# SAWTRI TECHNICAL REPORT

No. 572



# Further Studies involving the SAWTRI Length/Strength Tester

by

D W F Turpie and J Cizek

SOUTH AFRICAN
WOOL AND TEXTILE RESEARCH
INSTITUTE OF THE CSIR

P.O. BOX 1124
PORT ELIZABETH
REPUBLIC OF SOUTH AFRICA

ISBN 0 7988 3213 4

# FURTHER STUDIES INVOLVING THE SAWTRI LENGTH/STRENGTH TESTER*

*by*

*D W F TURPIE and J CIZEK*

## ABSTRACT

*A number of profiles of raw wool staples are illustrated, and also the profile of a raw mohair staple. It is shown that testing of the strength of raw wool staples at a short gauge (20mm), in addition to the maximum practical gauge, (namely where the staple is clamped 18mm from both root and tip), can be potentially useful in explaining variations in percentage noil during subsequent combing. Further experiments have shown that collective information on the profiles of raw staples could have application in the prediction of the length characteristics of wool and mohair tops.*

## INTRODUCTION

An introduction to the SAWTRI length/strength tester for raw wool staples was presented to the Technical Committee of the IWTO in January 1985, and has since been published as a SAWTRI Technical Report[1].

The instrument was developed for the routine automatic measurement of the cross-sectional profile and length of a wool staple, the position of its thinnest place, its tenacity and the work required to break it. Results of some initial studies showed good correlations between the lengths measured manually and on the machine, and between the positions of the thinnest placed identified by the instrument and the positions of actual break. Many different staple profiles were encountered, and not only were profound differences identified between different wool lots in respect of their strength characteristics, but also between different staples within a lot. The instrument is currently being evaluated by the South African Wool Board.

Since the previous publication[1], some further work has been carried out to assess the adaptability of the SAWTRI system to a wider range of staple types

*Paper presented to the Technical Committee of the IWTO at the 54th International Wool Conference held in Barcelona, May 1985.

in respect of length testing, and to assess the feasibility and usefulness of extending the range of the strength tests to provide information at different gauge lengths. This work is summarised in this paper.

## EXPERIMENTAL AND DISCUSSION

### 1. Initial experiments at maximum gauge and at a short gauge:

During some initial experiments, significantly different staple tenacity results were obtained on certain samples tested at the maximum practical gauge length compared with being tested at a gauge length of 20mm . Subsequently, 27 different wool lots were tested, both at the maximum practical gauge (namely where the staple was clamped 18mm from both tip and root) and at a fixed gauge of 20mm (the jaws being positioned at 18mm and 38mm from the root). About 10 staples were selected from each lot and were carefully split longitudinally into two sub-samples, the one half being subjected to the maximum gauge test while the remaining half was subjected to testing at a gauge length of 20mm . The strength results were expressed in terms of both the average estimated linear density of the wool between the clamps and in terms of the estimated linear density of the thinnest place between the clamps. The results of this experiment are given in Table I and correlations between the various strength results are given in Table II.

While Table II shows that highly significant correlations were evident between the various strength results, Table I illustrates that wide variations in the individual ratios between the short gauge and maximum gauge results can occur.

### 2. Examination of some staple profiles and stress/extension curves at maximum gauge and short gauge:

Fig. 1 shows three examples of the type of profile and stress/extension curve that was found with relatively high tenacity staples when half of the staple in each case was tested at maximum gauge and the other half at a fixed gauge of 20mm . The position of the clamps is clearly shown on each figure. Additionally, a vertical line is shown either between the clamps or coincident with one of them. This vertical line identifies the thinnest part of the staple between the two clamps. The lower profile curve is an estimate of the scoured profile of the staple. The lower of the two stress/extension curves pertains to the tenacity results expressed on the *average* cross-sectional area, whereas the other curve pertains to the tenacity results expressed on the *minimum* cross-sectional area between the clamps. The latter has been used in the discussion which follows.

It is clear from Fig. 1, that peak tenacities of around 100N/ktex were obtained on all the staples illustrated, irrespective of whether the staples were subjected to the strength test at maximum gauge or at a gauge of 20mm . It

