



The pivotal role of Zinc in India's development journey: Making steel more sustainable

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India's path to becoming a **developed economy** hinges on **robust infrastructure**, with steel as a cornerstone of this transformation. According to the **Ministry of Steel**, India became the world's second-largest steel producer in 2024, driven by **significant growth** in production. However, the increased reliance on **steel** comes with **challenges**, particularly **corrosion**, which compromises the durability and safety of structures.

India's **diverse climate** - marked by high humidity, **salt-laden coastal air**, and pollution - renders **steel structures** highly susceptible to corrosion. With a **7,800 km-long coastline**, large portions of the country face accelerated **steel degradation**, especially in coastal areas classified as extremely **corrosive zones**. The National Association of **Corrosion Engineers** estimates that corrosion costs India about 5% of its GDP annually, far higher than countries like **Japan** and **Australia**, where widespread use of zinc-coated steel has reduced this figure to less than 1.5%.

The 2023 report by the **International Zinc Association**, **New Corrosion Map of India**, highlights India's aggressive climatic impact on steel. Zinc-coated (galvanized) steel demonstrated resilience in an 8-year testing period across major Indian cities. At the 2023 **Global Zinc Summit**, the Ministry of Steel emphasized that adopting zinc-coated structures could prevent losses exceeding Rs.1,000 crore annually in coastal areas alone. Zinc's protective layer is indispensable in these regions, where **high humidity**, **salt** and moisture rapidly accelerate corrosion and compromise structural integrity.

Zinc galvanization is the most effective solution for protecting steel structures from corrosion. Galvanization, a continuous process involving the application of a **zinc coating to steel**, creating a **metallurgical bond** that protects **steel**, and provides a solution that is both pragmatic and essential. Zinc sacrifices itself in preference to the **underlying steel**, effectively shielding it from red rust. In most environments, galvanized steel can last over 50 years. This sacrificial property extends the lifespan of **steel structures**, yielding **substantial economic** benefits, including reduced maintenance costs, increased asset life, and improved structural reliability. The zinc coating also acts as a **barrier between the harsh environment** and the **steel**, making it more resistant to mechanical damage during transport and installation. Additionally, galvanized steel's versatility and design flexibility allow for customization and efficient construction, making it a cost effective and practical choice for various projects. Zinc galvanization has a **superior performance** advantage over painted non-galvanized steel. The zinc coating offers **cathodic** or sacrificial protection, which means it will protect the steel even if the coating is scratched or damaged. This means that zinc will protect steel across the entire country and will play a critical role in protecting **public infrastructure**, **railways**, **roadways**, bridges and **power transmission**. The galvanization process serves as a durable protective shield, effectively preventing corrosion and prolonging the lifespan and safety of the structures.

As India continues to invest heavily in infrastructure like **highways**, railways, **bridges**, airports, and smart cities, the use of **galvanized steel** translates into long-lasting, reliable infrastructure, fewer Sensitivity: **Public** (C4) repairs and lower maintenance costs. The use of non-galvanized steel in these projects make it prone to corrosion, and using zinc galvanization creates a long-lasting barrier which is resistant to external factors such as heat, pollution, moisture, water among others. This also ensures that **public infrastructure** remains functional and secure for decades, safeguarding investments made by the government, taxpayers and private sectors alike.

Government initiatives such as the **National Infrastructure Pipeline** and **Gati Shakti Yojana** prioritize the use of durable materials like galvanized steel to meet international quality standards. These programs underscore India's commitment to self-reliance under the **Atmanirbhar Bharat** initiative, by reducing its dependence on imported materials that may not be suited to local conditions. By promoting the use of domestically sourced **zinc solutions**, India enhances local manufacturing capabilities while creating employment opportunities.

Zinc-coated steel is also crucial for **renewable energy projects**. **Wind turbines** and solar panel installations require materials capable of enduring **harsh environmental conditions**. Zinc galvanization not only protects these structures but also enhances their efficiency and lifespan. As India continues to invest in renewable energy **storage solutions**, zinc will play a crucial role in supporting this transition. Zinc's high recyclability aligns with sustainable development and circular economy principles. By promoting zinc galvanization across sectors like **infrastructure**, **automotive**, and pipes & tubes, India can significantly lower its carbon footprint while supporting sustainable practices.

As India strives to become a \$5 trillion economy by 2025, the use of zinc to protect infrastructure projects will be **instrumental** in achieving this vision, with zinc's annual consumption projected to rise to over **2 million tonnes** in the next 10 years. As the world observes India's transformation into a developed economy characterized by **resilience** and **sustainability**, the role of zinc will be pivotal in shaping this future; a future built on strong foundations that ensure safety, reliability, and **prosperity** for all its citizens.

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