



## STARFISH Model Environment Processing Parameters

### Processing Parameters

The Processing Parameters define how the grey or machine state knitted fabric is converted into finished fabric.

The Grey Fabric is specified by the Yarn Type, the Yarn Count and Stitch Length and the Number of Active Needles in the Knitting Machine.

The Finished Fabric is specified by the Wet Process, the Depth of Shade and the Finishing Quality Target Values.

The choice of Yarn Type, Wet Process and Depth of Shade together with the Knitting Quality Values determine the Reference Dimensions of the Finished Fabric.

The delivered dimensions are calculated from the Reference Dimensions using the Finishing Quality Target Values that have been entered for the two properties of the Finished Fabric that have been chosen as Finishing Targets.

The choice of Finishing Targets determines which two properties of the Finished Fabric are held constant when changes are made either to the Knitting Parameters or to the selections for Yarn Type, Wet Process and Depth of Shade.

The Trimming Allowance option enables the Fabric Width predictions to be adjusted for Open Width Processed Fabric.

The Knitting Parameters and the Finished Fabric Properties are calculated and presented in the chosen Units. When a change is made either to the Fabric Manufacturing System, the Working Environment or the individual Quality Values STARFISH recalculates the data and displays the results.

The following topics provide additional information on the processing options that are available.

- Wet Process
- Depth of Shade
- Finishing Targets
- Trimming Allowance

### Wet Process

The Wet Process is one of the selections that specify the Fabric Manufacturing System. The choices made for the Fabric Manufacturing System affect the Reference Dimensions of the finished fabric. The Reference Dimensions determine the balance of fabric properties that can be obtained in the finished as delivered fabric.

The choice of Wet Process, together with the selections for the Yarn Type and Depth of Shade determine which of the standard STARFISH Prediction Equations will be used to calculate the Reference Courses, Wales, and Weight of the Finished Fabric.

For this reason, only one Wet Process can be selected for use in a Model at a time. The chosen Wet Process is applied to all Qualities. However, within each Model the Wet Process can be changed repeatedly and independently of any other selections.

The standard Wet Process options provided model the effect of the various combinations of length tension and mechanical action that occur in different types of preparation and dyeing equipment on the relative length and width of the finished fabric.

They represent average conditions that have been derived from the changes in Course Density and Wale Density observed in the STARFISH Database fabrics.

The Standard Wet Process options simulate probably the full range of conditions that might be encountered. However, it is important to establish from measurements made on representative samples taken from actual production which options are the most appropriate for use in an individual mill.



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### Wet Process Classifications

For convenience the Standard Wet Process options have been classified according to the general class of preparation / dyeing machine that may be used. They do not refer to specific makes or models of machinery. In addition, due to the range of possibilities within each broad classification, there is some overlap between the classes.

For example,

The **True jet classification** is representative of the older style of jet machine where the fabric is driven round the dye vessel primarily by the flow of liquor from high impulse jets.

The **Winch-jet classification** includes both winch beck machines and the modern overflow or softflow jets where the passage of the fabric is assisted by the incorporation of a winch wheel.

The **Continuous classification** includes both continuous preparation and dyeing and also pad batch processes where the fabric can be subjected to higher length-wise tensions.

The **Mercerise: Open Width classification** refers to fabrics which have been piece Mercerised prior to bleaching and / or dyeing on an open width mercerising machine.

The **Mercerise: Tubular classification** refers to fabrics that have been piece mercerised prior to bleaching and / or dyeing on a tubular mercerising machine.

### Wet Process Selection

The Wet Process is one of the selections that specify the Fabric Manufacturing System. Only one Wet Process can be selected at a time. However, within each Model the Wet Process can be changed repeatedly and independently of all the other selections.

The chosen Wet Process together with the selections for the Yarn Type and Depth of Shade determine the Finished Reference Dimensions for all of the specified Knitting Qualities in the Model.

#### The Standard Wet Process options provided are:

- True jet: High impulse
- Winch-jet: Low tension
- Winch-jet: Medium tension
- Winch-jet: High tension
- Continuous: Low tension
- Continuous: Medium tension
- Continuous: High tension
- Mercerise: Open-width
- Mercerise: Tubular Low tension
- Mercerise: Tubular High tension

#### **Note:**

The Standard Wet Process options complement the Standard Depth of Shade options.