## TABLE I
## COMPARISON OF AVERAGE STRENGTH RESULTS OBTAINED AT MAXIMUM GAUGE LENGTH AND SHORT GAUGE LENGTH

| | MAXIMUM GAUGE | | | | | SHORT GAUGE | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lot No. | Gauge Length (mm) | Standard deviation (mm) | Thinnest place between clamps (%) | Peak Tenacity (N/ktex) based on average cross-section | Peak Tenacity (N/ktex) based on minimum cross-section | Gauge Length (mm) | Thinnest place between clamps (%) | Peak Tenacity (N/ktex) based on average cross-section | Peak Tenacity (N/ktex) based on minimum cross-section |
| BR58 | 48,3 | 4,3 | 76 | 24,1 | 31,0 | 20 | 83 | 61,6 | 74,0 |
| BR99 | 44,7 | 8,2 | 82 | 49,2 | 58,6 | 20 | 92 | 71,9 | 77,7 |
| BR75 | 46,6 | 8,6 | 77 | 30,4 | 39,8 | 20 | 90 | 50,7 | 56,2 |
| PP153 | 39,9 | 9,6 | 86 | 62,4 | 72,2 | 20 | 89 | 71,7 | 79,3 |
| PP139 | 50,9 | 15,2 | 75 | 44,4 | 58,4 | 20 | 82 | 59,8 | 70,1 |
| BR33 | 41,2 | 8,3 | 88 | 46,3 | 52,5 | 20 | 92 | 64,1 | 69,7 |
| BR65 | 30,0 | 5,3 | 80 | 53,7 | 67,5 | 20 | 85 | 75,4 | 89,5 |
| PP72 | 41,9 | 8,1 | 86 | 65,2 | 74,7 | 20 | 90 | 74,6 | 82,9 |
| BR41 | 35,4 | 5,6 | 87 | 61,6 | 69,7 | 20 | 91 | 79,5 | 86,5 |
| BR67 | 50,2 | 9,4 | 84 | 60,6 | 72,8 | 20 | 96 | 91,2 | 95,4 |
| BR35 | 44,3 | 8,2 | 77 | 32,3 | 41,8 | 20 | 87 | 52,6 | 60,6 |
| BR96 | 47,8 | 11,4 | 86 | 43,1 | 50,4 | 20 | 93 | 66,7 | 71,5 |
| BR42 | 41,3 | 9,1 | 78 | 48,0 | 62,2 | 20 | 89 | 62,7 | 70,2 |
| PP122 | 52,2 | 9,3 | 88 | 74,1 | 84,1 | 20 | 92 | 88,0 | 95,4 |
| BR88 | 57,0 | 11,2 | 82 | 72,0 | 87,1 | 20 | 83 | 73,2 | 89,1 |
| BR15 | 45,2 | 7,6 | 86 | 70,1 | 81,1 | 20 | 89 | 74,8 | 83,3 |
| PP55 | 59,0 | 17,8 | 81 | 39,3 | 46,7 | 20 | 92 | 66,9 | 72,4 |
| PP57 | 55,6 | 18,9 | 83 | 67,4 | 80,8 | 20 | 90 | 80,5 | 89,7 |
| PP49 | 57,8 | 21,8 | 71 | 39,7 | 55,7 | 20 | 88 | 65,2 | 73,4 |
| BR27 | 60,3 | 22,6 | 76 | 44,5 | 58,5 | 20 | 87 | 74,6 | 85,4 |
| BR53 | 70,7 | 9,9 | 83 | 32,0 | 38,2 | 20 | 92 | 59,1 | 64,3 |
| BR11 | 56,2 | 9,8 | 82 | 68,2 | 83,8 | 20 | 89 | 80,6 | 90,7 |
| PP101 | 48,7 | 16,3 | 72 | 38,5 | 53,2 | 20 | 89 | 60,1 | 67,6 |
| BR08 | 58,0 | 18,2 | 75 | 38,6 | 49,2 | 20 | 87 | 63,5 | 72,4 |
| BR09 | 53,8 | 7,2 | 78 | 67,3 | 85,0 | 20 | 90 | 78,8 | 87,1 |
| BR21 | 54,4 | 7,4 | 86 | 67,1 | 78,5 | 20 | 93 | 89,1 | 95,5 |
| BR93 | 57,8 | 15,3 | 73 | 43,0 | 59,6 | 20 | 85 | 64,1 | 75,0 |
| Mean | 50,0 | | 80,7 | 51,2 | 62,7 | | 89,1 | 70,4 | 78,7 |
| S.D. | 8,8 | | 5,2 | 14,7 | 16,2 | | 3,4 | 10,6 | 11,0 |
| CV(%) | 18,0 | | 5,0 | 29,0 | 26,0 | | 4,0 | 15,0 | 14,0 |

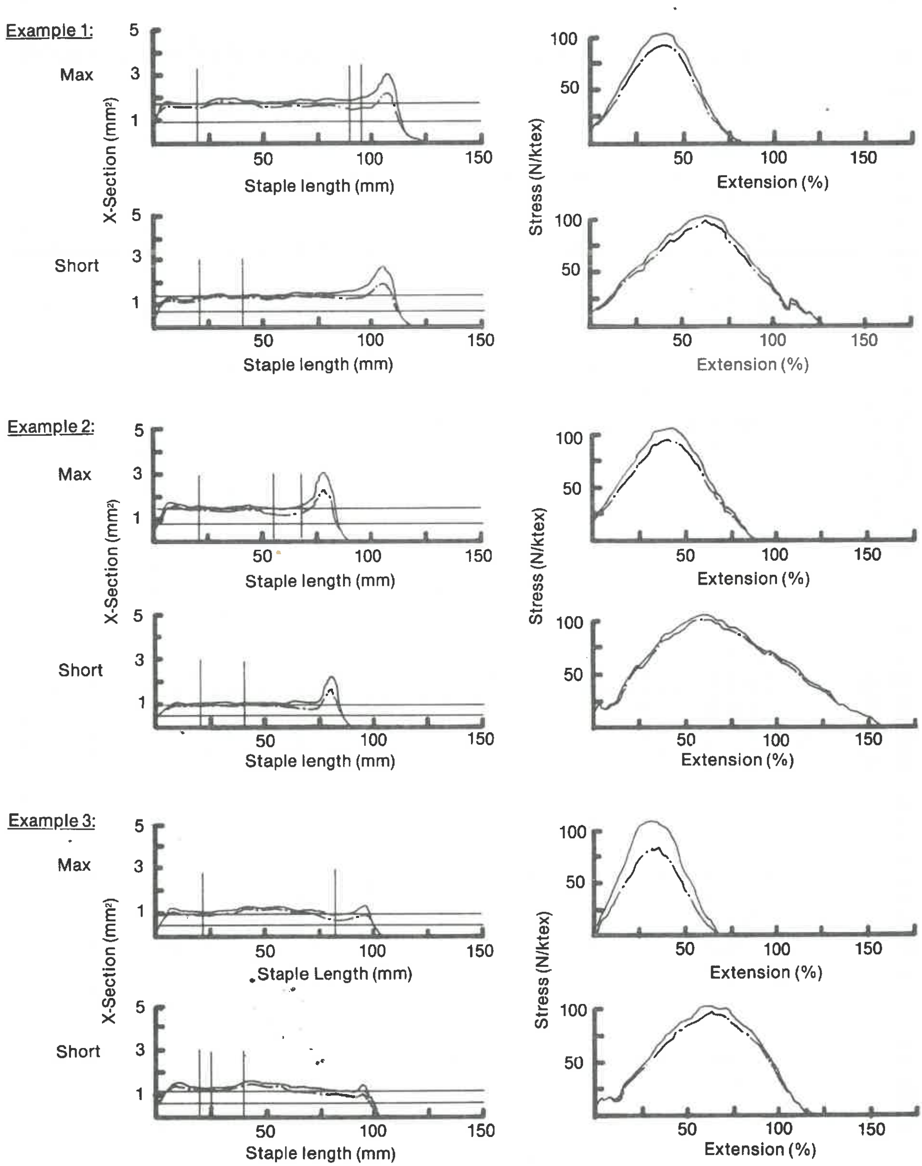


**Fig. 1: Profiles and Stress/Extension Curves of Split Staples of High Tenacity Tested at Maximum Gauge and Short Gauge Respectively**

should be noted that the profiles of the staple halves were well matched and showed little evidence of thinning anywhere along their length.

