

CORDUROY – A challenge for the textile machinery manufacturers and process engineers

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Nowadays, corduroy is fashionable for apparel and in some markets also home textiles. Many manufacturers are using modern fibres and weaving techniques for the finishing corduroys, therefore, these finishing methods require new production and process treatments. Engineering and process technology have to face innovative production processes to realize new forms of article creations with regard to look and requirements.

Corduroy belongs to the family of weft pile cloths. The name comes out of the French term "Corde du Roi". The pile for the ribs is created through cutting and brushing the ribs run in warp-direction. Number of ribs is normally indicated per 10cm (alternatively per 1 inch). Corduroy designation depending on number of ribs.

Designation	No. of ribs/ 10 cm width	criteria
Ripless Cord, weft pile	100 - 110	Ribs not visible
Baby corduroy	> 50	Very fine
Fine- or Europe corduroy, Bull corduroy	44 - 50	Low pile, heavy fine corduroy
Middle corduroy, Genua corduroy	21 - 43	Dense pile
Manchester	21 - 43	Hard finish
Wide corduroy	21 - 24	High stability
Fancy corduroy	Alternating ribs	Different strengths of rib

Fabric weights range from 200 – 500 gsm, partly up to 700 gsm. Besides the classical corduroy of 100% Co other important articles are Co/PES blends 90 / 10% 80 / 20% 70 / 30% 67 / 33%.

Adding 2 – 8% Spandex leads to warp and bi-elastic stretch corduroy and a higher wearing comfort.

V- Weaving: The pile-creating weft strand is simply tied in the basic cloth. The v-weaving creates a nice, voluminous pile. Stability is less though.

U-Weaving: The pile-creating weft strand is again simply tied but to two warp strands.

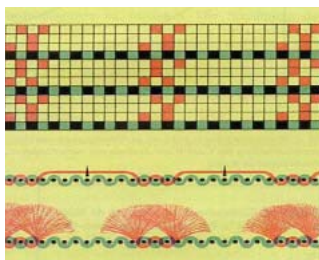


Illustration 1. W – Weaving.

W-Weaving: The pile-creating weft strand is double-tied in the basic cloth. This double-tie avoids drawing off the cut weft thread and generates dense and pile-stable corduroy.

An ideal combination for a sturdy corduroy with relatively dense pile is a mixture from V- and W-weaving. In general all weaving types can be combined.

Pretreatment prior to cutting corduroy

According to fabric quality (number of ribs / yarn / cotton seed wastes) and application, corduroy should – prior to cutting – be roughened on pile and rear side with a Drum raising machine

Treatment of uncut corduroy helps to clean and loosen the sized corduroy coming out of weaving. Using the Raising fillet leads to shrinkage in crosswise direction. By that the pile-loop (Rippenkanal) loosens from the ground weft. This enables an easier sliding of the guiding needle through the pile-loop.

Especially with fine and baby corduroy, this process improves cutting and enlarges production by minimizing down-times and running periods.

When using fabric with unclear weft yarn, a light sanding and brushing passage on pile side can be helpful for cutting. This pre-treatment process can be executed with a sanding machine or a bristle brushing machine.

Tradition holds another possible way of treating corduroy. Application of alkaline compounds such as soap of Marseille.

New products and processes of the industry are widely applied nowadays. This treatment which takes place on pile side via a one side padder and a cylinder dryer, dwells the fibre and softens existent seed peelings. Thus sliding characteristics of the corduroy cutting needle inside of the pile channel are improved.

Cutting Corduroy

The prepared fabric is cut on the corduroy cutting machine. The number of ribs determines the number of cutting operations.

Qualities with up to 48/10 cm (12 ribs/inch) shall be cut in one operation. Qualities with more than 48 ribs/10 cm shall be cut in 2 operations or more. Therein one has to consider that in the 1st cut, ribs 1 – 3 – 5, etc. and with 2nd cut ribs 2 – 4 – 6, etc. will be cut.

Before cutting, the fabric enters the machine with the back along a left side brush. This removes dirt and keeps the fabric back on the cutting table in plain condition. In the following the fabric passes a heating cylinder which homogenizes the fabric moisture before cutting. By this, the needles have better sliding characteristics within the pile loop and tension will be reduced. During the cutting process the size which is still inside the fabric has a supportive finishing effect.

For cutting circular knives are used. Their number on the knife spindle corresponds with the number of needles which are used over the working width. Each pile loop has one needle. The knives are adjusted to cut only the floating pile threads. Each knife is lead through a split needle.



