Journey of Hindalco as an Integrated Aluminium Producer

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Abstract

Hindalco, a flagship company of Aditya Birla Group, began its journey in 1958 from Renukoot, Uttar Pradesh state of India, as a first integrated plant of Independent India. Renukoot plant received bauxites from Lohardaga mines and hydropower from G B Pant Sagar Dam project to produce 40 ktpa alumina refinery and 20 ktpa aluminium smelter. Over the years, through successive organic expansions the company reached to 242 ktpa by 1999. This was followed by expansion through acquisition of INDAL and Novelis, a biggest expansion by an Indian company to become the largest Flat Rolled Products (FRP) producer in the world. In the last two decades, Hindalco continued its expansion by adding Utkal alumina refinery and new state of the art AP36 smelters at Mahan and Aditya.

During this journey, a range of technologies were adopted to achieve the best technical and financial performance. For alumina extraction from Boehmitic bauxite of Lohardaga, the company mastered double digestion technology. We were first in world to test the Gas Suspension Calciner technology of FLSmidth and commissioned a plant in 1986 replacing the rotary kiln technology for production of smelter grade alumina. Many technical initiatives and strategic collaborations helped Utkal alumina refinery to become one of the lowest cost producers of alumina.

The best plant practices and technical inquisitiveness helped us to develop and implement in-house technologies like copper insert collector bars, magnetic compensation loop, energy efficient cell lining designs, etc. for both old and new smelters. These technology developments helped to not only reduce specific energy consumption but also achieve high quality metal with special LME grading, including best quality P0202 grade metal from Mahan smelter.

The technological partnership of our downstream plants with Novelis and Aleris has realized a range of new products and applications. We are leading the lightweighting of mobility sector in India by introducing aluminium bulkers, trailers, railway wagons and range of products for Electric Vehicles (EV) like battery foils, separators and enclosures.

As a responsible producer, we have a special focus on sustainability with a target of net zero in emission, discharge and land fill by 2050. Various technology initiatives from generation and storages of renewable energy, 100 % utilisation of bauxite residue, decarbonisation technologies areas assisted company to rank number 1 in Dow Jones Sustainability World Index, consecutively for the last 3 years. Adoption of Industry 4.0 driven digital technology transformations in various areas of aluminium value chain and customer centricity, is also facilitating to achieve these challenging targets.

Keywords: Hindalco, Aditya Birla, Indian Aluminium Industry, Sustainability, Industry 4.0.

1. Introduction

Hindalco Industries Limited, the metals flagship company of the Aditya Birla Group, has a consolidated turnover of 28 GUSD during Fiscal Year (FY) 2023, making it an industry leader in aluminium and copper producers. Hindalco is one of the largest integrated primary aluminium producers in Asia. Hindalco's Pan-India presence, encompasses the entire gamut of an integrated operations, from bauxite mining, alumina refining, aluminium smelting, and converting primary metal into value-added products via rolling, extrusions, etc. The finished products include alumina, primary aluminium in the form of ingots, billets and wire rods, value-added products such as flat rolled products (FRP), extrusions, and foils. Metallurgical alumina is used for aluminium smelting process, whereas chemical alumina and hydrates are used in range of industries including water treatment, fillers in cables and plastics, refractories and ceramics, glass among others.

Hindalco also owns state-of-art copper facility comprises a world-class copper smelter which is one of Asia's largest at a single location and a captive jetty [1]. The Birla Copper unit produces copper cathodes and continuous cast copper rods, and other by-products, including gold and silver. It is also India's largest private producer of gold. Aluminium contract on the London Metal Exchange (LME), while its copper quality is also registered on the LME with Grade-A accreditation. Hindalco's product portfolio serves industries like electrical, mass transportation, automotive, packaging, cookware, defence, building, construction and architectural. Hindalco has introduced numerous new products in the Indian market, including branded roofing sheets, branded kitchen foils and input material for automotive body and railway wagons. Some of these products are branded, such as Eternia windows, Maxloader and Hindalco Extrusions under the extrusions segment, Everlast Roofings under the FRP segment, Freshwrapp and Superwrap under the aluminium foil products segment, as well as mainstream products and co-products segment from Birla Copper have garnered strong customer acceptance.

2. Hindalco's Journey

Hindalco's story dates to the young Indian democracy of the 1950s. During 1958, the premier industrialist of India, Shri G D Birla made a significant contribution to the vision of an industrial India by setting up its first aluminium production facility at Renukoot, in collaboration with Kaiser Aluminium Corporation Ltd of USA. It was developed as an integrated aluminium facility located at Renukoot and named as Hindustan Aluminium Company Ltd (presently, Hindalco Industries Ltd). The energy requirement for aluminium smelting, was met through green source, the Rihand hydroelectric power plant, situated in the proximity. The integrated facility at Renukoot comprises of an alumina refinery, smelter, downstream products manufacturing as well as the power generation plant supported by co-generation facility. Over the last few decades, Hindalco has undergone several technology upgrades, brownfield and greenfield expansions as well as acquisitions, illustrated in Figure 1.

