# USTER® CLASSIMAT 5

The yarn classification system
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.
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!

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.
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.

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 11 mm 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.
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® introduces measurement of outliers and provides detailed outlier information for all fault categories. Outliers are classified in nep, 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.

**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
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 10 mm) or long (10 mm and above) and are shown on a scatter plot.

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.

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

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
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.

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.

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.

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**Benchmarking – USTER® STATISTICS and more**

**Key features and benefits**

**Features**

- Simultaneous classification of thick and thin places according to three standards
  - **YARN BODY™** and foreign-matter Dense Areas
  - **USTER® CLASSIMAT QUANTUM**
  - **CLUD**

- Classification of additional 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

**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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute</th>
<th>Relative (per 100 km)</th>
<th>UST 52 week best</th>
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<tbody>
<tr>
<td>PP ≤ 10 mm</td>
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<tr>
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<td>PP Total</td>
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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.