower furnaces is through convection by direct impingement of the burner on the metal in the lower section of the tower, and by the combustion gases as they travel out the tower past the metal charge.

A variation of the tower furnace uses a grate system which lowers the metal through four grates, gradually heating the charge through each grate until on the fourth and final grate, the charge melts and falls into the hearth.

The advantages of the tower furnace are high efficiency (40%-77%) and low oxidation losses. The disadvantages of tower furnaces are their higher capital costs and the furnace size is restricted by height limitations.

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Gas Fired Crucible

Crucible furnaces are small capacity, indirect aluminum melters/holders typically used for small melting applications or exclusively as a holding furnace. The aluminum is placed our poured into a ceramic crucible which is contained in a circular furnace which is fired by a gas burner. The energy is applied indirectly to the metal by heating the crucible.

The advantages of crucible furnaces are their ability to change alloys quickly, low oxidation losses, and their low maintenance costs. Disadvantages include low efficiency, (as low as 12%), high emissions, and size limitations.

Energy efficiency can be improved by 50% by adding a ceramic matrix recuperator to the exhaust system to recover waste heat for preheating the combustion air.

Morgan Thermal Ceramic, Ltd. has introduced a regenerative gas crucible furnace that circulates waste heat to provide both high temperature capability and high efficiency.

Sweating Furnace

A sweating furnace is a dry-hearth furnace used to process aluminum scrap that contains considerable amounts of unalloyed iron and/or zinc. The charge is loaded onto a slanted hearth and heated above the melting temperature of zinc but below that of aluminum. The molten zinc runs off and is collected. Then the furnace temperature is increased above the melting point of aluminum, but below the melting point of iron. The molten aluminum is then collected separately from the zinc, and the solid iron is left behind in the furnace.

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ALUMINIUM COOKING POTS

Aluminium is one of the more common elements on this planet. Your body is constantly in contact with it, and has very efficient mechanisms for getting rid of it. It would be extremely startling if it turned out to be a hazard after so many millions of years of contact. Aluminium is present in many common antacids, and no-one has ever indicted those. Aluminium is present in many anti-perspirants. An aluminium salt is used to treat drinking water to improve clarity.

- The Food and Drug Administration (FDA) has determined that aluminum cooking utensils, aluminum foil, antiperspirants, antacids, and other aluminum products are generally safe.

- It has been claimed that, in Alzheimer's disease, the aluminium content in the nerve cells with tangles is higher than in adjacent, undamaged nerve-cells. Similar findings have been claimed for tangle-bearing cells present in a rare disease similar to Alzheimer's disease (the so-called 'Guam' disease). However, recent studies using a new and very powerful kind of analytical microscope (nuclear microscopy) have shown that the high levels of aluminium in tangles are actually caused by the way the cells were prepared when they were being examined.

- It has been claimed that the brain content of aluminium is increased in Alzheimer's disease. However, recent studies in which Alzheimer brains were carefully compared with normal brains failed to find any difference in the overall amount of aluminium.

- Most foods contain some aluminium. Tea and some herbs and spices contain particularly high levels. Scientists think you probably absorb very little of the aluminium you take in from food. 'An average person has a daily intake of 7mg of aluminium. By far the greatest intake comes from food. But most is not retained and passes straight through the gut and is excreted. ... The aluminium added to most foods by cooking in uncoated aluminium pans is less than 0.1mg per 100 gram serving.'

- Aluminium has not been shown to pose a health risk to healthy, nonoccupationally exposed humans. There is no evidence to support a primary causative role of aluminium in Alzheimer's Disease.

Finally, it should be noted that the latest crop of aluminium cooking pots do not present an aluminium surface to the food anyhow. These days the manufacturers use what is called a 'hard

anodising' finish. So such good cooking pots are very reliable. However, the cheaper plain unanodised aluminium pots and billies will still corrode under acid foods such as tomatoes and apricots. They are OK for boiling water of course.

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ALUMINIUM COOKWARE AND BAKEWARE/ POTS

Cookware and bakeware are types of food preparation containers, commonly found in a kitchen. Cookware comprises cooking vessels, such as saucepans and frying pans, intended for use on a stove or range cooktop. Bakeware comprises cooking vessels intended for use inside an oven. Some utensils are considered both cookware and bakeware.

The choice of material for cookware and bakeware items has a significant effect on the item's performance (and cost), particularly in terms of thermal conductivity and how much food sticks to the item when in use. Some choices of material also require special pre-preparation of the surface—known as seasoning—before they are used for food preparation.

A good cooking pot design has an "overcook edge" which is what the lid lies on. The lid has a dripping edge that avoids condensation fluid from dripping off when handling the lid (taking it off and holding it 45°) or putting it down.

Aluminium is a lightweight metal with very good thermal conductivity. It is resistant to many forms of corrosion. Aluminium is commonly available in sheet, cast, or anodized forms, and may be physically combined with other metals.

Sheet aluminium is spun or stamped into form. Due to the softness of the metal it may be alloyed with magnesium, copper, or bronze to increase its strength. Sheet aluminium is commonly used for baking sheets, pie plates, and cake or muffin pans. Deep or shallow pots may be formed from sheet aluminium.

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Cast aluminium can produce a thicker product than sheet aluminium, and is appropriate for irregular shapes and thicknesses. Due to the microscopic pores caused by the casting process, cast aluminium has a lower thermal conductivity than sheet aluminium. It is also more expensive. Accordingly, cast aluminium cookware has become less common. It is used, for example, to make Dutch ovens lightweight and bundt pans heavy duty, and used in ladles and handles and woks to keep the sides at a lower temperature than the center.

Anodized aluminium has had the naturally occurring layer of aluminium oxide thickened by an electrolytic process to create a surface that is hard and non-reactive. It is used for sauté pans, stockpots, roasters, and Dutch ovens.

Uncoated and un-anodized aluminium can react with acidic foods to change the taste of the food. Sauces containing egg yolks, or vegetables such as asparagus or artichokes may cause oxidation of non-anodized aluminium.

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ADVANTAGES OF ALUMINUM RECYCLING

Aluminum recycling is a common practice that has been around since the early 1900s. It is a very important process because of the numerous advantages as can be seen below:

1. **Saves Energy**

   Used beverage containers are among the largest components of aluminum scrap. Most of the scrap metal is recycled back into cans. The other largest user of the recycled aluminum is the automotive industry. According to the Aluminum Association President, recycling of old aluminum cans into new ones requires less energy (95%) than producing new ones from the scratch. He states that the recycling process also produces 95% reduced greenhouse gas emissions than entirely making new cans.

2. **Prevents Depletion of a Valuable Commodity**

   Aluminum is a metal that is mined from the earth's crust as Bauxite ore. This therefore means that, recycling prevents continuous mining and depletion of this valuable commodity. Each year, recycling prevents approximately five percent of the total Bauxite ore mining in the world.

3. **Reduction of the Carbon Footprint**

Increased environmental awareness and the need for social responsibility have led to the increased aluminum recycling among many countries and companies today. Did you know that recycling aluminum helps in preventing more than approximately 90,000,000 tons of toxic carbon dioxide from being let free into the air every year? Yes, recycling a single drink can made of aluminum prevents carbon dioxide emission that equals a single mile car ride and it saves adequate energy to power a typical television set for about two to three hours. Today, every country has the responsibility to do whatever it can to reduce carbon emission. This means that if all countries focus on the reduction of carbon dioxide emissions there will be little concern about global warming.

