Hydrostatic Head - rise condition analyses

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June 16, 2016

Introduction

This document presents an analyses of the work performed by Rotecno when measuring the hydrostatic head of a number of different test fabrics using two different rise rates as per ISO 811. All data supplied by Robert Riedo at Rotecno, analyses by Pete Phillips of SMTL.

These fabrics are from the Rotecno archive and are not commercially offered products.

In the graphs below, the 20cm limit referred to in EN 13795 is denoted by an orange line.

Summary Statistics & Graphs

Table 1: Summary statistics of hydrostatic head data for seven materials using two different rates of rise.

			height				
material	rate	n	mean	sd	min	max	first.quartile
1	10	5	15.70	1.15	14.00	16.50	15.00
	60	5	22.00	3.10	18.50	25.50	20.00
2	10	5	11.60	0.82	10.50	12.50	11.00
	60	5	18.96	0.84	17.50	19.50	19.00
3	10	5	18.20	1.75	16.00	20.50	17.00
	60	5	26.64	2.77	22.00	29.00	26.70
4	10	5	12.30	1.40	10.00	13.50	12.00
	60	5	20.46	2.87	17.00	24.90	19.50
5	10	5	11.10	0.42	10.50	11.50	11.00
	60	5	17.22	1.61	15.10	19.00	16.00
6	10	5	13.80	2.25	11.00	17.00	12.50
	60	5	26.00	3.22	22.50	31.00	24.50
7	10	5	19.20	1.52	16.50	20.00	19.50
	60	5	29.58	1.65	27.00	31.00	29.00

Table 2: p-values from t.tests for each material comparing hydrostatic heads from each of the two rise rates

material	p.value
1	0.00775525
2	6.6e-07
3	0.00078531
4	0.00140764
5	0.00068042
6	0.00020142
7	7.03e-06

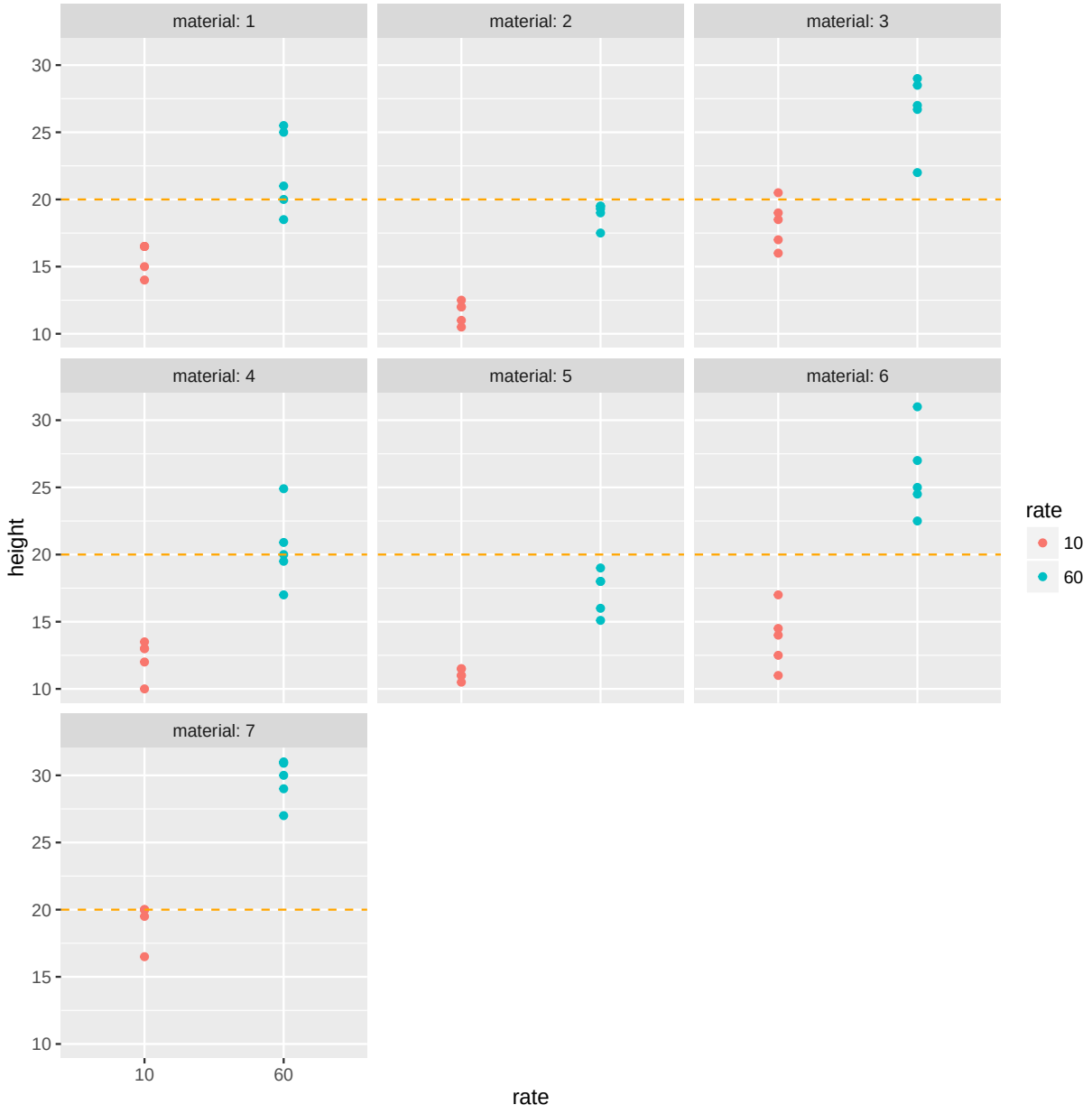

Figure 1: Graphs showing differences in hydrostatic head height for seven materials using two different rates of rise.

Conclusion

Fabrics for this particular end use, surgical textiles, standard performance- critical areas (nominally dry procedures) are required to have a hydrostatic head of 20cm at the 1st quartile value (draft for the revision of EN 13795-1:2016).

- Larger variation is seen in the results with the faster rate rise (60cm/min), which implies less precision in the test results;

- The results for each material are statistically significantly different in every case when the hydrostatic head for the two different rates are compared using a t.test;
- All fabrics failed at 10 cm/min, but 4 of the 7 would have passed at 60 cm/min.

This data supports comments on WD 811 registered with ISO by UK and France i.e. that when tested at 60 cm/min rise the results are elevated compared to the results at 10 cm/min and that frequently the precision at 60 cm/min is significantly worse.

The replacement of the 10cm/min rate with 60cm/min may cause some previously unsatisfactory materials to pass the requirements of 13795-1.