vedanta
a natural mining advantage
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VEDANTA AL
Aluminium

CEO's MESSAGE

India has tremendous primary production and downstream value-added potential in the aluminium sector driven by growing demand, supply chain development and robust resource centre. In India's case, the production, Medanta is well positioned to leverage this opportunity.

Arun Kapur
Chief Executive Officer
Vedanta AL, Aluminium & Power Business

Aluminium has tremendous potential to contribute to a more precise, prudent and sustainable manner. The quality of the material, With certain features in the aluminum sector, India is well positioned to leverage this opportunity.

Billet extrusion tools for a material that enough to extrude easily and is capable of withstanding the pressure and temperature. Vedanta Aluminium Business Aluminium is the leading producer of billets in India, with a capacity of 1,000 MTPA.

The productivity rate of the extrusion is largely dependent on the extrusion speed of the material. Billets with a higher Mg content, Fe content and Mn content are difficult to extrude, can be extruded at a low extrusion because pressure. The alloy of the extrusion process is 6063 alloy. The 6063 alloy is a medium strength alloy with excellent corrosion resistance and outstanding surface finish. Aluminium is the material of choice for many industries in developing the product.

PRODUCT CORNER

HIGH SPEED ALUMINIUM BILLETS

THE ENGINEERING BEHIND HIGH SPEED ALUMINIUM BILLETS

The effects of the alloying elements added to the aluminium are mentioned in Table 1.

ALLOYING ELEMENTS	EFFECTS
IRON	Fe is a very particle formation, also aids in strength
SILICON	Reduces melting temperature and improves fluidity, in combination with magnesium it produces a precipitate which increases strength and hardness
MANGANESE	Increases strength through solid solution strengthening and improves their resistance to creep
MAGNESIUM	Vedanta's casting alloy, Mg is added to improve the use of our metal for the purchase in modern up alloy
COPPER	Copper increases strength increases in strength and improves precipitation hardening. It can also be added to impart some finish to the extruded product
CHROMIUM	Reduces stress corrosion cracking and improves toughness

Table 1

Vedanta's High Speed Billets (HSB) have been engineered for extruders following strict quality and process parameters for achieving the best finish. For the Magnesium Silicon graph, the total composition is schematically shown in Figure 1.

Figure 1 Mg vs Si schematic diagram for 6xxx

The Al-Si precipitates which form in the alloy are critical to get important owing to the improved physical properties. The Al-Si phase diagram is shown in Figure 2. The mechanical properties and their morphology have been modified so that the material can be extruded easily. The Al-Si phase diagram shows a simple eutectic system with eutectic at Figure 2. Suit in case of HSB, pattern Si is added which impacts unique properties to the billets.

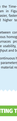


Figure 2 Silicon modification

PERFORMANCE ANALYSIS

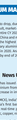
Figure 3 Extrusion Breakout Pressure vs Extrusion Speed

Figure 3 exhibits how HSB 01 and 02 are different variants of HSB can be extruded at a low extrusion pressure. Billet 01 and 02 are HSB 6063 alloy. The extrusion breakout pressure decreases for HSB. These billets can be extruded at 12 times the average extrusion speed without compromising on the mechanical attributes of the product, enabling better productivity and better finish. Vedanta Aluminium Business Aluminium is the leading producer of billets in India. Aluminium is the material of choice for the customer which in turn results in lower costs of production for the billet extrusion.

Vedanta has brought another advanced R&D technology, state of the art smelting & casting technology, to India. Vedanta Aluminium Business Aluminium is develop three high Speed Billets, carefully tailored for extrusion who aim to increase their production rate without compromising on the quality of their products.

HOMOGENIZATION, FOR BETTER PROPERTIES & FINISH

Homogenization of aluminium billets, performed after casting consists of three stages: heating, soaking and cooling. Heat treatment of the billets prior to extrusion improves ductility, which, is determined by the alloy chemistry and downstream requirement. Since aluminium billets are used for the production of extrusions, the homogenization process is important and all of the alloying elements are in solid solution. Additionally, during this phase, the needles like brittle AlFeSi β phase transforms into a more spherical α phase which improves the material's mechanical properties and finish. The 6063 alloy, Vedanta Billet, Casting plays a vital role in the homogenization process. It is the cooling rate that determines the fineness and uniformity of dispersion of the precipitates and aids in improved extrusion.



