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Air Jet. False twist, at speed.

Air-jet spinning inserts twist and then takes it out again — and leaves behind a yarn held together by a wrapped surface. It was the first air system to reach commercial scale, and it still owns a specific and profitable corner of the polyester market.

300 m/min

typical delivery, well over ten times a ring spindle

2 jets

opposed nozzles doing all the work of a spindle and traveller

PC / PV

the blends where air-jet has held its ground commercially

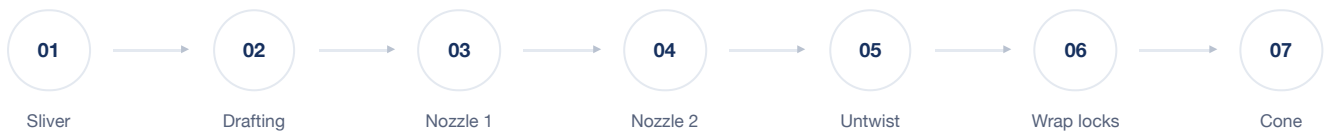
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CHAPTER 01

Twist that undoes itself

Two air nozzles are placed in series, swirling in opposite directions. The second, stronger jet inserts false twist; the first wraps a small number of edge fibres in the opposite direction. When the false twist unwinds, those wrapper fibres tighten — and that is the yarn.



The false twist disappears; the wrapping it created is what remains

01 Drafting

A high-precision drafting system delivers a thin, controlled ribbon into the first nozzle.

03 False twist inserted

The second, stronger nozzle twists the whole bundle. Edge fibres are held back and wrap oppositely.

05 The wraps tighten

The oppositely wound surface fibres are now pulled tight around a parallel core.

02 Edge fibres separate

The first nozzle catches a small proportion of fibres at the ribbon edges and lifts them free.

04 The twist unwinds

Downstream of the nozzle the false twist runs out, as false twist always does.

06 Direct to package

The yarn is wound onto a cone with no separate winding operation.

The whole trick. Only about 5–10% of the fibres end up as wrappers. **That small minority holds the other 90% together.** It is why air-jet yarn is sensitive to fibre uniformity — if the wrappers do not form correctly, nothing else can compensate.

CHAPTER 02

Ninety per cent core, ten per cent binding

Like vortex yarn, air-jet yarn is a core-and-wrapper structure rather than a twisted one. The difference is in how much of the surface is wrapped and how tightly.

	AIR-JET YARN	VORTEX YARN
Wrapper share	Roughly 5–10% of fibres	A substantially higher proportion
Wrap coverage	Intermittent along the length	Dense and continuous
Resulting strength	Lower	Higher than air-jet, still below ring
Hairiness	Low	Lower still
Best fibre	Polyester and PC blends	Viscose and MMF

STRENGTHS	WEAKNESSES	REQUIREMENTS
Very high speed	Lower tenacity	Uniform staple
Low hairiness	Fibre sensitive	Clean sliver
Good evenness	Firm handle	Low short fibre
Low conversion cost	Narrow window	Stable air supply

CHAPTER 03

Why polyester and not cotton

Air-jet spinning is the most raw-material-sensitive system in commercial use. Its commercial history is essentially the story of that sensitivity.

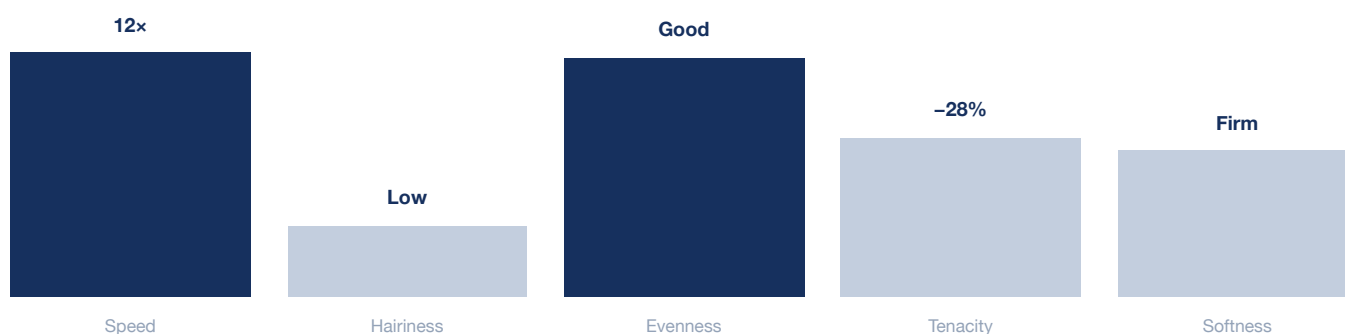
FIBRE	SUITABILITY	WHY
Polyester staple	Excellent	Perfectly uniform length, no short fibre tail, no trash — ideal wrapper behaviour
PC blends	Very good	The polyester component carries the wrapping; the commercial mainstay of the system
PV blends	Very good	Uniform man-made staple throughout, running reliably at high speed
Viscose	Good	Works well, though vortex generally does the same job better
Combed cotton	Marginal	Short fibre disrupts wrapper formation; commercially difficult to sustain
Carded cotton	Unsuitable	Short fibre and trash make consistent wrapping effectively impossible

A commercial lesson. Air-jet spinning was launched as a general replacement for ring spinning and could not spin cotton acceptably. It survived by **retreating to the fibres it is genuinely good at** — a useful reminder when any system is sold as universal.

CHAPTER 04

What the yarn delivers

Air-jet yarn is smooth, even and fast to produce. It is not strong, and it is not soft. Within those boundaries it is a very effective commercial yarn.



