Modular · intelligent · economical

TubeScan 100 % print inspection

From simple 100 % web monitoring to complex inspection tasks:

Intelligent print inspection

Simple and economical 100 % print inspection with the TubeScan product series.

Now you can fulfill all of your quality control requirements with a single modular system. TubeScan product series offers 100 % web monitoring, detection of missing labels and matrix residues, simple counting of labels to rewinder control, and high resolution 100 % print inspection within a workflow.

▶ **Video**
Print Inspection with TubeScan

Available web widths [mm] and typical applications:

900, 1100, 1400, 1700
See brochure
*TubeScan XL*

850
760
660
550
470
430
370
330
250
180

All you need for your print inspection:

TubeScan digital strobe

» Can take and display up to 30 images per second in live mode – seamless monitoring of every repeat in real time
» Maximum machine speed up to 500 m / min (1500 ft / min) – depending on the model
» Superb image quality due to high camera resolution
» Various camera models available up to 8k resolution
» 100 % web viewing during make-ready and production
» Automatic repeat synchronization across the entire speed range of the machine

» No health risk, less tiring compared to conventional monitoring using strobe lights
» Fast and easy job setup
» Interfaces to PDF editors from HYBRID Software (CLOUDFLOW, PACKZ), ESKO (Automation Engine); adaptation via system integrators
» Interfaces to MIS systems such as CERM
» Very reliable and stable operation
» Cost-effective

In the split screen view, the reference image is displayed at the top and the current defect is highlighted in the bottom part.
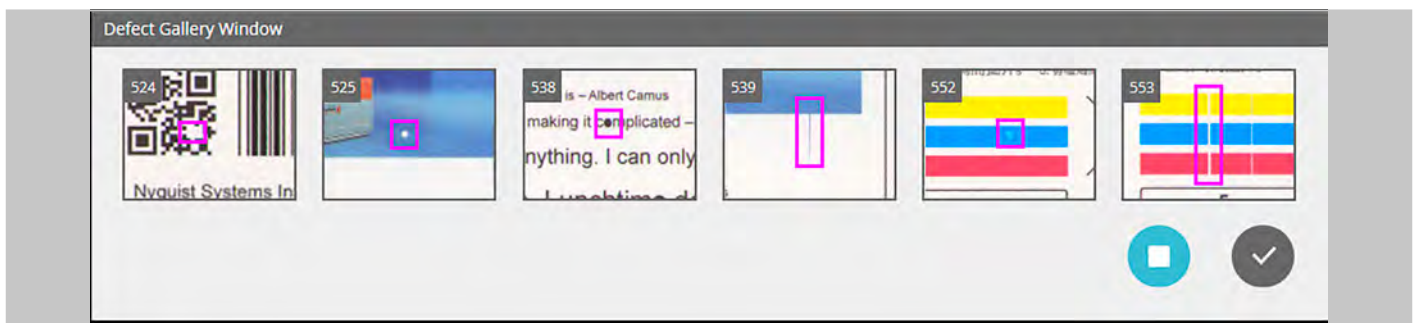
Defect Gallery: Navigation and quick overview over the last defects.

3

The influential factor for print finishing and special effects:

Choose the right illumination for delicate products

Not every material can be checked well with standard white light. You need the right illumination for special surfaces, such as foil embossing or for luminescent applications such as paint, adhesive or silicone applications. Due to the pulsed operation, the power consumption is minimal.

Bright field illumination for highly reflective materials

The broad outline of silver foil finishing is highly reflective

Camera image with dark field illumination

With bright field illumination, the foil finishing is clearly visible

» Choice of dark field or bright field illumination to generate maximum contrast. Matte and slightly glossy surfaces can be checked well in dark field. Bright field illumination is usually more suitable for highly reflective surfaces.

Typical applications:
› Cold foil / hot foil applications
› Holograms
› Coatings

UV illumination for luminescent applications

Standard illumination: The QR code printed with transparent luminescent ink is invisible

The UV illumination makes the QR code clearly visible for inspection

» Inspect luminescent areas such as coatings, adhesives and silicones
» Inspect security features printed with transparent luminescent ink
» UV and white light can be combined, each with adjustable intensity
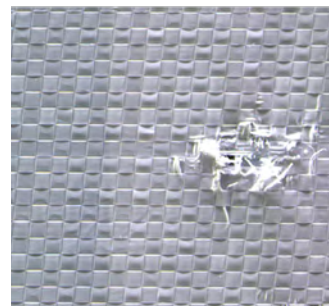
Typical applications:
› Security print
› Pharma

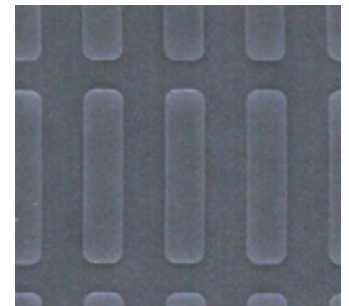## Contour light for recognition of elevations

Braille without contour light: Barely visible

With contour light, braille writing is easy to see

Detection of irregularities on surfaces ...

