UNIT 1

Adaptation of Basic Sleeves

Structure

1.0 Introduction
1.1 Sleeve terminology
1.2 Sleeve styles
1.3 Basic sleeve types
1.4 Set in sleeve types
1.5 Added fullness and cap variations
1.6 Two piece sleeves
1.7 Sleeves/ bodice combinations
1.8 Standards of a well fitted sleeve

Learning objectives

After studying this unit students would be able to understand

- Parts of the sleeve
- Different types of sleeves
- Different styles of sleeves
- Selection of right sleeve in designing
• Difference between set in sleeves and sleeve bodice combinations
• Standards of a well fitted sleeve

Unit preview

Sleeve is the part of a garment that covers the arm, or through which the arm passes or slips. The pattern of the sleeve is one of the characteristics of fashion in dress, varying in every country and period. Various survivals of the early forms of sleeve are still found in the different types of academic or other robes. The chapter gives the knowledge on basic sleeve and its adaptation in to different sleeve types.

1.0 Introduction

Sleeves have been used as a device for changing the silhouette of a garment throughout fashion history. Sleeves are functional but decorative parts of the garment that cover and encircle the arm. They have a major impact on silhouette, because they range from an extreme broad-shouldered style to a natural tubular form. Silhouette is influenced by sleeve length and by the amount of fullness incorporated into the sleeve design.

Sleeves may be of any length, including cap, short, elbow, three-quarter, seven eights and long. In addition sleeves may be fitted or full and may include a puff, bell, draped or gathered style.

The basic sleeve is the foundation for all sleeve variations. Sleeve design changes are made in relation to the following reference points.

1.1 Sleeve Terminology

1.1.1 Cap Seam line

This is the curved top seam line of the sleeve. Notches are always used along this line for matching the sleeve to the bodice armscye. Sleeve fit is affected by the shape of this curved seam line. Identical concave curves along the lower bodice armscye seams and the lower part of the cap seamline enhance a smooth fit at the underarm area.

1.1.2 Cap line

The horizontal line that joins the two underarm corners. It is the widest part of the basic sleeve and also designates the bicepline and crosswise grain.

1.1.3 Sleeve cap

The upper portion of the sleeve between the cap seam line and the cap line. This area must be high enough to cover the arm from the shoulder to the
biceps without pulling up. Cap height may be increased or decreased as style variations are produced. However, cap height should not be shortened for the basic sleeve.

![Fig 1.1 Sleeve Terminology](image1)

**1.1.4 Grainline**

A line that is perpendicular to the cap line and extends the length of the sleeve.

**1.1.5 Underarm seams**

The two vertical seams that extend down from the capline corners to the length of the sleeve. On the basic sleeve, the front underarm seam is a slight inward curve, whereas the back is a slight outward curve.

![Fig 1.2 Sleeve Terminology](image2)
1.1.6 Elbow darts

Darts that shape the sleeve to fit the natural bend in the arm and allow for arm movement. They are located at the back underarm seam.

1.1.7 Elbow line

A line that is perpendicular to the grain line and goes through the pivot point of the single dart sleeve or the common pivot point of a two dart or three dart sleeve. It serves as a reference in design development.

1.1.8 Wrist line

The line across the bottom of the sleeve that joins the ends of the underarm seams.

1.2 Sleeve Styles

Sleeves fall into three main categories - classic, casual, and t-shirt. The sleeve style is mainly determined by the height of the sleeve cap.

1.2.1 Classic Sleeve

The classic sleeve is the sleeve found in most traditional tailored, fitted styles. It can be drafted with or without an elbow dart. It should be sewn to an armscye where the shoulder point at the armscye ends at the shoulder tip, thus the armscye is not dropped off the shoulder. The classic sleeve is characterized by a high sleeve cap. The higher sleeve cap is much more formal and attractive when movement is not a priority. The armhole depth on the bodice could be raised slightly to provide a bit more freedom of movement without sacrificing aesthetics.
The classic sleeve is a trade off between style and mobility.

### 1.2.2 Casual Sleeve

The casual sleeve is a less tailored style. The bodice armhole shoulder point is dropped off the shoulder from one half to one inch (1.25 to 2.5 cm). Diagonal wrinkles will form at the armscye as a result; however, greater freedom of movement is possible. The casual styles are a nice compromise between style and mobility and between formal classic styles with little freedom of movement and sloppy t-shirt styles.

### 1.2.3 T-Shirt Sleeve

The t-shirt sleeve is a very casual style. The shoulder point on the bodice armscye is typically dropped off the shoulder more than one inch (2.5 cm) and the armhole is a very shallow curve. Diagonal wrinkles will form at the armscye as a result. Greater freedom of movement is possible with this style though.

### 1.3 Basic Sleeve Types

There are two basic sleeve types they are

- Set-in sleeves
- Sleeves/bodice combinations

#### 1.3.1 Set-in sleeves

Set in sleeves are sewn to the bodice armholes. All set in type sleeves must be eased, gathered, darted, or tucked and sewn into the bodice armscye seam. They can be fitted or flared, cut to any length, and their hemlines finished in a variety of ways.

#### 1.3.2 Sleeve bodice combination

Sleeve bodice combinations have the bodice and sleeves attached in some way. Eg: Kimono and Raglan sleeves

(a) **Kimono sleeves** are cut all in one with the front and back bodice. The kimono sleeves are always cut with a deeper armscye than the set in sleeve. Wrinkles under the arm are inherent to this type of sleeve because of the extra fabric between the bodice and sleeve.

(b) **Raglan sleeves** have part of the sleeve attached to the bodice. A diagonal seam is formed from the neckline to the underarm. Underarm wrinkles are common in this type of sleeve, as well. Extra ease is added across the chest and the armhole is lowered to increase freedom of movement.
It is possible to develop a wide range of designs from the basic sleeve sloper, including long, short, fitted or full.

1.4 Set-in sleeves - types

Set in sleeves are eased, gathered, or tucked and sewn into the bodice armseye seam. A variety of sleeve styles and design modifications are possible, including changes in the sleeve length, amount of fullness, cap height and hemline finishes. If a change in the sleeve length is desired, it is made prior to additional pattern work.

A change in the cap height results in a sleeve that relates differently to the body than does the basic sleeve. The sleeve stands away or just out from the arm if the sleeve cap is shortened, where as a higher than normal cap produces a sleeve that extends above the normal shoulder line.

1.4.1 Basic set-in

Basic set-in sleeves maintain the original cap. No changes are made to the cap seam line width or height.

1.4.2 Three-quarter

It is the simplest form and is made from the basic sleeve sloper. A three quarter length can be introduced into many sleeve designs such as straight, bishop, deep armhole, kimono and raglan. The lower edge maintains the shape of a new sleeve design.

1.4.3 Straight

It is a rectangle below the cap line and is wider than the basic sleeve below the cap line. This sleeve serves as a foundation for other sleeve designs.

1.4.4 Roll-up

The rollup sleeve has a wide hem and self-cuff. It is made from the straight sleeve and has markings to indicate the fold lines and roll lines. From the fold line, the fabric turns back on itself, leaving the hem underneath. This sleeve is generally used for shirts.

1.4.5 Shirtwaist

This is also called as shirt maker sleeve. It is a tailored sleeve that is finished with a cuff. A placket opening at the lower edge is used in conjunction with a cuff to allow entry for the hand.
1.5 Added fullness and cap variations

Fullness is added to the sleeves in the same way as to the other pattern pieces. When fullness is created at the lower edge, a shorter than average cap is produce, which pulls the sleeve away from the body. When fullness is created at the top of the sleeve, a higher than average cap is produced, which makes the sleeve stand up and out from the shoulder tips. Parallel additions create fullness at both the top and bottom of the sleeve.

1.5.1 Bishop sleeve

These are sleeves that are long and are fuller at the bottom of the sleeve than at the top. The bishop sleeves are normally gathered into a neat cuff. Minimum width of a bishop sleeve is a rectangle from the cap line down. Design variations can be produced from the basic bishop sleeve. A peasant sleeve is a variation of bishop sleeve in which parallel fullness is added to create gathers at the top and lower edge.

![Fig 1.4 Bishop sleeve](image)

1.5.2 Bell sleeve

Bell sleeves do not have any ruffle, but is a flare from elbow to the bottom. The bell sleeve stands away from the body falling into soft folds at the lower edge. Bell sleeves may be cut to any length. A- bell sleeve has a smooth cap and a hemline flaring out in the shape of a bell.

![Fig 1.5 Bell sleeve](image)
1.5.3 Cap sleeve

Cap sleeves do not go below the armpit level as they are short sleeves. This type of sleeve only covers the shoulder area. If sewn properly is very appealing and attractive. This sleeve is often self-lined. The shape of the cap sleeve can be shaped in variety of ways.

![Fig 1.6 Cap sleeve](image1.png)

1.5.4 Puff top sleeve

These types of sleeves are generally noticed on many children’s dresses, evening dress or wedding garments. Puff sleeves can be short (3/4) length or long sleeve. These types of sleeve style are normally designed as a gather at the top or bottom of the sleeve. Puff sleeve has fullness added to the body and are generally designed with gathers at the hemline.

![Fig 1.7 Puff top sleeve](image2.png)

1.5.5 Banded puff-bottom

The banded puff-bottom sleeve is similar to the bell sleeve except that additional length is added to the lower edge to create a bloused effect over the band.

![Fig 1.8 Banded puff bottom](image3.png)
1.5.6 **Balloon sleeve**

This sleeve is a full sleeve with a high, wide cap. Fullness at the lower edge is controlled by the elastic casting or band.

![Fig 1.9 Balloon sleeve](image)

1.5.7 **Leg-o-mutton**

The leg-o-mutton sleeve is named for its resemblance to a lamb’s leg. It is full from the shoulder to the upper arm and it is tight fitting from the elbow to the wrist. Leg of mutton is developed by enlarging the biceps and cap area, tapering the fullness towards the elbow level.

![Fig 1.10 Leg-o-mutton sleeve](image)

1.5.8 **Cowl sleeve**

The cowl sleeve has extra cap height and width that is created by triangular additions. It is cut on the bias to form a draped effect similar to the cowl neckline bodice.

![Fig 1.11 Cowl sleeve](image)
1.5.9 Dolman Sleeves

Dolman sleeves are long and a bit narrow at the wrist and wide at the top joining the armhole. Dressmakers always do cut dolman sleeve as an extension of the garment and not as a separate sleeve to insert. Dolman sleeves are not sewn to the garment; rather the fabric is cut in such a way that the sleeves are part of the garment.

Fig 1.12 Dolman sleeve

1.6 Two piece sleeves

Sleeves may be divided horizontally or vertically into two or more pieces to create varied design effects. At the divisional point, the sleeve may have fullness added. It may be gathered, tucked, pleated or have extensions for overlapping. Some of the examples of the sleeve styles produced by dividing the sleeve into two pieces are

1.6.1 Lantern sleeve

Lantern sleeve is a two section sleeve that flares out from the cap and hemline to a style line within the sleeve. The lantern or barrel sleeve is cut horizontally into two pieces at the cap line or below and has triangular fullness added to the horizontal seam line.

Fig 1.13 Lantern sleeve

1.6.2 Petal sleeve

The petal, tulip or overlapped sleeve is a two piece sleeve that overlaps at the top of the arm. Petal sleeve is shaped and resembles a petal as the sleeve sections crosses over each other at the cap.
1.6.3 Tailored

The tailored sleeve is a two piece, fitted sleeve with two vertical seam lines but no underarm seam line.

1.7 Sleeve/ Bodice Combinations

Patterns may be developed with the sleeve and the bodice attached, thereby eliminating the armscye seam. Two basic sleeves in this category are the kimono sleeve and the raglan sleeve.

1.7.1 Kimono sleeve

Kimono sleeves are cut in one with the bodice; the bodice front and the sleeve front are one pattern and the bodice back and the sleeve back are one pattern. The shoulder seam extends from the neckline to the wrist line and is called the over arm seam. The side seam of the bodice and the underarm seam of the sleeve are joined in one continuous seam line. Design possibilities are numerous.
1.7.2 Raglan sleeve

This type of sleeves extends from the arm to the neckline. These sleeves have part of the upper bodice attached to the sleeve, forming a diagonal seam line from the neck to the underarm. The diagonal line often begins at the neckseamline, and goes to the underarm corner of the kimono sleeve. The raglan sleeves are designed in such a way that it can be a one-piece or a two-piece sleeve. The type of sleeve can be generally seen on any sports top or jersey.

1.8 Standards of a well fitted sleeve

- It should not slip of the shoulder for style or comfort.
- The armhole curve must be smooth and gradual.
- No diagonal wrinkles should be appeared under the arm pit.
- Length wise grains should be straight from armholes to elbow.
- It should be snug fitting and should not be tight in lower part.
- The sleeve should never twist away.
- Wrist line should be in position when arm is bent.
I. Test your understanding

1. The type of sleeve which extends from arm to neckline is________________

2. The sleeve which is a two piece sleeve that overlaps at the top of the arm is________________

3. The sleeve which gives a draped effect is________________

4. The line across the bottom of the sleeve that joins the ends of the underarm seams is________________

5. The horizontal line that joins the two underarm corners is________________

6. The sleeve that is cut horizontally into two pieces at the cap line or below is________________

7. These types of sleeves which are generally noticed on many children’s dresses, evening dress or wedding garments is________________

8. The sleeves that do not go below the armpit level is________________

Summary

The basic sleeve is the foundation for all sleeve variations. The knowledge of adaptation of basic sleeve to different types of sleeves gives students the knowledge of their application according to the use and the personality of wearer, because the sleeve is the most important part of the garment which changes the look of the silhouette according to its application.

