Stitches & Seams

(Text book appendix, p.161~164)

ADM 4307 Apparel Manufacturing

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Stitches & Seams Analysis

Objectives:

- Understand Stich/Seam Classification in Apparel Manufacturing.
- Identify seam classification, types, and uses
  - Relate to the properties of stitches and seams to production costs, performance, and quality.
- Analysis seam appearance and performance.
Stitches and Seams

- Standards that defined stitches and seams:
  - ASTM D 6193, Standard Related to Stitches and Seams

- Definitions
  - A Stitch: is the configuration of the interlacing of sewing thread in a specific repeated unit.
  - A Seam: is a line where two or more fabrics are joined.
  - A Stitching: consists of a series of stitches embodied in a material for decorative purpose or finishing an edge.
Stitches

• Stitch classification is based on:
  • Structure of the stitch
  • Method of interlacing stitch properties.

• Stitch properties:
  • Relate to aesthetics and performance
    • Stitch size (Stitch length, width, and depth).
    • Thread tension.
    • Stitch consistency.
Stitch properties:
Stitch size

- **Stitch Length:**
  Stitches per inch (spi)

  - **High spi**
    - Short stitches: High quality
    - Potential problems (seam pucker or weaken fabric).
    - Higher spi, the more time and thread, high cost.
    - Example: 22 spi vs. 8 spi

  - **Low spi**
    - Long stitches: Lower quality
    - Problems: Less durable, snagging, abrasion, grin-through
    - Fast, less thread, less cost.
**Stitch properties:**

**Stitch size**

- **Stitch Width:** Distance between the outermost lines of stitches.
- Refers to the horizontal span covered in the formation of one stitch.
- Referred to as **Gauge (Inch)**
- Example: overedge, zigzag, and cover stitches (1/4 inch)
- Width dimensions require multiple needles or lateral movement of thread carriers: Example: **needle bars, loopers, or spreaders.**
Stitch properties:
Stitch size

- **Stitch Depth**: Distance between the upper and lower surface of the stitch
- Example: Blind stitches (Curved needle with lateral movement)
Stitch consistency:  
Thread tension

* Stitch Consistency: the uniformity with which each stitch is formed in a row of stitches. Need a compatibility of fabric, stitch and seam type, needle, thread, and machine setting.

* **Thread Tension** affects stitch formation in 2 ways:
  * The *balance of force on the threads* that form the stitch.
  * The *degree of compression on the fabric* created by the threads as a stitch is formed.
  * Too much tension, a tight thread causes: Seam pucker, uneven stitches, unbalanced stitch formation weekend thread, and potentially damaged fabric.
  * Too little tension causes: Excessive looping or loose and uneven stitches.
Stitch classes

- Stitch classes (ASTM D 6193) based on the type of thread formation by a sewing machine
- **Six classes of stitch types**
  - 100 Single thread chain stitch
  - 200 hand stitch
  - 300 lockstitch (formed with needle thread and bobbin)
  - 400 Multi thread chain stitch
  - 500 Overedge and safety stitch
  - 600 Cover stitch or flat seam stitch
Class 300- Lockstitch

- **Lockstitch machines**: 2 threads to form a stitch.
  - Needle thread + Lower thread
  - A rotary hook catches the needle thread loop as it passes around the bobbin and interlocks the 2 threads.

- ****Lockstitch machine** is good for versatility, but time-consuming and costly for an operator.
Class 300- Lockstitch

- The 301 lockstitch
  = Plain stitch or Straight stitch
  - The least amount of thread.
  - Flattest stitch, reversible.
  - Used for top stitching
  - The tightest/ most secure stitch
  - Good for setting zippers and pockets.
  - The 301 is not for elastic or knit fabrics, or bias seams.
Class 300- Lockstitch

- Zigzag lockstitches (304)
  - Examples:
    - Sewing athletic wear
    - Appliqués, attach lace on lingerie.
    - Decorative stitching.
    - Used to make bar tacks
    - Buttonholes.
Class 300- Lockstitch