Air-jet yarn against a comparable ring yarn in polyester-cotton

PROPERTY	PRACTICAL CONSEQUENCE
Low hairiness	Clean fabric surface, sharp prints, and very little fly in the weaving shed
Good evenness	Fewer thin and thick places than ring at the same count, thanks to controlled drafting
Lower tenacity	Warp use needs care; many mills restrict air-jet yarn to weft or to sized warp only
Firm handle	Reads as crisp and dry. Correct for formal shirting, wrong for soft knitwear
Good abrasion	The wrapped surface resists rubbing better than its tensile figure suggests
Low fly	A genuine operational benefit in both weaving and knitting departments

CHAPTER 05

Where air-jet yarn is used

Air-jet holds a real position in polyester and blended shirting and in a set of technical and institutional fabrics where its combination of speed and smoothness is exactly right.

END USE	WHY AIR-JET FITS
PC shirting	Smooth surface, crisp handle and a cost structure formal shirting volumes demand
Uniform fabric	Low hairiness survives industrial laundering; appearance holds through heavy use
Bed linen in blends	Even yarn and a clean face at high thread counts, produced economically
Lining fabric	Smoothness is the requirement; strength demands are modest
Industrial & filtration	Uniformity and a controlled surface matter more than tensile strength
Sewing thread base	For selected blended threads where a smooth low-fly surface is required

- **Poor fit:** 100% cotton at any count — the fibre simply does not suit the mechanism.
- **Poor fit:** soft knitwear, where the firm handle is immediately obvious against the skin.
- **Poor fit:** unsized warp at fine counts, where the tenacity gap becomes a loom efficiency problem.

CHAPTER 06

The levers, and what they cost

Air-jet spinners work almost entirely with air pressure and nozzle geometry. The settings interact strongly, and a change made to fix one symptom routinely creates another.

Nozzle pressure ratio

The balance between the two jets decides wrapper count and tightness. The master setting.

Nozzle distance

Spacing between jets and from the front roller changes how many fibres become wrappers.

Delivery speed

Higher speed shortens wrapping time. Strength falls before anything else does.

Draft ratio

Controls ribbon width entering the first nozzle — the input the whole system depends on.

SYMPTOM

USUALLY MEANS

Weak yarn

Too few wrappers — pressure ratio or nozzle distance needs correcting

Harsh, boardy handle

Over-wrapping; the surface has been bound too tightly

Erratic strength

Short fibre variation in the sliver, or unstable compressed air supply

Surface fuzz appearing

Nozzle wear — the geometry has drifted and wrapping is degrading

High breakage rate

Draft distribution wrong, or the fibre is simply unsuited to the system

CHAPTER 07

A short line and a fast machine

Like rotor and vortex, air-jet deletes the speed frame and the winding department. Its cost advantage comes from the combination of that and a very high delivery rate.

01 Production rate

Ten to twenty times a ring spindle in the counts it suits.

03 Compressed air

The dominant running cost and a continuous one. Air efficiency is the conversion cost.

05 Raw material

Must be uniform man-made staple, which limits how cheaply you can buy fibre.

02 Departments removed

No roving and no winding. Sliver in, finished cone out.

04 Labour

Very low per kilo; automatic piecing and doffing are standard.

06 Realisation

Sold as a functional commodity yarn rather than a premium one, in most markets.

Where it lost ground. Vortex spinning took much of the market air-jet was built for, by producing a better yarn from the same air principle. Air-jet held on where **polyester-rich blends and pure speed** are the requirement.

CHAPTER 08

Sliver quality is not negotiable

Because so few fibres do the binding, anything that disturbs those fibres disturbs the yarn. Air-jet spinning demands the cleanest and most uniform sliver of any system.



Three draw passages are common — fibre parallelisation matters more here than anywhere else

01 Short fibre is fatal

A short fibre cannot form a stable wrapper. Short fibre percentage is the first thing to control.

02 Parallelisation matters

Fibres must present to the nozzle in an orderly ribbon. Extra draw passages exist for this reason.

03 Trash must be absent

Any particle disturbs the air flow locally and produces a fault at that point.

04 Sliver weight consistency

There is no draft reserve. Hank variation becomes count variation directly.

CHAPTER 09

Specifying air-jet yarn

Air-jet yarn is usually bought as part of a fabric programme rather than on its own. These are the checks that keep such a programme stable.

01 Confirm the blend

Air-jet performance is fibre-driven. State the exact blend ratio and the polyester type.

03 Ask for hairiness trend

A rising trend across the lot means nozzle wear and a fabric that will change mid-run.

05 Test the handle on fabric

The firm handle is the usual rejection reason. Test at fabric stage, not on the cone.

02 Set tenacity against use

Decide warp or weft up front. The tenacity gap is manageable in weft and awkward in warp.

04 Check evenness and IPI

Air-jet should be good here. If it is not, the drafting or the sliver is at fault.

06 Verify air system stability

Ask how compressed air pressure is regulated. It is the most common source of lot variation.

How Shivpriya reads it. We treat air-jet as a **blend-specific yarn**. Where the programme is polyester-rich, formal and volume-driven it is often the most sensible option on the table. Where cotton content rises, we will point you elsewhere before the trial rather than after it.

IN CLOSING

Twist it, untwist it, keep what is left.

Air-jet spinning is a clever piece of engineering that found its market by being honest about its limits. In polyester-rich blends at speed it remains hard to beat on cost. If you are running a PC or PV programme and weighing air-jet against ring or vortex, talk to us — the blend ratio usually decides it.

TALK TO US

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