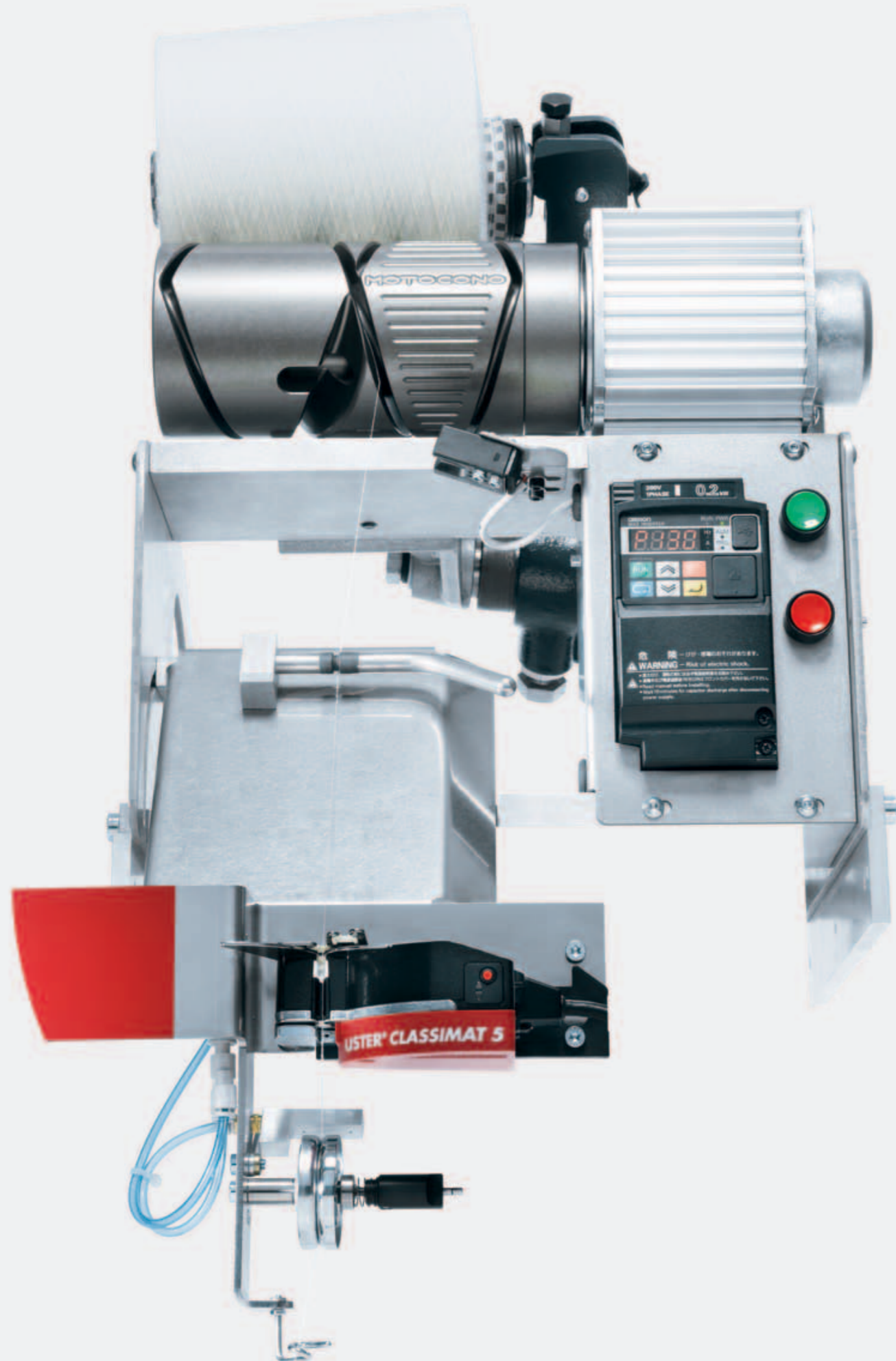




USTER® CLASSIMAT 5

The yarn classification system

USTER® CLASSIMAT 5 – transforming the industry



The USTER® CLASSIMAT has an impressive pedigree. For spinning mills, quality management started in 1949, one year after the introduction of the GGP yarn evenness tester. USTER created a numeric value to describe the level of yarn unevenness, the so-called U%, deriving from the German word 'Unregelmässigkeit', which means irregularity. This was followed by the first USTER standards in 1957, which provided classification of yarn quality into different levels, today referred to as the USTER® STATISTICS percentile levels. With the introduction in 1960 of the first automatic yarn clearer, the USTER® SPECTOMATIC, spinners had a means of controlling the quality of yarns in the production process.

But spinners were still challenged to find a way of using data gathered in the laboratory to optimize the settings of the in-process quality control capabilities of the yarn clearer. The solution came with the launch of the USTER® CLASSIMAT in 1968, which classified yarn defects into classes – the CLASSIMAT® values – with associated USTER® STATISTICS produced the following year. The classification of defects into classes provided the means for spinners to optimize their yarn clearing and the users of yarn to specify the required quality levels.