- Lockstitch blind stitches
  - 306, 313, 314
  - Example uses:
    - For linings, the inside components of waist bands for men’s dress slacks.
Class 100-Chain stitch

- The class 100 chain stitches, with the assistance of spreader, are formed when 1 or more needle threads pass through the fabric and form a loop on the underside of the fabric.
- **No lower thread!**
- Single thread chain stitch is an intra-looping formation.
- Loop formation allows good elongation and stretch and makes unraveling easy.
Class 100-Chain stitch

- The 101 chain stitch (see the sample).
- Pulling a loose thread may easily unravel.
- Examples:
  - For closing bags of sugar/ Bar tacks
  - Shirring
  - Buttons/Buttonholes
Class 100-Chain stitch

- The **103** chain stitch
  (= **Blind stitch** machine)
  - A type of blind stitches formed by curved needle, single needle thread, and spreader to form the loops.
- Examples:
  - Hemming
  - Tailored jacket lapels
  - Belt loops of dress slacks.
Class 100-Chain stitch

- The 104 chain stitch (=Machine saddle stitching)
- Examples:
  - Decorative stitching on western wear
  - Pleated skirts.
Class 400- Multithread chain stitch

- **Stitch class 400 (Multithread chain stitch)** required 1 or more needle threads that form loops as they pass through the fabric and inter-loop with the looper thread on the underside.
- Compare to the 100 class,
  - The 400 class is more durable and used extensively on apparel.
  - The 400 class use upper needle thread and a looper to carry the lower thread.
Class 400- Multithread chain stitch

• The 401 two-thread chain stitch (= Double-locked chain stitch)
• Appearance is the same as the 101, but the 401 has a loop formation on the underside and More durable.
• The chain stitch elongates when extended.
• Example uses:
  - Good for setting elastic in waist bands or decorative stitching on belts.
  - Parallel rows of stitches for lapped side seams of woven shirts and jeans.
Class 400- Multithread chain stitch

• The 402 cording stitch
  • 2 needle threads that produce two parallel rows of stitching on the face of the fabric.

• Examples:
  • Used for stitching permanent creases
Class 400- Multithread chain stitch

- The 404 Zigzag chain stitch:
- More elastic than 401 Two-thread chain stitch.
- Example uses:
  - Decorative stitching
  - Attaching curtain to the inside of the waist band.
Class 400- Multithread chain stitch

- The 406 and 407 **Cover stitches**
- Examples:
- The 406 is used to form hems on knit garments, necklines of T-shirts.
- The 407 is similar except 3 needle threads and has more stretch. (e.g. for undergarments).
The 500 Overedge stitch (=Overedge, overlock, **serge**, overcast, or **merrow**) Overedge machines trim the edge of fabric and form stitches over the cut edge.

- **A pair of knives and 3 stitch forming devices;** a needle to carry the thread through the fabric, a looper or spreader to carry the thread from the needle to the edge of the material on the bottom, and a looper or spreader to carry thread up and over the edge of the material on the top.

- High thread users and **stretch**.

- Chain off the stitching. (continuously run after the fabric)
Class 500-Overedge stitch

- Odd numbered (501, 503)
  - “Break open” stitches.
  - Example uses:
    - Edge finishes and hems rather than for seams.

- Even numbered stitch types (502, 504)
  - Much tighter needle thread, hold 2 layer fabrics at actual seam line.
Class 500-Overedge stitch

- The 503, 504, 505 for **Serging**.
- The 503
  - 1 needle, 1 looper thread, for blind hemming and serging, hems on T-shirts, and serging the seams of dress slacks.
- The 504
  - 1 needle, 2 looper threads.
  - **Seams for knit**, the most common.
- The 505
  - Box edge stitch, For Serging.
Class 500-Overedge stitch

- The **512** and **514** (Mock safety stitches)
  - For seaming knits and woven.
  - 4 threads (2 needle threads, 2 looper threads).
  - The 514: Stronger and more elastic and chains off better than 512.
Class 500-Overedge stitch

