
Use stainless steel rebars for critical applications

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Over the last 3 decades, premature deterioration of reinforced concrete structures has become a serious problem worldwide due to corrosion of the embedded steel. The estimated cost of repair is in excess of USD 550 billion.

The structures chiefly affected are those situated in an aggressive marine environment, and road bridges to which de icing salts are applied during winter periods. Corrosion of the steel is initiated when the chloride ion from the salt permeates through the concrete to the level of the reinforcement which is attacked on contact.

The solution, now favored by highways authorities in Europe and North America, who have studied many alternative materials and design solutions, is simple as it is the carbon steel that corrodes.

Stainless steel reinforcing bar is currently produced in a range of diameters from 3 mm to 50 mm. It is produced to British, North American and European National Standards Documentation and its application is included in authoritative design guidance for highway bridges issued by the UK Highways Authority.

The use of stainless steel reinforcement provides the following benefits

- 1) Significant increase in durability
- 2) Significant reduction in repair and maintenance costs
- 3) Reduced downtime and a reduction in routine maintenance costs
- 4) The elimination of concrete sealants
- 5) A reduction in thickness of the concrete cover
- 6) A 50% increase in crack width to 0.3 mm.

Although more expensive than carbon steel, stainless steel will not corrode for the design life of the structure, 120 years in the case of highway bridges. The reductions on ongoing repair and maintenance costs are significant. Environmentally, the reduced downtime for maintenance and repair impacts upon traffic flow and disruption making the use of stainless steel highly attractive.

Stainless steel can readily be used with conventional carbon steel reinforcement in concrete without causing galvanic effects. Stainless steel can be cost-effective when used in the elements of the structure at highest risk to corrosion or, where repair is difficult and expensive.

Typical applications of stainless steel reinforcement include

- 1) River crossing and Highway bridges
- 2) Highway underpasses and tunnels
- 3) Sea walls, quays and defenses
- 4) Coastal structures

By using stainless steel reinforcement, the concrete mix can also be simplified as it not necessary to provide passivity to the steel for corrosion protection. There are several grades of stainless reinforcing bar available. The choice enables cost-effective usage for specific applications.

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