



FASH 15 textiles

yarn processing



yarn processing



most apparel & interior fabrics produced from yarns

yarn:

continuous strand of textile fibers, filaments or materials in a form suitable for knitting or weaving or otherwise intertwining to form a textile fabric





filament yarns



made from manufactured fibers—except tiny percentage of filament silk



grouping of filaments with the addition of twist creates filament yarn



filament yarn

yarn name:

outdoor UV resistant thread

yarn type:

multi-filament

twist direction:

Z

amount of twist:

high

yarn appearance:

standard filament

fiber content:

100% polyester

end uses:

#1



filament yarn

#2

yarn name:
elastic sewing thread

yarn type:
corespun filament

twist direction:
none

amount of twist:
none

yarn appearance:
braided

fiber content:
42% polyester
58% rubber

end uses:





filament yarns—smooth-filament yarns



uniform as they come from the spinneret

more luster than spun yarn—depending upon delusterant & amount of twist



- no protruding ends
- do not lint
- resist pilling
- shed soil



strength depends upon:

- strength of individual fibers
- number of filaments in yarn



smooth-filament yarn

yarn name:
thread

#3

yarn type:
filament

twist direction:
Z

amount of twist:
high

yarn appearance:
Standard filament

fiber content:
100% polyester

end uses:





filament yarns—monofilament yarns



primarily for technical uses—low cost, high durability

consist of single coarse-filament fiber



end uses:

- sewing thread
- fishing line
- fruit & vegetable bags
- nets



metallic fibers used as monofilament yarns—sparkle, minimize static electricity, clean-room apparel & technical applications

monofilament yarn

#4

yarn name:
quilter's invisible nylon thread

yarn type:
filament

twist direction:
none

amount of twist:
none

yarn appearance:
standard filament

fiber content:
100% nylon

end uses:



monofilament yarn

yarn name:

metallic

yarn type:

corespun filament

twist direction:

none

amount of twist:

none

yarn appearance:

standard filament

fiber content:

60% nylon

40% polyester

end uses:

#5





filament yarns—tape and network yarns



tape—

inexpensive yarns produced by extruded polymer films



coarse and usually used in carpet backing, rope, cord, fishnets, bagging and interiors support fabrics



network—

made of fibers connected in a network arrangement—bulkier & less dense than tape yarns



used in technical products in which bulk & low density more important than high strength

tape yarn

#6

yarn name:

tape yarn

yarn type:

extruded polymer film

twist direction:

none

amount of twist:

none

yarn appearance:

flat, lustrous

fiber content:

100% polyester

end uses:





filament yarns—bulk yarns



processed to have greater covering power or apparent volume than that of conventional yarn



sometimes referred to as bulk-continuous-filament (BCF) yarns



bulking gives filaments aesthetic properties of spun yarns





filament yarns—bulk yarns



methods of adding texture/bulk:

- false-twist process
- draw-texturing
- stuffer box
- air-jet
- knit-deknit

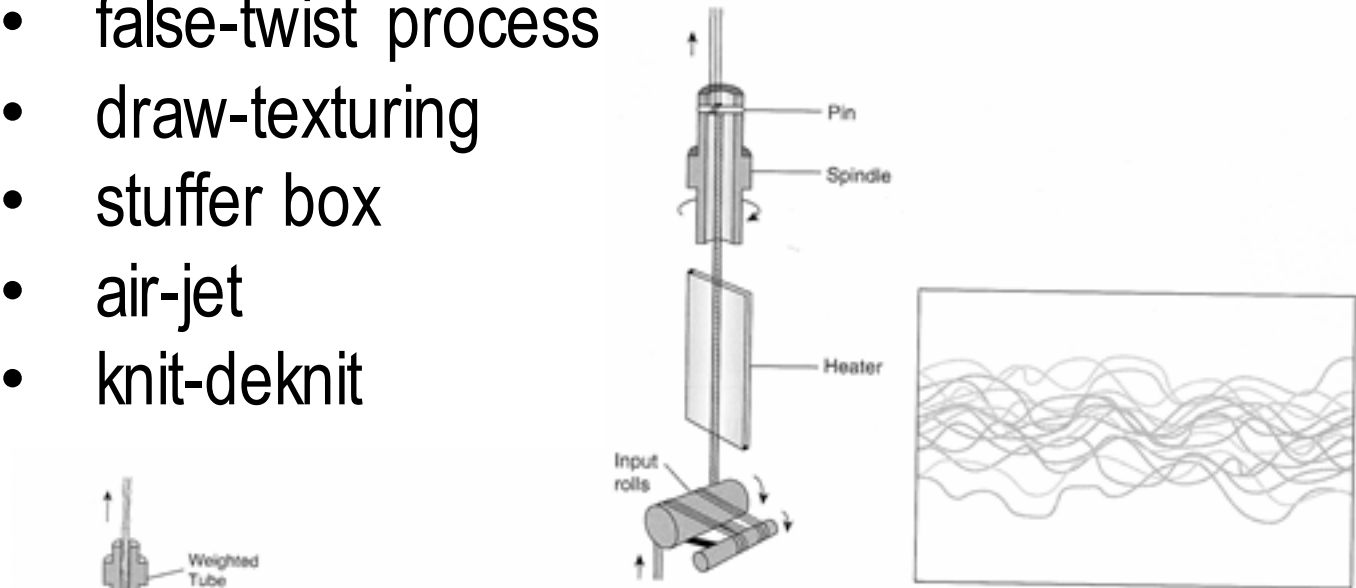


Figure 10.4 False-twist process (left), yarn (right).

SOURCE (left): Courtesy of Solutia Inc.

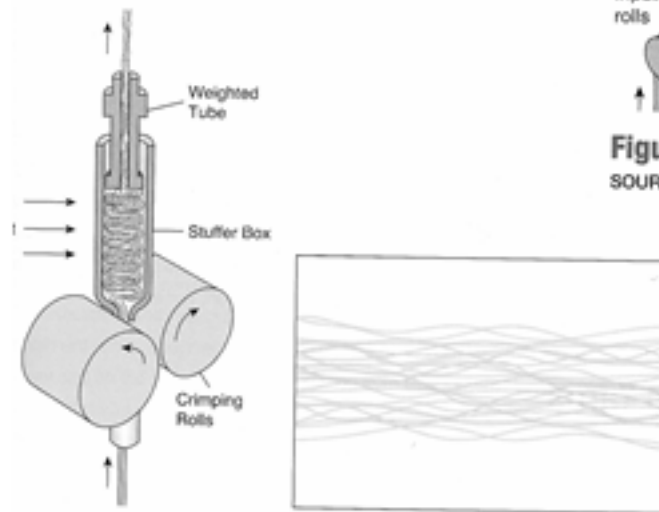


Figure 10.5 Stuffer box process (left), bulky yarn used in apparel (right).

SOURCE (left): Courtesy of Solutia Inc.



bulk yarn

#7

yarn name:

cording

yarn type:

spun

twist direction:

none

amount of twist:

none

yarn appearance:

braided

fiber content:

100% polyolefin

end uses:



bulk yarn

#8

yarn name:
boucle

yarn type:
spun

twist direction:
S

amount of twist:
low

yarn appearance:
texturized

fiber content:
100% acrylic

end uses:





filament yarns—spun yarns



continuous strands of staple fibers held together in some way—twist generally used



characteristics:

- fuzzy surface
- greater amount of twist than filament yarns
- short fibers that pull apart
- more comfortable on skin than smooth-filament
- low-twist—trap air/insulate
- high-twist—air permeability reduced/wind resistant





participation activity: spun yarns



...pick up a “spinner” tool & some fiber
...watch the instructor as she demonstrates the spinning method that we will be using
...try your hand at “spinning” your fiber
...at the conclusion of the lecture, answer the following questions:



- how easy was this method of spinning?
- what would have made it easier?
(fiber type & length, fiber processing, tools, practice, etc...)
- is your yarn uniform?
- how could you have made it more uniform?
- what did this process teach you?





filament yarns—processing staple fibers



opening—

loosens: fibers from compacted bales

cleans: removes short fibers, soil, plant debris, & other foreign matter

blends: from several bales, achieves more uniform quality



carding—

- partially aligns fibers & forms them into a soft, very weak rope of fibers called a *carded sliver*
- carding machine—revolving cylinder with short wire teeth that remove trash & naps