- The 515, 516, 519
- Safety stitches
  - Combination of an overage stitch and 401 chain stitch.
  - Example uses: Shirts, jackets, blouses, and jeans
Class 500-Overedge stitch

- The 521:
  - Excellent elasticity and strength for seaming hosiery.
Class 600- Cover stitch

- Stitch class **600 Cover stitch** (= Flat-lock or flat seam stitches)
  - 2 or more needle loops, inter-looping on the underside, and interlocking on the upper side.
  - Machines are fast and efficient.
Class 600- Cover stitch

- The 602, 605, and 607
  - Strong, elastic stitches to cover raw edges and prevent raveling.
  - Example uses: knits and lingerie
  - The 607 for infant’s panties
Seam dimensions

- Seams (3 dimensions): Seam length, width, and depth
  - Seam length: the total distance covered by a continuous series of stitches. (e.g. shoulder seam)
    - Seam length is a factor in determining stitch types.
  - Seam width: width of a seam allowance
    - Measured from the cut edge of fabric to the main line of stitches.
    - Wider seam allowances may increase cost.
    - The seam heading of a top stitched seam.
      - The distance from the folded edge of the top ply to the first line of stitches.
      - A header reduces the strain on the cut edge of fabrics and makes the seam stronger.
  - Seam depth: the thickness of a seam, which are major factors in appearance and comfort of a garment.
Seam classes (ASTM D 6193)

- ASTM D 6193 standard practice for stitches and seams
- 4 seam classes and 2 stitching classes
- Line drawings of seam types: Line drawings represent cross sections of a seam.
- Each long line: a piece of fabric.
- The short lines: penetration of the needle and lines of stitches.
- Curve lines: a connecting thread between two lines of stitching.

SSa (Side Seams of skirts)

EFd (Edge finish, serging)
Superimposed seam (SS)

- Superimposed seam (SS) class
  - Joining 2 or more pieces fabric with seam allowance edges even.
  - Stitches: Sewn with a lock stitch, chain stitch, overedge stitch, or safety stitch.
  - Examples: Side seams

SSa (Side Seams of skirts)

- SSa:
  - Side seams

- SSb:
  - Finishing belt ends, attaching elastic to waistline

- SSC:
  - Ends of waistbands on jeans

- SSD:
  - Seaming, but not widely used.

- SSE:
  - Collars or cuffs, seamed and topstitched.
Lapped seam (LS) class

• Lapped seam (LS)
  • 2 or more pieces of fabric joined by overlapping at the needle.
  • Some are used to reduce the amount of bulk; others for durability, or appearance.
  • Stitches: lockstitch or chain stitch (NOT an overedge stitch)
  • Examples: attaching front bands to shirts, setting pockets, and sewing side seams of quality dress shirts, side seams or inseams of jeans, etc.

• LSa:
  • Vinyl and leathers

• LSb:
  • Attaching curtain to waistband of men’s dress slacks.

• LSc:
  • Side seams of dress shirts and jeans

• LSd:
  • Attaching patch pockets and overlay yokes.

• LSe:
  • Attaching yokes
Bound seam (BS) class

- **Bound seam (BS)**
  - One piece of fabric or binding.
  - Stitches: Lockstitch, chain stitch, or cover stitch *(NOT an overedge stitch).*
  - Examples: To finish edges or garments, necklines, short, sleeve on T-shirts, sleeveless tank tops with binding.

- **BSa:**
  - Edges bound with ribbon or braid

- **BSb:**
  - T-shirt necklines or sleeve edges with knot trim.

- **BSc:**
  - Neckline or front edges bound with bias-woven material.

- **BSd:**
  - Seaming and binding

- **BSe:**
  - Seaming and binding
Flat seam (FS) class

- Flat seam (FS):
  - Sewing together two butted pieces of fabric, not overlapping
  - Stitches: wide 600 class (Cover stitches)
  - Examples: sweatshirts, lingerie, and long underwear.

- FSa:
  - Raglan seams of sweatshirts.

- FSb:
  - Sweatshirts and underwear.

