

Chapter 14

Knitting and Knit Fabrics

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

Knitting

- The formation of a fabric by inter-looping of one or more yarn sets.

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

Knit Characteristics

- Quick process
 - 4 times faster than weaving
- Made on wider machines
- Versatile process
- Yarns must be much more regular; filament, combed, or worsted

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

Knit Characteristics

- Requires More yarn than woven fabrics.
- **Fabric:** Porous, bulky, lofty, warm, wrinkle resistant, low in cover, permeable, stretchy; may run (collapse of a wale).
- **Uses:** Apparel, furnishings, & industrial goods.

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

Knit Fabrics

- **Quality and performance assessment:** Similar to woven fabrics, but snagging and skew can be major problems.
- Better quality knits have good weight for fabric type, are well suited for end use, free of defects, and have good performance potential.

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

Knitting

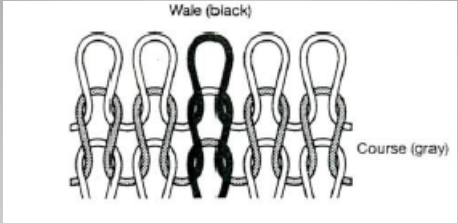
- **Methods**
 - **Filling or weft knitting:** yarn moves horizontally (back and forth) or around the fabric
 - **Warp knitting:** yarn moves vertically in the fabric
- **Needles:** spring-beard, latch, or compound
- **Stitches:** loops made by needles (also known as loops)

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- **Wales:** Vertical column of stitches; each needle forms a wale; *wpi* is wales per inch.
- **Course:** Horizontal row of stitches; one row of wales; *cpi* is courses per inch; *wpi* X *cpi* describes fabric density.

Knits

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.



Wale and Course as Seen From the Technical Face of Filling-Knit Jersey

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- **Cut or gauge:** Number of needles per inch (related to stitches per inch); higher the number, finer the knit.
- **Technical face:** Better finish; more expensive and finer yarns; least snagable floats; pronounced design; may not be fashion side (filling pile and imitation purl knits).

Knit Characteristics

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- **Environmental impact:**
 - Less than for weaving
 - Less use of chemicals to prepare yarns
 - No equivalent of water or air jet looms
 - Quieter than shuttle looms
 - Less lint
 - Less energy use

Knits

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- **Machine knitting steps:** Loop pulling, running, clearing, yarn feeding, knock-over.
- **Types:** Hand or machine.
- **Machine types:** Flat bed or circular.

Filling or Weft Knits


Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- Basic stitch of majority of fabrics
- Technical face (top) and technical back (bottom) of jersey



Knit Stitch

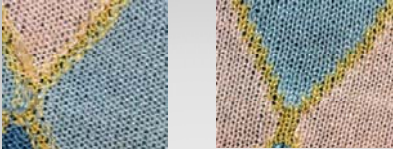
Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.



Jersey (Made with Tape Yarns)

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.


back **face**



Intarsia

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

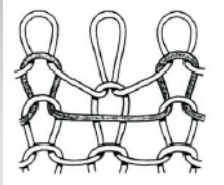
- Old stitch stays on needle in forming new stitch; thicker, wider, less likely to elongate than knit stitch.
- Creates pattern in fabric.



Tuck Stitch

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.


- Yarn floats across wale; narrower, thinner, and less likely to elongate than knit stitch.
- Create design using different color or texture yarns.



Float or Miss Stitch

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

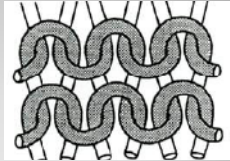
face **back**



Jacquard Jersey

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.


- Looks the same front and back, like the technical back of knit stitch.
- Seldom used, expensive to produce; technical back of knit stitch creates identical look for lower cost.



Purl or Reverse Stitch

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- Machine uses one set of needles.
- Usually circular type:



- **Flat bed machines:** Wide fabrics or shape product parts.

Single Filling Knits

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- **Pile knit jersey:** Cut or uncut pile with two yarn sets (bulk continuous filament (BCF) and other); knit, heat set; BCF yarn shrinks, other yarn forms pile.

knit terrycloth



velour



Single Filling Knits

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- **Sliver knit jersey or fake fur:** Yarns form ground and sliver forms pile.



Single Filling Knits

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- **Weft insertion jersey, French terry, fleece:** Large, novelty, or irregular yarns laid in courses for texture, weight, or appearance; brushed or unbrushed.

