

# Hindustan Zinc reinvents an ancient mining legacy

Nestled within the mineral-rich folds of the Aravalli hills Zawar is the world's oldest known site of zinc mining and smelting, a living testament to India's ancient technological prowess. Archaeological discoveries trace large-scale zinc production in Zawar to as early as 750 BCE (Before Common Era). While Europe was still experimenting with zinc production in the 18th century, Zawar's Bhil community had already mastered it using techniques that shaped global metallurgy.

In ancient India, Zawar was exporting zinc globally to produce brass and coins. This extraordinary legacy finds its modern custodian in Hindustan Zinc, a Vedanta Group company, which is the world's largest integrated zinc producer today—meeting 77% of India's zinc demand and supplying to more than 40 countries worldwide. Zinc is a critical metal, primarily used in the steel industry to protect steel from corrosion. India loses approximately 5% of its GDP each year due to corrosion—a



Hindustan Zinc: A benchmark in modern underground mining.

loss that can be significantly mitigated through the application of zinc.

It wasn't until 1743 CE (Common Era) that Europe finally managed to smelt zinc, a milestone made possible

through the transfer of knowledge from India. By then, Zawar's furnaces had been refining zinc for over two millennia. The brilliance lay in the unique reverse distillation technique developed by

Zawar's metallurgists, a process involving precise temperature control, water-cooled chambers and intricately crafted, brinjal-shaped clay retorts coated with turmeric for

durability. These inverted pots enabled the collection of pure zinc vapour and the production of high-quality zinc. Today, scattered remnants of these ancient retorts can be found all around Zawar, narrating a phenomenal story of ancient scientific innovation.

The name Zawar, often referred to as Jawar, is believed to have originated from jawar, meaning jewellery, a nod to its flourishing silver trade that was found alongside zinc. Yet, it was zinc that truly defined Zawar's global legacy. Zawar is more than just an ancient mining site—it is a geological time capsule. According to Somdeb Dutta Mal, geologist at Hindustan Zinc, "Zawar is a site of immense geological and historical significance—set

within a billion-year-old meta-sedimentary basin, its narrow, vein-type ore bodies in dolomite, present unique challenges, making every discovery here a deep dive into earth's ancient history." Today, Hindustan Zinc produces more than 2 lakh tonnes of zinc metal in concentrate (fine powder produced from ore).

Hindustan Zinc uses the world's top technology such as drone-based underground exploration, borehole electromagnetic (exclusively deployed by Hindustan Zinc in India), geophysical surveys and AI-driven 3D modelling to identify new reserves and execute sustainable mining. Zawar reflects the perfect synthesis of India's ancient mining knowledge with modern tech-

nological progress.

A defining chapter in Zawar's modern era was scripted in 2002—under the visionary leadership of Anil Agarwal, chairman, Vedanta—when the Vedanta Group acquired equity stake in Hindustan Zinc. This landmark move is regarded as one of the most successful disinvestments by the Indian government. Under Vedanta's leadership, Hindustan Zinc embraced global best practices and fostered a culture of technological innovation. Interestingly, Zawar has witnessed a phenomenal four-times growth since disinvestment. In 2016, the Geological Society of India declared Zawar a National Geological Heritage Site in recognition of its legacy.

Yojitha Kattekola, mining engineer and a member of India's first women underground mine rescue team at Hindustan Zinc, reflects on her journey: "To work at a location that pioneered zinc production centuries ago and now stands as a global benchmark in modern underground mining is a source of immense pride."

From an ancient tribal innovation to a globally significant industrial operation, Zawar's journey stands as a testament to the enduring supremacy of India's metallurgical excellence. This mine, along with the company's other four mines, has made Hindustan Zinc the world's largest integrated zinc producer and India's only zinc and silver producer.

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Excavating zinc ore.



Roasting and mixing of ore.



Retorts at high temperature.



Zinc molten metal processed at high temperatures.

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