... or of missing transparent labels on transparent or opaque liners

» The special contour light makes the finest elevations visible for the inspection camera
» Detect almost invisible missing labels and matrix residue, especially on blank labels
» Contour light and white light can be combined, each with adjustable intensity
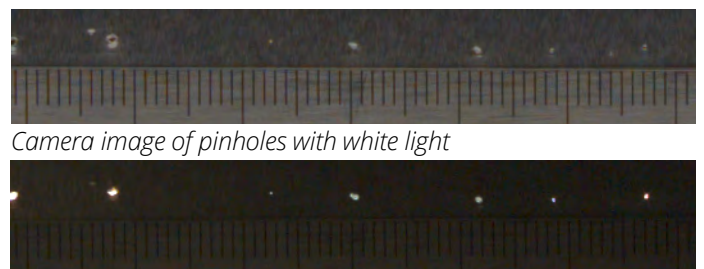
Typical applications:
› Clear-on-clear, clear-on-paper (without print)
› Sleeves / tubes
› Braille
› Irregularities on surfaces

Back light for improved contrast
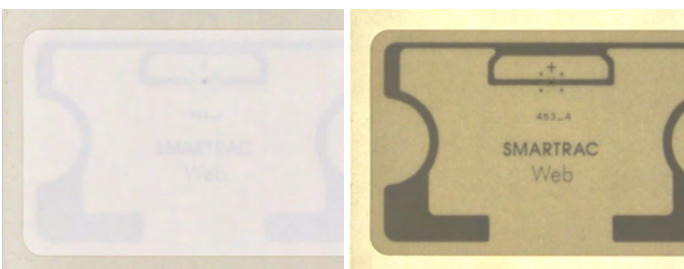
Camera image with white light

Back light for better inspection of internal structures

Camera image of pinholes with white light

Back light provides high contrast for reliable inspection

» Back light can be used to increase contrast or reveal internal structures, e.g. in RFID antennas.
» Back light and white light can be combined, each with adjustable intensity

Typical applications:
› Pinhole detection, e.g. in aluminium lids, aluminium foil, blister packs
› White labels on white liner
› Internal antenna structures for RFID

A modular system that can be extended at any time:

Manifold functions for your reliable quality assurance

Automatic die cutting recognition

Inspection of alphanumeric sequences → see page 10 /11

Secondary zones and masking for different inspection tasks

Distance monitoring → see page 8

CIE L*a*b ΔE color monitoring → see page 9

Masking of areas to be excluded from inspection

*Counting repeats and errors (order-related)*

1D and 2D barcode inspection and verification → see page 10 /11

Dynamic Roll Map

The Dynamic Roll Map is typically used on presses. It is
a virtual representation of the roll that is currently being
printed.
» Gain an overview of production discrepancies and areas
  of interest
» Investigate the camera image and properties of each
  individual defect by selecting the corresponding symbol
  within the lane
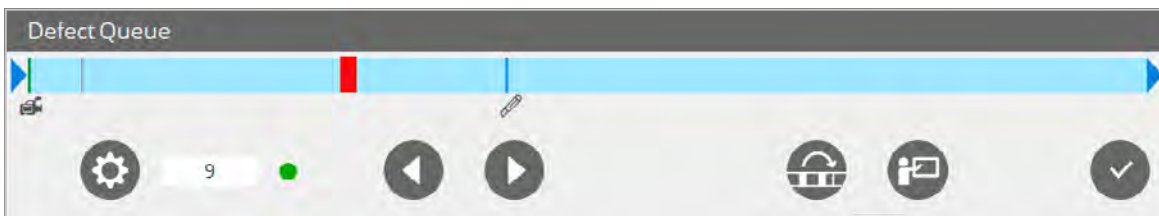
Defect Queue for placement control

The Defect Queue is typically used on slitters/rewinders
» Easily locate defects in relation to the target stop
  position
» Identify contiguous defects and skip them on the fly if
  required
» Benefit from re-inspection / re-positioning during
  activated pharma inspection