Short Answer Type Questions

1. What is the difference between set in sleeve and sleeve bodice combination

2. Differentiate leg o mutton sleeve from lantern sleeve

3. Write about the standards of a well fitted sleeve

4. What are the different types of sleeves that are formed by bodice and sleeve combinations?

5. Write about two piece sleeves

6. What are the different styles in sleeves?
Long Answer Type Questions

1. Write in detail about set in sleeves and its variations along with illustrations

2. Define sleeve, explain in detail about parts of the sleeve.

3. What are the basic sleeve types? How to differentiate them?

4. In what way fullness is added to sleeves? Explain them along with suitable examples and illustrations
UNIT 2

Creating Design Variety

Structure

2.0 Introduction to collars
2.1 Terminology related to collar
2.2 Types of collars
2.3 Classification of collars
2.4 Designing collars
2.5 Introduction to Yokes
2.6 Definition
2.7 Selection of yoke designs
2.8 Creating variety in yoke designs
2.9 Pockets- introduction
2.10 Types of pockets
2.11 Selection of pocket designs
2.12 Creating variety in pocket designs

Learning objectives

After going through this unit, you will be able to distinguish
• Different types of collars
• How to select collars according to one's personality
• Different types of yokes and their suitability for different end use
• Selection of the right yokes for right garment
• Different types of pockets and their end uses

Unit preview

The creativity of the designer lies in the fact that how well he/she knew about basic parts of a garment like yokes, collars, pockets. Yokes and collars are purely for decoration purpose whereas pockets are purely functional. Few pockets are decorative. So one should know different types of collars, yokes and pockets and their suitability to different personalities and end uses. This chapter gives you a pure view of different types of collars, yokes and pockets and how to select them according to the wearer.

2.0 Introduction to Collars

Collar is a design feature that frames the face. It is added to the garment neck edge to create variation in line, shape, colour or texture in order to enhance its appearance. Proportion and shape are critical in the success of a collar. It serves to finish the raw edges at the neckline. Collars are usually made of double layers of fabric (with or without an interfacing). In every collar one must distinguish the outer edge and the inner edge of a collar. The set of the collar i.e., the way it lies and fits at the neck, depends on the shape of the inner edge or sewing-on edge. This in turn depends on the difference in length between the two edges. The collar is attached to the neckline with the outer edge hanging free.

2.1 Terminology related to Collar

The following terms will serve as an aid in collar development

2.1.1 Collar type: Determined by the shape of the collar neckline. The shape of the collar neckline directly affects how a collar relates to the wearer's body. A collar may lie flat against the bodice of the garment, or it may stand up partially or entirely against the wearer's neck.

2.1.2 Neckline: The edge of the collar that is attached to the garment. It is of the same length as the garment neckline and always marked with notches that corresponds to the garment neckline.
2.1 3. **Collar style**: Determined by the shape of the outer edge of the collar.

2.1 4. **Style line**: Outer edge of the collar created by the designer.

2.1 5. **Stand**: The collar raise above the garment neckline that lies against the wearers neck. A collar may be designed to have no stand or to be full stand.

2.1 6. **Fall**: Part of the collar that extends from the top of the stand to the neckline or below to become the outer part of the collar. It must be as wide or wider than the stand in order to cover the neck seam line.

2.1 7. **Roll line**: Formed where the collar stand and fall meet; the line at which the collar turns down.

2.1 8. **Break point**: Point at which a lapel turns back on itself.

2.1 9. **Upper collar**: Outer visible part of a collar.

2.1 10. **Under collar**: Inner or under part of the collar. The outer seam line of the collar should roll to the underside and is not shown in the finished product.

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If both the outer and the inner edges of the collar corresponds in shape and length to its flat outline made on the bodice pattern, the collar will lie perfectly flat. But if the outer edge is shortened, the collar can no longer lie flat and begin to stand up and roll over the neck. The bigger the difference between the two edges, the more pronounced is this effect and the more definite the roll at the neck.
The outer edge length only can be changed, the length of the inner edge must remain the same to fit the neckline, though its shape will change and become less curved. Whenever the collar turns over and rolls, extra depth is needed for the stand of the collar. This extra depth of collar is an allowance for the stand, which invariably forms at the neck edge as soon as the outer edge of flat collar is shortened.

Since collars form a background for the face, great care has to be taken in designing collar styles, which suit the wearer.

### 2.2 Types of collars

There are four basic collar types:

- Flat collar
- Full roll
- Convertible
- Partial roll

A variety of collars can be developed from these basic collars.

**Flat collar**

The length of the collar neckline should be equal to the length of the bodice neck line.

#### 2.2.1 Flat collar

A flat collar lies against the body and has no stand. However, a slight roll is produced so that the collar covers the neck seam line. Eg: Peter Pan collars, which lies perfectly flat and has no roll at all. Flat collars however can be of any shape-square, pointed etc.
2.2.1 (a) Peterpan collar

When the ends of flat collar are rounded, the flat collar is referred to as peter pan collar. The collar can be designed to have rounded ends at the front only or at the front and back if a separated collar is planned.

![Fig 2.3 Peterpan collar](image)

2.2.1 (b) Sailor collar

The sailor collar is a flat collar with a V in the front and a square at the back.

![Fig 2.4 Sailor collar](image)

2.2.1 (c) Berthacollar

![Fig 2.5 Berthacollar](image)
A bertha collar is a wide, flat collar that extends to the shoulder or beyond to create a cape like effect. Often, a bertha collar is attached to a slightly lowered, round, or boat neckline with the bodice featuring either a front or back opening.

2.2.2 Full-roll collar

The full roll collar has a full stand and fall at centre back with the stand tapering to nothing at center front. The neckline edge of the full roll collar is a straight line these are always developed by drafting from bodice neckline measurements taken from the basic sloper. Garment neckline and the collar neckline are of same length.

![Fig 2.6 Full roll collar](image)

2.2.2 (a) Basic full roll

A basic full roll collar generally does not exceed 3 – 4 inches in width or the collar would stand up too high around the neck. The style line edge of a basic full roll collar is a straight line, although design variations may be introduced to the style line to create different effects.

2.2.2 (b) Bias full roll collar

The bias full roll collar has an equal amount of stand and fall encircling the neckline, which allows it to fit snugly around the neck. This collar sometimes referred to as turtleneck collar or rolled band collar.

2.2.3 Convertible collar

A convertible collar may be worn closed with the garment buttoned or zipped together at centre front, or opened to create a collar/lapel effect.

The turned back, upper part of the bodice that begins above the garment closure is called a lapel.
2.2.3 (a) One-piece and two piece convertible collars

The basic convertible collar can be designed with

1. The under collar attached to the upper collar along the style line edge to create a one-piece convertible collar

   (or)

2. The under collar as a separate pattern piece to create a two piece convertible collar.

2.2.3 (b) Mandarin collar

The mandarin collar is a narrow, standing band usually 1 to 1 1/2 inch wide. Because the collar is narrow, it stands up and has no fall. It can be shortened to separate at center front, lengthened to include a front button/buttonhole extension, or meet at center front. In addition the front corners can be square or round. This collar can also be referred to as Chinese, Nehru or military collar.
2.2.3 (c) Shirt collar with band

The shirt collar with band is composed of two separate pattern pieces, the band and a collar section. A seam attaches the stand and fall of the collar along the roll line. The band or the collar stand is designed with a button/button hole closures.

![Fig 2.9 Shirt collar](image)

2.2.4 Partial roll collars

The partial roll collar has a small stand at centre back with the fall being wider than the stand.

2.2.4 (a) Shawl collars

The shawl collar is a design in which the collar and the bodice front are cut as one and the collar sections are seamed together at center back. When the collar folds over, the front of the garment rolls back to create a lapel. This collar always is worn open. The basic shawl collar is developed by attaching a full roll collar to the bodice front.

![Fig 2.10 Shawl collars](image)

2.3 Classification of Collars

Collars are classified according to their various characteristics such as

- Width of the collar
• Shape of its outer edge
• Shape of the neckline
• Roll of the collar etc

2.3.1 Difference in Width and shape of the outer edge

• Peterpan collar is the narrow collar with rounded ends
• Sailor collar is a wide collar having a square shape at the back and v shape in the front.
• Cape collar is a wide round collar.

2.3.2 Shape of the neckline and roll of the collar

Collars may be classified as ripped, flat, partial roll and standing types the way the collar rolls (raises up) from the neckline edge or whether it ripples or stay flat is determined by the shape of the neckline edge of the garment.

If the centre back edges of all these types of collar patterns are kept together and their neckline shapes compared, (the notch indicating the shoulder point on the neckline). The neckline curve goes from deep concave (inward curve) in the rippeled collar to convex (outward curve) in standing collar. From this it is evident that the outer edge of the collar becomes shorter as the neckline curve becomes straighter.

In spite of the big variety in collar styles, there are certain types which can be recognised as basic. By studying these basic collar patterns, grouped according to the method of cutting them, one can learn to deal with many different fancy collar styles.

2.4 Designing Collars

Collars can be designed in various shapes and sizes to create variety. A simple collar design can be made to look decorative and individualistic by introducing suitable trimmings such as scallops, frills, tucks, gathers, smocking, buttons, laces, bows, ricrac, embroidery etc. A collar may be cut out of material differing its colour, design, texture and grain from the rest of the garment to produce interesting effects.

For example, a printed dress may be designed with a plain collar or a plain dress with a printed collar, a white or light collar may be used on the dark coloured dress or viceversa, etc. For a checked fabric the collar will be effective if it is cut on bias while the rest of the garment is cut on straight grain.
2.4.1 Factors to be considered while designing collar styles

(a) Design of the fabric
(b) Colour and texture of the fabric
(c) Pattern of the garment
(d) Purpose and use of the garment
(e) Sex and age of the wearer
(f) Appearance of the wearer

2.5 Introduction to Yokes

The construction of yoke pattern involves some “cutting up”- an important element in the designing. The front and back are divided or “cut up” into two sections: a “yoke” and lower part. The lower part under the yoke, can be easy fitting, close fitting or full, and can have gathers, tucks, smocking, gauging and different kinds of pleats, folds and even draped effects.

2.6 Definition

A yoke is a segment of a garment usually placed at the shoulders, above the waistline-at midriff or below the waistline-at hip.

There are two basic types of yokes
2.6.1 Midriff yoke

Midriff yoke

Referred to as torso or waist yoke and is a good device for securing fullness over the bust and provides a smooth and trim fitting around the waistline.

Fig 2.12 Midriff yoke

Partial yoke

A yoke, which does not extend across the entire garment, is called a partial yoke.

Fig 2.13 Partial yoke
They are used

- For controlling and supporting fullness needed over the bust, chest, hips etc
- To keep the upper area or the waistline of the garment trim and smooth.
- For decoration and may not have any fullness.

The depth of a yoke is usually established by reference to the CF line and not to the armhole, and it is marked as a proportion of the CF length. “Balance marks” have to be drawn across the yoke line to fix the position of the fullness under the yoke.

### 2.7 Selection of Yoke design

The yoke design used on the garment depends on various factors.

- Design of the fabric
- Design of the garment
- Purpose and use of the garment
- Sex and age of the wearer
- Figure and personality of the wearer

### 2.8 Creating variety in the Yoke design

Variety in the yoke design can be brought about by

#### 2.8.1 Variety in shape and size

Yokes can be designed with various shapes such as square, round straight line, scalloped, triangular and asymmetrical or panel yoke-part of a yoke may be extended to the full length of the garment. Sometimes the yoke may extend in to the sleeve, or it may extend only part of the way across the garment as in a partial yoke.

#### 2.8.2 Variety in material and grain

If the garment is of one colour, the yoke may be made out of a different coloured fabric; for a dark coloured the yoke may be of white or light coloured. A printed yoke on plain or viceversa would give a good appearance. With regard to grain, the yoke can be cut on bias and the garment on the lengthwise grain.
2.8.3 Designing decorative seaming

The yoke can be joined to the body of the garment in a decorative way by insertion of ruffles, laces, binding or by faggoting-decorative stitches or top stitches using coloured thread.

2.8.4 Designing fullness decoration with the yoke:

The yoke can be quilted, embroidered, shirred, smocked, tucked or pleated.

2.8.5 Introducing yokes in different positions on the garment

The yoke may be introduced at the top of the dress, above the waist or below the waist-hip yoke, or created partly called partial yoke.

2.9 Introduction to Pockets

Pockets are generally used mainly for utilitarian purpose rather than for decoration. The chief purpose of pockets in women’s clothing is to add design interest. They should be planned giving considerable attention to the design of the dress and figure of the wearer.

Appearance of the children’s garments can be enhanced to a great extent by designing pockets of varied shapes, sizes and location with decorative details such as bias binding, lace, ruffles, tucks, pleats, appliqué, embroidery etc. Suited to the design and the purpose of the dress.

2.10 Types of Pockets

There are three main types of pockets:

(a) Applied pockets

(b) Structural pockets

(c) Inserted pockets

(a) Applied pockets: As the name indicates, these type of pockets are sewn on to the garment usually with top stitching eg: patch pockets, pleated patch pocket with flap, Bellows pocket

(b) Structural pockets: Form an integral part of the design Eg: Front Hip pocket, In-seam pocket

(c) Inserted pockets: Are those inserted behind a slash in the garment eg. Welt, Bound pockets.
These pockets are also classified as

2.10.1 **Patch pockets**: These are attached to the outside of the garment and may be cut in the various shapes. Patch pockets may be furnished with a flap which holds it shut or for mere appearance. Sometimes flaps are used without any pocket, purely for decoration.

![Fig 2.14 Patch pockets](image)

2.10.2 **Set-in pockets**

This type of pocket is inside the garment with a slash of some types for its opening. There are three types of set-in pockets—bound, welt and flap. In the bound pocket each edge of the slash is finished with binding of even width. These bound edges are referred to as lips. The welt pocket has one wide lip called the welt extending above the pocket opening. The flap pocket has a flap or extension turned down over the opening.

![Fig 2.15 Set in pockets](image)

2.10.3 **Pocket set into seam**

Any types of pocket in which the opening falls along a seam line of the garment is referred to as “pocket set in to a seam”.

2.11 Selection of pocket design

Pocket designs should harmonise with the design of the fabric as well as the design of the garment and its components (collar, sleeve, cuff etc) for the striped dress the rectangular shaped pockets cut on crosswise grain and finished with bias edging is a good choice.

The sex and age as well as the figure and personality of the wearer should also be considered while designing pockets. Scalloped and rounded pockets suit only for girls dresses. For men’s and boys dresses straight line pockets are more suitable. For older women and stout women, inconspicuous designs such as set-in-pockets are advisable.