This is schematically shown in the Time-Temperature-transformation diagram in Figure 1. Homogenization of billets, performed after casting consists of three stages: heating, soaking and cooling. Heat treatment of the billets prior to extrusion improves ductility, which is determined by the alloy chemistry and downstream requirement. Since aluminium billets are used for the production of extrusions, the homogenization process is important and all of the alloying elements are in solid solution. During this phase, the needles like brittle AlFeSi β phase transforms into a more spherical α phase which improves the material's mechanical properties and finish. The 6063 alloy, Vedanta Billet, Casting plays a vital role in the homogenization process. It is the cooling rate that determines the fineness and uniformity of dispersion of the precipitates and aids in improved extrusion.

Billet producers can choose between conventional batch or modern continuous homogenizer. The batch homogenizer is preferred because it provides flexibility in alloy and cast-billet, continuous furnace offer superior control over temperature, higher throughput and better process control.

Vedanta Aluminium Business Aluminium can choose between two homogenizers depending on the downstream requirements. Specifically, parameters such as homogenization temperature, soaking time and temperature distribution across the material remains uniform for the best optimization.

IGNITING THE FUTURE

VEDANTA SPARK – THE GLOBAL STARTUP ACCELERATOR PROGRAM

On 20th October'20, Vedanta Resources launched Vedanta Spark, a global corporate accelerator program for startups across the world to collaborate with Vedanta Group companies and scaling-up their business. The program aims to identify engaged and build a startup ecosystem which can bring in innovative and sustainable ideas by leveraging digital technologies and solutions to address the challenges in the areas of environmental impact, health, safety and environment (HSE) performance of the company across various businesses.

The program covers 9 verticals that have the potential to propel Vedanta's businesses towards a sustainable future. Digital Supply Chain, Sustainability & Circular Economy, Operational Excellence Division, Revenues & Efficiency Improvement, Asset Optimization and Productivity Improvement, Health, Safety & Environment, Zero Harm, Digital Transformation, Technical Services & Digital Transformation Mobile-DEPO, Logistics Efficiency & Supply Chain Management, Value Added Product Development, TQR & Commercially Development, Technology Development, Technical Services & Digital Transformation Mobile-DEPO, Logistics Efficiency & Supply Chain Management, Value Added Product Development, TQR & Commercially Development, Digital Marketing & Selling, Digital and Transformation Management, Employee Engagement and Industrial Security.

Interested startups can explore and read more about this novel initiative at **https://www.vedantaspark.com**

ALUMINIUM MARKET OUTLOOK

The 1 - month LME price is set to drop, due to the gloomy investor sentiment and US-China trade tensions. The 3 - month LME price is set to drop, due to the US-China trade tensions. Spot price through the entire FY 2021 up to FY 2022. Experts anticipate a surplus of 12.9M in 2020, primarily outside China and mostly having occurred in 1Q2. Smelt with cost-cutting measures, China's output is set to drop, due to the coronavirus outbreak. The US tariff on China is concerned, primary aluminium imports in 2020 reached nearly 300,000 tonnes, marking a 17-year high in 2020. Analysts forecast China will return to be a net importer of primary aluminium by end of 2021. However, exports of semi-fab will continue to struggle.

MEDIA COVERAGE

The Cross Metal, Aluminium, is the Metal of the Future
by **Arpita Ghosh** | Senior Journalist at Power Business, Vedanta AL

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Aluminium Can Play A Pivotal Role In
The Changing Face Of The Automotive Sector
by **Arun Kapur**

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Post-Covid World: Acid Test Of True Leadership
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The digital twin that's been helping Vedanta steer out of the crisis

Cover aluminum maker turn at vendors is having new technologies in the aftermath of the coronavirus crisis, and Vedanta Aluminium is one of the companies that has been leaning into digital transformation.

Nitish Aggarwal | Editor | October 27, 2020, 06:00 IST

In the year 2020, where many businesses and their technology investments were affected by the pandemic, Vedanta, Asia's largest diversified natural resources company, has been leveraging the pandemic to turn it into a blessing in disguise.

Vedanta Ltd., Aluminium Business has been consistently in India, and Vedanta Aluminium has been leveraging technology to overcome challenges, Vedanta Aluminium Business