Processing Alpaca Fibre into Yarn

The Woollen mill for sale uses the woollen system (as opposed to worsted) and whether using wool from sheep, hair from angora rabbits, silk, or synthetics, the process is nearly the same. Following are the steps that the fibre goes through on its way to being converted into a finished article suitable for sale to the end customer.

Fibres - What you put in, is what you get out — Good quality wool in terms of fibre and cleanliness is important. If the shepherd and shearer have done their job well, removing belly and leg wool, manure tags, and portions of the fleece that may have excessive amounts of vegetable matter (usually the neck), then the operators can make a saleable yarn from the fibre delivered. For wool growers operating a woollen mill will build an awareness of how important it is to present quality product for sale to buyers, and how poor wool preparation at the grower levels impacts on the final product delivered to consumers.

Scouring - Fibres to be processed need to be cleaned of dust and the natural greases produced by the animal. Sheep can produce a lot of grease and fine-fibered breeds, such as Merino have more than others. Most of this has to be removed and the process is called scouring. In our operation this washing is done by an outside firm that does commercial scouring. However depending on the location the mill is established in-house scouring may have to be considered. The wool goes through five vats of hot water and detergent that progressively remove most water soluble oils and dust before drying. Angora, silks and synthetics need not be scoured because they have virtually no oil on the fibers.

Dyeing - once the wool is scoured it can be dyed into colours, this is the most economical way to dye. The dyed fibres can then be processed as block colours or blended with other coloured fibres in differing proportions to achieve yarns with coloured effects according to the creativity of the yarn designer.

Dyeing need not however occur at this point. The yarn can be processed as white fibre and dyed in the yarn. This is the most cost effective way to manufacture yarn as long runs can be done with out concerns of colour contamination.
Colouring of yarns after manufacture, give a yarn designer the advantage of being able to do very small lots of yarn to a particular colour. Hand “painted yarns” are always popular, these yarns are laid out and the dye is painted on, in creative colour combinations by the designer. These yarns offer the crafts person a yarn that has its own design built in without the need for the knitter do produce a design through the stiches. Hand dyed yarns demand a premium for their inherent uniqueness.

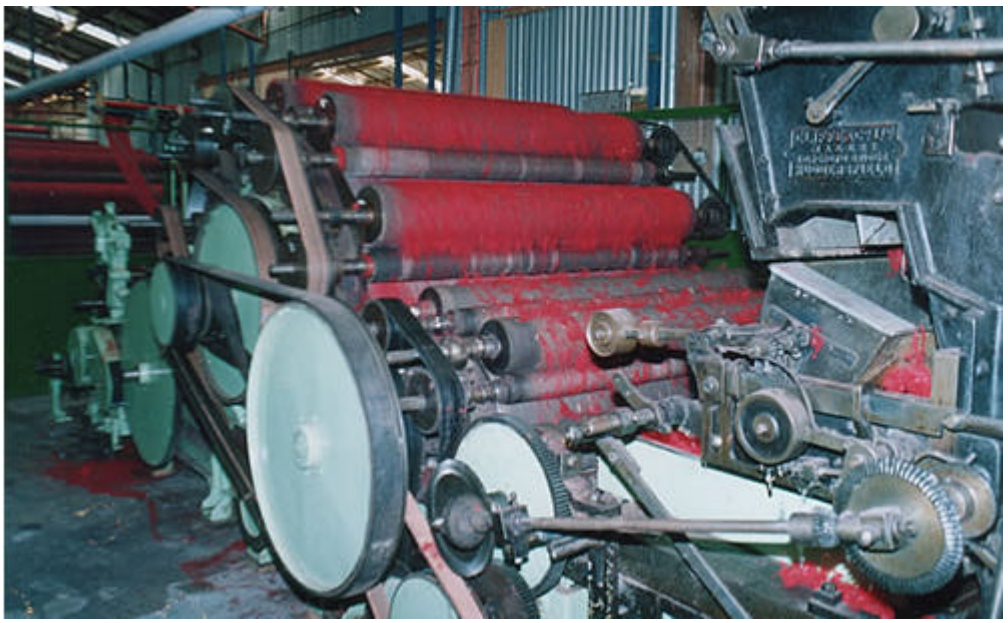
Opening and blending - According to the need for design effects required in the yarn, any one type of yarn may require upwards of three colours of wool fibre or perhaps several different types of fibres. Two things must happen at this point. The fibres must be

opened, meaning that we must begin to separate the fibres that hold together in little clumps and, secondly, we must blend the different colours or different fibres evenly. This is a continuous, although a two-stage process. Fibres and colours are layered in the picker feed box which then feeds them to the picker and from the picker the fibres are blown into a large room for collection. Depending on the fibres being spun, sometimes the different fibres must be picked first by themselves, then blended with wool. Blending takes place in the feed box, in the picker and in the blow room as the fibres are homogenized by the blowing air. This process may be repeated several times if necessary. Several things happen as the result of picking - fibres are opened, fibres are blended and the picking loosens dirt and vegetable matter in the wool which results in cleaner fibre and resulting yarn.
During the picking process a water soluble oil is sprayed on the fibres. This gives the fibres a certain slipperiness that facilitates the remainder of the yarn-making process and helps reduce static electricity during carding.

