Seating Surface Temperature Reduction in Foam Carve Seating

West of Scotland Mobility and Rehabilitation Centre

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Background

The West of Scotland Mobility and Rehabilitation Centre (WestMARC) has an established process for in-house production of foam carve (FC) contoured seating. User feedback indicates that the greatest need for improvement is in the regulation of temperature to reduce perspiration. This study aims to discover what changes can be made to our FC seating in order to reduce the interface temperature and increase user comfort.

Aim

- To establish a protocol for measuring temperature in foam carve seating,
- To investigate and minimise the errors associated with the measurement technique,
- To investigate if the measurement would be sensitive to common strategies used for regulating temperature in FC seating.

Equipment

1 x standard FC seat

1 x modified FC seat (air channels)

1 x reverse Dartex cover

1 x Spacer fabric cover

6 x Thermistors (BETATHERM 3K3A1B (+/- 0.1^{0}C))

1 x M-7000 data logger & software

1 x 10.8W fan (directed at sacrum)

1 x 1.2W fan (directed at groin)

Methodology

Ambient maintained @ 30^{0}C +/- 1^{0}C and 40-50% humidity, to promote sensible moisture

Chair tilted to 25^0 to distribute pressure evenly

It was found that only 3 tests were required per seating variant as disparity between results was very low

One healthy subject sat in the seat wearing cotton trousers and T-shirt for 65 mins to ensure temperature had plateaued (found to be after a 1 hour)

Testing started 2 hours after lunch

Thermistor sampling rate of 1Hz

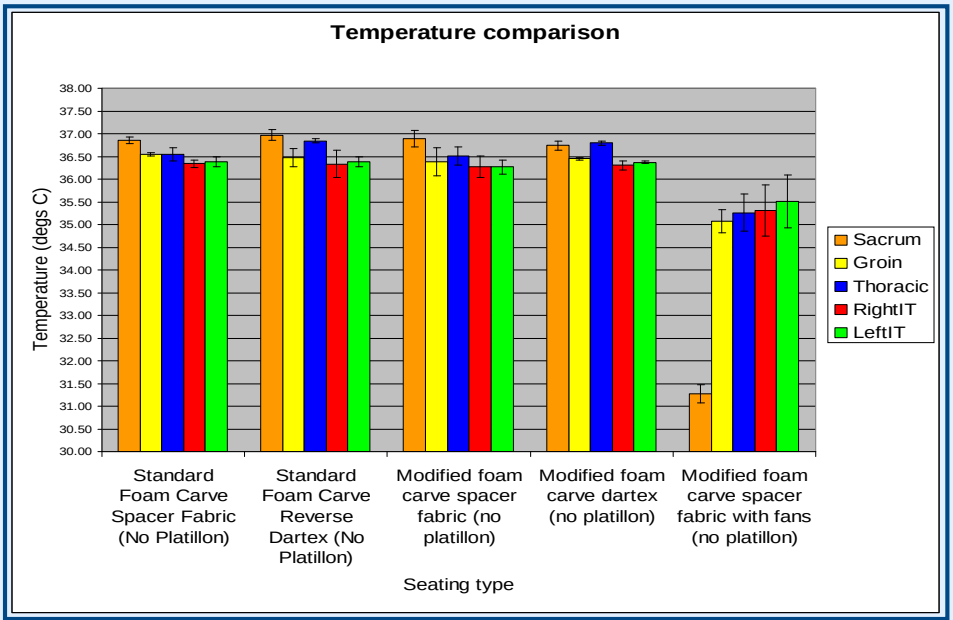
Mean temperature and SD calculated for the last 5 mins of testing

Tested with: standard & modified FC

reverse Dartex & Spacer fabric

Modified FC with fans & spacer fabric

Results



Discussion

The measurement technique used in this study has shown to be repeatable and is also reproducible.

The results suggest that different cushion covers may have very little effect on interface temperature and that an active method of cooling is required.

To test using more subjects will require an FC seat to be manufactured per subject to ensure optimum envelopment and reduce error.

We subjectively found that perspiration increased when using dartex although temperature remained similar

Future Work

To increase reliability, further testing will be carried out with more test subjects.

We aim to carry out a similar test with hygrometers to measure humidity. Although maintaining ambient humidity may prove difficult.