PROJECT WORK

ON

STUDIES ON THE QUALITY CONTROL PROCEDURE OF CUTTING DEPARTMENT IN FOOTWEAR INDUSTRY.

A Dissertation for the Partial fulfillment of the requirements for the degree of

Bachelor of Science in Footwear Technology

Under

The University of Dhaka

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Submission:

Submitted To

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BANGLADESH COLLEGE OF LEATHER TECHNOLOGY

DEDICATED

TO

MY PARENTS

ABSTRACT

In order to produce products like footwear resources in the form of man, machine, material and money are required. And the more efficient use of resources is ensured, the more goods and services will be produced. By this process of efficient use and effective utilization of resources the economic system can attain self-sustain growth. And in fact, this efficient use and effective utilization of resources is truly productivity, which is essential element and successful strategy for the well-being of the individuals. Productivity improvement is not just doing things better but doing the right things better. The right things or more specifically factors influencing productivity is the prime concern for productivity program managers. Inter-linked and inter-relationship among these factors are vital and should be balanced and co-ordinate into an integrated whole. These influencing factors are macro and variable relating to external and internal factors as well as job related, resource related and environment related factors.

ACKNOWLEDGEMENT

All the thanks and gratefulness to almighty Allah who has created us and has made our sense to justify.

Then, I pay my tribute and profound respect to Professor Dr.Khan Rezaul Karim, Principal and the Pioneer as well as Leather technologist maker.

Likewise, I am so grateful and like to express my indebtness to Mahatab, Lecturer (Tech) because of his invaluable direction and suggestion to complete my thesis work and also for his conductive idea .

Furthermore, I am really owed to Noor Mohammod Head of the Department who sacrificed his valuable time to help me.

Above all, I would like to thank and express my gratitude for unboundless contribution to my project work to Hiralal Paul, Lecturer (Leather Products Technology) who has helped me tremendously and allowed his time for me to solve my query.

Mohammad Imrul Khorshed

July, 2007

AIM OF THIS PROJECT WORK

Footwear sector has its drawbacks due to some invaluable facilities and tremendous prospect. This sector has the potentiality of earning a lot of foreign exchange after the fulfillment of local demand. But the sector needs careful handling as well as proper directions and guidelines to heading towards the foreign market to deserve the best among the Shoe exporting countries.

With the partial fulfillment of my study part, the thesis is to survey the market trend, present condition of local and overseas market of Shoe of Bangladesh which represent the present condition of this sector.

As a student of Foot Wear technology it is much more important to know about the quality control procedure of cutting department in footwear industry. It is high time for necessary steps which should be taken to expand the market demand.

Productivity is done

- To monitor performance
- To reveal problem area
- To appraise how well resources are utilized
- To improve productivity situation.

Measurement of productivity depends upon two factors i.e. .
output indicators input indicators.

Finally, my thesis work will help the student as well; as the entrepreneurs who have the tendency to come forward to work such type of sector of great prospect.

METHODOLOGY:

a. Review of the relevant literature
b. Calculation the productivity of the footwear industry
c. Analysis of the productivity

Draw the conclusion & recommendation

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Acronym Used

BCLT	**Bangladesh College of Leather Technology.**
BBS	**Bangladesh Bureau of studies.**
BFLLFEA	**Bangladesh finished Leather Leather Goods and Footwear Association**
EPB	**Export Promotion Bureau.**
EPZ	**Export Promotion Zone.**
GTZ	**German Technical Cooperation.**
ITC	**International Trade Centre.**
LFMEAB	**Leather Goods and Footwear Manufacturer and Exports' Association of Bangladesh.**
RSMA	**Raw hides & Skins Merchants Association.**
R&D	**Research and Development.**

CHAPTER I

1.1. INTRODUCTION

From time immemorial, the arts and crafts of Bangladesh are closely linked to our culture and heritage. Leather and Footwear have always been a part of that heritage and after the emergence of an independent Bangladesh in 1971; the industry received a fresh impetus. Today the country earns a sizeable amount of foreign exchange every year through export of leather and Footwear to a number of overseas markets. The Leather Industry of Bangladesh has been given particular attention for developing its infrastructure. By combining the latest in leather technology with abundant raw materials and inexpensive skilled labour, Footwear now playing an important role in earning foreign exchange for the country. Export of leather and Leather goods (including Footwear) earned US$303.33 Million for Bangladesh in the fiscal year 2004-2005.

The raw materials leather industry produces the world's finest quality goatskin of a very fine and smooth grain pattern. Country's cow leather has excellent natural compact fibre structure with a round feel and touch. More than eighty percent of the country's annual production is exported worldwide as semi finished/finished Leather, footwear and accessories.

Over 250 manufacturers are producing various Leather items such as travel goods, suitcases, briefcases and fashion accessories, along with belts, wallets, hand bags, case holders etc. for overseas export. Bangladesh has also

entered the field of Leather fashion garments with items of distinction and prestige.

Contents of the lesson:

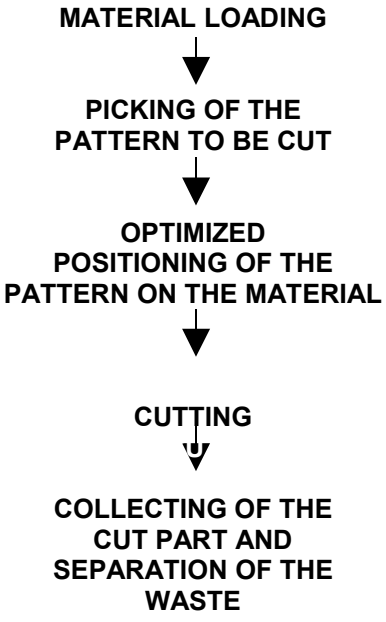
1. Cutting of leather and synthetic materials

2. Die cutting systems

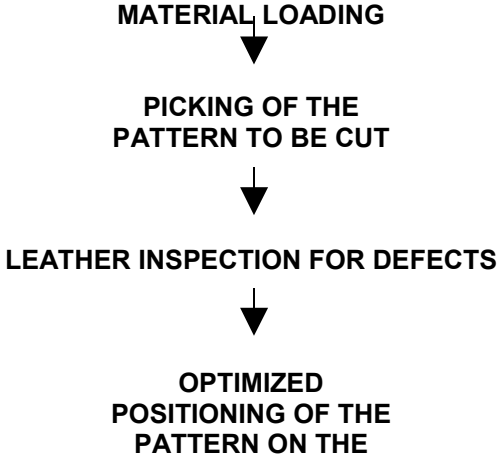
3. Die-less cutting systems

4. Nesting and layout of leather

1.2 Cutting of synthetic materials:



1.2 Cutting of the leather:



MATERIALS

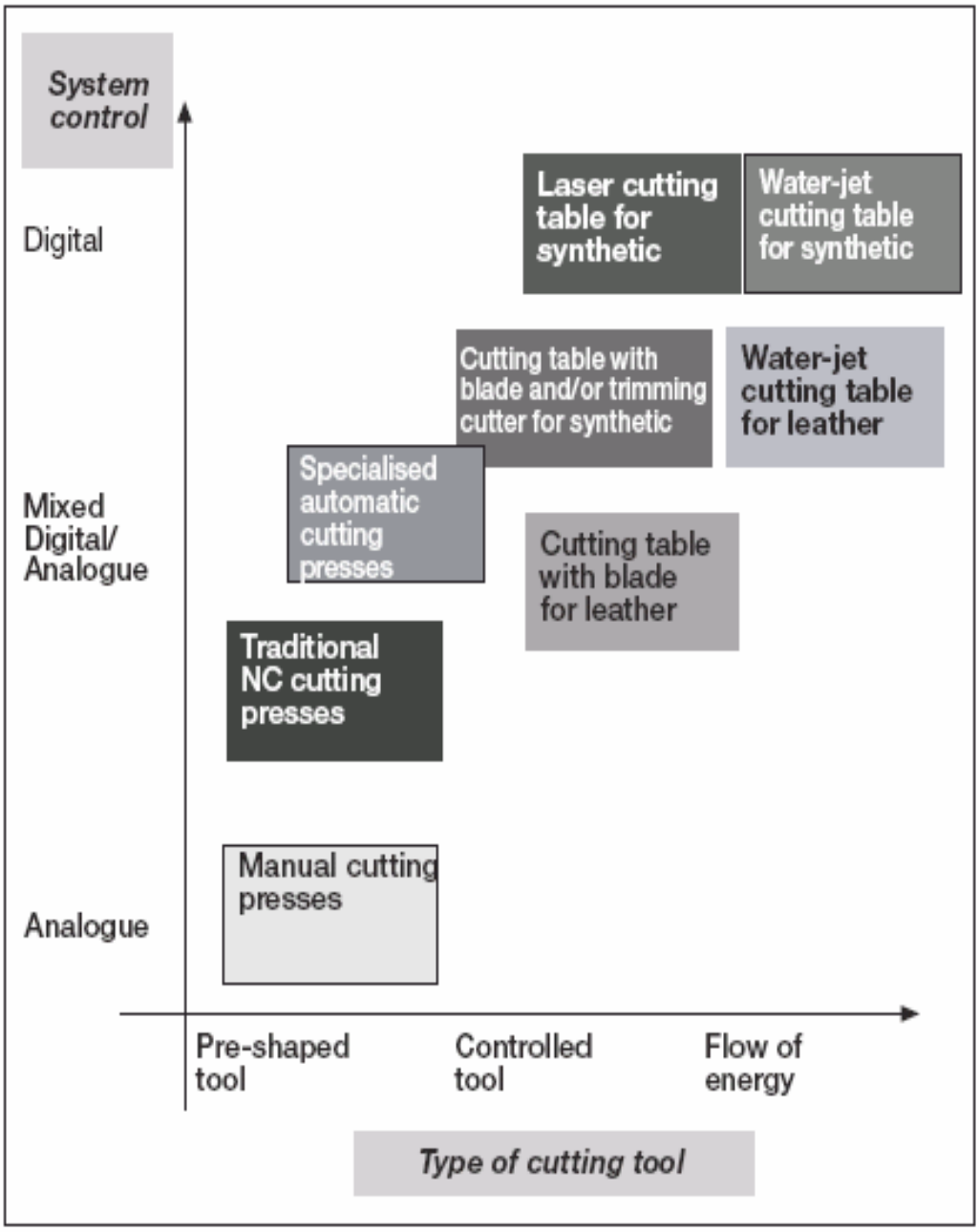
↓

CUUTING

↓

COLLECTING OF THE CUT PART AND SEPARATION OF THE WASTE

Cutting of synthetic materials:

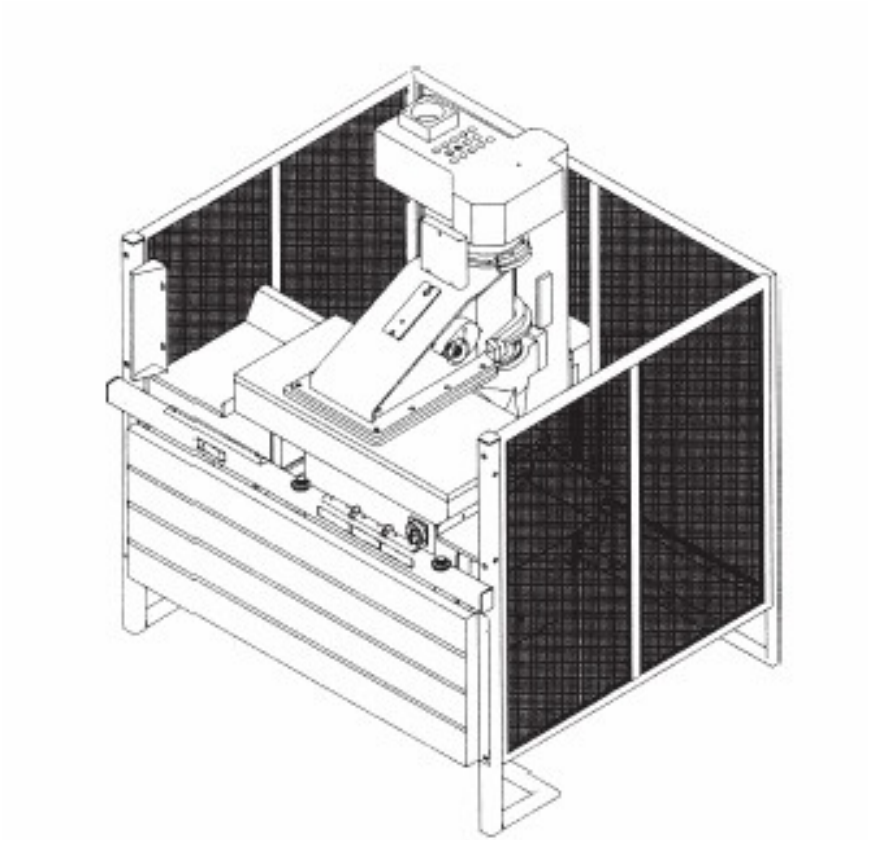


1.3 DYE CUTTING SYSTEM:

Knife:

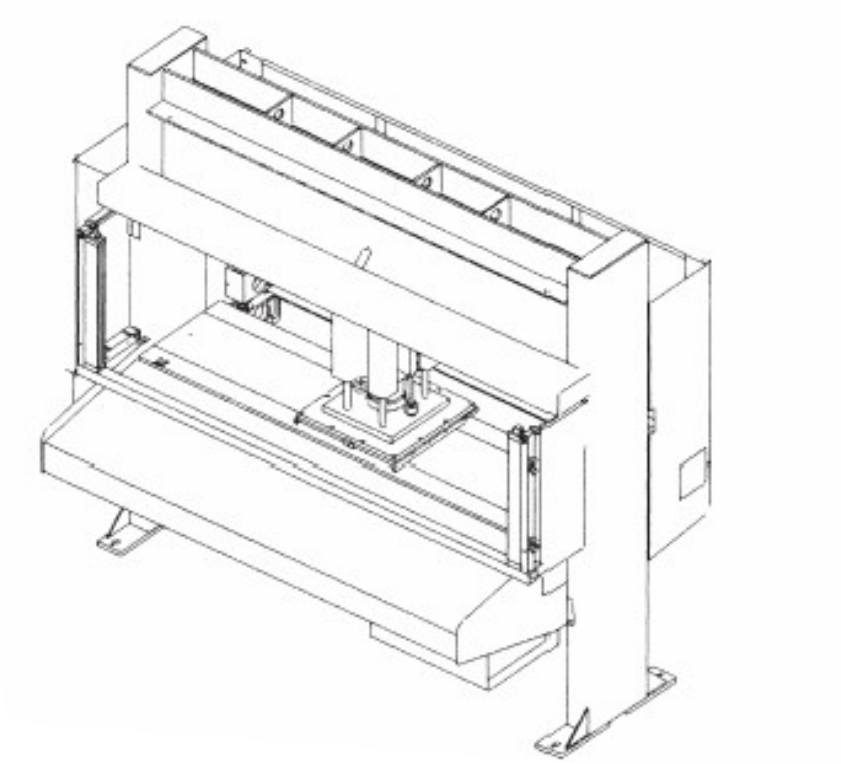
Figure: Single or double edge cutting knife (or die).

