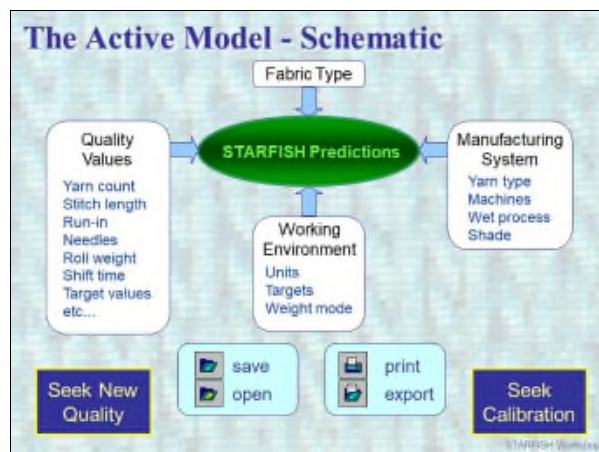# The STARFISH Software

Basic Principles

STARFISH is a Simulator

It models the production and processing of certain cotton circular knitted fabrics, and predicts their expected dimensional properties

Simulation models comprise:

* Fabric Type
* Manufacturing System
* Working Environment
* Quality Values

The Active Model - Schematic

Fabric Type

Quality Values
Yarn count
Stitch length
Run-in
Needles
Roll weight
Shift time
Target values
etc...

STARFISH Predictions

Manufacturing System
Yarn type
Machines
Wet process
Shade

Working Environment
Units
Targets
Weight mode

Seek New Quality

save
open

print
export

Seek Calibration

Fabric Type

Models begin with the Fabric Type

* Plain Interlock
* Plain 1x1 Rib
* Plain 2x2 Rib
* Plain Single Jersey

* Double Crosstuck
* Single Crosstuck
* Six-thread Crosstuck
* Two-thread Fleece

Crosstuck fabrics are often called Piqué or Lacoste
Exact constructions are given in STARFISH Help

Manufacturing System

Materials, equipment and wet processing

Yarn Type	Ring, OE rotor Single, Folded
Knitting Machines	Machine park database
Wet Processing Type	Standard or User-defined
Depth of Shade	High white to deep black (process weight loss)

Working Environment

Determines how calculated data are presented

* **Units of calculation**

  Length: inch, yard - cm, mm, metre

  Weight: oz, lb - g, kg

  Count: cotton (Ne), metric (Nm), tex

* **Calculation priorities**

  Performance targets (e.g. weight, shrinkages)

  Weight mode (fixed or variable width)

Quality Values

Data Values that define the specification

* **Knitting Quality**   e.g.

  Yarn count   30.0   Ne

  Stitch / course length   2.80   mm

  Machine characteristics   2256   needles

* **Finishing Quality**

  Performance target values   5.0   % shrinkage

  Trimming allowance   4.0   cm

Setting up the Active Model

Current Model for the Active Fabric Type

* **Manufacturing System**
  ➤ select one yarn type, process, shade
  ➤ select up to 9 knitting machines

* **Working Environment**
  ➤ select working units (if necessary)
  ➤ select calculation priorities (if necessary)

* **Quality Values**
  ➤ enter up to 9 yarn count values
  ➤ enter required performance target values

Speedy Working

A database containing all of your machines (and others if you like) is maintained for rapid easy access.

Individual models can be saved to a file for later recall or modification.

"Last Active" model is always saved, so you can re-start exactly where you left off.

"Default" model profiles, which you customise, are maintained for a rapid start to brand new projects.

Permitted Data Ranges

A very wide range is allowed in data entry, so as to permit experimentation.

* Yarn count (number): 5 to 100s cotton count

* Machine gauge: 5 to 40 npi

* Machine diameter: 5 to 65 inches

* Machine speed factor: up to 1500

* Knitted tightness factor: 8 to 20 (dep. on fabric type)

※ Knitted tightness factor is defined in STARFISH Help

Units of Measurement

For most data items, you can choose your preferred units. For example ...

Yarn count	※	cotton count, metric count, tex
Stitch length	※	inch, cm, mm
Roll weight	※	lb, kg
Fabric weight, yield	※	oz/sq yd, gsm, yd/lb, m/kg, etc.
Fabric width	※	inch, cm (tubular or open)
Courses & wales	※	per inch, /cm, /3cm, /10cm, etc.

Non-commercial Data Entry

STARFISH will issue a warning ...

If your data entries lead to possibly non-commercial production conditions, or unacceptable performance of the finished fabric.

For example, you will get a tightness factor warning if your knitting conditions will cause the tightness factor of a plain jersey fabric to exceed 18.0.

And you will get a Shrinkage warning if your model conditions result in a shrinkage prediction of more than 15%.

Making Predictions

Every time you enter data or make a new selection, STARFISH immediately re-calculates the expected properties of the specified fabric qualities ... (courses, wales, weight, width, shrinkage, etc) ...

Based on the selected Manufacturing System, Working Environment, and Quality Values ...

Using the STARFISH Reference Equations

Viewing the Results

Four ways to look at the model output

View Predictions by Qualities
➢ all qualities, one machine at a time

View Predictions by Machines
➢ all machines, one quality at a time

View Production Data
➢ kg/hr, kg/shift, hr/roll, revs/roll, etc. - all machines

View Specification
➢ knitting spec, finishing spec, etc. - per quality

Seek New Quality

If you are not sure what yarn or machine to choose ...

You enter the required weight and width, then click on the "Test" button ...

STARFISH will suggest a yarn count and stitch length and a number of machine needles that will deliver the specified weight and width.

You can force STARFISH to use a particular yarn or machine. You can specify maximum shrinkage levels and a maximum range of tightness factor.

Seek Calibration

Standard STARFISH predictions are based on average conditions, as represented by the STARFISH database.

You can train STARFISH to take account of your own, specific local conditions.

You do this simply by entering your own test data for a representative yarn type, fabric quality, and wet processing route.

The resulting "User Defined Process" can be named and saved to a special file. It then becomes a Standard STARFISH processing option.

On-line Help System

A comprehensive Help system is provided.

This is not just the normal type of Help - explaining how the program works and how to operate the various features (though these are included of course).

There is also a comprehensive technical reference, including detailed background know-how on circular knitted fabric technology.

A lot of this stuff is unpublished material that you can not find in text books.

Outputs are Dynamic

One important difference between a STARFISH simulation and a real-life fabric development is that the STARFISH predictions are "alive".

You can alter any Input (e.g. course length) and see at once the effect on the Outputs (e.g. fabric weight and width) as STARFISH re-calculates instantly.

You can do more fabric development simulations in an hour with STARFISH than you could do real-life developments in a year.

….. even supposing you could afford the time, materials, and production resources.

Trial and Error Development

Using the STARFISH software is a lot faster, cheaper and more reliable than making real fabrics with real yarns, machines, people, and company resources.

For example:

> You can nudge the stitch length up or down in small increments, whilst holding the shrinkage constant.

`[ 2.830 ] mm`

STARFISH immediately updates the weight and width, so you can quickly find out whether the required performance targets can be achieved with the chosen yarns and machines.

Faster, Cheaper, More Reliable

Faster - because each simulation takes only a few minutes of your time.

Cheaper - because you don't have to buy unnecessary yarns, or knit, dye and finish unnecessary fabrics, or needlessly occupy valuable production resources.

More Reliable - because STARFISH is not affected by day to day variations in materials, production and laboratory testing.

STARFISH Version 6.5

The faster, cheaper, more reliable way of doing product development.