USTER® *QUANTUM 3*

New Features

Software Version 2.x
50th Anniversary Edition

Textile Technology / Version 1.2 EN / December 2015 / SE 671

USTER®
Think quality

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1 Introduction

After the successful market introduction in 2010 the success story of Uster yarn clearers was continued. The new functionalities, e.g. YARN BODY™, as well as the *Smart Clearing* have been introduced with a great success and very positive customer feedback.

There is a constant improvement initiated by Uster Technologies AG. There is a set of new features introduced with ITMA 2015.
Beside a great new way of confirming the appropriate splice limits, the selection and setting of the right yarn alarms have become easier. In addition a new way of reporting has been introduced.
Today's requirement from side of the quality and maintenance department is considered by the ability of displaying the data directly on the CCU, for every group or even single positons, up to 9 shifts backwards.

Another new and important step is to handle the 2 most important yarn types beside the so called "normal" yarn type. Therefore a complete and unique set of setting abilities for Core spun yarn as well as Colored yarn is introduced with the new software release which will be launched as part of the 50th anniversary software.

All these functionalities are seen as the support of Uster for the customer to improve the final fabric quality.

2 50th Anniversary Edition

On the 50th anniversary of the first yarn clearer for automatic winding, Uster Technologies AG is introducing an "Anniversary Edition" USTER® *QUANTUM 3* – packed with valuable new and well-established features for optimized yarn quality.

Fig. 1
50th "Anniversary Edition"

2.1 Features overview

2.1.1 Smart Limits: for colored and mélange yarn

Smart Limits are now also available to provide the right setting to detect defects of a different color compared to the actual yarn shade or color. This new functionality will ease finding the appropriate settings for colored yarns.

2.1.2 Color and Shade Variation detection

Color mix-ups and shade differences are big issues along with the production of mélange and colored yarns. USTER's advanced Foreign Matter Sensor can now detect these faults. The new Shade Variation (SV, CSV)* feature with USTER® *QUANTUM 3* automatically detects any color or shade variation from the base yarn.

*Detection of Shade Variation can be accomplished with all CF and OF sensors

2.1.3 Core Yarn Clearing

Core yarn produced without the core, e.g. elastane or when the elastane is off-center is a serious problem for the downstream processes, potentially causing enormous waste of fabric. USTER® *QUANTUM 3* tackles this with the Core Yarn Clearing option. This uses unique USTER® sensor combinations to identify when the core component is either missing (MC)* or off-center (OC)** at a significant level and over long lengths. The core yarn features are available with the foreign matter option only.

* feature to detect missing core with capacitive clearers (CF)

** feature for off-center core detection for all capacitive (CF) and optical clearers (OF)

2.1.4 Online hairiness measurement*

Hairiness variations in yarn can cause cloudiness in finished fabric. USTER® *QUANTUM 3* "Anniversary Edition" offers online measurement of yarn hairiness – so outlier bobbins can be separated. Mills with linked winders can also monitor the condition of rings and travelers.

* Only with foreign matter clearers

2.1.5 Advanced classes

Some defects once regarded as tolerable are no longer acceptable today. USTER® *QUANTUM 3* "Anniversary Edition" now includes information on new advanced classes correlating to the USTER® *CLASSIMAT 5*. Users can also customize classes and inspect specific defects.

3 Benefit for all users of USTER® *QUANTUM* 3

3.1 Splice distribution

Yarn clearing by definition is replacing a disturbing defect by a less disturbing splice. Under normal conditions the splice quality is nearly equal to the original yarn characteristics. But as always in the textile mill a splice is only as good as the setting, maintenance and housekeeping is done.

In some cases only a single winding position is continuously producing bad splices without being realized by the responsible persons. To enhance this process transparency there are various functionalities already established but with the USTER® *QUANTUM 3* new edition some more functionality is supplied.

