

Effect of Carbon Content on the Correlation between Ultrasonic Attenuation and Corrosion of Plain Carbon Steel

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The field of Metallurgical Engineering includes a vast range of applications from tiny mechanical components to massive construction applications. The service life of metals is highly concerned and studied extensively. Among all industrial metals, plain carbon steel plays a considerable role. Detecting the actual amount of corrosion has become very vital and critical since the failures occurring due to corrosion is still a substantial problem. Ultrasonic Testing is one of the modern methods which can be used to identify the degree of corrosion of a metallic component accurately, without causing any destruction. This study sought to contribute the field of metallurgical engineering by identifying the effect of carbon content and ultrasonic attenuation towards the corrosion of plain carbon steels. Plain carbon steel samples of different carbon contents were allowed to corrode under accelerated environment and periodically tested for ultrasonic attenuation and weight loss measurements. In addition, corrosion penetration of the samples was examined under optical and scanning electron microscopes. Observations were taken for both destructive and non-destructive testing and were correlated so that, using this correlation, the degree of corrosion can be determined in a non-destructive way without damaging the components and hence the remaining service lifetime could be predicted.

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