- FSc:
  - Seams of support garments

- FSd:
  - Sweatshirts and underwear

- FSe:
  - Sweatshirts and underwear
Stitching classes (EF)

• **Edge Finishing (EF)**
  • Single piece of fabric. (may be folded in a variety of ways).
  • Stitching encompasses a cut edge or provides a finish for a single ply of fabric with a folded-edge.

  EFd (Edge finish, serging)

• **EFa:**
  • Single-fold hem

• **EFb:**
  • Double-fold hem

• **EFc:**
  • T-shirt hem

• **EFd:**
  • Edge finish, serging

• **EFe:**
  • Ornamental edge finish
Stitching classes (OS)

- **Ornamental stitching (OS)**
  - Single piece of fabric. (may be folded in a variety of ways).
  - Examples: For decorative purpose. Jeans pockets, embroidered logos, etc.

- **OSa:**
  - Decorative sitting on jean pockets

- **OSb:**
  - Decorative stitching with cording insert

- **OSc:**
  - Raised stitching without cording insert for backs of gloves.

- **OSd:**
  - Raised stitching, cording between 2 plies of material

- **OSe:**
  - Pin tucks on font of blouse.
Specifications for stitches and seams

401 LSc-2

- Identifies the stitch class and type
  - (Example: two thread chain stitch)

- The seam class (Example: Lapped Seam)

- The type of seam

- 2 independent rows of stitches
Specifications for stitches and seams

• An example of a specification

Example:
Stitch type: 406 Cover seaming stitch
Seam class: BS (Bound seam)
Lab: Stitch and Seam Analysis
### Garment Analysis and Specification Development

#### Chapter 5

**Part 5: Garment Components Assembly**

**Style Number**: Mac1427f

**Yoke**: 1 (pocket piece and thread)

**Pocket**: 2 (pocket piece and thread)

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**Operation Breakdown**

Determines the sequence of Assembly (list of steps)

<table>
<thead>
<tr>
<th>Operation</th>
<th>Description</th>
<th>Hem pocket</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Attach pocket to shirt front</td>
<td>16 301 EFb</td>
</tr>
<tr>
<td>2</td>
<td>Stitch pencil pocket</td>
<td>16 301 LSd</td>
</tr>
</tbody>
</table>

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**Drawing of component pieces**

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**Drawing of finished component with measurements**

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Figure 5–2 (continued)

Part 5 of the Garment Analysis and Style Specification Worksheet.
<table>
<thead>
<tr>
<th>Operation</th>
<th>Task Description</th>
<th>Stitch/Seam Type</th>
<th>Special Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Attach yoke to shirt back and fronts</td>
<td>301 LSbp, front 301 LScf</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>Attach collar band to shirt neck</td>
<td>301 LSar, 301 LScn</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>Attach sleeves to shirt body</td>
<td>Single needle tailoring 401 LSaw</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>Sew side seams</td>
<td>Lapped seams 401 LSc</td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td>Stitch hem</td>
<td>301 EFb</td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td>Stitch buttonholes</td>
<td>Stitch/Seam type: 301 Lock stitch</td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td>Attach button</td>
<td>Stitch/Seam type: 301 Lock stitch, cross-stitch pattern</td>
<td>None</td>
</tr>
<tr>
<td>4</td>
<td>Trim threads</td>
<td>Stitch/Seam type: 301 Lock stitch, cross-stitch pattern</td>
<td>None</td>
</tr>
<tr>
<td>5</td>
<td>Form pressed</td>
<td></td>
<td>None</td>
</tr>
</tbody>
</table>

Analysis of Finished Garment

- Matching fabric design: Match buttons and thread to fabric
- Color shading: Commercial match
- Consistency of stitches and seams: Uniform stitches and no seam puckers on topstitching collar, cuffs, pocket; 16 spi.
- Overall appearance: Salable appeal to young men
- Compatibility of materials: Uniform stitches and no seam puckers on topstitching collar, cuffs, pocket; 16 spi.
- No differential shrinkage
Next class...