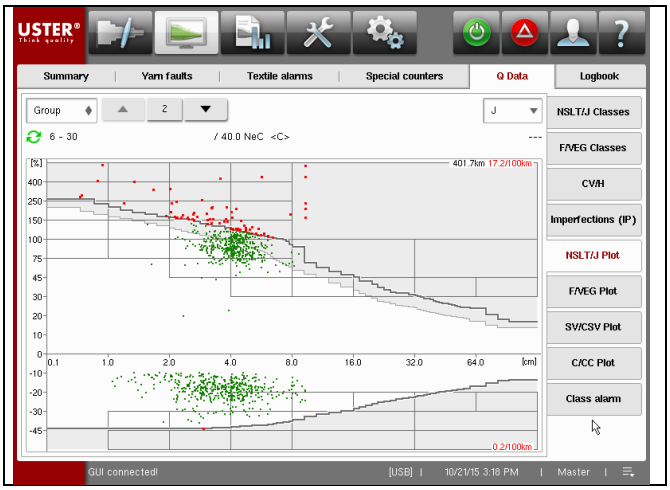

Fig. 2 Display of splice distribution and NSLT scatter plot in one screen

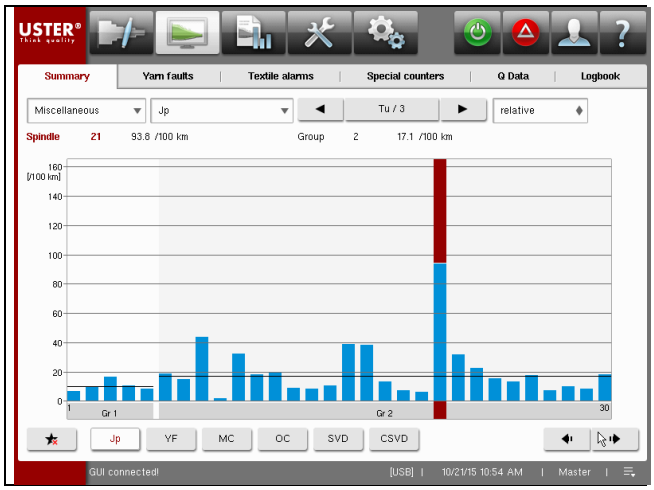

Fig. 3 Summary screen for Jp cuts of a winding machine

In addition to the well-established functionalities as separate splice clearing limits, with the possibility to an automatic adjustment to the NSL T clearing limits, there is a further important improvement available.
At some customer places a mismatch between the YARN BODY™ and the splice distribution could be found. The result was an increased number of splice cuts reducing the overall winding efficiency. The quality management was often not aware of this interaction between YARN BODY™ and splice distribution. Comparing the splice distribution with the scatter plot of that actual yarn, it could be easily seen if the splice setting is not optimized.

3.2 Enhanced reporting tool

The USTER® *QUANTUM 3* becomes even more user friendly than before.

3.2.1 Shift reporting

The new version of USTER® *QUANTUM 3* offers now to review clearer data even 9 shift back. All values can be recalled directly on the CCU. In different screens, the last 9 shifts in addition to the actual one, can be recalled in an easy and intuitive way. This is helpful to check the running performance after the weekend or if the Expert system is not available.