Fig. 2 shows three examples of the type of profile and stress/extension curve that was found with medium tenacity staples at maximum gauge and at a gauge of 20mm . Peak tenacity values of around 75 N/ktex were measured and again these appeared to be little influenced by the gauge length. Again the profiles of the staple halves appeared well matched, and showed little evidence of thinning.

Three examples of profiles and stress/extension curves found with low tenacity staples are shown in Fig. 3. The first example, although of unusual profile, shows no obvious staple weakness and the peak tenacity values are about the same for maximum gauge and 20mm gauge. The second example shows slightly higher tenacity at short gauge than at maximum gauge, but the profiles were not very well matched, and the one pertaining to the maximum gauge test shows a slightly more marked trough between the clamps. The third example shows that peak tenacity was almost the same at maximum and at short gauge, but the reason is clearly seen from the profile which shows a

## TABLE II
## CORRELATIONS BETWEEN VARIOUS STRENGTH RESULTS

| | | | Peak Tenacity | | | |
|---|---|---|---|---|---|---|
| | | | Maximum Gauge | | Short Gauge | |
| | | | Average Cross-section | Minimum Cross-section | Average Cross-section | Minimum Cross-section |
| Peak Tenacity | Maximum Gauge | Average | 1 | 0,98 | 0,84 | 0,84 |
| | | Minimum | | 1 | 0,81 | 0,84 |
| | Short Gauge | Average | | | 1 | 0,97 |
| | | Minimum | | | | 1 |

| | | | Work to Break | | | |
|---|---|---|---|---|---|---|
| | | | Maximum Gauge | | Short Gauge | |
| | | | Average Cross-section | Minimum Cross-section | Average Cross-section | Minimum Cross-section |
| Work to Break | Maximum Gauge | Average | 1 | 0,99 | 0,76 | 0,75 |
| | | Minimum | | 1 | 0,74 | 0,73 |
| | Short Gauge | Average | | | 1 | 0,99 |
| | | Minimum | | | | 1 |

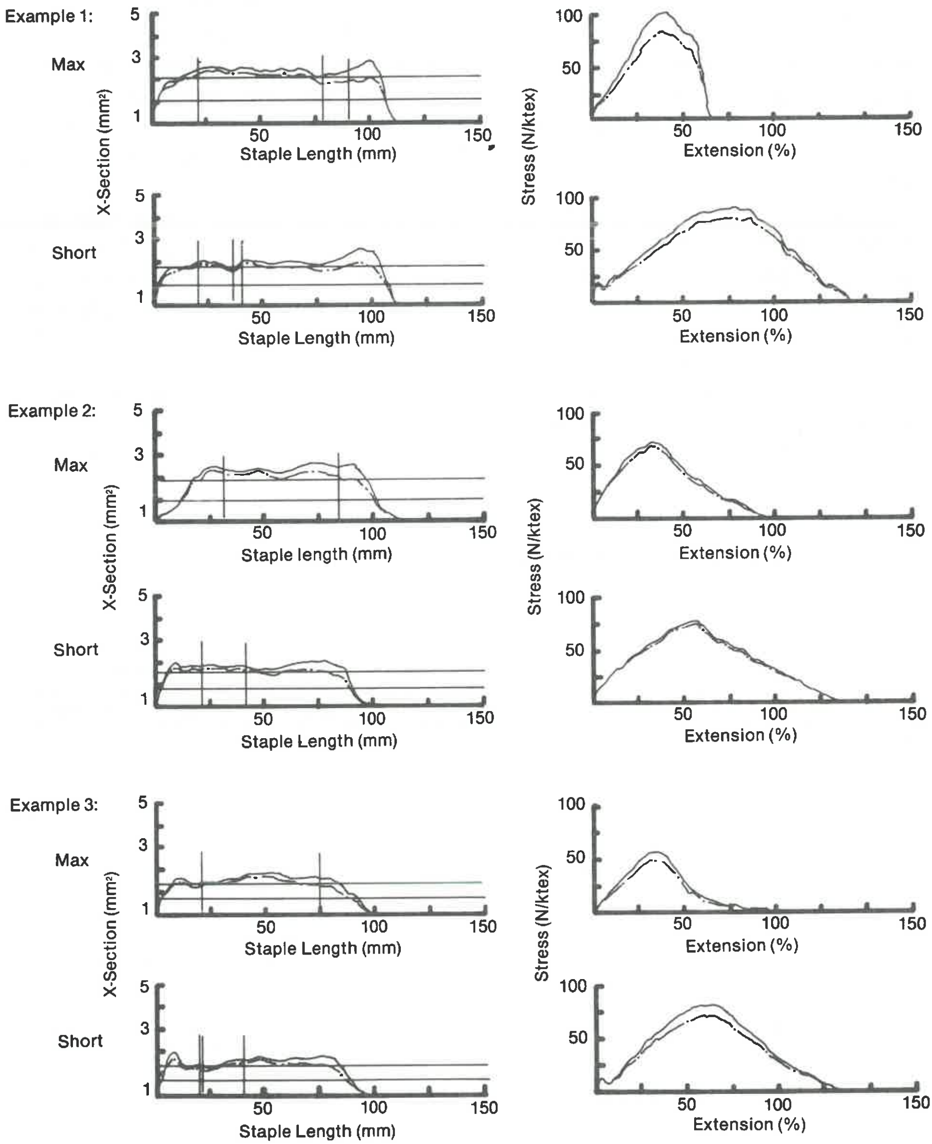


**Fig. 2: Profiles and Stress/Extension Curves of Split Staples of Medium Tenacity Tested at Maximum Gauge and Short Gauge respectively.**