This unique combination of USTER® STATISTICS quality benchmarks, USTER® TESTER analytical yarn data and USTER® CLASSIMAT classification data transformed the industry. The basic elements for an approach to quality management in spinning mills, which USTER today calls Total Testing, were in place. With these tools, spinning mills have had the capability over past decades to make huge improvements in the levels and consistency of their production quality, as well as optimizing their processes to minimize waste and cost. And of course USTER has made significant advances with continued improvements in sensors, technology and application development, supporting the industry in meeting the challenge of ever-increasing demands for improved quality. To help spinners in achieving excellence, to 'Think Quality'.

Today, we are proud to offer the new generation of USTER® CLASSIMAT to the textile industry. This latest generation brings quality assurance to a new level, introducing an unrivaled range of new features and capabilities that makes it an indispensable precision tool for both producers and users of yarns. The approach of Total Testing to achieve consistent quality becomes more tangible than ever before.

Welcome to the USTER® CLASSIMAT 5.

Quality classification – the full picture

Parameters measured by the USTER® CLASSIMAT have played a vital role in spinning mills and yarn trading worldwide since the instrument was first developed more than 40 years ago. The classification of yarn defects according to their size and length into 23 standard classes is used extensively to certify yarn quality, to help control spinning processes and to optimize yarn clearing at the winding stage. In the meantime, quality demands have increased enormously. A class of defects regarded as

tolerable in the past is no longer acceptable today, because basic yarn quality has improved significantly over the years. Fault classification based on the well-proven analysis of thick and thin places remains fundamental, but must now also cover critical parameters such as foreign-matter, count variation, periodic faults, unevenness and hairiness. Consistent quality has risen in importance as much as absolute quality and the monitoring of quality exceptions is crucial to control them.

Addressing these needs, USTER® CLASSIMAT 5 delivers all the traditional classification standards, while broadening its focus on periodic faults, evenness, imperfections and hairiness. Contamination of yarns with disturbing foreign-matter is an on-going challenge in spinning mills. The USTER® CLASSIMAT 5 is the tool of choice for those who want to understand the nature and sources of these contaminants and to develop strategies to meet this challenge. Especially important are its powerful foreign-matter tools for assessing colored foreign fibers, vegetable matter and – for the first time – polypropylene content!



Top:
Fabric with a claim from a few thick and thin outlier bobbins

Middle:
Periodic faults can destroy an entire fabric lot

Bottom:
Polypropylene defects can disturb especially dyed fabric

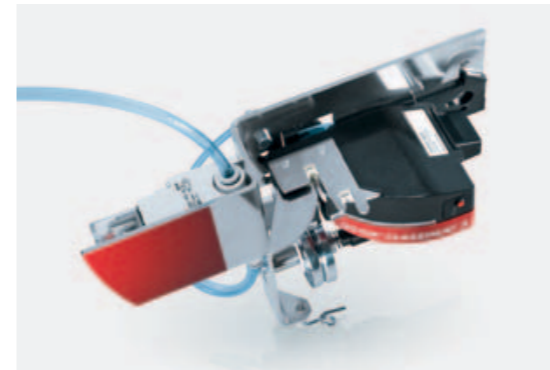
Top technology for ultimate accuracy and ease of use

USTER® CLASSIMAT 5 offers the most technically-advanced sensors and superior hardware to detect and eventually classify all types of defects. The unique USTER® sensor range has all the options covered:

- The new capacitive sensor identifies both short and fine neps, as well as troublesome thick and thin places that previously could not be detected until showing up in the final fabric.
- The latest foreign fiber sensor, using multiple light sources to locate and classify contamination in yarns, even separating colored fibers and vegetable matter in cottons and blends, to distinguish potentially non-disturbing materials from real defects.
- A novel sensor combination, enabling polypropylene content to be detected and classified for the first time.

Integrated USTER® CLASSIMAT 5 mounting module: New features such as foreign-matter detection demand new levels of accuracy in classification.

For example, USTER® CLASSIMAT 5 measurements are independent of the machine or test speed variations. The unique mounting module includes a special cleaning facility to prevent dirt and fluff in the measuring zone. And an array of guides and a tension control mechanism keep the yarn path straight and without vibration for highest accuracy in foreign-matter classification. USTER® CLASSIMAT 5 also measures and reports temperature and humidity to help maintain stable conditions and correctly interpret test results.



Top:
Advanced sensor technology integrated in the USTER® CLASSIMAT 5 mounting module

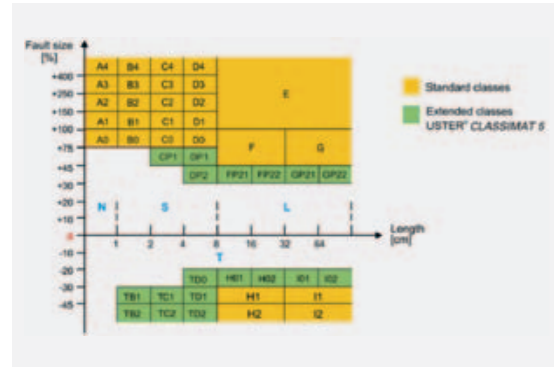
Bottom:
Foreign fiber sensor with multiple light sources

Unique range of advanced sensors covering every option for yarn defect classification