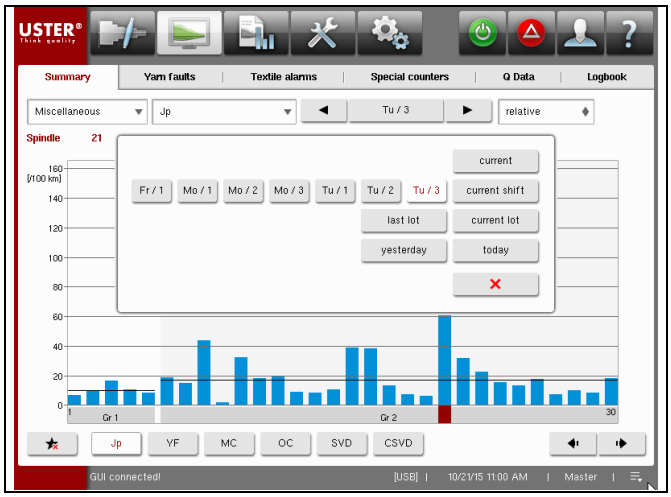

Fig. 4 9 shift reporting

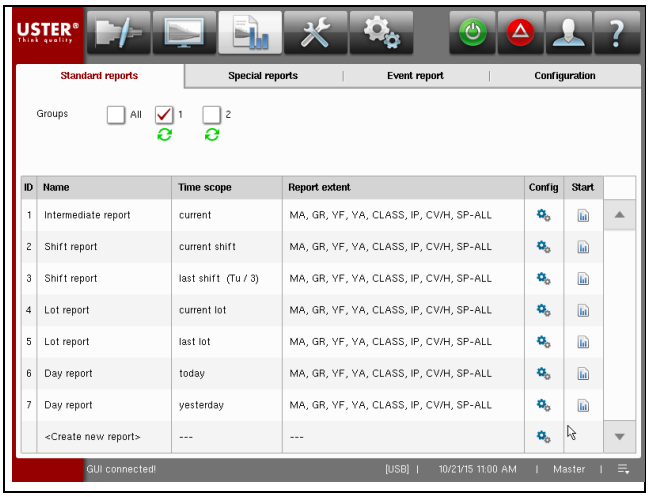

Fig. 5 Definition of standard reports

3.2.2 Standard report configuration

By supplying the extended shift reporting tool the configuration of the standard reports have been updated. The possibility is given now to pre-define different format types and time ranges which are intuitive and easy to use.

3.3 Online Hairiness measurement

Hairiness plays an important role in the textile industry. Hairiness variations in yarns can substantially affect the appearance and the hand of woven and knitted fabrics. Furthermore, hairiness can be disturbing in subsequent processes.

With the introduction of compact spinning, the hairiness monitoring on the machine became even more important. Since the hairiness of compact yarns is very low, it is important that bobbins which deviate in hairiness can be recognized immediately. Otherwise the fabrics have to be downgraded.

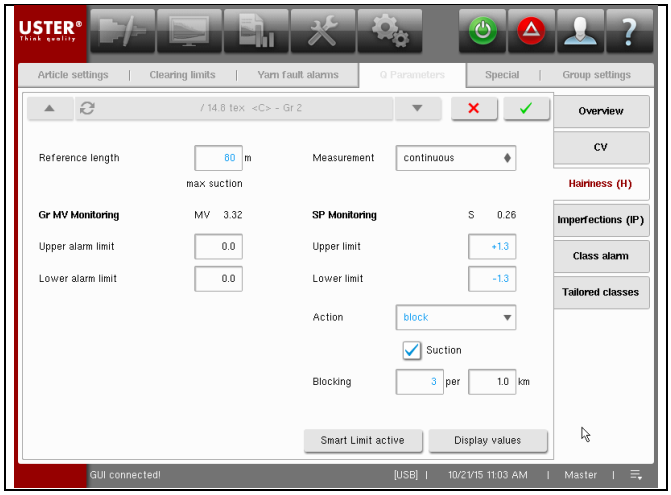

Fig. 6 Defining the limits for hairiness deviation

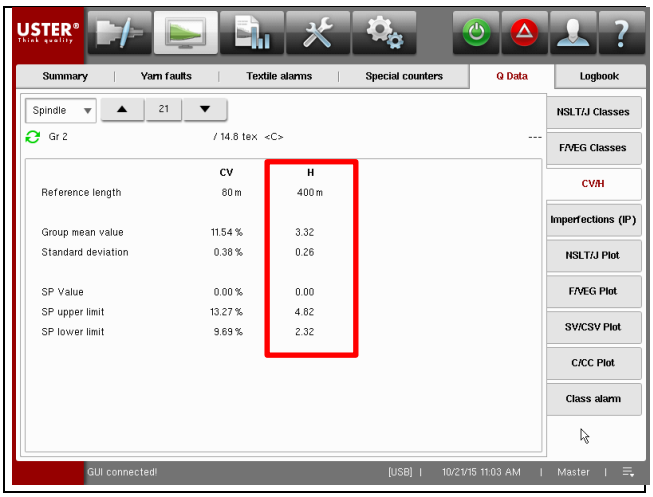

Fig. 7 Display of the actual Q-data reading for group, position and the limits applied

Statistical surveys (USTER® *STATISTICS*) have shown that yarns became more even in the course of the past years. Already slight variations in quality have become more disturbing than several years ago. This is also valid for the hairiness.

3.4 Advanced Classes and Tailored Classes

Classifications are used in spinning mills either as on-line monitoring system as a feature of the clearing system on automatic winding machines or as an analyzing instrument on manual winding machines in textile laboratories, and they play a very important role to analyze seldom-occurring yarn faults.

Tried and tested for many years, the classification matrix consist of 23 standard classes (yellow colored), for the classification of thick and thin places. For a better assessment of yarn types with different yarn structure and higher evenness, such as compact yarn or Siro spun yarns, the classification matrix was extended by 22 additional classes (green colored). Of course, the extended classes can also be used for conventional yarns providing additional information.