4. **Helps in Satisfying the Increasing Demand**

As the population increases so does the need for aluminum products. Today, aluminum has more uses and applications other metals. This means that there should be a continuous production of this metal so as to meet the increasing demand. Mining alone is not sufficient enough to meet this demand. Recycling therefore comes in to bridge the gap. In fact half of the aluminum cans are recycled. Manufacturers today use approximately 35 percent of the recycled aluminum and approximately 65 percent of the natural aluminum to meet up their manufacturing needs. Therefore, it is necessary to recycle aluminum.

5. **It Never Wears Out**

Aluminum is infinitely recyclable. This means that it can be recycled over and over without necessarily losing its natural qualities. It is because of this fact that most manufacturing companies are resorting to use aluminum in most of their products. The metal is light weight, versatile and can be used in a number of applications.

6. **Reduction of Landfill**

Waste management is becoming a big problem in today's economies. Solid waste management is in fact one of the biggest problems facing many countries in the world today. Most countries dig up huge holes in the ground for burying waste. By recycling aluminum, the space that would be needed for burying the aluminum waste is saved and can be used for other purposes.

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RECYCLING AND SCRAP MELTING: PROCESS DESCRIPTIONS

Aluminum secondary smelting (scrap recycling) accounts for approximately 33% of all primary aluminum produced. These processing plants are typically located near large urban areas where large supplies of scrap aluminum are available. Aluminum recycling and secondary smelting requires preprocessing of the scrap aluminum to remove impurities, followed by remelting of the aluminum. To maintain sufficient purity, the remelted aluminum is mixed with pure aluminum produced in a primary smelting plant (typically a 50-50 mix).

Prior to melting various mechanical, thermal, chemical, and magnetic techniques are used to separate contaminants and non-aluminum materials from the scrap. in contrast to the electricity intensive process of primary aluminum smelting, melting of scrap to yield secondary aluminum involves primarily natural gas usage.

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ALUMINUM CASTING: PROCESS DESCRIPTION

Foundries produce complex metal shapes by melting aluminum or aluminum alloys and pouring the molten metal into a mold to solidify into the desired shape. Aluminum casting accounts for 32% of all metal castings in the United States and the majority of these castings are for the automotive industry. There are three main methods used for casting metals: sand casting, investment casting, permanent mold casting, and die casting.

Die casting and permanent mold casting together account for over 80% of all aluminum casting. Due to aluminum's low melting temperature, inexpensive steel and iron can be used for forming the dies and molds. The molten aluminum feeding the casting line is derived from three different sources: ingots from a primary aluminum producer, molten aluminum directing from a smelting plant, or partially processed recycled aluminum scrap.

Casting consists of pouring molten aluminum into molds. Once in the mold, the aluminum solidifies into the shape defined by the mold. Three different casting methods are used: sand casting, permanent mold casting, and die casting. Molten aluminum is derived from three different sources: ingots from a primary aluminum producer, molten aluminum directly from a smelting plant, or partially processed recycled aluminum scrap.

Sand Casting

Sand Casting is the most versatile method and the most economical for producing small quantities. Almost any shape mold can be produced from fine sand and binder mixture. After casting, the sand molds must either be hauled to land-fills or reconditioned. Thermal sand reclamation processes are available that remove the binder material from the sand and allow the sand to be reused. These processes are typically natural gas fired.

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Investment Casting

Investment casting uses a ceramic mold which was created around a plastic or wax replica of the desired metal shape. Prior to casting, the ceramic mold is fired which increases the mold strength and burns the plastic or wax replica, removing it from the mold. Investment casting is capable of creating higher precision casts than sand casting.

Permanent Mold Casting

Permanent mold casting uses steel or other metal molds to shape the molten aluminum. Molten aluminum is forced into the mold under gravity or with the aid of a vacuum. Permanent mold castings are stronger than sand castings and less expensive for large production quantities.

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MARKET POTENTIAL

Aluminum Market Overview:

The Aluminum Market was valued at $133,564 million in 2015, and is expected to reach $167,277 million by 2022, registering a CAGR of 3.3% from 2016 to 2022. Aluminum is an electronegative metal, which possesses strong affinity for oxygen. It is the sixth most ductile and second most malleable metal present on earth. It is exceptionally light having 2.7g/ccm density, is impervious to dust, possesses high degree of conductivity, and exhibits significant strength when alloyed. It is widely used in food & packaging and pharmaceutical industries, as it is nontoxic in nature, preserves food for prolonged times, inhibits growth of microorganisms.

Aluminum is good electrical conductor and thus is used frequently in electrical transmission lines. In addition, it is used as primary propellant for solid rocket booster motor in space shuttle due to its high volumetric energy density. Corrosion resistance, reflectivity, and recyclability are other characteristics of Aluminum, which makes it a favorable choice for various industrial applications.

The growth of the global aluminum market is driven by development in the transport industry, technological advancements in aluminum manufacturing technologies and processing equipment, and increase in usage of aluminum in various industries such as building & construction and foil & packaging. Asia-Pacific is the leading region, in terms of growth, due to massive urbanization, growth in income of people living in urban areas, and rapid industrial development.

In addition, continuous advancements in transport industry and ongoing R&D activities to develop innovative, more effective, and cheaper aluminum products fuel the growth of the market. However, increase in competition from substitutes and fluctuations in prices of raw materials such as alumina are some factors that limit the market growth. Growth in demand from emerging economies such as China & India and increase in use of recycled aluminum products globally provides lucrative opportunities for the market expansion. Lowering energy requirement is one of the major challenges faced by aluminum industry.

Aluminum market is segmented based on end user, processing method, and geography. On the basis of end user, the market is categorized into transport, building & construction, electrical engineering, consumer goods, foil & packaging, machinery & equipment, and others (solar panel nanotechnology and aluminum air batteries). According to processing, the market is divided into flat rolled, castings, extrusions, forgings, pigments & powder, and rod & bar. Geographical breakdown and deep analysis of each of the aforesaid segments is included for North America, Europe, Asia-Pacific, and LAMEA.

Rise in global economic growth rate is expected to increase the construction spending of customers in advanced and emerging economies, which in turn assists in aluminum market expansion.

Market share analysis

Aluminum industry is a highly competitive sector. United Company RUSAL Plc., Aluminium Corporation of China Limited (CHALCO), Rio Tinto Alcan Inc. were the top three producers, in terms of market share, in 2014. High market share of leading companies is characterized by their vast product portfolio, wide distribution network, and R&D investments. United Company RUSAL Plc. dominated the market in 2014, in terms of market penetration, R&D activities, and capital investment.

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Asia-Pacific: Regional Analysis

China accounted for the highest market share in the Asia-Pacific aluminum market in 2015 owing to massive urbanization and industrial development. The transport and building & construction industries jointly accounted for more than 50% of the overall aluminum usage in China. New product developments, capacity expansions, and acquisitions are the key strategies used by the Chinese manufacturers to increase their market share. China's national environmental program to reduce CO2 emissions and increase in industrial energy efficiency led to shutdown of multiple aluminum smelters, which declined the aluminum production in China. Under the new rules, energy consumption for upgraded and new aluminum smelters should be below 13,200 kwh for ingots and 12,750 kwh per ton for liquid form. Product innovation and capacity expansions are the key strategies used by Korean manufacturers to increase their market share.

Key leading players operating in this market include Alcoa Corporation, Aluminium Corporation of China Limited (CHALCO), China Hongqiao Group Ltd., China Power Investment Corp. (CPI), East Hope Group Company Limited, Emirates Global Aluminum PJSC, Norsk Hydro ASA, Rio Tinto Alcan Inc., United Company RUSAL Plc., and Xinfa Group Co., Ltd.

