NEW TEXTILES

FIBER

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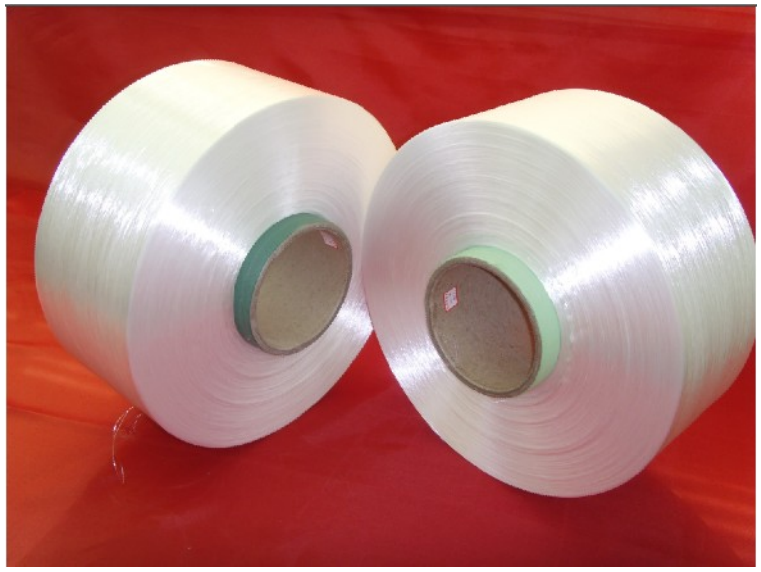
steel
wool
sisal
carbon
cotton
aluminum
copper
hemp
polyester-
acrylic

STAPLES AND FILAMENTS



MEASURING FIBERS

- Diameter
  - micrometers
- Length
  - Staples and tow: centimeters or inches
  - Filaments: kilometers or miles
- Denier
  - The weight in grams of 9000 meters of fiber or yarn
- Tex
  - The weight in grams of 1000 meters of fiber or yarn
- Denier per filament (dpf)

MEASURING FIBERS cont.

- Abrasion resistance
- Flexibility
- Tenacity
  - Force required to break
- Elongation
  - Percent elongation at break
    (how much did it stretch before it broke)
- Elastic recovery
  - Percentage of return to original length
    (when you stretch it does it recover)
- Absorbency
  - Moisture percentage of weight
- Conductivity

NATURAL FIBERS

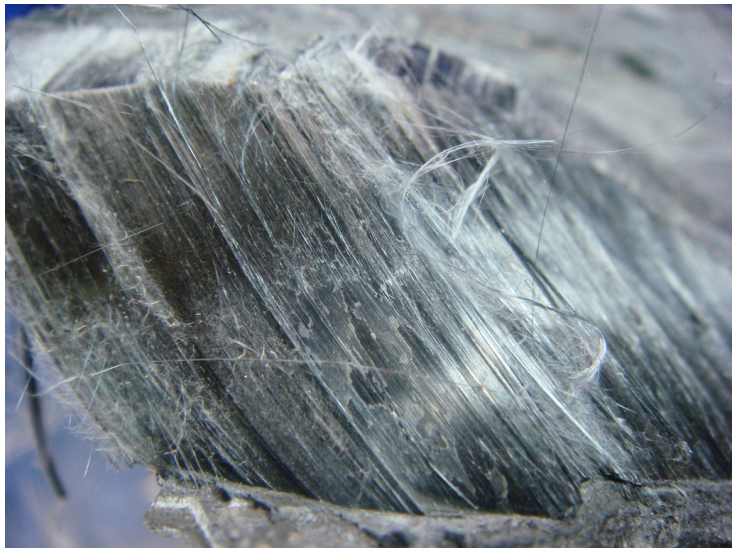
- Plant
  - Seed fibers: Cotton
  - Bast (plant stem) fibers: flax, ramie, hemp
  - Leaf fibers: pina, sisal
- Protein
  - Wool
  - Silk
  - Spider silk

MANUFACTURED FIBERS

- Regenerated
  - Rayon (Viscose)
  - Acetate
  - Lyocell
  - Bamboo
- Synthetic
  - Nylon
  - Polyester
  - Acrylic

MANUFACTURED FIBERS cont.

