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TEXTILE PROCESS AIR CONDITIONING

Manufacturing Processes: Yarn Making, Cotton System, Woolen and Worsted System, Preparatory Processes: Weaving, Knitting, Finishing; Factors Determining Optimum Conditions: Workers, Materials, Machines; Air-Conditioning Systems: Atomizer, Air Changer, Air Washer, and Wet-Duct Systems

THIS chapter will discuss: (1) the basic processes of yarn and fabric making, (2) the factors which determine the optimum conditions, and (3) various types of air-conditioning systems used in textile manufacturing plants.

MANUFACTURING PROCESSES

Most textile manufacturing processes may be divided into two general classifications: (1) yarn making and (2) fabric making. Yarn making procedures are similarly divided into spinning and twisting; fabric making into weaving and knitting. Each of these basic processes has many variations, but descriptions of the basic processes will reveal the principles upon which the influence of air conditioning is based.

YARN MAKING

The length of the fiber determines which of the two general classifications, spinning or twisting, must be used. Spun yarns are produced by loosely gathering inch-long fibers into rope-like form, drawing them out to increase fiber parallelism, and then applying twist. Twisted yarns are made from mile-long monofilaments or multifilaments by twisting alone. Ply yarns are made in a similar manner from either spun or twisted yarns.

The principles of spinning are applied in three different systems, identified as cotton, woolen, and worsted. The cotton system is used for all cotton, most synthetic staple, and many blends. Woolen and worsted systems are used to spin most wool yarns and some wool blends.

In all except novelty yarns featuring irregularities, two of the criteria of top quality are uniformity of twist and uniformity of cross section. Twist (in turns per inch) may be hard or soft, right (S), or left (Z) according to the desired characteristics of the yarn.

The uniformity with which individual fibers are distributed in a spun yarn largely determines uniformity of strength.

THE COTTON SYSTEM

As its name implies, the cotton system was originally developed for spinning cotton yarn. Now its basic machinery is also used for spinning all varieties of staple including a little wool and its blends. An outline of most of the steps from raw materials to fabrics and the ranges of frequently used humidities are shown in Fig. 1.

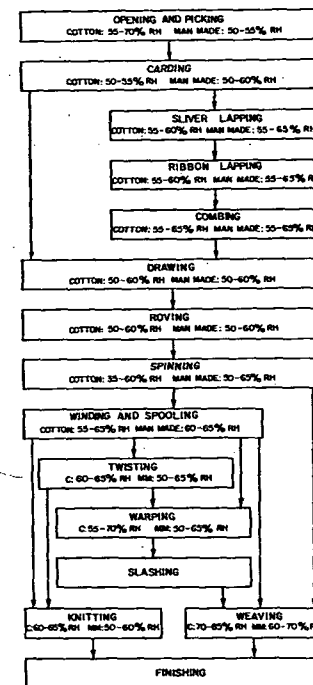
Opening, Blending, and Picking

In these preparatory steps, the compressed tufts are partly opened, most of the foreign matter and some short fibers removed, and the mass put in an organized form. Blending is either necessary or desirable or averaging out the irregularities between bales or for mixing different kinds of fiber. Man-made staple, being cleaner and more uniform usually requires less preparation. The product of the picker is a lap or batting of loosely compressed tufts, rolled into a cylindrical package.

The ideal is an established regain and the nearest practical approach to a uniform weight of fiber per unit of length.

Carding

The next process lengthens the lap into a thin web which is gathered into a rope-like form called a sliver. Further opening and fiber separation as well as the partial removal of



* For cotton (C) and man-made (MME) fibers.

Fig. 1 Textile Process Flow Chart and Ranges of Humidity*