Effect of Corrosion on Mechanical Properties of TMT Bars

Rafiul Bari[*1], Rajesh Chatterjee[*2], M. Mohshin[3]

[1]*Department of Civil Engineering, BAUET, Qadirabad Cantonment, Natore-6431, Bangladesh,*
E-mail: anganrafiulbari@gmail.com
[2]*Department of Civil Engineering, BAUET, Qadirabad Cantonment, Natore-6431, Bangladesh,*
E-mail: rcrajesh777@gmail.com
[3]*Senior Lecturer, Department of Civil Engineering, BAUET, Qadirabad Cantonment, Natore-6431, Bangladesh,*
E-mail: mmali19bd @gmail.com

***Corresponding Author**

ABSTRACT

Buildings along the coast are always difficult to construct due to the increased salinity of the ocean water and the saltiness of the soil, which is extremely high in comparison to other areas. The fact is that the saltiness of the water and soil has a significant impact on Thermo-Mechanically-Treated (TMT) bars, which are the backbone of general construction and are used in reinforced cement concrete (RCC) structures in combination with cement concrete. This salty water and soil mainly caused damage to the outer perimeter of the bar. As a result of the TMT bar's corrosion, its strength, durability, and stability are reduced. It also reduces the structural members' load-carrying capacity and serviceability, as well as some other mechanical properties of the rebar's. In this paper, an investigation was carried out into the effect of corrosion on the mechanical properties of TMT bars under seawater. The rebar is subjected to various levels of corrosion, and the universal testing machine (UTM) examines its stress-strain characteristics. The rust on the TMT bars is removed using an anode and cathode reaction method. The stress-strain characteristics in these experiments show a curve difference between the corroded and fresh bars, as well as a curve difference between the lower corrosion bar and the higher corrosion bar. In different stages of corrosion, the values of lower yield force, upper yield force, and maximum force or strength were found to be different. It also provided a change in the elongation of the bars. The rate of corrosion has a significant impact on the mechanical properties of TMT bars, according to the findings. The ultimate observation was that the high percentage of corrosion effects on the ultimate strength of TMT bars occurs in the reduction of the grade of TMT bars.

Keywords: Thermo-Mechanically-Treated (TMT), Sea Water, Corrosion, Anode-Cathode Reaction, RCC Structure, Mechanical Properties, Stress-strain, Maximum Force, Elongation.