

# Thermal Imaging Measurements for Assessing Structural Integrity of a Reinforced Concrete Water Tower

Carl J Debono

*University of Malta, Malta*

Ruben Paul Borg

*University of Malta, Malta*

Edward Gatt

*University of Malta, Malta*

Reinforced concrete structures may exhibit degradation as they age. Thermal imaging captured using an infra-red camera can be used as a non-destructive and non-invasive technique to identify the structural health of such structures by providing a heat map which can be analysed through examination of the differences in temperature. A healthy concrete region generally exhibits a homogeneous temperature while degraded regions of the concrete tend to exhibit changes and variations in temperature. The paper presents a preliminary analysis based on thermal imaging for the assessment of a historic reinforced concrete water tower structure. Thermal imaging is used for non-destructive assessment, to identify and assess any anomalies in the structure including degradation of materials. Significant information can be obtained through the gathered data and image analysis. The technique requires an understanding of mechanisms involved in deterioration, local conditions and adequate calibration. Patterns in results were identified in the investigation and variations in the concrete could be defined and classified including: detached or delaminated surface concrete which is disconnected from the main structure; cracks in the structure; reinforcement at the surface; previous repair interventions. Differences in moisture at the surface and defects can be detected through differences in the temperature. The investigation reported shows that thermal imaging can be effectively used to support routine inspections of reinforced concrete structures to assess degradation. The technique presents a rapid assessment method which can be used in conjunction with other non-destructive assessment methods for the assessment of structures.