TubeScan offers a wide range of features
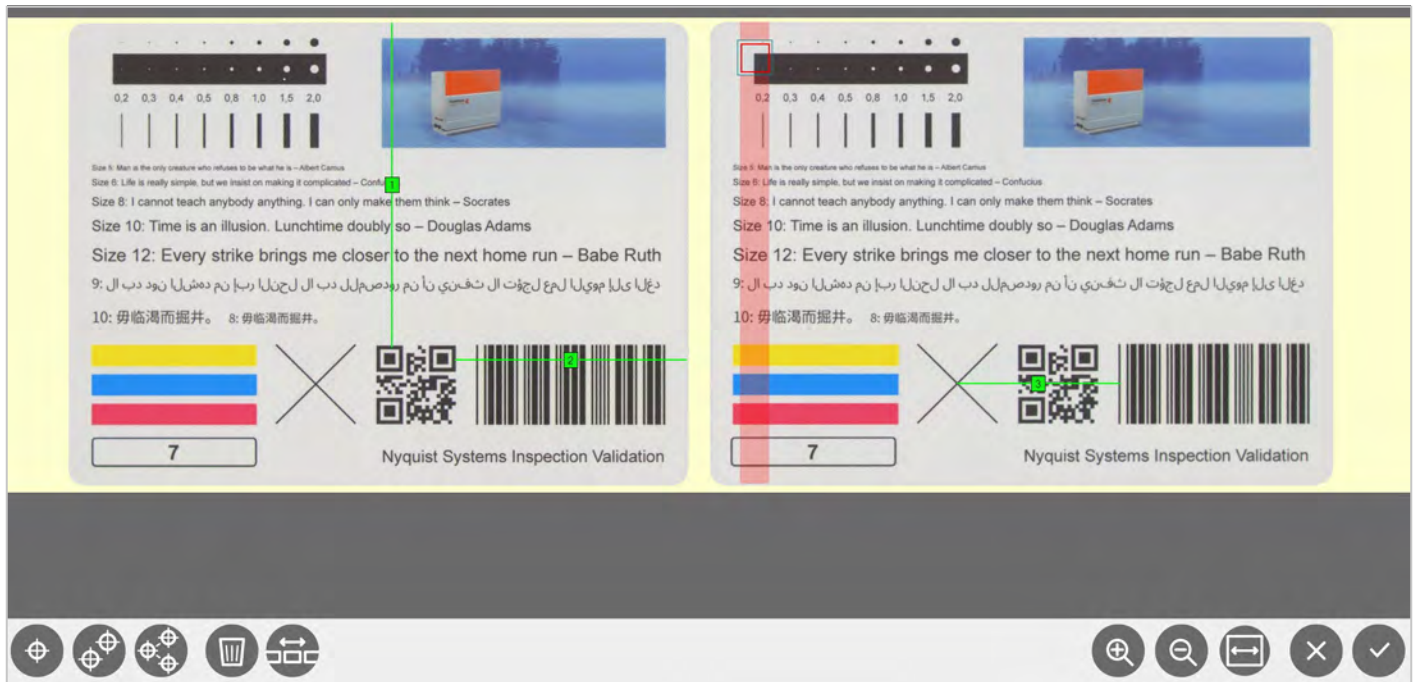# A solution for every inspection task

Inspection settings
A simple to use interface to set sensitivities
» Expert mode for the advanced user
» Set thresholds for defect size, color sensitivity, etc.
» Access numerous inspection functions as described below
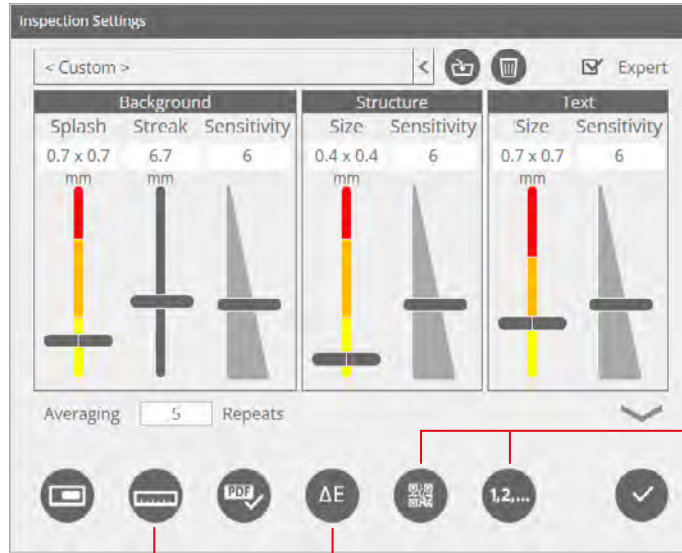
Inspection of variable data
→ see page 10 /11

 Distance monitoring

Relative distance monitoring based on edges or shapes
» Monitor the deviation of the repeat length
» Monitor deviations from reference distances (e.g. diecut contour to print, imprint to print)
» One-point, two-point and multi-point measurement
» Store all results in a CSV file

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ΔE Delta E monitoring

» Measurement points can be positioned as needed
» The color within a measurement zone is averaged and a corresponding Delta E value is calculated
» All Delta E values are stored in a CSV file to provide a complete history of the roll being printed
» Delta E limits can be defined to trigger an alarm or stop the press

Note:
The Delta E calculation uses RGB data of a CCD camera. It is not based on a spectral color information. Nevertheless, printers have found this feature useful, as it can serve as a trend indicator.

Variable data: Quality assurance through integration into your production workflow

Inspection of dynamic barcodes and OCR

Your customers are increasingly demanding barcode-enabled print products, whether for individual product labeling, making goods counterfeit-proof or traceable, marketing purposes such as sweepstakes, or pharmaceutical labeling.
As a print shop, you want to provide impeccable quality and long-term customer satisfaction:

TubeScan allows you to check, decode and evaluate alphanumeric strings and barcodes inline. This ensures that barcodes are both complete and correct, and that they function flawlessly. TubeScan operates with the same reliability and speed as high-priced inspection systems – at a fraction of the cost thanks to smart BST image processing with matrix cameras.
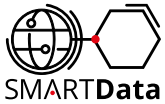
SMART**Data** — Inspection and decoding of static and dynamic 1D or 2D barcodes. Grading according to ANSI / ISO.