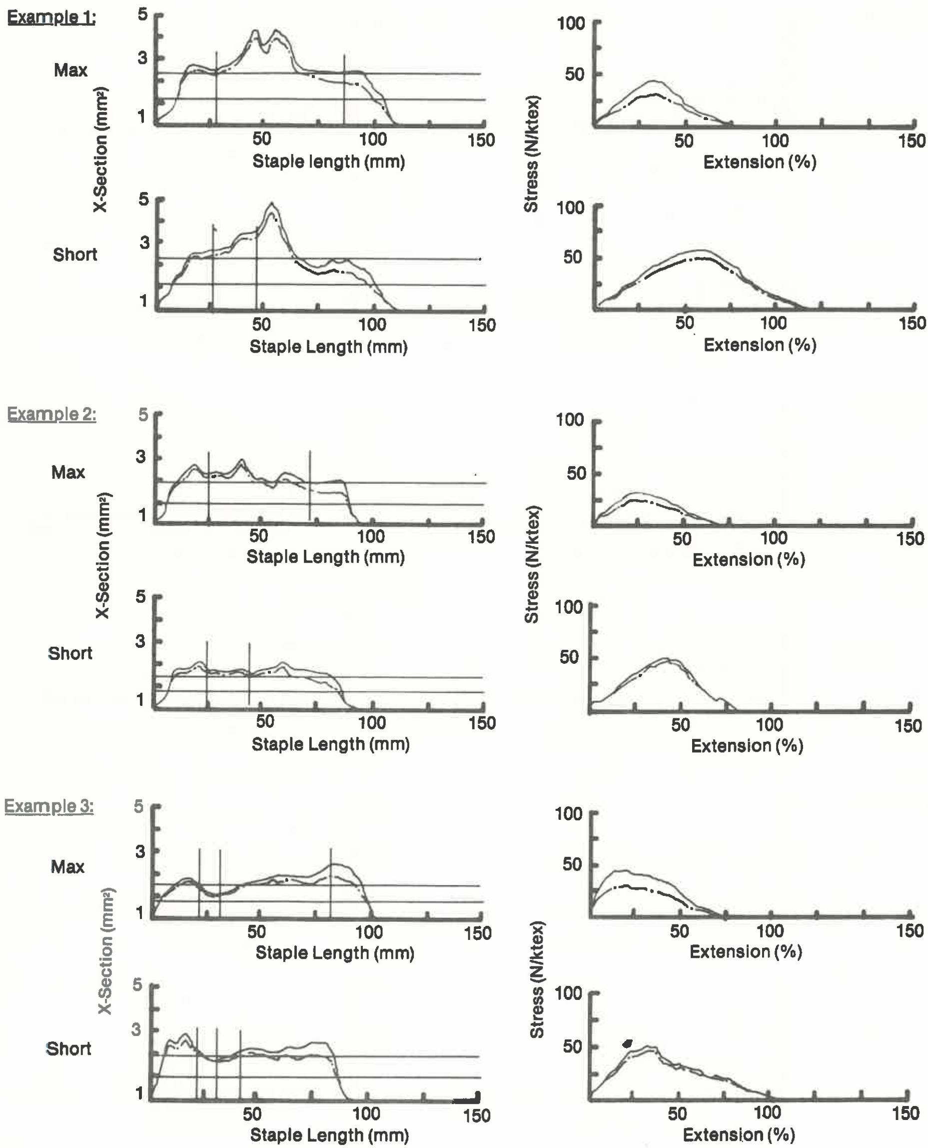


**Fig. 3: Profiles and Stress/Extension Curves of Split Staples of Low Tenacity Tested at Maximum Gauge and Short Gauge Respectively.**

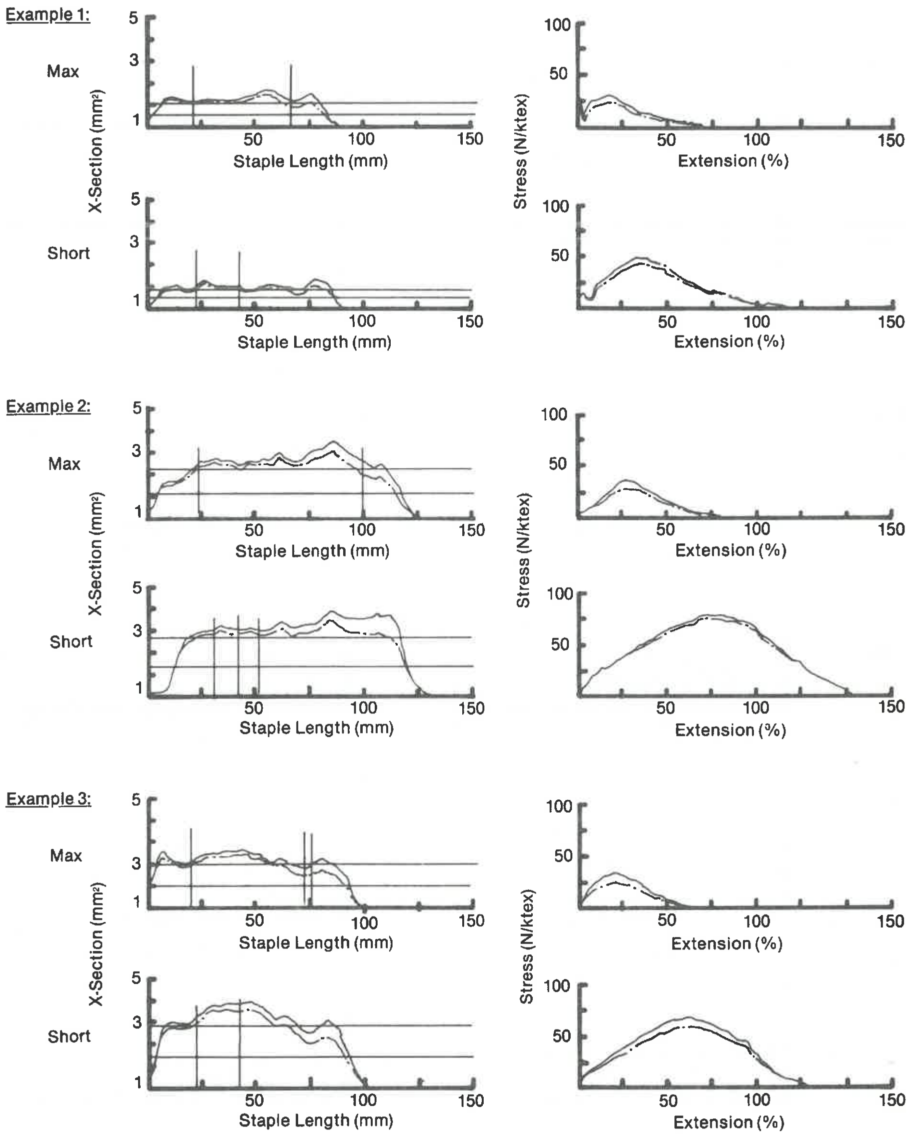


**Fig. 4: Profiles and Stress/Extension Curves of Split Staples Exhibiting Possible Tip Weakness.**

marked thinning of the staple near the root-end in both the maximum and short gauge tests.