<http://www.youtube.com/watch?v=HfXXAMu35FI>



filament yarns—processing staple fibers



drawing—

increases parallelism of fibers & combines several carded or combed slivers into a *drawn sliver*



combing—

- aligns long-staple fibers in a parallel arrangement
- removes short fibers—combed sliver more uniform in length



roving—

reduces the drawn sliver, increases parallel alignment & inserts a small amount of twist



<http://www.youtube.com/watch?v=97qEHNS6UEU>



filament yarns—processing staple fibers



spinning—

one of oldest manufacturing arts

advances in engineering & technology have

increased speed & quantity

<http://www.youtube.com/watch?v=7gXTWgMeMgl>



spun yarn

#9

yarn name:
thread

yarn type:
spun

twist direction:
Z

amount of twist:
high

yarn appearance:
silk finish—mercerized

fiber content:
100% cotton

end uses:



spun yarn

#10

yarn name:
spun single

yarn type:
spun

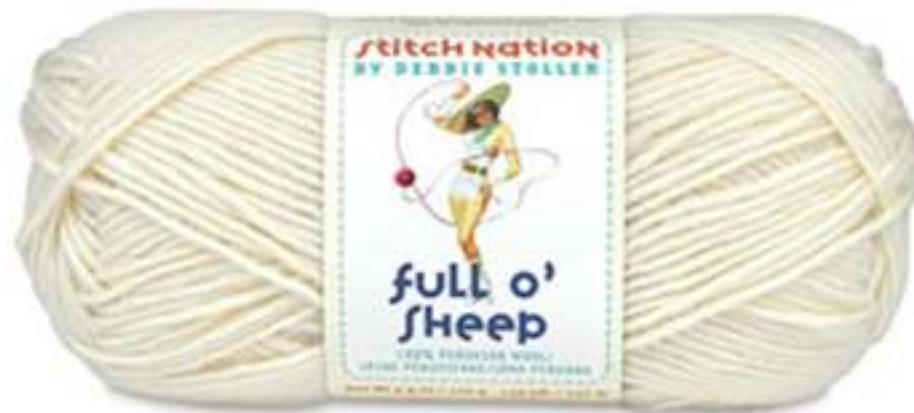
twist direction:
S

amount of twist:
medium

yarn appearance:
carded wool

fiber content:
100% Peruvian wool

end uses:





fiber blends



blend—

an intimate mixture of fibers of different generic type, composition, length, diameter, or color spun together—fibers cannot be separated



mixture—

refers to yarns of different types within a fabric; one type possibly used as warp while one used as weft—can be separated



combination—

ply yarns are used—at least one strand of a ply yarn is of different generic fiber type from the other strands





why fiber blends?



1. to produce fabrics with better combination of performance characteristics
2. to improve spinning, weaving & finishing efficiency
3. to obtain better texture, hand or fabric appearance
4. to minimize fabric cost
5. to obtain cross-dyed or unique color effects



blended yarn

#11

yarn name:

4-ply

yarn type:

spun

twist direction:

S

amount of twist:

medium

yarn appearance:

carded woolen

fiber content:

86% acrylic

10% wool

4% rayon

end uses:



blended yarn

#12

yarn name:

textured

yarn type:

combination

twist direction:

Z

amount of twist:

medium

yarn appearance:

texturized

fiber content:

52% acrylic

48% nylon

end uses:



combination yarn

#13

yarn name:
hand quilting thread

yarn type:
spun & filament

twist direction:
Z

amount of twist:
high

yarn appearance:
combed

fiber content:
68% polyester (core)
32% cotton

end uses:



combination yarn

#14

yarn name:

4 ply with metallic

yarn type:

spun & monofilament

twist direction:

Z

amount of twist:

medium

yarn appearance:

combed

fiber content:

97% mercerized cotton

3% metallic filament

end uses:





environmental concerns and sustainability

- hearing protection needed for workers of rotors used in false-twist texturing process
- opening generates large quantities of dust—breathing issues for workers
- opening, carding & combing produce significant waste—
 - now sold to specialists who produce yarns & other fibers products
 - plant debris & soil sold to gardeners for compost



participation activity: spun yarns



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