#### **Active Model**

The Active Wet Process is chosen from the option list in the Active Wet Process dialog. The Active Wet Process can be either a Standard Wet Process or a User Defined Process.

#### **Notes:**

- If a User Defined Process is selected, STARFISH checks the Active Yarn Type selection. If the UDP was originally created for a different Yarn Type to the Active Yarn Type a Warning Message is generated. The Yarn Type corresponding to the selected UDP is restored to the Active Model. The Active Yarn Type can then be changed using the Active Yarn Type dialog. STARFISH will automatically adjust the Calibration Ratios to account for the different Yarn Type.
- When the Active Wet Process is changed the Finished Fabric Properties data are recalculated.



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### Use as Default check box

The Active Wet Process can also be designated the Default Wet Process for the Active Fabric Type by turning ON the Use as Default check box.

To change the Default Wet Process for any other Fabric Type, use the Default Wet Process dialog.

#### **Note:**

A User Defined Process cannot be designated as a Default Wet Process. If the Active Wet Process is a User Defined Process the Use as Default check box is disabled.

### Default Models

The Wet Process for the Default Models is chosen from the Default Wet Process dialog.

#### **Note:**

Changing the Default Wet Process Selections affects only the Default Models for the selected Fabric Types. The Wet Process currently selected for use in the Active Model or in any of the Current Models is not affected.

### Wet Process Calibration

The Standard Wet Process options model the effect of the various combinations of length tension and mechanical action that occur in different types of preparation and dyeing equipment on the relative length and width of the finished fabric.

Most of the time one of the Standard Wet Process options will predict the effect of wet processing with sufficient accuracy. However, if the average results obtained in an individual mill are significantly different from those provided by one of the Standard Wet Process options then the Calibration facility allows the output of the standard equations to be modified to take account of these differences.

Calibration is carried out in the Prediction Window: Seek Calibration by adjusting the standard STARFISH Predicted Values for the Finished Reference State Courses, Wales, Weight, Width, Yarn Count and Stitch Length for one specific Fabric Quality in the Active Model. The Active selections for the Yarn Type, Wet Process and Depth of Shade determine which of the standard STARFISH prediction equations will provide the basis for the Calibration.

The Standard Wet Process options are provided with two values that represent numerically the relative effect of the Wet Processing on the number of Reference Courses and Wales in the fabric compared to those which would be found in a "Standard Grey Quality", measured in the Reference State.

These values are described as "Calibration Ratios". The values are different for each Fabric Type and for each specific combination of Yarn Type, Wet Process and Depth of Shade. They appear in the Active Model Memory Prompt next to Calibration.

During Calibration, changes to the Reference Values for the Courses and Wales change the STARFISH Calibration Ratios. The new Calibration Ratios are displayed in the Calibration Ratios Frame and are also updated in the Active Model Memory Prompt.

Once a Standard Yarn Type, Wet Process and Depth of Shade combination has been Calibrated it can be given a Name and Saved as a User Defined Process. A User Defined Process can be retrieved from the UDP files via the Active Wet Process option list for use in any subsequent Model for the same Fabric Type and Yarn Type.

#### **Note:**

During Calibration of the Courses and Wales the Process Name changes to "UDP - not saved". If the Fabric Weight is calibrated also then the Shade Name changes to Udp. The Active Wet Process and Depth of Shade are not affected until the Calibration is Applied to the Active Model.

### Depth of Shade

The Depth of Shade is one of the selections that specify the Fabric Manufacturing System. The choices made for the Fabric Manufacturing System affect the Reference Dimensions of the finished



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fabric. The Reference Dimensions determine the balance of fabric properties that can be obtained in the "as delivered" finished fabric.

The choice of Depth of Shade together with the selections for the Yarn Type and Wet Process determine which of the standard STARFISH Prediction Equations will be used to calculate the Reference Courses, Wales and Weight of the Finished Fabric.

