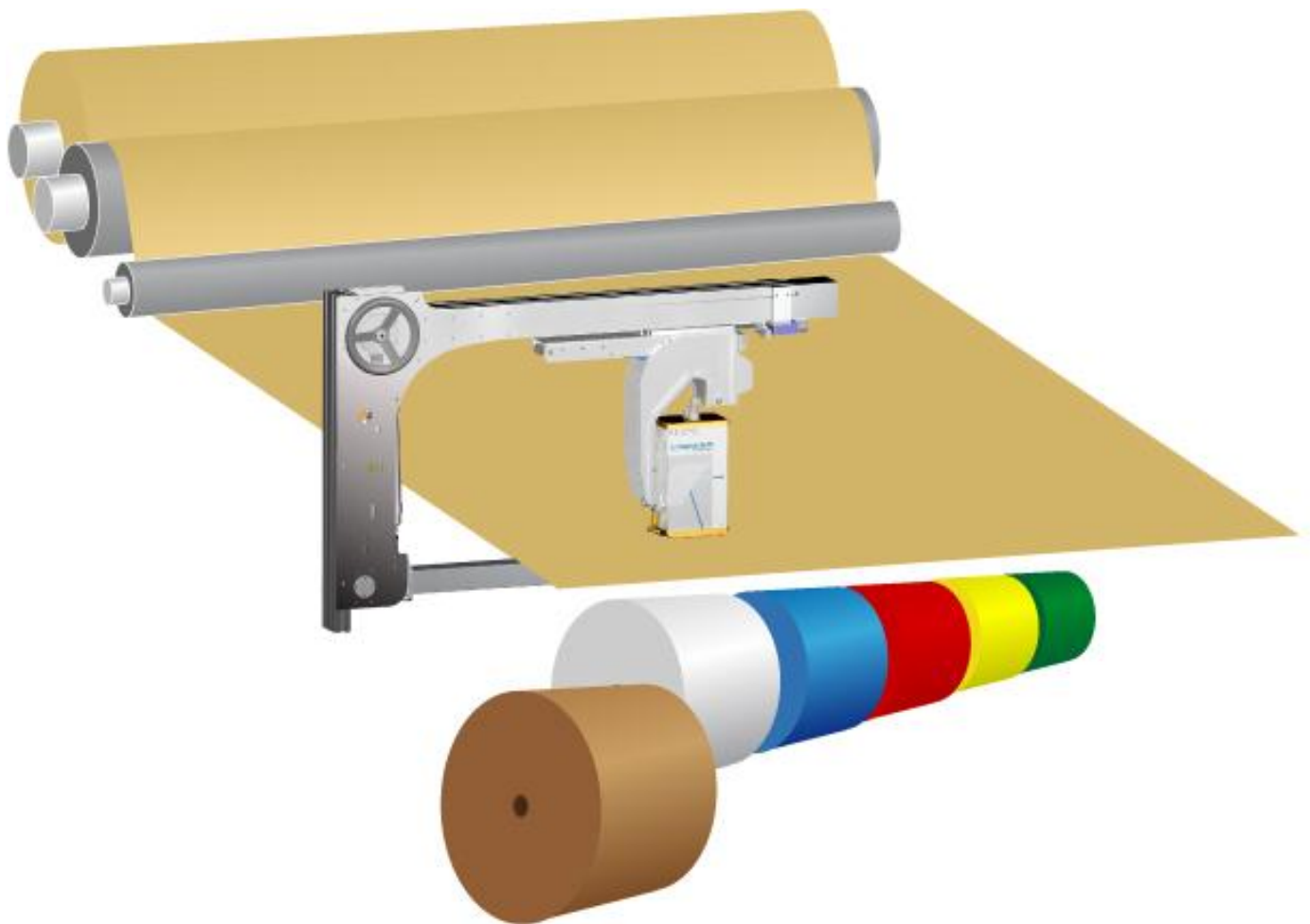


In-Line Color Measurement on any Paper Machine

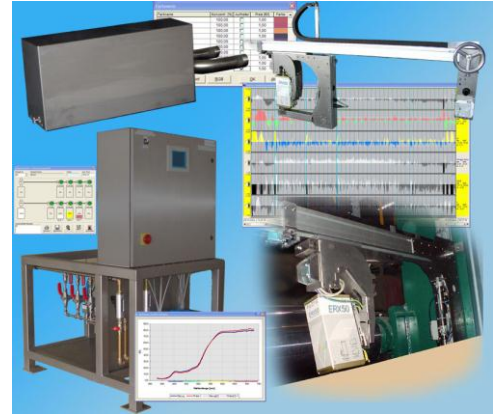
**Turnkey Color Measurement
Systems and Closed Loop
Color Control for all paper and
board types**



Color Measurement System !