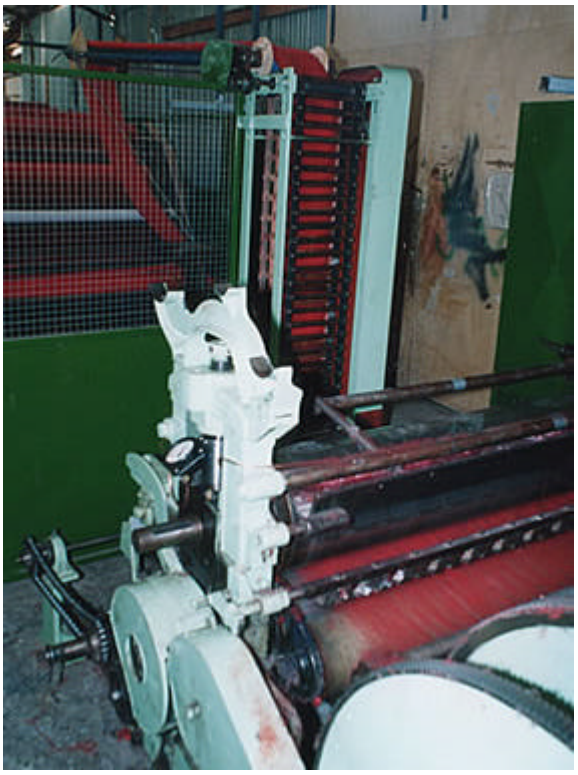
Carding - this is the most important process in yarn making. Carding the fibres determines the quality of the resulting yarns in terms of yarn weight, and thickness of yarn.
The carder is actually a series of machines, linked together in-line, that turn the picked fibres into pencil roving. The Carding machine is the biggest of the machine set, being 40’ x 10’ Several things happen to the fibre as it is carded. The fibres are further opened, dirt and short fibres fall out under the carder, the fibres are further blended, and the fibres are roughly oriented in a parallel fashion with the machinery as they move along the length of the machine. Additionally, the amount of fibres entering the carder is strictly controlled via a clock work scale mechanism and the distribution of the fibres is evenly placed across the width of the card, thus ensuring even, uniform pencil rovings being despatched from the machine. In all there are 84 ends of rovings simultaneously produced from the machine as it operates.

Within the carding machine set, the first piece, is the hopper. The hopper is a reservoir of fibre that is drawn from by the clockwork mechanism that weighs and delivers the fibres to the machine through the use of a weigh pan and feed table, feeding a predetermined amount of fibre into the card line. It is at this end of the process that we determine the weight and yardage of the pencil roving at the other end of the machine.

The next part of the card set is the breast. It is a large cylinder, 60" wide, with sets of smaller cylinders positioned above it. All of these cylinders are wrapped with metallic wire which has the appearance of the teeth of a hand saw. This is very tough material and is designed to handle the work of further opening the fibres.
Next we have the first of the major units of the card, the first breaker unit. It is comprised of one large cylinder (called a ‘swift’, approx 4’ in diameter) with six to seven sets of smaller cylinders around it's circumference. These smaller cylinders are called workers (about ten inches in diameter) and strippers (about three inches in diameter). All of these cylinders are covered with card cloth which is impregnated with thousands of “U “ shaped pieces of wire forming a mass of points of wire on the surface of the swifts and working rollers and strippers. Carding takes place as the main cylinder passes fibres to the worker, the stripper lifts the wool from the worker and places the fibre back on to the swift, to be carried forward to the next worker, this process is continually repeated as it passes through the first part of the carding machine.