Illustration 2. Circular Knife / Needle

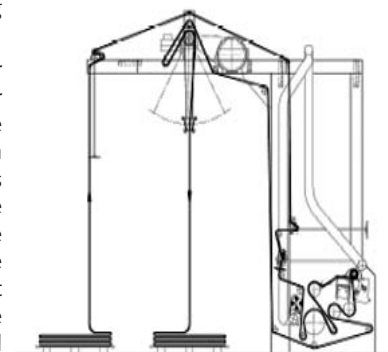


Illustration 3. Corduroy Cutting Machine



Illustration 4. Corduroy Cutting Machine

The needles are led by the floor loops which are generated by the warp and weft threads. As the fabric can never be guided through the machine exactly straight, the knives can be moved axially. At both sides of the spindle spare knives are installed in order to exchange damaged knives rapidly during operation.

The needle dimension is determined by the width of the rib and the fabric characteristics. For qualities, where all ribs are alike, the needles are split in

the middle. For the so called Fancy corduroy with different ribs, the needles are split asymmetrically.

Flaws or contaminations of the fabric lead to needle discharge, which cause a machine stop automatically. In 90% of the discharges, the needle can be fed again. Where this was not possible, fabric has to be marked and cut manually later on.

Manual cutting takes place on a fabric inspection table with combined winding device by means of cutting needle with sharp knife. Feeding/exit of fabric is possible by winder or stacker. When using hydraulic axial winding systems, a speed synchronization with the machine is a must in terms of fabric tension.

Desizing and washing

This process has to be executed very thoroughly. Fabric which has not been desized and washed intensively causes problems in the consecutive processes due to contamination of the pile itself and the brushes in the brushing machine by remaining size. Thorough washing raises the pile and removes spirality in the cut pile loops.

Wet Brushing and dewatering

After pre-treatment and before dyeing the fabric requires brushing. For this purpose a wet brushing machine is used.

Brushing generates the characteristic ribs of the corduroy. Brushing the cut pile-ends into one another with cross- and round-brushes forms the ribs and strengthens the pile.

After this first brushing the fabric passes a transportation and squeezing device, where it will be dewatered to a residual moisture of 60-70%. Behind the squeezer, the fabric is directly entering a round-brush machine. The round-brushes operate in fabric direction and raise the pile again which has been deformed during the squeezing process. The rib pile is oriented in warp direction and cleaned from lints and loose threads before drying.

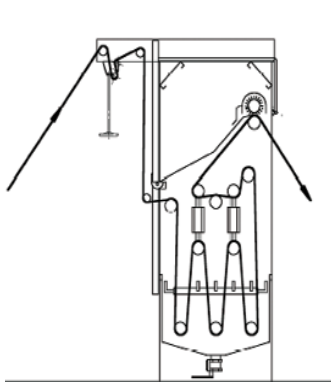


Illustration 5. Wet Brushing Machine

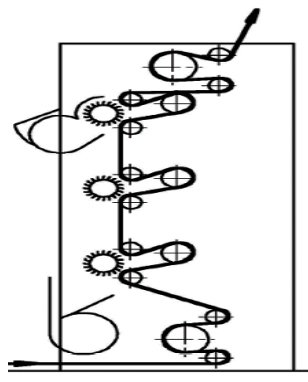


Illustration 6. Round-Brush Machine

Drying and Brushing

After the round-brush process the corduroy is led through the cylinder dryer single-sided with the bottom side on the cylinders continuously.

The evaporating moisture raises the pile additionally. By means of the following cross- and roundbrush machine the ribs will receive more shape, are stabilized and deformation in wet condition is avoided. The targeted residual moisture for this brushing process is 10%.

On smaller ranges with a fabric speed of up to 25 m/min. the drying process can be realized in one stage (one cylinder dryer).

With faster fabric speeds a multi-stage range is the ideal condition. In this case the fabric passes two cylinder dryers to achieve the desired residual moisture content. On the first dryer the fabric is dried down to 30-35%, followed by passing a cross-brush machine (e.g. MÜLLER-CROSS-BRUSH) and a round-brush machine.

In the following the corduroy fabric passes the second cylinder dryer to be dried to 10% and is transported to another cross- and round-brush machine to be finished.

The cross-brush machine raises the pile, removes the spirality in the weft pile, equalizes the pile and brushes at the same time. The ribs are brushed from left to right side alternating thanks to brushing belts which are installed crosswise to fabric direction. This generates an interlock of the pile fibres and strengthens the stability of the ribs.

The last brushing process is executed on the round-brush machine in dry condition (approx.. 10% residual moisture) to give orientation and stability to the pile of the ribs. Between the white- and coloured-brush operations the following steps are essential:

Singeing

In order to achieve a clean rib and an even fabric appearance the corduroy needs to be singed. All distant fibres which have been raised during the intensive brushing process will be singed right to the bottom. The singeing process determines the following fabric optics. It generates the lustre and determines a clean and calm surface appearance.