Staples illustrated thus far have ranged widely in their tenacity, but have exhibited little difference in the forces measured on maximum or short gauge. There are, however, as expected, many instances where significant differences have been observed between maximum gauge and short gauge measurements. If there is a weakness or thinning near the staple tip, for example, and this falls within the zone between the clamps at maximum gauge, as shown by the examples given in Fig. 4, there is frequently a dramatic increase in the tenacity value when the other half of the same staple is tested at short gauge. A similar situation arises if a tender staple is so tested that the tender place falls within the zone between the clamps during the maximum gauge test, but not during the short gauge test.

Further examples of large differences in tenacity are shown in Fig. 5, the first of these illustrating a possible weakness near the centre of the staple, and the second example illustrating a possible weakness near the tip.

### 3. A case study involving associated processing trials

As a result of the above investigation, it became clear that there could be some merit in testing the strength of raw wool staples both at maximum and at short gauge, provided the short gauge test was conducted on a part of the staple which did not include the thinnest place. Theoretically the test should, in this way, distinguish between staples of different "intrinsic" strength as well as between tender and sound staples, and such information could be of importance in explaining the behaviour of such wools during topmaking. It was therefore decided to conduct length/strength tests both at maximum gauge and at short gauge on a selection of wools, and to monitor their processing performance through to the top stage. A total of 12 lots were studied. All were processed on the same settings, and under the same conditions.

Staple length and strength measurements were carried out on 90 staples from each lot. Strength measurements at maximum gauge were carried out on 60 of these staples, while measurements at short gauge were carried out on the remaining 30 staples. The maximum gauge measurements were completed first, and in view of the fact that for those samples exhibiting tenderness, the thinnest place tended to be nearer the root than the tip, the remaining 30 staples were fed into the machine tip-first, to reduce the risk of the thinnest places in the staples falling between the clamps at short gauge. Additionally, the computer was programmed to reject any result for a particular staple if the thinnest place fell between the clamps.

Table III shows by way of an example the results obtained on 30 staples from one of the processing batches which was tested at a gauge of 20mm . It can be

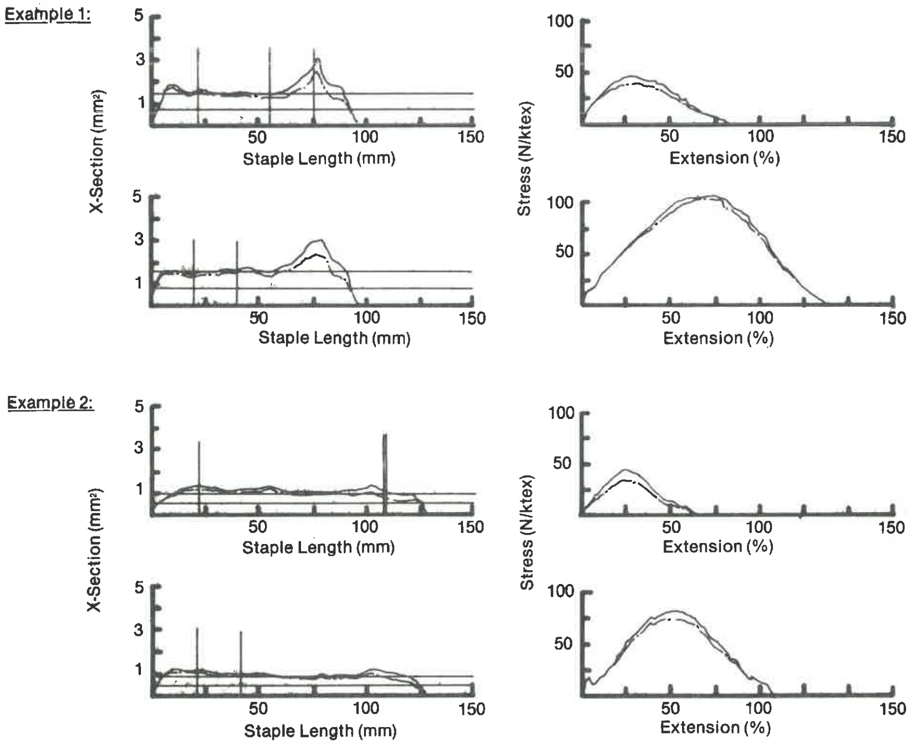


**Fig. 5: Profiles and Stress/Extension Curves of Split Staples Exhibiting Weakness near their Centre and Tip, respectively.**