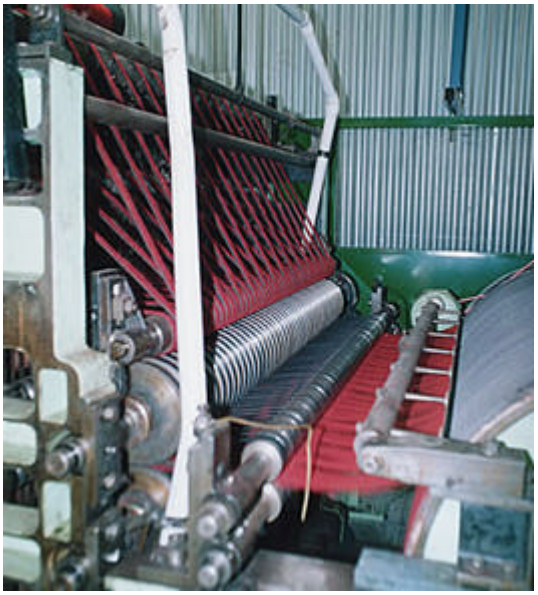


As the fibre leaves the first part of the card it pass' through heavy steel rollers, called "Peralta rollers" that are set to a very fine tolerance these rollers. The carded wool passes between the rollers, which results in vegetable matter being crushed but they do not harm the fibre. The fibre is then collected at a centre draw unit and transferred overhead to another feed table that delivers it to the second or finishing unit of the carding machine.



The fibre travels over the top on the overhead before descending to a device that lays it on to a feed table having first turned it's orientation by 90 degrees. This has the effect of feeding the fibre into the second breaker sideways. This is very important. By doing this we are able to further ensure that the amount of fibre across the 60" card is even in terms of weight and blend. Imagine this - suppose that on the first breaker we have red on one side and white on the other. If we were to run this straight through till the end we would have some red pencil roving and white pencil roving as it comes of the machine. The laying of the fibre across the machine blends any indescrepancies of weight and colour, so we have the same amount of colour/weight across the width of the machine.
At this point the fibres have entered the finishing part of the carding machine. The best carding takes place here as the fibres are well separated and blended and, typically, this part of the machine has the finest and sharpest wires covering the rollers.

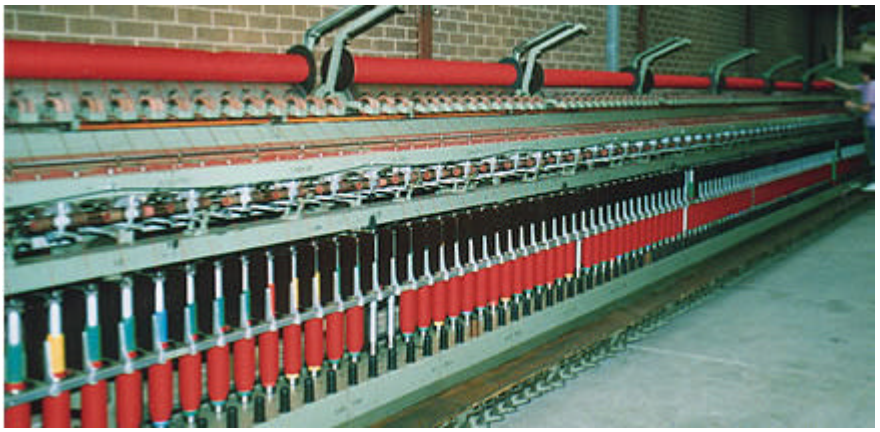
The last piece of equipment is the tape condenser. This section of the machine takes the 60" wide web of evenly carded fibres as it is combed off the finishing swift, and converts the web into 84 individual pencil rovings. It is a three-step process.



First the web is divided into 84 strips. This is done using 84 leather tapes that pass around intersecting rollers. The tapes trap the fibres of the entering web and strip the web into pieces, these strips of fibre web adhere to the leather and are carried to six different levels where the second process occurs.

Here the leather tapes deliver the individual strips of fibre to six sets of rubber-coated aprons. As the fibre passes between the apron sets the aprons do two things - they deliver the fibre to the other side and, most importantly, they rub the wool sideways, back and forth, causing the strip of wool to be rolled and condensed. It's a similar action to rubbing and rolling tobacco as an 'old timer' would to roll an cigarette. The action of rolling the fibres together give the strip of fibres some strength. Finally, the fibre strips, now called pencil roving, is wound on spools. 14 "ends" of pencil roving on each spool. The fibre is now in a form that is ready to be spun.

Spinning - Spinning is done on a spinning frame. Mechanically speaking, the spinning frame replicates everything a hand spinner does while at a spinning wheel. Every basic step or consideration of a hand spinner has been thought out by an engineer and can be controlled such as the delivery of wool, drafting, amount of twist and in what direction, through to placement on a bobbin. If the fibres are well carded the spinning frame will do this all day long, consistently and without complaint. We have in effect, 120 very efficient spinning wheels working that are able to spin faster than the carding machine can prepare the wool.