Manual cutting presses:



Swing beam clicking press

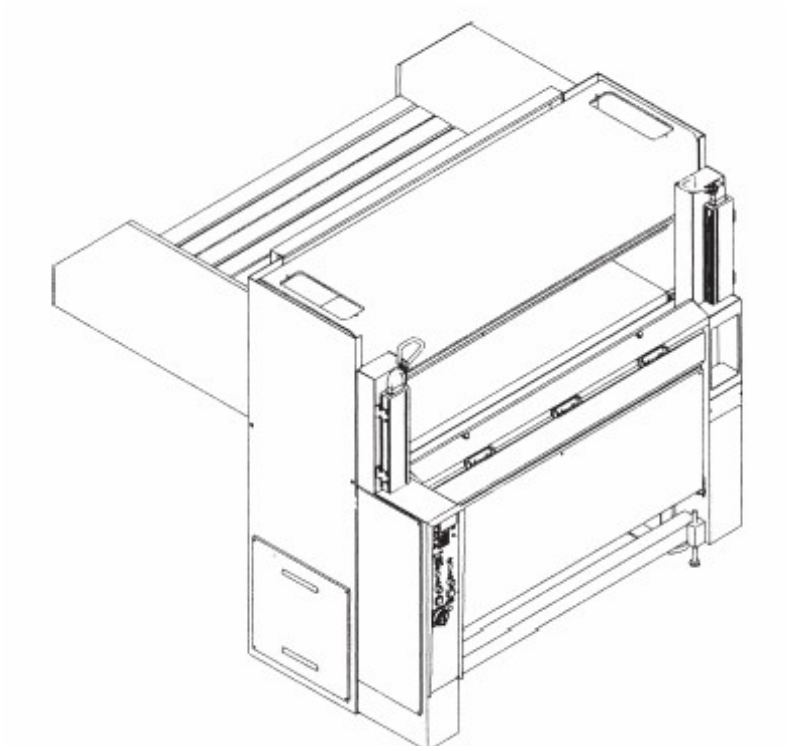
Manual cutting presses:



Traveling head press

Traveling head press

Manual cutting presses:



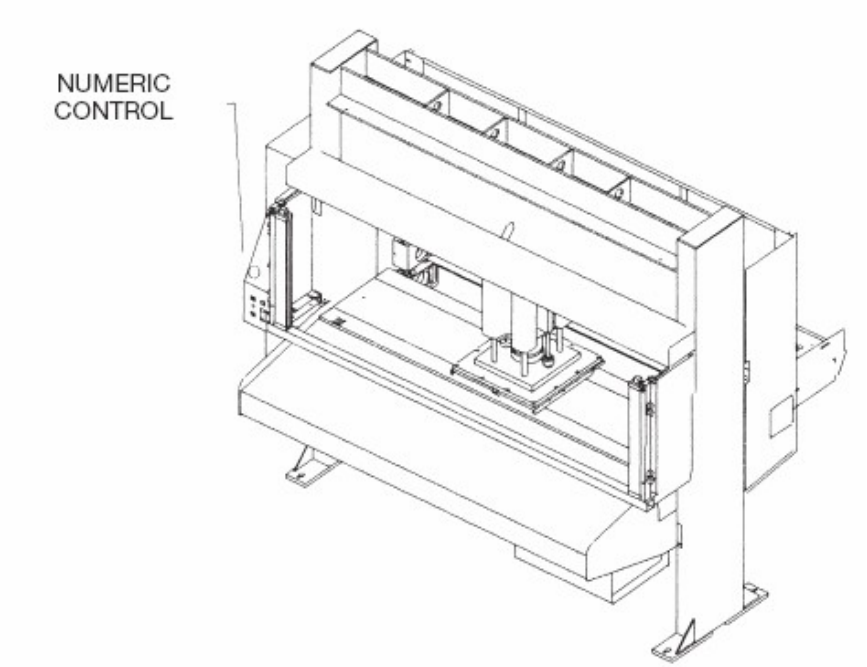
Beam presses

CN and intelligent cutting process:

Main characteristics

	Manual cutting presses	Traditional NC cutting presses	"Intelligent" automatic cutting presses
Die control and movement	manual.	mechanised, but rather laborious and not very precise. Generally only single-die.	automatic, precise and rapid. Multi-die models are available.
Control and material movement	manual, with possible motorising.	usually manual loading, displacement mechanised but not very precise in the case of many typical shoe materials. Not suitable for materials in sheets.	loading and cutting are automatic and very precise for sheets and rolls. Automatic unloading available.
Automatic programming of the cutting and production	manual, with possible cut-counter.	limited to simple single-die nesting, or with systems of manual layout.	completely automatic, with optimised nesting for entire production batches.

Traditional NC cutting press:



CN and intelligent cutting presses:

• The capacity to use all types of synthetic materials, both soft and rigid, in sheets and rolls;

• Easy and rapid substitution of the die, or better still the capacity to handle several
dies simultaneously;

• High productivity even for production batches with low unitary quantities;

• Guaranteed high efficiency in material use, introducing tangible savings with respect
to manual cutting standards;

• High flexibility of use in the switch from one material to the other, from one processing batch to another;

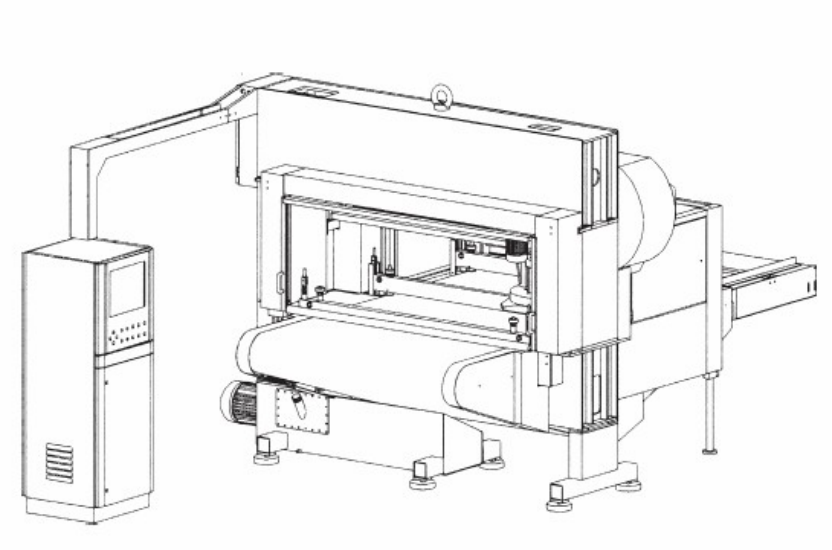
• A rapid investment return and low maintenance costs;

• Relative independence from the operator's skill and capacity, in term of operational
control and work programming;

• The possibility to be linked to a company programming and control system, receiving
information via a network and producing statistical reports on the work carried out.

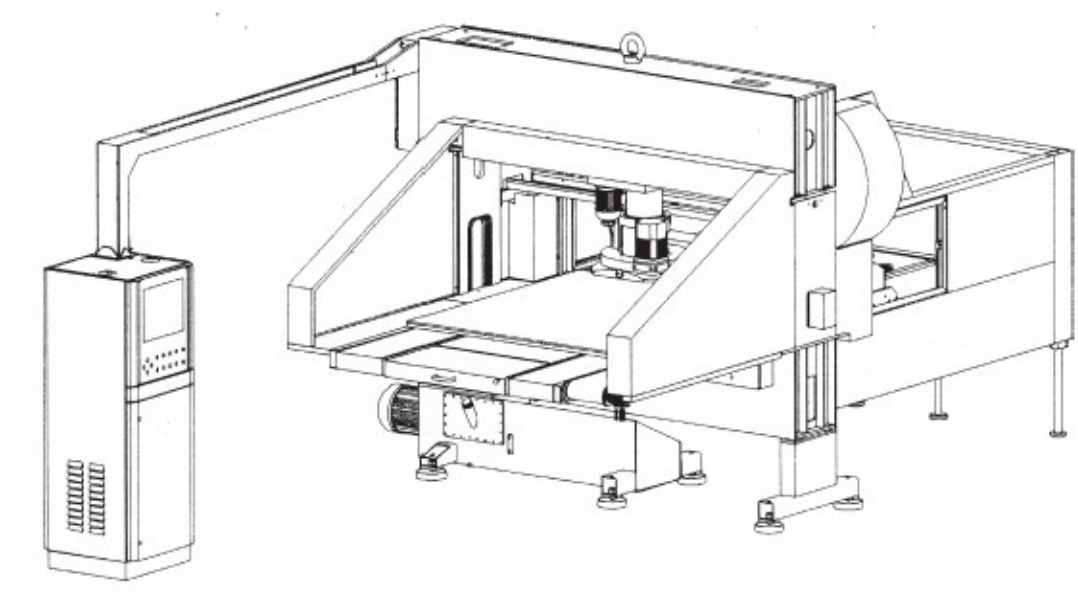
CN and intelligent cutting presses:

Automatic press with cutting belt and hold and dra pincers



CN and intelligent cutting presses:

Automatic cutting press with table, pincers and automatic unloading



CN and intelligent cutting presses:

Multi-tool press cutting head

1.4 Die-less cutting systems:

Comparison among various types of cutting technologies

	Type of materials	Cutting thicknesses	Cutting speeds	Cutting quality	Material blocking	Costs
NORMAL BLADE	synthetic	low	medium-low	medium-high	strong	low
OSCILLATING BLADE	synthetic and leather	medium	medium	high	strong	low
ULTRASONIC BLADE	synthetic and leather	medium	medium	medium-high	strong	medium
WATER-JET	synthetic and leather	high	high	medium-high	minimum	high
LASER	synthetic thin	low	medium	medium	nil	high
TRIMMING CUTTER	synthetic hard	medium-high	medium	high	strong	medium
PUNCH	synthetic hard	medium-high	medium-low	medium-high	strong	low

Characteristics of continuous cutting systems according to Material:

	LEATHER CUTTING	SHEET CUTTING	ROLL CUTTING
Cutting technique	blade/water-jet	blade/water-jet	blade/water-jet
Handling	manual/pallet/ continuous belt	pallet/continuous	continuous
Viewing	yes	no	no
Feed	manual	automatic loading	automatic and tenters
Unloading	manual or robot unloading	robot unloading	robot unloading
Automatic nesting	each hide	out of line	out of line
Interactive nesting	each hide	not recommended	not recommended
Control software	yes	yes	yes

Characteristics of continuous cutting systems according to Components to be produced:

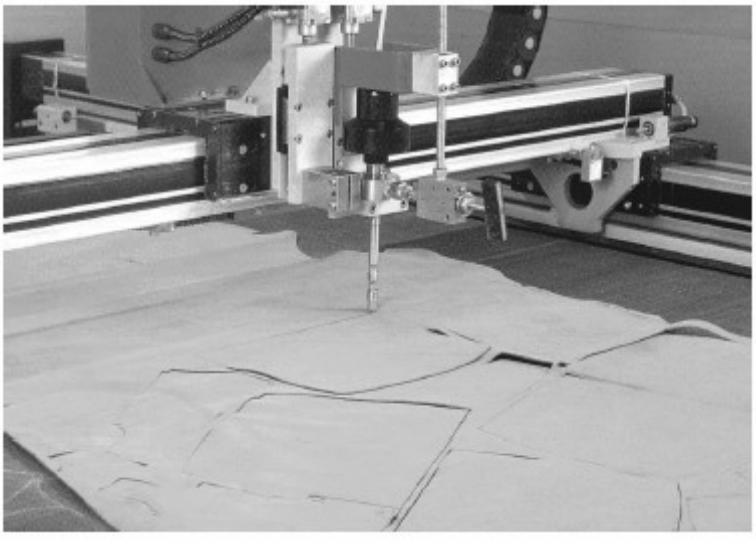
	APPLICATION	PRODUCTION PHASE	CUTTING TECHNIQUE
LEATHER	Uppers and linings	Development and samples Small batches Production	Oscillating blade Oscillating blade/ Water-jet/ultrasound Oscillating blade Water-jet
SYNTHETIC SHEETS	Components (*)	Development and samples Small series Production	Oscillating blade/trimming cutter Water-jet Water-jet
SYNTHETIC ROLLS	Uppers and linings	Development and samples Small batches Production	Oscillating blade Water-jet (**) Alternative blade

Die-less cutting system with oscillating Knife and one projector:

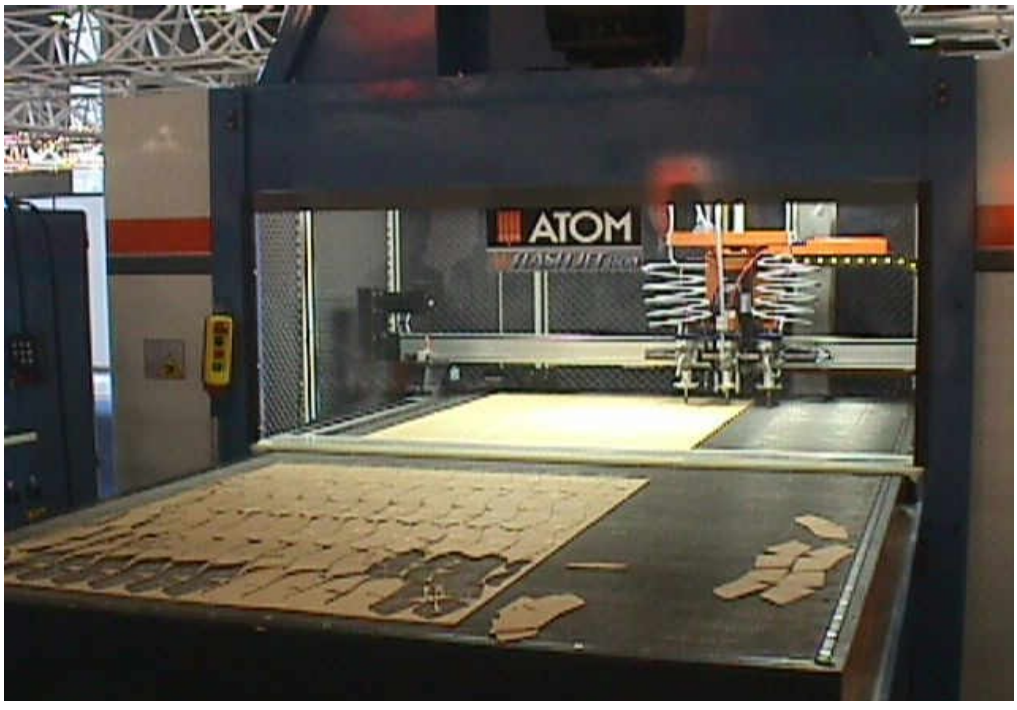
Detail of the cutting
Head and multi-tools:

Die-less cutting system with knife: phases of
Nesting and cutting:

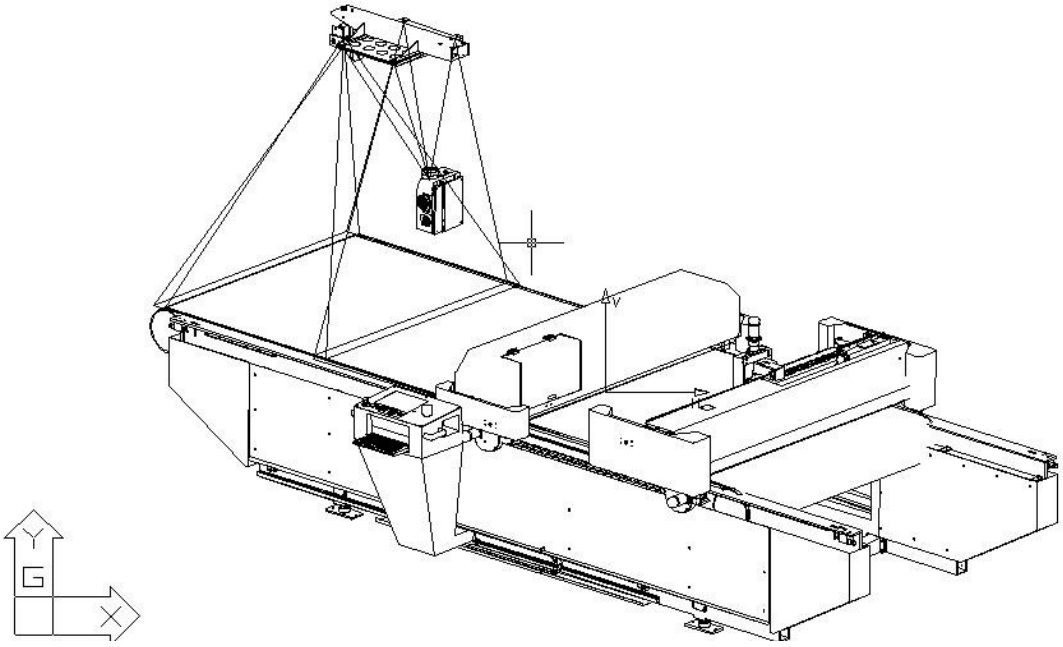
Continuous cutting system with knife and
double projector:



Multi nozzle water jet
cutting system for synthetic materials:



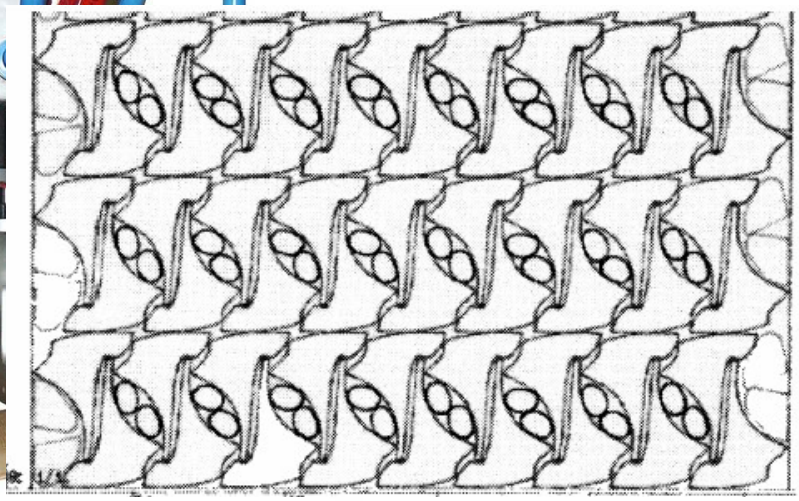
Dieless cutting system with high frequency oscillating knife, conveyor belt and robotized cut part collecting systems:



Automatic prehensor for Collecting:

Nesting of synthetic materials

- The boundaries of the material are regular
- The materials is homogeneous
- Several layers at the same time are cut
- The nesting is mainly and interlocking and geometry problem



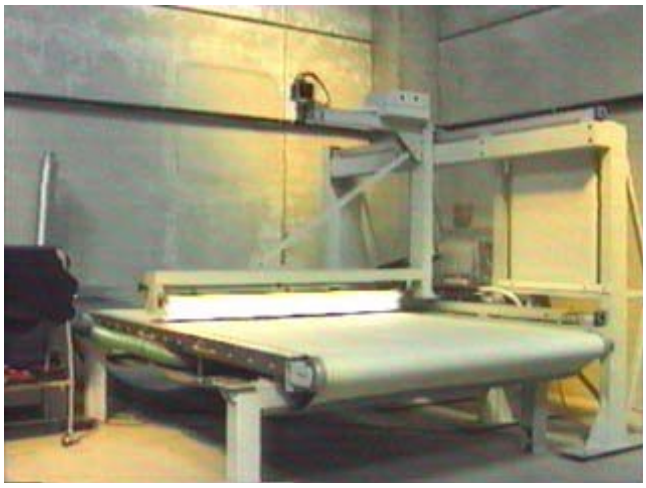
1.5 Nesting of leather

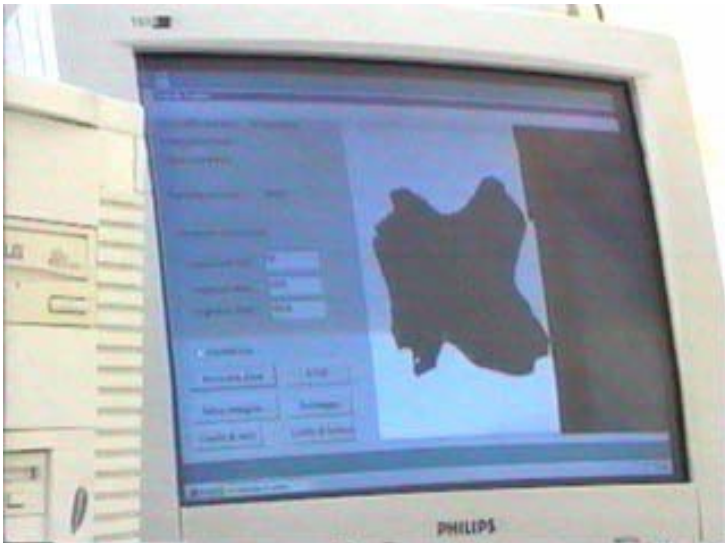
In order to nest and cut, leather flaws and quality areas must be marked and acquired

OFFLINE HIDE INSPECTION STATION

Automatic leather cutting systems can be very complex

Automatic capturing of leather flaws

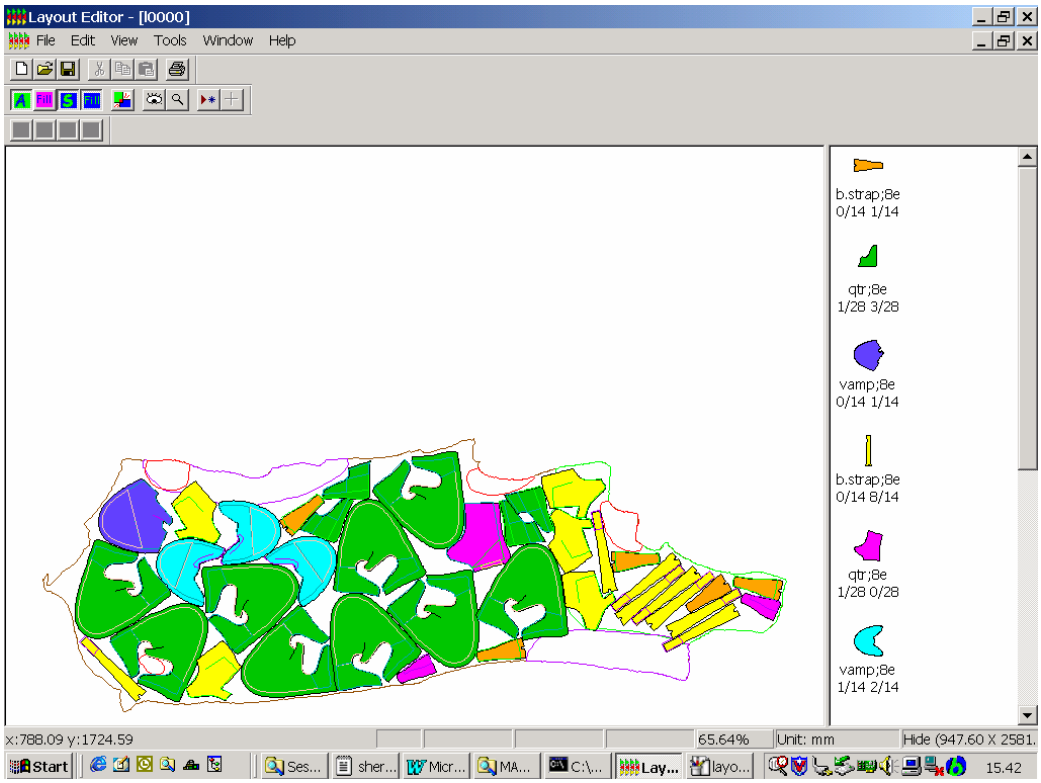




Nesting of leather:

The boundaries of the material are irregular
- The materials is non homogeneous
- Only one layer at a time can be cut
- The nesting problem is more a rule than a geometry problem.

1.6 Automatic nesting of leather:



CHAPTER 2

2.1 INTRODUCTION

Bangladesh Government has earmarked Leather sector as one of the thrust sectors. By & large the sector has been registering steady progress. But it is still a long way to be traversed to attain desired level of performance. As of today (2006) 70 – 75% output in the sector is crust leather while 25 – 30% output is reportedly by coursed by finished leather

Global trade in leather sector is learnt to be around US $ 65 billion yearly. Bangladesh share only 0.60 % (US $ 390 million) while is by improving finished leather output say by 20% additionally the export in leather trade is expected to be within the region of US $ 500 million. This means, the potentials in the leather sector is enormous. But the concentration of the tanneries in Hazaribagh location is certainly and whole up in further improving the tannery operation at large. Government in association with the trade bodies has

From time immemorial, the arts and crafts of Bangladesh are closely linked to our culture and heritage. Leather and Footwear have always been a part of that heritage and after the emergence of an independent Bangladesh in 1971; the industry received a fresh impetus. Today the country earns a sizeable amount of foreign exchange every year through export of leather and Footwear to a number of overseas markets. The Leather Industry of Bangladesh has been given particular attention for developing its infrastructure. By combining the latest in leather technology with abundant raw materials and inexpensive skilled labor, Footwear now playing an important role in earning foreign exchange for the country. Export of leather and Leather goods (including Footwear) earned US$303.33 Million for Bangladesh in the fiscal year 2006-2007.

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The History of Shoes: Shoe Making

Shoes both protect feet as well as, when incompatible in size and shape, present exciting factors in inflammatory conditions e.g. bunion. Despite the presence of pain, people are reluctant to change their footwear styles. The main function of modern footwear is to provide feet with protection from hard and rough surfaces, as well as climate and environmental exposure. To the wearer the appearance of their footgear is often more important than its (mis)function. Consumer resistance to change style is common. Informed decisions of shoe styles are thought to occur when the benefits of alternative shoe styles are carefully explained and footwear habits discussed in a culturally sensitive manner. The author, in the interests of intellectual exchange, explores the world of shoe making in an attempt to inform both lay person and health professional.

Anatomy of the shoe

According to McPhoil (1988) the anatomy of a shoe can be divided in an upper and lower (or bottom part). Sections of the upper include vamp, quarter, toebox, throat, insole board, and topline. The sections of the lower shoe consist of an outsole, shank and heel.

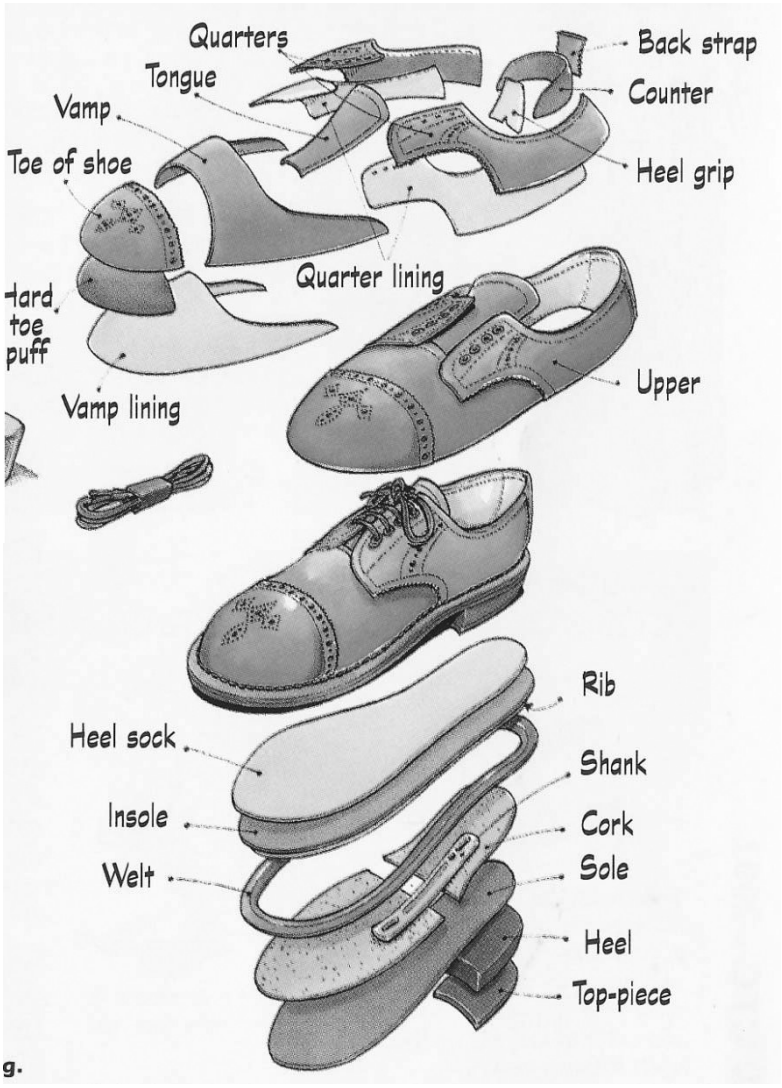


fig :parts of shoe

The Upper of the Shoe

All parts or sections of the shoe above the sole that are stitched or otherwise joined together to become a unit then attached to the insole and outsole. The upper of the shoe consists of the vamp or front of the shoe, the quarter i.e. the sides and back of the shoe, and the linings.

Vamp

The vamp covers the dorsum of the foot (includes the tongue piece) and superior aspects over the toes. This section i.e. the toe puff is reinforced which serves to give the shoe its shape as well as protect the toes.

Quarter

The complete upper part of the shoe behind the vamp line covering the sides and backpart. The top edge of the sides and back of the quarter describes the topline of the shoe. In athletic shoes the topline is often padded and referred to as a collar. The medial and lateral sections join in a seam at the posterior end of the shoe.

Toecap

Many shoes incorporate a toecap into the upper of the shoe. Toecaps are either stitched over or completely replace the distal superior aspect of the vamp and can be made into a decorative features referred to as toe tips. The toe box refers to the roofed area over and around the part of the shoe that covers the toes.

Linings

In quality shoes the quarters and vamps are lined to enhance comfort and durability. Linings may consist of various materials ie leathers, fabrics, and manmade synthetics.

Throat

The central part of the vamp just proximal to the toe box. The throat is formed by the seam joining the vamp to the quarter i.e. throatline. The position of the throat line depends on the construction of the shoe, for example a shorter vamp and longer quarters define a lower throat line.

The Sole of the Shoe

The term sole derives from 'solea' a Latin word meaning soil or ground.

Insole (inner sole)

A layer of material shaped to the bottom of the last and sandwiched between the outsole (or midsole) and the sole of the foot inside the shoe. The insole covers the join between the upper and the sole in most methods of construction and provides attachment for the upper, toe box linings and welting.

Outsole

This is the outer most sole of the shoe, which is directly exposed to abrasion and wear. Traditionally made from a variety of materials, the outsole is constructed in different thickness and degrees of flexibility. Ideal soling materials must be waterproof, durable and possess a coefficient of friction high enough to prevent slipping.

Shank

The shank bridges between the heel breast and the ball tred. The shankpiece or shank spring can be made from wood, metal, fibreglass or plastic and consists of a piece approximately 10cm long and 1.5 cm wide. The shank spring lies within the bridge or waist of the shoe, i.e. between heel and ball corresponding to the medial and lateral arches.

Heel

The heel is the raised component under the rear of the shoe. Heels consist of a variety of shapes, heights, and materials and are made of a series of raised platforms or a hollowed section. The part of the heel next to sole is usually shaped to fit the heel, this is called the heel seat or heel base. The heel breast describes front face of the heel.

Welt

The strip of material which joins the upper to the sole. Most shoes will be bonded by Goodyear-welted construction. Some shoes use an imitation welt stitched around the top flat edge of the sole for decorative purposes, but it is not a functional part of the shoe.

Last

"The close relationship between a man and his shoe maker was based on the shared secret of the client's measurements. The statistics of clients were never disclosed."

