

**Effect of Knitting Variables on Reference Dimensions**

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**Reference Dimensions**

The dimensions of a fabric, i.e.

- \* Courses per unit length
- \* Wales per unit width
- \* Weight per unit area

measured after laundering using the STARFISH Reference Relaxation procedure

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**Reference Dimensions**

Are determined by the key knitting variables

- \* Yarn Quality (type, count, twist)
- \* Average Stitch Length

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### Yarn Quality Variables

that affect the Reference Dimensions are

- \* Average Yarn Count
- \* Yarn Type
- \* Twist Multiple
- \* Fibre Quality

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### Effect of Count on Loop Size

Finer Yarn

Heavier Yarn

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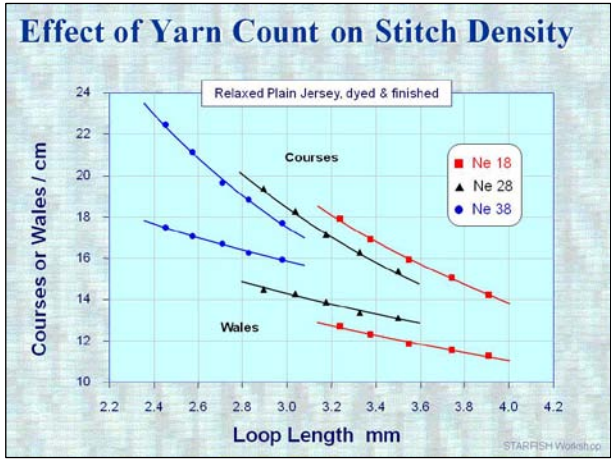
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### Effect of Yarn Count

At the same Stitch Length

Finer Yarn:   
 ➤ Fewer Courses   
 ➤ More Wales   
 ➤ Lighter Weight

Coarser Yarn:   
 ➤ More Courses   
 ➤ Fewer Wales   
 ➤ Heavier Weight

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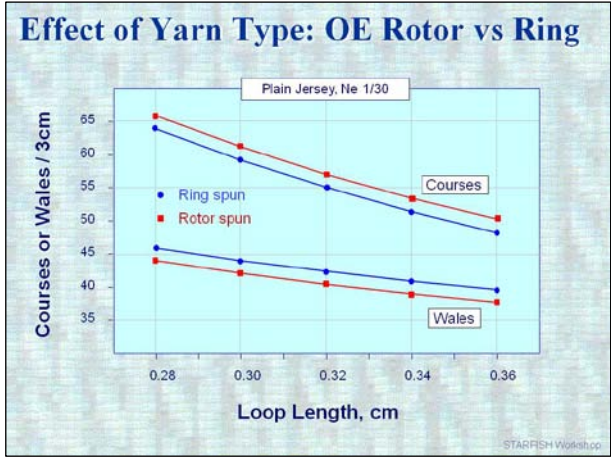
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### Ring Spun vs OE Rotor Spun

At the same Yarn Count & Stitch Length

Ring Spun yarn:   
 ➤ Fewer Courses   
 ➤ More Wales

Rotor Spun yarn:   
 ➤ More Courses   
 ➤ Fewer Wales

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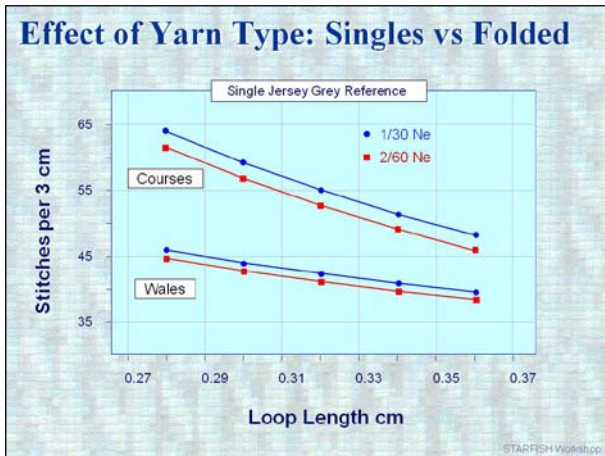
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### Singles vs Folded Yarn

At the same Yarn Count & Stitch Length

Singles Yarn	➤ More Courses
	➤ More Wales
	➤ Heavier Weight
Folded Yarn	➤ Fewer Courses
	➤ Fewer Wales
	➤ Lighter Weight

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### Yarn Twist Multiple

Influenced by

- \* basic fibre quality
- \* fibre preparation
- \* method of spinning
- \* efficiency of spinning
- \* properties required
- \* end use

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### Yarn Twist Multiple

Influences basic Yarn Properties

- strength
- bulk
- hairiness
- stiffness
- abrasion resistance

but also affects Yarn Twist Liveliness

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### Twist Liveliness



For yarns of similar quality

Twist Liveliness is related to the Number of Turns per unit length

- More turns - more twist lively
- Fewer turns - less twist lively

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### High Twist Liveliness Causes

