

**MEASUREMENT OF THERMOGRAPHY PARAMETERS  
FOR FIELD APPLICATION.**

**By**

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## ABSTRACT

Thermography is only at its preliminary stage and it has potential to be developed in Malaysia. It is a technique of obtaining an image of the heat distribution over the surface of material. It is also one of the techniques so-called Non-Destructive Testing (NDT) which is harmless to the object being studied. The intensity of emitted radiation reveals hidden defects where it depends on the temperature of the object and the ability of the objects to radiate. The infrared camera records the temperature contrast and produces a colorful image and temperature profiles can be constructed from it. Specific parameters such as emissivity  $\epsilon$ , thermal conductivity  $k$ , thermal effusivity  $e$ , thermal diffusivity  $\alpha$  and density  $\rho$ , has to be taken account in obtaining the temperature measurements. In this study, ThermoCAM PM595 infrared camera with accuracy  $\pm 2^\circ\text{C}$  and  $\pm 2\%$  is used to measure the temperature of sample with different of sample emissivity, coated sample and size of defect at ambient temperature and at indoor and outdoor field application. The samples analyzed were in various surface conditions scanned by ThermoCAM PM595 infrared camera that give emissivity reading.

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# CHAPTER 1

## INTRODUCTION

Thermal imaging is a technique for converting a scene's thermal radiation pattern, which is invisible to the human eye, into a visible image (Davis & Lettington 1988). Its usefulness is due to four main aspects, which are: -

- 1) It is a totally passive a technique, requiring no external source of illumination. This allows day and night operation and convert sensing.
- 2) It is ideal for the detection of hot or cold spots, or of areas of different emissivities, within a scene.
- 3) The thermal radiation can penetrate smoke and mist more readily than visible radiation, allowing visually obscured objects to be detected.
- 4) It is a real-time, remote sensing technique.

Thermography involves the measurement or mapping of surface temperature when heat flows from, to, or through a test object. Temperature differentials on a surface, or changes in surface temperature with time, are related to heat flow patterns and can be used to detect flaws or to determine the heat transfer characteristics of a test body. Generally, the larger the imperfection and the closer it is to the surface, the greater the temperature differential.

Thermogram produced is a photograph of two-dimensional record of an image, which maps the apparent temperature of the scene as sensed by an infrared imaging system. It can be portrayed in black and white (B & W) or color. Color thermograms delineate temperature variations quite well at the expense of spatial detail while black and white thermograms delineate spatial variations quite well at the expense of temperature detail.

Thermograms are produced by a device known as thermal imaging radiometer,