Textile Industry

Dependable online, inline, and atline solutions for your process needs.

Metrohm
Process Analytics

There is a dizzying array of clothing and other goods made from textiles – available in nearly every size, color, and shape, created from both natural and synthetic fibers. Synthetics are created from specific polymerization reactions which benefit from constant monitoring and bath adjustments. Fibers are later dyed (either as rope or in pre-woven sheets) and depending on the material, dye composition, pH and other parameters of the dye bath, and the finish, specific dyeing techniques must be used.

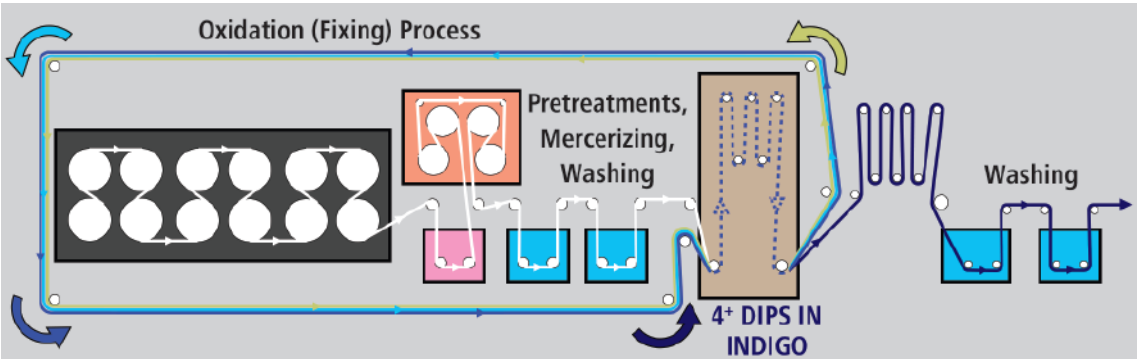
In order to run each part of these processes optimally, constant quality checks and analyses should be performed. Analyzing crucial process parameters inline, atline, or online instead of manual offline laboratory analysis saves time and optimizes process efficiency while reducing operation cost. Real time analysis as an integrated part of process control and automation will help you increase yields and improve production quality.

Metrohm Process Analytics offers several analytical techniques in many different analyzer configurations for any need: titration, photometry, ion chromatography, NIR spectroscopy, and ion-selective measurements. Our online process analyzers and custom sample preconditioning systems are manufactured in the Netherlands and supported by our local service engineers worldwide.

Denim: Indigo Dyeing Process

In order to achieve a uniform blue color, multiple dips may be necessary in the dye vats. There are three common dyeing processes in use: rope, slasher, or loop dyeing. Rope dyeing offers better color uniformity, though more yarn breakage can occur in the process. Continuous slasher dyeing offers faster throughput by dyeing a yarn sheet at once, with shorter immersion and developing times needed. However, the slasher dyeing process consumes more hydrosulfite (dithionite) because of the larger surface areas of multiple indigo boxes exposed to oxygen. Loop dyeing occurs in a single indigo bath, and the color density of the yarn is adjusted by dipping in the vat multiple times.

Together with the plant circulation system, our fast-responding online process analyzers can help keep the dye bath throughput high without losing money from excess chemical consumption due to inefficient processes, ensuring the quality of the dyed fabric remains constant.



Synthetic Textiles

Creation of synthetic textiles begins with a polymerization process in which a liquid mixture is forced through tiny holes (spinnerets) into a spin bath, developing small threads via chemical reactions. These fine threads are then dyed and woven into fabric.

There are many types of synthetic fibers created in this manner such as nylon, polyester, acetate, spandex, acrylic, and rayon (viscose). The properties of these synthetic materials, such as elasticity, can be modified much easier than for natural fibers.

By controlling the proportions of **sulfuric acid**, **sodium sulfate**, and **zinc sulfate** in a viscose spin bath for example, the amount of cross-linking between cellulose molecules can be adjusted, resulting in fibers with different qualities.

Optimization of the process through online analysis of these compounds in the bath combined with communication to the central chemical distribution system is possible with Metrohm Process Analytics.

Applications

Online determinations of several parameters in dye and spin baths

Many parameters need to be controlled during continuous dyeing processes: the pH for proper NaOH (alkali) dosage, the concentrations of both hydrosulfite and indigo (in the denim dyeing process), as well as the temperature and redox potential of the bath. For synthetic viscose spin baths, the concentrations of sulfuric acid and zinc are especially important to control in order to produce fibers with specified properties.

In order to monitor such important parameters and more, we offer the 2045TI Process Analyzer from Metrohm Process Analytics. With its modular configuration and rugged housing, this analyzer is built to tackle challenging applications even in extreme process environments.

ADI 2045TI Process Analyzer

NIRS Analyzer PRO

NIRS Applications in the Textile Industry

For fast, reagent-free, nondestructive and non-contact analysis, near-infrared spectroscopy can be used. This technique has been long used in the textile recycling industry to sort fabrics based on fiber types. Accurate determination of blend ratios between natural and synthetic fibers can be performed in **less than 1 second**.

Other possible applications for the textile branch include real-time analysis of the application of polyvinyl alcohol (PVA or PVOH) sizing to warp yarn, or the analysis of sulfur-based dyes in dye baths.

Cost savings during dye production and bleaching

Some textile manufacturers have begun to produce their own dyes on-site to help reduce costs of raw materials. Purity and concentration of the dye (whether indigo, reactive dyes, or others) are important aspects, having a direct influence on many factors downstream. To determine the concentration of indigo in dye production, a 2035 Process Analyzer can be integrated in the process, ensuring production runs within specifications.

The 2035 Potentiometric Process Analyzer is also ideal for the determination of hydrogen peroxide in oxidation and bleaching steps. The concentration of H_2O_2 affects the brightness of fabrics, and controlling this parameter online ensures the same brightness characteristics in the final product from batch to batch, without manual laboratory testing.

Process Analyzer 2035 Potentiometric

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Subject to change without prior notice
Layout by Alyson Lanciki, Metrohm Applikon B.V. Printed by Metrohm AG, CH-9100 Herisau, Switzerland
8.000.5229EN – 2017-09

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