A Review of the Consequences of Harsh Environmental Factors on Concrete's Life Span

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Abstract:

This article explored the fundamental factors that influence the longevity of concrete in severe environments. The building industry today requires an environmentally friendly material that will maintain its material features throughout its expected life duration. The material should be aesthetically beautiful, maintain ecological balance in order to care for the environment, and limit waste. Concrete is one such material that meets all needs. If concrete is impacted by harsh environments, it leads to costly and time-consuming repairs and reworks. These pervasive attacks shorten service life and necessitate early repair and maintenance, leading in increased life cycle costs and structural failure. Concrete's durability refers to its ability to withstand the conditions for which it was intended, or its ability to perform its needed function throughout the structure's lifetime without being damaged. Concrete's durability might be reduced due to external circumstances or internal elements within the concrete. This study discovered that the performance of concrete constructions is heavily influenced by their durability. This feature ensures that a structure maintains its integrity and functionality over time, even in severe settings. Understanding the factors that determine concrete durability can assist engineers, contractors, and property owners make informed design and construction decisions. Pollutants in the atmosphere, such as carbon dioxide and sulphur oxides, may have an effect on concrete. Concrete is currently gaining popularity due to its ability to withstand harsh environmental conditions such as the marine environment, harsh environments (high and elevated temperatures), sewer environments, sulphate-rich environments, acidic environments, alkaline environments, freeze and thaw cycles, and so on. These environments cause concrete deterioration through plastic shrinkage, strength loss at later ages, a drop in compressive strength, steel corrosion, and a decline in service life (life expectancy and durability). The permeability of concrete determines its susceptibility to damage from outside forces. Concrete must be impermeable in order to be lasting, which necessitates a high concrete resistance to adverse weather conditions. When concrete is exposed to a harsh environment, the environment degrades the concrete, affecting the setting time and hardening characteristics of the cement, and the reinforcements degrade, reducing the concrete's durability and bearing capacity.

Keywords:

Building Industry, Concrete, Consequences, Durability, Environmental factors.