Other key market players in the value chain include Aluminium Bahrain B.S.C, Ball Corporation, BHP Billiton Limited, Century Aluminium Company, Crown Holdings Incorporated, Constellium N.V., Glencore International AG, Hindalco Industries Ltd., Jindal Iron & Steel Company Limited , JW Aluminum Company, Kaiser Aluminum Corporation, National Aluminum Company Limited, Orkla ASA, Rexam plc, Shandong Nanshan Aluminum Co., Ltd., South32 Limited, State Power Investment Corporation, Talco Aluminum Company, Vale SA, and Vedanta Resources Plc.

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THE ALUMINUM RECYCLING INDUSTRY

Recycled aluminum is produced by remelters and refiners. Refiners produce casting alloys and deoxidation aluminum (used to remove free oxygen from liquid steel) while remelters produce wrought alloys. Casting alloys have a concentration of alloying elements of up to 20% and wrought alloys of up to 10%. Remelters must select the appropriate quantity and quality of scrap to correlate with the chemical composition of the wrought alloy to be produced. Hence, extra care must be taken to keep the different aluminum alloys separated.

The recycling activity of remelters started to gain in importance only in the 1980s. Refiners work under less stringent conditions in terms of alloys. They specialize in melting mixed casting and wrought alloy scrap into standardized aluminum alloys. For refiners it is common practice to mix different alloys to alloy-specific scrap batches before loading the scrap into the furnace. Some scrap is also used in so-called primary cast houses. This flow is included in the European Scrap Smelting Unit Model under remelting. Recycled aluminum is produced from purchased, tolled, and internal scrap. Tolled scrap describes scrap that stays in the ownership of the customer and is smelted for a fee. Scrap that is generated and smelted in the same company or company group is referred to as internal scrap.

With few exceptions, refiners are of small and medium size and only remelters are part of integrated groups (i.e., those companies involved in aluminum production and fabrication). Hence, only remelters produce aluminum from internal scrap. In this paper, scrap smelting and melting are equally used for the process of extracting aluminum from aluminum scrap in refiners and remelters.

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PROCESS OF ALUMINUM RECYCLING

The following is step by step process of aluminum recycling:

1. **Collection of Scrap Aluminum**

   Drinks cans, aluminum foil trays, and aerosol cans are collected from homes, streets and garbage collection centres by hired individuals or business people who major in aluminum collection. They are sometimes mixed with steel cans. The scrap aluminum is then collected together and then it is transported to the treatment plant.

2. **Sorting**

   The mixed metals (aluminum and steel cans) are taken to a materials recovery facility where they are cleaned, sorted into different metal streams and later compressed into bales. This step is very important in ensuring that the aluminum is separated from other metals. It is important to point out that drink cans and certain food cans are made out of steel.

3. **Shredding**

   The aluminum blocks bales are later transported to a processing plant. The blocks are then put onto a conveyor that transports them to the shredder. The shredder then cuts the cans into tiny pieces. This is done to make it easier to get rid of all the paintings and coatings that are used for decoration and protection purposes. Additionally, it makes it easier for the metal to melt quickly in the furnace.

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4. **The Shredded Cans are Passed Beneath a Powerful Magnet**

This process aims at completely eliminating traces of steel. Since steel is magnetic, it is easy to separate it from aluminum once it is passed under a magnet. This ensures that the recycled aluminum contains no steel and meets the quality standards set.

5. **De-coating**

The aluminum shreds then are taken by the conveyor system into a specialized decoater. This is where all the decorations are detached from the shredded pieces. The decoater then blows very hot air through the tiny pieces of shreds and the coatings, paintings and inks vaporize. The hot gases are then removed and cleaned.

6. **The Decoated Shreds Are Then Fed Into the Furnace**

Traditionally, the furnace is heated up to 7000C; this is the lowest melting point for certain metals. During this process of melting, certain chemicals are added into the molten aluminum to make it have the correct composition. All the impurities will then float to the top surface of the hot aluminum. This forms a layer called dross. The dross is then removed using a specialized scraping tool.

7. **The Holding Furnace**

The holding furnace is basically where the molten aluminum is transferred to. It is also known as the holding furnace. This is where the aluminum waits to be turned into ingots. From time to time, the holding furnace tilts to pour the molten aluminum into moulds. Each ingot or block contains approximately 1.6 million drink cans.

8. **Transportation**

The finished ingots are then lifted by an overhead careen from the casting pit. The ingots are then loaded onto queue waiting track to be transported and dispatched to the rolling mill. The ingots are then rolled out making thin sheets of aluminum. This gives the metal greater strength and flexibility. The sheets of metal are then collected and used by the packaging factories to make drink cans, foils and other useful products. Then the process begins once again. In a span of as a little as six weeks, the recycled aluminum products are sent back to the shelves in the shops and supermarkets ready for usage.

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ALUMINUM CASTING PROCESS

CHARACTERISTICS OF ALUMINUM

Aluminum is lightweight, has excellent strength, high thermal and electrical conductivity, high reflectivity, good corrosion resistance, excellent workability, and attractive appearance. It can be given almost any finish. It is nonmagnetic, nontoxic, and non- sparking.

Aluminum weighs 1.175 lb/in3, approximately 1/3 the density of steel, copper, and brass. Some of the stronger aluminum alloys exceed the strength of mild steel. The melting point of aluminum is 1215 degrees Fahrenheit.

The high thermal conductivity of aluminum is a marked advantage in any application where it is desirable to conduct or dissipate heat quickly and uniformly. On a weight basis, aluminum is the most efficient heat conductor of the common metals.

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ALUMINUM ALLOYS

An alloy is a substance having metallic properties, composed of two or more chemical elements of which at least one is a metal.

The 6000 series principal alloying constituent is Magnesium silicide. This series has good formability and corrosion resistance, with medium strength. These alloys are the most popular aluminum extrusion alloy class. They have good strength, corrosion resistance, machinabilty, weldability, formability, and are heat treatable. 6063, 6005 and 6061 are produced in Bonnell Aluminum's Carthage, Tennessee and Newnan, Georgia casting facilities. 6463 is only manufactured in Newnan.

1. 6063 is the most popular of the aluminum extrusion alloys. This alloy makes a good surface finish, is corrosion resistant, and can be heat-treated for strength. This alloy is used in fabricated parts such as: storm windows, storm doors, storefronts, and commercial buildings. In other words, it is primarily used in nonstructural applications, but occasionally it is used in structural applications.

2. 6005 is used in structural applications where more strength is needed. 6005 alloy is also less corrosion resistant compared to the other alloys in the 6000 series. An example of a product manufactured with this alloy is bicycle rims.

3. 6061 has good corrosion resistance and is used in transportation and structural applications. This alloy has the highest content of magnesium and silicon of all the alloys in the 6000 series. Examples of products that are manufactured from this alloy are car parts, electrical housings, and material handling systems (i.e. load bearing applications).

4. 6463 is manufactured Bonnell Aluminum's Newnan, Georgia casting facility. This alloy is used for making bright extrusions. Bright dip is a very shiny finish created by anodizing the extruded aluminum. Anodizing is a finishing process which puts a protective oxide coating on the aluminum. This alloy has low iron and high copper content to aid in the brightness of the material. It is mainly used in the production of shower and tub enclosures, running boards, and decorative trim.

5. 6060 is an alloy also known as easy squeeze. It is primarily used in the aluminum clad window market for products with thin walls and high tongue ratios. This alloy was created to extrude with 20% less pressure.

DODOMA ALUMINIUM & GASES LIMITED

CHARGING THE CAST FURNACE

Charging the furnace is the first step in the casting process. The cast house is equipped with the following in order to prepare a charge, which is a mixture of raw materials that are melted down to make an alloy. The equipment is as follows:

ALUMINUM CASTING EQUIPMENT

1. Pre-heat oven: used to pre-heat prime (prime is 99.9% pure aluminum) before it is added to the furnace. The heat comes from the recuperator and does not require the use of additional gas. Pre-heating is done to remove water from the prime. The presence of water when the metal is placed in the furnace will cause an explosion as the water rapidly vaporizes.