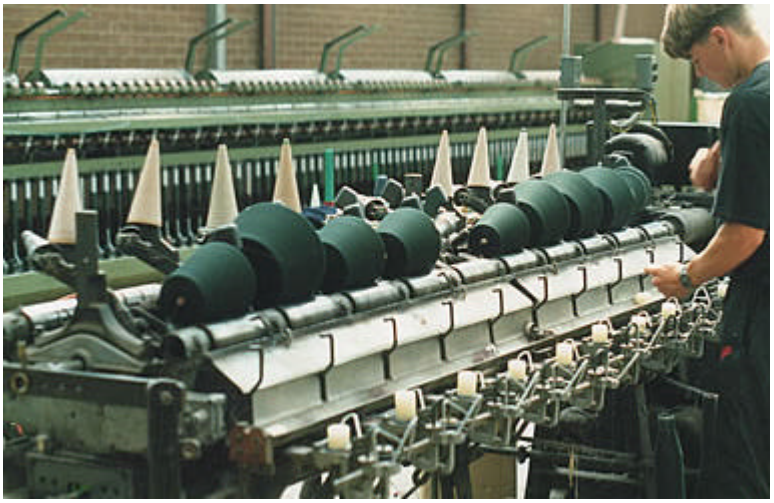
To explain how this happens, first the spools of pencil roving produced by the carding machine are placed on a drive drum at the top of the spinning frame. As the spool turns, the 14 ends from each spool are unwound into the spinning machine. The route the ends take is this - compression point, twister head, compression point and finally, the bobbin. Here is what happens. “Drafting” takes place between the two compression points. Each compression point is a point where the yarn passes between two rubber rollers gripping the roving firmly. Through the use of gears we can cause the frame to stretch out or draft the pencil roving by causing the drive rollers at the two compression points to rotate at slightly different speeds. Thus pencil roving carded at 150 grains can be drafted to produce a single strand of yarn that weighs 120 grains, for example (weights are based on 50 yards). By carding heavy and drafting you increase mill efficiency and allow finer yarns to be made in less time.

Yarn is made on exiting the second compression point. Here, the yarn is formed, attached to a bobbin which is on a spindle, spinning at high speed a twist is imparted into the pencil roving. The twist begins at the bobbin and travels up to the compression point but can not go further. As more roving descends past the compression point the twist

constantly goes into the descending roving which becomes yarn and gets strength as a result of the twist. To see how this works, take small group of fibres, pinch one end and twist the other. You can see how the twist travels towards the pinched end and if you can let additional fibres slip through the pinch point, you will continue to add twist to new fibres but not overtwist the first, just as occurs on a home spinning wheel.
By changing gears and/or chains we can control draft, direction of twist, amount of twist and other aspects on the spinning frame to produce the required twist, strength and fineness of yarn.

Steaming or conditioning. Moisture, as steam, is forced into a cabinet containing yarn still on bobbins. Heat and moisture have the effect of relaxing the yarn in it's present spun condition so when you remove it from the bobbin it does not want to "un-spin" itself but rather drapes naturally.

Winding The yarn once steamed is wound off the spinning bobbins d on to large cones of approximately 2.5lbs each.



At this point the yarn can be dealt with in different ways according to the end product desired….

If the yarn is to be used in woven or machine knitted products the cones are delivered to the respective facility, be they outsourced or in house. If however the yarn is to be converted to hand craft yarns further operations need to be performed on the yarns to achieve the desired end product.

Twisting - as it is known in a mill, or plying for hand spinners. A twister is a machine that delivers two or more ends of singles yarn to a compression point which limits the twist and from that point on the plied yarn, be it two, three or more strands, is carried to a bobbin. As with spinning, during twisting we can control for the direction of twist (almost always the opposite of the direction of spin, known as "S" or "Z" spins) and the amount of twist. It is possible to do fancy twists while plying, that is to add boucle, knops, and other effects into the yarns as they are twisted. These affects again are options the yarn designers have to construct unique yarns for the craft yarn market.

Skeining This is the process of removing yarn from bobbins and creating a loop of yarn, called a skein or a hank of yarn. This is done on a skein/hank winder, this machine measures off a predetermined length of yarn that is the basis for the Weight / length of yarn being sold to the end customer.

Further Conditioning Unless hand dyeing is to be undertaken, further conditioning in the form of washing the yarn is undertaken. Washing in wool softeners increases the loft in the yarns and also increases the softness of the yarn giving the yarn a visual and tactile enhancement ready for sale.