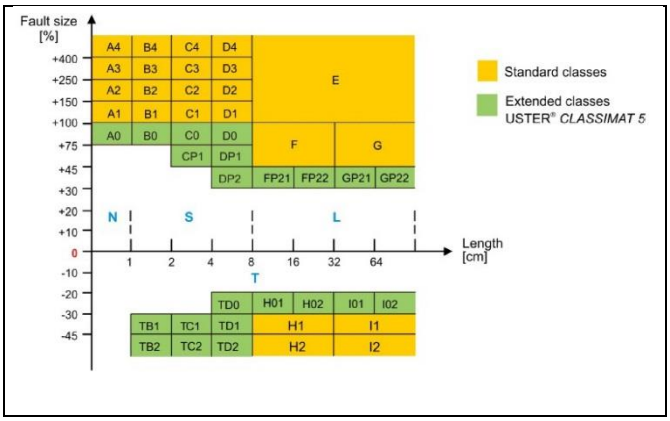

Fig. 8 CLASSIMAT 5 matrix for the thick and thin places

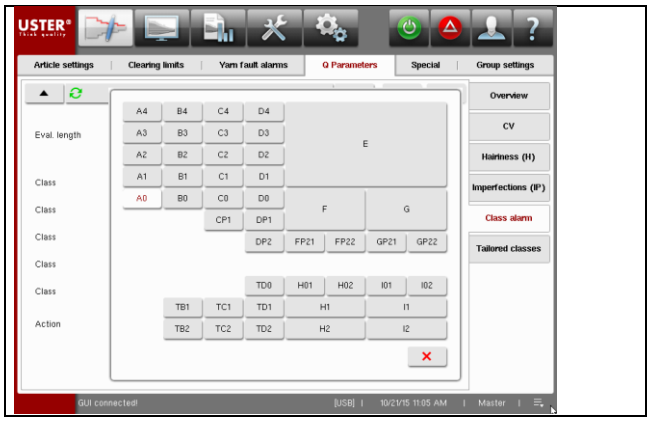

Fig. 9 Setting of the class-alarm at the Control Unit

The tailored classes offer the possibility to define customer classes or group classes together for special purposes. It is also useful to inspect yarn faults and foreign fibers within the customized class. Tailored classes are available for NSL, T and FD. The settings can be done by defining sensitivity in % and cm of the upper right and lower left corner for the tailored class for NSL, T and FD, FL. In order to inspect faults within the tailored class the user should use the LED display function of the sensor. The tailored class will be shown in the classification matrix of the related clearing function.

In the standard mode tailored classes are used only for information and will not influence the cut ratio. After changing the tailored class, the data should be cleared (clear counters) otherwise the tailored class values are mixed up with the former settings.