2. Recuperator: Hot air from furnace flows over a series of tubes where the air is heated which in turn feeds the burners for the furnace and in turn reduces gas consumption.

3. Front-end Loader/ Fork Truck: the front-end loader is a lift with a large bucket that is used to add scrap to the furnace when preparing a charge. The fork truck is used to add prime ingot into the side doors of the furnaces as well as remove dross and stir the mix.

4. Furnaces: used to melt down aluminum and cast logs. The furnaces are open well reverb. Open well means there is a well opening in the front of the furnace where is scrap added. The definition of reverb is when the flame does not melt the aluminum but the heat from the walls and ceiling of the furnace. The following diagram will illustrate the above definitions.

The furnaces are powered by natural gas 95-98% of the time. When there is a gas curtailment, propane gas is used. The furnaces are made and lined with 18"- 24" refractory, which is a heat resistant material that comes in two forms: brick and a castable mix.

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ALUMINUM CASTING MATERIALS

There are two types of aluminum logs, primary and secondary. Primary consists of pure aluminum and secondary consists of prime and scrap. There are three components used when charging a furnace to make secondary aluminum: prime, scrap, and hardeners. Bonnell Aluminum's Carthage, Tennessee and Newnan, Georgia casting facilities manufacture secondary logs. However, all billets/logs are cast within the Aluminum Association's specifications.

Prime: 99.9% pure aluminum. Prime comes in three forms: T-bars, tub sows, and pig.

- T-Bar and Tub Sows weigh more than fifty pounds
- Pig is prime that weighs less than 50 pounds
- Prime is also categorized by the iron content for example, 10/20 prime tells us there is a maximum of .10% silicon and .20% iron.

Scrap: material purchased from outside sources and that which is generated from within the plant.

Hardeners: Elements, which are added to a bath of aluminum to increase strength and give the final product the characteristics, desired such as finish, strength, and grain refinement. The elements are as follows: Silicon (Si), Iron (Fe), Copper (Cu), Manganese (Mn), Magnesium (Mg), Chromium (Cr), Zinc (Zn), Titanium (Ti), and Boron (Bo). Silicon, iron, copper, manganese, magnesium, chromium, and zinc are used to increase strength and to improve finish. Titanium and Boron are used for grain refinement which is a reduction in the size of the grains, creates a more consistent grain, and better extrudability.

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PREPARING THE BATH

The first step in charging the furnace is adding the appropriate amount of alloying agents: scrap, prime, and hardeners. A charge is a mixture of raw materials that are melted down and mixed to make an alloy. Prime and scrap are first added to the furnace. The alloy being cast determines the quantity of scrap and prime to be used to charge the furnace. Prime and scrap are preheated to remove moisture, which would cause an explosion.

ADDING ALUMINUM

To calculate how much prime needs to be added to the furnace you must first know how much of a heal was left in the furnace from the previous drop. A heal is the remaining metal left in the furnace after one heat has been completed. A drop is the act of pulling the pin on the furnace and allowing the aluminum to flow into the pan until the formation of logs is complete. The formula for calculating how many pounds of prime to add is:

Prime (lbs) = [Charge (lbs) - Heal (lbs)] * [Target % of Prime]

Once the prime has melted, scrap is put into the furnace until the furnace is full and allowed to melt. The melting point of aluminum is 1215 degrees Fahrenheit.

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DEGASSING/FLUXING

Degassing is the removal of hydrogen from molten metal by bubbling a mixture of gasses up through the melt. Flux is a substance that promotes fusion, especially of metals or minerals. Fluxing causes impurities, such as alkaline, sodium, and lithium, (which cause the material to have a bad finish), to rise to the surface of the bath. Once degassing is complete a sample is taken and analyzed for proper chemical content.

Dross is a mixture of aluminum oxides and non-metallic material, which float to the surface of molten aluminum. Dross is produced whenever aluminum is added to the furnace that has been painted, anodized, or dirty. Dross is skimmed off of the top of the molten aluminum into dross pots. Dross is cooled with argon gas to eliminates the oxygen in the mixture and prevent thermiting. Thermiting is the temperature at which aluminum will burn up. The dross is recycled to recover the aluminum from within it.

ADDING HARDENERS

Samples are taken and analyzed using a spectrometer. A spectrometer determines the concentration of elements in an alloy by comparing the relative intensity of the wavelengths of radiation produced when a sample is struck with an electric spark. Hardening agents, such as silicone and magnesium, are added to bring the concentration of the alloying agents up to the specification of the alloy being cast.

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MAKING A CAST

The temperature of the metal must be between 1300-1340 degrees Fahrenheit, the analysis must be within the ranges specified, and degassing must be complete to begin a drop. The casting process used at Bonnell Aluminum is called direct chill casting because the cooling of the log is taking place in the mold itself where water is running through the mold. After all criteria are met the drop can begin. Before tapping the furnace safety equipment must be put on. Tapping is the process of pulling the plug pin out of the furnace so the aluminum can flow into the trough and pan.

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PROCESS FLOW CHART

Aluminium Scraps
I
Grading / Sorting
I
Cleaning , Shredding
I
Melting in Furnace
I
Casting to make Pots
I
Pressing, Finishing
I
ALUMINIUM POTS

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PLANT AND MACHINERY SUPPLIERS

M. G. Furnaces (India)
Plot No. 97,
Sector 24, Sector 24,
Faridabad - 121005,
Haryana,
India
Call Us:08048601650
Mobile: +91-9810211359
+91-9899330535
Fax: +91-129-2441144
www.indiamart.com/mgfurnaces

Agnee Engineering
Tungarashwar Industrial Complex, No. 1,
Godavari 26 Village Sativali,
Vasai East,
Thane - 401208,
Maharashtra,
India
Call Us:08048762454
Mobile: +91-9422074436
+91-9324154436
Telephone: +91-250-2481421
+91-250-2481126
http://www.agneeindia.net

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Vibrant Thermal Engineering
Old No. 2/73,
New No. 3/849,
Sennerkuppam Devi Kalyana Madnadapam Complex,
Poonamallee,
Chennai - 600056,
Tamil Nadu,
India
Call Us:08048762635
Mobile: +91-9444063455
+91-9444492000
Fax: +91-44-26272680
http://www.industrialfurnace.co.in

J. R. Furnace & Ovens Pvt Ltd.
No. L-4, S. I. D. C. O. Industrial Estate,
Villivakkam, Chennai - 600049,
Tamil Nadu, India
Call Us:08048110053
Mobile: +91-9176620553
+91-7867018921
Telephone: +91-44-27923452
Fax: +91-44-43857108
http://www.furnaceandoven.com

Technotherm Engineers
K-70/1, Site V, Kasna, UPSIDC,
Greater Noida - 201310,
Uttar Pradesh, India
Call Us:08048719461
Mobile: +91-9811016947
+91-9599631313
Telephone: +91-11-25258016
http://www.technothermengineers.com

DODOMA ALUMINIUM & GASES LIMITED

RAW MATERIAL SUPPLIERS

ALUMINIUM SCRAPS

R.M. Metal & Alloys
3/A, Mahimwalla Building,
Ground Floor 12th Khetwadi Road,
Mumbai - 400004,
Maharashtra,
India
Call Us:08048607507
Mobile: +91-9820347333
+91-7021059393
Telephone: +91-22-66150169
Fax: +91-22-66394682
http://www.copperproduct.in