Comparison with database or validation against a rule base
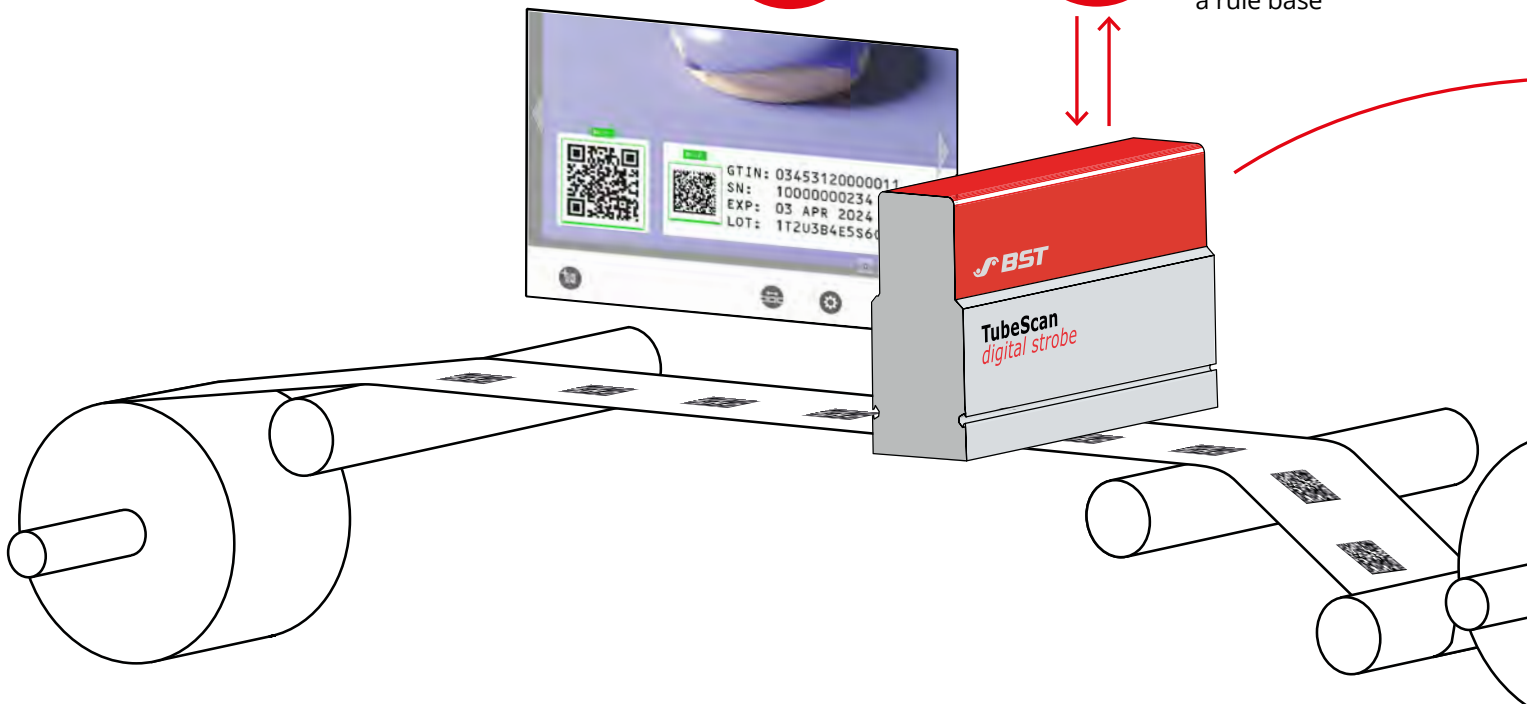
Inspection of
a) Quality:
» Readability / decodability
» Barcode- / matrix code print quality (verification, ANSI grading)
b) Content:
» Decode results, read out, export to list
» Check for sequence and duplicates
» Real-time comparison with code database

Dynamic verification of variable objects
» Numbers / text (OCR)
» Barcodes (1D barcodes): State, Codabar, Code 39, Code 93, Code 128, EAN 8, EAN 13, EAN 14
» 2D matrix codes: Aztec, Data Matrix, Maxicode, QR code, Micro QR code, PDF417, MicroPDF417, Truncated PDF417

