

SHIVPRIYA TEXCHEM · KNOWLEDGE SERIES

Circular Knitting.

Single jersey, rib, interlock — and the numbers behind them.

A circular knitting machine turns one cone of yarn into a tube of fabric at remarkable speed. What decides whether that fabric is 140 GSM or 220, soft or boardy, stable or spiralling, is a small set of numbers that are often left to the machine rather than chosen.

Loop length

the single variable that sets GSM before anything is weighed

18–28 G

the gauge range covering most apparel circular knitting

1 : 1

the ratio of needles to feeders that governs production rate

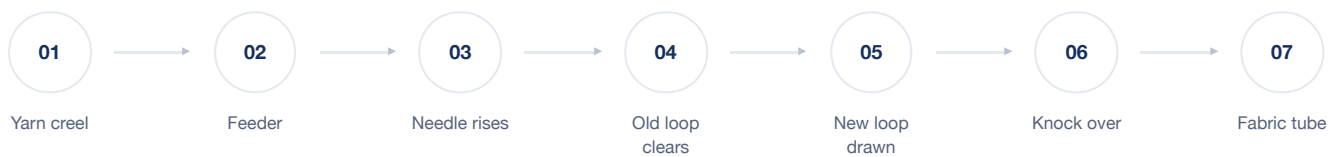
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CHAPTER 01

How a loop becomes fabric

Knitting builds fabric from intermeshed loops rather than from crossing threads. Every property that distinguishes knit from woven — stretch, drape, recovery, run behaviour — comes from that structural difference.



Each needle repeats this cycle continuously — thousands of times per minute

01 Needles in a circle

Needles sit in grooves around a rotating cylinder. Cams push them up and down as the cylinder turns.

02 Feeders supply yarn

Each feeder lays yarn into the needle hooks. More feeders means more courses per revolution.

03 The loop is drawn

The needle descends and pulls new yarn through the old loop. Loop length is set by cam depth.

04 Fabric forms as a tube

The knitted tube is drawn downward by take-down rollers under controlled tension.

05 Course after course

One machine revolution produces as many courses as there are feeders on the machine.

Loop length is the master variable. Every other fabric property follows from it. Loop length sets GSM, handle, stretch, dimensional stability and cover — and it is set by **cam depth on the machine**, not by anything the yarn does.

CHAPTER 02

The four base fabrics

Almost all circular knit apparel is one of four structures or a derivative of them. Each has a distinct needle arrangement and a distinct commercial character.

STRUCTURE	NEEDLE BEDS	CHARACTER
Single jersey	One (cylinder)	Lightest and cheapest. Curls at the edges and spirals. The T-shirt fabric
Rib	Two (1×1 or 2×2)	Excellent widthwise stretch and recovery. Cuffs, collars, fitted garments
Interlock	Two, interlocked	Stable, smooth on both faces, no curl. Heavier and more expensive
Purl	Two, double-ended	Lengthwise stretch. Less common in circular; more usual on flat machines

SINGLE JERSEY FAMILY	RIB FAMILY	INTERLOCK FAMILY
Plain jersey	1×1 rib	Plain interlock
Fleece	2×2 rib	Eightlock
Terry	Cardigan	Punto di Roma
Pique / Lacoste	Waffle	Piquet interlock

CHAPTER 03

Gauge, diameter and what they decide

Machine gauge and cylinder diameter are fixed at purchase and constrain everything afterwards.

Choosing them wrongly limits a factory for years.

GAUGE	YARN COUNT RANGE	TYPICAL FABRIC
14 – 18 G	10s – 20s Ne	Heavy fleece, coarse jersey, blankets
20 – 24 G	20s – 30s Ne	Standard T-shirt jersey — the volume band
26 – 28 G	30s – 40s Ne	Fine jersey, polo pique, lightweight fabric
32 – 40 G	40s – 80s Ne	Very fine jersey, innerwear, technical knits

Gauge	Diameter	Total needles	Feeders
Needles per inch. Higher gauge means finer needles and finer yarn — the two must match.	Cylinder diameter sets tube width and therefore the finished open width of the fabric.	$\text{Gauge} \times \text{diameter} \times \pi$. This figure determines the number of wales across the fabric.	Courses knitted per revolution. Production rate is feeders $\times$ rpm, and it is the productivity number.

Match yarn to gauge. Yarn too coarse for the gauge jams the needles and breaks them. Yarn too fine gives a slack, open, weak fabric. **The gauge–count relationship is a hard constraint**, not a preference.

CHAPTER 04

Controlling fabric weight

GSM is the number the buyer specifies and the number most often missed. It is controlled at the machine, and it is set by two things the knitter chooses deliberately.

01 Loop length sets GSM

Shorter loops mean more yarn per unit area and higher GSM. This is the primary control.

02 Yarn count sets GSM

Coarser yarn at the same loop length gives a heavier fabric. The secondary control.

03 Finishing changes GSM

Compacting raises GSM by shrinking area; over-stretching in finishing lowers it.

04 Measure at the right stage

Grey GSM and finished GSM differ substantially. Always specify which one is being quoted.

05 Consistency matters more

GSM varying across the roll is a bigger problem than being slightly off the target mean.

