PATTERN CUTTING

* This document has been produced without formal editing
This learning element was developed by the UNIDO Leather Unit's staff, its experts and the consultants of the Clothing and Footwear Institute (UK) for the project US/PHI/85/109 and is a part of a complete Footwear Industry Certificate course. The material is made available to other UNIDO projects and may be used by UNIDO experts as training aid and given, fully or partly, as handout for students and trainees.

The complete Certificate Course includes the following learning elements:

Certificate course

- Feet and last
- Basic design
- Pattern cutting
- Upper clicking
- Closing
- Making
- Textiles and synthetic materials
- Elastomers and plastomers
- Purchasing and storing
- Quality determination and control
- Elements of physics
- General management
- Production management
- Industrial Law
- Industrial accountancy
- Electricity and applied mechanics
- Economics
- SI metric system of measurement
- Marketing
- Mathematics
- Elements of chemistry
PATTERN CUTTING

Programme: 1. Definition of pattern cutting
2. Object of pattern cutting
3. Formes: definition objectives
4. Methods of forme cutting
5. Standard Construction
6. Cutting Parts; outside linings

Pattern Cutting - is the foundation of all subsequent shoe making operations. It is essential therefore all patterns should be 100% accurate. Any inaccuracies at this stage can cause problems in all departments of the factory.

Objective: To provide accurate patterns to a given style to correctly fit a range of lasts.

Range of Lasts: 2, 2½, 3, 3½, 4, 4½, etc.

Formes - a flat representation of the top surface area of the last.

Objective: To produce a shape identical to the top of surface of the last.

Sequence of Operation:

2 dimension  3D  2D  3D
form  last  standard  pullover

Methods of Forme cutting:
1. Paper
2. Tape
3. Fabric
4. Vacuum forming
Details to be observed:

1. allowances
2. outside seams (underlays making allowance)
3. adequate fitting marks
4. correct allowance for edge treatment
5. accuracy and neatness in cutting and entering of details

Difference between Oxford and Derby:

The vamp of the derby is on top of the quarter; while in oxford it is under the quarter.

Procedures of Pattern/Cutting for 3/4 Quarter Court Shoe:

1. Cover the lasts (use canvass method)
2. Draw center lines (front and back)
3. Find the vamp point
4. Back height (size 4 = 52 mm + 2mm between sizes)
5. Measure joint girth measurements mark 1/6 as vamp line
6. Join the joints back height and 1/6 at vamp point.

7. Cut along center lines (obtain inside & outside formes)
8. Remove the inside and outside and stick to a paper
9. construct a mean forme
10. construct the standard
    - draw a straight line - place the vamp point and toe point on the line.
      Mark around the forme
    - transfer design. Add 12mm lasting allowance
11. Cut it out. Mark all details like size, last no., name of the design and
    allowances.
Procedures:
1. Cover the last
2. Obtain inside and outside formes
3. Construct mean forme
4. Construct standard forme
5. Cut parts

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1. $XY = YZ$ = base line
2. $YP = 30$ or $20\text{mm}$
3. Trace inside and outside formes
4. $JP = 5/7$ of the foot length see (PJ TABLE)
5. $XJV = \angle 65^\circ$
6. $JI = 1/3$ of $JP$
7. $IK$ parallel to $JV$
8. $KP$ = long heel line
9. $PH = 5-10^\circ$ from point $P$ depending on the last used
10. $\angle PKH = 75^\circ$
11. $V, K, J, I, = 10\text{mm}$
Standard Construction for Ladies Court Shoe:

1. Construct standard for ladies court shoe
2. Cut a) whole cut
   b) 3/4 cut
   c) half cut parts

Standard Construction:

1. Draw a straight line
2. Place mean forme - vamp point and toe point
3. Add 12mm lasting allowance
4. 3/4 cut - measure distance from point "V" to point "B" divide by 4 and measure 3/4 from B.

