

SEALING FUJI PRESSURE-SENSITIVE FILM FOR PROTECTION AGAINST FLUID DAMAGE WHEN USED WITHIN A JOINT: A.B. Liggins, K. Surry and J.B. Finlay. University of Western Ontario, University Hospital, London, Ontario, Canada, N6A 5A5.

PURPOSE: To investigate the effects on the pressure-response of Fuji Prescale pressure-sensitive film caused by sealing it within a liquid-proof packet.

METHOD, RESULTS AND DISCUSSION: Fuji pressure-sensitive film consists of an "A-film" and a "C-film". The application of pressure bursts microscopic ink bubbles on the A-film, producing a pressure-dependent stain on the C-film; this response requires calibration for temperature and relative humidity (R.H.). Protective layers placed either side of the film, to prevent in-vitro fluid damage, have been described in the literature; however, a detailed discussion or validation of the corresponding calibration have not been presented. Therefore, the object of this work was to investigate the effects of protective sealing on the pressure-response of Fuji film.

Fifty 35-mm-square pieces of both A- and C-film were cut from "super-low"-grade Fuji film, forming a control-group. A further fifty pairs of A- and C-film pieces were each sealed between two layers of "Tegaderm" adhesive dressing material (3M, Canada), forming fifty sealed packets. The two groups were used in the following protocols:

1. 25-mm-diameter calibration stains were produced using a finely-ground punch and base-plate for twelve pressures between 0.25 and 3 MPa. Loading was applied under a regime of a one-minute linear ramp up to the required load, a one-minute hold at that load, followed by a one-minute linear ramp down to a 10 N pre-load. This procedure was conducted at 23 °C and 48% R.H.
2. Three calibration stains were produced, from both groups of film, at nominal pressures of 0.5, 0.9, 1.8 and 2.5 MPa. This procedure was conducted on three separate days, with mean (\pm SD) relative humidities of 59.4 (0.5)%, 54.2 (0.3)% and 66.2 (0.7)%; the temperature was 23 \pm 1°C during these tests.

The stains were digitized and their optical densities recorded using a PC-based digitizing system. The data from protocol 1 produced a graph of pressure against optical density; a fifth-order regression curve, applied to these data, showed differences between the responses of the two groups. From protocol 2, a combined analysis of variance showed significant differences between groups at both 1.8 MPa/59.4% R.H. and at 2.5 MPa/59.4% R.H..

These results show that, while it is possible to obtain a valid calibration from sealed Fuji film, its response is significantly different to that from the control-group under some ambient conditions. Therefore, the use of sealed Fuji film in a test situation requires a calibration to be conducted with sealed film.

An additional observation was that stains from the sealed-group exhibited a less even distribution of colour when compared to the output from the control-group. This phenomenon requires further investigation.

CONCLUSION: Sealing Fuji Prescale pressure-sensitive film has a significant effect on its response under some ambient conditions; however, a valid calibration of the sealed film is still possible; this calibration should be conducted with sealed film.

SIGNIFICANCE: Experiments conducted using sealed Fuji film and which use unsealed material to obtain calibration data may produce erroneous results.