Unab Technologies Private Limited
183C, 1st Floor,
Above Grace Oil Store
Ondipudur Post,
Coimbatore - 641016,
Tamil Nadu,
India
Call Us:08071805084
Mobile: +91-9944933799
Telephone: +91-422-2271506
+91-422-4393799
http://www.unab.co.in

DODOMA ALUMINIUM & GASES LIMITED

Radiance Papers Private Limited
3/14, D Block,
Shopping Complex,
Opposite Balaji Mandir,
Vivek Vihar, Delhi - 110095,
India
Call Us:08048585668
Mobile: +91-9810222741
+91-9211729387
Telephone: +91-120-4563772
www.indiamart.com/radiancepapers

Riters Solutions
No. 36, Summi Market,
Phatak Namak Hauz Qazi,
Hauz Qazi, Delhi - 110006,
India
Call Us:08071802279
Mobile: +91-9871296969
+91-9891092727
Telephone: +91-11-23235441
www.indiamart.com/riters-solutions

Karana Vinayagar Traders
4/134-20, Madhampalayam Ration Shop Street,
Bilichi Post, Coimbatore - 641019,
Tamil Nadu,India
Call Us:08071677044
Mobile: +91-9994074054
+91-8220504107
http://www.karanavinayagar.com

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EXPLANATION OF TERMS USED IN THE PROJECT REPORT

1. **DEPRECIATION:**

This represents reduction in the utility and value of a capital asset because of wear and tear, lapse of time, obsolescence etc. The use of an asset helps in the generation of revenue for the business. A part of the cost of the asset, estimated to be equal to the reduction in the utility and economic life of the asset, because of its use, is charged off by way of depreciation charge against such revenue to arrive at the true profits.

2. **FIXED ASSETS:**

Represent those assets which remain permanently (till their useful lives) with the business and are not meant for resale. These assets are acquired for use in the operation of business and help in the generation of revenue for the business. These include land and building, plant and machinery etc.

3. **WORKING CAPITAL:**

This represents the total expenses on Raw materials, utilities & overheads, and salaries & wages, for a specified period of time.

4. **BREAK-EVEN POINT:**

This represents the level of output and sales at which the firm is able to recover all its expenses-both fixed and variable. In other words it indicates the level of output and sales at which the firm is neither making profit nor incurring any loss. Level of output more than the Break-Even Level generates profit for the firm.

5. **OTHER FIXED EXPENSES:**

These represent expenses which remain fixed irrespective of changes in level of output. In other words these are the expenses which the firm has to incur whether there is production or not. These include expenses such as preliminary and Preoperative expenses, Insurance and Freight, Technical Know-how and Consultancy, Erection & Commissioning etc.building, insurance, etc.

6. **MARGIN MONEY:**

This represents that part of the cost pf project which the promoter has to meet from his own resources. This is the contribution which the promoter must make to the equity of the project for becoming eligible for assistance from financial institutions/Banks.

7. **TERM LOANS:**

Represent Loans which are repayable over a long period of time. These loans are meant for meeting capital expenditure of the project.

8. **TOTAL LOAD:**

It is the ratio of the maximum power consumed in KWH in a particular period of time to the number operating hours of the unit in that particular period.

$$\text{Total Load} = \left(\frac{\text{Power Consumed in KWH}}{\text{No. of operating hours of the unit}}\right) \text{ in a particular period of time}$$

9. **LAND AREA/MAN POWER RATIO:**

It is the ratio of manpower utilised per unit area of land required for operating the unit.

$$\text{Land Area/Man Power Ratio} = \left[\frac{\text{Land Area}}{\text{No. of persons Working on the unit}} \right]$$

DODOMA ALUMINIUM & GASES LIMITED

ADDRESSES OF STATE INDUSTRIAL DEVELOPMENT CORPORATIONS

1. ANDAMAN & NICOBAR ISLANDS INTEGRATED DEV. CORP. LTD. (ANIDCO)
   Vikas Bhawan,
   Port Blair,
   A&N Islands,
   Tel: 03192-232098, 232207
   Website: aniidco.nic.in

2. A.P. INDUSTRIAL DEVELOPMENT CORPORATION
   Parisrama Bhavan,
   5-9-58/B, Fateh Maidan Road,
   Hyderabad - 500004, A.P.
   Tel: +91-40-23235253-56
   Fax: +91-40-23235516, 23236756
   E-Mail: administrator_apidc@ap.gov.in
   Website: www.apidc.org
   www.apidc.gov.in

3. ANDHRA PRADESH TECHNOLOGY DEVELOPMENT & PROMOTION CENTER (APTDC)
   1-11-252/9, Plot No.7, Second Floor,
   Regal House,
   Motilal Nehru Nagar,
   Begumpet,
   Hyderabad - 500016
   Tel: 040-27765837
   Fax: 040-27765836
   E-Mail: ciihyd@aptdc.com
   Website: www.aptdc.com

4. ARUNACHAL PRADESH INDL. DEV. & FINANCE CORPORATION LTD.
C-Sector,
Ita Nagar - 791111
Tel: 0360-212672
Website: www.arunachalpradesh.nic.in/nip.htm

5. ASSAM INDUSTRIAL DEVELOPMENT CORPORATION LIMITED
R.G. Baruah Road,
Guwahati - 781024
Website: www.investinassam.com
www.aidcltd.com
www.industryassam.nic.in

5. ADITYAPUR INDUSTRIAL AREA DEVELOPMENT AUTHORITY
Adityapur,
Jamshedpur - 831013
Jharkhand State
Tel: 0657-2407693
Website: www.aiadaonline.com

6. BIHAR STATE INDUSTRIAL DEVELOPMENT CORPORATION
Udyog Vikas Bhavan,
Ram Charitar Singh Path,
Patna,
Bihar
Tel: +91-612-2232165

7. BIHAR INDUSTRIAL AREA DEVELOPMENT AUTHORITY (BIADA)
Udyog Bhawan, First Floor,
East Gandhi Maidan,
Patna - 800004
Tel: 0612-2302914, 2302945, 2232165
Fax: 0612-2302989
E-Mail: info@biada.in;
md@biada.in;
biada@rediffmail.com
Website: www.biada.in
www.biada.org.in

8. INFRASTRUCTURE DEVELOPMENT AUTHORITY
1st Floor, Udyog Bhawan,
Patna,
Bihar
Tel: 0612-2302991, 2302998
E-Mail: md@idabihar.com
Website: www.idabihar.com

9. CHANDIGARH INDUSTRIAL & TOURISM DEVELOPMENT CORPORATION LTD.
SCO 121-122, Sector 17-B,
Chandigarh - 160017
Tel: 0172-4644430-34, 2704761, 2704356, 2704455, 4644440
Fax: 0172-4644441
E-Mail: info@citcochandigarh.com
Website: www.citcochandigarh.com

10. CHHATTISGARH STATE INDUSTRIAL DEVELOPMENT CORPORATION LIMITED
LIC Campus,
Pandri,
Raipur - 492004
Chhattisgarh
Tel: 0771-2583789-90
Fax: 0771-2583794, 4091879
E-Mail: csidc.cg@nic.in;
csidc_raipur@yahoo.com
Website: www.csidc.in

11. CITY AND INDUSTRIAL DEVELOPMENT CORPORATION OF MAHARASHTRA LTD.
Navi Mumbai
Website: www.cidcoindia.com

12. DELHI STATE INDL. & INFRASTRUCTURE DEV. CORP. LTD. (DSIIDC)
N-Block, Bombay Life Building,
Connaught Circus,
New Delhi - 110001
EPABX: 23314231-33, 23316086, 23351026
E-Mail: support@dsiidc.org
Udyog Sadan,
419-F.I.E., Patparganj,
New Delhi - 110092
Tel: 23356585, 64557627
Website: dsiidc.org