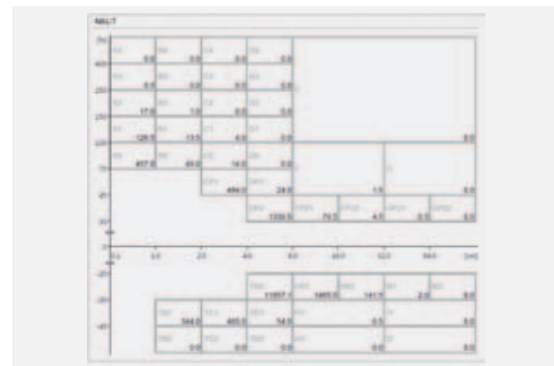
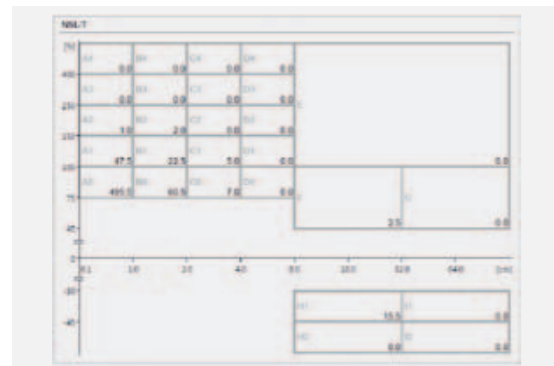
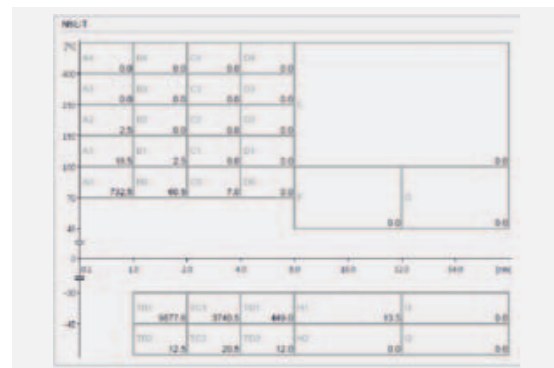
- New capacitive sensor with enhanced detection capabilities
- Foreign-matter technology, able to distinguish all colors and non-disturbing materials
- Breakthrough in polypropylene detection, based on novel sensor combination
- New mounting module, special guides and tension control, ensuring ultimate accuracy

Three classification generations in one instrument

YARN BODY™ – a powerful basis for assessing quality and clearing limits



Its ground-breaking technology means USTER® CLASSIMAT 5 has the power to detect and classify the widest-ever coverage of defects in a new extended classification matrix. Yet, previous standards are well-established in yarn trading and the transition to the latest level is best achieved progressively. That is why USTER® CLASSIMAT 5 also provides classification values for thick and thin places from the two previous-generation instruments, the USTER® CLASSIMAT QUANTUM and CLASSIMAT 3.



Top:
The USTER® CLASSIMAT 5 matrix –
Classes colored in green are new
classes

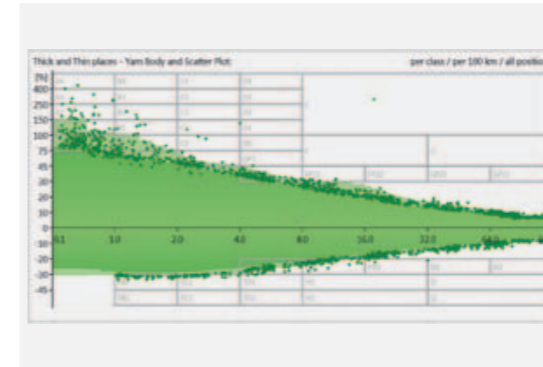
Middle top:
Classification results according
to USTER® CLASSIMAT 3 generation

Middle bottom:
Classification results according
to USTER® CLASSIMAT QUANTUM
generation

Bottom:
Classification results of USTER®
CLASSIMAT 5

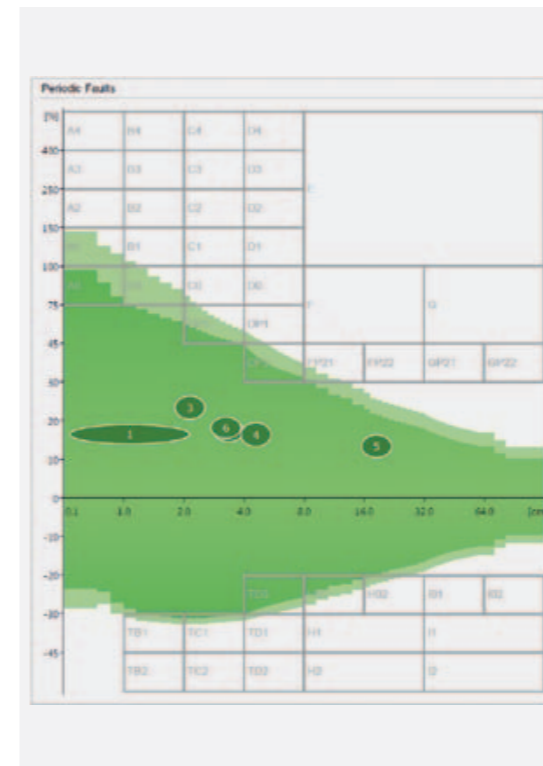
Total compatibility with previous classification standards

- Widest coverage of defects in USTER® CLASSIMAT 5
- Facility for gradual progression to USTER® CLASSIMAT 5 levels
- Values for thick and thin places for USTER® CLASSIMAT QUANTUM and USTER® CLASSIMAT 3 also provided



Today, defining which yarn defects are 'disturbing' is more complex than in the past, when it was gauged on the basis of disturbing classes within a classification matrix. Now, with increased pressure on yarn quality and improvements in evenness levels, a better method is needed, to identify disturbing defects – or outliers – which deviate from the required yarn profile.

