

# VLT

## VLT® AutomationDrive provide flexible, reliable and cost-effective yarn sizing

Prashant Westpoint Pvt. Ltd. in Ahmedabad, India, has produced sizing machines for the textil industry for 3-4 years.

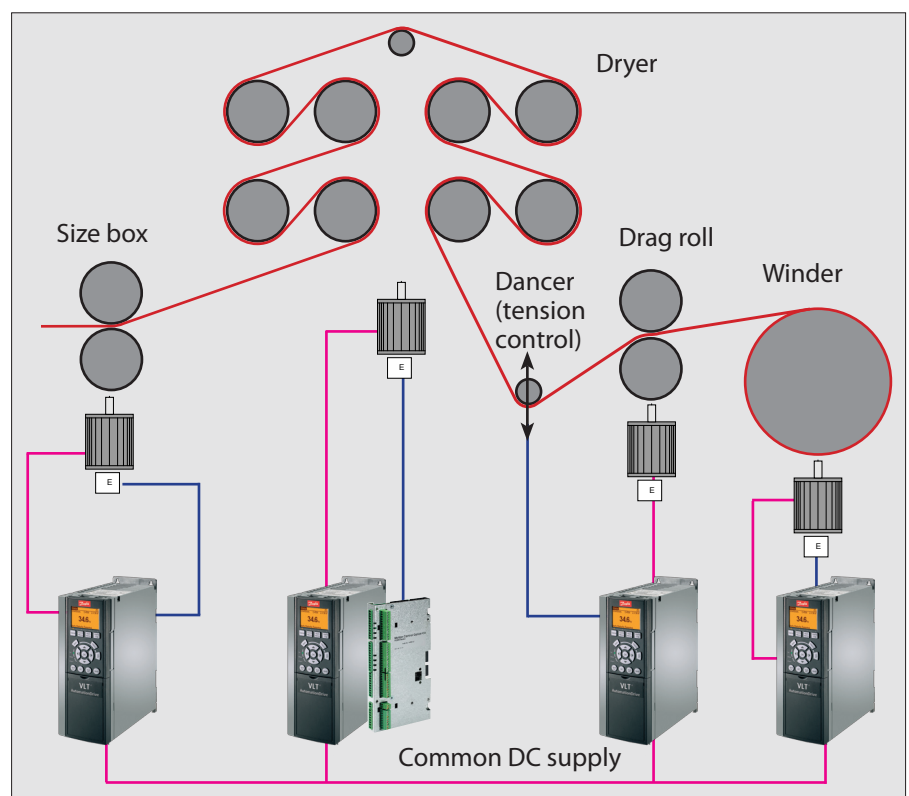
VLT® AutomationDrives with MCO 305 Motion Control Option provide flexible, reliable and cost-effective yarn sizing and make expensive servo-systems omissible.

A sizing machine stretches yarn from the spinning machine to size the yarn before it is woven. Sizing machines are in great demand in India and neighbouring countries processing cotton yarn mainly for denim cloth. Typically a sizing machine needs a min. of 4 to a max. of 10 drives of range from 1.5 kW to 37 kW.

It's important that the size box, dryer and drag roll motors are synchronised, and that the proportion is adjustable. The winder is a center winder. The reduction ratio of the winder motor is 15 (chain wheel + geared motor).

The diameter of the spool (the empty beam) is approx. 160 mm; the winding tension is 3000~7000N with full holding torque at 0 RPM.

It's essential to maintain accurate control of the yarn tension between the drag roll and the winder.



**Size box:** Unwinds the yarn from a beam and sizes it by passing it through hot starch or a chemical.

**Dryer:** Dries the yarn and sizes it using the surface temperature of steel cylinders heated by steam inside.

**Drag roll:** Draws and arrays the double-deck yarns orderly. It delivers the yarn at constant surface tension to the winder. The drag roll motor is adjusted depending on the line speed reference from the dryer and from a mechanical dancer feedback.

**Winder:** Winds the yarn at a constant, set tension irrespective of type of yarn. The yarn thickness varies from 60 to 120 counts and the diameter build-up is from approx. 60 mm to 1200 mm. It can wind the yarn forwards as well in reverse direction (top side of the yarn becomes the bottom side during winding) as per the user's requirement.

**The solution:**

Dryer: A VLT® AutomationDrive FC 301 with VLT® Motion Control Option MCO 305 works in closed loop speed feedback and acts as a master. It receives a line speed command and sets the tension for the winder and other interlocking commands via a fieldbus. The Motion Control Option MCO 305 is used to calculate the winder diameter using analog signals from an ultrasonic distance sensor. The Motion Control Option sets and keeps the winding tension dynamic depending on the set and the actual tension and the yarn diameter build-up.

**Size box:** The VLT® AutomationDrive FC 301 with an encoder feedback option card works in closed loop speed feedback and receives speed reference in the form of digital pulses from the dryer. The speed is synchronised and adjusted by +/- 2 - 5 % - known as the "stretch ratio".

**Drag roll:** The VLT® AutomationDrive works in closed loop and receives speed reference from the dryer and from a mechanical dancer as tension feedback.

**Winder:** A VLT® 5000 Flux works with torque control speed feedback and receives a torque reference in the form of analog signals from the dryer (MCO 305). Various settings such as initial and full winder diameter to calculate the diameter build-up ratio,

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The dryer section



The winder

yarn count, set tension, initial tension reference etc. are sent from a PLC-HMI on serial fieldbus by the MCO and is in turn used by the winder drive to make adjustments.

**Common DC**

A common DC supply is employed for powering all the drives and provides load sharing. A complete remote user interface is provided through a PLC HMI. The PLC also reads status and other data from all the drives through the RS 485 serial communication.

This application was jointly developed along with India Textile Partner M/S Digicon Automation

**Benefits:**

① The use of standard squirrel cage induction motors, avoiding costly servo motors and drives.

② From the application point of view there were two major gains as well; as compared to the previous drive configurations:

A: The machine could easily run at a lowest desired speed of 0.1 m/min – corresponding to 0.1 Hz of the drive output.

B: The torque control of the beamer motor during reverse winding was easy to achieve and was equally precise and accurate. This helped the customer to save cost and in turn proved to be a better value proposition by the virtue of using Danfoss drives.