Image Processing Approach for Detection and Quantification of Corrosion Behaviour of AZ91D Magnesium Alloy

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Abstract The AZ91D magnesium alloy is known for its high strength-to-weight ratio, excellent machinability and good castability making it an ideal material to be used in automotive components fabrication. But due to its weak corrosion resistance towards the environment, identifying and quantifying AZ91D magnesium alloy corrosion behaviour before any manufacturing processes can be a huge impact and may provide useful information to the manufacturers. The limitation of conventional corrosion detection and quantification methods also justify the further needs of image processing approach in this study. This paper study the feasibility of an image processing approach using the automatic thresholding method and various manual thresholding level in order to identify the corrosion attack on the AZ91D magnesium alloy. This method converts the original colour image to grayscale image and then convert it to binary image. Then through image processing approach, the image will be segmented to non-corroded and corroded area and labelled as 0 (black) and 1 (white) and make it easier to analyze. The white dots (1) distribution was then presented in percentage to shows that the pitting corrosion on the surface can be identified better by using the Otsu's method of automatic thresholding. The resulting image of various thresholding shows which thresholding values successfully portray similarity of the original corrosion image. Thus, this increases the reliability of AZ91D magnesium alloy corrosion detection and quantification via image processing approach.

Keywords Image processing · Corrosion · AZ91D Magnesium alloy · Quantitative assessment · Anodizing

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