

SHIVPRIYA TEXCHEM · KNOWLEDGE SERIES

Denim.

Indigo, twill and the most reverse-engineered fabric on earth.

Denim is a simple fabric — a cotton twill dyed with one colour on the warp only. Everything that makes it interesting comes from that one decision, and from the fact that the fabric is designed to be destroyed after it is sold.

Warp only

indigo dyes the warp; the weft stays white — the whole aesthetic

3/1 RHT

the classic construction — three-to-one right-hand twill

Ring surface

the mark of authenticity a rotor warp cannot reproduce

Bridging world-class spinning mills and your needs, since 2003.

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CHAPTER 01

What makes a fabric denim

Denim is defined by three things together: a twill weave, indigo-dyed warp, and undyed weft. Remove any one and it becomes a different fabric with a different name.

ELEMENT	WHY IT MATTERS
Twill weave	Warp floats over multiple wefts, so the face is predominantly warp — predominantly indigo
Indigo warp	Dyed before weaving, in rope or sheet form. The colour is the product
Undyed weft	Stays white. It is what you see on the reverse and what appears as the fabric abrades
Ring-spun warp	Surface irregularity gives the abrasion character; rotor warp gives a flatter, duller wash
Heavy construction	Traditionally 10–14 oz per square yard, though lighter denims now dominate volume

Why the reverse is white. In a 3/1 twill the warp floats over three wefts and under one. The face is roughly **three-quarters warp** — so it reads as indigo. The back is the inverse, mostly weft, so it reads as white. One weave decision produces the whole two-tone character.

CHAPTER 02

The dye that will not penetrate

Indigo is a poor dye by every conventional measure. It has low affinity, poor rub fastness and cannot penetrate the fibre properly. Those failings are exactly why denim works.

01 Indigo is a vat dye

Insoluble in water. It must be chemically reduced to a soluble leuco form before it will dye anything.

02 It oxidises to fix

After the yarn leaves the bath, air oxidation converts it back to insoluble blue inside the fibre.

03 It only coats the surface

Indigo builds in layers on the outside of the yarn and barely penetrates the core. This is called ring dyeing.

04 Multiple dips build shade

Six to eight dips with oxidation between each. More dips means a deeper, more layered blue.

05 Abrasion removes it

Because the colour sits on the surface, rubbing exposes the white core. That is the entire wash aesthetic.

Indigo's failure to penetrate is not a defect to be corrected. It is **the mechanism by which denim ages**, and it is why no other dye can replace it.

CHAPTER 03

Rope against slasher

There are two industrial routes for dyeing denim warp, and they produce measurably different fabric. The choice is fundamental to the mill and visible in the finished garment.

	ROPE DYEING	SLASHER / SHEET DYEING
Form	Yarn gathered into ropes of several hundred ends	Warp in open sheet form, as a beam
Dye penetration	More even; ropes tumble and expose all sides	Slightly less even across the sheet
Shade depth	Deeper, richer blue achievable	Generally lighter shades
Extra stages	Requires long-chain beaming after dyeing	Dyeing and sizing combined in one line
Cost	Higher — more stages, more handling	Lower, more continuous
Typical use	Premium and authentic denim	Volume and lighter-shade denim

Why rope dyeing costs more. Rope dyeing needs ball warping before and long-chain beaming after — **two extra handling stages** that slasher dyeing avoids entirely. Mills run rope for depth and evenness, and slasher for cost and speed.

CHAPTER 04

Reading a denim specification

A denim specification is compact and every element changes the fabric. These are the ones that actually matter commercially.

ELEMENT	WHAT IT CONTROLS
Weight (oz/yd²)	The headline figure. 8 oz is light summer denim; 14 oz and above is heavy and rigid
Twill direction	Right-hand is classic and firmer; left-hand gives a softer fabric and a different wash
Warp count	Typically 7s to 16s Ne. Coarser warp gives more surface character
Weft count	Usually coarser than warp. Rotor weft is the standard for bulk and cost
EPI × PPI	Ends and picks per inch. Together with count these determine weight and hand
Stretch content	Elastane percentage in the weft, and whether the yarn is single or dual core

Ring-ring

Ring-spun warp and ring-spun weft. The premium construction, with surface character in both directions.

Ring-OE

Ring warp, rotor weft. The industry standard — character where it shows, economy where it does not.

OE-OE

Rotor in both directions. Cheapest, flattest, least character in the wash.

Slub warp

Deliberate thick places that abrade differently, producing vertical streaking after washing.

CHAPTER 05

Weaving indigo warp

Denim weaving is hard on machinery and hard on the warp. The yarn has already been through dyeing and sizing before it reaches the loom.