The pocket design should be appropriate for the types of garment and the purpose and use of the garment. Simple straight line pockets are suitable for school uniforms and casual wear garments, while conspicuous pocket styles with decorations and trimmings may be used on party wear dresses.

2.12 Creating variety in Pocket Designs

2.12.1 Variety in shape, size, location and number

Pockets can be of varied shapes such as - rectangular, triangular, heart shaped, oval shaped, scalloped, round, etc. They may be placed at different positions in the garment. Pockets are generally used in pairs, but single pockets may also be used.

2.12.2 Variety in material and grain

Interesting effects can be achieved by planning pockets of material different in colours, design, texture or grain from the garment material. Pockets can be made out of contrasting coloured material, printed pockets on the plain garment and vice versa. Pockets can also be cut on crosswise grain and finished with bias edging.
2.12.3 Variety in decorative details and trimmings used on the pockets

The outer edge of the pocket may be finished with ruffles, bias binding, lace, decorative stitches etc. Decorations within the pocket in the form of appliqué, tucks, pleats, embroidery, patch work etc can also be done.

Summary

The knowledge on pockets, collars and yokes is very important for one who undergoes designing courses. Collars are added to the garment neck edge to create variation in line, shape, colour or texture in order to enhance its appearance. A pocket is a bag- or envelope-like receptacle either fastened to or inserted in an article of clothing to hold small items. A yoke enhances the beauty of the garments.

I. Test your understanding

Check your knowledge

• Identify shawl collar from your wardrobe
• Partial collars are generally planned on?
• What type of pockets does your jean pant have?
• What types of collar your fathers shirt has?

II. Test your understanding

1. The type of pocket which is inside the garment with a slash of some types for its opening is________________________

2. The pockets that can be cut in various shapes and are attached to the outside of the garment is________________________

3. The yoke, which does not extend across the entire garment, is________________________

4. The collar design in which the collar and the bodice front are cut as one and the collar sections are seamed together at centre back is________________________

5. The collar that is flat with a V in the front and a square in the back is________________________
Short Answer Type Questions

1. Write about different types of pockets.
2. How to create variety in yoke designs.
3. What are different types of convertible collars?
4. What is the difference between patch pocket and a welt pocket?
5. What is the difference between partial yoke and mid riff yoke?
6. Draw the figures of partial yokes and midriff yokes
UNIT 3

Grading

Structure

3.1 Introduction
3.2 Definition of grading
3.3 Importance of grading
3.4 Principles of grading
3.5 Grading techniques
3.6 Method of grading
3.7 Grading procedure
3.8 Different types of grading machines

Learning objectives

By studying this unit, you will be able to practice the following

- Grading different types of patterns
- Understanding the procedure of grading
- Use of correct measurements for grading
- Increase or decreasing the size of patterns from basic pattern
Grading is an interesting and creative skill; one can produce or develop patterns to desired size by taking prototype pattern of one size. The purpose of grading is to proportionally increase or decrease the size of a pattern, while maintaining shape, fit, balance, and scale of style details. The use of pattern grading is to make multiple sizes in less cost than making on individual pattern for each size garment.

3.1 Introduction

In the present fast life, no one has time to give clothes for stitching and wait till they are ready. The needs of the consumer are instantaneous and on the spur of the moment. To satisfy such modern consumers grading and sizing play an important role in garment making. Grading is a process by which a range of large and smaller sizes is produced from the sample pattern using a proportional system of measurement. It will faithfully reproduce the design without loss of balance, line or fit.

3.2 Definition of grading

It is a method of enlarging or reducing a pattern of a particular size proportionately to other sizes. The whole system of sizing is based on pattern grading.

Grading as per the sizing makes it possible to produce garments of different sizes in accordance with the requirements of the potential markets in term of both fit and distribution. It is these sizes that make the readymade tailoring different from the custom-made tailoring. Accuracy is essential or mistakes will magnify as grading proceeds. In general size ranges are known in 2” increases, such as 32in., 34in., 36 in., 38 in., 40 in., and 42in., these being the actual body measurements round the bust. It is possible to grade in one operation the six sizes mentioned. But it is more usual and more accurate today to grade more than 3 or 4 sizes at a time.

3.3 Importance of grading

- It is very important to the ready to wear industry as it allows each manufacturer to produce a line of dresses capable of fitting a maximum number of women.

- It is important to clothing retailer in that it provides him with a wide range of sizes in each style and this improved his market.

- It is important to consumers as it increases the chances to get the right dress in a size and style proportioned to her figure and required very or only a minimum alteration.
3.4 Principles of grading

• There is a direct relationship between the garment pattern and block pattern which was used as a basis for developing the pattern. This relationship also applies to the grading of garment pattern

• Basic grade, sizing ranges, size intervals and size chart should be clearly defined before the actual process.

• The final result of grading a pattern is a reconstructed version of the original pattern in another size.

• The movement of patterns during grading must follow the same network of lines in order to ensure accurate alignment throughout the range of sizes being graded.

• The construction lines provide the axis for grading and they are determined in the following way.

  The x-axis: For body and skirt grades, this would be a line on, or parallel to the centre back or the centre front. The x-axis for the other grades can be established from the true, straight grain direction.

  The y-axis: A line on or parallel to a major girth line such as a bust, waist or a hip.

• Irrespective of how the axis are determined, they are always at right angles to each other.

• The preparation of grading would require the marking of grading axes on each pattern, component and the position of the pattern in the most convenient position for grading.

• For most components, a single X-axis would be sufficient for the origin of width grades whilst it might be necessary to have number of y-axis for the length grades.

3.5 Grading techniques

1. Manual grading

2. Nest or stack grading

3. Mark and cut

4. Vector grading

5. Machine grading

6. Computerised grading technology.
3.6 Methods of grading

Proper grading requires, firstly proper sizing. Sizing is a set of measurements which have been predetermined as representing certain theoretical body structures. Sizing is done by doing anatomical and anthropometrical research which in turn determines structural relationship between body parts.

There are two methods used for grading.

3.6.1 The shifting method

This method is extensively used in wholesale trade where the pattern is shifted from point to point to give required additional measurements.

3.6.2 The second method

Is a good method for beginners and can easily be checked for accuracy.

Original lines: Common straight lines for all of the sizes to be graded from one component.

Two methods of choosing original lines

Method 1

Common external line: where one edge of the component, usually parallel to the x-axis is common to all sizes. This is the most generally used method because it enables the grader to move in one direction only for upgrades and in the opposite direction for downgrades.

Fig 3.1 Common external line
Method 2

Common internal line

Where an internal line or location point is common to all sizes. This method is sometimes used when it is necessary to grade around a special feature in the pattern.

3.7 Grading Procedures

Pattern size ranges are mostly 5cms increments but some manufacturers require extra size per range, and allowing 4cm difference between sizes makes this possible. It is wise to establish the required increments between sizes before starting to grade.

To begin with a master pattern is to be selected (or the normal size possessed by the majority of the population) designed for a particular type of figure, which also has to be accurate as per the base size.

To plan the amount of increase per pattern piece, one has to remember that most patterns are cut on half. Therefore from CB to CF on a 4cm grade, the half increment will be 2cm, and this amount would be further divided between the half back half front patterns i.e. 1cm on each quarter of the garment. For a proportionate increase in the overall size, the pattern has to be lengthened by $\frac{1}{4}$ at shoulder level and the same at center back. Further for each size increase, both the neck and shoulders have to be widened by $\frac{1}{8}''$ and the armhole by $\frac{1}{4}''$. These general observations must be kept in mind when going through the detailed procedures of grading.

3.7.1 Grading the back bodice

- Take a 32” size back bodice pattern without seam allowances and trace its outline on a large sheet of paper.
- Extend the CB line A₁ A by one inch and make four points at ¼” intervals (these represent bust sizes 32” to 40” at 2” interval) label the last point as A₂.

- Mark C 1” vertically above B and mark D ½ ” besides C. Connect BD.

- Divide BD into 4 equal parts, then connect these points to the points marked above CB line as shown.

- Draw DF parallel to the shoulder line to BE which is equal to BE + ½”. This will be the shoulder line for 40 size. Connect F to E which is the original shoulder line.

- Divide EF into four equal parts and join them to the corresponding points BD by lines, which will be parallel to DF.

- Draw a horizontal line LM from the underarm point and mark P as a mid point of AL. Draw PQ as shown and extend one inch outward and mark 4 points ¼” apart.

- Extend bust LM and waist line A₁ R and mark points ½” apart and connect all the points marked as shown.

Fig 3.3 Grading of basic bidice front and back
3.7.2 Grading front bodice

- Extend the bust line LM to N beyond CF for each size by 3/8” and beyond side seam by 1/8”

- Extend waist line AB beyond B and mark four points 3/8” apart. Label the last point as C.

- Connect CN and corresponding points and extend these four lines upwards to form the center front lines of various sizes.

- Extend line AB beyond side seam to D marking four points of 1/8th inch each.

- Connect all the points on the side seam lines at both B & D

- On shoulder line, draw vertical lines upwards from G and H and mark four points at 1/4th” interval. Mark the highest points as PQ respectively.

- On either side of the line PQ mark ¼” th as IK and extend PQ line

- Connect GI and HK. This is the angle for the shoulder increase. Rule shoulder lines in between sizes by connecting the points marked.

- Extend the centre front line by 1” and mark four points with 1/4th” apart. Join GF with a curve for neckline. Similarly all points on line G and F for necklines of various sizes and extend the lines to meet the centre front lines.

3.7.3 Grading sleeve pattern

- Trace the outline of the sleeve pattern on a sheet of paper. Extend line AB one inch each from B to B1 and A to A1. Similarly extend the centreline of the sleeve from C to C1. Mark points of 1/4th” each on the extended lines.

- Extend sleeve hem line EF beyond E and F by 1” each and mark off four points on the extended lines of 1/4th inch each.

- Connect all the marked points all around the sleeve pattern for all four sizes.

- The outermost pattern is of 40 inch size, next one is 38, next is 36 and so on.
3.8 Machines used for Grading

3.8.1 Machine grading

A mechanical grading machine is employed. The machine is clamped to the edge of the table and the pattern is inserted into the spring arms and held in position by small pins. Pattern movement is effected by means of two knobs, one for movement along the x-axis and the other for y-axis. The grader controls the amount of movement by means of the calibrations along the track of each axis.

The advantage of using a hand operated grading machine is that it eliminates the need to mark axis and increments both on the pattern and paper, and thus reduce preparation time and improves dimensional accuracy. The disadvantage is the machine is limited to movement along the x-axis and y-axis. Grading elements requiring movements at different angles cannot be done in this method.
3.8.2 Computerised grading technology:

This is the latest and fastest method of grading

Many manufacturers are now using computerised pattern grading system. They are fast, more consistent, accurate and manageable than manual grading. However these systems are only as good as the technicians operating them and it is essential that early planning is thought out clearly and related to the company’s production.

When a pattern is to be graded by computer, it must be accurate, with notches, grading points and other significant points marked clearly. The principle of computer grading is simple. A computer constructs diagram by using mathematical coordinates which can be recorded by placing the pattern on a digitizer which works as an electronic grid and records special points around the shape by means of a cursor. The centres of the cross hairs of the cursor are placed on the points to be recorded. When a cursor button is pressed, signals are sent to the computer which are translated in to a numerical record of the shape and information for the piece.
Once a basic shape, its significance features and grading information is stored in the computer memory, a range of sizes can be graded and plotted out on to pattern paper or used to construct by plans for production markers.

It includes software’s like Accumack, Lectra CAD, Gerber CAD, Reach CAD and PDS systems, etc. It comprises of plotter, digitizer, graphic display terminal, software etc.

1. **Test your understanding**

**Fill up the blanks**

1. The latest and fastest method of grading is ________________

2. The method of grading which is extensively used in wholesale trade, where the pattern is shifted from point to point to give required additional measurements is ________________

3. The method of enlarging or reducing a pattern of a particular size proportionately to other sizes is ________________

**Summary**

By going through this chapter one can know how to properly fit a pattern to a range of sizes, and how each pattern piece needed to be graded, or systematically increased or decreased. Today, pattern companies and apparel manufacturers take a middle-sized pattern and grade it up for larger sizes and grade it down for smaller sizes. It’s important to remember that grading only makes a shape larger or smaller and isn’t intended to change a shape. Grading also reflects the fact that individuals of different sizes are proportionately different, not uniformly different. When we grade up or down, we don’t merely make everything equally larger or smaller. Instead, we take into account that different body parts increase at different and proportional amounts.

**Short Answer Type Questions**

1. Write in detail about computerised grading machine.

2. How to grade a sleeve pattern of 32 to 34 and 36 sizes

3. What are different types of grading techniques?

4. Write about the methods of grading.

5. What is the importance of grading in industries?

6. What are the principles that are involved in grading?
Long Answer Type Questions

1. Write in detail about grading procedures employed for grading of basic front and back bodice

2. Write in detail about different types of grading machines

3. Define grading, explain in detail about importance and principles of grading.
UNIT 4

Commercial Sewing Machines

Structure

4.1 Introduction
4.2 Classification of Basic Sewing Machines
4.3 Different types of sewing machines
4.4. Sewing machine shapes
4.5. Different types of sewing machines

Learning objectives

By studying this unit, you will be able to know the following

- Different types of sewing machines
- Advanced types of sewing machines
- The purpose of using them
- Technological development in different sewing machines

Unit preview

Sewing machines are invented during the first industrial revolution; the sewing machine is instrumental in nearly all of the commercial clothes we wear. By taking a large chunk of time out of the manual sewing process, the sewing machine allowed the textile industry to take off extra time. Sewing machines
could be divided into many subtypes. This chapter deals with different types of industrial sewing machines along with their uses.

### 4.1 Introduction

The dominant process in garment assembly is sewing. Much of the application of technology to clothing manufacture is thus concerned with the achievement of satisfactorily sewn seams. A sewing machine is a machine used to stitch fabric and other materials together with thread.

Since the invention of the first working sewing machine, by Englishman Thomas Saint in 1790, the sewing machine has vastly improved the efficiency and productivity of the clothing industry.

