Chapter-III
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SHOE PRODUCTION TECHNIQUES

The previous chapter brought out the evolution of leather industry in India and the discussion highlighted that the leather industry has now reached at an advanced stage of its development and ranks amongst the largest leather ware industries of the world. It has also export potential with its contribution to the economic development of the country. The present chapter is devoted to the discussion enlightening on the techniques of footwear production followed by Indian leather footwear industry.

Footwear plays an important role in the life of human beings. Some people wear footwear to save their feet from getting spoiled, while others think that it is a way of life. In winter, people protect their feet from cold by wearing footwear and in summer, they protect their feet from heat. Footwear keeps the foot neat and clean. Moreover, the footwear helps to prevent injuries, relieves foot pressures, and supports the feet. Footwear also prevents development of new ulcerations and thus, saves the foot from further damage. In certain professions, such as armed forces, footwear is a must for the army men, who have to tread mountains, deserts and forests which cannot be done without footwear.

For producing footwear and other leather goods, tanned leather is used. The tanning of raw hides for the final product of finished leather comprises of three major processes, viz., Preliminary, Tanning and Crusting. The raw hides are treated by Preliminary Preservation Process wherein the hides are trimmed and salted. After being treated with chemicals, cleaning of dust and salts, the hides are treated with a combination of Calcium and
Sodium Sulphide Solution. In this process called Liming Process, the hides become free of hairs, loose flesh, lumps, etc. Thereafter, a combined solution of Mild Acids is applied. The fibres are treated with a combined solution of salt and acid, which is called Pickling. The hides are then treated with various tanning materials, such as, Vegetable Extracts or with basic Sulphates for about 24 hours. The resultant product Wet Blue, can be preserved for a long time.

The hides at Wet Blue stage are split and shaved to achieve required thickness, and thereafter dyed in the requisite colours. In the Crusting Department, they are further processed through Vacuum Drying Machines, Dyeing Chamber and finally in Togglng Machines before the finished product is measured and packed in the Finishing Department.¹

**KEY FACTORS IN LEATHER FOR FOOTWEAR**

Leather to be used in manufacturing is monitored from various angles. The basics involved in leather are visible as well as invisible. Basics which are not seen by the end user are strength, thickness, etc., and the apparent features which can be seen by the end user are colour, shine, feel, etc. Basic characteristics are mostly unmanageable once the final product has been made and these require lesser degree of maintenance by an average customer.

Apparent characteristics can somewhat be managed, at times with difficulty, as in case of nubuck (cow hide leather) and suede (leather, especially the skin of a young goat), which require a higher degree of maintenance.²
LEATHER MAKING – DIFFERENT APPROACHES

There are predominantly two broad approaches of making leather for footwear.

1. Basic- where the leather is finished after the end product is made.

2. Finish - where very little finishing is done after the end product is made.

RAW MATERIAL FOR MAKING FOOTWEAR

Footwear is made of leather and leather is produced from hides and skins. Hides and skins are derived from cattle, goat and sheep. There is no physical inadequacy found with respect to the quality of raw material inputs for polymer lasts, while for the wooden lasts, availability of seasonal wood due to environmental factors and seasoning time is a problem.

Leather is the most suitable material for preparing footwear and footwear components. Shoe uppers, soles, heels, etc., are prepared from leather. Various types of leather for footwear are described below:

1. Calf Leather:

This is produced from the young ones of cow or buffalo, usually tanned chrome having an area of 5 to 15 square feet. Calf leather has close fibrous structure with little variation in substances over the whole area of the hide. The leather could be smooth, boarded or suede finished and has a rubbery feel with good lasting characteristics. They are used as uppers for the manufacture of high quality shoes for ladies and men.
2. **Hides:**

Hides are produced from cattle. They are cut into two along the backbone and are called sides. Usually end side has an area of 9 to 11 sq. ft. and are chrome/semi-chrome or chrome re-tanned. They have strong fibrous structure, coarse grain with a heavy feel. The fibrous structure, as well as the substance, varies from butt to belly, loose in the belly than in the butt. Surfaces are finished smooth, boarded or printed grain and splits are processed as suedtes. Side leathers are used for making uppers for medium grade shoe boots, sandals, chappals, straps and ladies footwear. Vegetable tanned leather is used for soles, insoles, welts, and split leather for toe puffs and stiffeners.

3. **Kid:**

Kid skins are from milk fed young ones of a goat, having an area of 1 1/2 to 3 sq. ft. They have strong fibrous structure, tight grain, and light substance with full-rounded mellow feet. The surface could be glazed, gold or silver finished and used in for making ladies high-grade footwear.

4. **Goat Skins:**

They have an area of 4 to 8 sq. ft. with a coarse fibrous structure varying between butt to belly. Substance is thick, surfaces are glazed resin or polyurethane finished and are used for ladies medium grade footwear. Vegetable tanned goat skins are used as linings.