- Elastomers
  - Rubber: Neoprene
  - Spandex (Lycra, Elastane)
- Aramid
  - Kevlar
- Glass
- Metal
- Carbon
- Asbestos

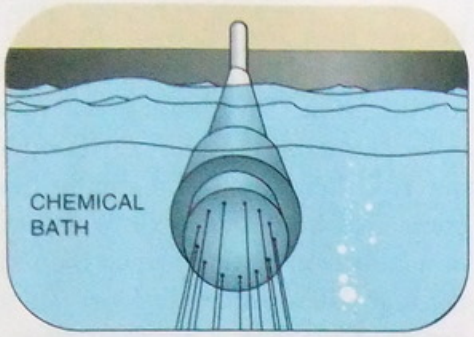


HOW FIBERS ARE MADE

1. A “dope” is prepared
   chemical or heating process creates a viscous solution
2. Dope is extruded through “spinneret”
   filament is produced
3. Fiber is solidified
   chemical or cooling process hardens filament

HOW FIBERS ARE MADE cont.

Wet Spinning: Acrylic, Lyocell, Rayon, Spandex

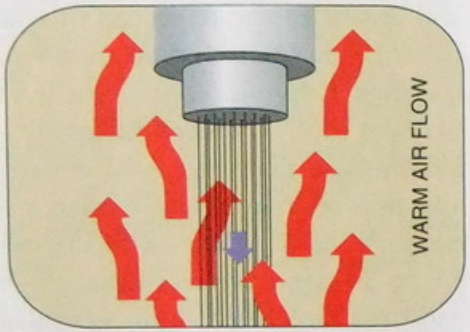


1. Raw material is dissolved by chemicals.
2. Fiber is spun into chemical bath.
3. Fiber solidifies when coagulated by bath.

Oldest process
Most complex
Weak fibers until dry
Washing, bleaching, etc., required before use
Solvent may be recovered and reused

Dry Spinning

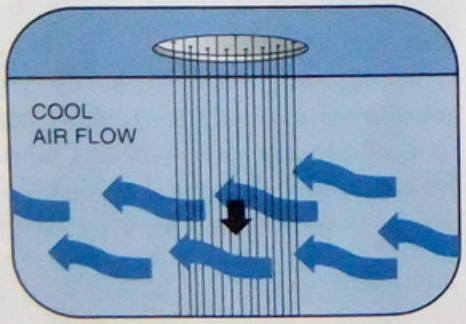
Acetate, Acrylic, Modacrylic, Spandex (Major Method)



1. Resin solids are dissolved by solvent.
2. Fiber is spun into warm air.
3. Fiber solidifies by evaporation of the solvent.

Direct process
Solvent required
Solvent recovery required
No washing, etc., required

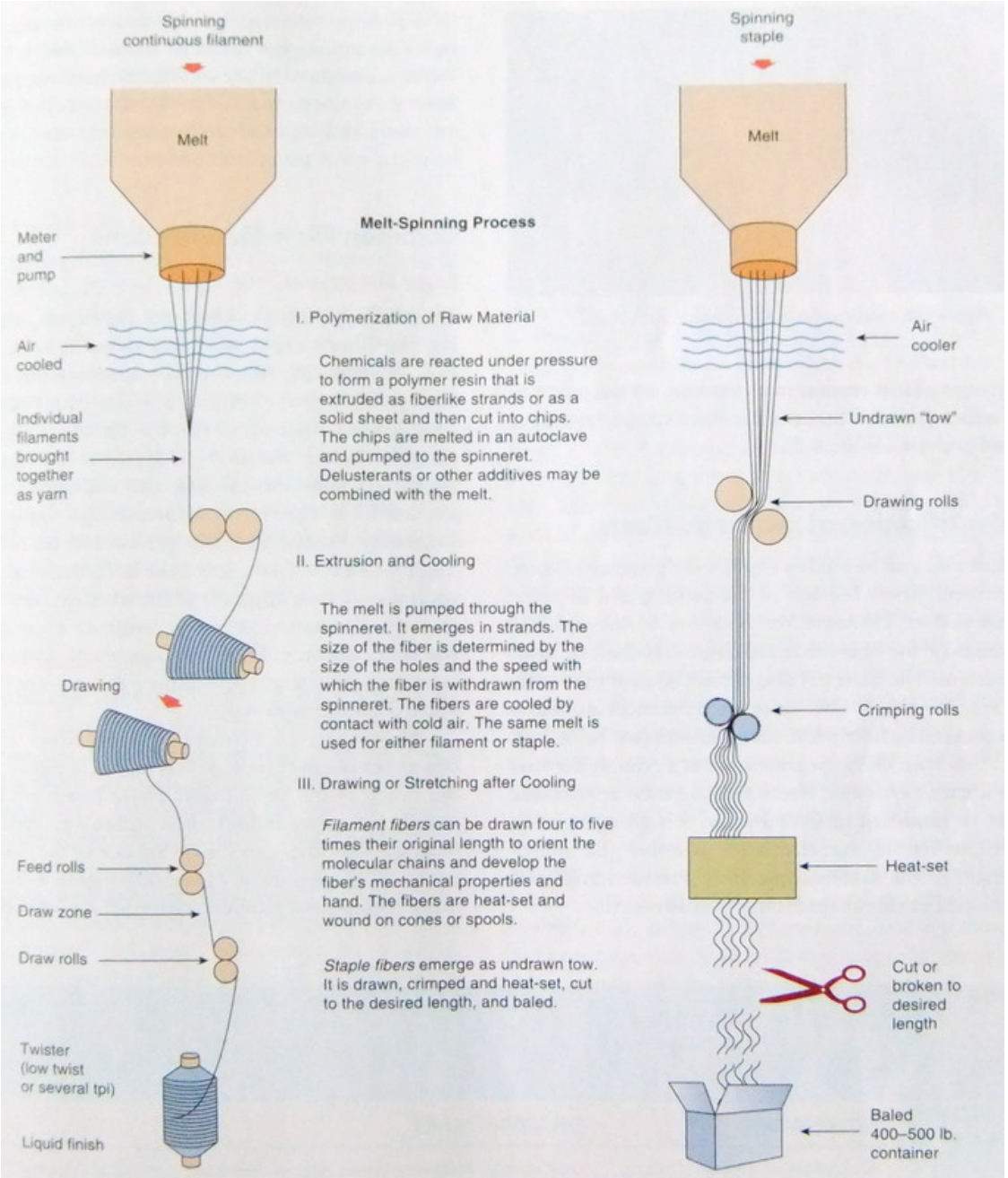
Melt Spinning: Nylon, Olefin, Polyester, Saran