## TABLE III
## EXAMPLE OF INDIVIDUAL RESULTS OBTAINED ON 30 STAPLES FROM ONE LOT (LOT NO SLT 1) TESTED AT SHORT GAUGE

| Staple Number | Staple Length (mm) | Mean cross-section ($mm^2$) | Thinnest Place | | Peak Tenacity (N/ktex) | | Thinnest place is between clamps |
|---|---|---|---|---|---|---|---|
| | | | Magn. (%) | Pos. (%) | Based on minimum x-section | Based on average x-section | |
| 1 | 81,8 | 1,90 | 96,7 | 38,3 | 30,5 | 29,5 | No |
| 2 | 108,7 | 1,62 | 94,9 | 33,2 | 33,4 | 31,7 | No |
| 3 | 82,0 | 2,54 | 80,5 | 33,1 | — | — | Yes |
| 4 | 87,2 | 1,74 | 85,7 | 29,9 | — | — | Yes |
| 5 | 87,7 | 1,63 | 94,3 | 26,4 | — | — | Yes |
| 6 | 91,2 | 1,89 | 81,8 | 47,1 | 70,1 | 57,4 | No |
| 7 | 91,3 | 1,85 | 93,1 | 25,3 | — | — | Yes |
| 8 | 80,7 | 2,63 | 81,6 | 34,7 | — | — | Yes |
| 9 | 85,1 | 1,67 | 89,8 | 49,6 | 48,9 | 43,9 | No |
| 10 | 71,1 | 1,74 | 96,4 | 35,3 | 48,8 | 47,0 | No |
| 11 | 104,1 | 2,02 | 97,5 | 30,9 | 61,1 | 59,5 | No |
| 12 | 97,1 | 2,01 | 89,6 | 31,2 | — | — | Yes |
| 13 | 77,4 | 1,93 | 82,3 | 53,0 | 66,2 | 54,5 | No |
| 14 | 71,0 | 1,91 | 90,7 | 56,5 | — | — | Yes |
| 15 | 117,4 | 2,22 | 94,1 | 25,0 | 68,5 | 64,4 | No |
| 16 | 76,4 | 1,59 | 80,0 | 56,4 | 42,9 | 34,4 | No |
| 17 | 78,8 | 1,62 | 90,0 | 54,6 | 63,6 | 57,2 | No |
| 18 | 90,6 | 2,35 | 93,6 | 25,5 | 38,8 | 36,3 | No |
| 19 | 108,4 | 1,84 | 92,6 | 38,1 | 56,9 | 52,7 | No |
| 20 | 77,4 | 1,72 | 94,8 | 29,9 | 57,6 | 54,6 | No |
| 21 | 106,3 | 1,73 | 93,4 | 27,4 | 85,4 | 79,8 | No |
| 22 | 90,0 | 1,78 | 89,2 | 47,9 | 56,0 | 49,9 | No |
| 23 | 70,3 | 1,71 | 88,1 | 31,7 | — | — | Yes |
| 24 | 82,1 | 1,32 | 90,0 | 51,4 | 52,3 | 47,1 | No |
| 25 | 103,0 | 2,10 | 92,8 | 39,0 | — | — | Yes |
| 26 | 87,0 | 2,14 | 95,4 | 48,6 | 50,6 | 48,3 | No |
| 27 | 93,2 | 1,74 | 93,3 | 29,2 | — | — | Yes |
| 28 | 69,0 | 2,48 | 94,7 | 35,1 | — | — | Yes |
| 29 | 101,7 | 2,02 | 94,5 | 35,4 | 69,5 | 65,6 | No |
| 30 | 102,1 | 1,72 | 95,8 | 41,3 | 69,7 | 66,8 | No |
| Mean | 89,0 | 1,91 | 90,9 | 38,0 | 56,4 | 51,6 | |
| CV | 14,6 | 15,9 | 5,7 | 26,6 | 24,9 | 25,3 | |

Total Length Results = 30
Total Acceptable Strength Results = 19

## TABLE IV
## LENGTH/STRENGTH DATA, DIAMETER AND COMBING RESULTS PERTAINING TO 12 DIFFERENT LOTS

| Lot No. | Staple Length (mm) | M F D ($\mu$m) | Thinnest Magni-tude (%) | Thinnest Position (%) | Max. Gauge Tenacity on min. (N/ktex) | Work on min (N/ktex. mm) | Max. Gauge Tenacity on Mean (N/ktex) | Work on Mean (N/ktex. mm) | Short Gauge Tenacity | | Noil (%) | Hauteur (mm) | Short Fibre (% <25mm) | 5% Length (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | on Min (N/ktex) | on Mean (N/ktex) | | | | |
| SLT 1 | 86 | 20.4 | 82 | 39 | 44 | 2047 | 36 | 1681 | 56 | 52 | 4,03 | 62,2 | 11,5 | 115,0 |
| 2 | 90 | 23,2 | 72 | 45 | 34 | 1810 | 26 | 1439 | 75 | 63 | 2,76 | 58,3 | 10,4 | 113,6 |
| 3 | 91 | 22,3 | 79 | 32 | 47 | 2564 | 38 | 2083 | 72 | 66 | 3,18 | 63,8 | 11,6 | 124,3 |
| 4 | 67 | 22,1 | 83 | 45 | 42 | 2359 | 35 | 1981 | 83 | 76 | 3,85 | 51,2 | 18,9 | 91,8 |
| 5 | 67 | 20,5 | 85 | 45 | 31 | 1864 | 26 | 1599 | 33 | 28 | 7,07 | 50,1 | 19,3 | 93,2 |
| 6 | 79 | 23,7 | 78 | 38 | 34 | 1605 | 27 | 1273 | 72 | 62 | 2,65 | 56,8 | 11,1 | 104,3 |
| 7 | 87 | 20,4 | 83 | 42 | 74 | 3975 | 62 | 3374 | 82 | 73 | 3,53 | 67,3 | 5,6 | 115,0 |
| 8 | 78 | 19,1 | 84 | 46 | 71 | 4008 | 59 | 3355 | 84 | 75 | 5,53 | 56,7 | 13,7 | 102,8 |
| 9 | 85 | 21,6 | 84 | 41 | 79 | 4237 | 67 | 3629 | 87 | 79 | 3,29 | 67,5 | 7,0 | 112,2 |
| 10 | 79 | 22,0 | 83 | 35 | 76 | 4223 | 64 | 3565 | 79 | 73 | 2,70 | 74,3 | 1,6 | 112,5 |
| 11 | 75 | 22,3 | 82 | 34 | 69 | 3877 | 57 | 3240 | 81 | 73 | 2,38 | 65,2 | 6,5 | 102,1 |
| 12 | 75 | 23,7 | 88 | 39 | 73 | 4961 | 64 | 4392 | 94 | 88 | 1,69 | 65,7 | 8,0 | 99,8 |

seen that only 19 out of the 30 staples met the condition that the thinnest place did not fall between the clamps. Nevertheless this success rate was considered satisfactory from the point of view that it at least provided useful additional information not hitherto available.

A summary of the average results for staple length, strength and diameter, together with the combing results for all 12 batches, is given in Table IV.

It can be seen from Table IV that the staple tenacity values measured at maximum gauge length varied from 26 to 67 N/ktex when based on the mean cross-sectional area, or from 31 to 79 N/ktex when based on the minimum cross-sectional area. Lots SLT 1 to 6 inclusive were considerably weaker on the basis of these results than Lots SLT 7 to 12.

The mean results obtained at short gauge were, in general, significantly higher than the results obtained at maximum gauge, although the variation in individual results was still large, being from as little as 33N/ktex to as much as 94 N/ktex. The results further suggested that Lot SLT 5 was "intrinsically" weak, since hardly any change took place in the strength values from maximum to short gauge. A similar impression could perhaps be obtained in the case of Lot SLT 1, whereas Lots SLT 2, 3, 4 and 6 showed considerable improvement in strength at short gauge. Lots SLT 7 to 12 which were the strongest when measured at maximum gauge, remained relatively the strongest also at short gauge.

