ISSF
INTERNATIONAL STAINLESS STEEL FORUM

Why use stainless steel reinforcing bar?

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Over the last three 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 US$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 (sodium chloride) permeates through the concrete to the level of the reinforcement which is attacked on contact.

The solution, now favoured 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 - use a steel that has proven to be highly resistant to chloride ion, - stainless steel.

Stronger than carbon steel, stainless steel reinforcing bar is currently produced in a range of diameters from 3 mm to 50 mm.

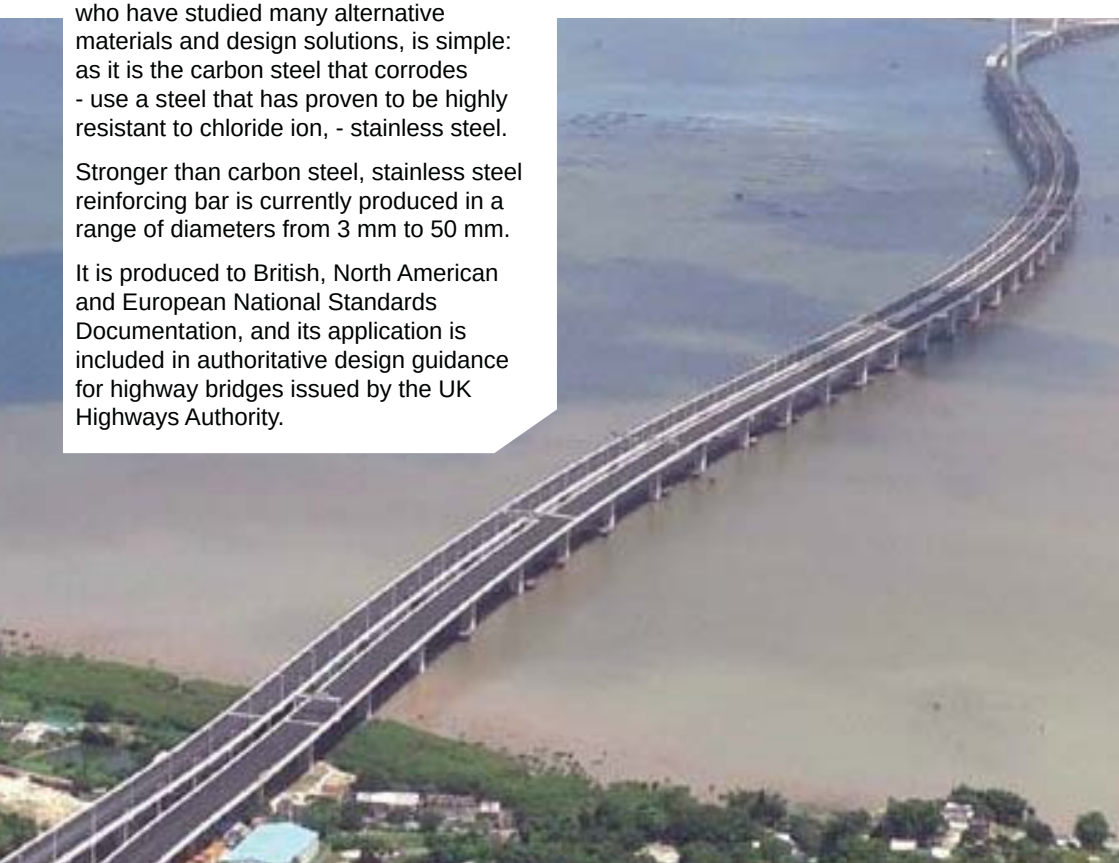
It is produced to British, North American and European National Standards Documentation, and its application is included in authoritative design guidance for highway bridges issued by the UK Highways Authority.

What are the benefits?

The use of stainless steel reinforcement provides the following benefits:

- Significant increase in durability
- Significant reduction in repair and maintenance costs
- Reduced downtime and a reduction in routine maintenance costs
- A reduction in thickness of the concrete cover
- A 50% increase in crack width to 0.3 mm.
- The possible elimination of concrete sealants (such as Silanes)

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.

Is it cost-effective?

Only a small percentage of the reinforcing steel needs to be stainless steel to achieve a significant increase in durability. 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 [with carbon steel used for the balance of the reinforcement] or, where repair is difficult and expensive.

Typical applications of stainless steel reinforcement include:

- River crossing and Highway bridges
- Highway underpasses and tunnels
- Sea walls, quays, and defences
- 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.

More information

For more information about using stainless steel reinforcement bar to ensure durable structures, please contact your local stainless steel development association. For a list of development associations, please visit worldstainless.org.

worldstainless.org

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