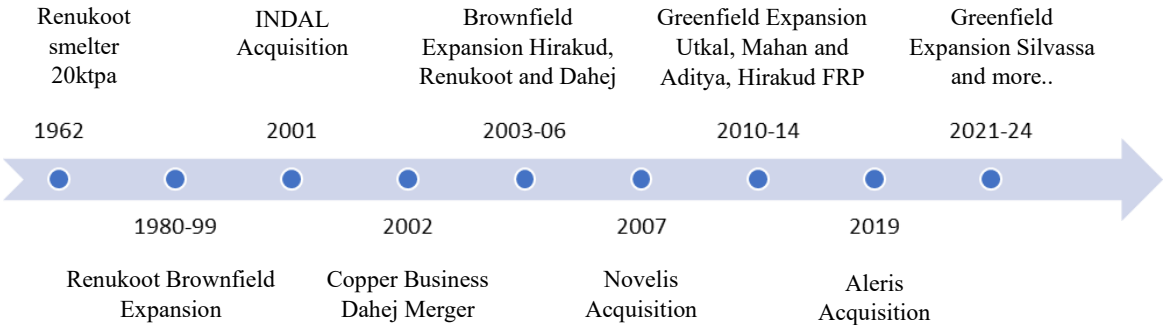

Figure 1. Hindalco journey over a period of more than six decades.

2.1 Scaling-up Production through Expansions and Acquisitions

Over the years, Hindalco Renukoot have undergone several technological upgrades in the refinery, smelter, and downstream processes to bring down the energy consumption and enhance process efficiency. There were series of brownfield expansion happened at Renukoot to enhance the production capacity in alumina refinery from 40 ktpa to 720 ktpa, and in smelter from 20 ktpa to 410 ktpa. The rolling and extrusion facility at Renukoot also expanded from 2.2 ktpa during inception to 35 ktpa by 1994.

Hindalco's growth trajectory took a sharp upturn in the 21st century with a series of investments in greenfield capacity expansions and acquisitions. The acquisition of the erstwhile Indian Aluminium Company (INDAL) in 2001 was a vital turning point, which significantly expanded the geographical footprint of Hindalco, brought in several upstream and downstream assets, which led to diversification of the downstream product portfolio. INDAL's mining operations in Lohardaga, refinery operations at Muri and Belgaum and interests in Utkal Alumina were significant additions. Hindalco expanded its upstream operations significantly in the last two decades. There was major greenfield expansion of smelting capacity by 720 ktpa at Mahan and Aditya, with inclusion of state-of-the-art AP36 technology. To cater the need of smelters, Utkal's greenfield alumina refinery was commissioned with a capacity of 1500 ktpa during 2013-14. Figure 2 to Figure 4 provides a glimpse to Hindalco's production journey over the decades.

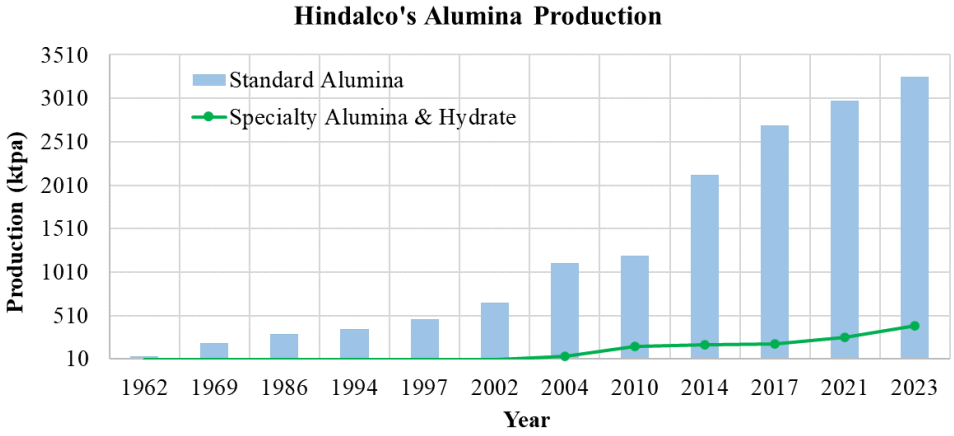

Figure 2. Hindalco's alumina production journey since inception.

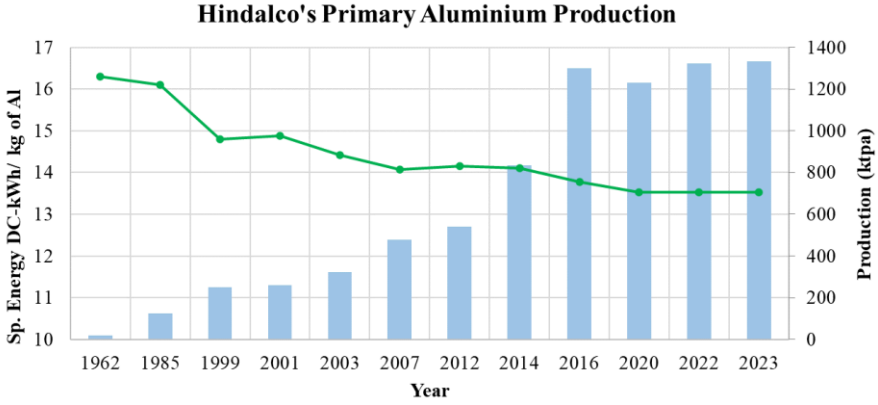

Figure 3. Hindalco's primary aluminium production and specific energy consumption over the years.