Further processing / workflow:
» Barcode errors are in the inspection report and can be positioned on the rewinder.
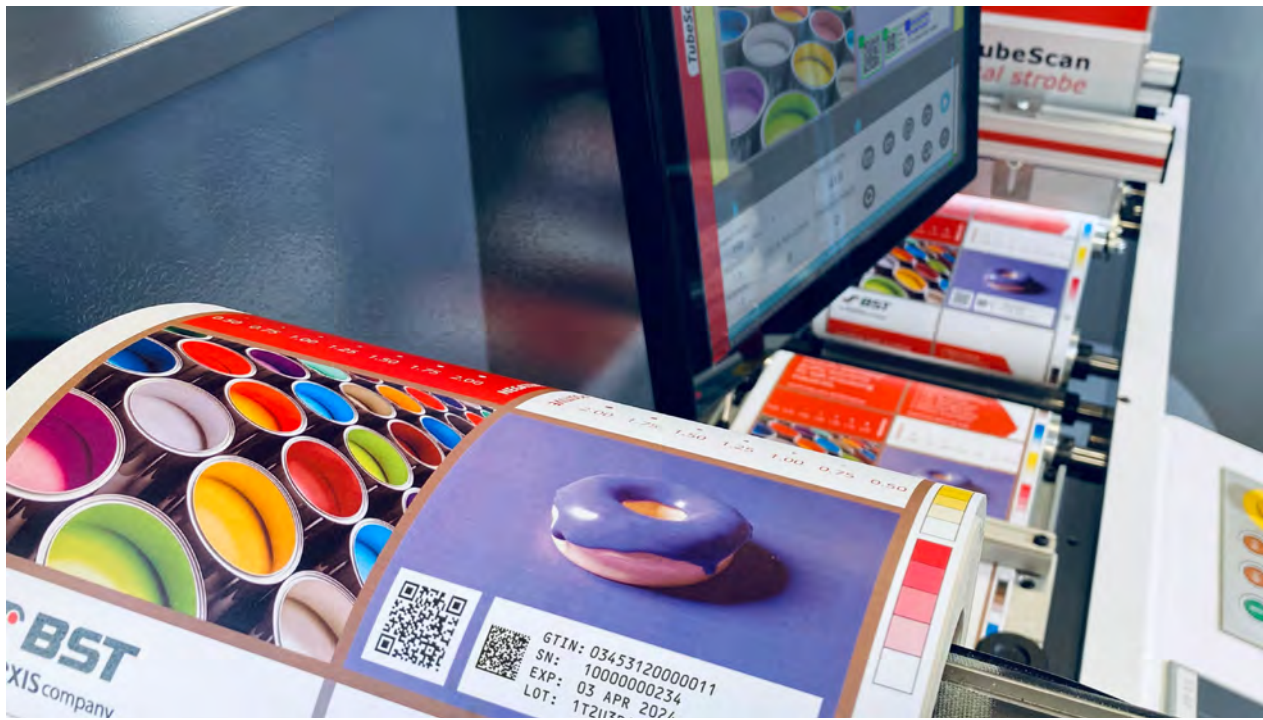
Export of the results into an inspection report (CSV file)

fast

Inspection of variable data with simultaneous print inspection at full inspection speed

high-resolution

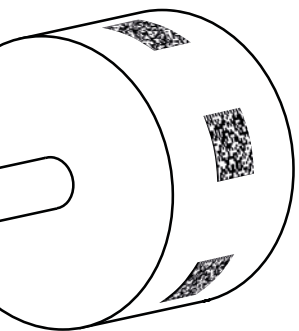**4k 8k**

Original size datamatrix on stamp

TubeScan image with 55 µm resolution

8 mm
0.31"

The patented combination:

TubeScan eagle view
Web viewing and 100 % inspection

Web viewing systems are a standard in converting and label printing. They are used on almost every printing press to monitor the registration by providing a highly magnified view of register marks and general visualization of particularly relevant print areas such as company logos, colored areas, barcodes, etc.

However, web viewing systems are not sufficient for 100 % print quality monitoring and must be combined with print inspection systems. The disadvantage of in-line 100 % inspection systems has been their high initial investment, which many printers have avoided, compromising quality assurance.

The patented TubeScan eagle view is the cost-effective alternative: multiple inspection cameras are integrated into one system. They provide a detailed viewing, while ensuring 100 % inspection. The intuitive touch screen interface makes setup extremely easy and fast.

*Full web view and detail viewing down to halftone dot size*

Your benefits

» Cost-efficient combination of 100 % print inspection and detail viewing

» Detail viewing of critical areas like registration marks, 2D barcodes, picture areas, etc. down to dot level

» Camera for detail viewing is traversing and can be easily navigated with respect to the displayed print repeat

» The detail camera and the inspection camera can use different lighting modes simultaneously. For example, the inspection camera could use standard white light while the detail camera uses UV light to show a luminescent safety mark. (See screenshot below)

» The printing cylinder repeat can be synchronized using an existing gear wheel or print mark sensor. Alternatively, synchronization can be achieved entirely through software, eliminating the need for external trigger sensors.

» The register of the reverse side print can be monitored with the optional back light

» Small foot print, only 125 mm (5") in web direction

» Can be combined with all options available for TubeScan digital strobe such as fine print inspection, PDF reporting, dynamic roll map, etc.

Technical data

Basic functions identical to TubeScan digital strobe

|	
Resolution of detail viewing (traversing camera)	~ 14 µm
View area of detail camera	35 mm × 25 mm 1.4" x 1" ~ 2500 px × 2000 px
Image rate of detail camera	up to 10 images per second
Automatic image synchronization within the repeat	
Picture-in-picture navigation via touch monitor	
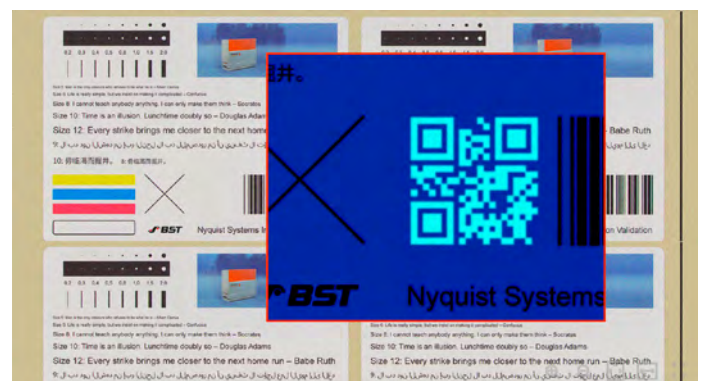
Screenshot of picture-in-picture viewing monitor: Standard white light for the inspection camera and simultaneous UV-illumination for the detail viewing of luminescent ink application