Washing, bleaching, dyeing and finishing

The pre-treated fabric will be washed and bleached if necessary. Bleaching intensity is determined by the colour shade which shall be achieved in the following dyeing process. During bleaching colour changes which occurred during singeing are removed. Dyeing and finishing will be carried out by means of well-known processes. For large dye lots, starting at approx.. 3000m per colour, a continuous bleaching and dyeing process is economical and advantageous.

Colour-brush Range

After dyeing and finishing the rib needs to be brushed once more. Washing and dyeing has brought deformation to the rib respectively the pile has become uneven again. To regain a clear appearance the fabric is treated finally with cross- and round-brushes. If the fabric has an uneven dry condition due to drying process or storage we suggest installing a steamer in front of the brushing station.

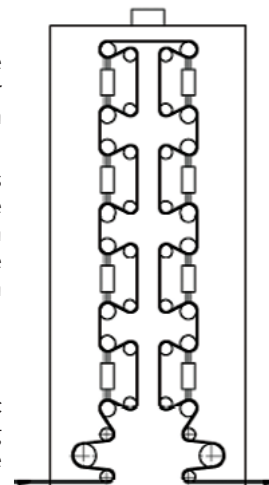


Illustration 7. Cross-brush Machine

The last finish by the final brushing process gives the fabric a calm and even surface.

Perspective

Whereas in former times both corduroy qualities – fine and wide – were required equally, today the fine qualities prevail, at least in the clothing section.

Heavy articles, which are applied in the work wear garment, however remain untouched. This section guarantees an all-year interest on the market.

Additionally a famous manufacturer of Italian premium automobiles offers optionally to furnish the interior of its cars (seats and door interior trim) with high-quality corduroys, made of 100% PES microfilaments.

Essential for the success of first-class corduroy finishing are the machines.

Moenus Textilmaschinen GmbH, with their Krantz/Müller corduroy finishing machine programme copes with the improvement of such processes for many years now. Now the co-operations with finishing companies, chemical companies as well as research institutes have come to life.

In general making and finishing corduroy is subject to a well-known and very traditional production method. Today's fashion requirements put new challenges to finishing and machine manufacturing. ♦



Illustration 8. White-brush Range

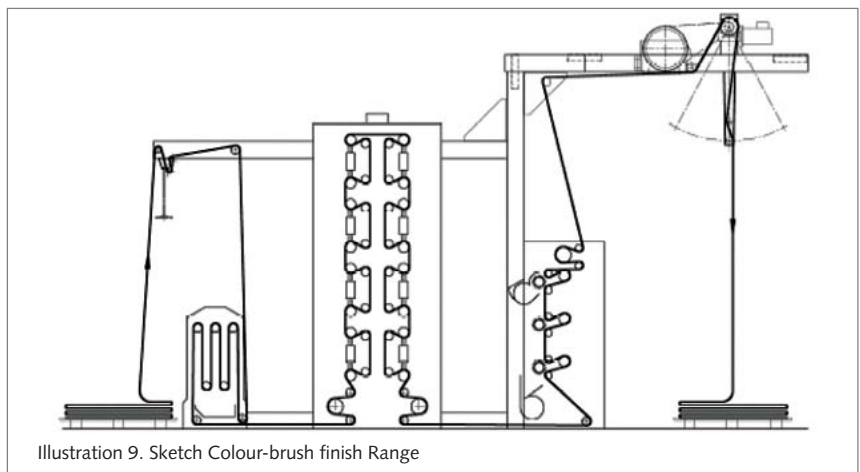


Illustration 9. Sketch Colour-brush finish Range

New fabric inspection machine Nazmatic with PLC Control by Nazer Industries

The new "Nazmatic" with PLC control has been developed for the inspection of all types of Woven Fabrics, from very light – weight fabrics up to heavy denim fabrics.

Model "Nazmatic" is equipped with three motors all synchronized by frequency inverter controls, two geared motors ensure smooth running and control of tension, which allows the proper inspection of stretch fabric with Lycra.

Tension is controlled simultaneously by mechanical and electronic means.

One direct drive motor controls the moveable head which is getting the signal through photo-cell which ensure edge control.

The electrical panel has a PLC control system, whereas OP / SMI display indicates operation and fault mode.

The machine is designed to be user friendly, easy to operate, and has a digital fault registration system, a sensor for fabric slowing control and fabric end. The machine is suitable for making rolls on paper tubes, PVC pipes or metal / wooden rolls from open fabric trolleys, A-frame / batcher trolley.

It can be equipped with a batcher / de-batcher. "Nazmatic" has a large number of machines operating in Pakistan, Bangladesh and the Gulf region.

The future machine is featured with a modem enabling online entry into the machine for trouble-shooting and programming.

For reporting purposes, this machine is also come equipped with a digital fault registration coupled with a printer.

Courtesy: Nazer Industries. ♦



The New "Nazmatic" Fabric Inspection Machine.