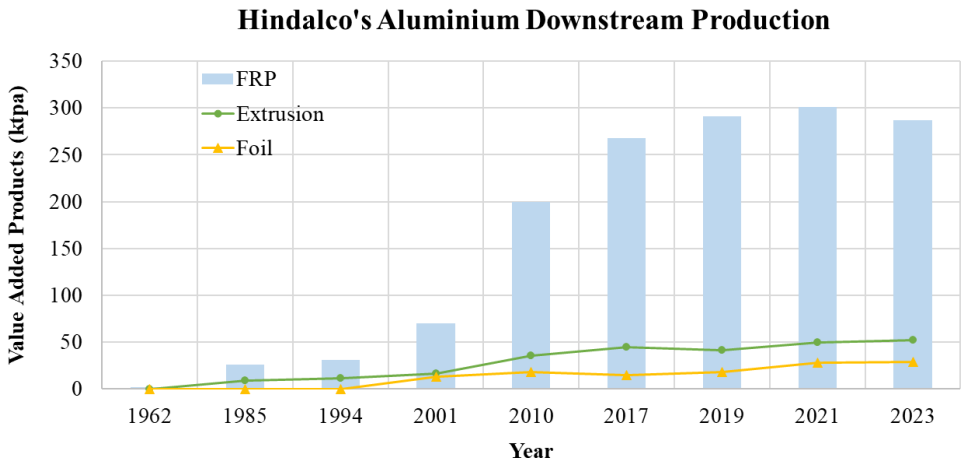

Figure 4. Production of value-added products in Hindalco's Al downstream journey.

The foresight to become the best globally, led Hindalco to acquire US-headquartered Novelis Inc. in May 2007, a company four times its size. Novelis being an auto lightweighting pioneer, added robust value to Hindalco, by providing access to technology and global marquee customers. This acquisition resulted in the formation of the world's largest aluminium rolling and recycling enterprise. During 2019-20 the acquisition of Aleris Corporation through Novelis was another major milestone for Hindalco on its path to global leadership; with a global footprint spanning 49 state-of-the-art manufacturing facilities in North America, South America, Europe and Asia. It enabled further diversification of Hindalco's metal's downstream portfolio, into other premium market segments, most notably aerospace. Aleris enhanced Hindalco's strategic position in Asia and solidifies its position as a leading global metals player, with a stronger presence across the U.S. and Europe as well [2].

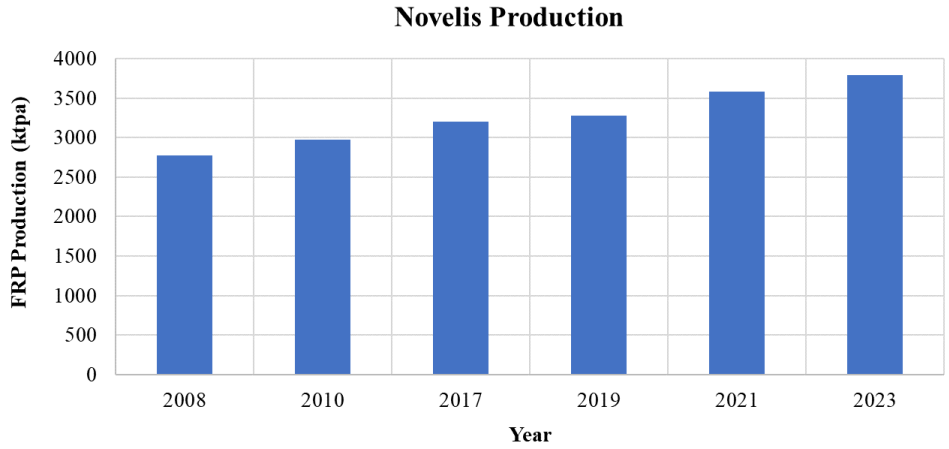

Figure 5. Novelis production over the years.

Subsequent sections describe the growth journey of Hindalco's India manufacturing operations i.e. alumina refineries, aluminium smelters and downstream with respect to technological advancement and capacity enhancement.

2.1.1 Alumina Refineries

Since inception, the entire alumina made at Renukoot was transported to the smelting unit. The mining of bauxite takes place at a distance varying from 200 to 400 km. Renukoot alumina

refinery enhanced its production capacity through radical modernization. The innovative approach involved were, introduction of Sweetening process, modernization of digestion units and up-gradation of precipitation circuit. The state-of-the-art Alusuisse precipitation technology was successfully incorporated to enhance the liquor productivity from 58 to 77 g/L [3]. The introduction of fuel efficient stationary calciner in 1986 with technology from FL Smidth, Denmark effectively contributed to lower down fuel and specific energy consumption. The brownfield expansion up to 720 ktpa was carried out with great success with respect to both process upgradation and efficient capital utilization. The fully stabilized and optimized operations also reduced the operating cost [3].