For this reason, only one Depth of Shade can be selected for use in the Active Model at a time. The chosen Depth of Shade is applied to all Qualities. However, within each Model the Depth of Shade selection can be changed repeatedly and independently of any other selection.

The Standard Depth of Shade options provided model the changes in yarn length and yarn weight that occur during the preparation and dyeing of the fabric. From these changes the Net Process Weight Change % is calculated.

The Standard options represent average conditions that have been derived from the range in Net Process Weight Change observed in the STARFISH Database fabrics.

It is important, however, to establish from measurements made on representative samples taken from actual production which option is the most appropriate for use in an individual mill.

### Depth of Shade Classifications

The Standard Depth of Shade options have been classified and given arbitrary descriptors according to the approximate Depth of Shade that they represent. These classifications also include a value that indicates the nominal average Net Process Weight Change % for the shade.

As an additional guideline, the approximate nominal percentage dyestuff on the weight of fabric in the dyebath, for each classification, is provided in the following table.

However, it is important to remember that the actual percentage of dyestuff required to achieve a particular Depth of Shade and the actual Net Process Weight Change % that will result depends on many factors. For example, the specific combination of conditions and equipment available in a particular mill, the Fabric Type, the Yarn Quality and the class of dyestuff used etc.

The white, pastel and light classifications assume a full Bleach preparation, the medium and medium + classifications a half bleach, and the deep, heavy and full classifications a normal Scour.

**The Standard Depth of Shade classifications are:**

Descriptor	% Net Weight Change	% dye o.w.f
White	[ - 5.5 ]	< 0.5
Pastel	[ - 5.0 ]	0.5 - 1.5
Light	[ - 4.5 ]	1.5 - 2.5
Medium	[ - 4.0 ]	2.5 - 3.5
Medium +	[ - 3.5 ]	3.5 - 4.5
Deep	[ - 3.0 ]	4.5 - 5.5
Heavy	[ - 2.5 ]	5.5 - 6.5
Full	[ - 2.0 ]	> 6.5

#### Note:

The Standard Depth of Shade options complement the Standard Wet Process options.

### Depth of Shade Selection

The Depth of Shade is one of the selections that specify the Fabric Manufacturing System. Only one Depth of Shade can be selected at a time. However, within each Model the Depth of Shade can be changed repeatedly and independently of all the other selections.

The chosen Depth of Shade together with the selections for the Yarn Type and Wet Process determine the Finished Reference Dimensions for all of the specified Knitting Qualities in the Model.

**The Standard Depth of Shade options provided are:**

- White [ - 5.5 ]
- Pastel [ - 5.0 ]
- Light [ - 4.5 ]



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- Medium [ - 4.0 ]
- Medium + [ - 3.5 ]
- Deep [ - 3.0 ]
- Heavy [ - 2.5 ]
- Full [ - 2.0 ]

### ▶ **Note:**

The Standard Depth of Shade options complement the Standard Wet Process options.

### **Active Model**

The Active Depth of Shade is chosen from the option list in the Active Depth of Shade dialog.

### ▶ **Note:**

If the Active Depth of Shade is changed, the Finished Fabric Properties data are recalculated.

### **Use as Default check box**

The Active Depth of Shade can also be designated the Default Depth of Shade for the Active Fabric Type by turning ON the Use as Defaults check box.

To change the Default Depth of Shade for any other Fabric Type, use the Default Depth of Shade dialog.

### **Default Models**

The Depth of Shade is chosen for the Default Models using the Default Depth of Shade dialog.

### ▶ **Note:**

Changing the Default Depth of Shade Selections affects only the Default Models for the selected Fabric Types. The Depth of Shade currently selected for use in the Active Model or in any of the Current Models is not affected.

## **Depth of Shade Calibration**

The Standard Depth of Shade options model the changes in yarn length and yarn weight that occur during the preparation and dyeing of the fabric. From these changes the Net Process Weight Change % is calculated.

Most of the time one of the Standard Depth of Shade options will predict the average changes that take place with sufficient accuracy. However, if the average results obtained in an individual mill are significantly different from those provided by one of the Standard Depth of Shade options then the Calibration facility allows the output from the Standard Equations to be adjusted to take account of these differences.