X-Rite supplies turnkey system solutions for the In-Line color measurement on a paper machine for all paper and board types. These systems have a decisive part in permanently maintaining a high level of quality in the produced paper.

Developed and manufactured in Germany, we supply it all to fulfill your requirements: From the non-contact color measurement system, to software and computer, and up to automatic color control including control of dye pumps, pump systems, management of recipes, colorants and pumps; as well as automatic pump distribution. These systems are easy to use and can be installed in very short time on any paper machine independently of other control systems.



Quality Cost ?



Constant paper and color quality are the base foundations in paper production. In order to manufacture high-quality finished goods many components have to work in optimum synchronization. Ideal pulp recipes, optimum machine settings, the right colorant mixture, the experience of the papermakers, all these ingredients result in the quality the customer expects from the paper produced. Color is a primary quality feature. A small irregularity in the dyeing can result in an inferior finished product or even cause rejects. Bad quality causes unnecessary costs, risks the customer's satisfaction and last but not least shows in the final price.

Recycling Paper ? Reject paper ?



One of the most important aspects is the constant color quality of the paper. To obtain the correct adjustment of the colorants is a time consuming matter. Fluctuating raw materials, changes in pH-value or retention and more introduce disturbances to the production process that have to be balanced. Samples have to be taken and analyzed, after that color corrections can be done. Only in the rarest of cases the correct color is achieved after the first correction. As a rule this procedure has to be repeated several times. Doing so, costs you time and huge amounts of raw material and colorants, waste that either have to be recycled or disposed of.

Drifting production ?



During the production process problems can occur. The paper color fluctuates and is no longer within the tolerance. The production quality drifts off. As a rule, active control actions are necessary. Until settings are corrected, a lot of inferior paper is produced. The continuous documentation throughout the whole reel not only helps to make early corrections, but also to document good product quality to avoid unqualified complaints of customers.

In-Line Color Measurement – reduces costs, improves quality!

X-Rite In-Line Color Measurement Systems make a significant contribution when producing high-quality paper. Precise color, transition time with waste of material is minimized. It is also possible to do early measurements in the pulp with the prediction of color of the finished paper. Typically, the measurement will be at the dry end, where the paper is finished – color deviations are permanently displayed and manual or automatic corrections can be done without delay.

Our In-Line Color Measurement systems perform a reliable documentation of measurement results for later evaluation of the production steps, according to the standards of quality management. The exact documentation of the production run and any color deviations are proof of the quality produced and prevent customer complaints.

Save time – reduce rejects !

Right after starting the production process the color measurement systems from X-Rite can measure exactly. This guarantees fast response times. In connection with a pump station the color is automatically controlled or can be adjusted manually. You do not need to take physical samples at startup at the reel change. When the In-Line color measurement data show the desired result, a control sample is checked in the laboratory and the production can continue.

Unnecessary delays are eliminated, the abuse of material and production of waste are minimized. During production color deviations from the target are displayed graphically, so that they are clearly visible also from some distance. They can be stored for later analysis. If necessary, data can be transmitted to a process control system.

Precise spectral color measurement !



In most cases the color is measured in a non-contact mode before reel-up. The high spectral resolution of 1 nm of the color measurement system ERX50 and the wide spectral range from 330 nm to 730 nm guarantee optimum measurement results even for critical colors and applications, exact for all papers, no matter if the product is white (including or excluding optical brighteners), whether it is in pastel or deep shade, high or low opacity.

The color measurement system operates 24 hours, 365 days a year and measures the color on your machine. The automatic internal calibration ensures precise and reproducible color measurement day by day and gives relief to paper makers. For better correlation on laminate paper it is recommended to measure the wet paper before the drying section.