5. **Sheep Skins:**

Sheep skins have loose fibrous structure, loose grain surface and light substance with a soft feel. They have an area of 2 to 9 sq. ft. and are suede finished. The wool sheep skins can be sheared. Sheep skins are used for linings.
MATERIAL FOR SHOE

The material required for shoe is given below:

1. **Shoe Upper Materials**

   (a) **Leathers:** Cow, Buffalo, Goat and Sheep, available as Full Chrome, Semi Chrome, Burnished Glazed Kid, Suedes, Napa (a soft leather made by a special tawing process from the skins of sheep or goats), Nubuck, Aniline (a colourless oily liquid used in manufacture of dyes plastics, etc.) Resin uppers, and so on.

   (b) **Synthetic Materials:** Synthetic materials include plastic, PU and PVC.

2. **Lining:**

   (a) Leather linings of different tannages and finishes.

   (b) Synthetic linings of PU and PVC

   (c) Textile like white drill

3. **Insole:**

   Vegetable tanned leather, cellulose fibre board, leather board.

4. **Outsoles (Bottoms):**

   Vegetable tanned butts, PU, PVC, TPR, Vulcanised rubber, Thylvynyl acetate are commonly used.

5. **Sock Material:**

   Thin leather or synthetic materials

6. **Adhesives:**

   (a) Upper folding: Hot melt cements, latex, rubber solution.

   (b) Upper closing: Latex, rubber solution.

   (c) Lasting: Thermo Cement (Hot Melt), Neoprene based.
(d) Sole attachment to upper: PU, Neoprene

7. Shank:
   Fibre board, Bamboo, Steel and plastic, Cellulose board with built in shanks.

8. Bottom Filler:
   Cork powder, Tarred felt, Loose leather pieces.

9. Toe Puff And Stiffeners:
   Leather, Leather board, Fibre board, Moulded fibre board (Stiffener), Solvent activator, Thermo plastic.

10. Thread:
    Cotton, Nylon, Polyamide, Blended

11. Self Adhesive Tapes:

12. Shoe Eyelets:
    Brass, Aluminium lacquered, Steel

13. Shoe Laces:
    Cotton or Nylon

14. Cushion:
    Foam Ethyl Vinyl Acetate (EVA), PU

15. Shoe Finishes:
    (a) Cleaners (b) Fillers (c) Finish (d) Wax finish (e) Repair.

DEFECTS IN LEATHER

Common defects observed in leathers are (1) Flay cuts (2) Salt stains (3) Growth marks (4) Scratches (5) Brand marks (6) Warble holes (7) Uneven dye absorption or colouring and (8) Discolouration from bad storage. Defects in leather reduce the usable area while clicking or cutting.
TYPES OF FOOTWEAR

There are two types of footwear, namely:

1. **Open Type Footwear**: Chappals and sandals

2. **Closed Type Footwear**: The shoe

1. **Open Type Footwear**—Chappal and Sandals come under this category.

   (a) **Chappal**: This consists of an insole and a strap across the instep, with or without a ring to hold the big toe. Sole is either stitched or cemented with a low or high heel.

   (b) **Sandal**: This consists of an insole with upper having straps across the vamp portion with flat or high heels. A belt passes round the heel to keep the foot in position by a buckle arrangement.

2. **Closed Type Footwear**—The following are the closed type footwear.

   (a) **Oxford** (*A type of lace-up shoe with a low heel*): The quarters are kept under the vamp and stitched.

   (b) **Brogue** (*Rough footwear of peasants*): An oxford construction with the upper decorated with stitches and punches.

   (c) **Derby or Gibson** (*A shoe having the eyelet tabs stitched on top of the vamp*): The quarters are stitched apart on the vamp, with 2 or 3 eyelets.

   (d) **Monk**: A derby style strap buckle attachment across the instep.

   (e) **Casual** (*Shoes suitable for everyday wear rather than formal occasions*): A shoe, which is easy to wear and has an elastic gusset across the instep or on sides.
(f) **Boot (A footwear covering the foot and ankle, and sometimes the lower leg):** A derby construction with the quarters above or up to the ankle.

(g) **Chukka:** A derby style with the quarters up to ankle with two or three eyelets. Quarters above the ankle and with an elastic gusset is Chelsea boot (an elastic-sided boot with a pointed toe).

(h) **Ghillie tie (A type of shoe with laces along the instep):** A ladies style/ the shoe lace passes through loops instead of eyelets.

(i) **Court shoe (A woman’s plain, lightweight shoe that has a low-cut upper and no fastening):** A ladies high heeled shoe of slip on type with a counter, toecap, vamp and quarters.

(j) **Slingback (A shoe held in place by a strap around the ankle above the heel):** Same as court shoe but with a strap and buckle passing round the heel.