The central process in the manufacture of clothing is the joining together of components—operations that all involve sewing in one form or another. Although there are a large number of different categories of sewing machine, their actual sewing functions are all derived from the same component parts of sewing.

Industrial sewing machines, by contrast, are larger, faster, more complex, and more varied in their size, cost, appearance, and task.

### 4.2 Classification of Basic Sewing Machines

In a recent article in the trade press it is said that there are about 3000 different types of sewing machines in the market. Apart from clothing types, there are producers of tents, curtains, bed linen, upholstery, shoes, luggage, parachutes, etc all of which contain sewn elements.

For the clothing industry there is a great diversity of regular and special sewing machines for sewing every conceivable type of garment and it is this variety, which enables clothing manufacturers to employ specialized equipment for their own particular requirements. While there is a vast range, some machines are basic items sewing room.

The sewing machine types used in clothing manufacture can be classified into the following levels, with the quantity of machines in commercial use decreasing rapidly from the first level to the last.

### 4.2.1. Basic Sewing Machines

The sewing machine has the same basic mechanical parts as any other machine. A sewing machine may be segregated into the following sections.
4.2.1(a) Machine Frame

It is the main casting which holds and houses the moving and stationary mechanical links of the sewing machine. The frame structure determines the bed type.

4.2.1(b) Prime Power Pulley

This is the pulley, which receives the power to drive the machine parts.

4.2.1(c) Intermediate Mechanical Links And Bands

They are the rods, gears, cams, shafts, pistons, belts, chain, etc, which are arranged in a synchronized motion to the stitching and feeding mechanisms.

4.2.1(d) Stitching Mechanisms

They are mechanical parts, which form the stitch. They are common only to sewing machines. E.g. needles, hooks, bobbins etc.

4.2.1(e) Feed Mechanisms

They are the mechanical parts, which move the fabric after each stitch is formed.

4.2.1(f) Lubricating Systems

They are the mechanical systems used to diminish heat and friction in the machine. A lubricant may be a gas, liquid or solid which may be placed between two mechanical links to reduce friction.

4.2.2. Simple Automatics

Here the machine is usually cam-controlled, producing only one configuration of sewing. E.g. are buttonholers, button sewers, bar tack machines and label sewers. The shape of the sewing line is determined by the machine, hence achieving consistency, but the operator must still carry out all the handling both before and after sewing.

4.2.3 Mechanized Work Places

These carry out many complex functions in addition to sewing. They make use of electric, electronic and pneumatic control and incorporate sophisticated conveyor and clamp technology. E.g. patch pocket setting on jeans and shirts, run stitching collars or flaps, long seam joining, sequential button holding.
4.2.4 Transfer Lines

Here garments parts are loaded and a series of machines carries out a series of operations to a section of a garment.

Apart from the above classification, With respect to operator control there are three kinds of sewing machines:

**Manual Control:** The operator controls manually, all phases of sewing cycle. This machine is generally used by small scale industries.

**Semi Automatic Sewing Machines:** Machines in which the sewing phases of the operation is controlled automatically by the machine after the operator actuates the machine; such as button hole machines, bar takers, button sewers, dart sewers, pocket sewers, etc.

**Automatic Sewing Machines:** In these machines the operator merely loads a hopper in the machine with a stack of garment parts and the machine automatically picks, positions, sews, extracts & discards the sewed pieces.

4.3 Different types of sewing machines

The modern general sewing machine with a needle lock-stitch mechanism is the common sewing machine. The features of the machines in common use today are:

1. Speeds of up to 6000 rpm with electronic controls which reduces the time required for acceleration and deceleration.

2. Automatic positioning of the needle in an up or down position

3. Automatic clipping of top and bottom threads

4. Bar tacking mechanism actuated though the foot pedal or automatically by means of an electronic seam-end sensor

5. Programmable sewing sequence via a micro-processor for respective operations.

The regular sewing machine is often regarded as an end in itself rather than as a basic sewing tool. There is an enormous variety of feed types, attachment and apparatus available to make this machine into one of the most versatile items of equipment in the sewing room.
4.4. Sewing machine shapes

In fashion manufacture the machines are still predominantly used in their basic forms but for some specialized garments and those made in higher volume, variations in machine shape are available which enable easier movement of the materials around the machine. These variations primarily affect the shape of the bed of the machine, i.e. the part on which the material rests. The best-known version is the flat bed and the main alternatives are:

1. Cylinder bed
2. Post bed
3. Feed-off-the-arm

Fig 4.1 Flat bed

The blind feeding machine is also a special shape and the over edge machines have no fabric space to the right of the needle.

4.4.1 Flat bed: Is used in the majority of sewing.

4.4.2 Cylinder: And Post bed are used where the parts to be sewn are small, curved or otherwise.

Fig 4.2 (a) Cylinder bed  Fig 4.2 (b) Post bed

Awkward in shape, a particular common situation is in sewing foot wear.

4.4.3 Feed-Off-The-Arm

Machine is used where a lapped seam has to be closed in such a way that the garment part becomes a tube. They are common in jeans production where the outside leg seam is normally a lap-felled and it is joined after the inside leg seam in the sequence of construction.
The operator wraps the part to be sewn around the machine bed and is fed away off the end of the bed.

4.5 Different types of sewing machines

Sewing machines can make a great variety of plain or patterned stitches. Ignoring strictly decorative aspects, over three dozen distinct stitch formations are formally recognized by the ISO 4915:1991 standard, involving one to seven separate threads to form the stitch.

4.5.1 Lock stitch Machine

The modern general sewing machine with a needle lock-stitch mechanism is the common sewing machine.

The features of the machines in common use today are

1. Speeds of up to 6000 rpm with electronic controls which reduces the time required for acceleration and deceleration.

2. Automatic positioning of the needle in an up or down position

3. Automatic clipping of top and bottom threads

4. Bar tacking mechanism actuated though the foot pedal or automatically by means of an electronic seam-end sensor

5. Programmable sewing sequence via a micro-processor for respective operations.
Usage

The regular sewing machine is often regarded as an end in itself rather than as a basic sewing tool. There is an enormous variety of feed types, attachment and apparatus available to make this machine into one of the most versatile items of equipment in the sewing room.

4.5.2. Over Locking Machines

This is the generic name given to over edge stitch machines used to trim and cover the rough edges of the fabric in order to present a clean and neat appearance where seam edges are visible. Over lock machines are also used for the assembly of some types of knitted articles such as T-shirts. (Fig:4.3)

![Fig 4.3 Over lock stitch machine](image)

Overlock stitches are classified in a number of ways. The most basic classification is by the number of threads used in the stitch. Industrial overlock machines are generally made in 1, 2, 3, 4, or 5 thread formations.

Each of these formations has unique uses and benefits

1. **1-thread**: End-to-end seaming of piece goods for textile finishing.

2. **2-thread**: Edging and seaming, especially on knits and woven’s, finishing seam edges, stitching flat lock seams, stitching elastic and lace to lingerie, and hemming. This is the most common type of overlock stitch.
3. **3-thread**: Sewing pin tucks, creating narrow rolled hems, finishing fabric edges, decorative edging, and seaming knit or woven fabrics.

4. **4-thread**: Decorative edging and finishing, seaming high-stress areas, mock safety stitches which create extra strength while retaining flexibility.

5. **5-thread**: In apparel manufacturing, safety stitches utilizing 2 needles create a very strong seam. For every 1 cm of seam length you would require 20 cm of thread to sew it.

The features of over edge stitch machine are

1. Speeds of up to 8500 rpm
2. Automatic thread clipping
3. A vacuum system for extracting cloth waste and thread ends.
5. Creating continuous or intermittent fullness on the top or bottom when joining two plies.

Overlock stitches are traditionally used for edging and light seaming. Other applications include.

1. Flat-locking
2. Edging emblems
3. Pearl stitching
4. Rolled hemming
5. Decorative edging

4.5.3. **Safety Stitching Machine**

Safety stitching machines have the same features as over lock machines and are used for the simultaneously seaming and over locking of many garments where there is no necessity for pressed open seams. There are two types of safety stitch machines in general use, the main difference between them being the number of threads used to construct the stitching, which consists of locked chain stitch parallel to an over locked edge. (Fig: 4.4).
Fig 4.4 Safety stitch machine

Features of safety stitch machine are

1. With the four thread machine, one of the looper threads of the overlock stitch is used as the bottom thread for the chain stitch.

2. On a five thread machine, each row of stitches has its own threads i.e. three for the overlock and two for the chain stitch.

4.5.4. Blind Stitching Machine

These machines are used for fastening hems or facings as the name suggests, they perform this operation without the stitch impressions showing on the right side of the garment. This class of machine uses a curved needle which is designed to slightly penetrate the surface of the fabric but emerges on the same side as it enters. (Fig : 4.5)

Most blind stitch machines are fitted with an optional skip stitch device which device causes the machines to catch the outside layer.
The special features are

1. Sewing speeds of up to 2000 st/min
2. Automatic thread clipping
3. Automatic needle positioning
4. Pneumatic opening and closing of the work plate
5. One or two thread versions are available and with the two thread machine the stitch is locked in order to prevent unraveling.

Uses

1. Hemming of fine fabrics
2. Sewing machines can make a stitch that appears nearly invisible by using a blind-stitch setting and a blind stitch foot.
3. Blind-stitches are commonly used to finish hems of applique designs on fabric.

4.5.5. Button Hole Machine

A buttonhole is a straight or shaped slit cut through the garment and then sewn round its edges to prevent fraying and stretching. The cut shape of the buttonhole and the number of threads used to cover its edges depend on the garment type and quality. (Fig: 4.6).
Features

1. Where standard types of garments, such as shirts are being produced, the buttonholes are automatically sewn and spaced at pre-determined distance.

2. The operator simply positions the work in the machine and starts the cycle.

3. An unloading device removes and stacks the sewn work after completion of the cycle, which enables the operator to work on more than one buttonholing units at a time.

Uses

Used for stitching different types of button holes on trousers, shirts and tailored coats and jackets

4.5.6. Bar Tacking Machine

The bar tacking machine has many applications in the clothing industry; one of them is the sewing of a dense tack across the open end of a buttonhole. (Fig:4.7)
The machine sews a number of stitches across the end of the buttonhole, and then over sews them at right angles with a series of covering stitches. Each machine sews fixed number of stitches with an option to change stitch density and machines are available which sew bar tacks containing from 18-42 stitches. Belt loops of trousers can also be bar tacked with these machines.

![Bar tacking machine](image)

**Fig 4.7 Bar tacking machine**

**The other features available are**

1. A mechanism, which signals audibly and visually when the bobbin thread is below a certain level.
2. Automatic thread cutting
3. 2-stage pedals which opens and closes the work clamp and also operates the machine.
4. A brake wheelbase, which enables the machine to be easily moved.

In other specialized versions, bar tack machines are used for sewing small decorative tacks and shapes.

**Features**

1. Bar tacking is a type of reinforcement stitching used by the fabric and textile industries to fortify stress points in clothing, sporting equipment, uniforms, and a host of other products.
2. The bar tack stitch is a tight zigzag pattern repeated perpendicularly over itself several times to make sewn products stronger, and resistant to tears or rips in the seams

Uses

1. Reinforcing areas of stress on a garment, such as pocket openings, bottom of a fly opening or buttonholes

2. In a denim industry, it is often used in a contrasting color, such as orange or white.

3. Bar tacking ensures that the seams will not fray or split while the equipment is in use

4. Bar tacking ensures durability of product

4.5.7. Button sewing machine

Buttons with two holes, four holes or shanks can all be sewn on the same machine by simple adjustment to the button clamp and the spacing mechanism. The sewing action consists of a series of parallel stitches whose length is equal to the spacing between the centers of holes. The needle has a vertical movement and the button is moved from side to side by the button clamp. Buttons can be sewn on with one or two threads. (Fig:4.8)
Generally decorative buttons will be sewn on with half the number of stitches used for functional buttons.

**Features**

1. Each machine has a maximum number of stitches i.e. 16, 24 or 32 and can be adjusted to sew the full amount or half i.e. 8 or 16, 12 or 24, 16 or 32.

**Uses**

1. Button sewers are most often used for attaching different types of buttons such as four hole, two hole, shank buttons to different articles of clothing.

**4.5.8. Label Sewing machine**

Variety of label sewers are available from those sewing simple zig-zag stitches to a pre-determined length on one or two edges of a label to sew around a wide range of shapes and sizes of label. A specially shaped cylinder bed machine is available over which the inside pocket of a jacket can be passed, enabling jackets to be labeled with a retailers label after the manufacturer.

**Uses**: Can stitch different types of labels on to clothing (Fig:4.9).
4.5.9. Others

A variety of other short cycle machines are available which can be used for attaching hooks, bars, metal badges. These may be programmable type of machines.

Uses

Motifs and many other decorative and functional garment parts can be easily attached through these machines.

4.5.10 Special Sewing Machines

Apart from the basic general-purpose sewing machines there is also a huge range of high-performance special machines that are built to perform one operation only at a consistently high level of quality. The concept behind these machines is to reduce the skills input of the operator. Ideally the operator is only required to feed the machine rather than controlling the operation.

Summary

Commercial sewing machines as the name suggests are used by industries for mass production of garments.

1. Test your understanding

1. Have you ever seen commercial sewing machines
2. What is the machine that is used for sewing labels?
3. The machine used for sewing shank buttons is?
4. The machines that are used for fastening of hems and facings?

II. Test your understanding

Fill up the blanks

1. The machine which is used to attach labels to garments are____________________________
2. The machine used to sew buttons is called_________________
3. Sewing of a dense tack across the open end of a buttonhole is done by__________________machine
4. These machines which are used for fastening hems or facing is_________________
5. The generic name given to the over edge stitching machine is__________________________

**Short Answer Type Questions**

1. Write about the features and uses of button sewing machine.
2. Classify the basic sewing machines.
3. What are the special types of sewing machines that are used commercially?
4. Write about the features and uses of over locking machine.