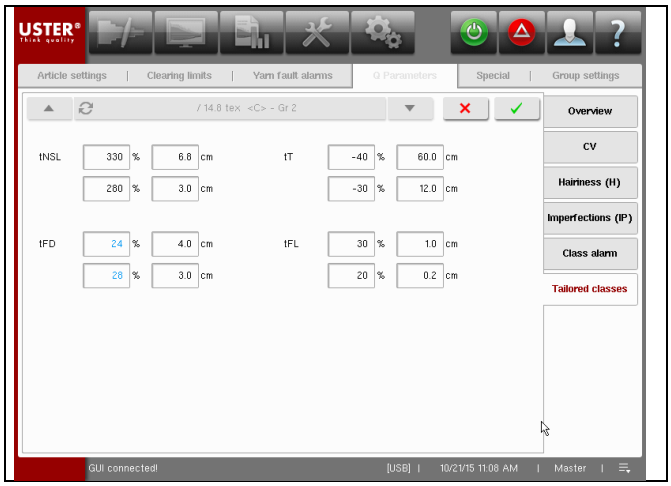

Fig. 10 Setting of the tailored classes

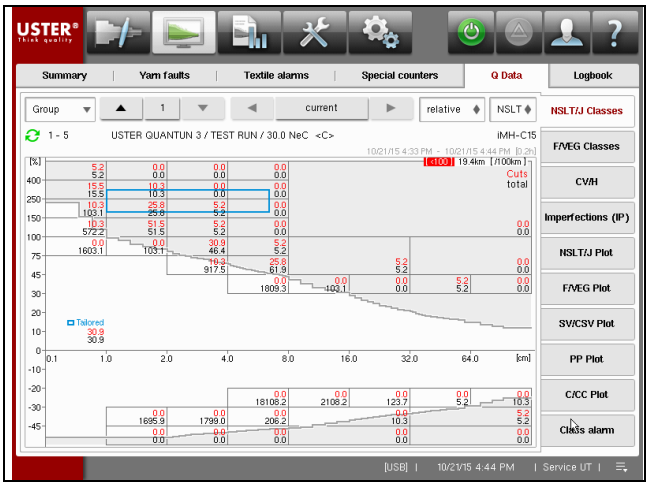

Fig. 11 Display of the tailored classes at the Control Unit

4 Colored yarns

Today's fashion market has a constant trend to utilize colored yarns for the weaving or knitting industry replacing the piece dyeing process. In the past years mainly the greige yarn was produced, wound on dyeing packages and went for the yarn dyeing process. After the dyeing these yarn packages had to be rewound before being used for knitting or weaving. These additional processes have been costly and also generated environmental pollutions.

The international market is now growing fast to produce colored or mélange yarns already made from dyed fibers or blend components. There is a potential of color or mélange shade mix-up in the spinning mills which might not be detected until the fabric is finished. Therefore Uster Technologies AG developed a set of great new features to enable the customer to detect color differences as well as colored disturbances in the yarn with the USTER® *QUANTUM 3* clearer.

Fig. 12 Color contamination by fluff and fly

Fig. 13 Spun-in colored defect in colored yarn

4.1 Smart Limit for colored yarn (FD, FL)

Depending on the color or mélange shade there are accumulations of single colored defects or contaminates due to fluff and fiber fly. Such color defects can have their disturbing appearance to both sides, either to the darker color (FD) or lighter color (FL). The challenge for the spinning mill is mainly to adjust the appropriate clearing limits to handle such issues.

The unique *Smart Limit* clearing concept of the USTER® *QUANTUM 3* clearer is now providing a technical solution by applying a *Smart Limit* proposal for both clearing channels.

The example below is illustrating the typical FD and FL dense areas of a colored yarn, in this case for a grey colored mélange yarn.

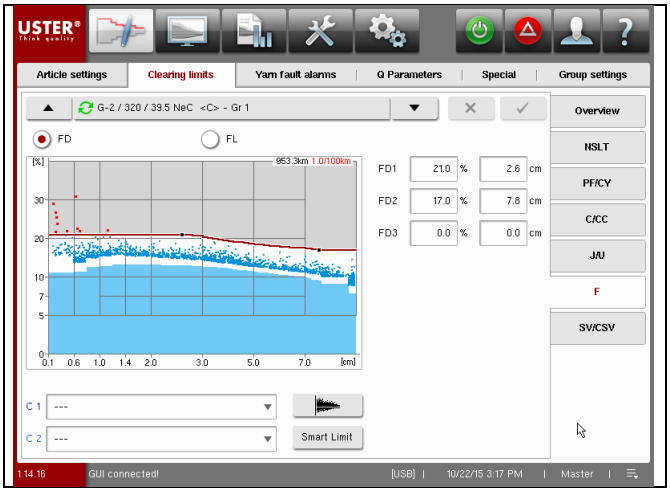

Fig. 14 Smart Limit proposal for FD setting

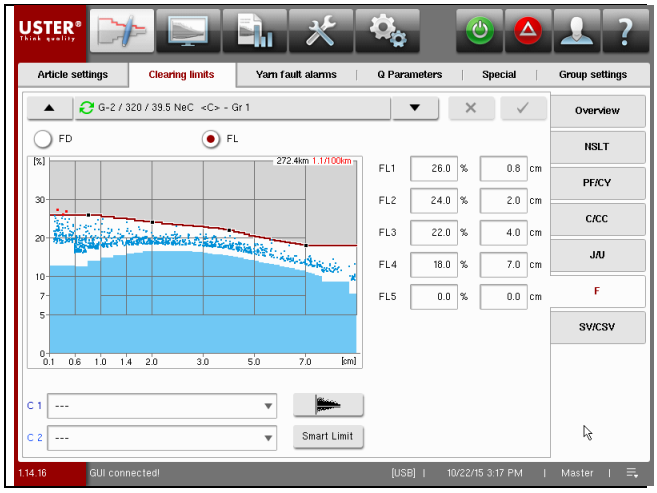

Fig. 15 Smart Limit proposal for FL setting

4.2 Detection of Shade variation (SV, CSV)

One of the pain in every flexible color yarn spinning mill is the prevention of color or shade mix-up during production. There are various reasons how such a problem can happen. The result will be costly anyway. Until now it was not possible to detect such deviations by means of an individual setting.