(k) **Moccasin (A soft leather slipper or shoe originally worn by North American Indians):** The upper also passes through the bottom of the shoe. The apron is stitched by hand. Shoe with or without heel.

(l) **Children’s school footwear:** A derby style with a broad toe for boys. A shoe with a wide toe and a bar and buckle attachment for girls.

(m) **Winter boots:** A derby boot or moccasin style lined with soft sheep sherrlings or other warming material.7

**MAKING OF FOOTWEAR: OLD TECHNIQUES**

Footwear is produced over a very wide range of varieties. There are many old artisans in the country, especially in Agra, who are producing footwear by using old techniques of production.
Many years ago, the story of making footwear was different because a large part of the whole process was performed by hand, but now machines are also used. H. A. Silverman has explained six stages in making footwear.

The first comprises the Clicking Department, in which the uppers and linings are cut. The work of cutting the uppers is highly skilled and performed entirely by male labour. Lining cutting is usually the task of juniors in training.

Secondly, the different parts of uppers are stitched together in the Closing Department. The work consists of many operations, mostly mechanical and is done by female labour.

Thirdly, there is a Press Cutting, Rough Stuff and Preparing Department in which the sole or bottom leathers are cut and the sundry grades are sorted. Only male workers are employed in this department; young female workers are partly employed in the preparing section.

Fourthly, in the Lasting or Making Department, the close upper is shaped and the sole is attached. The attaching may be effected by sewing machine or, in lighter footwear, by a cementing process. Only males are employed in the lasting department.

Fifthly, in the Finishing Department, the soles are given a smooth edge and finished surface. The range of mechanical process is carried out by male operators.

Sixthly, the uppers are glossed and cleaned and the completed product is boxed and dispatched. In this department, female labour is mainly employed.⁸

MAKING OF FOOTWEAR: NEW TECHNIQUES

The manufacturers of large-scale units produce footwear according to new techniques. In the new technique, footwear
undergoes maximum process like shear, tear, heat, cold, heat and cold (Thermal shocks), light, chemicals, abrasion, and so on. Leather is a major raw material of the body of the shoe.\textsuperscript{9}

On an average, 500 pairs of shoes can be made from a single wooden last and around 1500 pairs of footwear, from a polymer one.\textsuperscript{10}

The steps involved in new techniques of shoe making are described below:

1. **Production Steps in Shoe Making:**

   The production process of shoe making is as follows;

   The process is divided in four main departments, namely

   (a) Upper Cutting
   (b) Upper Closing (stitching)
   (c) Sole Making
   (d) Shoe Making (Shoe Assembling)

   **(a) Upper Cutting:** The components of the upper are cut with the help of cutting dies, on a cutting machine.\textsuperscript{11}

   **Cutting and Clicking Dies:**

   Clicking dies (clicking machines) are the heartbeat of the leather goods and footwear industries, and a veritable indicator of the state of health of these industries, particularly the organized sector, that is mostly responsible for exports.

   There are about 20 manufacturers of clicking dies in India at present. Another four or five factories can be expected to come up by the year 2005. The reason for slow growth in this area is related to high cost of imported raw materials, competition and recent recession, particularly in the footwear industry.

   Since the growth envisaged in the footwear industry is 3 percent per annum, and in the leather goods industry about 5
percent per annum; and considering that non-users of dies will also start using dies, the overall growth until the year 2005 can be estimated at about 125 percent of the current level, for the clicking dies production.\textsuperscript{12}

The following process is adopted.

\begin{itemize}
  \item Stitch marking \rightarrow Stamping \rightarrow Skiving \rightarrow
  \item Component inspection and checking \rightarrow
  \item Consolidation and delivery to upper closing department.
\end{itemize}

(b) Upper Closing: Here, the sequence of operations are different for each model of upper, therefore, this process is controlled, by a Central Feeder on each conveyor, who is also the quality supervisor. He sends a batch of work to every operation simultaneously and then interchanges between the batches in a pre-planned sequence as desired. The various operations are listed below:

\begin{itemize}
  \item Checking \rightarrow Glueing \rightarrow Attaching the components together \rightarrow Single needle stitching \rightarrow
  \item Double needle stitching \rightarrow Taping \rightarrow Eyeleting, cleaning and finally inspection of the completed upper.
\end{itemize}

(c) Sole Making: Premoulded sole units are made out of PVC or TPR by an Injection Moulding Process

(d) Shoe Making (Shoe Assembling): All the main parts of a shoe are prepared and collected here for shoe assembling, with the help of the following processes: -
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The foregoing discussion clues up the technique of footwear production followed by Indian footwear industry. It highlights that production of leather footwear in India is done through crude manual methods by cottage and households individual workers as well as by modern and scientific methods by firms and registered companies. As Agra is one of the largest and important centres of shoe production in India, the next chapter focuses on the ‘Development of Footwear Industry in Agra.’
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