Effect of Wet Processing on Reference Dimensions

Reference Dimensions

Fundamental fabric dimensions are
- Courses per unit length
- Wales per unit width

Shrinkage is the difference between
- As-delivered dimensions
- Reference dimensions

Reference Dimensions are determined by
- The size of the knitted loop
- The shape of the knitted loop

Loop Size and Shape

Are determined by
- Knitting Variables
- Wet Process Variables
- Finishing Variables

Key Knitting Variables

- Stitch Length (loop length)
- Yarn Type & Quality
- Yarn Count

Wet Process Variables

- Severity of preparation
- Depth of shade
- Length tensions
- Aggressive agitation
- Time

Wet Processing

Can cause
- Changes in the yarn weight
- Changes in the average loop length
- Changes in the loop shape

In addition
- Different process types have different effects

Reduction in Yarn Weight

Due to removal of impurities and loose fibre

Cumulative weight losses due to removal of impurities and fibre during a full standard bleach are normally between -4 and -6%

Increase in Yarn Weight

Due to additions of dyestuffs and chemicals

Maximum weight gain due to dyestuff addition is unlikely to exceed +5%

Net Weight Change

Is the result of
- losses in preparation
- gains in dyeing, etc.

Is influenced by
- severity of fabric preparation
- length of cycle and depth of shade
- fibre and yarn quality

Usually there is a net weight loss

Net Weight Change %

STARFISH Standard Depth of Shade options have allowances built in, e.g.

White	- 5.5%
Medium	- 4.0%
Deep	- 3.0%
Full	- 2.0%

Reduction in Loop Length

Average yarn shrinkage

Standard processing	-1 to -2%
Open mercerising	-2 to -4%
Tubular mercerising	up to -8%

Change in Yarn Count

Is the net result of
- yarn shrinkage
- process weight loss / gain

After standard processing
- yarn tex is usually reduced

After mercerizing
- yarn tex is usually increased

Usually there is a net weight loss

Net Effect on Yarn Tex

After standard processing

Shade	Range
Pale	-4% to -3%
Medium	-2% to -1%
Med/Deep	-1% to 0%
Deep	no change

Net Effect on Yarn Tex

After mercerizing

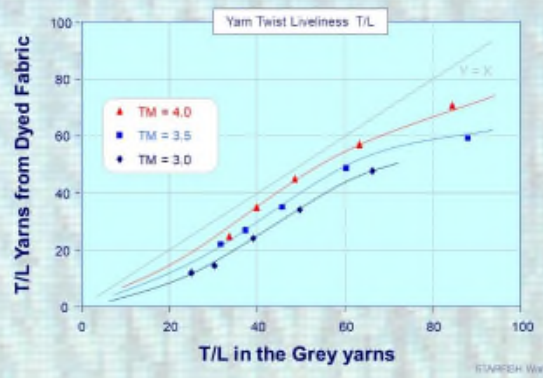
Shade	Open Width	Tubular
Pale	-3% to -1%	+1% to +3%
Medium	-1% to 0%	+3% to +5%
Med/Deep	+1% to +3%	+6% to +8%
Deep	+3% to +5%	+8% to +10%

Changes in Loop Shape

Changes in yarn characteristics …
- Yarn twist liveliness
- Fibre and yarn stiffness
- Yarn specific volume

Affect the space that the loop occupies
- Course / Wale ratio
- Fabric thickness

Wet Processing and Twist Liveliness



Effect of Wet Processing

Loop shape is affected by …

- amount of length tension
- aggressive agitation
- processing time

… which are influenced by

- machine type and design
- loading and liquor ratio
- running speed

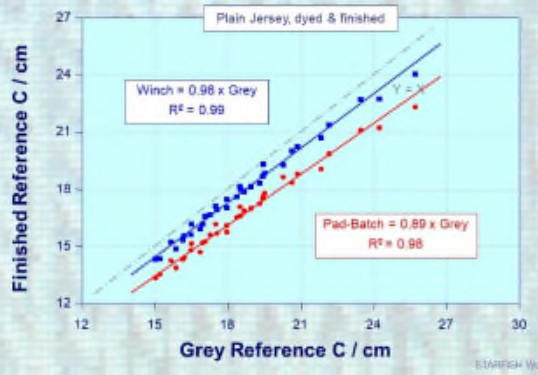
Effect on Course Density

High length tensions reduce Courses
Continuous processes tend to generate higher tensions than winches and jets.
Fabrics tend to be longer.