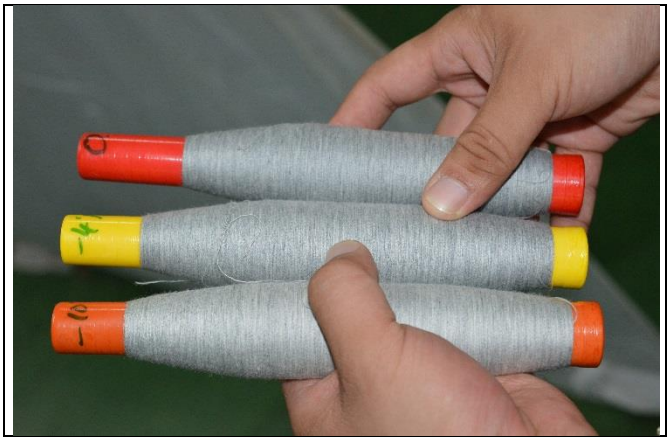

Fig. 16 Different mélange shades

Fig. 17 Mix-up of different mélange shades

With the USTER® *QUANTUM 3* it is now possible to detect such deviations already after the bobbin change (SV) or even during running (CSV). The principle is based on the same idea like the count (C) and continuous count channel (CC).

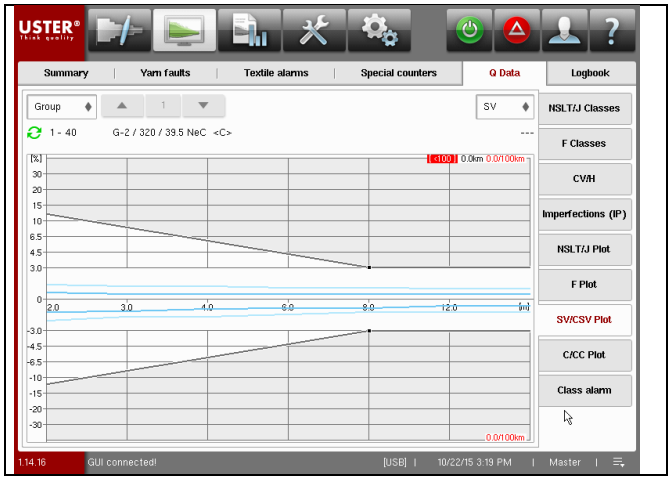

Fig. 18 Display of SV setting

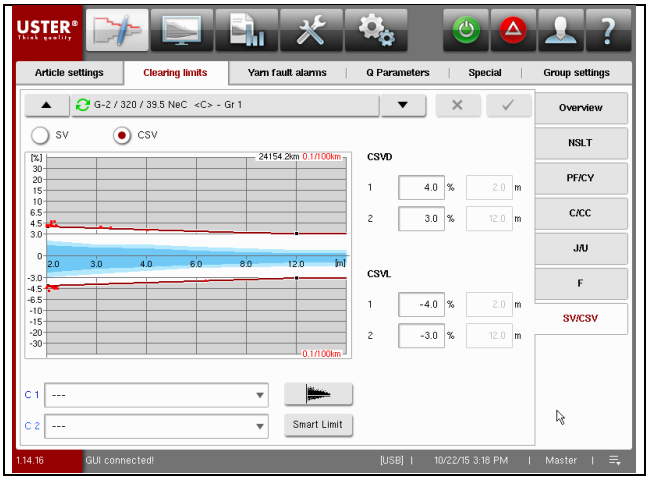

Fig. 19 Smart Limit proposal for CSV setting

The real yarn variation as measured by any CF or OF sensor will be displayed. The Shade Variation (SV) is active after every splice to ensure that the yarn from the bobbins has the same color shade than already wound on the package. A reference length, e.g. 8 meter can be defined and the plus and minus limits. Every long color deviation will be measured and if violating the limits defined it will be cut and removed. There are 2 directions a color shade can deviate from the original yarn color or mélange shade. Therefore a “+” as well as a “–“ limit can be applied.