**Long Answer Type Questions**

1. Discuss about different type of sewing machines that assist in completion of men’s shirt.
UNIT 5

Production Process in Industry

Structure

5.1 Introduction
5.2 Design / Sketch
5.3 Pattern Design
5.4 Sample Making
5.5 Production Pattern
5.6 Grading
5.7 Marker Making
5.8 Spreading
5.9 Cutting
5.10 Sorting/Bundling
5.11 Sewing/Assembly
5.12 Inspection
5.13 Pressing/Finishing
5.14 Final Inspection
5.15 Packing
Learning objectives

After studying this unit the student will be able to

- To know about infrastructure and the work flow of a garment industry.
- To acquire knowledge about the raw materials, machinery and equipment required or used in an industry.
- This chapter gives details of the various steps involved and equipments used for garment fabrication.

Unit preview

Manufacturing or clothing technology is the generic name given to the technologies used for the manufacture of clothing. There is a great deal of homogeneity in these technologies because almost every type of garment goes through the same series of main processes during its manufacture. This chapter gives the knowledge about work flow and machinery used in an apparel industry.

5.1 Introduction

Through its long history, the clothing industry has been characterized by hand sewn products to mechanized production, from computerization to robotic systems. During the past three decades this situation has undergone drastic changes.

The main aim of this course is to provide a panoramic view of the technological advancements that have taken place, therefore the student is introduced to Garment Manufacturing Technology i.e., is about the infrastructure required, various departments of garment industry, machinery and equipment used for garment assembly and fabrication and other allied aspects of an industry. This knowledge helps the students to set up a unit or work in an industry.

In addition, computerized systems for all planning, control, administration and financial management have been introduced. Computer Integrated Manufacturing (CIM) became essential element in the infrastructure of clothing factories. Apparel production has become a more organized structure with categorization into various departments.
1. **Design Department**: The design department can be considered as the research and development department of a clothing factory, because it is in this department that the prototypes of garments are developed and prepared for selling and production.

2. **Production Department**: In a large, more sophisticated environment the production department has three main groups of functions - Manufacturing, Service, Control.

3. **Marketing Department**: The marketing department carries out three major functions, which according to the size and organizational structure of the company, may be combined or may be separate entities. The primary functions of this department are - Marketing, Merchandising, Sales.

4. **Finance and Purchase Department**: The finance department is responsible for managing all the financial administrative affairs of the company and has a very important influence on many of the policy and commercial decisions taken by management. The financing of a company’s operations require precise timely planning and control in order to ensure that adequate funds and credits are available when needed.

   The primary objective of purchase department is to obtain the right materials, in the right quality, at right time and price. As purchasing department and raw materials stores are operational departments, they are responsible to the operations manager, and in management of finished goods, warehouse is responsible to the marketing department.

5. **Packaging and Warehousing Department**: The final group of operations in the production of clothing is to prepare finished merchandise for delivery to the customer. These operations come under the heading of material handling systems and are no less important than other systems used in the factory. The warehouse is an integral link in the manufacturing chain and should receive the same thought and planning as is given to other production systems. Even before the goods reach the warehouse, the goods are packed.
5.2 Design / Sketch

The designing process is mainly undertaken by the design department. The design department can be considered as the research and development department of a clothing factory, because it is in this department that the prototypes of garments are developed and prepared for selling and production. For most factories the process of product development involves seven stages.

1. Forecasting,
2. Designing,
3. Collection Planning,
4. Pattern Making,
5. Technology,
6. Production of sample garments,
7. Pattern Grading.

Forecasting commences with the evaluation and interpretation of the market’s future needs in terms of fashion and price. These forecasts are based on the accumulated knowledge, expertise and experience of the company to make a fairly accurate prediction of the types of garments customers will buy and the prices they are willing to pay.

The designer starts by preparing some sketches of the core ideas for the collection and selecting the fabrics and trims to be used for each design. The designs themselves can be hand drawn and colored or produced using a computerized design system. These systems are becoming widely used and provide the designer with a highly versatile and flexible tool for creating new designs in the shortest time, which is ready to be used for the next stage of sampling process and collection planning.

5.3 Pattern Design

This function connects the design to production by producing paper templates for all the components, such as cloth lining and fusible, which have to be cut for a garment. Pattern making is a highly skilled technique. Industrial pattern making has two stages, the Block pattern and the Garment pattern.

5.3.1 Block Pattern

Is without any style features and incorporates the measurements, proportions and posture of the body.
5.3.2 Garment Pattern

The styled patterns used for cutting the original sample garments can be developed by flat method or modeling or a combination.

The conventional methods of pattern construction are gradually replaced by computerized systems, which interact with pattern maker. E.g. Pattern Design Systems (PDS); Pattern Generation Systems (PGS). PDS systems help form garment patterns when the pattern maker inputs the block patterns into the computer. When the pattern components for the top cloth have been developed by the computer via PDS, the PGS automatically generates the patterns for auxiliary components such as linings & fusibles.

5.4 Sample Making

Sample garments are usually produced by a small unit supervised by the pattern maker or the designer. This is usually stitched on calico or muslin which is an inferior quality of fabric as it reduces cost. Sampling is a continual process during the development of new product. As each sample is approved, its cost must be accurately calculated in order to determine the selling price.

This sample is constructed to analyze the pattern fit and design too. After the sample garment is stitched it is reviewed by a panel of designers, pattern makers and sewing specialists. If any changes have to be made they are made at this time.

5.5 Production Pattern

The pattern design is now taken for creating the production patterns. The production pattern is one which will be used for huge production of garments. The pattern maker makes the patterns on standard pattern making paper. These papers are made-up of various grades. The most important component, the tissue paper pattern, is made from the lightest and thinnest paper commercially available.

Garment patterns can be constructed by two means: manual method, CAD/CAM method. Today many companies have developed CAD/CAM because of the ease of designing patterns, fluency and precision involved which cannot be guaranteed with the manual method. Many buyers around the world prefer manufacturers who are using CAD/CAM methods. The production patterns created in CAD/CAM can be stored easily and they can be modified at any point of time.

A garment sewing pattern or pattern draft is developed by calculating and taking account of the following measurements.
1. Direct Sample.
2. Specification Sheet/Measurement Chart.
3. Actual body size measurements.
4. Ease Allowances.
5. Sewing Allowance.

These allowances are different for different type of fabrics and patterns.

5.6 Grading

The purpose of grading is to create patterns in different standard sizes. Grading a pattern is really scaling a pattern up or down in order to adjust it for multiple sizes. Pattern sizes can be large, medium and small or else there are standard patterns of size 10, 12, 14, 16 and so on for different figure and statures sizes. This is generally how we get S M L XL XXL sizing. Pattern grading by manual method is a cumbersome task because the grader has to alter the pattern on each and every point from armhole, to neckline, sleeve cap and wrist etc. by using CAD it is much easier and faster.

5.7 Marker Making

A marker is a diagram of a precise arrangement of pattern pieces for the sizes of a specific style that are to be cut from a single spread. Marker making is the process of determining the most efficient layout of pattern pieces. This requires time, skill and concentration. Use of computer in making helps improve accuracy, reduction in preparation time & increases control of variables.

5.7.1 Types of Marker Paper

There are two types of marker papers available. They are

- Spot and cross paper
- 1 to 5 paper

The grid markings on the marker paper help in positioning the patterns, in maintaining grain of pattern pieces and in spacing them out. This is very useful in making markers for stripes, plaid or dotted fabrics. The marker papers are made in varying widths of 24 inches to 96 inches and come in rolls of 50 to 900 feet long.
5.7.2 Methods of marker planning and marker use

1. The marker planner uses full-size patterns and arranges them in the most economical fashion on marker paper. This is a specially printed-paper having symbols on it which enable the marker planner to visually control the positioning of components according to their specified grain lines.

2. The full size patterns are reduced, generally to a 1:5 scale, to facilitate the work of the marker planner. The miniature patterns are then arranged on a planning board with the cloth width represented at the same scale. When the marker has been planned it is photographed and this is used as a guide for preparing the full sized marker.

3. Computerized systems are used and the marker planner works interactively with the system to plan the markers, which can then be used for manual or computer controlled cutting.

The markers can be produced on paper, which is fixed to the spread with pins or staples, or on an adhesive paper, which is heat-sealed to the top ply of the spread. For computerized cutting, the marker is held in the position by vacuum used to compress the spread and keep it stable. Multiple copies of the paper marker can be produced either from the first drawn marker plan or master marker.

The mixing of sizes in a marker, as opposed to cutting for a single size is termed as Scrambling. With scrambling there is a scope for fabric savings. The design department determines the fabric yardage needed for each style and size of garment. Computer software helps the technicians create the optimum fabric layout to suggest so fabric can be used efficiently. Markers are laid in such a way that minimum possible fabric gets wasted during cutting operation. After marking the garment manufacturer will get the idea of how much fabric he has to order in advance for the construction of garments. Therefore careful execution is important in this step.
5.8. Spreading

This is a preparatory operation for cutting and consists of laying plies of cloth one on top of the other in a pre-determined direction and relationship between the right and wrong side of the cloth. The composition of each spread i.e., the number of plies of each is obtained from the cut order plan. A cut order normally specifies the quantity of each size & color. Ex: 500 dozen blouses may include, 200 dozen RED, 200 dozen BLUE, 100 dozen GREEN in sizes 12, 14, 16 & 18 in ratio of 2:4:4:2. A high lay generally gives a low cutting labour cost per garment.

The spreads can be of two basic types

1. Flat spreads: All the plys are of the same length. (Fig:5.2)

2. Stepped spreads: This is built up in steps, with all the plys in one step having the same length. A stepped spread is generally used when there is imbalance between the quantities to be cut. The cut order plan details the colours and ply lengths for the stepped spread. (Fig:5.3).

5.8.1 Methods of spreading:

The methods of spreading used in industry are:

1. Spreading by hand: It is a time consuming process and requires an operator on each side of the table. The fabric is drawn from its package supported on a frame and is secured by weight or clamp ensuring that there is no tension or wrinkles. Typical fabrics, which must be spread by hand, are checks, crosswise stripes, other regularly repeating patterns or a repeating design.
2. Spreading using a machine

Classification of spreading machines

1. Stationery spreaders-portable and fixed
2. Travelling spreaders-manual, semi-automatic(Fig:5.5) and automatic(Fig:5.4)

Spreading machines carry the piece of fabric from one end to other end dispensing one ply at a time on to the spread.

The basic elements consists of

- A frame or carriage
- Wheels travelling in guide rails at the edge of the table
- A fabric support
- Guide collars to aid the correct unrolling of the fabric

The operator clamps the free end of fabric in line with end of the spreader to the other end, cuts off the ply in line with that end, clamps the beginning of next ply and pushes the spreader to the other end.

More advanced machines may include a

1. Bolt drive motor drive the carriage, a platform on which the operator rides
2. A ply cutting device with automatic catcher
3. An alignment shifter actuated by photo-electric edge guides
4. Ply width-two photo cells on each side of the machine are indexed to the narrowest width of cloth
5. Ply counters- preset counters enables to count the number of plies and the machine stops automatically
6. Creases removal device-a perforated air blower system mounted on the exit line of the cloth directs fine jets of compressed air
7. Pattern matching. An optical head is used to scan the pattern & information fed into a control unit synchronizing the lateral and lined movement of cloth
8. Loading-performed manually or mechanically with swivel arms
9. Defect scanner- A VDU (Visual display unit) mounted on the side of machine digitizes the size and position by a projector type cursor.

10. Operation comfort-most motorized machines are equipped with a platform on which the operator can stand and sit while machine is traversing the table.

Fig 5.4 Fully Automatic Computer Controlled Spreading Machine

Fig 5.5 Semi Automatic Spreading Machine
Numerous attempts have been made over the years to develop methods of cutting cloth other than by means of some kind of metal blade. Today, in the majority of cutting rooms, the cutting process makes use of hand shears, a mechanized knife blade in one of several possible types, or a die press which stamps out the garment shapes. In all these methods, a sharp blade is pressed against the fibers of the fabric.

The importance of cutting

As a unit the cutting room has a great effect on excessive manufacturing costs than any other department concerned with the actual production of the garments. These excess cost can be divided in to two groups:

1. **Internal costs**: Those incurred at the cutting room itself

2. **External costs**: Those incurred by other departments as a result of the malfunctioning of the cutting room

The common factors between the two groups are efficiency and quality, and each influences the other.

Cutting is a major operation of the cutting room, when the spread fabric is cut into garments.

From the stand point of cutting stroke action,

**There are two basic types of cutting machines**

1. Continuous

2. Intermittent

**The major continuous types are**

1. Rotary blade cutting machine (Fig: 5.6)

2. Vertical blade reciprocating cutting machines(Fig:5.7)

3. Band knife machines (Fig:5.8)
Fig 5.6 Round Knife

Fig 5.7 Straight Knife

Fig 5.8 Band knife
The major intermittent types are

1. Die cutters: clickers and presses
2. Shears
3. Cutting knives: short knives & table sword knives
4. Notchers
5. Drills

Advanced types are

1. Press cutting
2. Die cutting
3. Computerized cutting
4. Laser cutting
5. Plasma cutting
6. Water jet cutting
7. Ultrasonic cutting

5.10 Sorting/Bundling

The next group of operations is concerned with preparing the cut components for sewing and includes the following

1. Position marking
2. Shade marking
3. Bundle preparation
4. Bundle tickets

1. Position Marking: When required, this operation marks components with guides for sewing and other operations. The mark itself can be a very small hole or a mark made by a chalk based liquid taken through the spread by the drill flutes.

2. Shade Marking: This operation ensures that components cut from different shades of the same colour do not get mixed up during the assembly process. Every component for one garment is marked with a unique number, usually printed on a small ticket which is stuck on the component.
3. **Bundle Preparation**: Bundles of cutwork are prepared according to size, colour and quantities, their actual composition determined by the requirements of the sewing room. E.g. all the components for one bundle of garments can be packed into one box or each of the major components packed in its own container ready to be issued to different preparation and sub-assembly sections in the factory.

4. **Bundle Tickets**: These tickets identify each bundle and in themselves play an important role in production planning and control for the sewing and finishing sections. The tickets themselves can be in alpha-numeric form or bar coded, and in both cases they can be computer generated.

5.11. **Sewing/Assembly**

The dominant process in garment assembly is sewing. Much of the application of technology to clothing manufacture is thus concerned with the achievement of satisfactorily sewn seams.