Calibration is carried out in the Prediction Window: Seek Calibration by adjusting the standard STARFISH Predicted Values for the Finished Reference State Courses, Wales, Weight, Width, Yarn Count and Stitch Length for one specific Fabric Quality in the Active Model. The Active selections for the Yarn Type, Wet Process and Depth of Shade determine which of the standard STARFISH prediction equations will provide the basis for the Calibration.

During Calibration, changes to the Reference Values for the Yarn Count and Stitch Length alter the individual Values for the Yarn Shrinkage and the Yarn Weight per unit length, and the cumulative Value for the Net Process Weight Change %.

If the Value for the Net Process Weight Change is altered directly then STARFISH will recalculate the individual values for the Yarn Shrinkage and Yarn Weight per unit length and the Reference Yarn Count and Stitch Length automatically.

Changes to the Reference Yarn Count and Stitch Length primarily affect the Reference Weight of the Fabric however they also cause small changes to the Reference Courses and Wales as well.

The new Calibration Values for Yarn Shrinkage and Yarn Weight per unit length are displayed in the Net Change frame. The new Value for the Net Process Weight Change % is displayed in the Process Weight Change Frame and is also notified next to Wt. Change in the Active Model Memory Prompt.



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Once a Standard Yarn Type, Wet Process and Depth of Shade combination has been Calibrated it can be given a Name and Saved as a User Defined Process. A User Defined Process can be retrieved from the UDP files via the Active Wet Process option list for use in any subsequent Model for the same Fabric Type and Yarn Type.

### ► **Note:**

During Calibration of the Courses and Wales the Process Name changes to "UDP - not saved". If the Fabric Weight is calibrated also then the Shade Name changes to Udp. The Active Wet Process and Depth of Shade are not affected until the Calibration is Applied to the Active Model.

## Finishing Targets

The Finishing Targets are those two properties of the finished fabric that are chosen to be held constant when changes are made either to the Knitting Parameters or to the selections for Yarn Type, Wet Process or Depth of Shade.

The Finishing Targets options enable fabric development problems to be approached from two different perspectives – either from the point of view of the Customers Performance Targets or from the point of view of the Finishers Control Targets.

The Customers **Performance Targets** are most commonly the specified fabric weight, width and maximum shrinkage levels demanded in the finished delivered fabric.

**Finishing Control Targets** are those specific Fabric Properties that the dyer and finisher attempts to control, in order to guarantee that the customer's Performance Targets shall be met. Specifically, they are the smallest number of fabric properties which, if held constant, will guarantee constant values for all of the Performance Targets.

The dimensions and properties of a knitted fabric are linked by strict mathematical rules. If two properties of the finished fabric are specified (one for the width and one for the length) then for a given Fabric Quality all of the other properties are predetermined.

The Finishing Targets options enable the Target Values of different combinations of fabric properties to be held constant when changes are made either to the knitting or to the processing parameters. In this way the fabric production specification can be fine-tuned such that the optimum combination or balance in the finished fabric properties can be discovered.

Perhaps more importantly, these options provide the means for discovering whether or not a particular combination of Performance Targets can actually be achieved with the particular combination of Yarns, Knitting Machines and Processing equipment available to the Fabric Manufacturer and enable alternate solutions to be discovered very rapidly.


## Finishing Targets Selection

**The Finishing Targets options provided are:**

- Length and Width Shrinkage
- Courses and Wales
- Weight and Width
- Weight and Courses
- Length Shrinkage and Width
- Weight and Length Shrinkage
- Courses and Width

### **Active Model**

The Active Finishing Targets are chosen from the option list in the Active Finishing Targets dialog.

 The properties selected as Finishing Targets are indicated in the Predictions Tables by the Targets Symbol.

When a different pair of targets is chosen the targets symbols move to indicate the new selections.



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### ► **Note:**

Changing the Finishing Targets selection does not affect the Values of the Finished Fabric Properties.

### **Use as Default check box**

The Active Finishing Targets can also be designated the Default Finishing Targets for the Active Fabric Type by turning ON the Use as Default check box.