Thus, Course Density is mainly affected by

- stitch length
- processing tension

Effect of Wet Process on Course Density



Effect on Wale Density

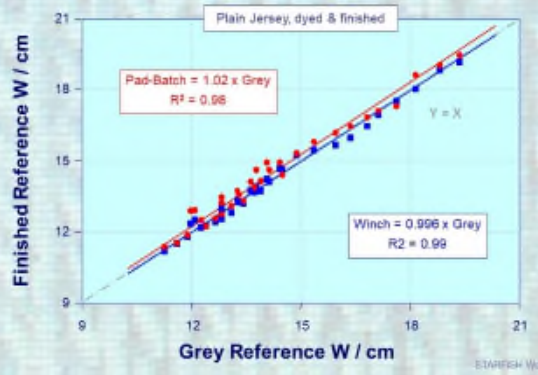
High length tensions can increase Wales

Aggressive agitation can reduce Wales

High pressure jets disrupt the yarn structure more than winch or pad-batch processes.
Fabrics tend to be wider.

Wale density is mainly affected by the physical characteristics of the yarn

Effect of Wet Process on Wale Density



Effect of Wet Processing

Longer processing times can increase the effects of tension & especially of agitation on sensitive fabric types, e.g. Interlock

Fabric construction and yarn type may also influence sensitivity

- tight vs slack
- combed vs carded
- OE rotor vs ring spun

STARFISH

Provides a wide range of choices

- 10 standard process options
- 8 standard depth of shade options

Provides a Calibration facility

- calibrate for course & wale density
- calibrate for process weight loss

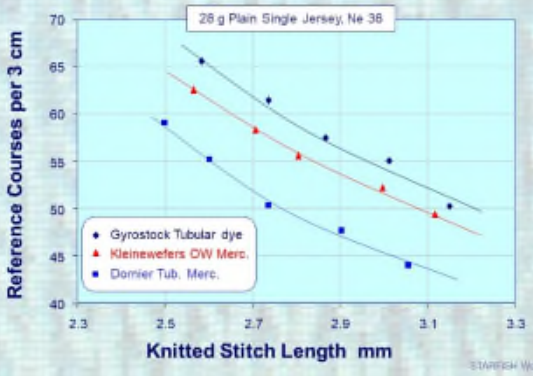
Effect of Mercerizing

Potentially large changes in yarn count and loop length

Potentially large changes in loop shape

The size of the changes is influenced strongly by the mercerizing conditions

Mercerizing: Tubular vs Open Width



Effect of Finishing

Mechanical Finishing processes
e.g. calendering or compacting
mainly affect *delivered* dimensions

Chemical Finishing processes
e.g. crosslinking (resin finishing)
also affect Reference Dimensions

Tubular vs Open Mercerizing

Tubular mercerized fabrics

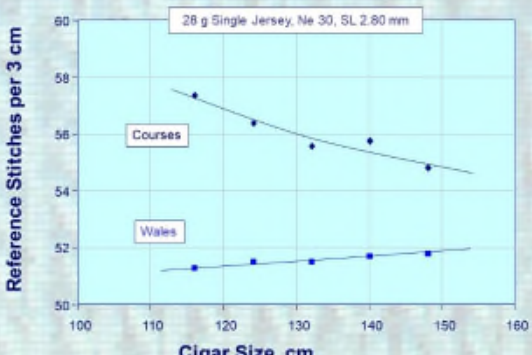
- more wales (narrower)
- fewer courses (longer)

Open-width mercerized fabrics

- fewer wales (wider)
- more courses (shorter)

Dornier Mercerizer: Cigar Size

Dornier Mercerizer: Cigar Size



Width Stretch in Mercerizing

Increase in processing width (tension)

- reduced courses (longer fabric)
- slightly increased wales (narrower)

Finishing Processes

- Crosslinking
- Drying
- Calender / Compactor

Effect of Finishing

Mechanical Finishing processes
e.g. calendering or compacting
mainly affect *delivered* dimensions