13. GOA STATE INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED
7th Floor, EDC House,
Dr. Atmaram Borkar Road,
Panaji - Goa - 403001
Tel: 0832-6645769-773
Fax: 0832-2226256
E-Mail: email@gsidcltd.com
Website: www.gsidcltd.com

14. GOA, DAMAN & DIU INDUSTRIAL DEVELOPMENT CORPORATION
Plot No. 13-A-2, EDC Complex,
Patto Plaza,
Panjim-Goa - 403001
Tel: 0832-2437470 to 73
Fax: 0832-2437478 to 79
E-Mail: goaidc1965@gmail.com;
goaidc@sancharnet.in
Website: www.goaidc.com

15. HARYANA STATE INDL. & INFRASTRUCTURE DEV. CORP. LIMITED (HSIIDC)
C-13&14, Sector-6,
Panchkula - 134019
Haryana
Tel: 0172-2590474
E-Mail: info@hsiidc.org
Website: hsiidc.org

16. HARYANA STATE ELECTRONICS DEVELOPMENT CORPORATION LIMITED
SCO-111-113, Sector 17-B,
Chandigarh - 160017
E-Mail: hartron@hartron.org

17. HIMACHAL PRADESH STATE INDUSTRIAL DEVELOPMENT CORPORATION LTD.
New Himrus Building,
Circular Road,Shimla - 171001
E-Mail: hpsidc@sancharnet.in;
sidc-hp@nic.in
Website: www.hpsidc.nic.in

18. H.P. ELECTRONICS DEVELOPMENT CORPORATION
Asstt. System Analyst,
for HPSEDC Computer Centre,
Dharamshala,Kangra, H.P.
Tel: 01892-228460
E-Mail: hpsedc@hpsedc.com;
sedc-hp@nic.in

19. J&K STATE INDUSTRIAL DEVELOPMENT CORPORATION
J&K SIDCO, Drabu House,Rambagh,
Srinagar - 190015
Tel: +91-194-2430036, 2434402
Fax: +91-194-2430036
Regional Office:
4th Floor, Jawaharlal Nehru,
Udyog Bhawan, Railhead Complex,
Jammu - 180004
Tel: +91-0191-247800
Tel: +91-0191-2477310
Delhi Office:
E-61, III Floor,
Kalkaji, New Delhi - 110019
Tel: +91-11-26441123, 41608237
Fax: +91-11-26441123
E-Mail: info@jksidco.org
Website: www.jksidco.org

20. KARNATAKA STATE INDL. INVESTMENT & DEV. CORP. LIMITED (KSIIDC)
Khanija Bhavan 49,
4th Floor, East Wing,
Race Course Road,
Bangalore - 560001
Tel: +91-080-22258131/133
Fax: +91-80-22255740
E-Mail: info@ksiidc.com;
ksiidc@airtelmail.in
Website: www.ksiidc.com

21. KARNATAKA STATE ELECTRONICS DEVP. CORP. LTD.
29/1, Race Course Road,
Bangalore - 560001
Tel: +91-80-22257201, 22262203
Website: www.keonics.com

22. KERALA STATE INDUSTRIAL DEVELOPMENT CORPORATION LTD.
2nd Floor, Choice Tower,
Manorama Junction,
Cochin - 682016
Kerala
Tel: 0484-2323010
Website: www.ksidc.org

23. KERALA STATE ELECTRONICS DEVELOPMENT CORPORATION LTD. (KELTRON)
Thiruvananthapuram,
Chairman: 518549, 325239
Managing Director: 333028, 518485, 320621, 322430
Fax: 91-471-320176
Website: www.kerala.gov.in

24. MADHYA PRADESH STATE INDL. DEV. CORPORATION LIMITED (MPSIDC)
"AVN Towers"
192, Zone-1, Maharana Pratap Nagar,
Bhopal-462011 (M.P)
Tel: 0755-4270370, 4037100
Fax: 0755-4270280
E-Mail: mpsidc@sancharnet.in
Website: www.mpsidc.org

25. MAHARASHTRA INDUSTRIAL DEVELOPMENT CORPORATION
Udyog Sarathi,
Mahakali Caves Road,
Andheri (E),
Mumbai - 400093
Board Numbers: 91-022-26870052/54/73
Fax: +91-022-26871587
E-Mail: feedback@midcindia.org
Website: www.midcindia.org

26. MAHARASHTRA ELECTRONICS CORPORATION LIMITED
307, Malleswaram West,
Bangalore - 560055
Tel: 23334708

27. OMNIBUS INDL. DEV. CORP. OF DAMAN & DIU & DADRA & HAVELI LTD. (OIDC)
Plot No.35, Somnath,
Nani Daman
Tel: 0260-2241120, 2231108, 2244731, 2240976, 2244731
Website: www.daman.nic.in
www.oidc.nic.in

28. THE MANIPUR INDUSTRIAL DEVELOPMENT CORPORATION
(FORMERLY THE MANIPUR SMALL INDUSTRIES CORPORATION LTD. (MSIC)
Website: www.mastec.nic.in/manidco.htm

29. NAGALAND INDUSTRIAL DEVELOPMENT CORPORATION
Website: www.nagaind.com

30. MEGHALAYA INDUSTRIAL DEVELOPMENT CORPORATION LTD.
"Kismat", Upland Road,
Laitumkhrah,
Shillong - 793001
Tel: 0364-224965, 224763, 226941, 226893
Website: www.ibef.org/artdisplay

31. MIZORAM INDUSTRIAL DEVELOPMENT CORPORATION
M.G. Road,
Upper Khatla,
Aizawal - 796001
Mizoram
Tel: +91-389-2323217, 2326240
E-Mail: zidco@sancharnet.in

31. TRIPURA INDUSTRIAL DEVELOPMENT CORPORATION LTD.
Shilpadyog Bhavan,
3rd Floor, Pandit Nehru Complex,
P.O. Kunjaban,
Mizoram
Website: www.tidc.co.in

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32. THE INDUSTRIAL DEVELOPMENT CORPORATION OF ORISSA LTD.
IDCOL House,
Unit-2, Ashok Nagar,
Bhubaneswar - 751009
Orissa
Tel: 0674-2530036/2533459
Fax: 0674-2530518
E-Mail: idcorissa@hotmail.com
Website: www.idcorissa.com

33. THE ORISSA INDUSTRIAL INFRASTRUCTURE DEV. CORP. (IDCO)
IDCO Towers,
Janpath,
Bhubaneswar - 751022
Orissa
Tel: 0674-2542784, 2540820
Fax: 0674-2542956
E-Mail: md@idcindia.com
Website: www.idcindia.com

34. PIPDIC LIMITED
No. 60, Romain Rolland Street,
Puducherry - 605001
Tel: 0413-2334361,2333938, 2338491
E-Mail: pipdic@vsnl.com
Website: pipdic.com

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35. PUNJAB STATE INDUSTRIAL DEVELOPMENT CORPORATION LIMITED (PSIDC)
Udyog Bhawan,
18-Himalaya Marg,
Sector-14, Chandigarh _ 160017
Tel: 0172-2704040, 2705909, 2702881-84, 2702791
Fax: 0172-2704145
E-Mail: psidc@rediffmail.com;
psidc@chd.nic.in;
psidc@dot1.net.in
Website: www.punjabgovt.nic.in

36. PUNJAB INFORMATION & COMM. TECHNOLOGY CORP. LTD. (PUNJAB INFOTECH)
5th-6th Floor, Udyog Bhawan,
18-Himalaya Marg,
Sector-17,
Chandigarh
Tel: +91-172-3017299, 3017300 (EPABX)
Fax: +91-0172-2701595
E-Mail: punjabinfotech@punjabinfotech.org