Traditionally before mass production, the original shoemaker started the process by taking a footprint outline of the sole. He whittled or chiselled a wooden last from the print. A last ('laest', Old English meaning footprint) was traditionally made from wood but are now available now in metal or plastic.

2.2 History of Shoes

It is impossible to estimate at exactly what phase in development on earth that man first thought of protecting his feet from the natural hazards of weather/climate and the rough ground that they walked on. Shoes are very interesting to analyze because they have a long history. It is obvious that shoes were made for the shielding of feet but aside from their actual purpose, shoes can help to tell the story of the person who wore them.

"It gives us a strong indication of personality".

-Colin Dowell.

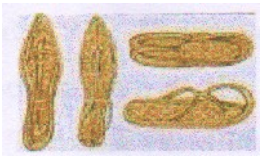


Fig: Sandal made of Papyrus Fibre

It's known that only the noblemen of that time owned sandals. Even Pharaoh as Tutancamon paved footwear as sandals and simple leather shoes (despite the ornaments of gold).

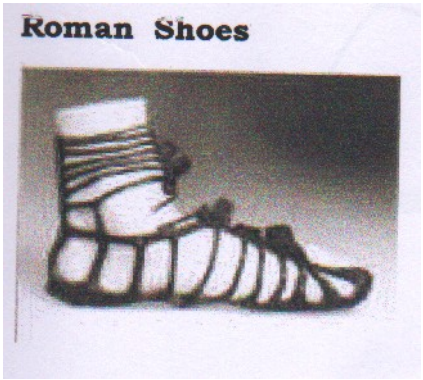
In Mesopotamia it was common raw leather shoes tied to the feet by straps of the same material. The boots were symbol of high social status. The Greek introduced new fashion as different models for right and left feet.

In Rome the footwear indicated the social class. The consuls wore white shoes, the senators wore brown shoes moored by lour leather tapes tied with two knots and the traditional footwear of the legions was the short boot that uncovered the toes.

In the middle age, men as well as women wore leather shoes whose form was similar to the ballet slipper. Men also wore high and short boots tied in the front and in the side. The most current matenal was the cow skin, but the upper quality boots were made of goat skin.

Figure: Ancient leather shoes

The standardization of the numeration is of English origin. The king Edward (1272-1307) was the first to uniform the measures. The first reference known of the manufacture of footwear in England is of 1642 when Thomas Pendleton provided 4,000 pairs of shoes and 600 pairs of boots to the army. The military campaigns of this time initiated a substantial demand for boots and shoes. In the middle of the 19th century the machines that helped in the confection of the footwear began to appear, but only with the sewing machine the shoe started to be more accessible. From the fourth decade of the 20th century on, big changes in the footwear industries began to happen as the change of the leather by the rubber and synthetic materials. Mainly in the female and infantile footwear.



Boot:

Any footwear extending above the ankle. There are numerous designs and types for a variety of uses and made from a number of materials.

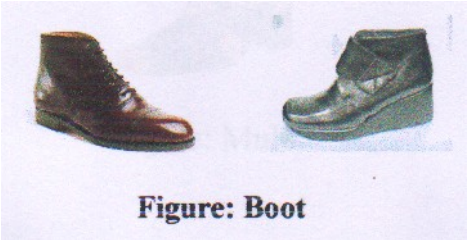


Figure: Boot

Clog:

A thick soled wooden shoe sometimes with leather upper.

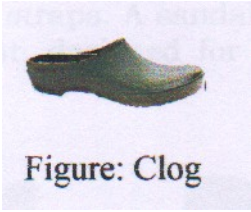


Figure: Clog

Lace-Up:

Any low cut shoe fastened by lacings, such as an Oxford or Blucher.

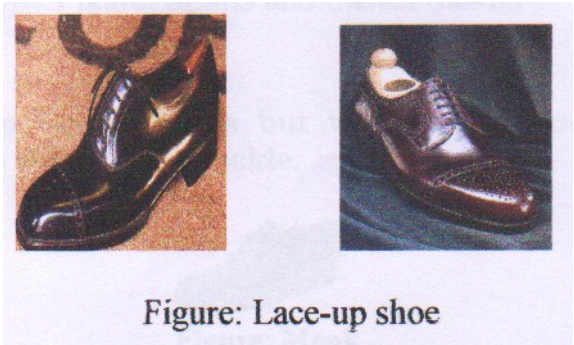


Figure: Lace-up shoe

Moccasin:

The term moccasin originates from the Algonquian language for foot covering.

This is the oldest shoe construction known, dating back about 12000 years. It is simply a piece of upper material cradle-wrapped around the foot or last and sewn at the butting of the two edges along the center of the sole.

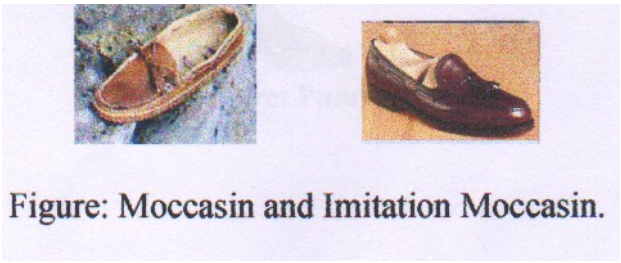


Figure: Moccasin and Imitation Moccasin.

Mule:

A backless shoe or slipper with or without a heel.

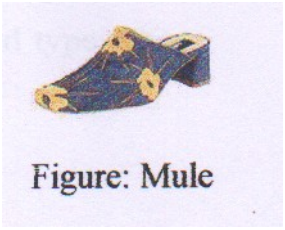


Figure: Mule

Sandal:

Originally a slab of leather sole attached to the foot by thongs. Today any open shoe who's upper consists of any decorative or functional arrangement of straps. A sandal can be foot low to knee high, or with any heel height, designed for simple utility or casual wear or as a fashion shoe.

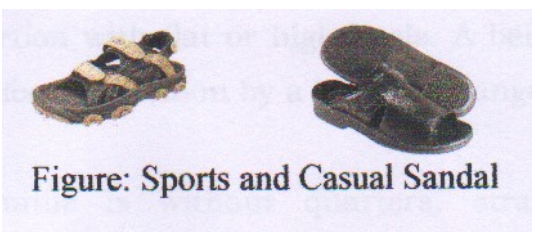


Figure: Sports and Casual Sandal

Monk:

Similar to Derby Shoes but with a cross over section to fasten the quarters with a side buckle.

Figure: Monk

Pumps:

Heeled shoes with low cut fronts and usually no fastening.

Figure: Pumps

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.

Sandal:

This consists of an insole with the 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.

Slipper (mule):

Mule is without quarters, strap and buckle attachment. The foot is supported at the vamp by a strap. A high or low heel can be fitted.

Clogs:

Bottom is of wood and the upper may be of straps with decoration across the vamp or with a vamp and toe cap.

Oxford:

The quarters are kept under the vamp and stitched.

Brogue:

An oxford construction with the upper decorated with stitches and punches.

Derby or Gibson:

The quarters are stitched apart on the vamp, with 2 or 3 eyelets.

Casual:

A shoe which is easy to wear and has an elastic gusset across the instep or on sides.

Court shoe:

A ladies high heeled shoe of slip- on type with a counter, toecap, vamp and quarters.

Other closed footwear's are:

Sports shoes / Athletic footwear

Running shoes.

Walking shoes.

Pole vault shoes.

Tennis shoes

Badminton shoes

Basket ball shoes

Field game shoes:

- Football shoes
- Hockey shoes
- Cricket shoes
- Boxing shoes

Walking shoes:

During walking the foot is lifted, after the lead foot makes contact with the ground. The shoe is made up of a forepart midsole, a heel wedge of EVA. MCR or PU, outsole of hard wearing rubber compound wrapped up at the toe region, rigid non collapsible heel counter of leather.

Turned shoe

The turned shoe is made inside out with only an outset sole between the foot and the ground. The upper and soles are very flexible. The last is designed in a single size and then a set is made in the range of sizes and widths in which shoes are to be manufactured.

Welted Shoes

Any construction using a welting, either as an intrigal part of the construction or simply for imitative effect.

2.3 Shoe Size System

A continual frustration to many who care for the foot weary is the absence of a standard shoe size system. Shoe sizing systems based on standard metrological measurements have been in existence for just over 100 years but shoes made in half sizes have only been available half that time. As part of the protection many craftsmen operated in early times, shoes were individually coded.

UK System

The first description of a shoe sizing system was made and recorded by British genealogist Randle Holme in the Academy of Armory and Blazon in 1688

Third Inch Scale (Barley Corn)

0	3	6	9	12	15	18	21	24	27	30	33	36	39
	1	2	3	4	5	6	7	8	9	10	11	12	13

UK System Quarter Inch Scale

Child Sizes

0	5.25	5.5	5.75	6.0	6.25	6.75	7.0	7.25	7.5	7.75	8.0	8.25	8.5
	1	2	3	4	5	6	7	8	9	10	11	12	13

Adult Sizes

8.5	8.75	9.0	9.25	9.5	9.75	10.0	10.25	10.5	10.75	11.0	11.25	11.5	11.75	12
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

American System

The first shoe sizing system with detailed proportional measurements for lasts and shoes came from North America.

Adult Sizes

8.5	8.75	9.0	9.25	9.5	9.75	10	10.25	10.5	10.75	11	11.25	11.5	11.75	12
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Mondo Point

This was a proposed international shoe sizing system based on the metric system. The idea originated in Australia and was intended to replace English, French, Italian and other size systems. Shoes were described as 255/98 or 255 millimetres long and 98 millimetres broad.

Size Conversion Charts

Male Adult Sizes - Conversion

UK	1	2	3	4	5	6	7	8	9	10	11	12	13	UK
US	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	US

PP	33	34	35.5	36.5	38	39.3	40.5	42	43	44.5	46	47	48	cm
Mondo	220	227	236	245	252	260	270	278	286	298	305	312	320	mm.

Female Sizes - Conversion

UK		1	2	3	4	5	6	7	8	9
US		3	4	5	6	7	8	9	10	11
PP		34	35	36	37	38	39	40	41	42
Mondo		227				252				278

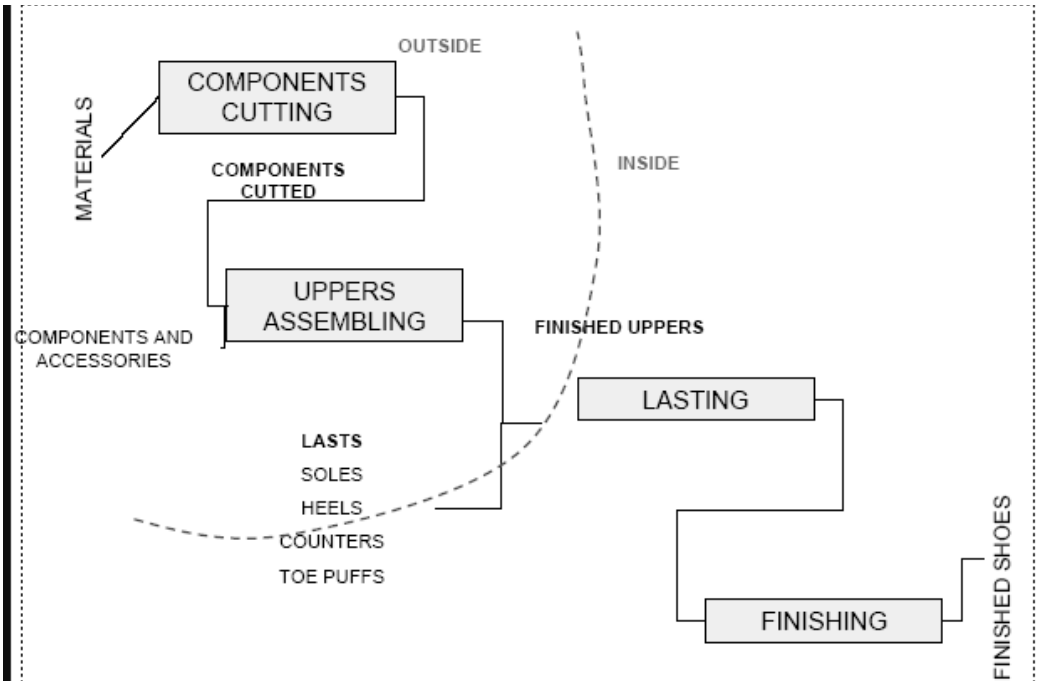
Children's Sizes - Conversion

UK		1	2	3	4	5	6	7	8	9	10	11	12	13	UK
US		2	3	4	5	6	7	8	9	10	11	12	13	1	US
PP		18	19	20	21	22	23	24	25	26.5	28	29	30.5	31.5	PP
Mondo		108	125	132	139	146	153	160	167	175	185	195	202	210	Mondo

Width Fitting

In the American (Arithmetic standard width measurement) this ranges from AAAAA to EEEEEE.

2.4 FLOW CHART OF FOOTWEAR MANUFACTURE



CHAPTER-3

3.1 METHODS OF CUTTING AND SYSTEMATIC ARRANGEMENT OF PATTERNS:

A parcel of leather may be cut right up into the most suitable portions considering not the orders, but only the quality and economy of the leather. This is termed the "exhaustive" method. If skins are selected suitable for our immediate requirements for orders, and from then are cut out portions in demand, leaving those portions for which there is no immediate demand, this is termed the "selective" method.

A combination of these two methods will often prove the best, i.e. to cut to orders and run in for stop to save waste.

In the combination method the best material is used for the first quality work and the other portion cut in to the lesser grades of upper. This method can only be used when a range of qualities is made, and it becomes even more economical if the selection of styles is also available. It requires a high standard of efficiency and keen discernment.

Before cutting, each skin should be examined on both sides for defects, and if any are not easily discernible they should be clearly defined so that they can be avoided more readily. Providing the material is strong enough, damaged portions may be used if placed where the defect will be covered, such as in a through vamp to which a toe-cap will be machined, or a Derby back with an outside counter, also in lasting and underlay allowances

Methods of Cutting:

The action of cutting the component can be either by hand or machine. Traditionally, cutting was done by hand, but today many of the larger companies use machine cutting. Whether it is by hand or machine the action part of the cutting operation is considered to be the easiest expect of the job. Which method is chosen is largely a question of economics. If the pair age of shoes likely to be sold on any one style justifies the cost of press knives, the shoes will be machine cut; if not they will be hand cut. Larger companies making many pairs of same style are more likely to machine cut, while the smaller companies who make a limited pair age of each style are likely to hand cut.

The quality of the finished upper should not be affected by the method used, whether it is by hand or machine. Man made materials, because of their uniformity, can be cut

multi-thick and need much less skill in cutting than leather.

a. Hand Cutting:

Rigid fiber board payers with brass bound edges and hand knives are used. Curved knives with vertical cutting edges are the best for leather, so that there is no need to over-cut at corners. A straightknife is best for fabric and Very light leather as it cuts down onto the cutting block and holds the leather in position.

b. **Press Cutting:**

For speed and economy of effort, press cutting is used wherever the anticipated demand justifies the capital outlay on knives. Hand cutting is still used for samples, etc. and for fashion shoes when only a limited run is expected. Beam presses are used, and these can be one of three types. Mechanical, hydraulic or electronic. Many newer machines are hydraulically assisted electronic machines and are know as hytronic. With mechanical and hydraulic presses, the cutting blocks may be of wood, fibre board or a synthetic rubber composition. With electronic and hytronic presses, the block is of soft metal covered with a thin layer of scotch tape. The possibility of driving the knife deeply into the cutting block is eliminated with the electronic and hytronic presses, since as soon as the knife comes into contact with the metal block and electrical circuit is completed and the beam rises. "Crush plates" on the central column of the press electrical circuit is not completed. For the cutting of fabrics or rubber sheeting twin beam places are being marketed. These presses can cut materials up to 60 inches in width straight from a roll and have ample space behind the beams both for rolls of material and sheets of rubber or fibre board.