USTER® CLASSIMAT 5 now introduces the solution: a new standard known as the 'YARN BODY™' – which is a visual representation of the yarn profile and thick and thin disturbing outliers based on the YARN BODY™. YARN BODY™ profiles are specific to the mill, the raw material, the spinning processes and settings and the yarn count being spun.



Periodic fault classification: Periodic faults in yarn produce the dreaded moiré effect – ruining woven and knitted fabrics if left undetected. USTER® CLASSIMAT 5 deals with this potentially disastrous issue for the first time, with classification of periodic faults displayed in a special bubble graphic. The size and placement of the bubbles in the classification matrix instantly show the severity of the defects, with full details presented in a separate table. In the example shown in the picture, there were five periodic faults detected with defect number 1 (16.5% thick and 11mm long) identified as 'severe', which is also reflected in the size of the bubble. USTER® CLASSIMAT 5 also presents the share of defective yarn caused by each periodic fault as a new parameter called 'Affected Share'. In the table here, defect number 1 affected 7.20% of the tested sample.

ID	Period	Yarn fault	Regularity	No. of faults	Total length	Affected share
1	8.4cm	16.5%, 11mm	49%	17056	14.391km	7.20%
2	24.0cm	17.3%, 35mm	52%	1664	0.400km	0.20%
3	49.1cm	23.4%, 22mm	55%	626	0.308km	0.15%
4	46.6cm	16.4%, 48mm	56%	87	0.041km	0.02%
5	61.2cm	13.4%, 193mm	54%	85	0.052km	0.03%
6	12.3cm	18.2%, 34mm	52%	945	0.117km	0.06%

Top:
YARN BODY™ – The new standard

Middle:
Periodic fault classification graphic

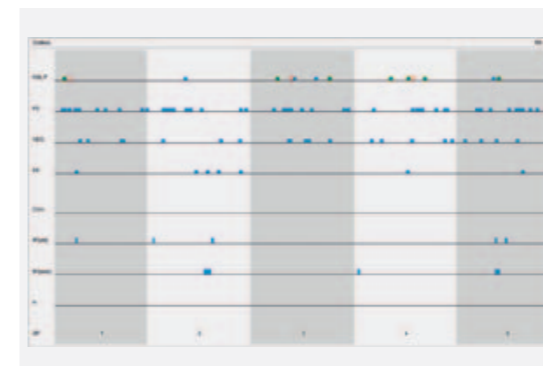
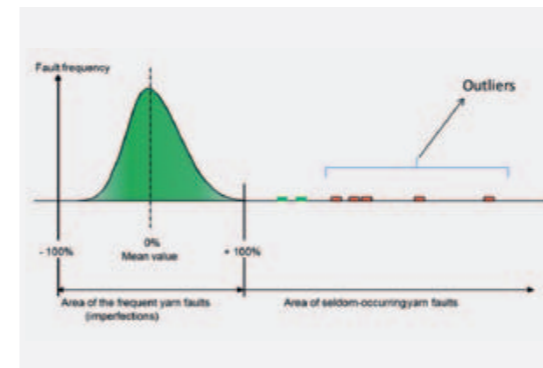
Bottom:
Periodic fault classification table
with Affected Share

Outlier classification – a new standard

Experience shows that only a few bad quality bobbins can cause an entire delivery to be rejected by the customer. They contain defects outside the normal distribution and known to damage fabric appearance or productivity in downstream processes. This applies to all fault categories, such as thick and thin places, unevenness, imperfections, hairiness and foreign-matter. These few bobbins are called 'outliers', as illustrated below. Controlling outliers using

yarn clearers and preventing them by pinpointing the root causes in the spinning process is critical to ensure consistent quality. But the first step is to measure and quantify them.

Until now, a comprehensive monitoring and quantification of these critical bad bobbins or outliers was not possible in the laboratory. USTER® CLASSIMAT 5 introduces measurement of outliers and provides detailed outlier information for all fault categories. Outliers are classified in neps, short thick, long thick and thin places (NSLT), foreign-matter including polypropylene, and key quality parameters. In the case of quality parameters – such as CV_m , periodic faults, imperfections and hairiness – CLASSIMAT® shows the range and the total affected share of the sample. For example an affected share of 1% for CV_m means that CV_m outliers have affected 1% of the sample. A special graphic display allows rapid assessment of the overall level and distribution of outliers in each sample.