Fig. 20 Mix-up of 2 color shades using the same tube color

Fig. 21 Shade variation detected by the SV channel

The Continuous Shade Variation (CSV) will measure the colour deviation throughout the entire winding process. The same way as used by the CC-channel, there are different reference length, between 2 meter and 12 meter, analysed and activated in parallel.

This continuous measurement ensures that any colour deviation occurring during the winding process. USTER® *QUANTUM 3* provides a *Smart Limit* proposal for a fast and optimized setting of the CSV channel.

As used for all clearing channels an individual alarm limit for SV as well as CSV can be set to detect and eliminate off quality bobbins.

5 Core spun yarn (MC, OC)

The production of core spun yarn is increasing during the last years. Beside an overall increase of ring spinning machines equipped with core spun devices a certain trend to yarns with an increasing share of the core filament can be seen. This is not automatically only for using elastane as a core filament, there are also more and more hard core filaments as well as double core or even colored core types inserted.

Fig. 22 Missing core resulting in fabric barré

Fig. 23 Missing core leads to cloudy fabric appearance

5.1 Missing Core (MC)

A missing core can only be detected efficiently by a capacitive clearer. The setting is easy and intuitive to be done, only the reference length and the deviation limit has to be entered. Like other channels the Smart Limit proposal is automatically generated and available. By selecting the yarn type Core yarn two channels will be available, there is one channel responsible for detecting the missing core (MC) and another channel assigned to the detection of off-center core (OC).

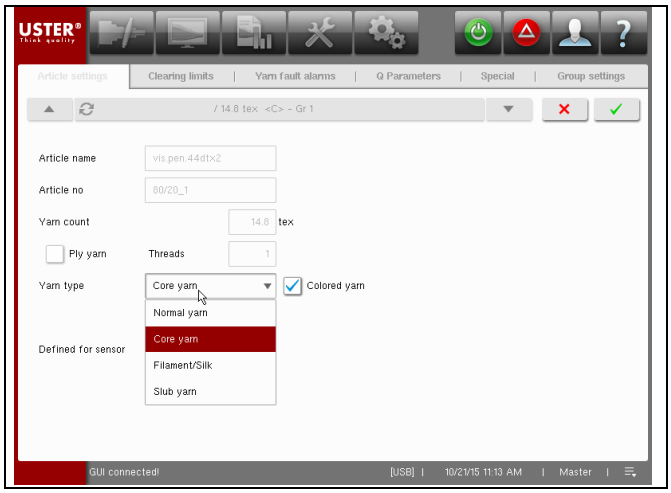

Fig. 24 Selection of Yarn type "Core yarn"

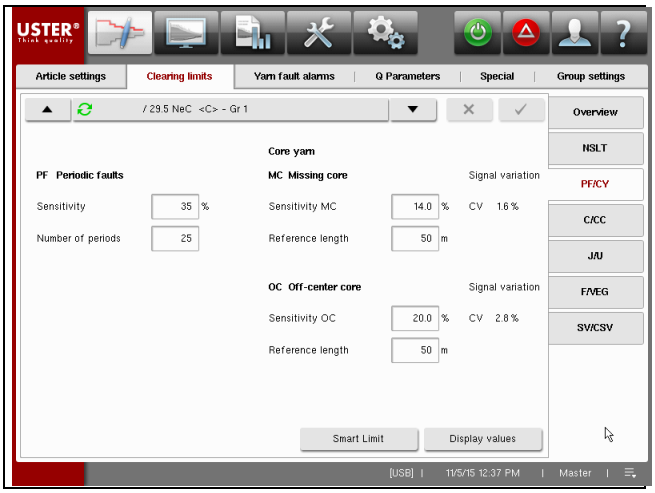

Fig. 25 New clearing limits for Core yarn

For both channels the actual variation of the yarn signal can be displayed to help in understanding the overall quality consistency of the yarn. These new features are designed to detect significant share of core on longer length. Limitations are mainly given by the count regularity and variation of the yarn produced. To find the appropriate detection limit depending on the yarn variation, the variation of the signal can be displayed, it Is not be recommended to use a setting closer than that.