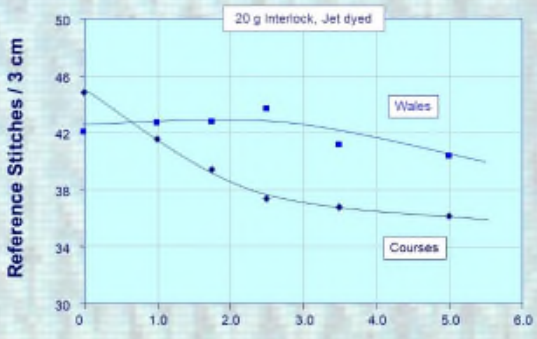
Chemical Finishing processes
e.g. crosslinking (resin finishing)
also affect Reference Dimensions

Resin Finishing

Resin Finishing changes the Reference Dimensions by altering the shape of the loop - permanently

The size of the effect depends on resin concentration

Effect of Resin on Courses and Wales



Resin and Spirality

Can Resin Finishing improve spirality ?

Yes, but the reduction is small, and the disadvantages are significant

Spirality: Effect of Resin Finish

		Del.	Ref.
Mill 1: 28g plain jersey Ne 1/30, SL 2.72 mm	Grey	10.2	15.3
	Dyed	3.3	8.8
	Resin	2.5	8.4
Mill 2: 24g plain jersey Ne 1/30, SL 2.80 mm	Grey	10.1	17.2
	Dyed	8.3	12.7
	Resin	3.6	9.2

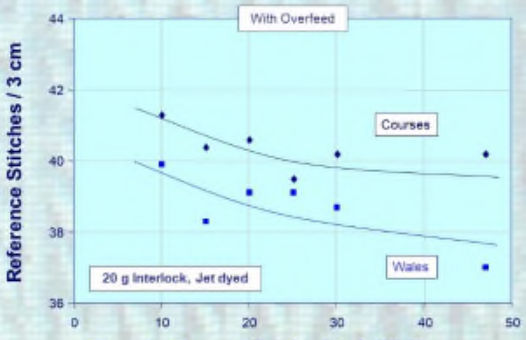
Drying Conditions

Large tensions in drying can permanently alter the Reference Dimensions

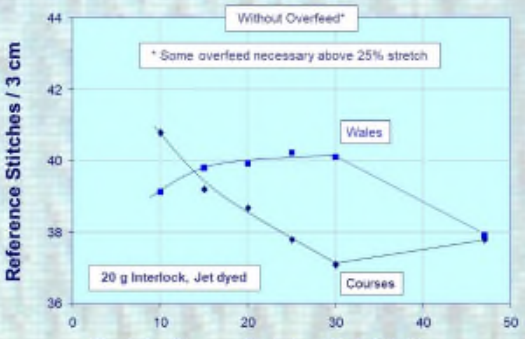
Normal tensions have only a small effect

Different machines may have different effects

Width Stretching in Stenter Drying



Width Stretching in Stenter Drying



Effect of Drying Machinery

24g plain jersey, Ne 1/30, SL 2.80 mm

	Reference Dimensions		
Dyed only	C/3cm	W/3cm	Wt gsm
Winch/Kiefer	60.1	47.3	161
Winch/Stenter	60.4	46.4	157
Jet/Kiefer	60.5	46.3	153
Jet/Stenter	60.6	45.7	154

Effect of Drying Machinery

24g plain jersey, Ne 1/30, SL 2.80 mm

	Reference Dimensions		
Dyed + Resin	C/3cm	W/3cm	Wt gsm
Winch/Kiefer	56.9	45.6	152
Winch/Stenter	57.8	45.0	152
Jet/Kiefer	57.6	45.5	151
Jet/Stenter	57.5	44.6	148

Drying Conditions

Drying machinery can affect Reference Dimensions

BUT

The effects are likely to be small and mainly in the width

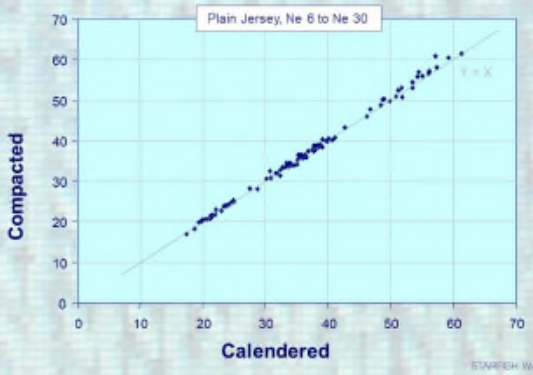
Calendering & Compacting

Calendering and Compacting

do not affect the

Reference Dimensions

Effect of Compacting: Reference Courses



Effect of Compacting: Reference Wales