Outliers				
Type	Abs.	Rel.	USP	52 week best
NSLT	101	50.5/100km	-	-
FD	149	74.5/100km	-	-
VEG	60	30.0/100km	-	-
PP	4	2.0/100km	-	-

Quality outliers				
Parameter	Range	Affected share	USP	52 week best
Unevenness (CV _m)	18.7 - 19.4	1.1%	-	-
IP (/km) +50%/-50%/+200%	265.0 - 433	1.5%	-	-
IP (/km) +35%/-40%/+140%	1.374.0 - 2.1	1.5%	-	-
Hairiness Index (H)	6.8 - 7.3	2.4%	-	-

Top: Definition of outliers

Middle: Outlier distribution diagram

Bottom: Summary table of outliers

Powerful new features to pinpoint and classify outliers

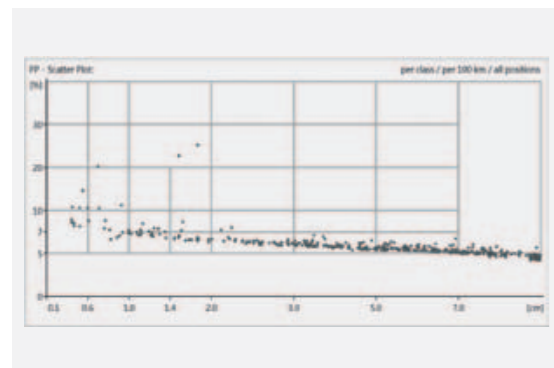
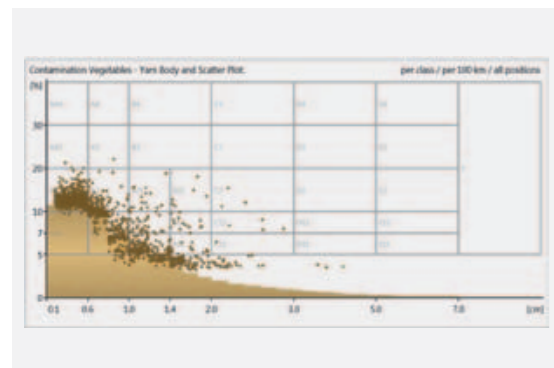
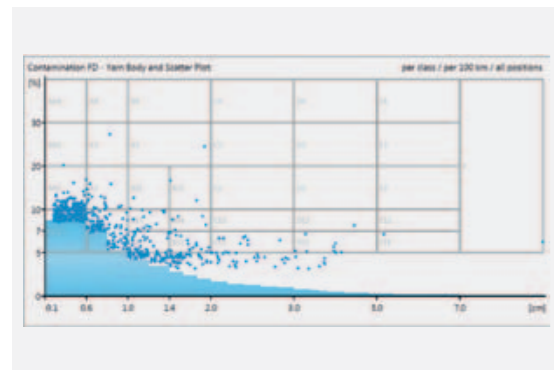
- Reduces rejects caused by a few rogue bobbins
- Provides detailed information on outliers in all fault categories
- Graphic display quickly summarizes distribution of outliers in the sample

Full assessment of foreign-matter levels

High levels of foreign-matter in cotton and increasing quality expectations are the twin headaches facing spinners today. Effective control of disturbing defects is essential – and the first step is to identify and evaluate the various types and degrees of foreign-matter.

Thanks to its powerful new sensor technology, USTER® CLASSIMAT 5 can detect defects of any color – even very short and light-colored ones. For cotton and cotton-blend yarns, the system then separates contaminants into two categories: foreign fibers and vegetable matter. This is an important distinction, since vegetable matter can often be regarded as ‘non-disturbing’, in terms of its impact on final quality.

Polypropylene defects are regarded as ‘very disturbing’ – especially in dark-dyed fabric. As well as affecting the appearance of the final fabric, they can also cause yarn breaks in weaving preparation or on weaving machines, potentially causing significant decreases in efficiency and productivity. USTER® CLASSIMAT 5, for the first time, deals with these problems by incorporating classification of polypropylene defects. Defects are classified as either short (below 10mm) or long (10mm and above) and are shown on a scatter plot.



