

Effect of Penetration of Corrosion on the Load-Bearing Capacity of Mild Steel

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The field of Metallurgical Engineering associated with the estimation of the service life of corroded structural members which has been studied in extensive detail, the world over. Most of the research work in this area have focused on the general attack (uniform corrosion) faced by steels across a range of atmospheres. This study sought to contribute to this field by examining whether the penetration of corrosion beyond the general attack has a significant effect on the load-bearing capacity of mild steel. Mild steel samples were corroded in an aggressive atmosphere over a 5-month period, subjected to periodic tensile testing and corrosion mass-loss analyses and examined under optical and electron microscopy. Through the identification and measurement of the penetration of corrosion using scanning electron microscopy, this research managed to correlate corrosion mass-loss and tensile load-loss data with said microscopic measurements. The results showed that the actual fracture loads deviated negatively from the expected load-bearing capacity, which was determined through conventional methods. This deviation showed a close correlation to the increase of penetration of corrosion with time. As a result of this correlation, the research concluded that allowances ought to be made for the penetration of corrosion when the remaining service life of corroded load-bearing members has to be calculated more accurately.

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