1. Resin solids are melted in autoclave.
2. Fiber is spun out into the air.
3. Fiber solidifies on cooling.

Least expensive
Direct process
High spinning speeds
No solvent, washing, etc., required
Fibers shaped like spinneret hole

HOW FIBERS ARE MADE cont.



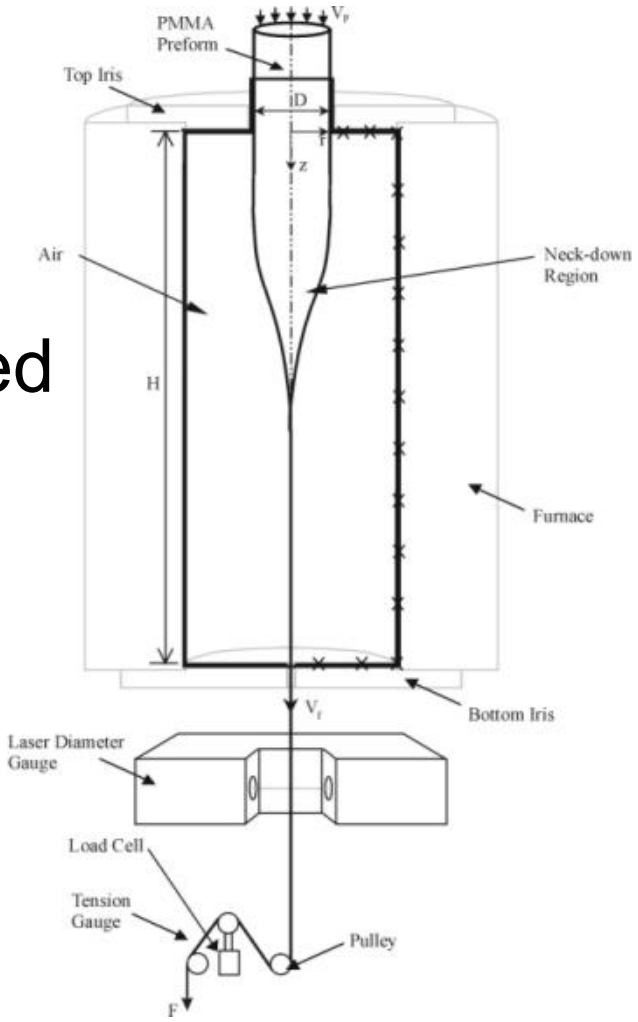
HOW FIBERS ARE MADE cont.

http://www.youtube.com/watch?v=K1vj_Ww5GcU

HOW FIBERS ARE MADE (ALTERNATIVE PROCESS)

1. A cylinder of material is prepared and placed into a “draw tower”
2. Cylinder is heated
3. Material is stretched (“drawn”)
4. Material is wound onto spool

http://www.youtube.com/watch?v=03hM7Ixx8Eg



IDENTIFYING FIBERS: BURN TEST