To change the Default Finishing Targets for any other Fabric Type, use the Default Finishing Targets dialog.

### **Default Models**

The Finishing Targets for the Default Models are chosen from the Default Finishing Targets dialog.

### ► **Note:**

Changing the Default Finishing Targets Selections affects only the Default Models for the selected Fabric Types. The Finishing Targets currently selected for use in the Active Model or in any of the Current Models is not affected.

## **Finishing Targets Units**

Finishing Targets are those two properties of the finished fabric that are chosen to be held constant while changes are made either to the Knitting Parameters or to the Yarn Type, Wet Process or Depth of Shade.

The Units used to display the Target Values for the chosen Finished Fabric Properties are those that have been selected for the individual properties.

### **Active Model**

The Active Units are selected for each fabric property individually from the option lists on the dialogs that can be accessed from the Change Menu, or by clicking on one of the buttons in the Active Toolbar.

### ► **Note:**

The Values are presented in the chosen Units. If the Units are changed then the associated Values are converted automatically.

### **Default Models**

The Units for the Default Models are selected for each Fabric Type individually using the appropriate Tab in the Default Units dialog.

### ► **Note:**

Changing the Default Units selections affects only the Default Models for the selected Fabric Types. The Units currently selected for use in the Active Model or any of the Current Models are not affected.

## **Finishing Targets Values**

### **Active Model**

The Values for the Finished Fabric Properties are calculated dynamically according to the selections for the Fabric Manufacturing System, the Working Environment and the entered Quality Values.

When a change is made to the Active Model Environment the values for the Fabric Properties are recalculated.

The Target Values for the two properties chosen as Finishing Targets are entered using the Edit Column data entry boxes adjacent to the Finished Fabric section of the Predictions Tables in the View By Quality and View By Machine.



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New Values can be entered either directly by typing a new value for one of the Target Properties or indirectly by changing one of the other properties that affect the Value of the Target Property. e.g. changing the Length Shrinkage will change the Course Density.

When a new value is entered the Dependent Fabric Properties are recalculated and the Predictions Tables updated.

When a change is made either to the Knitting Quality, or to the Yarn Type, Wet Process, or Depth of Shade, STARFISH attempts to maintain the Target Values when re-calculating the values for the other fabric properties.

Depending on the Finishing Targets option that is chosen changes to the Model Environment may cause the values of one or more of the fabric properties to go Out of Range. In this case a Data Out of Range message is generated and the change is aborted.

### Tip:

The greatest flexibility is achieved if Length and Width Shrinkage are chosen as the Finishing Targets. Before making large changes to the Model Environment change the Finishing Targets to Length and Width Shrinkage. Once an approximate solution has been discovered, one of the other Target options can be selected for fine tuning the Quality Values to arrive at the best compromise.

### Fix Target Values Control

The Target Values for the chosen Finishing Targets are **not** held constant when a change is made to the value of one of the other fabric properties.

For a given Knitting Quality, the properties of the finished delivered fabric are completely interdependent. Changing the value for one of the properties simply changes the proportions of the fabric. Therefore, when a change is made to the value of one property, STARFISH recalculates the values of all of the other Dependent Properties.

The Fix Targets control allows the Target Values for the two properties chosen as Finishing Targets to be entered independently. However, when the Fix Target Values check box is turned ON all of the other fabric property data entry boxes are disabled. The values for the other properties are recalculated as the Target Values are altered but they cannot be changed independently.

### Note:

The data are presented in the Prediction Windows in the chosen Units. If the Units are changed then the Values are converted automatically.

### Default Models

When a Default Model is first opened the values for all the Finished Fabric Properties are determined by the Default Settings.

### Finishing Targets Limits

The actual range of values that can be entered for the individual Fabric Properties chosen as Finishing Targets depends on the selection of Fabric Type, Knitting Machine, the Knitting Quality and the chosen Units. Essentially, they are the same as those imposed for the individual fabric properties. The range is wide enough to allow experimentation and evaluation of qualities outside of normal commercial limits.