Court Shoe with:

a) toe cap
b) vamp
c) quarter
d) counter
e) collar
Procedure for Derby Style:

1. Draw two base lines XY-YZ
2. \(YP = \text{heel height} = 30 \text{ mm}\)
3. Trace inside forme by placing seat point on "P" and forepart along XY base line.
4. Trace outside forme by placing seat point on "P" and the high toe point with inside forme toe point
5. \(PJ = \frac{5}{7} \text{ of foot length}\)
6. \(XJV = 65\) on XY base line
7. \(JI = \frac{1}{3} \text{ of } JP = 60 \text{ mm from point } J\)
8. IK parallel to JV --- instep line
9. \(KP = \text{long heel line}\)
10. \(\angle KPH = 5^\circ\)
11. \(V, K, J, I, = 10 \text{ mm}\)
12. Draw a straight line from \(V_1V\) and toe
13. Construct parallel line from \(V_1\) to VJ
14. Draw a curve line thru points MCI\(_1\)
15. Draw underlay of 8 mm from point M C I\(_1\)
16. Extend JV\(_1\) line of 20 mm and mark point N
17. Join V\(_1\), H
18. to obtain the top line join from point "H" through long heel line to BH
19. add 12 mm lasting allowance to inside and outside formes
20. reduce top back line by 2 mm and add 3 mm to the seat line on point P
Precision Designing:

How the main points of the upper design are fixed on the last.

1. Back Height - it is 1/2 of the girth measurement of the instep.

2. Height of the quarter
   a) 1/2 of the standard insole length for the size of last concerned
   b) measure the length in a straight line from the top of the back height of the last to a point where the given length meet with the center line on the comb.

3. Flex free area
   a) the idea is to determine on area on the forepart of the last which is free of flexion
   b) Tab points and oxford throat have to be placed within that area to avoid gaping of quarter
   c) measure in a straight line 2/3 of the standard insole length from the center of the heel towards inside and outside feather edge
   d) measure 1/9 of standard insole length. Measure this distance behind the two previous points and this gives the Near limit.

4. If you want to design derby style - 1/6 of the joint girth measurement
   oxford - 1/7 of the joint girth measurement
   casual - 1/6 of the joint girth measurement
Procedure for Men's Casual with Saddle:

1. Draw a straight line
2. Trace the inside forms along the straight line. Do the same with the outside forms.
3. \( AB = 112 \text{ mm} \)
4. \( BI = 35 \text{ mm} \)
5. \( IC = 30 \text{ mm} \)
6. \( BC \), draw a
7. Draw a straight line from point I to \( X_1 \)
8. Bisect IX, and mark X
9. Mark back height TS = 60 mm
10. Connect points TX will give top line
11. Draw a 10 mm-collar top line
12. Design a saddle
13. Design counter 20 mm Top line
    \[ 76 \text{ mm Bottom line} \]
14. \( AA_1 = 30 \text{ mm join to point X} \)
15. Add 12 mm lasting allowance
16. Measure 16 mm from the bottom line X draw parallel to XX, collar
17. Connect points C to X use curve line
18. Adjust top and back by 2 mm at top. Add 3 mm at bottom
Procedures for Men's Monk Style:

1. Draw a straight line
2. Trace inside and outside formes to obtain mean forme
3. $AB = 112$ mm for size 8 $\pm$ 2 mm between sizes
4. $BI = \frac{1}{2}$ standard length (SL) + 10 mm = 80 mm
5. $BX \perp AB$ or $\angle ABB X = 90^\circ$
6. $BV = 2/5$ of $BX = 34$ mm
7. Bisect $BI$ to find $H$ point mark centre of the strap
8. Draw a line $HX$, at 90% to $B$
9. Draw a straight line at the $\angle 84$, mark 75 mm from point $H$
   ($HL = 75$ mm)
10. Make width of the bar 22 mm
11. $F_1$ and $F_2$ are 30 mm from $H$ with 10 mm between holes and $F_2$
    being the buckle position
12. Back height = 60 mm
    
    $ST = 60$ mm joint points $V$ & $T$ with straight line that will represent topline.
13. Tab point of quarter is 10 mm from $V$ on line $VT
Procedure for Men's Grecian Slipper:

1. AB = 120 mm
2. BI = 40 mm
3. BX = 30° to AB
4. BV = 40 from B
5. W = 15 mm from X₁
6. Lasting allowance 15 mm

Lining:  B₁ = 16 mm from B
Trisect BX = C
Draw vamp line for B₁ through "C" to "W"
Seam position - where the quarters join vamp CC₁ = C₁W
Procedure for Children Ankle Strap Shoe:

1. \( AB = 75 \text{ mm for size 2} \)  1 mm between sizes
2. \( X = 90^\circ \) to \( AB \)
3. \( X = \frac{1}{3} \) for \( BX \)
4. \( V_1 = 5 \text{ mm from } V \)
5. \( C = 46 \text{ mm for size 2} \)  1 mm between sizes
6. Connect \( V_1 \) to point \( C \)
7. Make distance of 46 mm between galosh & bottom strap
8. Add 10 mm to the width of the bar
9. Make bar length half standard length of the last
10. Make \( CC_1 = 25 \text{ mm} \)
11. Widen the end of the strap to 12 mm
12. Add 12 mm lasting allowance
Procedure for Children's Veldschoen Sandal:

