CRC for Premium Quality Wool

Wool: the Fibre

Produced for the CRC for Premium Quality Wool undergraduate program by;
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Fibre Classification

- Natural
  - wool
  - cotton
  - silk, cashmere, alpaca
  - mineral
- Regenerated
  - natural raw material
    - cellulose
    - protein (discontinued)
  - rayon
    - ~1900
  - re-launched Tencel
    - 1990's
- Synthetic
  - polyester
    - 1940
  - nylon
    - 1939
  - acrylic
    - 1942
  - polypropylene
    - 1960
  - re-launched fibres
    - 1980's onwards

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Fibre Production

	wool	cotton	synthetic	regenerated
Raw material	amino acids	carbohydrates	petroleum by-products	cellulose
Polymer synthesis	biosynthesis	biosynthesis	synthetic polymerisation	N/A (some modified)
Production unit	follicle	boll	extruder / spinneret	extruder / spinneret
usable form	fibre	fibre	fibre filament	fibre filament

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Fibre Properties

	wool	cotton	polyester	rayon
diameter	15 – 25 µm	7-9 µm (equiv.)	to 5 µm	~ 12 µm
length (processed)	50 – 110mm	20 – 40 mm	able to be specified	able to be specified
strength (fibre)	1.0 (relative)	2.5	3.5	1.3
elongation at break	~40%	5 – 10%	10 – 40%	~25%
shape	elliptical	flat tube	varies	varies
surface texture	scales	convoluted	able to be modified	striated
absorbs water	YES	YES	NO	YES

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Source: Morton, W.E. and Hearle, J.W.S. 1962

Discussion

- Comment on the properties of wool compared to competing fibres
  - see Fibre Properties
- fibre fineness (diameter)
- fibre length
- fibre shape
- tensile properties
- surface properties

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Fibre Comparison: Wool

- relatively coarse
- relatively long
- high degree of fibre length variation
- processed on a long staple system
  - approx. 20 year technology lag
- relatively weak but has good elongation
- absorbs moisture well
  - gives off heat when absorbing moisture
  - finishes well (can be set)
- subject to shrinkage in use (scales)

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Fibre Users: Early Stage

- Topmakers, Commission Combers
  - quantity, diameter, processed length, short fibre content, specified VM, processing efficiency, colour
  - yield, diameter, strength, length, contamination, colour
- Spinners
  - spinning efficiency, yarn evenness, yarn performance, colour, yarn faults
  - diameter, CV diameter, processed length, short fibre content, contamination, colour

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Fibre Users: Later Stage

- **Weavers, Knitters, Dyers, Finishers**
  - yarn construction, yarn performance, fabric performance
  - contamination, fibre type, colour
- **Garment-makers**
  - fabric performance, design, price
  - contamination, colour, fibre type

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Fibre Users: Retail

- **Retailers**
  - price, design
  - colour, fibre type
- **Customers**
  - comfort, easy care, performance, fashion, price
  - colour, fibre type?

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