The sorted bundles of fabrics are now ready to be stitched. (Fig: 5.9) Large garment manufacturers have their own sewing units other give the fabrics on contract to other contractors. Stitching in-house is preferable because one can maintain quality control during the processing. On the other hand if contractors are hired keeping eye on quality is difficult unless the contactor is one who precisely controls the process.

Fig 5.9 Sewing or assembling operations
There are sewing stations for sewing different parts of the cut pieces. In this workplace, there are many operators who perform a single operation. One operator may make only straight seams, while another may make sleeve insets. Yet another two operators can sew the waist seams, and make button insets. Various industrial sewing machines too have different types of stitches that they can make. These machines also have different configuration of the frame. Some machines work sequentially and feed their finished step directly into the next machine, while the gang machines have multiple machines performing the same operation supervised by a single operator. All these factors decide what parts of a garment can be sewn at that station. Finally, the sewn parts of the garment, such as sleeves or pant legs, are assembled together to give the final form to the clothing.

5.12 Inspection

Quality control is the process of maintaining the given standards in the product, from the design phase to the consumer’s use of the product for the given life with the given conditions. For this each company maintains certain quality standards in which open seams, wrong stitching techniques, non-matching threads, and missing stitches, improper creasing of the garment, erroneous thread tension and raw edges are some of the sewing defects which can affect the garment quality adversely. During processing the quality control section checks each prepared article against these defects.

Most of the routine decisions will be made by the quality manager who will have an in-depth understanding of the company’s products and will be highly conversant with customer’s attitudes and requirements regarding garment quality.

The inspectors employed by the department work in various sections of the factory, each being responsible for a specific pre-production or production activity. They all report to the quality manager and not to the managers or supervisors of the various sections or departments, because inspectors do not have direct control over production workers but act in a strictly advisory capacity. Responsibility for the quality of operations coming off a section belongs to the production supervisor or departmental manager, but they work closely with the inspection team to maintain standards.

5.13 Pressing/Finishing

The next operations are those of finishing and/or decorating.

Over the last hundred years, pressing equipment has undergone considerable change. In 1890’s men’s suits were pressed with gas fed irons
weighing as much as 20 lbs. Gas was fed by a rubber hose to the center of the iron and then ignited to produce heat. With this system a presser could press 10 suits in a 10-hour day.

**Types of Pressing Equipment**

Solid surface pressing equipment uses a firm surface to apply pressure while steam and heat mold the fabric, garment or garment parts. Pressure may be applied through rolling action, gliding action or compression.

**The basic process that are involved can be divided into two groups**

  i. **Under Pressing** : This is the term used to describe the pressing operations performed on garments they are made up.

  ii. **Top Pressing** : This refers to the finishing operation, which a garment undergoes after being completely assembled.

The various pressing equipment used in apparel manufacturing are as follows

**Classification of Pressing Equipment** : Since, the invention of the first mechanically operated pressing machine in 1905, there had been a never-ending development of pressing equipment. Today one prominent manufacturer of this equipment lists over 500 different types of general and special purpose machines ranging from those for one simple operation to combination machines capable of performing every operation required for pressing a man’s jacket. These machines are categorized in three major categories.

**i. Solid Pressure Equipment (Pressing Equipment)**

  1. Pressing Irons
  2. Buck Presses
  3. Mangle Presses
  4. Block Presses
  5. Form Presses
  6. Pleating Presses
  7. Creasing Machines: Edge Foldes

**ii. Moisture Pressure Equipment (Steaming And Wetting)**

  1. **Wetting Tanks** : London Shrinkers & Auxiliary Equipment
  2. Sponging machines
  3. Decaters
4. Steam Guns & Jets
5. Steam Chambers
6. Autoclaves.

iii. Heat Energy Equipment (Heating & Baking)

1. Thermo Electric Machines
2. Hot Plates
3. Casting Equipment
4. Dry Heat Ovens
5.14 Final Inspection

For the textile and apparel industry, product quality is calculated in terms of quality and standard of fibers, yarns, fabric construction, color fastness, designs and the final finished garments. Quality control in terms of garment manufacturing, pre-sales and posts sales service, delivery, pricing, etc are essential for any garment manufacturer, trader or exporter. Certain quality related problems, often seen in garment manufacturing like sewing, color, sizing, or garment defects should never be over looked.

5.15 Packing

The final group of operations in the production of clothing prepares finished merchandise for delivery to the customer. These operations come under the heading of materials handling systems and are no less important than other systems used in the factory. The warehouse is an integral link in the manufacturing chain & should receive the same thought & planning as given to their production systems.

The main sequence of operations in a finished goods warehouse is

- Receiving finished goods from the factory
- Checking the quantities & sorting into styles, colour & sizes
- Storing the garments in pre-planned locations
• Allocating the garments according to customers orders

• Packing and preparing the garments for delivery to the customer (Fig : 5.15)

• Organizing the deliveries

![Shirt Packing Machine](image)

Fig 5.15 Shirt Packing Machine

**Packaging may have two major functions**

• Distribution

• Merchandising

The distribution functions deals with packaging the apparel or allied product in a manner which permits the apparel manufacturers to ship the product at the lowest cost and in the shortest time to the purchaser, without diminishing the quality of the product.

The merchandising function deals with presenting the apparel product in a manner designed to stimulate consumer desire for the product.

**5.15.1 Types of Package Forms:**

The basic type of package forms used in apparel and allied products are bags, boxes, cartons, cases, crates, twines (or cords) and wrappers.(Fig:5.16).
Fig 5.16 Different types of packaging forms

5.15.2 Types of Packaging Materials

The basic packaging materials used for apparel and allied products are paper, plastic, film, wood, nails, staples, cords (twine and rope), gum tape (cloth and paper) and bands (metal).

Quality Specifications for Packing Material

Quality specifications for packaging paper and film are similar to that of fabric. The basic quality factors in paper & films are;

(a). Properties

1. Clarity
2. Thickness
3. Width and length
4. Weight
5. Yield

(b) Characteristics

1. Tensile strength
2. Elongation
3. Bursting & tearing strength
4. Flammability
5. Porosity
6. Air / moisture permeability
7. Sunlight transference
8. Resistance to odours
9. Dimensional stability to heat and sunlight

Storage consists of putting the items to be warehouse in their designated area, in a manner which permits immediate location & retrieval of each individual item such as a bolt of fabric or a garment.

**Summary**

Manufacturers are primarily engaged in the design, cutting and sewing of garments from fabric. Some manufacturers are contractors or subcontractors, which generally manufacture apparel from materials owned by other firms. Larger manufacturers often contract production to many such contractors or subcontractors in the U.S. and abroad. Some manufacturers are vertically integrated, producing the textiles from which they make garments, or even operating retail outlets too.

**I Test Your Understanding**

**Arrange steps in a proper Sequence**

1. Pressing/Finishing ( )
2. Cutting ( )
3. Inspection ( )
4. Spreading ( )
5. Sewing/Assembly ( )
6. Final Inspection ( )
7. Sorting/Bundling ( )
If Test Your Understanding

State whether true or false

1. The final group of operations in the production of clothing is finishing/packing merchandise for delivery to the customer
2. Many buyers prefer manufacturers who are good at CAD/CAM technologies
3. A stepped spread is generally used when there is correct balance between the quantities to be cut
4. The first step in garment manufacturing is designing the sketch for the dresses
5. The production pattern is generally used when there is less production of garments

Short Answer Type Questions

1. Write in detail about materials and equipment involved in packing
2. Explain about the importance and equipment used for cutting
3. What are the methods of spreading?
4. Write about marker making
5. Write about sewing/assembling operations

Long Answer Type Questions

1. Write about the steps involved in the production process of apparel industry.
2. Explain about the spreading, cutting and assembling processes.
3. Write in detail about the finishing and packaging equipment.
## Apparel Industry Terminology

### Structure

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Learning objectives

By this unit, one can get familiar with terminologies related to apparel industry

6.1 Costume

The term **costume** can refer to wardrobe and dress in general, or to the distinctive style of dress of a particular people, class, or period. Costume may also refer to the artistic arrangement of accessories in a picture, statue, poem, or play, appropriate to the time, place, or other circumstances represented or described to a particular style of clothing worn to portray the wearer as character or type of character other than their regular persona at a social event such as a masquerade, a fancy dress party or in an artistic theatrical performance.

6.2 Ethnic

Ethnicity or ethnic group is a socially defined category based on common culture or nationality. Ethnicity can, but does not have to, include common ancestry, appearance, cuisine, dressing style, heritage, history, language or dialect, religion, symbols, traditions, or other cultural factor. Ethnic identity is constantly reinforced through common characteristics which set the group apart from other groups.

6.3 Apparel

An all embracing term that is applied to men’s, women’s and children’s clothing.”clothing not necessarily fashionable.”

6.4 Boutique

A boutique is a small shopping outlet, especially one that specializes in elite and fashionable items such as clothing and jewelry.

A form of French word meaning “little shop” a free standing shop or an area with in the retail store, devoted to specialized merchandise for special
interested customers. A shop associated with few of kind merchandise, generally of very new or extreme styling, with an imaginative presentation of goods.

6.5 Classic

“A fashion that is long lasting or a particular style that continues as an accepted fashion, over an extended period of time.” Some styles never become completely obsolete, but instead remains more or less accepted for an extended period. A classic is characterized by simplicity of design, which keeps it from being easily dated. Depending up on the fashion statement one wishes to make, a person may have only a few classics or may have a wardrobe of mostly classics. A classic is characterized by simplicity of design which keeps it from being easily dated. An example is the channel suit which peaked in fashion in the late 1950s and enjoyed popularity again in the 1980s and 1990s.

6.6 Fad

A short lived fashion, can come and go in a single season. They lack the design strength to hold consumer attention for very long time. Fads usually affect only a narrow consumer group, begin in lower prize ranges are relatively simple and inexpensive to copy. And therefore flood the market in a very short time. Because of market saturation, the public tires of them quickly and they die out.

A fad is any form of behavior that develops among a large population and is collectively followed with enthusiasm for some period, generally as a result of the behavior’s being perceived as novel in some way. A fad is said to “catch on” when the number of people adopting it begins to increase rapidly. The behavior will normally fade quickly once the perception of novelty is gone.

6.7 Silhouette

“An outline of an garment.” The dark shaped outline of a garment that is visible against a lighter background. It is also frequently referred to as “shape/form”. It may appear to the casual observer that women have worn countless silhouettes throughout the centuries. Research shows however, that there are actually only 3 basic forms – straight or tubular, bell shaped or bouffant; and the bustle or back fullness- with many variations.

6.8 Camouflage

The design incorporating the army’s brown-green camouflage print, the army looks.

6.9 Couture

This term is reserved for fashion that is made to order to fit individual client measurements. These clothes are the most luxurious and the most expensive
and reserved for a very small international clientele. “French word for dress making, applied to fashion business that makes clothes to order.”

6.10 Adaptation

“A design that reflects the outstanding features of another design but not an exact copy.” Designs that have all the dominant features of the style that inspired them, but do not claim to be exact copies.

6.11 Custom made

Apparel made to order for the individual customer, out and fitting to individual measurements as opposed to apparel that is mass produced. “Apparel made to the customers special order, cut and fitted to individual measurement; opposite to ready to wear.”

6.12 Display

“Visual presentation of merchandise or ideas”. The word display means making a prominent exhibition of (something) in a place where it can be easily seen.

6.13 Designer

“A person employed to create ideas for garments or accessories in the fashion industry.” Designer clothing is clothing that bears the logo of a recognizable fashion designer. There can be many variations of detail with in a specific style/ a design is a particular or individual interpretation, or version of a style.

6.14 Knockoff

“A copy of high priced styles.” An item that looks exactly like an original product but lacks the expensive designer label and is replaced with a fake one. Usually costs half the price with the styled appeal. An unauthorized copy or imitation, as of designer clothing.

6.15 Accessories

“All articles ranging from hosiery to shoes, bags, gloves, belts, scarves, jewellery and hats. For example for worn to complete or enhance outfit of apparel.” Includes shoes, hats, gloves, scarves, hair accessories, sun glasses, jewelry, bags, backpacks, hosiery, and underwear’s, belts, caps and ties for boys and infant accessories such as bibs and booties. Hats to protect children from the sun have been particularly popular and have become fashion statements.
6.16 Fashion

Is the style or styles most popular at a given time. The term implies three components style, change and acceptance. The prevailing style of any given time implies change in style.

Fashion is a general term for a popular style or practice, especially in clothing, footwear, accessories, makeup, body piercing, or furniture. Fashion refers to a distinctive and often habitual trend in the style with which a person dresses, as well as to prevailing styles in behavior. Fashion also refers to the newest creations of textile designers. A fashion is a result of social emulations and acceptance. A style does not become a fashion until it gains some popular acceptance, and it remains a fashion only as long as it is accepted. High fashion refers to a new style accepted by a limited number of fashion leaders who want to be the first to adapt changes and innovation in fashion. Mass fashion or volume fashion, consists of styles that are widely accepted.

6.17 Market

“A group of potential customers, or the place, area, or time at which buyers and sellers meet to transact business or for the purpose of trading ownership of goods at wholesale price. Marketing is a tool system of business activities designed to plan, price, promote and place products and services to present and potential customers.” Fashion market works by using current trends in fashion to analyze, develop and implement sales strategies. Fashion marketing investigates the relationship between the fashion design and marketing including the development, promotion, advertising and retailing aspects of the fashion industry.

6.18 Mass production

“The production of merchandise in quantity.” Mass Production (also called Flow Production) is the production of large amounts of standardized products on production lines. It was popularized by Henry Ford in the early 20th Century. Mass production is notable because it permits very high rates of production per worker and therefore provides very inexpensive products.

6.19 Style

“Certain characteristics that distinguish a garment from other garment, a particular look in fashion.” A characteristic/distinctive mode of presentation or conceptualization in a particular field. In apparel, style is a characteristic or distinctive appearance of the garment, the combination of features that make it different from other garments.
6.20 Brand

“A trade name or symbol that distinguishes a product as that of a particular manufacturer or distributor.” A type of product manufactured by a company under a particular name. Brand is the “name, term, design, symbol, or any other feature that identifies one seller’s good or service as distinct from those of other sellers.