The rope dyeing route — dyeing happens before beaming, not after

01 Sizing is essential

Indigo-dyed warp is abrasive and must be sized to survive the reed and healds.

02 Shed geometry matters

Heavy coarse warp needs a clean shed; poor shedding causes float faults and stops.

03 Rapier and air-jet both used

Rapier handles heavy coarse weft reliably; air-jet is used for lighter denim at speed.

04 Indigo rubs off

The loom, reed and healds accumulate indigo. Cleaning discipline affects fabric appearance.

05 Stretch changes everything

Elastane weft contracts sharply off the loom. Loom width must be planned around it.

CHAPTER 06

Skewing, sanforising and the fabric that fits

Grey denim off the loom will twist and shrink. Finishing corrects both, and the correction is what makes a jean hang straight after washing.

PROCESS	WHAT IT DOES
Singeing	Burns off surface hairs for a cleaner face and sharper twill definition
Desizing	Removes the size applied before weaving so the fabric can be finished and washed
Skewing	Deliberately biases the fabric to counteract twill torque — this is what stops legs twisting
Sanforising	Compressive pre-shrinking so residual shrinkage falls within a stated limit
Mercerising	Optional. Increases lustre and dye uptake in premium denim
Coating / finishing	Resin, wax or overdye treatments for specific hand and appearance effects

Leg twist is a finishing failure. When a jean's side seam spirals around the leg, the cause is **twill torque that skewing did not correct**. It is set in the finishing range, not in the sewing room, and it cannot be fixed after the garment is made.

CHAPTER 07

Designing the wash into the fabric

The most important thing about denim is that its final appearance is created after sale, by wear and by laundry. That appearance must be engineered into the fabric at the mill.

01 Ring yarn abrades unevenly

Surface irregularity means the high points lose indigo first — creating contrast and depth.

02 Slub yarn streaks

Thick places wear differently, producing the vertical streaking sold as vintage character.

03 Rope-dyed depth builds contrast

A deeper indigo layer means more contrast is available as the surface is worn away.

04 Weft colour shows through

A white weft gives classic contrast; a coloured or black weft changes the entire washed appearance.

05 Weight affects wear pattern

Heavier denim holds creases and develops sharper whiskers and honeycombs.

06 Stretch limits character

Elastane content constrains how aggressively the fabric can be washed and abraded.

Every other fabric is sold at its best. Denim is sold at its **beginning** — and judged on what it becomes.

CHAPTER 08

The water and chemistry problem

Denim is among the most water and chemical intensive fabrics in the industry. This is now a commercial constraint as much as an environmental one.

PRESSURE POINT	WHAT IS CHANGING
Indigo reduction	Traditional sodium hydrosulphite is being replaced by pre-reduced and electrochemical routes
Water in dyeing	Foam dyeing and low-liquor systems substantially cut water per metre
Garment washing	Ozone and laser increasingly replace stone, enzyme and manual abrasion
Effluent	ZLD is mandatory in several Indian clusters and shapes every expansion decision
Chemical restrictions	Potassium permanganate spraying is restricted or banned by many buyers
Recycled content	Recycled cotton and rPET weft, with GRS documentation through the chain

Dry processing is the direction. Laser abrasion and ozone bleaching produce wash effects with **a fraction of the water and no manual chemical handling**. The capital cost is real, but buyer pressure and effluent regulation are pushing the industry there regardless.

CHAPTER 09

Specifying denim

Denim specifications are frequently written around weight and shade alone, and both are the least informative elements.

01 Specify the yarn construction

Ring-ring, ring-OE or OE-OE. This decides the wash character more than anything else.

03 Give full construction

Weight, twill direction, warp and weft counts, EPI and PPI. All of it.

05 Wash-test before bulk

Send fabric through your actual laundry programme. Denim cannot be judged unwashed.

02 State the dyeing route

Rope or slasher. It affects shade depth, evenness and the contrast available after washing.

04 Set shrinkage and skew limits

With test methods. Leg twist complaints are expensive and entirely preventable.

06 Confirm stretch recovery

For stretch denim, recovery matters more than stretch percentage. Test after repeated wash.

How Shivpriya reads it. We assess denim programmes on **the wash result, not the greige fabric**. A denim that looks correct on the roll and flat after laundering has failed — and that only becomes visible if you test through your own wash before committing to bulk.

IN CLOSING

A fabric designed to be worn out.

Denim is the only major fabric engineered around what happens to it after purchase, which makes yarn construction and dyeing route far more consequential than weight or shade. If you are developing a denim programme, talk to us — and plan to judge it after the wash, not before.

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