Top:
Foreign-matter classification:
Colored foreign fibers

Middle:
Foreign-matter classification:
Vegetable matter

Bottom:
Foreign-matter classification:
Polypropylene fibers

Comprehensive analysis of all types of foreign-matter

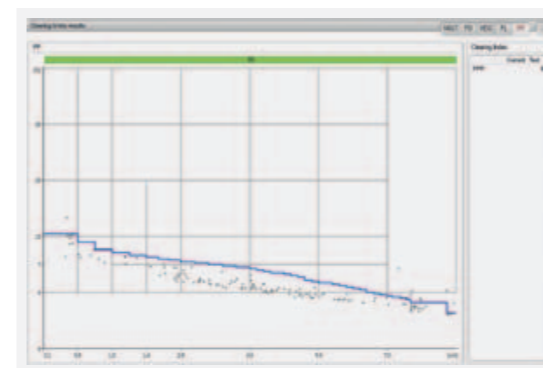
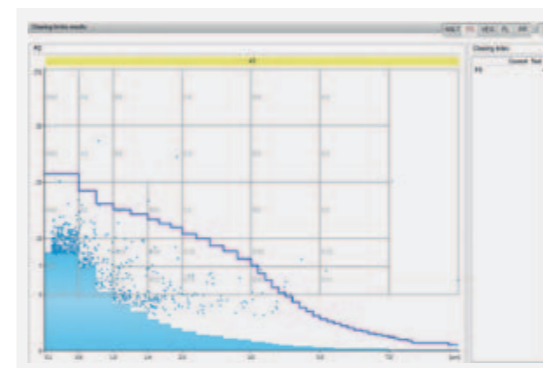
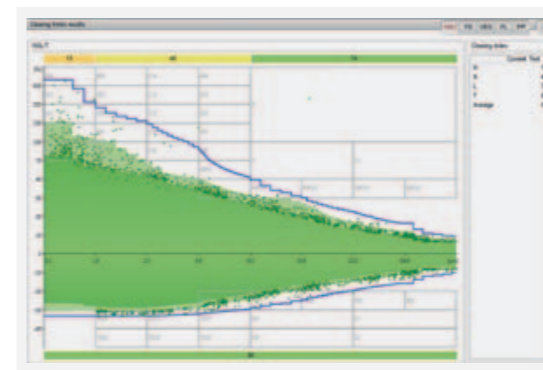
- New sensor technology detects even very fine color defects
- Separation of cotton contaminants into foreign fibers and vegetable matter
- First successful classification of disturbing polypropylene content

Clearing Index – powerful optimization tool

Defining optimal clearing limits for each yarn clearer model to meet the expected quality is not easy. Especially when lot and material changes are as frequent as they are these days. Yet spinning mills have to ensure similar quality, even if they use different yarn clearer models for clearing the same yarn. Optimum limits and quality consistency are vital, even when spinning mills are using a number of different yarn clearer types to control yarn quality during winding.

With the new USTER® CLASSIMAT 5 clearing limit analysis feature, the spinner can test yarns produced using different clearers and arrive at optimized clearing limits for each type. USTER® CLASSIMAT 5 analyzes remaining yarn faults to estimate the clearing limit used (the blue curve in the graphs shown here) and then compares it to an USTER reference clearing limit. For each fault type – neps, thick and thin places, or foreign-matter – a Clearing Index is calculated based on this comparison.

In the examples here, this is 13 for neps (N), 48 for short thick (S), 74 for long thick (L) and 80 for thin (T). The yarn seems to be very even in general and therefore this suggests that clearing limits should be reviewed for N and S in particular while L and T settings seem to be fine. The Clearing Index for each yarn fault area could then be used to fine-tune the clearing limits until the required quality is reached. The process can be repeated for production from each yarn clearer model, giving added assurance that consistent quality will be achieved.



Top:
Clearing limit analysis for thick and thin places with respective Clearing Index

Middle:
Clearing limit analysis for foreign-matter with Clearing Index

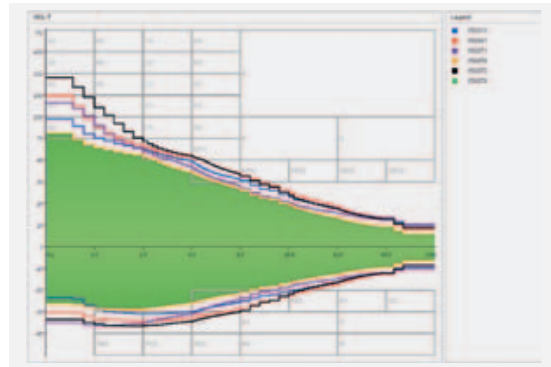
Bottom:
Clearing limit analysis for polypropylene with Clearing Index

Automatic guidance on clearing limits

- Optimized clearing limits for different clearer types
- Data comparison provides Clearing Index
- Clearer settings can be fine-tuned to achieve quality requirements

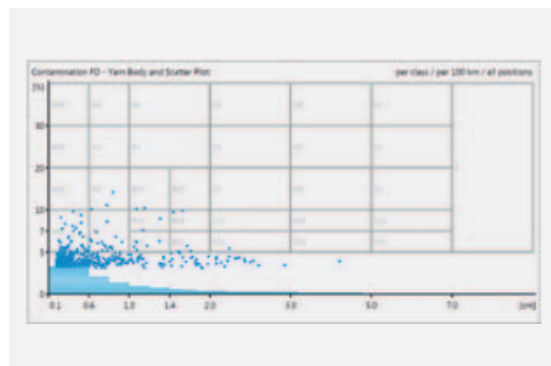
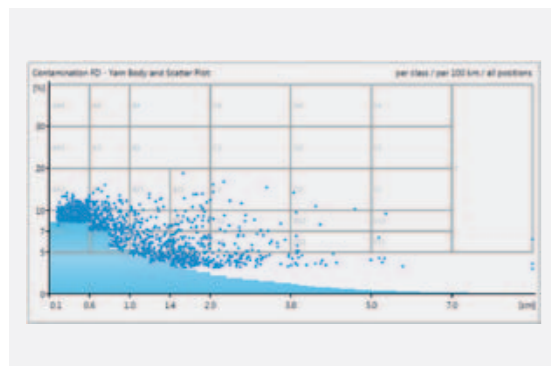
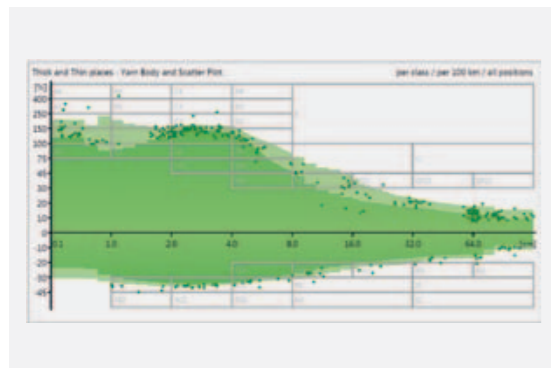
YARN BODY™ comparison