Smart and economic automation
SMARTData QLink inspection workflow

By integrating your TubeScan inspection into the workflow, you minimize operator decisions. This significantly increases quality and improves your productivity. For example, the net count is automatically updated after each editing. No more costly over-production just to ensure there is enough good material.

Gigabit network

100 % inspection + QLink real-time editor
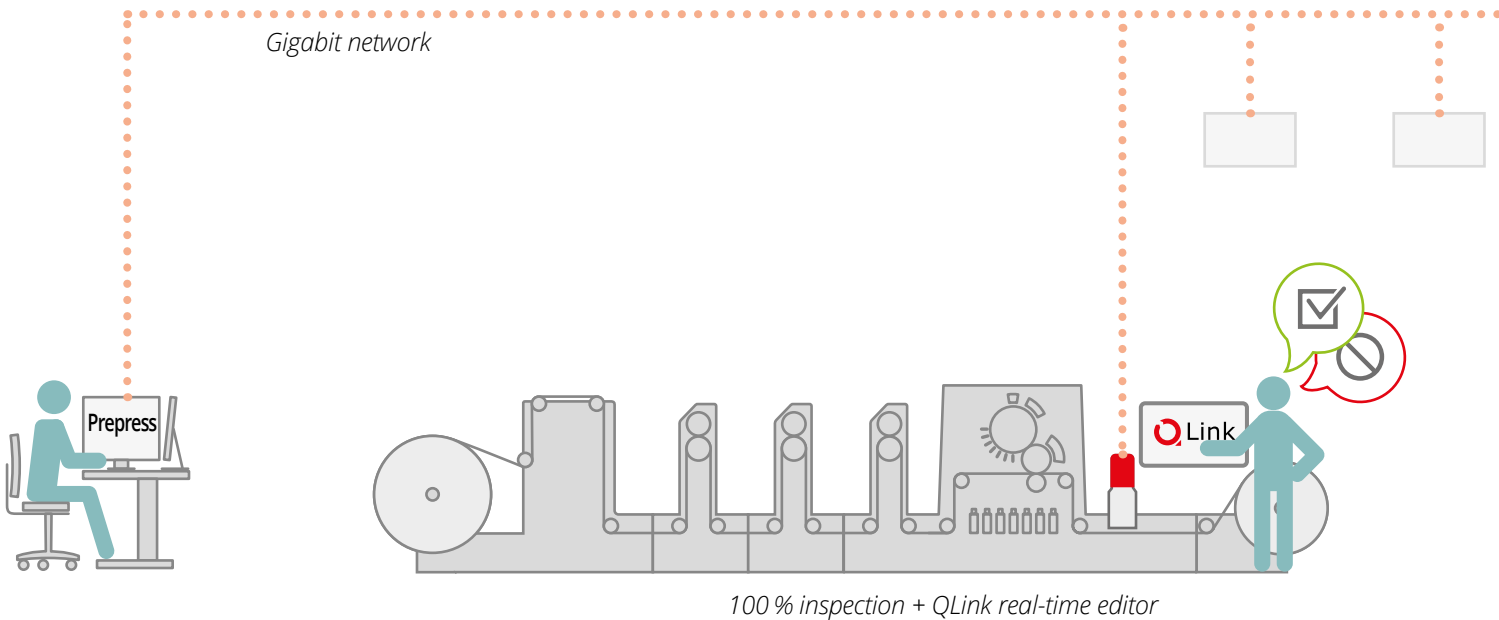
Connection to Prepress

Interfaces to
» Prepress software from HYBRID Software (CLOUDFLOW, PACKZ), ESKO (Automation Engine); adaptation via system integrators
» MIS systems such as CERM

Generation of Master-PDF
» Inspection zones
» Zones for variable data
» Lead-in / lead-out barcodes for Dynamic Job Change
» Layer processing

Referencing to data bases
» PDF meta data
» CSV files containing variable data

QLink Press: On the printing press

Software module with local mass storage, based on TubeScan digital strobe or TubeScan eagle view

Real-time editor
» Editing of the roll protocol database during printing
» Display of the net count in real-time, taking into account the edited roll protocol – per roll or cumulated over the entire production

Roll management
» Selection, editing and transfer of the roll protocols within the network

Local mass storage
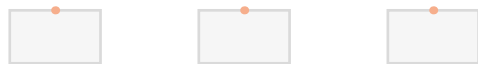» Temporary, local data storage of the roll protocols

QLink Editor: Quality management

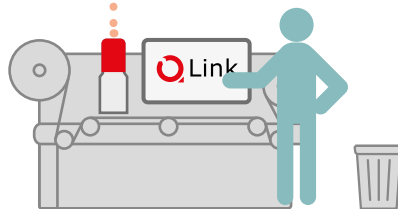Software module on a PC for your inhouse access
» Processing of all roll protocols in the network
» Roll protocols can be visualized and edited for further converting

Multiple printing and converting machines can be integrated into the network

Customer server storage

Defect handling

QLink Rewinder: On the finishing machine

Software module based on TubeScan digital strobe or TubeScan eagle view. Synchronizes the QLink roll maps with the physical roll and can be used in parallel as an additional 100% inspection.