Your advantages at a glance

- **Permanent information on your production -> "Early warning system"**
- **Fast reaction to color deviations possible**
- **Faster set-up times**
- **Savings on dyeing costs by lowest possible color addition**
- **Reduction of waste**
- **Documentation of your production prevents customer complaints**
- **Turnkey color measurement on your paper machine**
- **Turnkey color control with pump control and pumps (option)**
- **Connection to your control system possible (e.g. via OPC)**
- **Developed and manufactured in Germany**

Transparent and low operating costs!

- **Installation and setup in 1-2 days. Production stop only necessary for 3 hours maximum**
- **Maintenance time for you: as a rule 1 hour / month**
- **Preventive maintenance by X-Rite: as a rule once per year, Costs: approx. € 2.000**
- **Amortization typically in 3 to 9 months**

In-Line Color Measurement System

Color measurement in the pulp

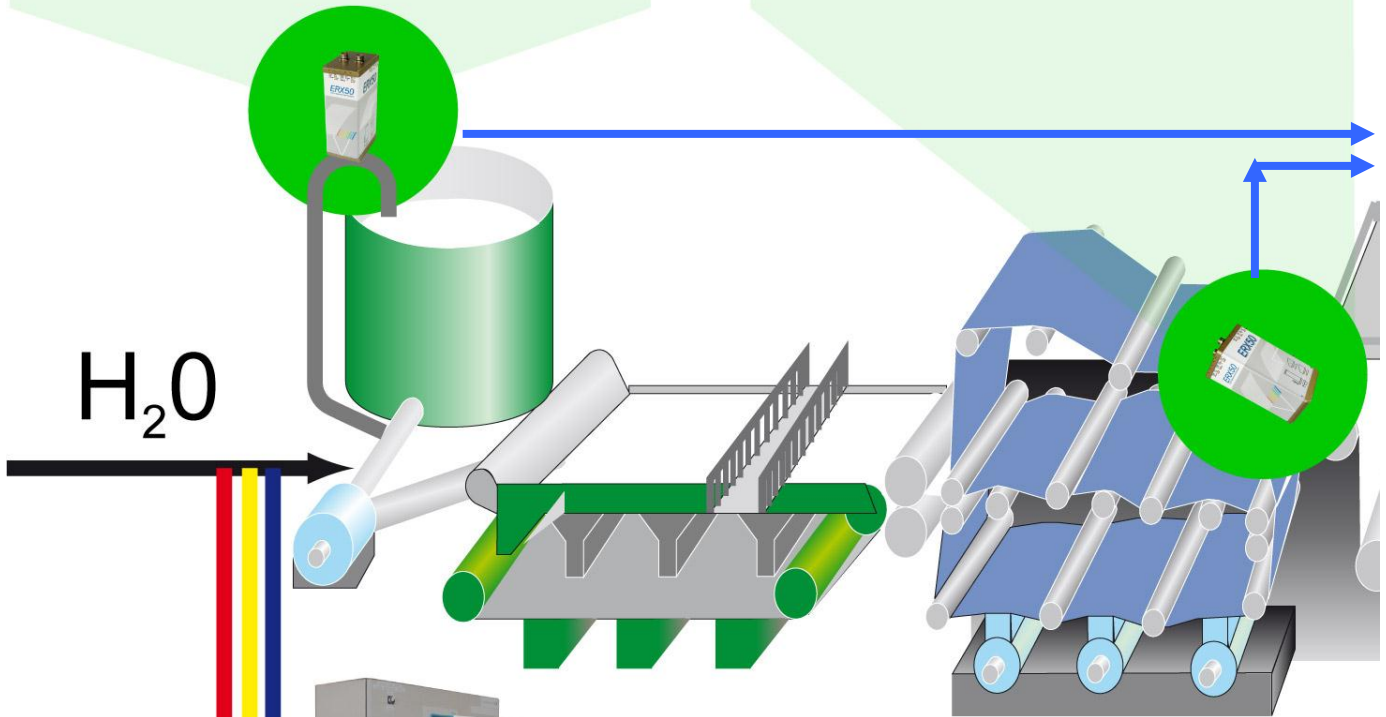
Early information about color/whiteness results of bleaching, deinking, precoloration, about influence of optical brightener.