FABRIC	TYPICAL GSM	NOTES
Fine single jersey	110 – 140	Summer T-shirts, inner layers, lightweight tops
Standard jersey	150 – 180	The volume T-shirt band
Heavy jersey	190 – 240	Premium T-shirts, structured tops
1×1 rib	180 – 240	Cuffs, collars, fitted garments
Interlock	200 – 280	Stable double-face fabric for polos and dresses
Fleece	260 – 400	Sweatshirts and hoodies, brushed on the reverse

CHAPTER 05

The faults that reach the buyer

Circular knitting faults have distinctive appearances and traceable causes. Most are set up long before the fabric is inspected.

FAULT	APPEARANCE	CAUSE
Barré	Horizontal stripes across the tube	Mixed yarn lots, count variation, or uneven yarn tension between feeders
Spirality	Side seam rotating around the body	Residual yarn torque in single jersey — a yarn issue, not a knitting one
Needle line	A vertical line down the fabric	A damaged or bent needle in that position
Holes / drop stitch	Small holes at random	Yarn breaks, weak places, or incorrect yarn tension
Sinker mark	Fine vertical lines	Worn or damaged sinkers
Fly / lint	Contamination knitted into the fabric	Poor department cleaning, or a hairy yarn shedding at the feeders

Barré is a yarn problem. The most expensive knitting complaint is almost never caused by the knitting machine. **Barré comes from mixed yarn lots** — different spinning lots, different count, different dye affinity. Lot discipline at the yarn store prevents most of it.

CHAPTER 06

What knitting demands from yarn

Knitting is harder on yarn than weaving in some ways and easier in others. The requirements are specific and worth stating on the purchase order.

01 Low twist

Knitting yarn is spun at a lower twist multiplier than weaving yarn. High twist gives a hard fabric and spirality.

03 Even and clean

Thin places break at the needle; thick places jam. Both stop the machine.

05 Low hairiness

Hairy yarn sheds fly into the needle bed, causing faults and forcing cleaning stops.

02 Steam set

For single jersey, setting relaxes residual torque and is the primary defence against spirality.

04 Waxed

Knitting yarn is waxed to reduce friction at the needle. Wax type and pick-up both matter.

06 Lot matched

One spinning lot per fabric run. This single discipline prevents most barré complaints.

A weaving yarn put on a knitting machine will knit. It will also **spiral, feel hard and shed fly** — three complaints that all trace back to one purchase decision.

CHAPTER 07

What happens after the machine

Knitted fabric leaves the machine in a relaxed, unstable, tube form. Finishing turns it into a saleable fabric with predictable dimensions.



Compacting is where dimensional stability is finally established

Slitting

The tube is cut open into flat fabric. Slitting must follow a wale line or the fabric skews.

Dyeing

Usually in soft-flow or jet machines. Knit fabric must move freely to avoid crease marks.

Compacting

Fabric is over-fed and compressed to pre-shrink it. This sets the final GSM and shrinkage figure.

Shrinkage control

Residual shrinkage is tested after finishing. Under-compacted fabric shrinks on the customer.

Compacting is not optional. Knitted fabric that has not been properly compacted will shrink in the first domestic wash — commonly 6–8% in length. **Compacting trades a little width for dimensional honesty**, and skipping it moves the problem to the consumer.

CHAPTER 08

Where knitting cost comes from

Circular knitting is one of the cheapest ways to convert yarn into fabric. The cost structure is dominated by yarn and by machine productivity.

COST LINE	SHARE	NOTES
Yarn	Dominant	Typically the large majority of grey fabric cost. Count and quality drive it
Knitting conversion	Modest	Machine hours, power and labour. Feeders × rpm sets the rate
Needles and sinkers	Small but real	Consumables on a defined replacement cycle; neglect shows as fabric faults
Dyeing and finishing	Substantial	Often comparable to knitting conversion, and more variable
Wastage	Watch closely	Fabric rejected for barré and needle lines is the largest avoidable loss

The cheapest saving. The most reliable cost reduction in a knitting unit is not a faster machine. It is **yarn lot discipline** — because rejected fabric costs the yarn, the knitting, the dyeing and the finishing all at once.

CHAPTER 09

Specifying knitted fabric

Knit fabric specifications are frequently incomplete, and the missing items are always the ones that cause disputes later.

01 State structure and gauge

Single jersey, rib or interlock, with the machine gauge. These are not interchangeable.

03 Specify the yarn fully

Count, fibre, combed or carded, twist and whether it is steam set.

05 Set a spirality limit

Especially for single jersey. Without a number, the complaint arrives after the garment is made.

02 Give finished GSM

And say explicitly that it is finished, not grey. This is the commonest ambiguity.

04 Set a shrinkage limit

Length and width, with the wash test method named. Enforceable and objective.

06 Require lot matching

One yarn lot per fabric order, confirmed in writing. The single best defence against barré.

How Shivpriya reads it. For knitting programmes we lead with **twist multiplier, setting and lot discipline** — the three yarn decisions that cause the majority of knitted fabric complaints. Get those right and the knitting machine rarely becomes the problem.

IN CLOSING

One cone in. A tube of fabric out.

Circular knitting is fast, economical and unforgiving of yarn that was specified for something else. Most knitted fabric complaints — barré, spirality, hard handle — begin at the yarn purchase order. If you are setting up or troubleshooting a knitting programme, talk to us and we will start there.

TALK TO US

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