Yarn Classifications And Numbering Systems
Classification of Short Staple Yarns

Short staple yarns are formed by several different spinning processes.
1. Ring Spinning
2. Open-end Rotor Spinning
3. Air Jet Spinning
4. Wrap Spinning
5. Friction Spinning

Hence, we hear such classifications as ring yarn, rotor yarn, wrap-spun, friction yarn, and air jet yarn. The important thing is that each of these yarns have a different structure and exhibit different properties.

In addition, short staple yarns can be further classified and described as follows:
1. Carded Yarns
2. Combed Yarns
3. Singles Yarns
4. Plied Yarns
5. Novelty Yarns
Spun Yarn Classifications

By Staple Length

**Short (cotton count):**
- Carded Yarn
  - Usually 2" or less in staple length
- Combed Yarn

**Long:**
- Worsted Yarn
- Woolen Yarn
Yarns Spun From Staple Fiber
Yarn Number

- Measure of "linear density" of a yarn, and NOT the diameter or cross-sectional size of the yarn.

- Expressed as the relationship between the weight and length of the yarn.
Yarn Numbering Systems

**Indirect**
Linear density of the yarn is expressed as length (Hanks) per unit weight (pounds).

\[
\frac{\text{Length}}{\text{Unit Weight}} = \frac{\text{Hanks}}{\text{Pound}}
\]

**Direct**
Linear density of the yarn is expressed as weight (grams) per unit length (meters).

\[
\frac{\text{Weight}}{\text{Unit Length}} = \frac{\text{Grams}}{\text{Meters}}
\]

\[\text{Indirect only for cotton:}\]
\[1 \text{ Hank} = 840 \text{ yards}\]
\[20' \text{ yarn} = 20 \text{ Hanks} = 20 (840 \text{ yards})\]
# Yarn Numbering Systems

## I. Indirect

<table>
<thead>
<tr>
<th>Type</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Cotton</td>
<td>( \text{Ne} = \frac{\text{Yards}}{840 \times \text{Pounds}} )</td>
</tr>
<tr>
<td>B. Worsted</td>
<td>( \text{Nw} = \frac{\text{Yards}}{560 \times \text{Pounds}} )</td>
</tr>
<tr>
<td>C. Woolen</td>
<td>( \text{WR} = \frac{\text{Yards}}{1600 \times \text{Pounds}} )</td>
</tr>
</tbody>
</table>

## II. Direct

<table>
<thead>
<tr>
<th>Type</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Denier</td>
<td>( \text{Denier} = \frac{9000 \times \text{Grams}}{\text{Meters}} )</td>
</tr>
<tr>
<td>B. Tex</td>
<td>( \text{Tex} = \frac{1000 \times \text{Grams}}{\text{Meters}} )</td>
</tr>
<tr>
<td>C. D-Tex</td>
<td>( \text{D-Tex} = \frac{10,000 \times \text{Grams}}{\text{Meters}} )</td>
</tr>
</tbody>
</table>
Standard Yarn Numbering Systems With Interconversions

<table>
<thead>
<tr>
<th>System</th>
<th>Cotton (N)</th>
<th>Worsted (N_w)</th>
<th>Woolen Run (WR)</th>
<th>Denier (Den)</th>
<th>Tex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>840-yard hank</td>
<td>560-yard hank</td>
<td>1600 yards</td>
<td>9000 meters</td>
<td>1000 meters</td>
</tr>
<tr>
<td>Mass</td>
<td>1 pound</td>
<td>1 pound</td>
<td>1 pound</td>
<td>grams</td>
<td>grams</td>
</tr>
<tr>
<td>Number Equals</td>
<td>yd / 840 (Lb)</td>
<td>yd / 560 (Lb)</td>
<td>yd / 1600 (Lb)</td>
<td>9000 (gm) meters</td>
<td>1000 (gm) meters</td>
</tr>
<tr>
<td>Cotton (N) =</td>
<td>1</td>
<td>2/3 (N_w)</td>
<td>1.9 (WR)</td>
<td>5315 Den</td>
<td>590.6 Tex</td>
</tr>
<tr>
<td>Worsted N_w =</td>
<td>1.5 (N)</td>
<td>1</td>
<td>2.86 (WR)</td>
<td>7972 Den</td>
<td>885.8 Tex</td>
</tr>
<tr>
<td>Woolen Run WR =</td>
<td>0.525 (N)</td>
<td>0.35 (N_w)</td>
<td>1</td>
<td>2790 Den</td>
<td>310 Tex</td>
</tr>
<tr>
<td>Denier Den =</td>
<td>5315 N</td>
<td>7972 N_w</td>
<td>2790 WR</td>
<td>1</td>
<td>9 (Tex)</td>
</tr>
<tr>
<td>Tex =</td>
<td>590.6 N</td>
<td>885.8 N_w</td>
<td>310 WR</td>
<td>Den 9</td>
<td>1</td>
</tr>
</tbody>
</table>

Examples: Cotton number, \( N_1 = \frac{2}{3} (N_w) \); Woolen run, \( WR = 0.35 (N_w) \); Denier = 5315/N