Acquisition of INDAL led to capacity expansion of Hindalco by addition of Muri and Belagavi alumina refinery. Muri alumina refinery, commissioned in 1948, was India's first alumina refinery. It is located about 65 km from Ranchi, the capital city of Jharkhand state. The initial installed capacity of Muri plant was 4 ktpa. Over the years, it has gone through various stages of expansion and debottlenecking to reach its present capacity of 450 ktpa. The refinery produces standard and special grades of alumina as well as alumina hydrate to serve customers in aluminium, metal, refractory, glass and alum manufacturing industries. Another INDAL's alumina refinery at Belagavi started its operations in 1969, located in Karnataka state. Since 1990s, this plant has become a predominantly export-oriented unit of special alumina and alumina hydrates for non-metallurgical applications, like refractory, ceramics, polishing, fire retardant filler in polymer composites, alum, zeolite etc. Post acquisition, Hindalco Belagavi unit has expanded its capacity of specialty products with approximately 120 different grades, serving more than 600 customers across 32 countries.

Utkal was originally conceptualized in 1992-93 to set up an alumina refinery with captive bauxite mines, by four reputed corporate groups – Alcan, INDAL, Tata and Norsk Hydro Aluminium of Norway. Post acquisition of INDAL by Hindalco, the Utkal Alumina International Limited (UAIL) became a 100 per cent subsidiary of Hindalco in 2008. The Utkal greenfield plant was commissioned with state-of-the-art AP technology from the world's acclaimed technology supplier Rio-Tinto-Alcan, with a capacity of 1 500 ktpa. Utkal refinery is in the Rayagada district of Odisha state, which had expanded its capacity to 2 120 ktpa by 2021 and recently to about 2 500 ktpa. UAIL comprises an alumina refinery, a captive Baphlimali bauxite mine of 8 000 ktpa with valid lease title up to 2048, and a captive co-generation power plant of 90 MW along with a 5 MW solar power plant. The bauxite is sourced from mines and travels over the 18 km Long Distance Conveyor (LDC), which is one-of-a-kind in the world. UAIL enjoys the global leadership position in terms of product quality, energy consumption and low cost of production. UAIL caters to 70 % of Hindalco's smelter's alumina requirement and supplies to other domestic and international market. The high purity alumina supplied by Utkal refinery enables our new age smelters to produce niche aluminium metal (such as P0202 grade) catering to sectors like aviation and space, defense, food and beverage, transport etc.

The present alumina production capacity of individual unit of Hindalco is depicted in Figure Figure 26. The refinery at Renukoot, Belgavi and Muri operate using the double digestion technology whereas Utkal refinery operate with single digestion, considering the quality of bauxite.

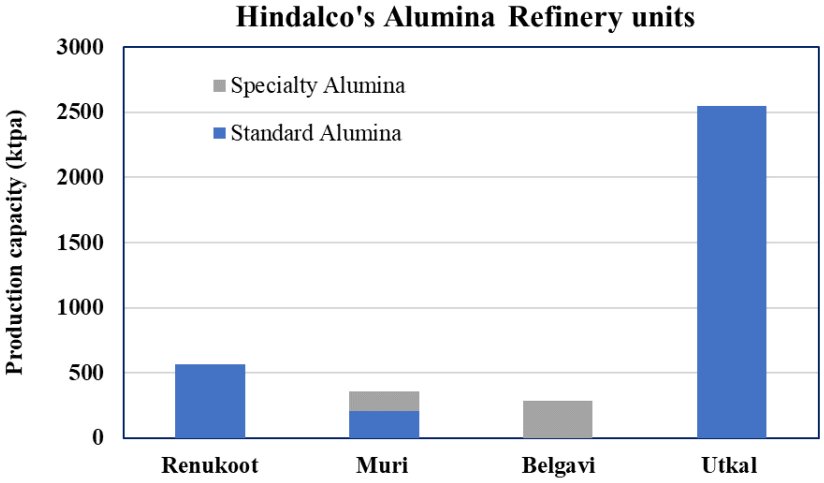

Figure 6. Present alumina production units at Hindalco.

2.1.2 Aluminum Smelters

In the beginning the energy requirement of Renukoot smelter was met through green source, the Rihand hydro electric power plant. To further strengthen the steady supply of electricity, Hindalco established a captive power plant (CPP) at Renusagar in 1967, the first ever for an aluminium industry in India. This, along with a co-generation power unit ensured continuous supply of power for the smelter and other operations at Renukoot [2]. The Kaiser's smelting technology used in Renukoot relied on manual alumina feeding, voltage adjustment, anode-effect termination and most other operations. Owing to high energy consumption and rising energy prices, during mid 80's profound efforts were made to modernize the plant by retrofitting new technologies, which can be depicted from Figure 7. During this transition, the guiding principles were energy reduction, pollution control, improvements in norms of inputs, improved current efficiency, leading to the reduced cost of production and improved metal quality [4].

Figure 7. Renukoot smelter plant before and after modernization [2].

Hirakud smelter, which was setup by INDAL in partnership with Alcan, using HSS (horizontal stub Soderberg) technology, which had end-to-end potline operating at 55 kA. Post acquisition by Hindalco, it was upgraded from Soderberg to Prebaked potline using GAMI technology with increase in line amperage from 55 to 85 kA. Subsequently during 2012-2014, there was also a brownfield expansion of 50 ktpa with 235 kA side-by side pot technology from GAMI, which led to Hirakud smelter attaining a total production capacity of 216 ktpa. Figure 8provide a glimpse of different smelting technology used during the journey of Hirakud smelter.