The expected color of the finished paper can be calculated with reasonable accuracy



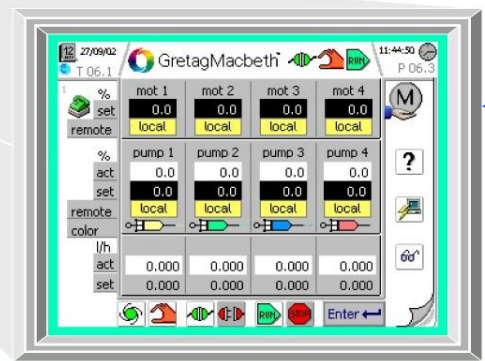
Color measurement on the wet paper web

Ideal for laminate and decor papers ! For better correlation with laminated paper. The water in the paper has similar optical properties like the melamine resin in the finished product. A calculation of the expected color values of the laminate is possible.



Pumps for color dosage

- Different models can be supplied
- High dynamics of flow rate (up to 10 000 to 1)
- Robust, compact and durable construction
- Starts from zero continuously up to the maximum flow. This allows a smooth dosing of dyes.



Pump Control

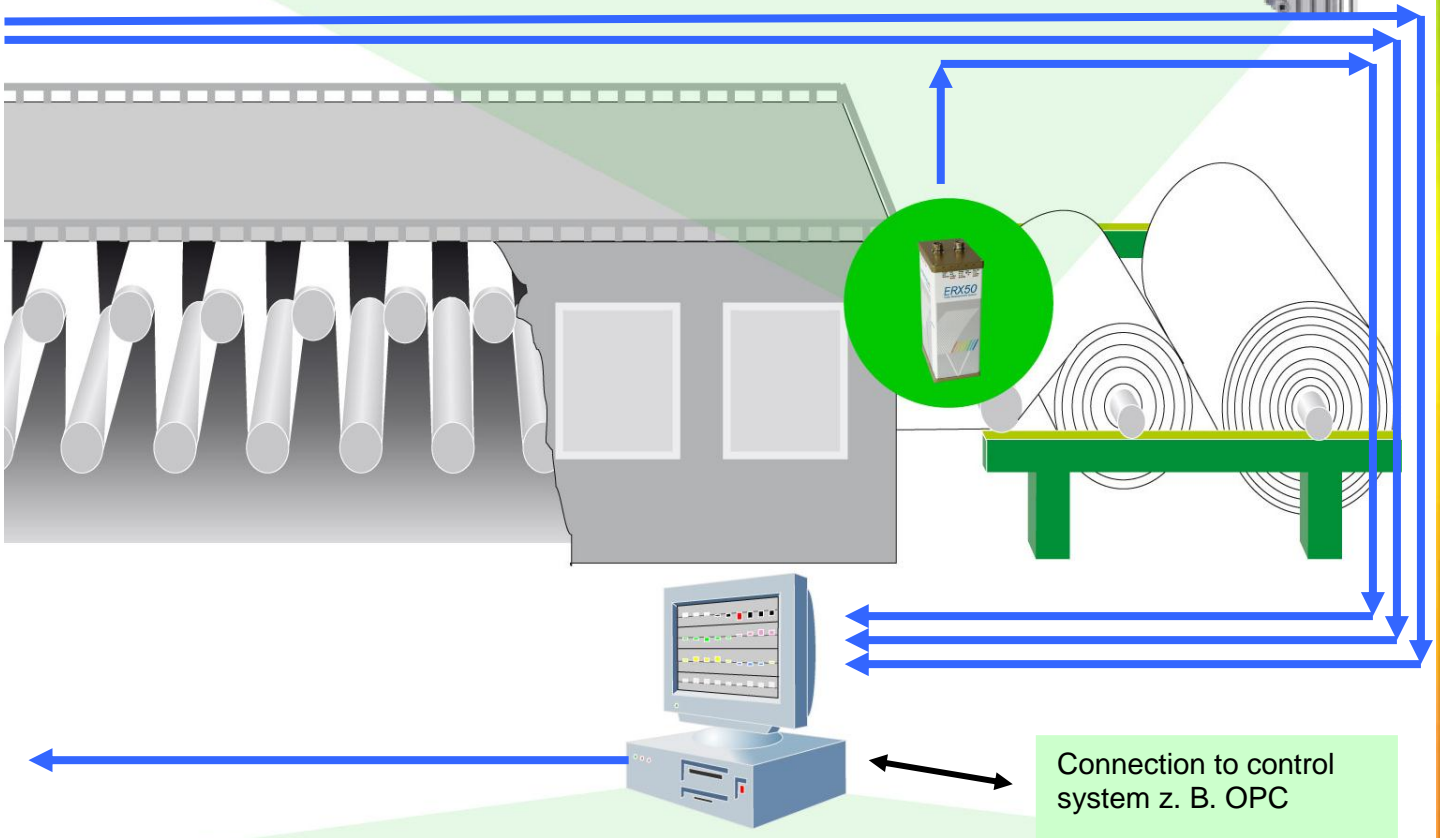
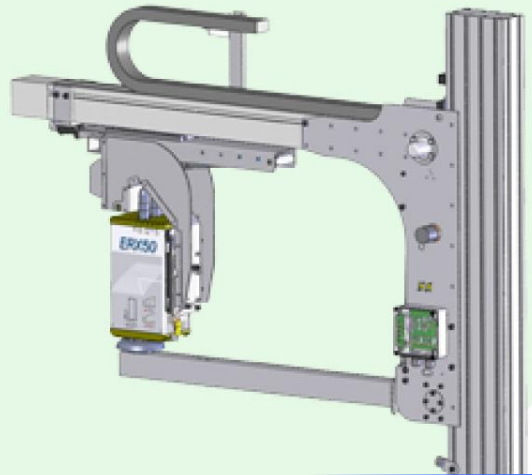
- Local control of the dye pumps or remote control
- Manual operation via touch screen, colored display of the used recipe colors
- Monitoring of pumps
- Purge function for pumps when colorants are exchanged