1. AB = 75 mm for size 2
2. X = 90° to AB
3. V = 1/3 of BX from B
4. V₁ = 10 mm from V
5. I = 1/4 standard length of the last
6. I₁ = 10 mm from I, I, W parallel to BX
7. F = 6 mm from I center of bar
8. FL = 85° to FI
9. F₁ = 45 mm from F with 8 mm between holes
10. Make T bar 4 mm wide at I and 8 mm at B
11. TS = 46 mm for size 2 - 2 mm between sizes
12. Lasting allowances = 11 mm
13. Flanged out 8 mm from S
Procedure for Men's Ankle Boot:

1. Draw a base line AB - BC
2. Mark Heel heights "BP"
3. Trace the inside form
4. Trace the outside form (consider points "P" & points on toe)
5. Pitch line is 5/7 of the foot length
6. JV - (vamp point) < 65° from AJV
7. JI = 1/3 of JP
8. IK parallel to JV
9. KP = long heel line
10. Short heel line = ∠ KPH = 10°
11. ∠ PKH = 62° = point "H"
12. HX = XP
13. Draw a parallel line to "BC" baseline and mark the length XH = X₁
14. YX₁ = 1/3 of HP
15. X, X₁, Y₁ = 85° Y, X, X = 95°
16. Draw a straight line from V points to toe point
17. Add lasting allowance (15 mm)
Construct Standard for Moccasin Style:

1. Cover top part - apron
2. Cover bottom and side of the last
3. Design moccasin style
4. Cut top - apron
5. Cut vamp part
6. Add stitch allowances to apron & vamp
7. Mark perforations on apron and vamp

Procedure:

1. Draw center lines (front - back)
2. Design apron
3. Design sides
4. Cut apron - stick on to paper
5. Pull out upper stick on the paper
6. Add 14 mm to the front of apron
7. Mark line on the original line and then 11 mm from original
8. Mark holes 10 mm apart starting from the center both sides
9. Mark the same amount of holes on the apron
Geometric Method of Ladies High Boot Standard:

1. AB & BC = base lines
2. BF = pitch line or heel height
3. Place and draw around inside forme
4. Place outside forme and draw around
5. Pitch line = 5/7 S I (FJ) = 170 mm
6. JV = AJV = 60°
7. Instep line JI = 1/3 of JP parallel to JV
8. KP (long heel line) KPH ladies = 5°; mens = 10°
9. PH = short heel line KPH Ladies = 5°; mens = 10°
10. HRP = 72°
11. HL = LP = LN parallel to BC base line
12. N₁ = N₂ is 1/3 of PH from N
13. Calf is 72% of the total
14. Draw a straight line from point V through toe point. Add 15 mm lasting allowance.
15. At point P = 6ss 3 mm or thickness of the stiffener.
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<tr>
<td>Grained Goats</td>
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<td>Glace Kid</td>
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</tr>
<tr>
<td>Suede Calf</td>
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<tr>
<td>Suede Kid</td>
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<tr>
<td>Suede Sheep</td>
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<tr>
<td>Suede Splits</td>
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<tr>
<td>Rounded Butts and Square Shoulders</td>
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<td>-5</td>
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<tr>
<td><strong>LINING LEATHERS</strong></td>
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<tr>
<td>E1 Calf</td>
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<tr>
<td>E1 Kips</td>
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<tr>
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<td>Sheep</td>
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<table>
<thead>
<tr>
<th>GRADE</th>
<th>PROPORTION AND UNUSABLE LEATHER TO TOTAL AREA</th>
<th>AVERAGE WASTE</th>
<th>% ADDITION</th>
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<tr>
<td>1</td>
<td>Up to 27%</td>
<td>-</td>
<td>Normal</td>
</tr>
<tr>
<td>2</td>
<td>Over 27% &amp; up to 71%</td>
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<td>5%</td>
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<tr>
<td>3</td>
<td>Over 71% &amp; up to 124%</td>
<td>10%</td>
<td>11%</td>
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<tr>
<td>4</td>
<td>Over 124% &amp; up to 174%</td>
<td>15%</td>
<td>18%</td>
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<tr>
<td>5</td>
<td>Over 174% &amp; up to 224%</td>
<td>20%</td>
<td>25%</td>
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<td>6</td>
<td>Over 224%</td>
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<td>determined by experiment for each leather</td>
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