This means that within the normal range of practical and commercial limits any value can be entered, so that the effect of changing the Finishing Quality Target Values on the other fabric properties can be evaluated.

Restrictions are imposed only if the entered values are calculated to produce Length or Width Shrinkage values in the finished fabric outside the range -5 to 25%.

When the maximum limits for an individual property are reached a Warning Message is generated. These messages provide information on the actual range of values allowed for the selected Fabric Quality.

### Copy Target Values Control

When the Copy Target Values check box is turned ON, STARFISH checks to see what the effect would be on the other Qualities in the Model. If the Target Values for the selected Quality are





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calculated to produce Length or Width Shrinkage Values outside the range -5 to 25% for any of the other Qualities a Warning Message is generated and the Copy Targets command is cancelled.

### Tip:

The greatest flexibility is achieved if Length and Width Shrinkage are chosen as the Finishing Targets. Before making large changes to the Model Environment change the Finishing Targets to Length and Width Shrinkage. Once an approximate solution has been discovered, one of the other Target options can be selected for fine tuning the Quality Values to arrive at the best compromise.

## Trimming Allowance

The Trimming Allowance option allows STARFISH to calculate the Useable Width of Open Width processed fabric.

Trimming Allowance is defined as the total amount of fabric that is trimmed from both sides of an open-width finished fabric to remove the gumming or stenter pin marks before pattern cutting and garment making.

The Trimming Allowance is deducted from the full natural width of the fabric to calculate the Useable Width.

In STARFISH, the entered Value for Trimming Allowance is only deducted from the Full Width of the Fabric when the Width Units are chosen as Open, Trimmed.

## Trimming Allowance Units

### The Units provided are

- Centimetres Open Trimmed
- Inches Open Trimmed

### Active Model

The Active Trimming Allowance Units are chosen from the option list in the Active Width Units dialog.

### Note:

If the Active Width Unit is changed the Width Values and the Value for Trimming Allowance are converted automatically

### Use as Default check box

The Active Width Unit can also be designated the Default Width Unit for the Active Fabric Type by turning ON the Use as Default check box.

To change the Default Width Unit for any other Fabric Type, use the Default Units dialog.

### Default Models

The Width Units for the Default Models are chosen from the Width Tab on the Default Units dialog.

### Note:

Changing the Default Units selections affects only the Default Models for the selected Fabric Types. The Units currently selected for use in the Active Model or any of the Current Models are not affected.

## Trimming Allowance Values

The Value entered for Trimming Allowance is taken to represent the total amount that will be trimmed from both sides of the open width fabric.

- When the chosen Fabric Width Units are "Tubular" or "Open" the entered Value for Trimming Allowance is ignored and the full, natural width of the fabric is calculated.
- When the chosen Fabric Width Units are "Open Trimmed" the entered Value for Trimming Allowance is deducted automatically from the full, natural width of the fabric.



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Finished Fabric Width is calculated dynamically according to the selections for the Fabric Manufacturing System and Working Environment and the entered Quality Values.

When a change is made to the Active Model Environment, the Values for Fabric Width are recalculated.

The values are presented in the Prediction Windows in the chosen Units. If the Width Units are changed then the Width Values and the entered Value for Trimming Allowance are converted automatically.

### Active Model

The Active Trimming Allowance is set using the data entry box in the Active Trimming Allowance dialog.

### Use as Default check box

The Active Trimming Allowance can also be designated as the Default Trimming Allowance for the Active Fabric Type by turning ON the Use as Default check box.

To change the Default Trimming Allowance for any other Fabric Type, use the Default Trimming Allowance dialog.

### Default Models

The Value for Trimming Allowance for the Default Models is entered using the Default Trimming Allowance dialog.

#### **Note:**

Changing the Default Trimming Allowance affects only the Default Models for the selected Fabric Types. The Trimming Allowance entered for use in the Active Model or any of the Current Models are not affected.

## Trimming Allowance Limits

The maximum range in values that can be entered for the Trimming Allowance depends on the chosen Width Units.

Centimetres      0      to      25.4

Inches            0      to      10

#### **Note:**

The limitations on the Values that can be entered for Fabric Width are not affected by the Trimming Allowance.