Color measurement before reel-up

- Most widely used location for color measurement systems as the finished products is measured
- Right position for Closed Loop Color Control
- Very good correlation to the laboratory

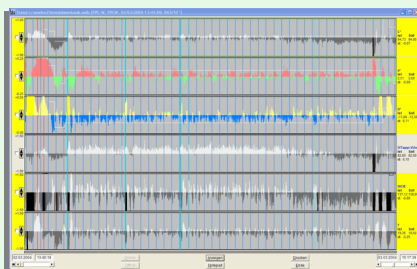
Customer specific measurement frame EFX

- Safe installation of the instrument
- Automatic removal at sheet break
- The instrument can be moved to the edge of the web for service purposes.



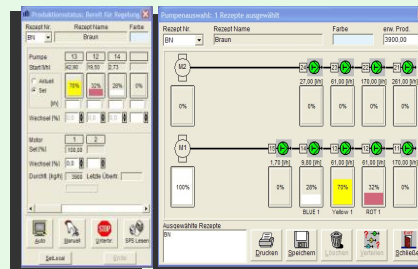
Color quality control

- Control of color measurement system
- Calculation and display of the deviation from target of the color data, opacity and whiteness / brightness
- Storage of data in a database



Automatic Closed Loop Color Control (CLCC)

- For colored, brown and white papers
- To control up to 3 dyes plus optical brightener if required
- Control of dosage pumps automatically or manually