- \* SPIRALITY in Single Jersey fabrics twisting in garments
- \* Higher Density of Courses & Wales in all fabrics
- \* Greater SHRINKAGE up to about 3 percentage points

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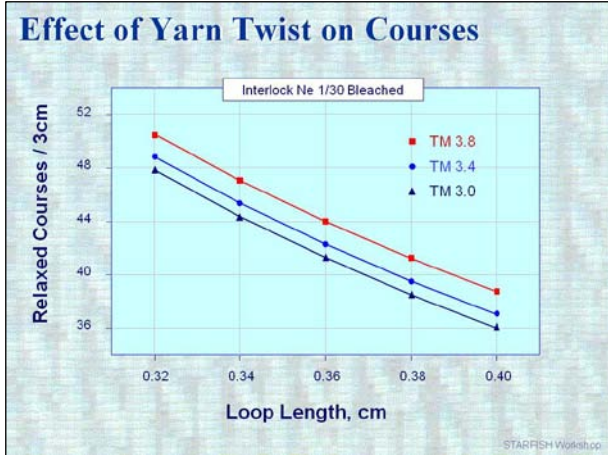
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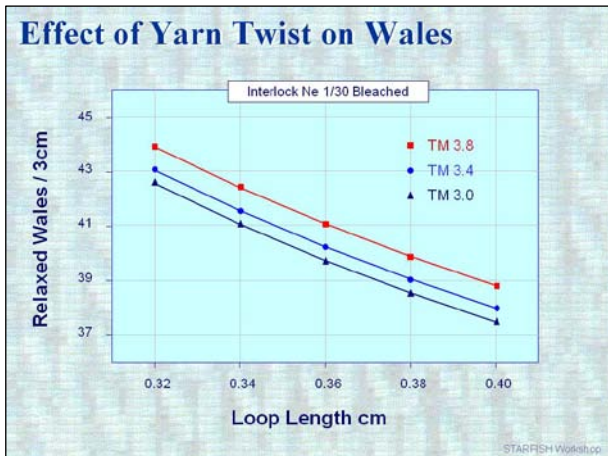
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### Cotton Fibre Quality

Fibre Quality determines

- Yarn Strength
- Yarn Regularity
- Amount of Twist
- Dyeing properties

but also affects Reference Dimensions

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### Effect of Cotton Type

Two matched sets of 27 different Interlock qualities averaged over Twist Multiple & Stitch Length

		Courses	Wales
Ne 22	Texas	12.82	10.42
	California	12.59	10.62
Ne 26	Texas	14.09	11.44
	California	13.69	11.59
Ne 30	Texas	15.03	12.20
	California	14.88	12.48
Mean Fibre Effect %		+1.9	-1.8

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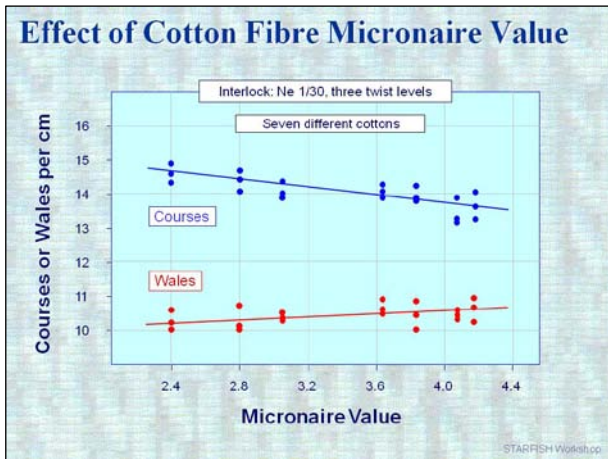
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### Stitch (Loop) Length