Comprehensive comparison of yarn qualities



The 'YARN BODY™' is a highly-effective concept which gives an immediate visual presentation of the yarn. It brings together all the elements that make up a yarn – raw material, count, process and spinning equipment – into a single combined format. Simply put, the narrower the YARN BODY™, the more even the yarn. There are numerous examples of the YARN BODY™ being used to identify quality problems and implement improvements.

USTER® CLASSIMAT 5 incorporates a valuable YARN BODY™ and foreign-matter Dense Areas comparison tool. Users can match their yarn against integrated sample mean values to spotlight quality issues, compare raw material types or assess foreign-matter levels in different cotton origins.



Top:
YARN BODY™ comparison

Middle top:
Example of YARN BODY™:
Slub yarn

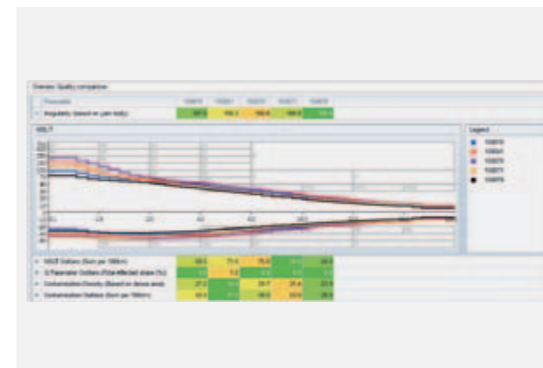
Middle bottom:
Example of Dense Area for a
highly contaminated cotton

Bottom:
Example of Dense Area for a
less contaminated cotton

Visual image of all the elements that make up a yarn

- Helps identify quality problems and suggest improvements
- Valuable tool compares YARN BODY™ and foreign-matter Dense Areas
- Users can benchmark yarns against integrated samples or mean values

Parameter	150019	150041	150070	150071	150078
Irregularity (based on yarn body)	187.6	190.3	192.4	188.9	190.4
NSLT Outliers (Sum per 100km)	68.5	71.6	75.9	79.9	49.0
Q Parameter Outliers (Total Affected share (%))	0.0	1.2	0.0	0.0	0.0
Contamination Density (Based on dense area)	27.2	14.4	25.7	31.4	23.9
Contamination Outliers (Sum per 100km)	52.6	21.1	30.9	53.0	38.6



Parameter	150019	150041	150070	150071	150078
Irregularity (based on yarn body)	187.6	190.3	192.4	188.9	190.4
NSLT Outliers (Sum per 100km)	68.5	71.6	75.9	79.9	49.0
Outliers per 100km					
U	19.9	29.9	28.8	32.9	21.0
S	32.5	27.5	29.9	13.0	16.0
L	16.5	9.0	10.0	9.0	1.0
T	8.5	4.0	8.0	8.0	2.0
Sum of Outliers	68.5	71.6	75.9	79.9	49.0
Q Parameter Outliers (Total Affected share (%))	0.0	1.2	0.0	0.0	0.0
Contamination Density (Based on dense area)	27.2	14.4	25.7	31.4	23.9
Contamination Outliers (Sum per 100km)	52.6	21.1	30.9	53.0	38.6

Parameter	150019	150041	150070	150071	150078
Foreign Fibres deliv (F3)	49.5	13.1	37.9	52.9	38.6
Vegetables (VEG)	0.0	0.4	0.9	0.6	0.6
Polypropylene (PP)	0.0	0.0	1.9	1.8	0.8
Sum of Outliers	52.5	21.5	38.9	53.9	38.6

The full range of quality classification handled by USTER® CLASSIMAT 5 is summarized and comprehensively compared by a special new tool which can help spinners match their yarns with a particular end-use. Total Testing requires an assessment of traditional quality values and also outliers. In line with this, for the first time, yarns are compared according to CLASSIMAT® parameters in the yarn – thick places, thin places, imperfections and foreign-matter. Filters allow yarns to be selected according to various options – count, cotton type, source, supplier etc. Users can compare up to five different yarns at the push of a button.

The comprehensive USTER® CLASSIMAT 5 analysis presents results as color codings, to identify the best (dark green) and the next best (orange) quality levels, with detailed figures available at a click. In the examples here, results from five different suppliers were compared using the tool. Clearly, the supplier with the test sample number 150078 seems to be the best overall.