Results for percentage noil and for the mean fibre length of the tops (hauteur) were related to the staple length ($X_1$), mean fibre diameter ($X_2$), thinnest magnitude ($X_3$), thinnest position ($X_4$) and staple strength ($X_5$ = maximum gauge, $X_6$ = short gauge) of the lots by means of multi-linear and multi-quadratic regression analyses. The following best fit equations were derived.

$$\% \text{ noil} = -0{,}00050X_1X_5 - 0{,}0105X_2X_6 + 0{,}00166X_6^2 + 13{,}0 \quad (\% \text{ fit} = 96{,}3$$

$$\text{Hauteur (mm)} = 0{,}0101X_1X_5 - 0{,}0136X_4X_5 + 48{,}9 \quad (\% \text{ fit} = 91{,}0)$$

$$5\% \text{ Tail length (mm)} = 1{,}057X_1 - 0{,}0262X_2X_4 + 45{,}6 \quad (\% \text{ fit} = 96{,}8)$$

$$\text{Fibres} < 25\text{mm } (\%) = -0{,}0027X_1X_5 + 0{,}0059X_3X_4 + 1{,}0 \quad (\% \text{ fit} = 79{,}4)$$

According to the above regression equations, the staple strength results based on the short gauge test played a significant role in explaining variations in percentage noil. Such a test could therefore be of practical importance.

**4. The use of collective information on wool staple profiles to obtain an estimate of fibre distribution:**

To obtain an estimate of raw fibre length distribution, a summation of the profiles of all the test staples tested were made after first normalising the staple thickness values so that all staples carried the same weight in the analysis. The

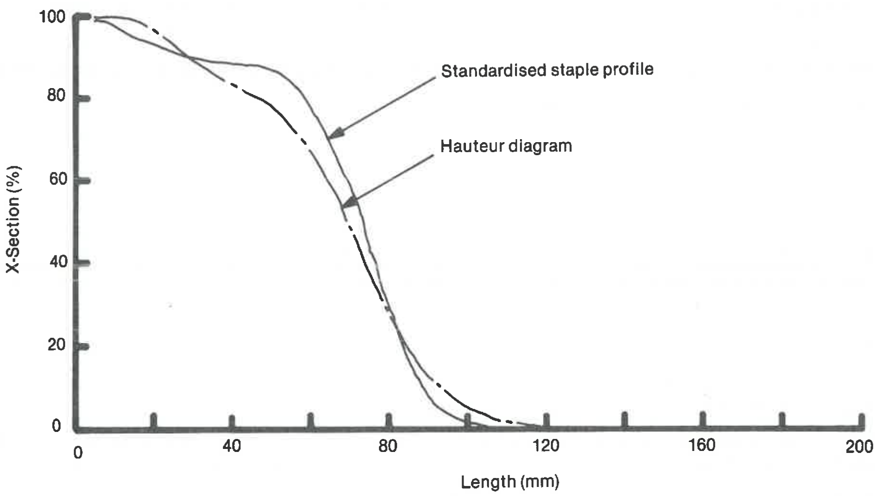


**Fig. 6: Standardised Staple Profile for a Wool Lot comprising Sound Staples (Lot SLT 12) together with the Hauteur Diagram of the Resultant Top.**

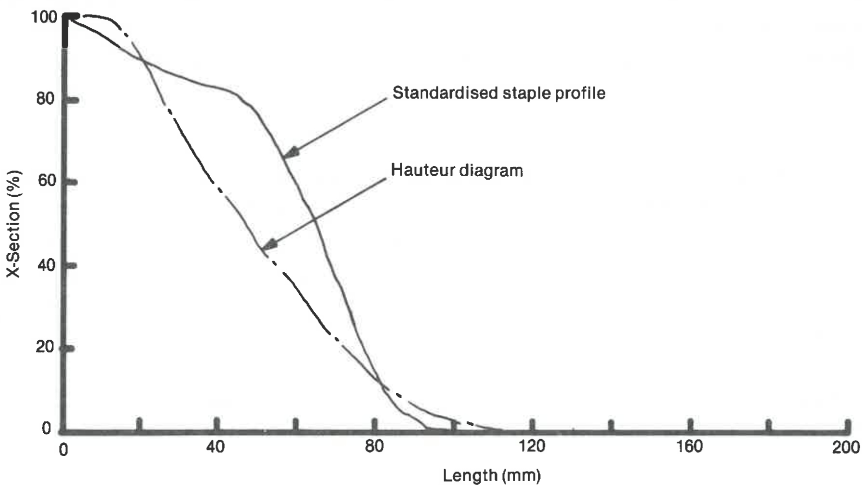


**Fig. 7: Standardised Staple Profile for a Wool Lot comprising Weak Staples (Lot SLT 5) together with the Hauteur Diagram of the Resultant Top.**

resultant curve obtained was then smoothed and standardised in such a way that, when completed, it simulated a fibre diagram. From the diagram a mean length, a tail length and a short fibre content were then obtained. Fig. 6 shows the resultant curve obtained for Lot SLT 12, and also shows the corresponding Hauteur Diagram which was obtained on the top produced from this lot. Fig. 7 shows the respective curves for Lot SLT 5.

No further comment will be made at this stage except to say that the technique looks interesting, and could possibly have application in the development of a mathematical model for the prediction of top characteristics from raw wool staple data obtained on the SAWTRI machine.

**5. Determination of the staple length and profile of mohair:**

Some initial studies have been carried out on the determination of the staple length and profile of mohair staples to test the adaptibility of the machine to this staple type. A typical example of a mohair staple profile is shown in Fig 8, from where it can be seen that a pronounced taper is evident from the root to the tip. The characteristic wave pattern of the staple can also be seen from the profile. The estimated scoured profile is somewhat the reverse to that found for wool in that the greatest correction for contaminants has to be made at the root end and the least at the tip. In a limited experiment covering 10 staples sampled from each of 15 mohair lots, but in which a wide range of length and diameter was covered, a relatively good correlation was found between the machine measured staple lengths of the mohair staples and the lengths measured by hand. The relation is shown in Fig. 9.

**6. The use of collective information on mohair staple profiles to obtain an estimate of fibre length distribution:**

The exercise reported above on the summation of wool staples was repeated on the fifteen mohair lots referred to above, and fibre diagrams obtained for each of the lots of raw hair. The mean length and tail length data obtained from these diagrams have been plotted against the mean fibre length and tail length of the tops which were produced from the hair in Figs. 10 and 11 respectively. Despite the small number of staples examined, the degree of association appeared to be relatively good (r = 0,80 and 0,76).

