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The testing of materials in the interest of quality (II)

In a previous article (see *Textiles Suisses* No. 1/1957, page 100) we stressed the importance of the testing of materials for the maintenance and improvement of quality in the textile industry. We should like to complete the previous article by describing certain practical examples, which will enable the layman to form a better idea of the value of this research.



Spectrograph attachment for analysing the yarn readings given by the « Uster » Evenness Tester.

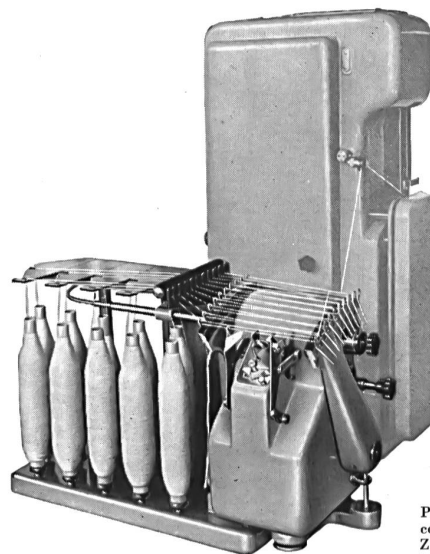
One very important field of testing is that concerning the quality of the yarns used for weaving, particularly with respect to their strength and evenness. Yarns are tested for breaking strength and elongation on an apparatus called a dynamometer. At one time these tests had to be carried out by hand, which required a great deal of time. Today Switzerland produces completely automatic dynamometers like the one we saw at the St. Gall Testing Institute. This apparatus carries out tests automatically along the whole length of a yarn, piece by piece, continuously recording the different readings as they are obtained: elongation, breaking load, etc. The graphs made in this way show any periodic unevenness in the yarn (places of least resistance). The cause of the unevenness is easily detected by comparing its periodicity with the length of yarn. These periodic faults are caused by defective working of the spinning frame and it is therefore possible to discover which part has a revolution corresponding to the length of yarn in question.

No matter how precise a spinning frame may be, the thickness of the yarn it spins will always vary slightly from one end to the other. It is therefore important to know whether the variation in the thickness of the yarn exceeds certain permissible tolerances laid down for each type of article. This test, which at one time had to be carried out by empirical means, is carried out today on a very ingenious machine which checks the thickness of the yarn continuously, as it unwinds, by electronic means, at the same time recording the points above or below certain previously laid down standards. The same apparatus also continuously and automatically records on a strip of paper the variations in thickness of the yarn.

With a second apparatus, a spectrograph, connected to the first, a curve may be drawn indicating the size of certain irregularities in the yarn compared with their wave length. This test is very important, for if too pronounced defects are repeated periodically in a yarn used as the weft of a fabric, they will cause the formation of undesirable patterns in the fabric itself, which will be conspicuous if they are repeated at too close intervals. The spectrograph reveals the origin of the periodic defects and consequently the means of eliminating them, since these defects are due to the faulty working of some part of the frame, as we have already explained above.

The importance of such tests in maintaining good quality or eliminating defects is obvious. That is why they are common practice in the textile industry today. They are also however carried out in official laboratories, for not all spinning mills can afford to possess the necessary equipment themselves; then again, the textile trade also requires similar analyses to be carried out for the classification of yarns, and it is sometimes necessary too, in cases of dispute for example, to be able to obtain the opinion of a neutral organisation.

The testing we have been considering so far concerns visible defects in the structure of a fabric. But there are other defects too, for example those which occur during dyeing owing to the fact that a dye will not always take with the same intensity on all textile fibres. If by mistake an article is made of two different yarns, it may lead to differences in shade which will spoil the appearance of the fabric and greatly reduce its market value. At EMPA, the Federal Institute for Testing Materials, we were shown cotton socks which had certain rows of stitches lighter in colour than the rest of the article. A careful examination of the socks showed that they were a double yarn knit, one of the yarns on the inside of the sock being lighter but appearing from time to time on the outside. A chemical analysis of the two yarns showed that one had been more heavily mercerised than the other; this difference was enough to cause the difference in the intensity of dyeing. A woollen garment also had several rows of stitches lighter than the others. The regular occurrence of these stitches made it possible to deduce that the yarn at fault came from a single reel of the circular knitting machine. Under the microscope it was seen that the lighter yarn was one of staple fibre which must have got among the woollen yarns by mistake, the difference in material accounting for the unevenness of the dyeing.



Photos: courtesy of Zellweger Ltd., Uster.

« Uster » yarn strength tester with automatic multiple-bobbin attachment.

The lives of airmen and airplane passengers may depend on the quality of a parachute fabric. The nylon fabric of which parachutes are made has to possess a specific degree of permeability to air in order to ensure a correct dropping speed. A very simple apparatus draws air through an orifice over which the parachute fabric is stretched. The quantity of air passing through the material is measured. If it is too much or too little, the manufacturer has to modify his manufacturing procedure by increasing or decreasing, as the case may be, the number of yarns to the square centimetre.

Among the tests applied to materials, many are carried out to make sure that the material of a uniform, for example, corresponds on delivery to the specifications of the government service that ordered it. On other occasions it is a question of determining for a manufacturer whether his product is suitable for the purpose for which it is intended. Occasionally, too, it is necessary to discover whether a fabric wears out or deteriorates too rapidly. In such cases, the fabric is subjected to friction, in particular by rubbing with brushes, abrasive disks or other surfaces. The permanent aim of the institute is the continual improvement of testing procedure and machinery so as to obtain ever more reliable results, that is to say independent of the periodic variations that may occur in the working of the testing instruments and spoil the results. The analysis of fabrics also involves the testing

of the yarns — often of different types — of which they are made. In this case the fabric is sometimes taken to pieces, the separated yarns then being rewoven into ribbons in order to carry out separate abrasion tests on each quality of yarn for the purpose of discovering the weakest link in the mixture.

Finally, let us mention the tests carried out on finished articles as a result of complaints on the part of consumers. It is generally a question of articles that have shrunk after washing or are prematurely worn out, etc. In this type of test, analysis unfortunately only too frequently shows that the major cause of damage is lack of care on the part of the consumer (washing or ironing at too high temperatures or contrary to the manufacturer's instructions, too heavy demands made on the wearing qualities of clothing, etc.). Often, it is impossible to take a sample, and the fabric has to be examined under a microscope or by macrophotography, two methods enabling the type of wear to which it has been subjected to be determined.

We feel that these few examples, typical of the daily routine of the Federal Institute for Testing Materials at St. Gall, will give our readers an idea of the great variety of the work that an establishment of this kind may be called upon to deal with in its task of maintaining and improving the quality of textiles.

R. C.

Economic news

A feather in the cap of «Textiles Suisses»!



Photo Krüsi

A feminine subscriber to «Textiles Suisses», living in Capetown in the Union of South Africa, noticed on page 82 of number 4/1956 of this periodical a silk organdie dress with large appliqué embroidered flowers. Wishing to buy some of this fabric for herself, the lady wrote through «Textiles Suisses» to the manufacturer in St. Gall, who

unfortunately had run out of the article in question. At the express request of the fair client, this lovely creation of St. Gall industry was put back into production.

Here we see the final testing of the ten yards of fabric made specially by *Union S. A. at St. Gall*, before being forwarded by air to South Africa.