

IN-LINE YELLOWNESS & b^*

MEASUREMENT

Yellowness and/or b^ values not only are an indicator for product quality but are also useful as an excellent insight for process monitoring. Many times yellowness is an indication of product degradation. It is now possible to make measurements directly in liquids, powders and slurries. Immediate adjustments of the process parameters are therefore possible through immediate 'off-specification' detection.*

INTRODUCTION

Yellowness measurement is a well-accepted technology to check the quality of many materials. Usually these measurements are performed 'off-line'.

The typical procedure for off-line measurements:

- Manually take a sample from the process
- Send/take the sample to the laboratory
- Perform 'off-line' measurement in the lab
- Report the results to production
- Make a decision then on a process adjustment
- Repeat the above five steps if necessary, to obtain another measurement e.g. corrections or after change of process parameters

The delay between sampling and obtaining the results from the laboratory can be time consuming. A significant disadvantage is that only a single measurement is generated in this time period and the quality of the product before and after the sampling point is unknown.

With the in-line yellowness measurements taking place directly in the manufactured product, not only is complete documentation possible, but when degradations occur, immediate intervention can take place. This method eliminates many steps of the offline method and the measured results are available in real time.

INNOVATION

This technology deploys a probe directly in the material being produced. Various probes are available from Equitech for both reflection and transmission measurements in immersion and flow cell designs. Different probe offerings allow for measurement of most liquids, polymers, powders and slurries.



Photo 1: Typical chemical manufacturing plant.



Photo 2: Yellowness is an indication of degradation in many materials

YELLOWNESS MEASUREMENT

Illumination of the product through the probe window is achieved by optical fibers which convey the light of a xenon flash lamp. Both reflection- and transmission-based measurements are available depending on the material to be monitored. The detected light is returned via optical fibers and is then interpreted by the spectrophotometer. Yellowness (including YI E313-00, YI D1925) and or b^* values are calculated from this spectral curve, and displayed as trend charts (see Photo 3).

For a continuous yellowness monitoring, 10 to 60 seconds is recommended as the measurement interval. Intervals as fast as 1 to 2 seconds are possible. The spectrophotometer is designed specifically for the demands of the production process and is integrated in a stainless steel NEMA4 box with an industrial computer and touch screen (see Photo 4). The appropriate spectral range is 380-780 nm (resolution 1 nm). The instrument enclosure is designed and equipped specifically for use in the production environment where the ambient conditions can be dusty, vary in temperature, or subject to vibration etc. The box also contains a thermoelectric cooling and heating device to eliminate the influences from ambient temperature by keeping the temperature inside the box at a constant level.

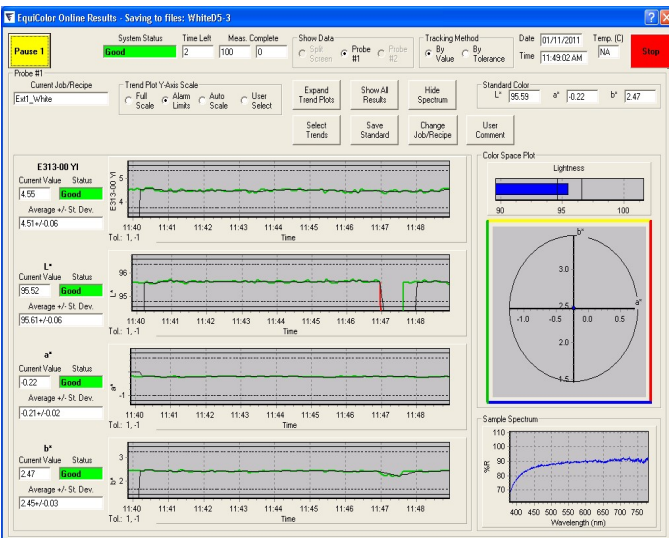


Photo 3: View YI trend charts for continuous monitor



Photo 4: Stainless Steel NEMA4 box with touch-screen

Materials we can Monitor

The Equispec™ Yellowness and b^* Process Analyzer has excellent sensitivity and flexibility making it useful in process applications involving process lines or mixing tanks. The analyzer and process probes are design to be used in high-temperature, high-pressure and corrosive environments. Adhesives, Coatings, Purified Terephthalic acid (PTA), Titanium Dioxide are examples that we have measured.

USER BENEFITS

- **Real-time information about process stability & quality**
- **Avoid off-specification batches & waste production**
- **Detection of dosage elevations**
- **Optimized recipe formulation & process design**
- **Comprehensive quality audit trail customer documentation of the quality of the delivered product**
- **Reduced costs – higher ROI**

For more information or to discuss your yellowness application in detail,

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