With an eye to the future and the possibility that automatic or semiautomatic cutting will become far more important, and in view of the introduction of synthetic materials, new types of presses have developed.

Large beam presses with moving cutting heads have been developed. On these presses, the feed of the material, the movement of the cutting head and all other parts of the operation are controlled automatically from punched tapes.

Knives:

Upper press knives can be single or double-edged and are made from steel, cold-bent to the pattern required. It is important that the knives are checked frequently against a master pattern to ensure that the knife shape has not distorted.

Size notches are usually incorporated in the knife and any indication marks, such as prick marks for tapping allowances, are also incorporated.

Knives must be kept sharp to give a good clean cut, the number of sharpening possible on any knife being limited, since the knives are shallow.

Provided the cut is clean, it makes little difference whether it is made by hand or by machine since it is the positioning of the pattern or knife that is important.

3.2 Systems:

Systematic arrangement of patterns should be at the disposal of the operative when cutting uppers. A "system" is the arranging of the patterns in a certain definite order, which facilitates repetition in the same order for a number of times. The size and quality of the skin, the type of pattern used, and the method of application determine to a large extent the number of times the systematic arrangement may be adhered to.

Using systems will save much time. A maximum product will result with a minimum of waste if the convex curves are placed in just a position to concave curves, and the lines against similar lines. By memorizing suitable

"systems" the clicker will be able to select the arrangement most adaptable to the work in hand and the type of skin to be cut the foundation of most systems must be based on an initial straight line; unless this is done the repetition of placing can not be continued.

Although systematic cutting is a means of economy, the more important principles of quality, lines of tightness, substance, etc. must be the main considerations. A system that will cut the work in pairs is preferable to one, which cuts all for one side, as difficulty may occur in pairing up owing to the variations of substance and grain in deferent skins.

Vamps may be cut to a system, especially when the pattern is cut for interlocking.
The method illustrated does not conform entirely to the requirements of the recognized principles of clicking, for vamps are cut slightly on a bias to the lines of tightness necessitating additional discernment on the part of the clicker. It should be adopted only when the prime cutting area is limited, as, for instance, narrow side leather, which will only permit the cutting of vamps immediately along the backbone.

Three-quarter goloshes present an appearance of a whole golosh on the outer side of the boots, whilst the joined section is placed on the inner side. They may be cut to advantage by using the system illustrated in the fig.1, the dotted lines indicating the possibility of a "turned-in" golosh being required. The goloshes may be arranged along the straight line of the backbone, and when cut will leave a square edge suitable for further repetition. When cutting whole goloshes to a system, it is essential that a large clear area is available.

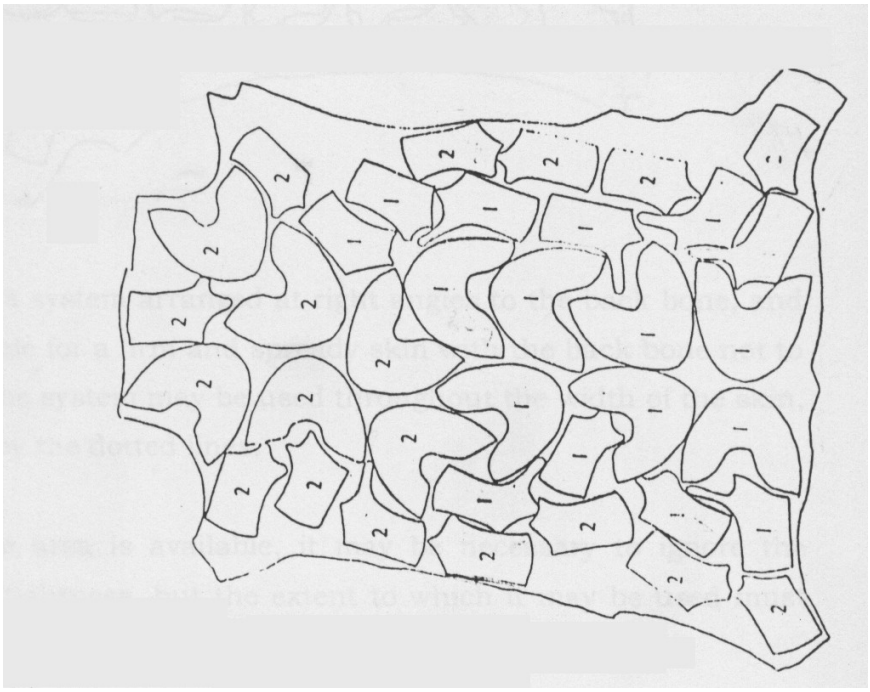
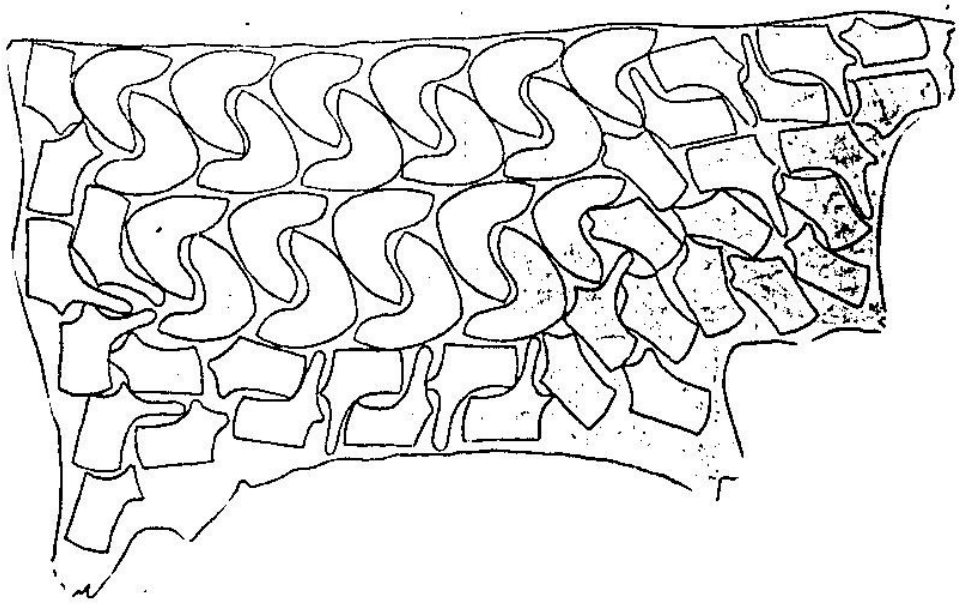


Fig. -1 shows another method of arranging galoshes.

When cutting whole goloshes to a system, it is essential that a large clear area is available. The pattern is usually designed to interlock, but when small skins are being cut, such as glace kid, that is not recommended.

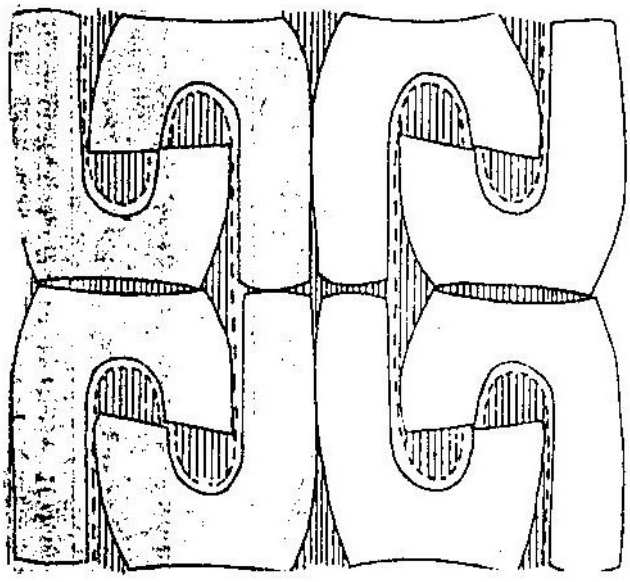


When a large area is available, it may be necessary to ignore the principles of tightness, but the extent to which it may be used must be at the discretion of the clicker.

It is essential that large clear areas are available for systems to be used to the best advantage, and seldom can they be used in the cutting of small skins.

A very economical method of cutting legs for goloshed boots, but all the legs are cut for the same side; the next skin should be cut to pair them.

The legs may be paired from the corresponding position on the opposite side of the back bone, when they would be similar. Occasionally it is more advantageous to cut a damaged section and preserved an existing system, than to avoid the damage and destroy the system, the particular section afterwards being used to best advantages. It by a slide manipulation the damage may be avoided, it
is better that it should be so.



Methods of placing shoe quarters are also shown in fig.-3, all other established principles, its virtue changes to vice if exploited unduly.

Ascertain first to what extent this is necessary, and cut accordingly. In cutting colored leathers this principles dose not applies, as it is advisable to pair the sections up as cutting proceeds,

The cutting of complete pairs from each skin facilitating the arrangement

When cutting skins, commence at the butt and work each side from the back bone to the shank, the cutting proceeding is this manner until the neck is reached. A poor clicker may cut good material to advantage, but cutting inferior parts demands greater skill, especially at the neck of a small skin, which contain growth marks diagonally to the lines of tightness. Growth marks become less apparent when subjected to strain in the length, but are more pronounced when the strain is applied in the opposite direction. It is customary to give preference to the appearance, but the precautions of preventing the leather stretching by applying an adhesive backer must be resorted to, otherwise difficulty will be experienced in the closing and lasting operations.

3.3 Sorting Cut Stuff :

There are some firms that prefer the cut stuff to go direct from the cutters to the closures, thus eliminating the sorting process, in which case the responsibility for quality and suitability is with the clicker. This arrangement may be satisfactory when work is cut to ticket, but when cut for stock; it is imperative that the cut stuff should sort for quality and substance.

Sorting is highly-skilled and should be interested to an experienced operative, acquainted with the standers required. The tendency is to cut more to ticket than hitherto, even when cutting by the exhaustive method, resulting in certain section being forced at the expense of other sections. This dose not relieves the sorter of his responsibilities.

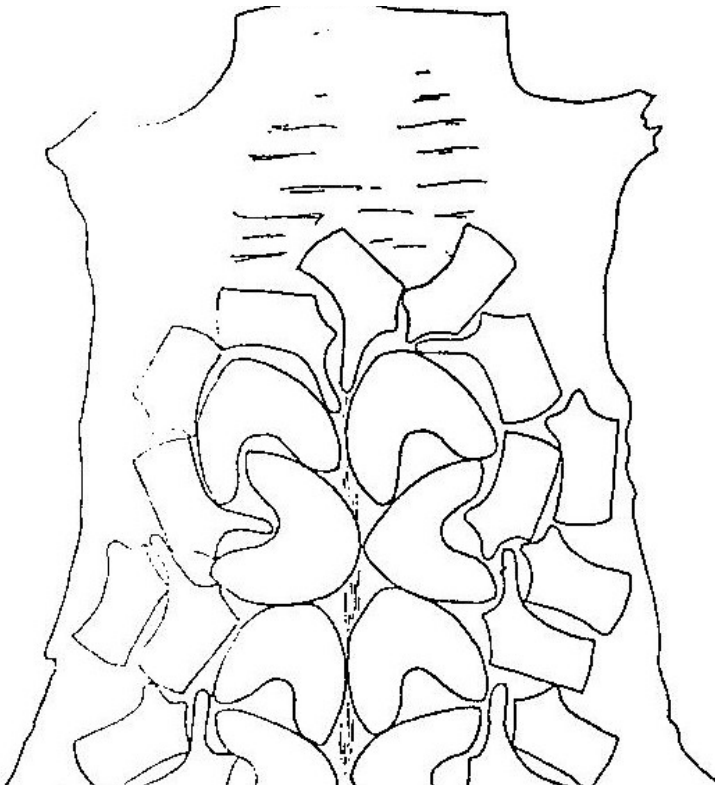


Fig. No :4 Cutting pairs in colored leather.

Sometimes uppers are cut for the same quality from the same consignment of leather to the same pattern, yet one class is required to be heavier than the other, and whereas the clicker will concern himself mainly with a minimum standard bellow which the section cut is of no value, the sorter will determine into which class the section may be most suitably placed in relation to both quality and substance. Furthermore, there should be a similarity of grain and texture. The sorter must therefore arrange the section to ensure this when the parts are fitted together.

Suitability of sections must be the constant theme with special care that vamps and caps are free from growth marks and other defacements. it is essential that a fine grain be secured in the cap as great strain is applied to this section during lasting.

When dealing with flaws and inferior leather they should be placed in their relative qualities according to the extent of the damage and its bearing on the finished boot.

In no circumstances should a section be passed as satisfactory if it is know that the defect will be detrimental to the wearing qualities. Surface mark, which only affects the appearance, may be permissible if well placed when sorting low-grade work, but never in such a conspicuous place as the cap on the crown of the toe. The sorter should be observant for irregularities of cutting, which should be clean and accurate, and also keen to discern the effects of extended cutting of a previous section. Should any variation of cut stuff be noticeable by comparison with the average product, it should be brought to the notice of the foreman so that a repetition may be avoided.

3.4 QUALITIES REQUIRED IN A CLICKER:

The work performed in the Clicking room is very important for two main reasons. Firstly, a clicker will be cutting up hundreds of pounds worth of materials in any week. It is possible by economical cutting or otherwise to show a large profit or loss. Thus, it can be seen that Clicking is an area that wills greatly affecting the profit- ability of a company. The second reason is that poor Clicking can affect a great number of subsequent operations than any other operations.

Clickers, therefore, are generally above average ability operatives with inherent qualities that are necessary due to nature of work. The main qualities required are:

I. Good Reason Ability:

At the present time 41% all shoe uppers are made from leather. No two skins are the same shape. So you cannot give a Clicker a blueprint to follow when cutting up skins. He must be able to reason this out for himself.

II. Spatial Perception:

If economical clicking is to be achieved, a clicker must have the ability to interlock different shapes on to each other and also to plan ahead to achieve the maximum number of cut components from a skin. He must have the perceptive ability to distinguish blemishes and the defects on the surface of the skin.

III. Color Realization:

Due to the variation of color shades within skins it is necessary to match many cut components. It is important, therefore, that Clickers are not color-blind.

IV. Decision Making:

Clickers must be able to make quick, accurate decisions. Each time a component is cut the clicker makes a decision as to its suitability for the

finished shoe. If he was a poor or hesitant decision maker his output of good quality cut work would be very low. Some of the larger shoe manufacturing companies employ selection tests for clickers to find out if new recruits have these inherent qualities before spending a great deal of time and money in any in training them to their maximum potential.

3.5 MATERIALS:

Suitability of Leather for Upper Materials:

Leather is the preserved skin of an animal. During the whole complex process of changing the skin into leather there are two stages of preserving involved. These are:

1. A temporary preservation to delay putrefaction immediately the animal is killed.
2. A permanent preservation made by tanning processes which changes the skin into leather.

There are several reasons why leather has been considered to be very suitable for shoe uppers, the most important being listed below:

I. Elasticity and Plasticity:

These two properties are often loosely descried as `give' or flexibility in leather. When a shoe is flexed it is expected to recover its original shape, without damage, hen it is remove from the foot. The material must, therefore, have **elasticity** otherwise the shoe will rapidly loose its shape. The **plasticity** of leather is also vial to enable the shoemaker to mould the shoe into its required shape initially.

The plasticity, therefore, gives the shoe its shape and the elasticity ensures that it keeps that shape during wear.

II. Strength and Stretch:

Leather has both a very high tensile strength and good stretch properties before it breaks. The properties are very according to the type of animal and the method of tanning used.

III. Permeability:

Owing to its unique fiber structure, leather allows water vapor to permeate to the atmosphere. It does, however, remain highly resistant to the passage of liquid. This ensures that the foot will remain moisture-free despite outside agents such as heat or rain.