37. PUDHUCHERRY INDL. PROMOTION DEV. AND INVESTMENT CORP. LTD.
Post Box No. 190
60 Romain Rolland Street,
Puduchery - 605001
Tel: +91-413-2334606, 2335116, 2334361, 2336842, 2334064
Fax: +91-413-2336842
E-Mail: mgdir@pipdic.com
Website: www.pipdic.com

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38. RAJASTHAN STATE INDL. DEV. & INVESTMENT CORP. LTD. (RIICO)
Udyog Bhawan,
Tilak Marg,
Jaipur - 302005
EPABX: 2227751 (5 Lines) 5113201 (5 Lines
Tel: +91-141-5113200 (Office)
Fax: 5104804
E-Mail: riico@riico.co.in;
chairman@riico.co.in
Website: www.riico.co.in
www.riico.com

39. SICOM LIMITED
Nirmal, Nariman Point,
Mumbai - 400021
Tel: +91-22-66572700, 22023018
Fax: +91-22-22825781, 22882895
Website: www.sicomindia.com

40. SIKKIM INDL. DEV. & INVESTMENT CORP. LTD. (SIDCO)
Bhanu Path, Tashiling,
Gangtok, E. Sikkim
Tel: 03592-202287
E-Mail: industriesdept@yahoo.co.in
Website: www.sikkimindustries.nic.in/sidico.htm

DODOMA ALUMINIUM & GASES LIMITED

41. T.N. INDUSTRIAL INVESTMENT CORPORATION LTD.
Industries Department,
Secretariat,
Chennai - 600009
Tel: +91-44-25671383
E-Mail: indsec@tn.gov.in;
cmd@tidco.com
Website: www.tidco.com

42. TAMIL NADU INDUSTRIAL DEVELOPMENT CORPORATION LIMITED (TIDCO)
19-A, Rukmini Lakshmipath Road,
Egmore, Chennai - 600008
Tel: 044-28554479
Fax: 044-28553729
E-Mail: lan@tidco.com
Website: www.tidco.com
www.tidco.tn.gov.in

43. THE PRADESHIYA INDL. & INVESTMENT CORP. OF U.P. LTD. (PICUP)
Gomti Nagar,
Lucknow - 226010, U.P.
Tel: 0522-2720689, 2720798
Fax: 0522-2720792

44. U.P. ELECTRONICS CORPORATION LIMITED & PUBLIC INFORMATION OFFICER
10, Ashok Marg, Lucknow
Tel: (O) 0522-2286816 (R) 0522-2418064
Mob: 9415920335
Residential Address: C-336, Rajajipuram, Lucknow

DODOMA ALUMINIUM & GASES LIMITED

45. UTTAR PRADESH STATE INDL. DEV. CORPORATION LIMITED (UPSIDC)
A-1/4, Lakhanpur, Kanpur - 208024
Tel: 0512-2582851, 2582852, 2582853
Fax: 0512-2580797
Website: www.upsidc.com

46. UTTRAKHAND STATE INFRASTRUCTURE DEV. CORP. LTD. (USIDCL)
Uttrakhand Sachivalaya, R.No. 11, North Block,
4-Subhash Road, Dehradun
Website: www.gov.ua.nic.in

47. STATE INFRASTRUCTURE & INDL. DEV. CORP. OF UTTRAKHAND LTD. (SIDCUL)
2-New Cantt. Road,Dehradun - 248001
Tel: 0135-2708109
Fax: 0135-2742575
E-Mail: argaanu@gmail.com; rajiv.garg@ilfsindia.com
Website: www.ilfsindia.com

48. WEST BENGAL INDUSTRIAL DEVELOPMENT CORPORATION LIMITED
5, Council House Street,Kolkata - 700001
Tel: 033-22105361-65
Fax: 033-22483737
E-Mail: wbidc@wbidc.com; wbidc@vsnl.com
Website: www.wbidc.com

49. WEST BENGAL INFRASTRUCTURAL DEV. CORP. (WBHIDCO) LTD.
Salt Lake Stadium Complex, Gate No. 3,
Sector-III, Kolkata - 700091
Tel: (Enquiry) 2335-7166, 2335-7148
Fax: 2335-6677/2335-0096
Website: www.wbhidcoltd.com

DODOMA ALUMINIUM & GASES LIMITED

ADDRESSES OF RELEVANT GOVERNMENT OFFICES

1. Department of Electronics
   Electronics Niketan
   6, CGO Complex, Lodi Road,
   New Delhi 110003
   Tel: 4363126
   Fax: 4363083, 4363134
   E-Mail: omvikas@xm.doe.ernet.in

2. Federation of Indian Chambers of Commerce and Industry, FIICI
   Federation House, Tansen Marg, New Delhi-110001Tel.: 2373 6190, 2373 8760-70
   Fax : 91-11-23312170 23320714 23721504
   Email: aceindia@giasdl01.vsnl.net.in

3. Federation of Indian Export Organisations,
   PHD House, III Floor
   4/2, Siri Institutional Area,Opposite Asian Village Complex,New Delhi - 110016.
   Tel. : 26851310/1312Fax : 26863087

4. PHD Chamber of Commerce & Industry
   PHD House, Opp. Asian Games Village
   New Delhi - 110 016
   Tel.: 2686 3801, (4 lines)
   Fax : 91-11-2686 3135, 2656 8392
   E-mail : phdcci@del2.vsnl.net.in

5. Confederation of Indian Industry
23, Institutional Area, Lodhi Road
New Delhi-110003.
Tel.: 2337 1277/24629994-7
Fax : 24601298, 24626149, 24633168
E-mail: manish@co.cii.ernet.in

6. The Associated Chamber of Commerce & Industry of India (ASSOCHAM)
147-B, Gautam Nagar, New Delhi.
Tel.: 011-26512477~79
Email: assocham@sansad.nic.in

7. Directorate of Technical Development,
Udyag Bhawan, New Delhi - 110001.

8. Secretariat For Industrial Approvals,
Ministry of Industry,
Udyog Bhawan, New Delhi - 110001.

9. Directorate General of International Trade (DGIT),
Ministry of Commerce,
Udyog Bhawan, New Delhi - 110001.

DODOMA ALUMINIUM & GASES LIMITED

We hope our **Pre-Feasibility Report** in your possession at the time, must have conveyed you the elementary idea on process data, market and economics. We feel you must have now taken a decision to finalise your project plan for ultimate implementation in a successful manner. Before you go ahead, we suggest you to take our Market Survey Cum Detailed Techno Economic Feasibility Report.

