CHAPTER 1

INTRODUCTION

1.1 Background

1.1.1 Cold Joints

Cold joints are formed primarily between two batches of concrete where the delivery and placement of the second batch has been delayed and the initial placed and compacted concrete has started to set. The full knitting together of the two batches of concrete under vibration to form a homogeneous mass is therefore not possible, unlike the compaction of two fresh workable batches of concrete. This could be a potential plane of weakness. Cold joints, unlike cracks that form in hardened concrete through tensile restraint, are not gaps in the concrete but merely seams containing no appreciable void structure. They are usually linear, closely joined and bonded. However, there is a danger of small voids in areas where the concrete is not fully compacted, as with any concrete pour.

Generally, cold joints are not a problem structurally if the joint is in compression. However, the location of the joint within the structure, the structural function of the element and aesthetics need to be considered when assessing a cold joint.

1.1.2 Infrared Thermography

Any process that leads to a variation in temperature of the object can be subjected to thermographic investigation. With the present of infrared camera and fast data processing abilities of computer systems, infrared thermography has the potential to explore in experimental engineering. The infrared detector of the camera absorbs the infrared energy emitted by the object under investigation in and convert it into electrical signal. Any object above the absolute zero temperature emits radiation that is proportional to its surface temperature (Banerjee *et al*., 2013).

1.2 Problem Statement

In construction industry, some of concreting work cannot be completed the same day. There is some case, casting one part of beam today, and continue other parts other day. By conducting this, we can observe cold joint between the structures itself. The problem arise, whether the structure obtain the same strength compare to concrete whole structure in same time.

Except for very small structures, it is impractical to place concrete in a continuous operation. Construction joints are needed in order to accommodate the construction sequence for placing the concrete. The amount of concrete that can be placed at one time is governed by batching and mixing capacity, crew size, and the amount of time allotted. Correctly sited and properly executed construction joints provide limits for successive concrete placements, without adversely affecting the structure (Pfeiffer and Darwin, 1987).

1.3 Objectives

1. To analyse cold joint of beam by image processing based on infrared thermography image

2. To determine uniformity of concrete within cold joint beam.

1.4 Scope of Study

Six samples of beam size 150 mm x 150 mm x 750 mm casting, 2/3 of the beam casted first and the remaining part of beam casted after 24 hours. After it matured more than 28 days, Ultrasonic Pulse Velocity test are conducted at cold joint of beam and area of the same casting session.

Flexural machine is used to applied load on beam, during loading, infrared camera captured the image of the beam. Colour summarization software summarized the colour appeared on beam surface.

1.5 Research Significances

Within recent years, there has been an increase in the use of non-destructive test to detect defects in construction structure. This paper will analyse the strength of cold joint beam with normal beam, whether the strength similar or different. Images of infrared thermography and readings from Ultra Pulse Velocity test will be use to analyse the data.