IV. Surface Characteristics:

The surface of leather is very versatile and can be made into any color or type of finish required.

V. Ease of Working and Maintenance:

Leather can be stuck, stitched, tacked, split or cut easily to make it workable. It also lends itself to repair, holding new tacks and stitches well owing to its fibrous structure.

The main types of leather used for shoemaking are calf, cow, kid, goat, sheep, pig and unusual leathers such as snake, lizard and crocodile.

The Development of Artificial Leathers:

In recent years, demand for leather has far outstripped supply and there is now a world shortage of skin and hides.

By taking into account the increase in world population and the increasing use of leathers in articles other than shoes, it is thought that the supply of skins and hides will be at least 30% less than the potential demand by the 1980's. This has led to the emergence of various forms of

artificial leathers which are being increasingly used in footwear production.

There are two main types of artificial leathers at present available to the shoe industry. There are:

1. Coated fabrics
2. Synthetic poromerics

1. Coated fabrics:

These materials were first developed by using a coating of linseed oil over either oven, knitted or non-oven fabrics. Linseed oil has now been replaced by thermoplastic coatings such as P.V.C., or curable coating such as polyurethane.

2. Synthetic poromerics:

These materials have absorption and permeability properties similar to leather. The material consists of a surface of polyurethane film with either a micro porous or microcellular layer beneath.

In addition to these two main types collagenous poromerics are being experimented with and being used to a small degree. With these materials tanners can use either of the two methods:

a) The reformation of tanned leather fibres from leather scraps into fibrous sheets.
b) The dissolution of untanned leather fibres from the raw skin followed y the reformation into sheets which are then tanned to produce the finished product.

In view of the large range of artificial leathers available, it is difficult to summaries the precise advantages and disadvantages of them all. It is true to say that some artificial leathers lack some of the unique properties of leather, but in some you will find greater strength, more abrasion resistance and the ability to retain better shape and cleanliness.

3.6 CHARACTERITICS AND VARIATIONS IN LEATHER

a) Substance (Thickness)

The substance and quality of different parts of a skin are determined by the anatomy of the animal. As a guide, it is the areas which are subject to the least distention or stretch during the animal's life which are generally the best substance and quality.

The butt is composed of the soutest leather as this covers the delicate organs along the back. This is also most even in quality and texture.

The middle and shoulders are of lighter substance but the quality remains good.

The neck varies considerably. Cattle, especially bull calf, and sheep, tend to be quite stout in substance but heavily lined with growth marks. This does not apply as much to goats.

The shanks are light but the quality is often quite sound.

The belly is the lightest substance and generally the poorest quality.

It will be realized, however, that each area merges into the next so that no rigid demarcation is possible. The substance is sometimes equalized by the tanner splitting, shaving or sectioning the skin.

b) Tension and Stretch:

The type of animal skin, the age of the animal, the type of tannage and the type of finish applied to the surface of the skin affect the

degree of stretch within the skin. However, all skins will be consistent in their direction of stretch and the direction of tightness. Since the lines of tightness are those to be followed in cutting they are shown on the next diagram. The lines of stretch run directly at right angles to the lines of tightness.

c) Texture:

Texture is a matter of feel, dictated by the tightness of the fibre structure of a particular skin. Over the backbone of the animal, which is subject to little movement during its life, tight fibre structure and good texture are to be found. In the parts of the animal which is subjected to most movement, i.e. bellies, neck and legs, poor texture, compared with the skin over the backbone, is to be found.

d) Color:

Within the skin there are variations of shade. This is due to the parts of the skin with loose fibre structure absorbing much more dye than the parts of the skin with a tight fibre structure. This mainly applies to "drum-dyed" leather- those leathers which have been completely immersed in pigment in a revolving drum. "Spray dyed" leathers tend not to show the same inconsistencies of color.

e) Quality:

The areas of best quality in a skin generally correspond to those areas of best substance. However, other factors must be taken into consideration when considering the quality of a skin. These are:

- The proportion of prime material compared with the size of the skin.
- The regularity of the substance.
- The shape of the skin - good square shape or narrow "poorly grown" shape.
- The deflect within the skin, natural, mechanical and disease disfiguration which have occurred during the animal life.

3.7 MANUFACTURING REQUIREMENTS FOR UPPERS, LININGS, SOCKS AND FABRICS:

The quality requirements foe different part of a shoe depends on the functions during wear.

The first requirement foe a shoe is that it would retain its shape during making and wear. It is, therefore, most important to observe the lines of tightness when cutting to ensue that the requirements in the shoe are matched by the characteristics of the cut pieces. All components, therefore, are cut "tight to toe", i.e. with the lines of tightness running from heel to toe. This rule is strictly adhered to in cutting most type of footwear. It is disregarded only in special circumstances, e.g. when cutting open-toe sandals where the strain is across the forepart sandal straps or when cutting woman's fashion boot-legs where "tightness" is required up the length of the leg.

Uppers:

Vamps must withstand great stress and strain from the flexing of the foot in walking. Vamps, therefore, are cut from the butt and middle.

Toecaps are equally noticeable and firs class quality is needed. They are not subjected to such hard wear and are supported by the toe puffs. A lighter substance is, therefore, acceptable.

Quarters should match the vamp where they are joined and match each other at the back seam. Facing and toe line should be firm butlighter substance may be included at the heel where the quarter is supported by the stiffener. Better quality is preferable on the out side of the shoe, as this is more noticeable.

Back straps, Counters, Saddles, etc. must be won from usable leather which remains. Appearance is more important than substance, as these

are stitched over the upper leather which can itself be of inferior quality as blemishes will be hidden.

Facings which are backed to prevent the eyelet's from tearing through can also be light in substance, although appearance is important.

Tongues should be light in substance so as to avoid discomfort to the wearer.

Heel covers would have the substance by splitting and are suitable from shank leather.

"Match Marked" work:

Adjacent parts of the same shoe and both shoes of a pair must match not only for substance and quality, but also for appearance.

Accordingly, a good sound guide for cutting is adjacent parts of the shoe from adjacent areas of the skin, when "match marked" work is being cut. Suede shoes should, therefore, be paired up as they are cut. This rule also applies to shoes cut from embossed and printed grain leathers and also to leathers that have been "drum dyed".

Matching for substance and shade is less of a problem today, since skins are usually pre-sorted into bundles of similar substance, and many are also pigmented to a uniform tone. With aniline leather, the clear finish allows the natural grain to show, and there can be considerable differences in tone between the areas of the skin. When the natural or artificial marking of a skin are used to give a distinctive appearance, for example lizard and crocodiles skin, it becomes an intricate problem to match the markings.

3.8 INDIVISUL BLEMISHES:

Problems of substance, tension/stretch and quality are common to all skins and follow the same principles for all. Variations in grain and color are peculiar to individual skins but comfort to some sort of pattern, which is easily recognizable. In addition, very every single skin has its own defects which must be noted and avoided. It is, therefore, necessary for the cutter to examine the skin carefully when planning his pattern arrangement so that blemishes are not included where they will show.

Defects may be due to be anatomy of the animal, for example:

A well-grown animal has little unusable leather whereas with a badly grown skin large portions of the belly and neck may be unusable.

If the animal has a prominent or weak backbone, the skin covering it may be of poorer quality than the remainder of the butt.

In addition, there may be flay cuts, scratches, tick marks, etc.. at random on the skin. These may be comparatively inconspicuous yet would open up and become very noticeable under the strain of lasting. It is possible to include them in the lasting allowance or where they will be hidden by a lapped seam.

It is advisable for the cutter to cut a high proportion of vamps from the better skins in unmatched work to compensate for the poorer skins more suitable for quarters.

The principles already described must be borne in mind when cutting any skin

Match adjacent parts of the shoe for color, grain, nap etc.. (Possible by cutting them from adjacent parts of the skin);

Cut each part of the shoe from the appropriate part of the skin with priority for the vamps;

Cut quarters always and vamps as a rule "tight to toe".

3.9 Economy of Leather:

Consistent with these principles the aim of the cutter is to use his leather as economically as possible by avoiding waste involved in uncuttable remains. He does this by arranging the patterns or knives so that they interlock closely. Inevitably some leather will remainbetween patterns which do not quite interlock (first waste). Some must be discarded as unsuitable offal or cannot be used due to the irregular shape of the skin (second waste). The aim of the cutter is to reduce the waste as much as he can, although it would be quite wrong to do so by including leather which should not properly be used. Experience enables him to see exactly where and how each pattern should be placed. Some guiding rules are:

1. Cut larger sizes from the larger skins
2. Fit a straight line to a straight line: a curve to a like curve.
3. Never cut a section without planning the next.
4. Cut sections square across the leather, avoiding awkward angles.
5. With a small whole skin, cut right feet from one side of the back-bone, left feet from the other, in other words, cut across the skin cutting a pair at a time.

It will be obvious that there is a great difference between the systematic cutting of large sides with the same simple knives, time and again, and the arrangement of patterns of complex shapes to make best use of a small skin. Accordingly, there is a difference in skill between cutting for sandals and fashion

shoes. With sandals, it is possible to work out a system which can be applied to skin after skin; with the latter, the arrangement of patterns for each pair of shoes may be a separate work or art.

To a large extent, the designer and pattern cutter can influence the economy which can be achieved. Small regular patterns are more easily inter locked than large irregular ones and blemished leather can be used where one part is hidden by another. The foreman too can kelp by presorting the leather to suit the ticket of work and allotting to the cutter a range of sizes to the cut together, since a small size may be fitted in where a large one would not.

3.10 Linings and Socks:

There are some considerations particulars to the cutting of linings and socks:

a) Linings:

The quarter linings are most important from the point of view of appearance and wear. They are, of course, most noticeable when the shoe is on display and any blemishes would show. They are also vital to the comfort of the wearer owing to the friction between the heel bone and stiffener. They should, therefore, be cut out of the better leather.

Vamps are often unlined; when they are lined with leather, the lighter substance of skin can be used. It is essential that they should be taken out when lasting.

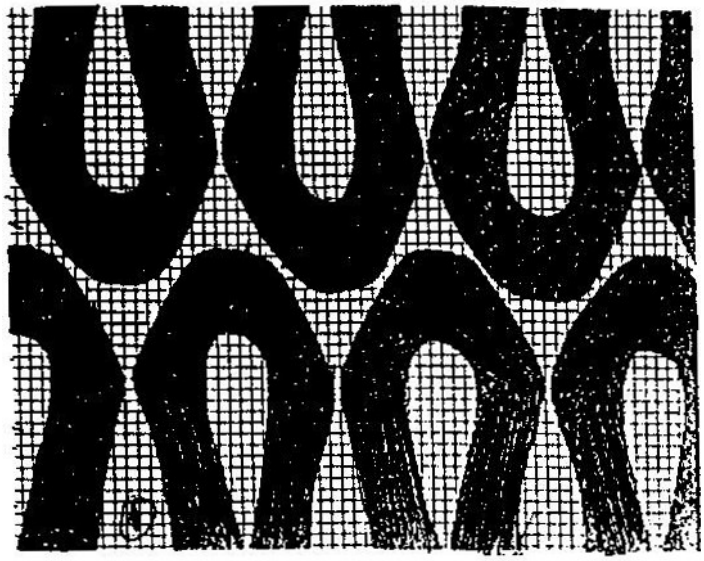
b) **Socks:**

The appearance of socks is especially important at the seat and waist where they show and where attention is drawn to them by the brand mark. Loose socks, for example woolly ones, must always be cut "tight to toe". Although there is no tension in wear when socks are stuck to the insole they are liable to be distorted when they are inserted unless they too are cut correctly.

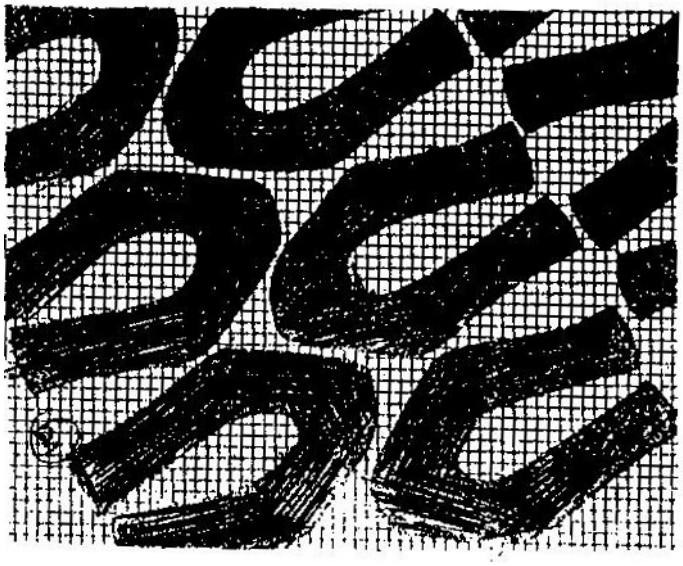
Fabrics:

When -fabrics are used for upper materials in place of leather, problems of substance and quality do not apply as these are uniform. The principle of tightness and stretch does apply, as the weft threads (those running across) are usually more stretchy than the warp threads (those running lengthwise). However, the line of tightness is regular and consistent.

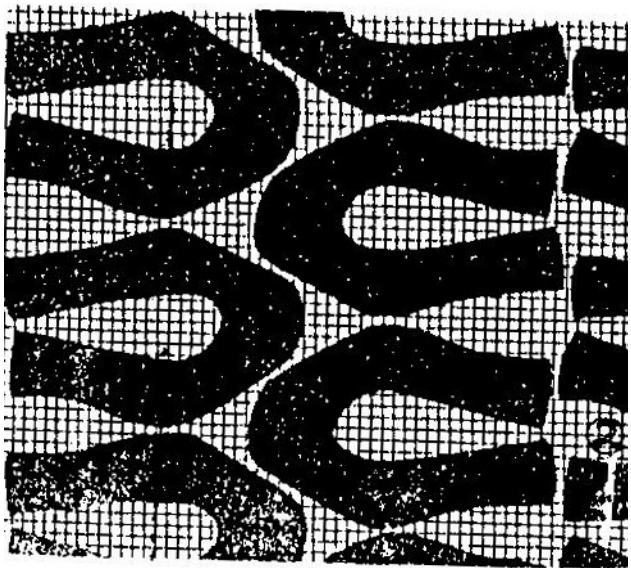
Patterns can be cut on:



The warp system
(lengthwise); this is "tight to toe" but makes them liable to breakage in manufacture.



The weft system
(across); this is more flexible.



This bias system (diagonal); this is usually employed when a vamp lining is combined to u plumper (or thickening layer) so that there is equal elasticity in each.

It will be obvious that fabrics (unlike leather) can be cut strictly to a system, so that the waste is reduced to a minimum between patterns. When cutting uppers from fabrics which are decorated, it is necessary to match exactly the designs on both shoes of a pair.

3.11 LEATHER MEASUREMENT SYSTEMS:

Introduction:

Since leather is the most expensive single item in a shoe, it is important that it should be cut economically and, therefore, the amount of leather necessary to cut a pair of shoes must be calculated as accurately as possible. Several leather measurement system have been involved over the years to do this. All however, have their advantages and disadvantages and as yet, no completely accurate method has been discovered.

"Marking Up" Method:

In the very early days no allowances at all wear used, and the cutters just drew what leather they required to cut the job in hand.

The first system used was one in which the cutting foreman selected an average skin from the bundle, and this skin was marked up with patterns at the average shoe size as they should be cut. The area of the skin was divided by the number of pairs which could be cut from it and this was used as the standard allow.

"Russ And Small" Method:

The first systematic study of factors affecting leather allowance was made by Russ and Small and published in 1922. There work was developed by Wyngate Kelly, who published further data in 1930, and since then a number of people in the world has given censurable attention to this subject. The system to be described is substantially the original approach set out by Russ and Small, but has been adapted to incorporate later developments know to be in current use.