(a) Old Soderberg Pot (HSS) at 55 kA (b) Converted Prebake 85 kA potline (c) Brownfield expansion 235 kA potline

Figure 8. Hirakud smelter plant conversion and brownfield expansion.

Post acquisition, the major greenfield expansion was undertaken by Hindalco. The state-of-the-art AP36 technology was used for greenfield smelters at Aditya Aluminium (located in Sambalpur, Odisha) and Mahan Aluminium (located in Singrauli, Madhya Pradesh), shown in Figure 9. Mahan and Aditya smelters were commissioned in 2015-16, which has not only resulted in expansion of Hindalco's production capacities by 720 ktpa, but also improved energy efficiency and cost of operations.

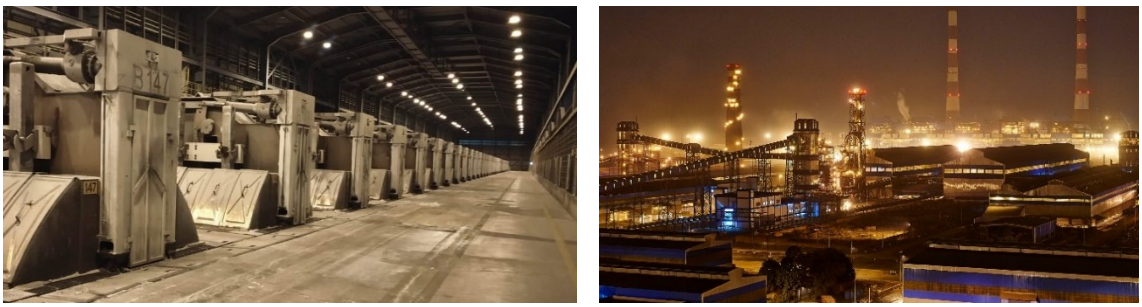

Figure 9. State-of-the-art AP36 smelting pot technology at Mahan and Aditya.

All the smelters have their own captive power plants and source alumina from Utkal alumina refinery. The present aluminium production capacity of individual smelter unit of Hindalco is shown in Figure 10 10.

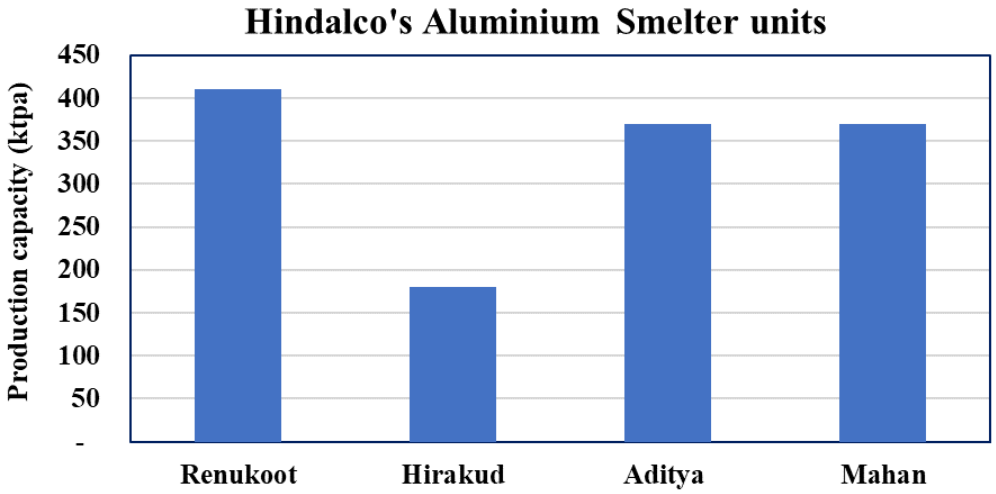

Figure 10. Present aluminium production capacity of Hindalco's smelter.

2.1.3 Aluminium Downstream

Renukoot integrated facility had downstream plant to manufacture rolled and extrusion products. The capacity and technology were upgraded to increase the size of rolling ingot to 2.2 tonnes during 1978-79 which reached to 25 ktpa by 1985. Installation of continuous caster and commissioning of the second cold mill led to further capacity increase to 35 ktpa at Renukoot by 1993-94. [2]

Hindalco downstream product portfolio was enhanced through the acquisition of INDAL's two rolling plants at Belur and Taloja. These plants produced lithographic sheet, foil stock, fin stock, closure stock and heavy gauge circles. The Belur plant was setup in 1938 with a small capacity of 2.5 ktpa and today it operates at 45 ktpa. The rolling products portfolio including foil was further enhanced by establishing new 30 ktpa plants at Mouda. The state-of-the-art foil rolling facility at Mouda incorporates the latest technology and offers a wide range of quality foils from 6 to 50 microns thickness. It has helped Hindalco to become India's premier foil and foil laminates supplier in different variants – plain, laminated, lacquered and printed which are used for various packaging applications [1, 5].

The most notable step was the acquisition of Novelis Inc. in 2007, which provided access to international high-end aluminium markets. Hindalco also leveraged Novelis capability, for the greenfield expansion at Hirakud FRP by establishing largest tandem aluminium rolling mill in India. Hirakud FRP is a low-cost world-class rolling mill complex with a capacity of 135 ktpa, which began commercial production in 2013. These facilities helped Hindalco to increase rolled products capacity to 287 ktpa and cater to a wide range of industries in India and across the globe [1, 5].