Although the results are limited to only a few lots at present, they confirm that the technique could have useful application in the prediction of top characteristics. This may be particularly so in the case of lots comprised of coarse strong fibres where breakage during processing is minimal.

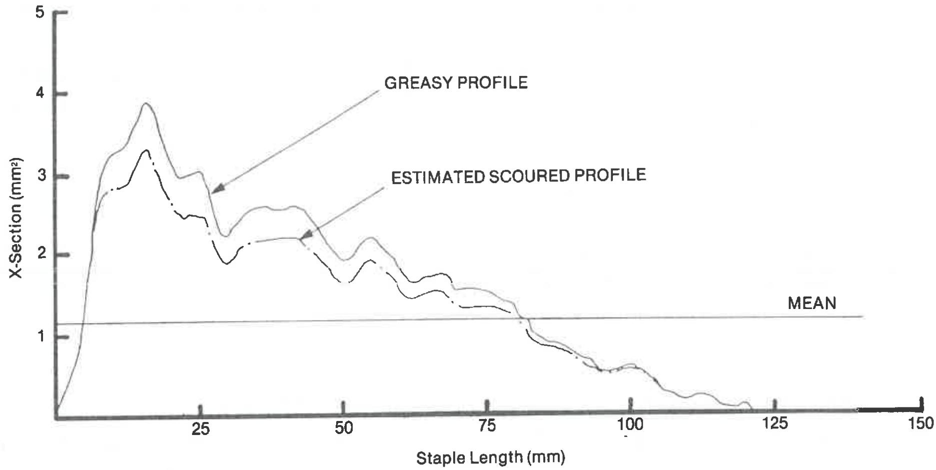


**Fig. 8: Example of a Raw Kid Mohair Staple Profile and also its Estimated Profile in the Scoured State.**

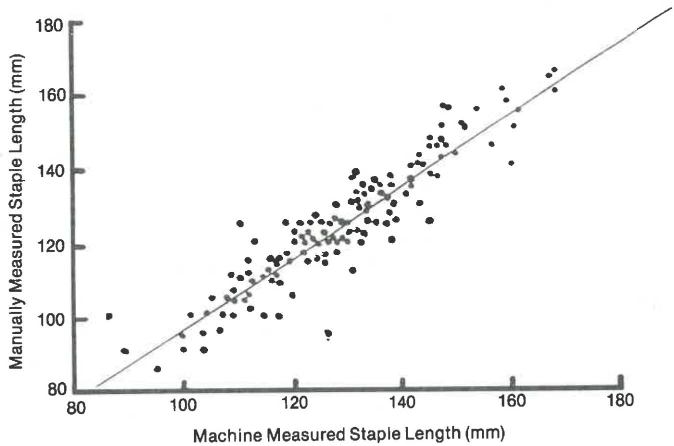


**Fig. 9: Machine Measured versus Manually Measured Staple Length for Mohair.**

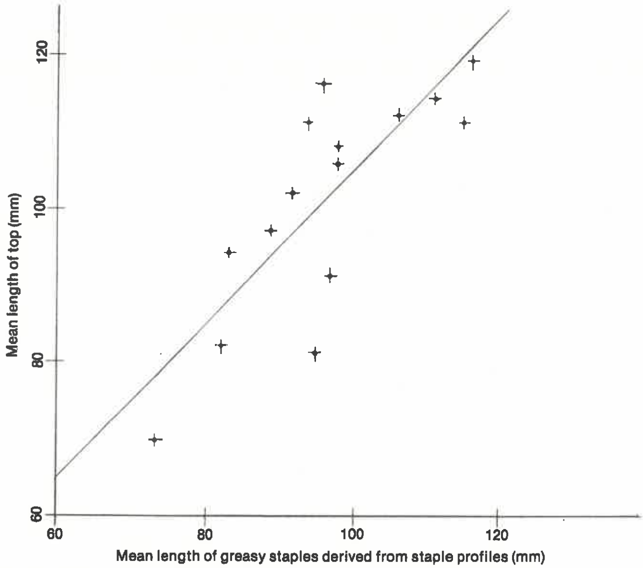


**Fig. 10 Mean Length of Greasy Staples Derived from the Standardised Staple Profiles of Raw Mohair versus the Mean Fibre Length of the Resultant Tops.**

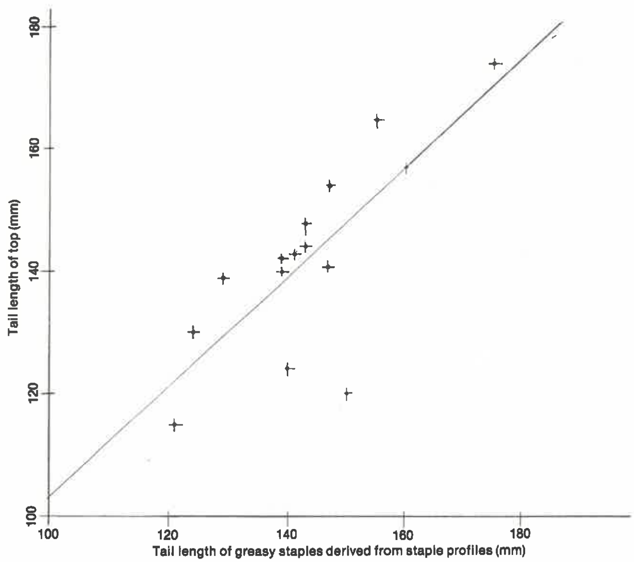


**Fig. 11: Tail Length (5% Length) of Greasy Staples derived from the Standardised Staple Profiles of Raw Mohair versus the Tail Length (5% Length) of the Resultant Top.**

## ACKNOWLEDGEMENTS

The Authors would like to thank the staff of the Department of Long Staple Processing for technical assistance and the South African Wool Board for permission to publish these results.

## REFERENCE

1. Cizek, J. and Turpie, D.W.F., An introduction to the SAWTRI Length/Strength Tester for Raw Wool Staples, *SAWTRI Tech. Rep.* No. 561 (March 1985).

Published by
The South African Wool and Textile Research Institute,
P.O. Box 1124, Port Elizabeth, South Africa,
and printed in the Republic of South Africa
by Nasionale Koerante Beperk, P.O. Box 525, Port Elizabeth



ISBN 0 7988 3213 4