

# Staple Fiber Technology

## Introduction

Zimmer AG is a leading engineering company which concentrates on technologies and plants for polymers and synthetic fibers. Zimmer is building staple fiber production plants since 1962 applying its proprietary technology. The total staple fiber capacity of plants built by Zimmer already amounts to around 1.8 million tons/year.

During the past 40 years Zimmer has constantly improved its technology with respect to quality and economics resulting in large direct spinning plants up to 200 tons per day in one line. Staple fibers are produced in a two-step process:

1. continuous spinning process using Zimmer's high productivity spinning system BN 100
2. discontinuous fiber processing line for the production of all types of fibers for a wide range of applications

## Technology highlights of the spinning line

### Spin pack bottom loading system

Spin packs are installed from the bottom, thus less heat loss by avoiding the so called chimney effect and only one floor operation facilitating easy handling.



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### Semi-automatic spin pack installation

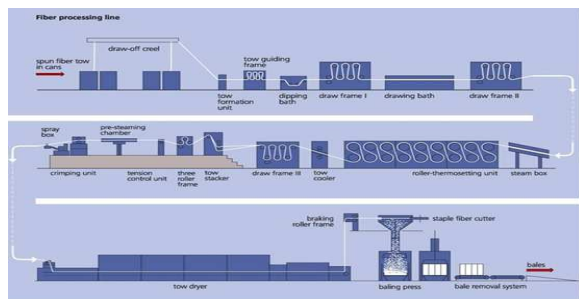
Spin packs are installed with a semi-automatic handling unit which, together with the self centering/self sealing pack design, reduce down times for pack changes and simplifies handling.

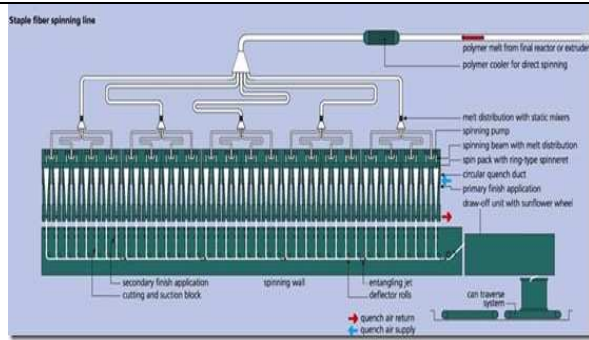
### Compact ring spinneret system BN 100 for capacities up to 200 t/d

Spinning gauge of 600 mm and highest productivity per spinneret enable compact spinning systems, thus less space requirement for lower building costs and short polymer pipes for lower degradation of polymer.

### One floor one side operation in spinning

Because of its very compact design the spinning line is built in one line to be operated from one side only, avoiding the disadvantages of a back to back layout.





**Closed circular quenching system** Quench duct and manifold are closed during operation. Therefore 100% of the quench air is used for cooling down the filaments. The quench air is completely sucked off and cleaned in a scrubber, thus monomers are removed thereby ensuring a clean spinning area free of deposits.

**Quench air flow from outside to inside** Quench air penetrates the filament bundle from the outside to the inside, thus enhanced contact between quench air and filaments, hence better cooling conditions for higher product uniformity.

**Blow-outs or broken filaments are always** Immediately entangled into the tow. Thus spinning shut downs due to wrapping are avoided. This very substantially reduces the average waste amount and ensures a reliable operation.

**Application of spin finish inside quench duct and at spinning wall** Spin finish is applied via slot oilers with inverter controlled metering pumps for trouble free operation and higher finish uniformity.

**Drip detector for online quality control** In addition, polymers drips are continuously observed online by a unique drip detector which enables the operator to identify spin packs which have to be checked.

**Automatic thread cutting at the spinning wall** Cutting/suction blocks automatically cut all threads in case of wraps on take up unit or sunflower wheel, thus shorter down times.

**Semi-automatic tow threading** Entangling jets are installed for easy operation, thus fewer down times.

**Can traversing operated by computer controlled drives:** Less sensitive than hydraulic drives and more accurate for controlling cable length, thus less maintenance, fewer failures and spinning cables with improved evenness.

**Technology highlights of the fiber processing line**

**Five zone drawing technology** For high flexibility to produce all types of fibers the fiber line is equipped with five drawing zones

**Advanced draw bath** For smooth stretching conditions and optimum heat transfer a water wave stretching system is used.

**Thermosetting using high pressure steam cascade system** : In this high pressure steam cascade system, the design features double shell rollers for high steam velocity, therefore better heat transfer, temperature uniformity and lower energy consumption. Condensate is regenerated into steam in a steam cascade system at a lower pressure and used to heat other units e.g. draw bath and draw frames.

**Finish application using inverter controlled spray systems** : Spin finish is applied by inverter controlled dosing pumps via spray nozzles, thus achieving a higher oil pick-up accuracy and a lower spin finish consumption.

**Tow tension control by computerized load cell** : Tow tension at crimper and cutter is controlled by load cells thus achieving a higher tension uniformity and trouble free operation.

**Jumbo crimper** : This crimper enables high production capacities of up to 200 t/d in a single spinning line with one crimper only. Consequent to the enhanced design of the jumbo crimper, higher lifetimes of check plate and bearings are achieved.

**Semi-automatic cutting wheel change**

Cutting wheels are changed semi-automatically in less than one minute, thus the fiber line does not need to be stopped for wheel changes.

**Inverter controlled AC drives** : All main drives of the fiber line are inverter controlled AC drives, thus higher draw ratio accuracy and less maintenance.

**Online quality control** : For optimum control of the product quality online systems like crimp monitoring and automatic cutting knife observation are available.



Staple fiber spinning lines with spin pack handling system



Staple fiber processing line

### Production Management System (PROMS)

Information from all plant sections can be gathered and evaluated in a computer based production management system

- for a professional handling in polymer and fiber production off all production related dates
- enables the producer to a more effective control of the production in all areas from raw materials to end products
- processed dates for all management levels.