Hindalco is a leader in aluminium extrusion with two manufacturing facilities at Renukoot and Alupuram. Both the plants are equipped with state-of-the-art equipment, having well established manufacturing processes and quality systems honed over last five decades. Recent developments include setting up a new extrusion plant in Silvassa to cater to the growing demand in western and southern India. There is additional capacity from the newly acquired Kuppam extrusion plant from SAPA aluminium, which was a subsidiary of Norsk Hydro. The present capacity of extrusion products is about 52 ktpa [1, 5]. The aluminium downstream products and production capacity of individual units of Hindalco is shown in Figure 11Figure 2.

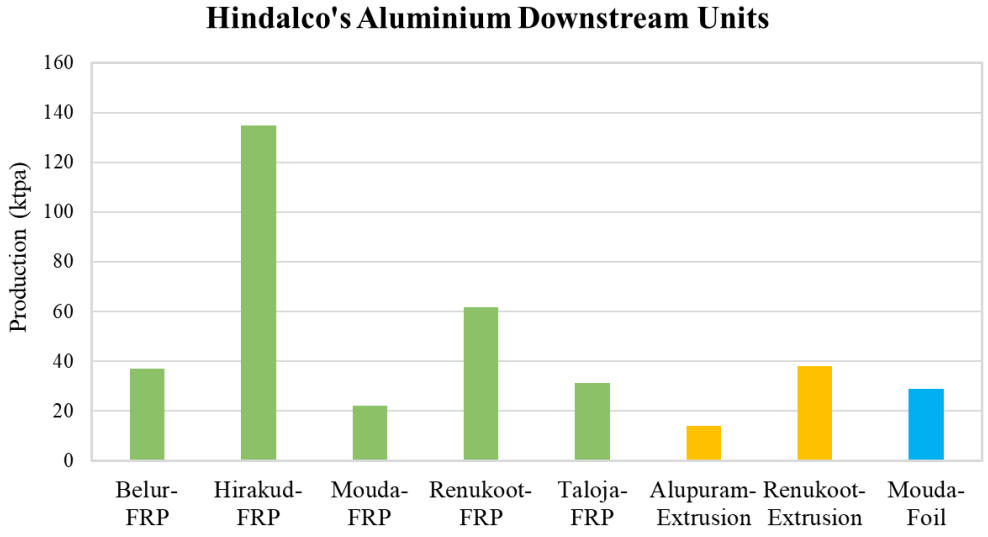

Figure 11. Aluminium downstream production at Hindalco.

2.1.4 Mining for Sustainable Operations

Hindalco has captive capabilities to source own major raw materials for aluminium production, and to cater the power requirement of smelters. Hindalco operates four coal mines: Gare Palma IV/4 and IV/5 mines at Chhattisgarh and Kathautia and Dumri mines in Jharkhand. These mines are a combination of underground and open cast mining. The mines are focused on maintaining safe and sustainable operations through appropriate methodology. These captive sources, together with linkage to coal sources from Coal India Limited (CIL), provide coal security to meet Hindalco's energy needs [1].

Bauxite ore is the basic raw material used in the production of alumina. Hindalco's bauxite mines are spread in 4 different states, namely Jharkhand, Odisha, Chhattisgarh and Maharashtra. There are in total 27 leases of bauxite mines with Hindalco, some of which, date back to the 1940s. These mines are spread over three geological zones – West coast region, Chotanagpur region and East coast region. The eco-friendly initiatives of Hindalco include Bagru ropeway and Long Distance Conveyor (LDC) installed at Baphlimali mines in Odisha. Bauxite mines have played a major role in Hindalco's sustainability drive. Water conservation through rainwater harvesting and other such initiatives have helped us be a water positive company [1].

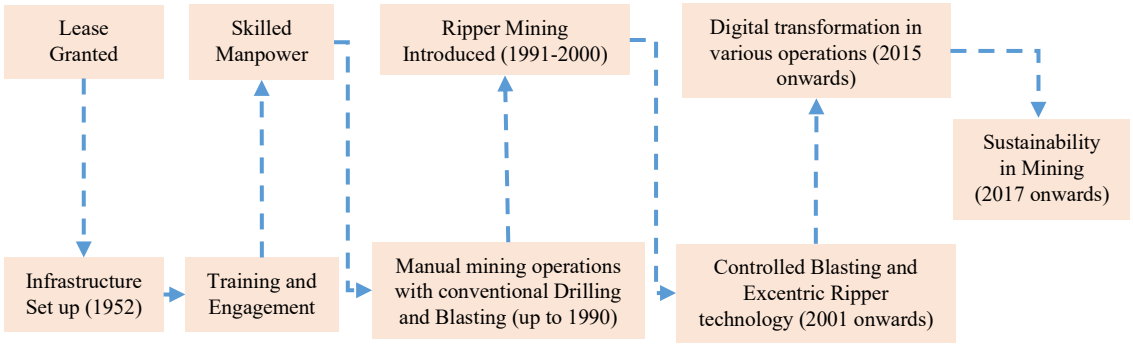

Figure 12. Bauxite mining journey at Hindalco.