» Control of the rewinder. Forward control or even pharma control
» Access and processing of all roll maps stored on the network
» Camera-based synchronization and visualization ensure optimal workflow stability. Eliminates time-consuming and error-prone positioning and adjustment of ultrasonic or contrast sensors
» If required, an additional 100% inspection can be performed without extra effort, e.g. to detect missing labels or matrix residues when die-cutting is performed downstream on a slitter-rewinder.

▶ **Video**
Dynamic Job Change

Features overview

Simple counting and thoroughness

… with TubeScan digital strobe+
100 % print inspection to detect missing labels, matrix residues and coarse defects.

Your benefits
» No time-consuming sensor adjustments
» Detection of missing labels, coarse print defects and matrix residues
» Accurate counting of repeats, labels and missing labels for up to 20 lanes – per lane and in total
» Generation of a 24 volt defect signal to trigger an alarm or marking system
» Optional placement control module with defect queue for automatic control of a rewinder

Complex 100 % high-resolution print inspection

… with TubeScan digital strobe++
to detect fine print defects, splashes, register and color deviations, etc.

Your benefits – in addition to digital strobe+
» Detection of fine print defects, register defects and large color deviations, down to approx. Ø 0.2 mm defect size (0.04 mm²), depending on the resolution
» Secondary inspection zones allow defining specific areas at higher or lower inspection tolerances
» Automatic label contour detection
» Masking function to ignore defined areas
» Surface inspection
» Job save function for repeat orders, incl. master image
» Real-time display of the detected defects on HD monitor
» Adjustable sensitivities for various defect classes

Options

... in addition to TubeScan digital strobe++

- » Relative distance monitoring based on edges or shapes
- » Generation of PDF roll reports
- » Dynamic roll map for the visualization of all defects in the current production roll
- » Snapshot recording and saving of all live-images over a defined period of time
- » Variable data (barcodes, alphanumeric sequences, OCR) and comparison with databases

- » PDF Toolbox
  a) for master image comparison
  b) import of inspection zones defined in pre-press, such as masking, die-cutting contours, secondary inspection zones, static or variable 1D / 2D barcodes and alphanumeric sequences
- » Interfaces to PDF editors from HYBRID Software (CLOUDFLOW, PACKZ), ESKO (Automation Engine); adaptation via system integrators
- » Interfaces to MIS systems such as CERM

Available web widths and housing lengths

TubeScan digital strobe	120	180	220	250	330	370	430	470	550	660	760	850	XL: 900 – 1700
Web width [mm]	120	180	220	250	330	370	430	470	550	660	760	850	see brochure TubeScan XL
Length of housing [mm]	210	260	260	310	410	410	510	510	610	760	840	960	
Web width [in]	5	7	9	10	13	15	17	18	22	26	30	34	
Length of housing [in]	8.3	10.2	10.2	12.2	16.1	16.1	20.1	20.1	24.0	29.9	33.0	37.9	

TubeScan eagle view	250	370	470	570	660	760
Web width [mm]	250	370	470	570	660	760
Length of housing [mm]	410	510	610	760	840	960
Web width [in]	10	14	18	22	26	30
Length of housing [in]	16.1	20.1	24.0	29.9	33.0	37.8

TubeScan
System overview

TubeScan camera unit   PC   22" touch monitor   22" or 32" web viewing monitor
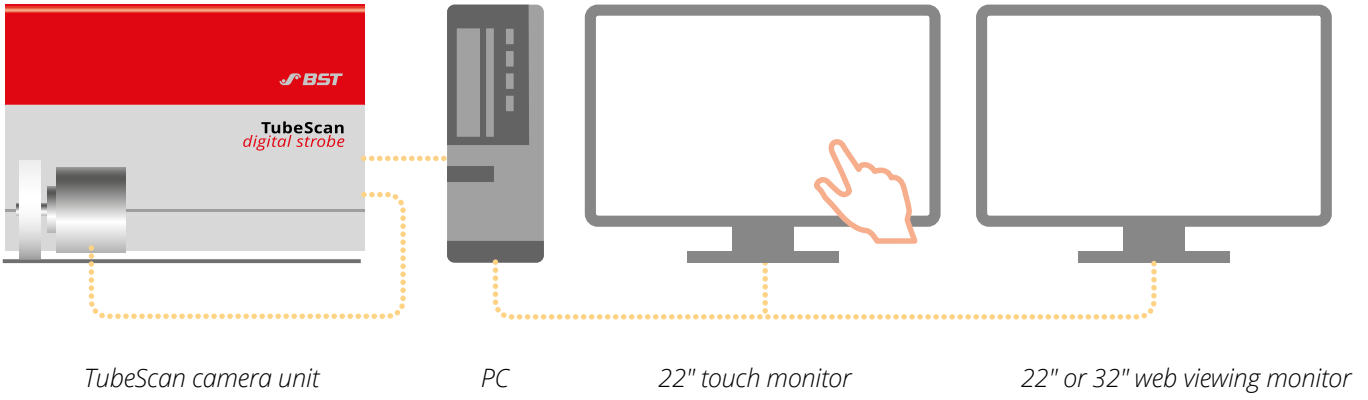
Backing bar