Color control already in the pulp



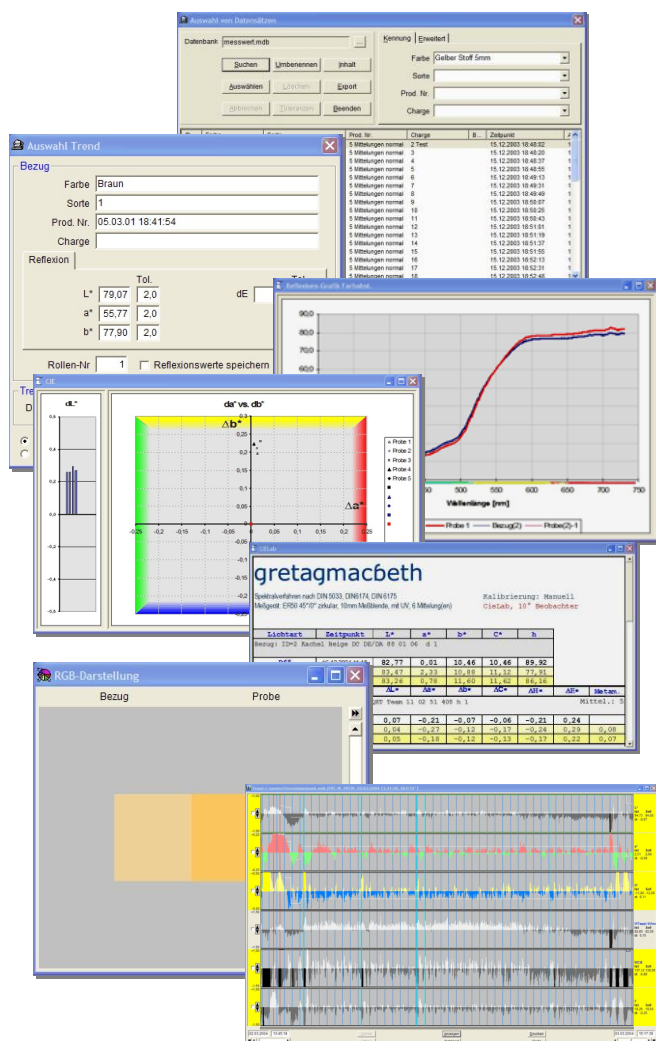
Even before the pulp enters the paper machine the special In-Line color measurement systems supply information on changes in color, opacity and whiteness.

This enables early intervention via manual correction or automatic control. If applied in the pulper, in the machine chest, during bleaching or deinking; the color results can be visualized and influenced. Pulp changes are recognized. Brighteners present in the pulp (e.g. from waste paper) are recognized. This is the best way to save on time and material already during stock preparation and to recognize errors.

The combination of color measurement in the pulp with color measurement at the dry end is the ideal combination to achieve high color quality, to identify and cure deviations in an early stage and to save money.

Color measurement with the ERX50

- For all **colors**: white, brightened, pastel to dark shades, high to low opacity
- Measurement of base whiteness and influence of **brightener**
- **Opacity**- and stack measurement; as in the laboratory also for brightened papers
- Color measurement in the **pulp** also possible
- **No influence** by **ambient light**, **web speed** or normal flutter
- Option: automatic **color control**



Measurement and evaluation as in the laboratory

The ESWIN software developed by X-Rite for In-Line color measurement on the paper machine not only controls the color measurement systems but also supplies in easy to interpret graphic form the measurement results required for high quality production. The measurement results are displayed as trend – bar – diagrams and can be read even from longer distance. If a tolerance is exceeded, this will be marked immediately by a color change of the graphic bars allowing for quick corrective actions.

Past productions are documented by storing the measurement results in databases. The production process can be displayed and analyzed.

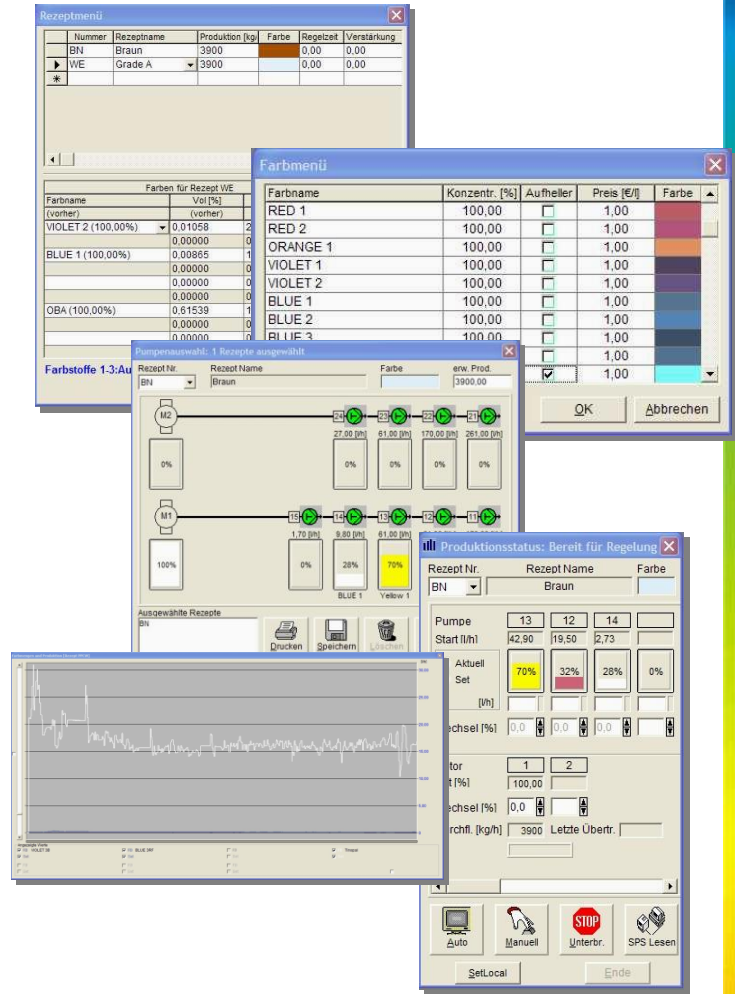
The software is easy to handle and permits configuration of user-specific profiles for entire measurement sequences. ESWin consists of several modules and can be configured to your specific needs. There are a variety of different program extensions to choose from, e.g. to measure opacity and stacks, or to measure the influence of optical brighteners.