3. Innovations and Technology Development

Process and product innovation as well as responsible business practices are integral to Hindalco's operations, which have played an important role in the sustainable growth of Hindalco. The Hindalco Innovation Centers (HIC) have been working on R&D of bauxite, alumina and specialty alumina products, aluminium fabricated products, and tribology. In addition, Hindalco engages with the Aditya Birla Group's corporate R&D center, established in 2001 and now referred as Aditya Birla Science and Technology Company Pvt Ltd. (ABSTCPL) [6]. ABSTCPL has unique capability of computational modeling, which are being leveraged for improving the design, efficiency and control of manufacturing processes across the complete value chain. During the last few years, we have developed numerous technologies as well as new products, which are described in subsequent sections.

3.1 Development of Specialty Alumina and Hydrates

Extensive research was undertaken for producing specialty alumina and hydrate products. Recent advancements in the production of fine alumina trihydrate (ATH) with micron and sub-micron dimensions have significantly expanded the repertoire of specialty solutions for industries like paints and coatings. Particularly noteworthy is the development of boehmite characterized by a narrow particle size distribution, a critical component in battery separators, a sector experiencing substantial growth. The market is witnessing an expansion into catalyst support applications,

fueled by the introduction of new gamma and activated alumina. The introduction of low and ultra-low soda alumina products, boasting a purity of 99.9 %, is revolutionizing advanced applications such as electronic substrates and bio-ceramics. Notably, the in-house patented process yielding 4N-grade alumina is poised to revolutionize high-end applications ranging from LED manufacturing to the production of sapphire single crystals and touch screen technologies.

3.2 Energy Efficient Aluminium Smelting Technology

Hindalco, in collaboration with ABSTC, has been working on reducing the energy consumption in smelters. ABSTC has advanced computational modelling and simulation capability coupled with solid know-how of aluminium smelting technology, which were utilized while developing some of the key technologies like Cu-inserted collector bar (CuCB), magnetically compensated busbar and PLC based pot control system, shown in Figure 13. These have helped in achieving some benchmark energy numbers for e.g. 13.6 DC-kWh/kg in Hirakud 85 kA and 235 kA pots, 13.2 DC-kWh/kg in Mahan and Aditya 360 kA pots [7, 8].

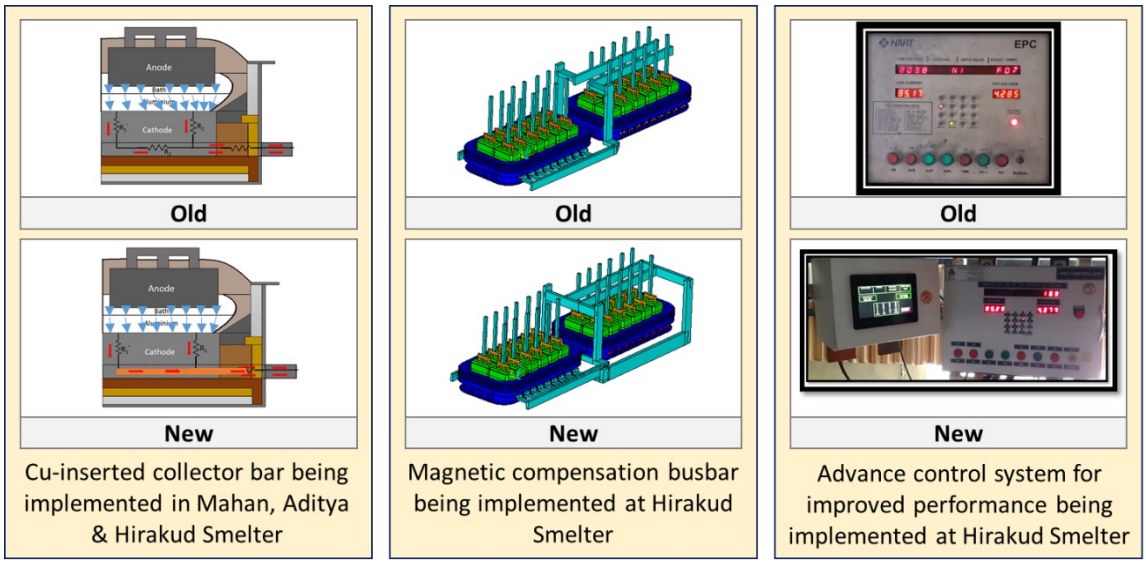

Figure 13. Key enabler for energy efficient aluminium smelting technologies.

A completely in-house development of 'HiPoT-85 kA Technology' consist of a new magnetically compensated busbar configuration, patented CuCB with energy efficient cell lining, as well as an improved anode/cathode assembly. It also consists of PLC based new pot control logic a system, which has inbuilt advanced analytics algorithms to predict key parameters for operational excellence. After successful trial in few pots, HiPoT-85 kA technology is being rolled out in all the pots of Hirakud 85 kA potlines. It would help in achieving the energy consumption of 13.7 kWh/kg from the original figure of 14.4 kWh/kg, thereby bringing down the energy level by about 0.7 kWh/kg. The improved lining has also enhanced the pot life and reduced SPL generation by about 5-6 kg/tonne of Al in Hirakud smelter. These improvements facilitated the sustainability of low amperage smelter, along with greater understanding of smelting process and technology [7, 9, 10].