"KAT" offer you
MARKET SURVEY CUM DETAILED TECHNO ECONOMIC FEASIBILITY REPORT

on this project. Brief contents of
Market Survey Cum Detailed Techno Economic Feasibility Report are as under :

INTRODUCTION:

* Product Mix
* Individual & Class Study of Products
* Suitability Factors for Uses & Applications
* Uses and Applications
* Property Assurance to Desired Service Conditions
* Quality Control Measures & their Introduction for Attaining Required Properties
* Economy & Productivity Competence

MARKET SURVEY:

* Market Position
* Installed Capacity, Production and Anticipated Demand
* Present Manufacturers
* Statistics of Imports & Exports
* Estimated Demand
* Demand and Supply Gap

PROCESS OF MANUFACTURE:

* Inventory Controls & Tests
* Comparative Study of Process for Manufacturing the Product
* Process Detail in stage from Raw Materials to Finished Products
* Process Flow Sheet Diagram

DODOMA ALUMINIUM & GASES LIMITED

PLANT & MACHINERY/EQUIPMENTS:

* Range of Machineries Required
* Detailed Specification of Machineries and Equipments
* Functional Details of Machineries Selected
* Standard & Special Accessories & Attachment
* Level of Automation and Controls
* Manufacturers/Suppliers of Machineries and Equipments

LAND & BUILDING:

* Total Land Area Required
* Covered Area Break-up with Estimated Cost of Construction
* Sector-wise Plant Layout
* Locational Advantage

RAW MATERIALS:

* Productwise Break-up of Raw Materials Requirement
* Raw Material Specifications
* Raw Material Prices
* Manufacturers/Suppliers of Raw Materials

PLANT ECONOMICS/COST ANALYSIS

* Rated Installed Capacity & Capacity Utilisation
* Basis of Working
* Land & Built-up Area Required with their Cost
* Plant & Machinery and Other Fixed Assets
* Total Fixed Capital Investment
* Working Capital Assessment
* Raw Materials & Consumable Stores
* Staff Salaries & Wages
* Utilities and Overheads
* Manufacturing Overheads & Utilities
* Administrative Overheads & Utilities
* Marketing Overheads
* Marketing Related Staff & Expenses
* Break-up of Product-Mix and Other Receipts
* Provisions for Power, Water & Fuels
* Total Cost of Project
* Source of Finance
* Profitability Analysis in view of Turn-Over & Cost of Manufacture

* Ratios of Profit of Sales, T.C.I., Cost of Production, Total Fixed Capital etc
* Break Even Point Determination

ANNEXURE OF CHARTS

* Depreciation Chart (Building, Machines & Other Loans) 5 to 10 Yrs.
* Interest Chart for 5 to 10 Yrs.
* Repayment Schedule for 5 to 10 Yrs.
* Cash Flow Statement for 5 to 10 Yrs.
* Projected Balance Sheet for 5 to 10 Yrs.
* Land Man Ratio

SPECIAL CHAPTERS

* I.S. Specification by Bureau of Indian Standard (BIS)
* If Imports of Raw Materials/Capital Goods/Technical Know-How, Sources are given

DODOMA ALUMINIUM & GASES LIMITED

ALUMINIUM POTS FROM ALUMINIUM SCRAPS

[KAT/KMSR/10172] JC:3850

PLANT ECONOMICS

Rated Plant capacity = 4.00 TONS/day
= 100.00 TONS/MONTH
ALUMINIUM POTS FROM ALUMINIUM SCRAP

Basis

No. of working days = 25 days/month

No. of shifts = 3 per day

One shift = 8 hours

Production 100 Tons/Month

Currency - US$

(ALL FIGURES ARE IN US$)

DODOMA ALUMINIUM & GASES LIMITED

LAND & BUILDING

1.	Land Required 1800 sq.mts Rent per/month	US$	428.00

	TOTAL	US$	428.00

DODOMA ALUMINIUM & GASES LIMITED

PLANT & MACHINERY

1.	Scrap Grading & Cleaning machines	US$	30,000.00
2.	Aluminium Melting Furnace	US$	85,000.00
3.	Pot Casting Plant	US$	155,000.00
4.	Moulds & Dies	US$	25,000.00
5.	Machine Tools,Shredder,etc.	US$	20,000.00
6.	Material Handling Equipments	US$	25,000.00
7.	Finishing Equipments	US$	30,000.00
8.	Weighing Scale etc.	US$	5,000.00
9.	Testing/Lab Equipments	US$	6,000.00
10.	Miscellaneous	US$	8,000.00
11.	Taxes,Transportation & Installation Charges	US$	20,000.00
	TOTAL	US$	4,09,000.00

DODOMA ALUMINIUM & GASES LIMITED

OTHER FIXED ASSETS

1.	Office equipment, furniture plus other equipment & accessories	US$	20,000.00
2.	Installation costs for water, electricity, fuel etc.	US$	12,000.00
3.	Pre-operative & preliminary expenses	US$	20,000.00
4.	Electricals,Lightings	US$	10,000.00
5.	D.G.Set, 100 KVA	US$	16,000.00
6.	Miscellaneous	US$	10,000.00
7.	Vehicles	US$	30,000.00
	TOTAL	US$	1,18,000.00

DODOMA ALUMINIUM & GASES LIMITED

FIXED CAPITAL

1.	LAND & BUILDING RENT		US$	428.00
2.	PLANT & MACHINERY		US$	4,09,000.00
3.	OTHER FIXED ASSETS		US$	1,18,000.00
		TOTAL	US$	5,27,428.00

DODOMA ALUMINIUM & GASES LIMITED

WORKING CAPITAL REQUIREMENT/MONTH

RAW MATERIALS

1.	Aluminium Scraps, 100 Tons, @ $ 1,500 per Ton	US$	150,000.00
2.	Packing/Rolls & Consumables	US$	5,000.00
	TOTAL	US$	155,000.00

DODOMA ALUMINIUM & GASES LIMITED

SALARY & WAGES / MONTH

1.	Manager	1 No.	US$	2,000.00
3.	Supervisor	1 No.	US$	1,500.00
4.	Engineer	1 No.	US$	1,800.00
5.	Sale/Purchase Officers	2 No.	US$	2,000.00
6.	Skilled Workers @ $ 1,000	5 No.	US$	5,000.00
7.	Semi/Unskilled Workers	50 No.	US$	6,900.00
8.	Accts.Officers/Admn Staffs.	2 No.	US$	2,400.00
9.	Peon/Guards	3 No.	US$	2,400.00
		TOTAL	US$	24,000.00
	Plus perks @ 25% p.a.		US$	6,000.00
		TOTAL	US$	30,000.00

DODOMA ALUMINIUM & GASES LIMITED

UTILITIES AND OVERHEADS

1.	Power Consumption of 20000 Kwatt hrs @ US$ 0.12 per Kwatt hr.	US$	2,400.00
2.	Water Consumption of 1000 KLs @ US$ 0.10 per KL	US$	100.00
3.	Stationery, Postage, Telephone etc.	US$	200.00
4.	Conveyance & Transportation etc.	US$	1,600.00
5.	Insurance Professional fees	US$	200.00
6.	Publicity & Sales Promotion	US$	2,000.00
7.	Repairs & maintenance	US$	300.00
8.	Miscellaneous	US$	300.00
9.	Fuel/Oil	US$	1,900.00
	TOTAL	US$	9,000.00

Total load is 110 Kwatts

DODOMA ALUMINIUM & GASES LIMITED

TOTAL WORKING CAPITAL/MONTH

1.	RAW MATERIAL	US$	1,55,000.00
2.	SALARY & WAGES	US$	30,000.00
3.	UTILITIES & OVERHEADS	US$	9,000.00
	TOTAL	US$	1,94,000.00

1.	WORKING CAPITAL FOR 2 MONTHS	US$	3,88,000.00
2.	MARGIN MONEY FOR W/C LOAN	US$	97,000.00

COST OF PROJECT

TOTAL FIXED CAPITAL		US$	5,27,428.00
MARGIN MONEY		US$	97,000.00
	TOTAL	US$	6,24,428.00

DODOMA ALUMINIUM & GASES LIMITED

TOTAL CAPITAL INVESTMENT

LAND/BULDING (RENT)P/MONTH	US$	428.00
PLANT	US$	4,09,000.00
OTHERS	US$	1,18,000.00
TOTAL WORKING CAPITAL FOR 2 MONTHS	US$	3,88,000.00
TOTAL	US$	9,15,428.00

DODOMA ALUMINIUM & GASES LIMITED

TURN OVER/ANNUM

1.	Receipts by sale of 1,200 Aluminium Pots from Aluminium Scraps, @ $ 2,700 per Ton	US$	32,40,000.00
	TOTAL	US$	32,40,000.00