Comprehensive tool allows rapid analysis of classifications

- Helps match yarn with end-use
- Color-coded display for fast overview
- Full details at a mouse-click

Top:
Quality comparison overview

Middle top:
Quality comparison details:
YARN BODY™ comparison

Middle bottom:
Quality comparison table:
NSLT outlier details

Bottom:
Quality comparison details:
Foreign-matter outliers

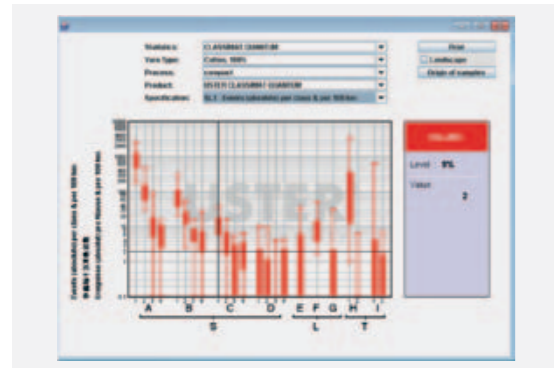
Benchmarking – USTER® STATISTICS and more

Key features and benefits

USTER® CLASSIMAT 5 integrates powerful benchmarking possibilities via the globally-recognized USTER® STATISTICS or with users' own internal data.

Most of the key quality parameters from USTER® CLASSIMAT 5 are covered by USTER® STATISTICS, and this benchmark data is displayed alongside the CLASSIMAT® test results. This allows mills to set targeted improvements to reach benchmarked levels.

A further useful benchmarking tool with USTER® CLASSIMAT 5 matches actual test values against best results achieved for that parameter during the past year. This '52-Week Best' feature is automatically displayed against each current result, so that users can judge progress and initiate changes if necessary.



Comparisons with the globally-recognized USTER® STATISTICS and with users' own data

- USTER® STATISTICS data automatically displayed alongside CLASSIMAT® values
- Allows mills to set improvement goals against world-class standards
- Special '52-Week Best' feature instantly measures the mill's results against the past year's best performance

PP

Parameter	Absolute	Relative (per 100 km)	USP	52 week best
PP < 10 mm	0	0.0/100 km	5%	0
PP > = 10 mm	2	1.0/100 km	9%	0.5
PP Total	2	1.0/100 km	8%	0.5

Top: USTER® STATISTICS graphic

Bottom: Comparison to USTER® STATISTICS and internal benchmarks

Features

- Simultaneous classification of thick and thin places according to three standards
 - USTER® CLASSIMAT 5 – the new standard including YARN BODY™ and foreign-matter Dense Areas
 - USTER® CLASSIMAT QUANTUM
 - USTER® CLASSIMAT 3
- CLASSIMAT® sums
- Create new customized classes using tailored classes feature
- Periodic faults classification
- Outliers for
 - Thick and thin places – NSLT
 - Colored foreign fibers – FD
 - Vegetable matter – VEG
 - Polypropylene – PP
 - Unevenness
 - Imperfections standard classes
 - Imperfections sensitive classes
 - Hairiness
- Powerful analysis
 - YARN BODY™ comparison
 - Foreign-matter Dense Area (FD) comparison
 - Analysis of clearing limits – Clearing Index
 - Quality comparison of multiple yarns
- Automatic comparison to USTER® STATISTICS
- Automatic comparison to internal benchmarks – '52-Week Best'
- Temperature and humidity measurement

Key benefits

- Yarn quality certification according to three classification standards
- Tool for yarn sourcing control
- Comparison of yarn qualities
- Raw material and process control
- Analysis and optimization of yarn clearing limits
- A reference instrument for process trials and analysis, due to high accuracy and stable results

The standard from fiber to fabric

USTER is the world's leading supplier of total quality solutions from fiber to fabric. USTER standards and precise measurement provide unparalleled advantages for producing best quality at minimum cost.

Think quality

Our commitment to state-of-the-art technology ensures the comfort and feel of the finished product – satisfying the demands of a sophisticated market. We help our customers to benefit from our applied knowledge and experience – to think quality, think USTER.

Broad range of products

USTER occupies a unique position in the textile industry. With our broad range of products, we have a wide reach across the textile chain that is unmatched by any other supplier in the market.

Optimal service

Know-how transfer and instant help – we are where our customers are. A total of 200 certified service engineers worldwide grants fast and reliable technical support. Benefit from local know-how transfer in your specific markets and enjoy our service à la carte.

USTER® STATISTICS – the textile industry standards

We set the standards for quality control in the global textile industry. With USTER® STATISTICS, we provide the benchmarks that are the basis for the trading of textile products at assured levels of quality across global markets.

USTERIZED® – brand your products with quality

USTERIZED® stands for 'defined quality assured' within the textile chain. We invite selected customers to join the USTERIZED® Member Program. More information at www.usterized.com.

USTER worldwide

With three technology centers, five regional service centers and 50 representative offices around the world, USTER is always sure of delivering only the best to its customers. USTER – committed to excellence, committed to quality. And that will never change.



Uster Technologies AG

Sonnenbergstrasse 10
8610 Uster
Switzerland
T. +41 43 366 36 36
F. +41 43 366 36 37
sales@uster.com
www.uster.com