3.3 New Downstream Products Development

Hindalco has diverse downstream offerings, such as FRP, extrusions, foils, wire rods and billets, finding application across various industries, ranging from automobiles, packaging, pharmaceutical, transportation, building and construction. Technology partnership of our downstream plants with Novelis and Aleris has realized a range of new products and applications.

Hindalco is leading the lightweighting of mobility sector in India by introducing aluminium bulkers, trailers, railway wagons and range of products for Electric Vehicles (EV).

Hindalco had launched India's first complete aluminium freight trailer and bulker in 2019 shown in Figure 14. The trailer is an initiative for India's logistics and freight industry. The trailer is 10.7 meters long, 50 % lighter and weighs over 2.5 tonnes less than an equivalent steel trailer. The high strength aluminium alloy ensures that the vehicle is safe, strong, durable, efficient and environment friendly. Each trailer saves over 15 000 litres of fuel and emits 25 tonnes less Green House Gases (GHG). It also has 70 % higher scrap value. The bulkers and railway wagons are another such products where steel was replaced with aluminium, which makes it lighter, thereby increasing fuel efficiency and reducing the GHG emissions [5].

Figure 14. Aluminium application development: Freight Trailer and Bulker.

Aluminium Foil for EV Battery Application: Hindalco is investing about 100 MUSD to build a new aluminum foil plant by 2025, near Sambalpur in Odisha. The facility aims to produce high quality foil for battery electrodes to support the rapidly growing electric vehicle and energy storage system markets. Hindalco is continuing to research and develop its foil products. Hindalco is utilizing its deep understanding of metallurgy to develop cathode foils, with aim of increasing the mechanical strength, fine tuning the thickness, and enhancing the surface characteristics. It is also working on new coatings on the battery foils that will boost performance by delivering better adhesion, lower resistance, and reduced corrosion. Additionally, Hindalco is working closely with original equipment manufacturers (OEM) to co-develop critical components like battery enclosures, motor housings, busbars, structural and safety components, and lightweight load bodies [1].

4. Sustainability Initiatives

Hindalco, as a responsible aluminium producer, has a special focus on sustainability i.e. net zero in emission, discharge and land fill by 2050. It has become a world leader in the utilization of bauxite residue and has created a benchmark for the alumina industry across the world. Hindalco has worked closely with the cement plant manufactures across India to develop a circular economy model. Hindalco is the world's first company to achieve 100 per cent red mud utilization across three of its refineries, namely Belagavi, Muri and Renukoot [11, 12].

Hindalco focuses on evolving mining into a prime sustainable developmental area in national interest. As a key sustainable drive, a Bio-Park (Dhumkuria and Birsa Upvan) was developed at Bagru mines in the mined-out area, as shown in Figure 15. Also, projects of red mud disposal at the mined-out area at Baphlimali mines are being executed. Several water-harvesting ponds have been created in each plateau along Hindalco's journey to water positivity. Also, 70 % of the mined-out areas have been backfilled and subsequently handed over to the village landowners for agricultural purpose [1].

Figure 15. Sustainable mining practices at Bauxite Mines of Hindalco.

Hindalco has ranked number 1 in Dow Jones Sustainability World Index (DJSWI), consecutively for the last 3 years. Hindalco Mining Group has won several awards in safety and environment. The mines have won the National Safety Award by the Honorable President of India in different categories in the years 2009, 2010, 2014, 2015 and 2018. The Federation of Indian Mineral Industries (FIMI) has awarded the environmental award for 2018-19 to Bhusar bauxite mines [1].

4.1 Corporate Social Responsibility (CSR)

Hindalco has believed in merging its development with that of society's. The CSR activities are carried out to tackle the challenges in five focus areas namely: health, education, infrastructure, sustainable livelihood, and social causes. In Jharkhand and Orissa state, the CSR activities are being carried out in more than 300 villages, out of which Hindalco is developing 23 villages and transforming them into model villages. Hindalco units are relentlessly working to improve the Human Development Index of our community through various CSR and sustainability initiatives, which are in line with the Sustainable Developmental Goal of United Nations 2030 [1].

5. Summary

Hindalco's journey started in 1962, at Renukoot as an integrated aluminium producer. Renukoot plant capacity has grown organically in all the fields from power, alumina, smelter and downstream, while ensuring efficiency and cost competitiveness. In the last two decades, Hindalco has undergone substantial expansion through (i) technology upgrade, (ii) acquisition of INDAL, Novelis and Aleris, as well as (iii) greenfield projects like Utkal alumina refinery and

aluminium smelters at Mahan and Aditya. During this journey, the focus had always been to remain an integrated aluminium producer to achieve the best technical and financial performance. The best plant practices and technical prowess helped us to develop several innovative in-house solutions and implement those to improve the process technologies across the aluminium value chain. Hindalco has consistent focus on sustainability with a target of net zero emission, discharge, and land fill by 2050. The sustainability initiatives and adoption of advanced technologies has helped company to achieve Dow Jones Sustainability World Index (DJSWI) rank 1, consecutively for the last 3 years.

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