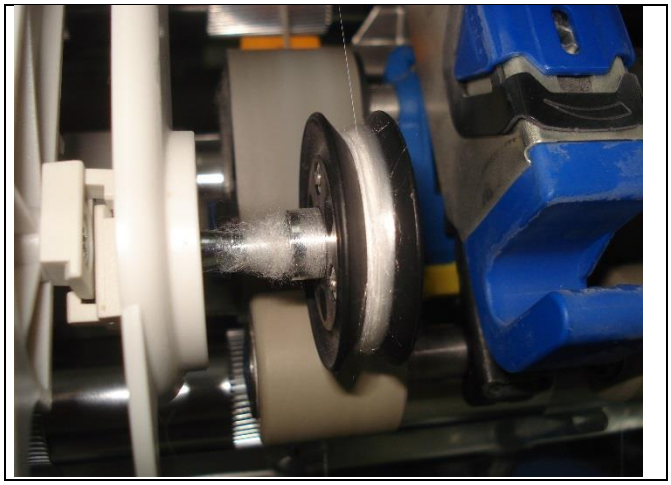

Fig. 26 Position running with broken core

Fig. 27 Defective yarn with off-center core

5.2 Off-center Core (OC)

To detect an off-center core, where the core itself is still existing but not properly covered by the surrounding fibers, a special assigned clearing channel is available. It can detect significant deviations over a long reference length caused by off-center core. The clearer will indicate the variation of the yarn as shown in Fig. 29 and a limit for the deviation can be set based on the quality requirements. As for other channels, the reference length will also help in detection of such defects, as longer a reference length is defined as smaller will be the signal variation and as closer the limits can be adjusted.

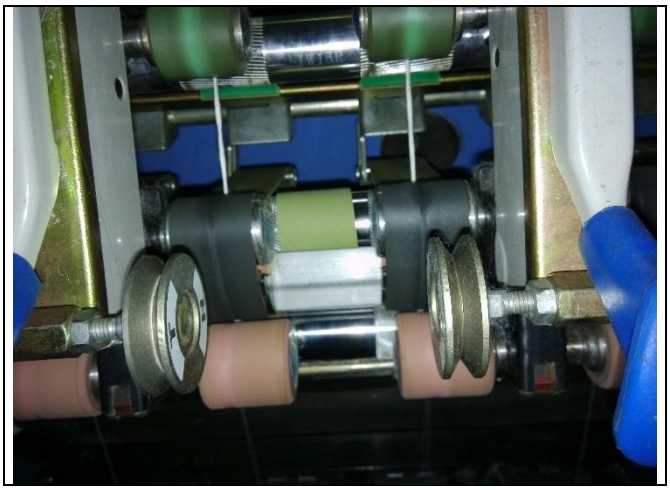

Fig. 28 Off-center core guide device

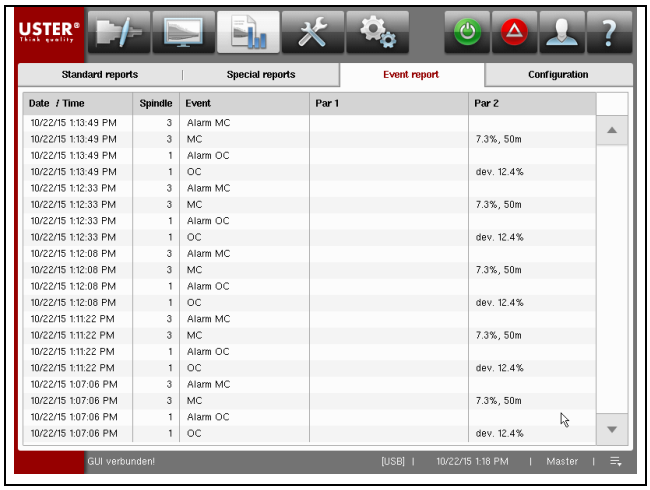

Fig. 29 Event report for MC and OC events

6 Appendix

The table is illustrating which features are available depending on the type of measuring head to be used.

Feature overview	UQ 3 Sensor Type					
	C15	C20	O30	C15F30	C20F30	O30F30
Enhanced reporting tool	X	X	X	X	X	X
Advanced Classification and Tailored Classes	X	X	X	X	X	X
Expert (only if UT6 is purchased)	X	X	X	X	X	X
Online hairiness measurement				X	X	X
Smart Limit for colored yarns (FD/FL)				X	X	X
Shade Variation (SV,CSV)				O	O	O
Missing Core (MC)				O	O	
Off-center Core (OC)				O	O	O

X: option included in 50th Anniversary edition
O: option available

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