Backing bar for insensitive liner-based materials

Roller backing bar for sensitive materials

Booklet backing bar for booklet inspection. It can be adjusted to accommodate booklet thicknesses up to 5 mm and retrofitted to the double-sided traverse mounting.

Mounting

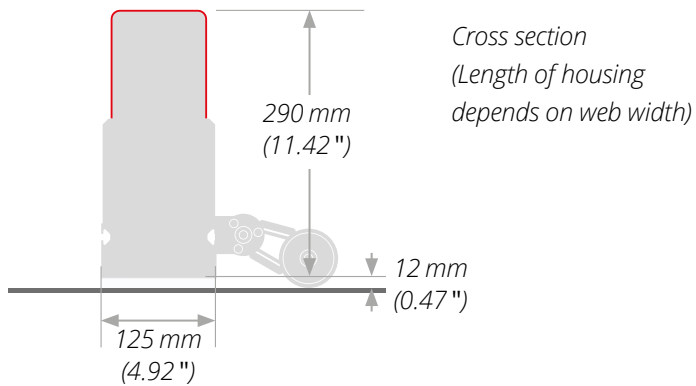*Cantilever mount, for housings up to 510 mm (20.1") of length*
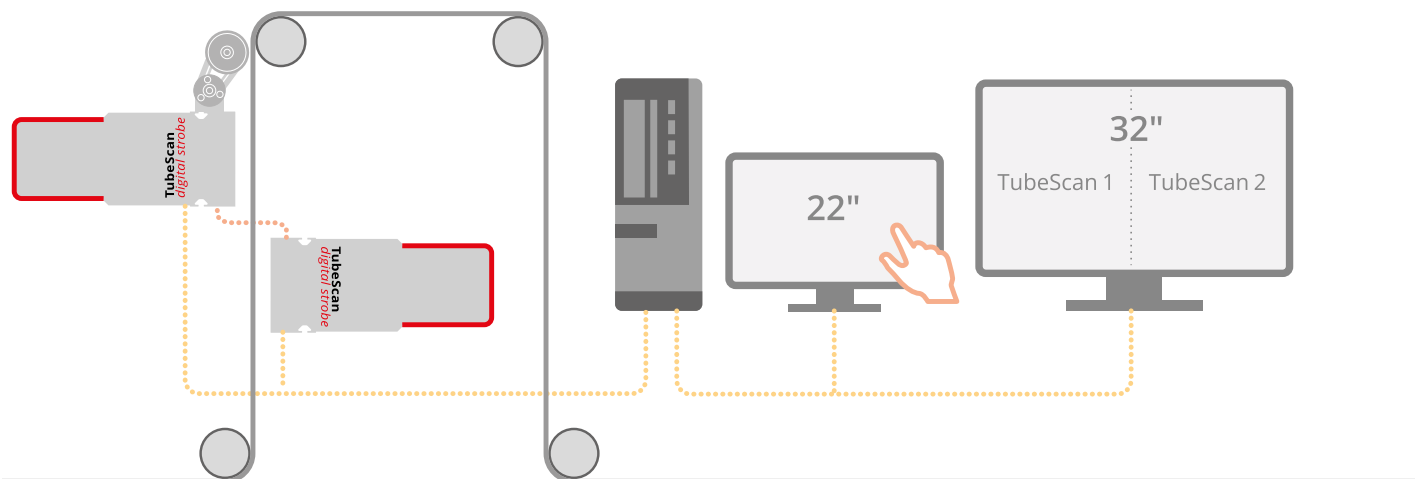
Front mounting brackets

Customized double-sided traverse mounting

Dimensions

*Cross section
(Length of housing
depends on web width)*

290 mm
(11.42 ")

12 mm
(0.47 ")

125 mm
(4.92 ")

Special application: Double sided inspection with TubeScan twinhead

A system comprising two camera units, controlled by a single PC and a single operator interface, represents a cost-effective solution for inspecting both sides of the web simultaneously.

Technical data for all TubeScan systems

Image rate	up to 30 images per second
Operating temperature	0° – +35° C (+32° – +95° F)
Supply voltage	100 – 240 V, 50 – 60 Hz
Shaft encoder with layon wheel	RS422, channel A+B
10 opto-isolated outputs 24 V, 80 mA max.	Configurable outputs for web-based defect signals, control signals for rewinders, etc..
Binary I/O module for up to 4 external event inputs (24V)	E.g. input signals for automatic roll change, output signals to automatically set flags

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