The correct color mixture

The perfect color of your paper prerequisites - besides the selection of the correct colorants (in cooperation with the colorant suppliers) - the right dosage and fast reaction to color changes. As supplier of complete turnkey systems X-Rite offers the right solution here, too. The software ES19Win is optimized for automatic color control on the paper machine for all papers.

The software compares the measurements of the In-Line color measurement system ERX50 with the target values of the color. From the differences corrections in the colorant quantities are calculated and transmitted to the metering pumps via the pump control.

This control is performed based on a mathematical model (theoretically in a single step) and not by a step-by-step correction process only. According to the pump settings defined in ES 19 Win control software, the system ensures a continuous color dosage right before the fan pump (for short dead times).



Membrane pumps



Peristaltic pumps



Stroke adjusted pumps

Higher productivity by automatic metering pumps

For fast, automatic color changes and continuous coloring often high dynamic of the pump throughput is mandatory.

In this context X-Rite offers different solutions, e.g. the pumps type E-P XX for color dosage. These pumps are robust and compact and guarantee safe operation even in rough environmental conditions. Flow rates from 0,05 l/h to 260 l/h cover all applications, from tinted white to deep colored paper grades. The optional transport water system covers the even distribution of the diluted colorants in the thin liquid. This results in short reaction times and high efficiency.

The metering pumps are controlled via the pump control EP 19-X. By this pump control manual or automatic adjustment is possible. It can be used also to control existing pumps like piston pumps, peristaltic pumps, membrane pumps.

In-Line color measurement systems world wide

Hundreds of X-Rite In-Line color measurement systems are used in the paper industry world wide and control the color quality during the production of:



- Laminate paper
- Fine paper
- Newsprint
- Board
- Test liner
- Coated paper
- Tissue

Service on all continents

Our service is global. From installation and training to maintenance at the customer's site we service more than 400 In-Line customers in e.g. the following countries:

- Argentina
- Australia
- Austria
- Belgium
- Brasil
- Canada
- China
- Croatia
- Czech Republic
- France
- Germany
- Great Britain
- Hungary
- Indonesia
- Israel
- Italy
- Japan
- Korea
- Luxemburg
- Netherlands
- New Zealand
- Norway
- Poland
- Russia
- Slovakia
- Slovenia
- Spain
- Sweden
- Switzerland
- South Africa
- Taiwan
- Thailand
- Turkey
- USA



Quality Management

We are certified

Voluntary participation in regular monitoring according to ISO 9001:2008

We are your specialists for:

Color measurement instruments

- In-Line
- Laboratory
- Portable

Software

- In-Line Color measurement
- In-Line color control
- Laboratory color measurement
- Laboratory color matching
- Color Management

Light

- Light booths
- Harmony rooms

Munsell and Pantone

- Color collections
- Color standards
- Color vision tests
- Education material

Our service for you:

- Consultation
- Application
- Installation
- Service Software
- Service Hardware
- Training



PANTONE®

X-Rite GmbH, Division In-Line
Fraunhoferstr. 14
82152 Planegg / Martinsried
Germany

Tel.: +49 (089) 85 70 7-0

Fax: +49 (089) 85 70 7-111

Email: inline@xrite.com

<http://www.ERX50.com>

erX50 e Overview.doc

Version 2.32 24.09.2012