Single Filling Knits

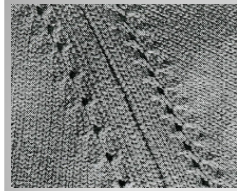
Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- **Full fashioning:** Shaping garment parts by adding or decreasing wales via loop transfer; done at necklines, armholes, collar points, usually in jersey; expensive; slow.
- **Looping:** Joining shoulder and sleeves of shaped parts to look like continuous knitting; avoids appearance of seams; more expensive and slower.
- **Hosiery**


Shaping While Knitting

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

True Full Fashioned



Mock Full Fashioned



Fashioning Garment Pieces

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- Made with two sets of needles; may use two sets of yarns
- **Gaiting:** arrangements of needles
 - **Rib gait:** needles on one bed opposite space on other needle bed; both beds knit simultaneously
 - **Rib knits:** simplest type is 1 X 1 rib; same appearance face and back; twice as extensible and thick as jersey; does not curl; runs or unravels from end knit last

Double Filling Knits

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- **Gaiting (cont.)**
 - **Interlock:** simplest fabric; two 1 X 1 ribs interlocked; both sides look like jersey; does not curl or run; unravels from one end only
 - **Interlock gaiting:** needles line up across beds; knitting must be synchronized

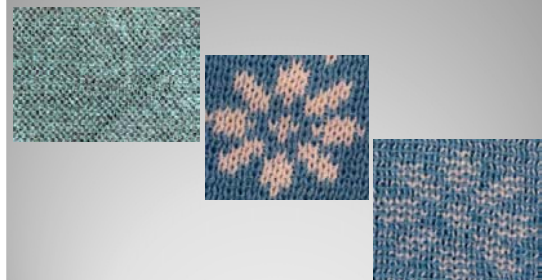
Double Filling Knits

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- Either gait
 - **Purl:** loops pulled to face on one course and back on next course; both sides look like technical back of jersey; highly extensible; does not curl; runs; unravels from either end; slow process
 - **LaCoste:** alternating tuck and knit stitches create mesh-like fabric
 - **Double knits:** two or more yarn sets create pattern
 - **Jacquard double knit:** each needle controlled by microprocessor to create structural designs

Double Filling Knits

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.



Simple Double Knit (left), Jacquard Double Knit Face (center), back (right)

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- Making fabric using one or more yarn sets where each set is controlled by guide bars and each stitch is formed by different yarns.
- **Gauge:** Needles per inch.

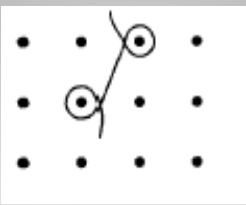
Warp Knitting

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- Fast method.
- Requires very regular yarns.
- More stable (like wovens), but flexible like filling knits.
- Less resilient and lighter weight compared to filling knits.
- Stable in both directions.
- Number of guide bars indicates number of yarn sets and fabric name (e.g., two bar tricot).
- **Point paper diagram:** Each point shows a needle in a course; each row shows a different course.

Characteristics of Warp Knits

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.



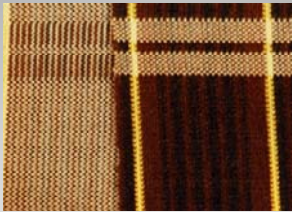
Warp Knit Stitch
(Point Paper Notation)

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- **Machines:** Tricot and Raschel.
 - **Tricot:** Uses one or more sets of yarns that are wound on warp beams and mounted on the knitting machine.
 - Often filament yarns in finer gauge; tricot (plain, brushed, etc); lock stitch or lock knit does not run, but may “zip” along a wale; outerwear, underwear; tulle.

Warp Knit Machines

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.



back **face**

Tricot

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- **Raschel:** Use one or two sets of vertically mounted latch needles.
 - Often spun yarns in coarser gauge in elaborate or complex pattern; lace, furnishings, industrial uses, & outerwear.
- **Insertion warp knits:** Usually a raschel type.



Warp Knit Fabrics

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

Yarns Move	Filling	Warp
Connections	Horizontally	Vertically
Production Rates	Horizontal	Diagonal
Design Potential	Lower	Higher
Stretch	Great	Less
Runs	2-way	Crosswise
Ravels	Yes	Less likely
Process	Yes	No
	Hand & machine	Machine
Production	Flat & circular	Flat
	Yardage,	Yardage
	Garments,	
	Garment parts	
Edge finishes	Yes	No

Comparison of Filling & Warp Knits

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.

- **Minor warp knits**
 - **Simplex:** uses spring-beard needles, two needle bars, and two guide bars.
 - **Milanese:** yarns move diagonally in fabric
- **Narrow knitted fabrics:** either filling or warp knit; elastics, trims, hook-loop fasteners

Other Warp Knits

Kadolph: Textiles, 10e © 2007 Pearson Education, Upper Saddle River, NJ 07458. All Rights Reserved.