COLOUR CHANGE OF HEATED CONCRETE
RGB colour histogram analysis as a method for fire damage assessment of concrete

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TESTING PROCEDURE

Concrete samples heating

Flatbed scanner for samples scanning and converting to a digital image

RGB colour system
- Red, Green, Blue
- Values from 0 to 255 (R,G,B)
- Black (0, 0, 0)
- White (255, 255, 255)
- Red (255, 0, 0)
- Blue (0, 0, 255)
- 16,777,216 colours

Scion Image v. 4.0.3, (Scion Corporation ©, USA)
TESTING PROCEDURE

Sandstone, 80x, polarized light microscope
APPLICATION

- non-stationary heating;
- external surface of the concrete specimen 0.30 x 0.30 x 0.12 m;
- R histograms of each slice compared with calibration scale.

*calibration scale* – external surface of the sample (cube, a= 0.1 m)
CONCLUSIONS

• Presented method is an practical technique for estimating the maximal exposition temperature of concrete subjected to fire by using an analysis of the colour image;
• a scanner seems to be a useful and simple tool for making digital images of samples/cores resulting in guaranteed consistent lighting conditions;
• colour analysis was performed using the RGB model and the readily available software package Scion Image;
• a calibration scale was produced by taking images of concrete samples heated to temperatures across the 100 - 1000 °C range. The scale can be used to estimate the exposition temperature of concrete in structures subjected to a real fire;
• In practice, several techniques should be combined in order to obtain a complete and accurate picture of the concrete member damage.