6.21 Catalog

“A potential book or booklet in which merchandise is offered for sale.” A catalog showroom is a place where customers study merchandise catalogs and sample merchandise on display. Orders are filled from a stock room on the premises and customers take their purchases with them.

I. Test your Understanding

1. A book or booklet in which merchandise is offered for sale is___________
2. The characteristics that distinguish a garment from other garment, a particular look in fashion is_______________________
3. French word for dress making, applied to fashion business that makes clothes to order is___________________________
4. A type of product manufactured by a company under a particular name is______________________________
5. The production of merchandise in bulk/quantity is________________________
6. A design that reflects the outstanding features of another design but not an exact copy is______________________________
7. Clothing that bears the logo of a recognizable fashion designer is___________________________
8. An outline of an garment is________________________
9. A small shopping outlet, especially one that specializes in elite and fashionable items such as clothing and jewelry is__________________________
10. The socially defined category based on common culture or nationality is__________________________
Summary

Students of fashion will eventually work in areas such as retailing, merchandising, buying, designing, branding and other such fields. They will find it helpful to understand the theoretical concepts behind fashion and style and how these meanings have shifted in the 21st century, through new innovations and a multicultural marketplace. By exposure to various terms of fashion, apparel, style and fashion, will allow students to serve a diverse range of clients and consumers, informed by an understanding of the ways in which purchasing behaviors are shaped by an individual’s identity and view of the world.
UNIT 7

Quality Control

Structure

7.1 Introduction
7.2 Importance of quality control in the garment industry
7.3 Quality control department
7.4 Product Standards – Specifications & Quality Control
7.5 Use of Specifications
7.6 Writing Specifications for Apparel Manufacturing
7.7 Phases of Apparel Specification Development

Learning Objectives

By learning this unit one can get information about quality maintenance in the apparel industry, quality inspections that were monitored in the apparel industry and how quality is maintained from purchasing of raw material till packaging of goods.

Unit Preview

Quality may be defined as the level of acceptance of a goods or services. For the textile and apparel industry, product quality is calculated in terms of quality and standard of fibers, yarns, fabric construction, color fastness, designs and the final finished garments. In India, different garments factories follow different quality control and management systems especially different inspection
systems for garment inspection. This unit contains the quality control processes as well as quality management procedures followed by different garment factories.

### 7.1 Introduction

Quality control is the process of maintaining the given standards in the product, from the design phase to the consumer’s use of the product for the given life with the given conditions. Quality control by the name is basically a systematic regulatory process which:

- Establishes standards appropriate to the quality objectives of the company,
- Has techniques for measuring the degree of conformity to these standards,
- Uses statistical methods for analyzing the significance of deviations from these standards,
- Reports on the findings of the analyses and when necessary, recommends and follow-up on corrective procedures.

The word ‘Quality’ itself is a concept and implies a degree of excellence the nature of which is dependent on the reasons for the garment being purchased. A term very often used to describe the quality characteristics of a garment which together provide the reason for purchasing it is ‘fitness for purpose’ and A-J Chuter has defined this as being:

- Quality of design,
- Quality of conformance,
- Quality of delivery and service.

This definition contains all that is to be followed in a clothing factory.

### 7.2 Importance of Quality Control in the Garment Industry

It is important to maintain a level of quality for every industry or business to get increased sales and better name amongst consumers and fellow companies. Especially for the business engaged in export business has to sustain a high level of quality to ensure better business globally. Companies who are into export business hold the prestige of the country, and due to this generally quality control standards for export are set strictly. It becomes mandatory to have good quality control of their products as export houses earn foreign exchange for the country. In the garment industry quality control is practiced right from the initial stage of sourcing raw materials to the stage of final finished garment.
In this industry, product quality is calculated in terms of quality and standard of fibres, fabric construction, yarn, surface designs, color fastness and the final finished garment products. The quality expectations for export are related to the type of customer segments and the retail outlets.

There are a number of factors on which quality fitness of garment industry is based such as - performance, durability, reliability, visual and perceived quality of the garment. The national regulatory quality certification and international quality programmes like ISO 9000 series lay down the broad quality parameters based on which companies maintain the export quality in the garment and apparel industry. Quality needs to be defined in terms of a particular frame work of cost. Here some of main fabric properties that are taken into consideration for garment manufacturing for export basis.

- Overall look of the garment.
- Right formation of the garment.
- Feel and fall of the garment.
- Physical properties.
- Colour fastness of the garment.
- Finishing properties.
- Final produced garments presentation.

### 7.3 Quality Control Department

Most of the routine decisions will be made by the quality manager who will have an in – depth understanding of the company’s products and will be highly conversant with customer’s attitudes and requirements regarding garment quality.

The inspectors employed by the department work in various sections of the factory, each being responsible for a specific pre-production or production activity. They all report to the quality manager and not to the managers or supervisors of the various sections or departments, because inspectors do not have direct control over production workers but act in a strictly advisory capacity.

Responsibility for the quality of operations coming off a section belongs to the production supervisor or departmental manager, but they work closely with the inspection team to maintain standards.
7.3.1 The Quality Checking

(a) Quality Audit

The work passed by inspectors is also subject to audit by means of a random sample drawn at specified intervals from the work passed by each inspector. The objectives of the audit are two folds;

1. To ensure that a minimum of faulty work is being let through,

2. To verify whether the specified standards are being interpreted correctly by the inspector.

(b) Quality Monitor

This can be considered as high-level audit performed at management level, and takes place at regular intervals of say once a week. A random sample of latest production is taken from the finished goods warehouse and collectively appraised, with discussion on overall quality. Alternatively, discussions made can lead to an agreement on the use of a new or different process technology, which could improve existing quality without an increase in cost. Quality monitors provide managers and technologists with regular and up-to-date feedback regarding the overall effectiveness of their own sphere of operations.

(c) Quality Circles

These are similar to monitoring sessions but with the participation of the section or line supervisor, the operators and quality control personnel. They are responsible to meet the quality achievements of the unit over a particular period.
Quality is everybody’s business in a clothing factory starting from design and follows the garment through, until it is hung finally or stored in the retailers shop. This is called “Quality Chain”.

### 7.4 Product Standards – Specifications & Quality Control

Apparel manufactures and retailers establish standards for quality, fit and performance for the products they produce and distribute.

**Standards** are a set of characteristics or procedures that provide a basis for resource and production decisions, standards are used to guide product development, selection of materials, production methods and finishing techniques. Standards reflect the quality level and quality characteristics that are important to a firm’s target customers and incorporate a firm’s need to make a profit while meeting consumer expectations.

Standards are used in developing specifications for each style in a firm’s line. **Specifications** (Specs) are brief written description of materials, procedures, dimensions and performance for a particular style. Specifications are used to communicate standards and provide control of products during production.

### 7.4.1 Sources of Product and Quality Standards

There are at least four different sources of product standards: Company standards, industry standards, national standards and international standards. International standards are important for doing business in global environment. The ISO – International Organization for Standardization is compromised of the national standards bodices from 91 countries. ISO has developed a set of standards for quality systems i.e. ISO-9000 that is required for quality certification. ISO-9000 is a set of five individual but related international standards on quality management and quality assurance.

### 7.4.2 Standards for quality, fit and performance

Quality Standards are part of firm’s “Standard Operating Procedure” and production planning. Standards reflect the overall intrinsic quality level the firm seeks to achieve. The fundamental purpose of using standards is to provide consistency between products and product lines. Quality standards may affect the costs, intrinsic quality, materials used and methods of production.

### 7.4.3 Size And Fit Standards

Using basic blocks for style and pattern development provides a basis for consistency among sample sizes for a variety of styles. Grade rules provide consistency in size variations from the standard fit of the sample size. Standards
are needed for production processes to maintain consistency of fit throughout production.

7.4.4 Performance Standards

Two types of performance standards are used in product development

1. Standards related to the performance of materials,

An apparel company makes decisions based on its interpretation of the performance level expected by the consumer. Product performance standards must meet the needs of both the consumer and the firm involved in the production and distribution of the merchandise. Materials and products are tested to verify that quality, fit and performance standards are met. The consumer is often concerned with performance related to aesthetics and use and care of a finished product.

7.5 Use of Specifications

Once a firm establishes quality, fit and performance standards, specifications for individual products can be developed to be sure that standards are maintained. For some firms, specifications are the result of intense study, testing, examination and integration of information from many sources within and outside the firm.

For each style, specifications are prepared that provide control over acquisition of materials, their performance characteristics, and the production processes required to make the finished production. Performance characteristics of materials that might be specified include wrinkle resistance, colorfastness, and dimensional stability. Production processes that are usually specified include types of seams and stitches, machine settings and processing sequence. Specifications are a means of

1. Communicating specific product descriptions,
2. Developing product consistency,
3. Negotiating bids and contracts.

7.6 Writing Specifications for Apparel Manufacturing

Both manufacturers and retailers develop specifications for the products they produce and buy. There is a wide range in the specificity of information presented on a spec sheet. Product specifications include;
1. Merchandising
   - Fashion and colour forecasting,
   - Styling of garment for specific target groups,
   - Pattern alterations,
   - Patterns graded by size,
   - Continuing supply of sample garments and materials.

2. Marketing
   - Advertising, marketing and promotional strategies,
   - Sales training,
   - Market research,
   - Display designs and programs for retail stores.

3. Materials
   - Material samples and colour cards,
   - Material costs,
   - Material usage,
   - Material specifications and characteristics,
   - Suppliers listing,
   - Laboratory evaluations of materials,
   - Dye formulas and instruction on dyeing processes,
   - Inventory control.

4. Equipment & Production Processes
   - Work place diagrams and layouts,
   - Machinery requirements,
   - Quality evaluation and control,
   - Assistance in training personal,
   - Supplies of machines and attachments,
   - Information about patenting,
• Research and computer applications,
• Updates on machinery and production,
• Warehousing and distribution techniques.

### 7.7 Phases of Apparel Specification Development

Specifications are developed in phases as a product begins to evolve and take form. Specifications are often general at first and evolve in greater levels of specificity, as the requirements for a product need to become definite and exact.

General specifications are based on the line plan summary and initial sample making and evolve into different phases.

1. Design specifications,
2. Style specifications,
3. Engineering specifications.
Operations of Quality Control Systems: For the majority of clothing factories, quality control is an in-built function, and some of the principles governing its operation are – Design & Standards,

Design: Garment design involves quality frame work of each garment in the collection, which is to be built-up at the design and sampling stage so as to ensure that it can stand up to the basic quality criteria of the company and its customers. Some aspects of this quality framework are – Patterns, fabrics and trims, pattern grading, patterns in general, technology.

Standards: A standard is a specification, which sets out the criteria for acceptable quality and covers all the characteristics that can accurately measured. Specifications can be drawn up to cover raw materials, operations, garment measurements, etc. Each specification includes plus or minus tolerance to the central measurement and this defines the range within which the quality is acceptable.

There are two types of specifications used in factories

1. General: These apply to all garments produced by the factory or to specific categories. E.g. all garments must have country origin labels in the designated positions or the nylon bags for individual hanging skirts must be bottom sealed 10 cm below the hem.

2. Specific: These relate to particular factors and cover materials purchases and all the manufacturing processes including cutting, fusing, sewing, pressing, and finishing. In addition, storage and transport conditions are specified so that the garments arrive at the warehouse or shop in mint condition.

Inspection: Where standards exit, inspection routines must be operated to check whether the item or operation meets the specified range of acceptable quality. Inspection procedures can be one of two types, or a combination of both.
1. **100% Inspection**: This involves the inspection of every single item or operation, which has been selected for inspection.

2. **Sampling**: This is a more sophisticated technique based on the ‘Law of Regularity’, which states that a sufficiently large sample taken at random will exhibit similar characteristics to the whole group from which it was drawn.

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**I. Test Your understanding**

1. The process which involves inspection of every single item, which has been selected for inspection is ____________________

2. Checking whether the item or operation meets the specified range of acceptable quality is called ____________________

3. A high-level audit performed at management level is ____________________

4. The degree of excellence or the nature of which is dependent on the reasons for the garment being purchased is termed as ____________________

5. A specification, which sets out the criteria for acceptable quality and covers all the characteristics that can accurately measured is called ____________________

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**Summary**

The knowledge about the quality control is very important for students who are planning their carrier in apparel industries because quality plays an important role in apparel industries. In the garment industry quality control is practiced right from the initial stage of sourcing raw materials to the stage of final finished garment. For textile and apparel industry product quality is calculated in terms of quality and standard of fibers, yarns, fabric construction, colour fastness, surface designs and the final finished garment products. However, quality expectations for export are related to the type of customer segments and the retail outlets.

**Short Answer Type Questions**

1. Write about the importance of quality control department in apparel industry.

2. What are the uses of specifications in apparel industry?

3. Write about the importance of quality control in an apparel industry.
4. What are the methods of quality checking?

5. What is the difference between standards and specifications?
Glossary

Alteration: Alteration refers to any change made to a pattern or garment that is being constructed or a change to a finished garment. When changing one part of a garment, you must pay attention to the part that the altered part is going to be attached to, so that they will still fit together. Pronunciation: alter-a-shun. Also Known As: altering, fitting, alteration

Alter: Modify a pattern or garment to customize the fit. This can be done by changing the length, modifying darts, taking in side seams, just to name a few.

Align: To match fabric edges, the pattern on the fabric (plaid or other printed/woven pattern) or pattern match points (notches or diamonds on the pattern).

Armscy: The armhole opening of a garment or pattern. This is an unusual sounding word that is thought to derive from the Scottish for “arm’s eye”.

Adaptation: Designs that have all the dominant features of the style that inspired them but do not claim to be exact copies.

Apparel contractors: A firm whose sole function is to supply sewing services to the apparel industry.

Apparel manufacturers: A firm that performs all the operations required to produce a garment.

Apparel: General term that includes men’s, women’s and children’s clothing.

Apparel Industries: Business that centre around textiles, garment manufacturing and retailing.

Apparel Manufacturing Industry: Group of firms that design and construct garment.

Appliqué: Design made separately and then sewn on fabric or a garment.

