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AUTOMATED INSPECTION SYSTEM USING THERMOGRAPHY FOR UNCURED DAMAGE DETECTION IN LNG CARRIER TRIPLEX BONDING LAYER

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ABSTRACT

This paper describes the automated thermography system (ATS) using a halogen thermography technique for detecting the uncured damage in liquefied natural gas (LNG) carrier triplex bonding layers. The uncured damage in the triplex bonding layers weaken the shearing stress and cause the failure of triplex bonding layers which can occur the reduction of structural longevity. To detect the uncured damage, first, the thermal wave is generated on the target structure by the halogen lamp, and the corresponding thermal wave propagation is measured by an infrared (IR) camera. Next, the uncured damage part can be extracted based on the phenomena that an abnormal temperature fluctuation is observed near the uncured areas compared with the intact area. Even though there has a small temperature difference between intact and uncured part, the proposed image processing algorithm can extract the uncured part. Here, the ATS is synchronized with mobile system so that ATS can inspect the whole area of LNG carrier automatically. The effectiveness of the proposed ATS is successfully validated by validation test with quantifying the uncured area.

KEYWORDS: Corrosion detection, Baseline-free image processing, Line laser thermography, Non-destructive testing.