



ABSTRACT

The University of Cape Town (UCT) campus has increasingly more buildings showing delamination deterioration and subsequent spalling of plaster sections, due to the poor bond between the plaster and reinforced concrete substrate. This poses a major safety concern to pedestrians on campus.

UCT currently detects delaminations using audio non-destructive techniques (NDT), which are time-consuming and labour-intensive. ‘Smart’ NDT procedures, such as infrared thermography (IRT), that allow for a fast overview of delamination size and depth are becoming more applicable for delamination detection on campus. IRT is a thermal imaging technology that detects surface temperature gradients to produce representative thermal imagery indicating the subsurface condition. Delaminations are detectable due to the trapped air in the delaminated void which interrupts the heat transfer. During heating cycles, delaminations will appear hotter than the surrounding sound concrete, while the opposite occurs during cooling cycles.

There is a guideline for the application of IRT in the condition assessment of bridge decks (ASTM D4788-03), but there remain uncertainties in the application of IRT for reinforced concrete and plastered buildings. This is due to the sensitivity of IRT to local environmental conditions, specific material properties, subsurface conditions, and the IRT equipment specifications.

The research testing entails producing representative concrete-UCT Plaster specimens, with known subsurface delaminations, to be analysed using the *testo 883* thermal imager and *IRSoft* PC-Software. These test specimens will be evaluated based on geometric variables, environmental variables, and equipment/viewer variables. Additional selected UCT buildings will also be measured and analysed using the same equipment, with the identified zones of possible delamination being verified through the current audio condition assessments carried out on campus. This will evaluate the efficacy of IRT in identifying delamination deterioration zones on UCT plastered buildings.