Assorter: Apparel manufacturing employee who sorts and prepares the cut garment parts to go through the production sewing, assembly line. Also called as assembler.

Bias: A diagonal line across the weave of fabric. If your pattern instructs you to cut a piece on the bias, the grain line on the pattern should run at
a 45 degree angle from the selvage. The reason for doing this is to give
the piece you are cutting more ability to stretch. Fabric cut on the bias
drapes differently than when it is cut on straight of the grain and can
completely change the look of a skirt or dress.

**Bias binding/bias tape:** Binding strip (see below) cut on the bias.
Bias binding has more stretch than straight-cut binding and can be used
on curved edges. Bias binding can be purchased pre-made in packages
or cut from matching fabric. Bias binding is also thought to be more
durable as edging on quilts because the wear on the edges is spread
across multiple fibers (at an angle), rather than along just a few threads.

**Bodice:** This is the part of a pattern or garment which covers the
upper body from the shoulder to the waist.

**Brand:** A name, trade mark or logo that is used to identify the product
of a specific maker or seller and to differentiate the products from those
of the competition.

**Business:** The act of creating, producing and marketing products/
services for a profit.

**Basic Apparel:** Garments that are worn most often and are the core
of a person’s wardrobe.

**Bats wing Sleeve:** kimono sleeve styles that is very low and loose at
the underarm with hardly any curve between the side waist line and the
sleeve bottom.

**Bell Silhouette:** Recurring style with fullness at the bottom.

**Blouson:** Dress style with blousy fullness above the waist, usually with
a fitted skirt and a belt.

**Button-down collar:** Collar style with points that button to the skirt.

**Buying:** Exchange of money/credit for goods or services.

**Cording:** Plain cording is rope that is covered with bias strips of fabric
(for flexibility) to make decorative piping. It comes in various sizes.
Decorative cording comes in various colors and fibers for embellishing
items.

**Count:** This refers to the number of warp and weft intersections per
inch in fabric; the higher the number, the tighter the weave of the fabric.
You see this most often in reference to sheets.
**Cross grain/cross-wise grain**: On woven fabric, the grain runs the length of the piece, between the selvages. When you cut across the width of the fabric, you are cutting across the grain. Most patterns call for the pieces to be cut with the grain rather than across it because this is the direction with the least amount of stretch. For example, a waistband would typically be cut on the lengthwise grain. You can create interesting effects when you change the direction of your fabric, especially when using stripes. Just be aware of how the fabric drapes and be sure to interface it if necessary.

**Cutting line**: This is the dark, solid line on a pattern that indicates where to cut your fabric.

**Classic**: A style/design that satisfies a basic need and remains in general fashion acceptance for an extended period of time.

**Consumer**: The ultimate user of goods and services.

**Custom made**: Clothing fitting specifically to the wearer.

**Customer**: A patron/potential purchaser of goods and services.

**Couture house**: An apparel firm for which the designers creates original styles.

**CAD**: Computer-Aided Designing

**CAM**: Computer-Aided Manufacture

**Cap sleeve**: Very short sleeve, like a sleeveless armhole at the underarm and a short kimono sleeve going out from the shoulder.

**COD**: Cash on Delivery

**Closures**: Zippers, buttons, snaps, hooks and eyes, Velcro or any other fasteners that enable the wearer to get into or out of garments.

**Collection**: Manufacturers or designers line (total group) of designs or creations for a specific season.

**Costing**: Procedures done to figure the expenses of producing something.

**Cowl**: Neckline styles, that is draped with flowing folds.

**Cuff**: Band at the bottom of the sleeve, pant leg, or other area.
**Cutter**: Apparel manufacturing employee, who cuts out fabric garment parts for production. Also the machine that does the cutting.

**Dart**: A tapered fold in the fabric that is stitched in place. They are used to make flat pieces of fabric into rounded shapes. Typical places for darts include the waistline, the bust and the back.

**Dart equivalents**: These are alternative methods for controlling shape. If you do not like the look of darts or want a less tailored look, you can substitute a gather for a dart. Princess seams are another method of shaping that replaces the use of darts.

**Design ease**: Garment patterns all have a certain amount of ease to them that allows room for body movement (this is called wearing ease). Design ease, on the other hand, is dictated by the style of the garment and the intention of the designer. Compare skinny-leg jeans to wide-leg pants. Both are wearable, but one is much looser fitting than the other.

**Drafting**: This refers to creating patterns on paper (or the computer) using measurements. This is pattern making in 2-D.

**Drape**: This term describes how fabric hangs from a body or an object. Softer fabrics drape more gently and have a more fluid motion when they move. Stiffer fabrics tend to fall into sharper folds that look more crisp and rigid.

**Draping**: This pattern method is done on a form or model using muslin. The fabric is pinned to the form and manipulated until the desired look is reached.

**Dolman sleeve**: Kimono type of sleeve with a lowered under-arm.

**Dropped shoulder**: Sleeve style with a horizontal sleeve with a lowered underarm.

**Design**: An original or individual arrangement of parts, form, colour, fabric, line and texture to create a fashion style concept.

**Designer**: Person who creates his or her own versions of concepts or styles in fabrics, apparel, accessories etc.

**Display**: Visual presentation of merchandise or ideals.

**Distribution**: Process of getting merchandise to the proper location.

**Easy to sew patterns**: Designs offered by commercial pattern companies that are simple to cut out and make.
Ease: Noun: describes the fit of a garment (see design ease and wearing ease); verb: to draw up fullness and stitch in place (without gathering) commonly used in curved areas such as a set-in sleeve.

Edge stitching: A row of machine stitching sewn very close to either the seam or garment edge, usually 1/8” or less.

Fabric: Cloth made from textile fibres or yarns by weaving, knitting, etc.

Fad: Temporary, passing fashion or item that has great appeal to many people for a short period of time, then dies out quickly.

Facing: A facing is a method of finishing the raw edges of a garment or other sewn project with the application of fabric that is sewn on and turned to the inside, encasing the raw edges.

Fashion: Type of clothing that is widely popular at any given time.

Fashion designer: Person who creates new ideas for garments and accessories.

Fashion leaders: Innovative, trend setting people who have the status and credibility to introduce and popularize new styles.

Finishing: All the process through which fibres, yarns, and fabrics are passed to improve their appearance, feel and performance in preparation for their end uses.

Fit: How tight or loose a garment is on the person who is wearing it.

Flaps: Decorative fabric pieces that fall down over the openings of pocket.

Flared: Garment, such as skirt or pants that widens near the bottom and has some fullness at the hem all around.

Franchise: Business arrangement in which a firm grants a retailer the right to use a famous or established name and trademarked merchandise in return for a certain amount of money.

French sleeve: Other term used for cap sleeve.

Garment: Any major article of clothing

Garment Industry: Another name for the apparel manufacturing industry.
Garment parts: The sleeves, cuffs, collars, waist band, and other components that make up a complete garment.

Gathers: Fullness in a garment created by pulling fabric together.

Grain: This refers to the direction of the threads in woven fabric. There are three types of grain: lengthwise (runs the length of the fabric), crosswise (runs across the width) and bias (runs diagonally across the fabric).

Grain line: A line printed on patterns to indicate how they should be laid on fabric before cutting.

Grading: Scientific process of making garment patterns into larger or smaller sizes.

Gusset: Wedge-shaped piece of fabric added to give more ease of movement at a kimono sleeve underarm or other area of the garment.

Hand: This is a descriptive term for the way fabric feels and moves when touched or rubbed in the hand. For example, you could refer to fabric having a “soft” or “stiff” hand.

Hem: This is when fabric at the lower edge of a garment is turned up to create a finished edge of the proper length. Garment parts that are hemmed include the bottoms of pants and skirts as well as sleeves. Tablecloths and curtains also have hems.

High Fashion: The very latest or newest fashion, usually of fine quality and beautiful fabric and therefore expensive.

Illustrator: Promotion artist who makes drawings of garments that have been designed and produced by others.

Industrial revolution: The time, roughly between the late 1700s and mid 1800s, when the hand crafting economy changed to a machine manufacturing economy.

Inseam: Seams on the inside of pants legs from crotch to bottom of hem.

Kimono: Full length garments with sleeves that is closed in the front or back with snaps or ties.

Kimono sleeve: Sleeve that is continuous extension out from a garments armhole area with no seam line connecting it to the bodice.
Knock-off: Copy of another, usually higher priced, garment.

Lable: Small piece of ribbon or cloth permanently attached to a garment that provides information, most of which is required by law.

Lapel: Pointed part of the front neckline

Laser cutting: The cutting out of the garment parts with an intense, powerful beam of light that quickly vaporizes the fabric.

Lengthwise grain: The direction that the warp yarns run in the fabric, parallel to selvedge

Lining: A lining is a secondary layer on the inside of a garment or other sewn item such as drapes. Linings are added to hide seams and other construction elements especially in garments where the inside might be visible, for example, a jacket. Lining fabric is typically very light weight and is smooth to allow for ease of movement.

Lingerie: Feminine undergarments, slips and night wear.

Lining: Inner layer of the fabric sewn inside the garment.

Logo: Symbol that represents a person, firm or organization.

Muslin: The term muslin has two meanings. It can refer to a type of light-weight loosely woven cotton fabric that is frequently used in quilting. The term muslin can also refer to the creation of a test garment for fitting purposes. Muslins are often made using, you guessed it, muslin.

Mail order retailing: Direct mail marketing done by selling to consumers through a catalog.

Marker: Long piece of paper that has a drawing of the layout of all the pattern pieces for fabric cutting in garment manufacturing.

Notches: Small cuts (slits or wedges) made in the edges of garment pieces to show how they should be aligned; this helps to ensure construction is done correctly. Commercial home-sewing patterns use dark triangles or diamonds for match points.

Pattern matching: This is the process of matching patterns such as stripes or plaids so that they match at seams, pockets and closures. This requires extra fabric depending on the pattern repeat.
Pattern grader: Apparel manufacturing or commercial pattern company employee who makes patterns in all the different sizes to be produced.

Pattern maker: Apparel manufacturing or commercial pattern company employee who translates an apparel design into pattern pieces that can be used for mass production.

Placket: Decorative strip of fabric over a sleeve vent, closure or fastener.

Packaging: The covering wrapper or container in which some merchandise is placed.

Ply: The word “ply” refers to a single layer or strand of yarn or thread.

Pleats: Structured folds of cloth that gives fullness in a garment.

Pockets: Built in “envelops” in a garment to hold things.

Pressing: Placing a heated iron on fabric and then lifting, rather than using a gliding motion as in ironing.

Prototype: The original correct version of something, the first full scale trial garment of a new design.

Quality control: Employees and activities which analyze the quality of manufactured products and solve problems when necessary where salable goods are produced.

Raglan: Sleeve styles with a shaped seam in the garment originating from the underarm.

Raw Edge: A cut edge of fabric that is unfinished and may be prone to fraying or raveling.

Ready-to-Wear (RTW): This term refers to clothing that is mass-produced and purchased off the rack.

Reinforce (seam): The process of making a seam more durable and less prone to breakage is called reinforcing. Methods include sewing a secondary seam next to the original seam or sewing seam tape or elastic into the seam (seam tape stabilizes the seam and prevents it from stretching, while elastic allows the seam to stretch without breaking). An example of a seam that frequently needs reinforcing is the crotch seam.
**Research and development**: Activities done to provide new knowledge, develop new products, and improve old products.

**Right side**: The right side is the side of the fabric that you want facing out, usually the printed side. Some garments, such as the Hawaiian shirts made by Reyn Spooner, are deliberately constructed using the “wrong” side.

**Ruffle**: Gathered fabric that is attached to another piece of fabric, mostly for decoration.

**Sample**: The model or trial garment to be shown to the trade.

**Sample Size**: This refers the garment size that companies use to make sample garments. For misses clothing, the standard sample size is typically a size 8.

**Seam Allowance**: The distance between the seam stitching line and the cut edge of fabric. The allowance varies depending on what is being sewn. Quilt block assembly is done using a 1/4” seam while most home sewing patterns specify 5/8” seam (except on hems). Some pattern companies do use non-standard allowances so be sure to always check the pattern before beginning to sew so that you assemble your item correctly.

**Seam Finish**: This is an all-inclusive term referring to how seams are finished to prevent fabric from raveling and to make the finished product look neat and clean.

**Seam Line**: The place where two or more pieces of fabric are sewn together with a line of stitching.

**Selvage**: This is the narrow, tightly woven edge along both lengthwise edges of woven fabrics.

**Sizing**: A fabric finishing agent that adds body and crispness to fabrics, making them wrinkle and soil resistant. Most ready to wear garments are treated with sizing to make them look better on the hanger. Sizing is available in spray form for using at home and is most effective on synthetic fabrics (starch is more effective on natural fibers).

**Sloper**: A sloper is a basic pattern upon which other garments are designed. A sloper encompasses basic measurements for a garment size or individual and includes only wearing ease, not design ease or seam allowances. A complete sloper set for a woman includes a bodice front
and back, a set-in sleeve, and a straight skirt. Having a customized sloper can greatly assist in altering patterns to address specific fitting issues. For this reason, making a sloper is on my sewing to-do list.

**Set in sleeve** : Sleeve that is stitched to the garment around the regular armhole.

**Shade** : A darkened colour made by adding black to a hue.

**Silhouette** : The shape of a clothing style shown by its outerline.

**Spreaders** : Machines that hold bolts of fabric and roll back and forth to spread yard goods onto long tables in high stacks for garment cutting.

**Style** : A particular design, shape or type of apparel item distinguished by the particular characteristics that make it unique.

**Textile designer** : Textile industry employee who creates new patterns and designs.

**Tubular silhouette** : A recurring style that is slim and straight from top to bottom.

**Warp** : The long loom threads that go the length of the fabric, parallel to the selvage edge. They are stronger than the weft threads that go side to side which is why patterns tend to cut following the length-wise grain.

**Wardrobe** : All the apparel a person owns, including all garments and accessories.

**Weft** : The threads that run across the width of the fabric between the selvages. Also called a crosswise grain.

**Yoke** : A flat panel section that divides a garment horizontally, most frequently used at the shoulder or waist. A common example of a yoke can be seen on the back of men’s dress shirts across the shoulder.