Factors affecting leather allowance:

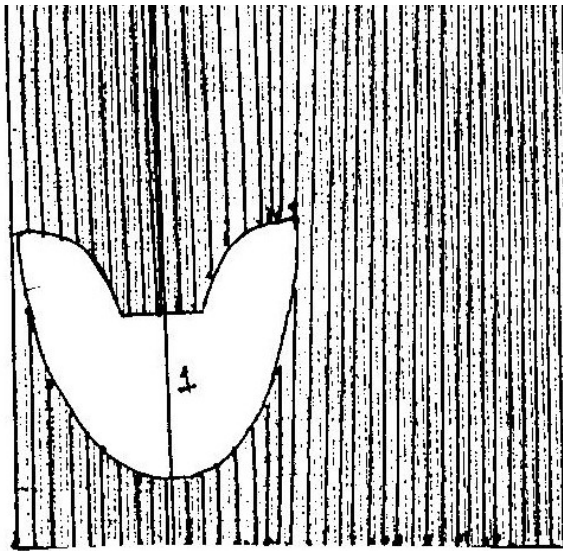
The first stage in the method is to ascertain the actual pattern area together with the inter looking or first waste. This combined area is ascertained in a single operation and the resulting figure is usually referred to as *a* **pattern scale,** which is defined as the area of any absolutely necessary looking waste caused by irregularities in thecontours of the pattern. this scale is always calculated in the first instance for an individual part of an upper, and the sum of the individual patterns scales forms the scale of the complete upper.

Scaling may be perform by drawing round the shape of a pattern, on graph paper, and repeating this until the first outline is completely surrounded by further outlines.

The System of laying out an individual pattern must follow certain rules,

Namely,

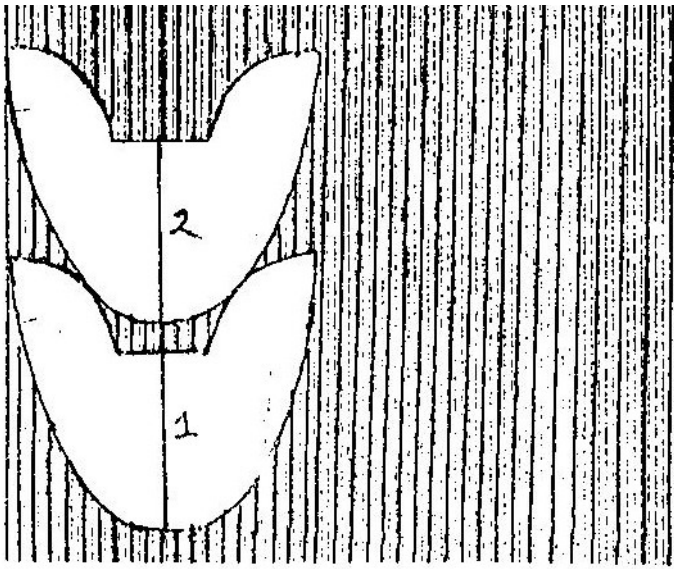
1. The pattern must not be turned over.
2. The positions of the patterns must be as close together as possible.
3. The relative positions must be either the same or exactly 180 degree opposite.



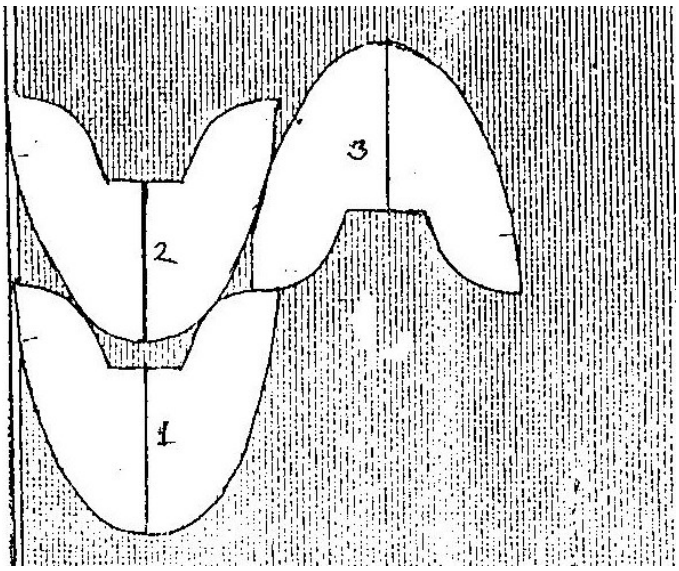
- Draw a straight line through the upper patterns which useful for proper

positioning of the same graph.

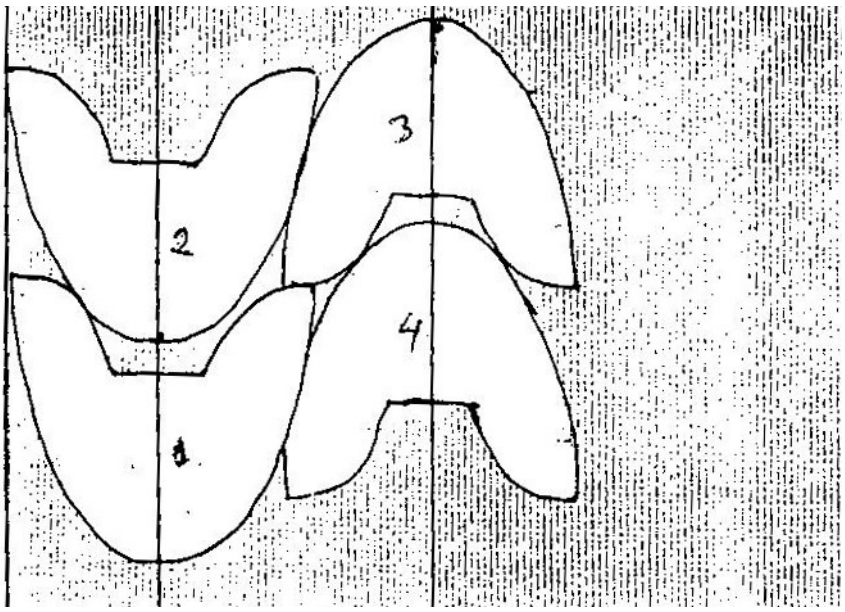
- And location spots for future reference on patterns traced.
- Position the pattern in such a way so that it is in line graph sheet.
- Trace around the pattern with a pencil to get first outline.



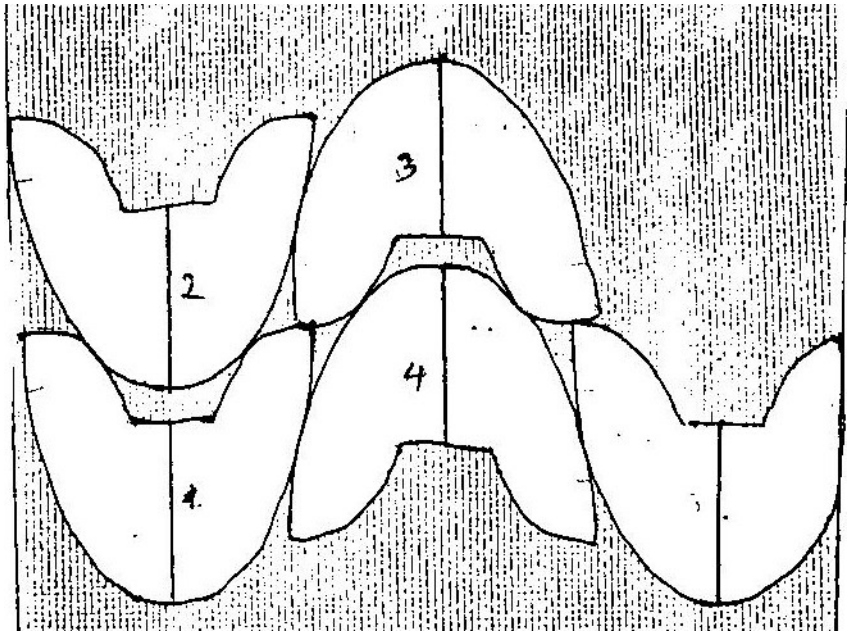
- Next tracing can face the same direction as the first (o degree method) or face the complete opposite direction 180^0 method).
- Whenever pattern is traced make sure that the centre line is in line with the graph sheet. And the second outline must touch the first one at least in two places.
- Trace using 0 degree method around the pattern.
- Mark the location spot on the tracing and mark this outline no. 2.



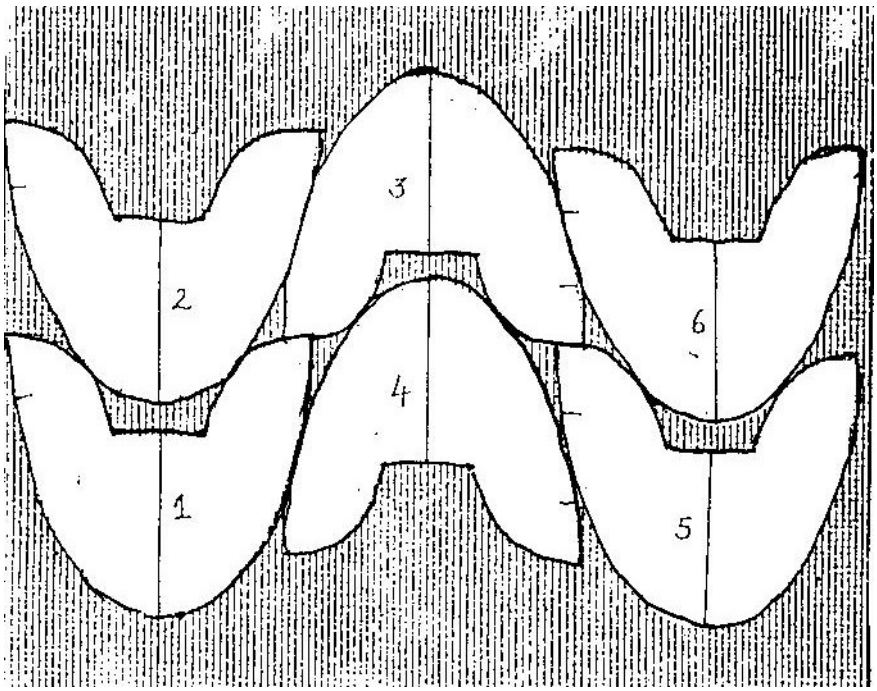
- Turn the direction of the third trace && outline obtained must touch outline no. I &outline no. 2.
- Avoid overlapping while tracing around the pattern
- Mark the location spot and number this outline no. 3



- Trace the fourth outline in same direction as no. 3
- Interlock to ensure it touches outline no. 1 and no.3.
- Mark the location spot and number this outline no 4.

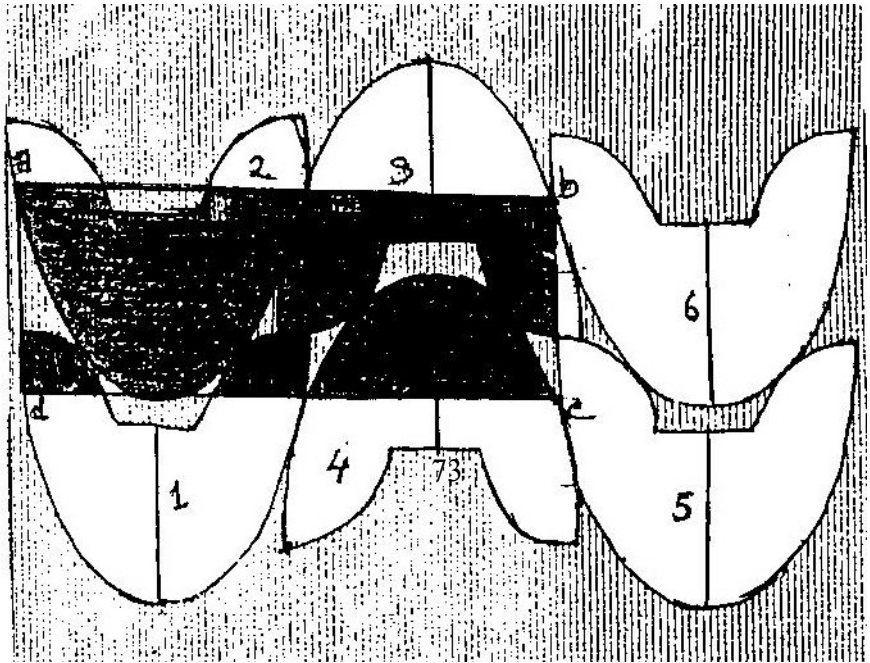


- Pattern outline from fifth trace must face the same direction as trace no l.
- It must touch the two outlines facing the opposite direction.
- Trace around the pattern and mark the location spot and number this outline no 5.



Obtain sixth outline by tracing around the pattern which faces the same way as outline no l. this will now give four outlines one way and two pattern outlines the opposite.

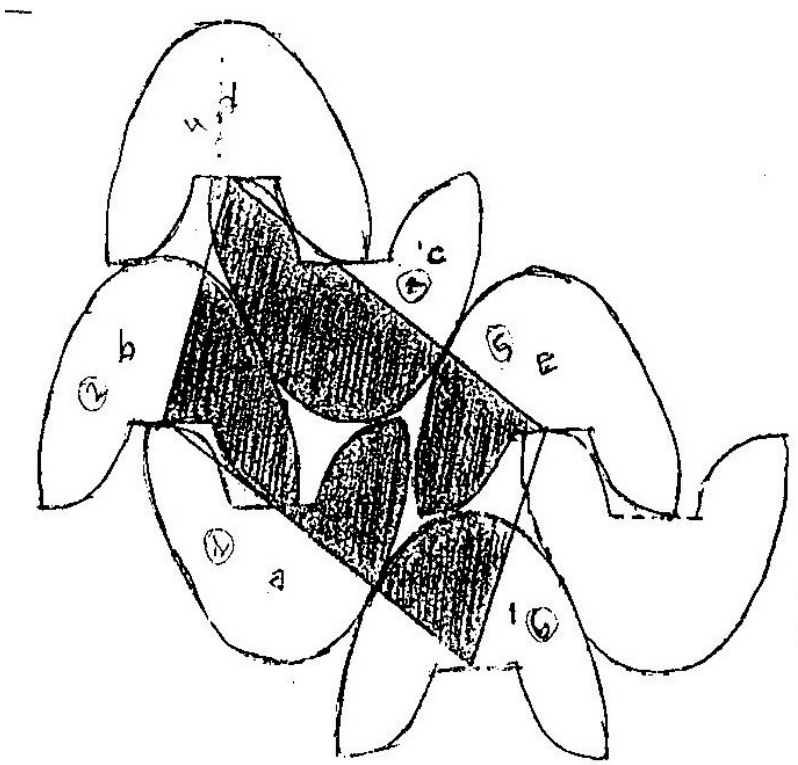
Mark the location spot and number this outlines as No. 6.



