AIR-JET SPINNING
PRINCIPLE OF YARN FORMATION

Figure 1. Basic Principle of Cotton Spinning System
The Murata Air-Jet Spinning (MJS) machine consists of:

- A standard 3-over-3 high speed roller drafting arrangement
- Two compressed-air twisting jets
- A pair of take-up rollers and yarn package build unit
A broad ribbon of fibres, drafted to the required count, is presented to the inlet of the first twisting jet.

On entering the first jet, the ribbon is lightly false twisted. The edge fibres or surface fibres are given a light Z-twist or sometimes twist in the opposite direction or no twist at all. The core fibres, which form the bulk of the resulting yarn receives the Z-twist by the vortex.
As the strand leaves the first jet and enters the second jet, the turns of twist are cancelled by the false-twist effect. The core fibres no longer exhibit any twist and are arranged in parallel.

The edge fibres, which previously have little twist or no twist at all, are given further twist by the second jet. They bind the body of the fibres together to ensure coherence and impart strength. The result is a bundled or wrapped-spun yarn structure (fasciated structure).
Spinning Channel

Z - Twist

$V_1$

S - Twist

Suction Inlet

Jet Nozzle

Outlet

Cross-Section AA
Yarn Structure

- Because of the separation and wrapping of fibers around the yarn bundle, the MJS has a fasciated structure.
- The yarn has a central core of mostly parallel fibers wrapped with binder fibers.
Yarn properties as compared with Ring Spun Yarns
(Disadvantages)

- The biggest disadvantage is that 100% carded cotton yarns cannot be produced commercially due to short fibers for binder fiber formation
- About 10 – 25% weaker in strength
- The yarns are stiffer and harsh in handle
Yarn properties as compared with Ring Spun Yarns
(Advantages)

- Delivery of yarn to a large package
- The yarns have low hairiness values
- Good evenness
- Less thin places
- Better depth of shade and color fastness
- Low pilling propensity
MACHINE SPECIFICATIONS

- Delivery Speed: 120 – 300 m/min
- Raw material: Suitable for synthetic fibres and blends with combed cotton
- Count range: 10 – 40 tex
- Feed sliver: 3rd passage drawframe slivers
- Yarn type: Bundled or wrapped-spun yarn
- Advantages: Low production costs, low personnel demand, no rapidly rotating parts
- End-uses: Fine gauge knitwear, shirtings, sheetings
Vortex Spinning

- An extension of Air-Jet Spinning in which 100% cotton fibres can be spun

- How?
  - By increasing the number of edge fibres so that there are more wrapper fibres
  - By extracting the short fibres

- Main advantages:
  - Low yarn hairiness
  - Low pilling propensity
Principle of Vortex Spinning
Less yarn hairiness
Applications of MJS Yarns

- Sheeting, comforters, bedding accessories, printcloth
- Cloth napkins
- Fleece
- Gloves
- Knit apparel
- Automotive upholstery
- Industrial fabrics
- Sewing threads