**The KEY**  
Dimensional control parameter  
is the average LENGTH of yarn  
in the KNITTED LOOP

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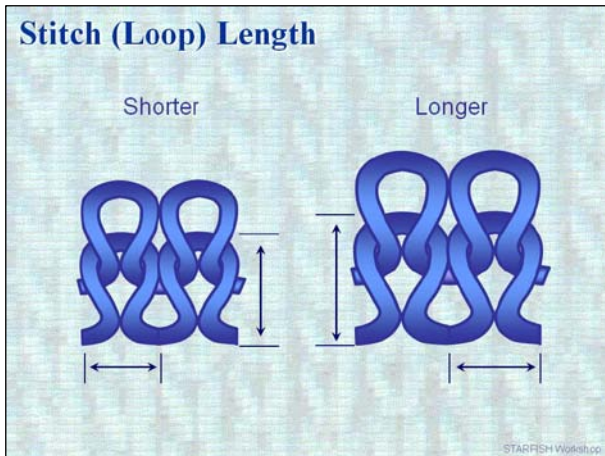
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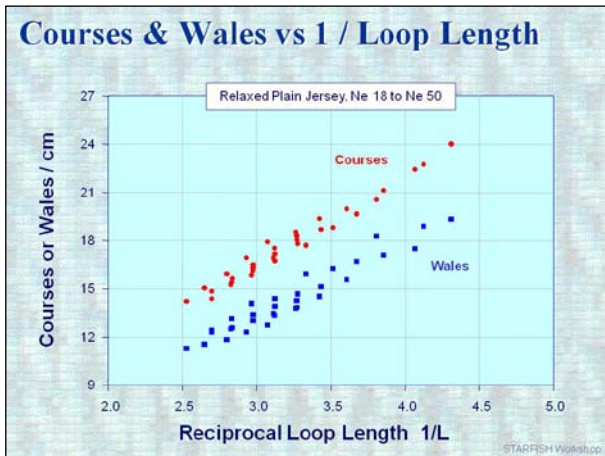
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### Stitch (Loop) Length

For a given Yarn Count

Shorter Stitch      ➤ More Courses  
                           ➤ More Wales  
                           ➤ Heavier Weight

Longer Stitch      ➤ Fewer Courses  
                           ➤ Fewer Wales  
                           ➤ Lighter Weight

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### Crosstuck (piqué) Fabrics

Single	Double	Six-thread
		
 knit		
 tuck		

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### Run-in Ratio (piqué fabrics)

For Crosstuck fabrics with an all-knit course

$$\text{Run-in Ratio} = \frac{\text{Knit \& Tuck Course Length}}{\text{All-Knit Course Length}}$$

Run-in Ratio greater than 1.0  
K&T longer than All-Knit

Run-in Ratio less than 1.0  
K&T shorter than All-Knit

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### Run-in Ratio (piqué fabrics)

- \* Affects fabric appearance
- \* Affects Reference Dimensions because stitch length is different between courses
- \* Affects Reference Weight because total yarn length per unit area is different
- \* Size of the effect depends on Construction

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**Single Crosstuck (piqué)**

Compared to Run-in Ratio = 1.0

Increasing K&T Stitch Length

- decreases Courses & Wales
- decreases Weight

Decreasing K&T Stitch Length

- increases Courses & Wales
- increases Weight

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**Six-thread Crosstuck (piqué)**

Compared to Run-in Ratio = 1.0

Increasing K&T Stitch Length

- decreases Courses & Wales
- increases Weight

Decreasing K&T Stitch Length

- increases Courses & Wales
- decreases Weight

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**It Follows That ...**

For Crosstuck fabrics with an all-knit course

both the All-Knit stitch length, and the Knit & Tuck stitch length must be ...

- Correctly specified
- Accurately measured
- Effectively controlled

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### Two-thread Fleece

Compared to Plain Jersey ...

the presence of an Inlay (backing) yarn causes

- Reduced Course Density
- Reduced Wale Density
- Increased Weight

Wales are affected more than Courses

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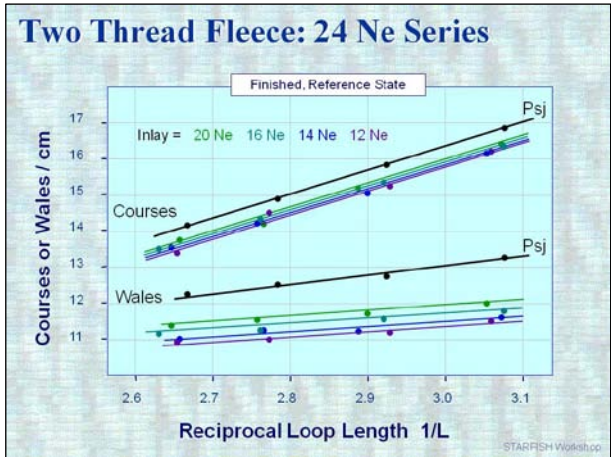
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### Two-thread Fleece

Compared to Plain Jersey

The heavier the Inlay yarn count,  
the greater is the reduction in stitch density

The greater the difference between  
Face and Inlay yarn counts,  
the greater is the difference between  
Plain Jersey and Two-Thread Fleece

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**Two-thread Fleece**

For a given combination of Face & Inlay

Fabric Weight is influenced mainly by the Stitch Length of the Inlay yarn

Fabric Dimensions are influenced mainly by the Stitch Length of the Face yarn

Correct specification, accurate measurement and effective control of both stitch lengths is essential

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**Knitting Machine Variables**

Machine Gauge & Diameter  
Do not affect the Reference Dimensions provided that the knitted Yarn Count and Stitch Length are the same

Number of Needles  
Determines the Reference Width  
 $Width = \text{Needles} / \text{Wales}$

Knitting specification must always include Number of Needles not just Gauge & Diameter

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