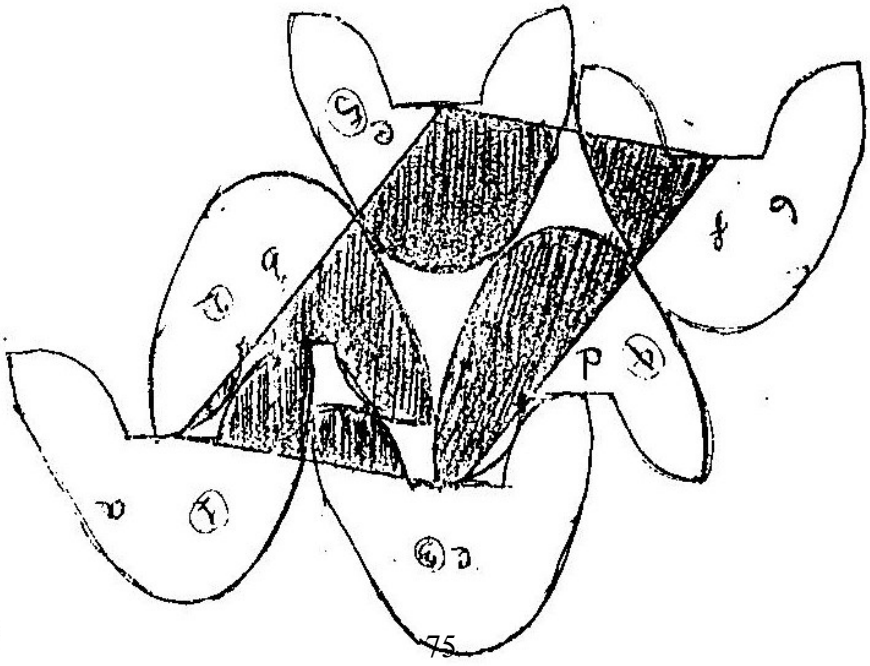
- Join the location spots of four pattern outlines all facing the same direction.
- Hence leading to geometric shape (abcd) having four sides and opposite sides parallel to each other, known as Parallelogram.
- The area of a Parallelogram is found by multiplying the base and vertical height.
- With in this area will fit equivalent parts of the patterns equal to two full outlines of the pattern being traced. This area is known as Pattern Scale Area.

Following these basic rules, other inter locks can also be obtained. However, the objective should be to put the one, which is having least amount of interlocking waste.

VAMP TRACING No. A:



VAMP TRACING No. B:



Tracing similarly obtains pattern scale area of all the components in a shoe and put them in a sheet used for calculation of leather allowances.

Size (or area) and shape of skin:

In addition it the interlocking or first waste, there is a second waste due to the area of the skin (commonly called spread) in relation to the size of the individual pattern shapes, the irregular stretch, shading, etc.. Because smaller the patter and bigger the size of skin, the lesser will be amount of marginal waste, as compared to bigger pattern and smaller size of skin. Therefore, the amount of second waste to be allowed will vary both with scale of the pattern and with the size of spread of the leather.

Second wastes percentage is obtained by refereeing to the table `A'. These tables show the waste percent, required to be added to any pattern scale for a given size of skin.

Types of Leather:

Each type of leather (e.g. calf, glaze kid, suede & etc.) has its won cutting value. It should therefore be possible to express this cutting value as a leather coefficient applicable to a particular type of leather. (Grades of each leather being dealt with separately), which will cover such characteristics as surface finish, color, excessive stretch and irregularities common to the type skin involved. Specimen table of leather coefficient is given in table B', but it should be noted that this table has not been tested on a wide scale and may require modification.

Size and Fittings:

Cutting areas are directly proportional to sizes and fittings. For cost estimating propose it is required to get the weighted averages of side and

fittings for the lot to be cut.

Separate averages are required for various markets. (Separate averages will always be required for normal differences of size ranges, and differences in sizing systems.

The different in cutting area between one size and another and from one fitting to another will be irregular steps in respect to any particular pattern. It has been established by number of different styles and designed that there is sufficient uniformity to enable a general series of table to be built which can be used for most purposes, Refer Table D' to fine coefficient for corresponding weighted sizes and fitting.

Net Coefficient:

Measuring Area Discrepancy leather

Leather area received by the buyer may be smaller, than stated by the supplier. Therefore checking the Area Discrepancy is important part of the incoming leather inspection. Area Discrepancy of both footwear upper and lining leather is measured by the following spot check sampling method.

Sample Size for Area Measurement:

Select 5-15 skins of each leather article in the consignment for a spot check inspection of leather area. Try to select the skins by random.

Area Measuring by Large Grid:

Have a large plastic grid framed and hinged in far side of the incoming inspection table, in order to "sandwich" the skin between the table and the grid, fig. 1.

Count those squares on the grid which are on top of the skin. To avoid systematic error, round up and down the partly covered squares the way the bankers are rounding money values. In absence of a large grid, measure the leather area by a smaller grid; example in fig. 2.

In this case the measuring is done by first drawing perimeters of the grid onto the reverse side of the skin, counting these; then continuing by counting the remaining areas by the grids smaller squares.

Area Measuring by Machine:

The skin area can also be measured by an electronic area measuring machine. Check periodically the area measuring machine results by measuring a piece of round shaped material of which area is known.

Calculating The Area Discrepancy Coefficient

Calculating the area discrepancy coefficient

By using the following formula.

AREA DISCREPECY COEFFICIENT = E=B/A

A= Total area of the skins in the sample, as stated by the supplier

B= Total area of the skins in the sample, as measured by the buyer

Example:

Leather being 5% sort on area would have an area coefficient of 0.95.

Leather Sorting (sorting to cuttabillity grades)

Leather sorting to grades by the supplier may not have been done according to the standard and consistency required by the buyer. Thus reassessing cut

ability of leather of each consignment is important.

Measuring cut ability of received leather:

Grade the received leather into cut ability grades a,b,c etc.. While sorting, assesses the proportion of uncut able area of each skin and place the skin onto the appropriate grade on the leather horse.

Sample size or cut ability Measurement:

To assure minimal error the person doing the sorting must periodically "calibrate" his/ her concept of grades by the following assessment method, "measuring cutabillity of leather."

Select from buyer sorted leather by random 10-15 skins of each leather grade for spot-check inspection of cutability.

Measuring the uncutable areas:

Write off accurately the uncutable areas of each skin in the sample, by using silver color ball pen, crayon chalk, or white pencil, (figure 3). Taking a general pattern as standard shoe, the uncutable areas are drown on the sample skin. Measuring the uncutable area of each skin in the sample by using a transparent plastic grid.

Obtaining the cutabillity :

Calculate and record the cutabillity, by using the following formula.

FORMULA:

Cutabillity coefficient = F = (B-C) / B

B= total skin area in the sample.

C= total defective area in the sample.

Calculating Net Coefficient:

By calculating both the area discrepancy and cutabillity coefficient, one will obtain useful information about the received leather.

The Net Coefficient will be calculated concise information.

Net Coefficient= G=E*F
E= area discrepancy coefficient of the sample.

F= Cutabillity coefficient of the sample.

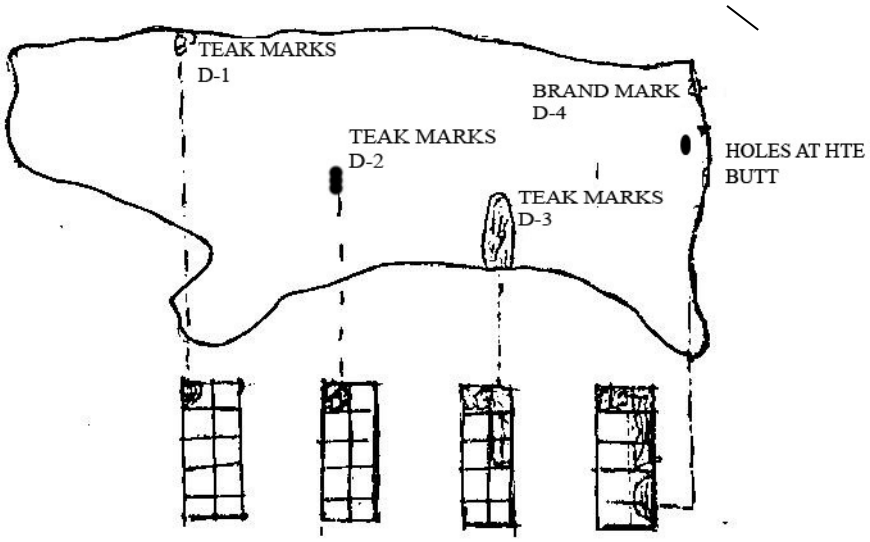


Fig.3: Making uncuttable area using the grid

Defect no. 1 & 2 would equal 1 sdm

Defect no. 3 would equal 3 sdm

Defect no. 4 would equal 1.5 sdm

Total Defect = 5.5 sdm

3.12 QUANTITY CHECK:

Checking received leather bundle:

Leather comes into bundles which are then opened. The tannery encloses a slip with each bundle indicating the quantity, area and thickness of the skins.

Area is also indicated on the flesh side of each skin, and marked the following way example,

6	means	6 sq. ft
6.25	means	6.25 sq. ft

6	means	6.50 sq. ft
6	means	6.75

Check the consignment inside each bundle there may be a slip from tanners calculator. Each leather bundle of each shipment is checked for quantity.

Measuring Area Discrepancy of Leather:

Leather area received by the buyer may be smaller, than stated by the supplier.

Therefore, checking the Area Discrepancy is important pat of the quantity check.

Area Discrepancy of both footwear upper and lining leather is measured by the following spot-checks sampling method.

Sample Size for Area Measurement :

Select 5-15 skins of each leather article in the consignment for spot check.

Try to select the skins by random.

CHAPTER- 4

4.1 Definition of productivity:

The concept of productivity first appear in European thought at the end of the 18th century with the onset of industrial revolution, international labor organization at its seventh international conference of labor productivity statistics.

The modern concept of productivity was first put forward by a small group of specialist in the American Bureau of Labor Statistics just after the Second World War. During 1960s many European and Asian countries established productivity centre expeditiously. And with the establishment of the Asian Productivity Organization (APO) in 1961S productivity measurement and analysis becomes a milestone in economic activities of this area. And since then a renewed interest is growing for the subject of productivity. In recent years, it is a realization among both theoreticians and policy maker of the less developed countries that increasing productivity is a ratio between output of benefits and input of resources. It implies how much input resources are required for production of certain amount of output or

specifically output per unit of input. It means efficient use and effective utilization of different factor input. Productivity can be expressed as a ratio i.e.

$$\frac{Q}{N}$$

Where,

Q= output

N= measures of input and

P= the resulting productivity.

4.2 Production and productivity:

Productivity is not production. The term of "productivity" is often confused with the term "production." Many people think that greater production, the greater the productivity. This is not necessarily true. Production is concerned with the activity of producing goods and services while productivity is concerned with different utilization of resources input in producing goods and or services. If viewed in quantitative terms, production is the quantity of output produced, while productivity is ratio of the output produced to the inputs used.

For example "Leatherex Footwear Ind." produced 10,000 PCs. Shoe by employing 30 workers at 8 hours per day for 15 days. Then

Production = 10,000

$$\text{Productivity} = \frac{10{,}000}{30 \times 8 \times 15}$$

= 2.77 PCs. / man-hour

Suppose in the next month, the same enterprise increase its Production to 12000 PCs, by adding 10 additional workers at 8 hours per day for 15 days, then,

Production = 12000 PCs.

$$\text{Productivity} = \frac{12000}{30 \times 8\ 15}$$

= 3.33 PCs. / man-hour

From the above example it is clear that production of shoes increase 20% (from

10000 to 12000) but Productivity remains same.

4.3 Efficiency, effectiveness and productivity:

Efficiency is the ratio of output attain to standard output expected. For example, if output of an operator is 120 PCs Per hour while standard rate is 180 PCs Per hour the operators efficiency is said to be 120/180=0.6667 or 66.67 Percent. Effectiveness is the degree of accomplishment of objectives. How well a set of result is accomplished reflect the

Effectiveness, whereas how well the resources are utilized to accomplish the results refers to the efficiency. Productivity is a both efficiency and effectiveness.

$$\text{Productivity index} = \frac{\text{Output obtain}}{\text{Input expanded}}$$

$$= \frac{\text{Performance achieved}}{\text{Resource consumed}}$$

$$= \frac{\text{Effectiveness}}{\text{Efficiency}}$$

4.4 Need for productivity measurement:

Enterprise develops productivity measure for a number of reasons. One reason is to ascertain how effectively and efficiently its resources in one period against another. This will tell it performed. It could also be used to gauge the performance of one industry in relation to another. The second reason helps manage to focus on productivity targets for all aspects of the business enterprise and their operations in order to close the gap between the current and planned objectives. This will in turn help in determining future resources utilization. All this would be necessary and useful if an enterprise is to remain viable and competitive.

Output indicators:

Output is production of goods and services by employing input resources.

Type of output:

(a) Physical measure = physical quality, type of physical product

(b) Value measure = quantity price =value

Type of value measure:

1. Profit= sale-expenditure
2. Cross value of production
3. Cross output: indicates
    a. sale -change in stock
    b. value of by-production
    c. income from service or other source

4.5 WORK STUDY

Work study can be defined as techniques that analyses the elements of a specific process carefully to eliminate unnecessary operations and to determine better method for these operation. Employees are trained to follow standard method. Equipment and working conditions are also standardized. When employees are working under standard condition, using standard equipment and following standard method, the time required for the job can also be considered and measured accurately.

Work study can be divided into the following two compositions.

- Method study (method design phase)
- work measurement (Standard time setting phase)

Method study:

The purpose of method study is to analyses the elements of a give work i.e. raw materials process, machinery, operating sequences and layout and to plan better working method and operating system.

Production Process Analysis:

Process analysis primarily includes two types of analytical method.
Production

Process Analysis and man process analysis:

Production process analysis is an analytical method applicable to various objectives and used to record and analyses specific process. This method employs five kinds of symbols denoting operation Inspection transportation delay and storage to illustrate the various processes, which appear during the course of production. It is used to investigate the structure of overall processing systems and the contents of each process to determine suitability. The results are used to determine improvement.

4.6 NEW POINTING SYSTEM FOR IMPROVEMENT OF PRODUCTIVITY FOR THE CUTTING DEPARTMENT

In this system, in the same time we can get

- Comparatively more production.
- Material saves.
- Quality Control.
- Make skilled worker.

In this system, Points are give to each cutter in three working divination. And this separate point are analyze to get the final point. Finally extra bonus gives to cutter for their points.

The point are given for

a. Target pairs cutting.
b. Target consumption.
c. Rejection.

Three systems for these three point of view given below -

For target pairs cutting

- If the cutter completes 90% for his target then he can get -5 point.

- If he completes 100% then he achieves -10 point.
- If the cutter can achieve more 10% from his target then he get -15 point.

For target consumption

- If he accurate the target consumption then he get -3 point.
- For more or less target consumption, for example - ± 0.01 ±0.02±0.03±0.04±0.05±0.06±0.07±0.08±0.09±0.10. Then he can get point like - ±5. ±10. ±15. ±20. ±25. ±30. ±35. ±40.±45.±50.

So, for - 0.01 point give (+5) and for +0.0 1 points give (-5)

For rejection

- Rejection of one-piece vamp (V), point is -7.
- For rejection of one-piece quarter (Q), point is -3.
- Rejection of half pair, points are -15.
- For rejection of one pair, point are -25

CONCLUSION:

To increase the productivity of any footwear industry, the cutting department is most important department. Because to prepare any type of shoe, quality starts from cutting department. Every cutter has knowledge about quality of materials and cutting direction to make qualityful shoe. The productivity of cutting department depends on cutter. For this reason a special bonus can pay to every cutter. For example, we can pay bonus according to new pointing system, which is also, increase productivity, material saved, quality control and skilled worker. To apply this new pointing system, the productivity of any footwear industry can increased.

On the other hand, B.Sc in footwear technology, the new subject and the first addition in Bangladesh College Of Leather Technology may be the possible solution to get a way to develop the sector in a significant way..

Footwear technology technologist will be able to improve the footwear sector with their innovation and technology.

After completion of my thesis work, it is crystal clear that footwear technology department has its drawbacks in the country economy and after completion the Degree there are lot of opportunities of the students of this subject.

In addition, this the sector which is closely related to the development of the country has the potentiality to involve people not only in the job market but also the footwear technology technologists have the scope to become an entrepreneur and an opportunity of establishment of new industry with their innovations and new technology. .

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