MÜHLBAUER AUTOMATION TEMA VISION

SOPHISTICATED INSPECTION SOLUTIONS
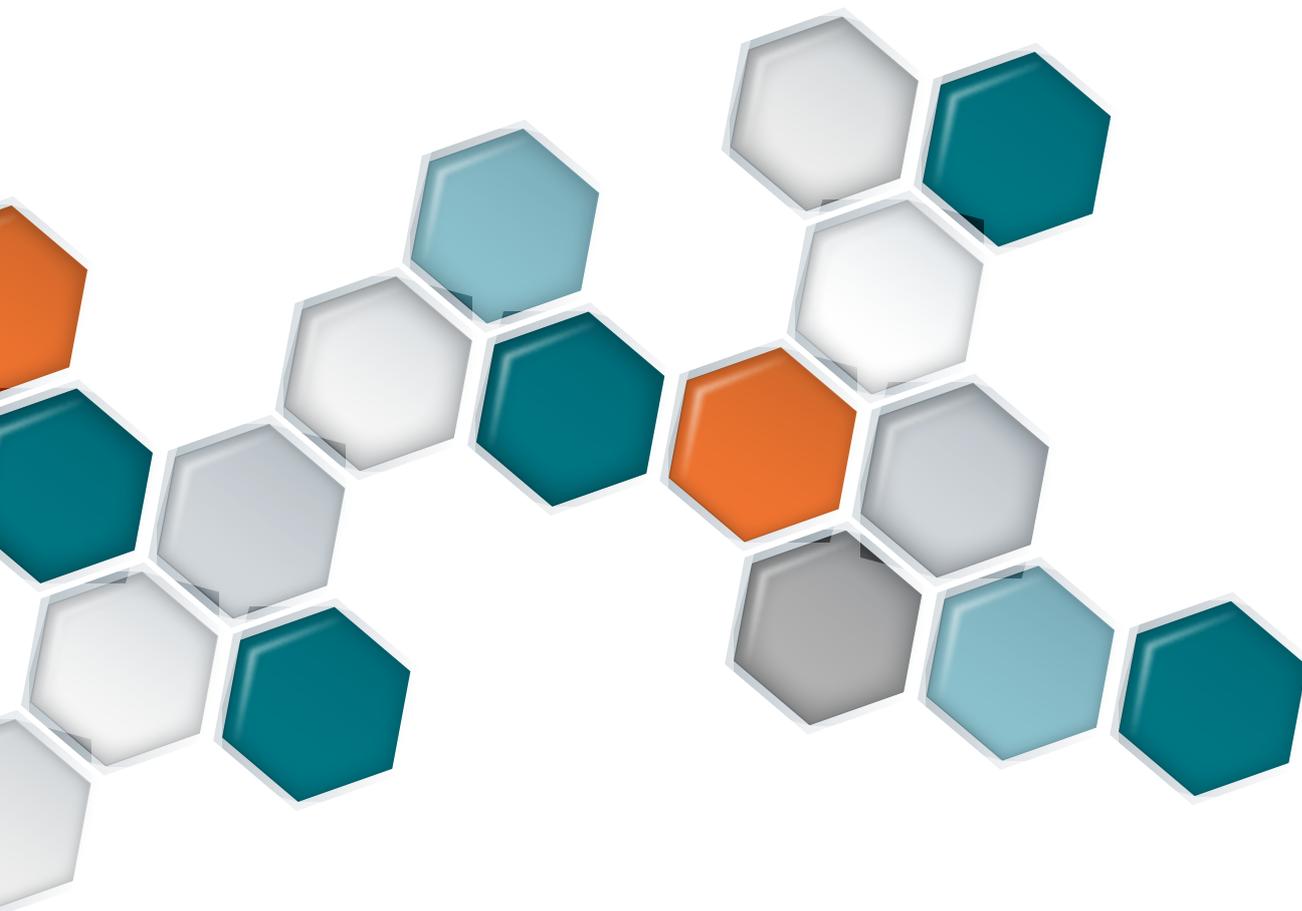
CONTENTS

MÜHLBAUER GROUP AT A GLANCE

MÜHLBAUER'S BUSINESS UNITS AND SITES

Founded in 1981 in the heart of Bavaria, the Mühlbauer Group has ever since grown to a leading global player in the fields of Parts & Systems, Semiconductor Related Products, Document Solution Related Products and TECURITY® Solutions. With around 3,500 employees, technology centers in Germany, Malaysia, Slovakia, the U.S.A. and Serbia and 35 sales and service locations worldwide, Mühlbauer created a strong competence network around the globe.

We continuously invest in the latest technologies and innovative processes to enhance our competences and provide you with optimized solutions. Our in-house precision part production MPS – Mühlbauer Parts & Systems – guarantees unlimited flexibility and highest customer satisfaction.

Our business unit AUTOMATION does not only develop and assemble individually customized production systems, but also provides matching software solutions for the production process of Document and Solution Related Products. Vision inspection technologies as well as semiconductor and RFID applications complete our comprehensive portfolio.

Our business unit TECURITY® is established as a competent partner for the implementation of security systems for identifying and verifying both documents and individuals. Our clients benefit from more than three decades experiential value which we have gained during the realization of over 300 ID projects worldwide.

Service Hub Russia

HQ Germany
Production Center Germany
Production Center Slovakia
Production Center Bosnia & Herzegovina
Production Center Serbia
Service Hub Spain
Service Hub Turkey
Service Hub Georgia
Service Hub Iraq
Production Center USA
Service Hub South Korea
Service Hub Japan
Production Center China
Service Hub Taiwan
Service Hub United Arab Emirates
Service Hub India
Service Hub Mexico
Production Center Malaysia
Service Hub El Salvador
Service Hub Uganda
Service Hub South Africa
Service Hub Brazil
Service Hub Australia

Mühlbauer
Bosnia & Herzegovina

Mühlbauer
China

Mühlbauer
Germany

Mühlbauer
Malaysia

Mühlbauer
Serbia

Mühlbauer
Slovakia

Mühlbauer
USA

MPS
Precision Parts & Surface Engineering

**AUTOMATION**
Production Equipment & Systems

WORLD OF TECURITY®
Government & Technology Solutions

TEMA VISION OVERVIEW

STATE-OF-THE-ART INSPECTION SOLUTIONS ALONG THE PRODUCTION LINE

FINAL
INSPECTION

3D SHAPE
CONTROL

PRINT
INSPECTION

SURFACE
INSPECTION

SERVICE

CONSULTING

SOFTWARE/
DATA LOGGING
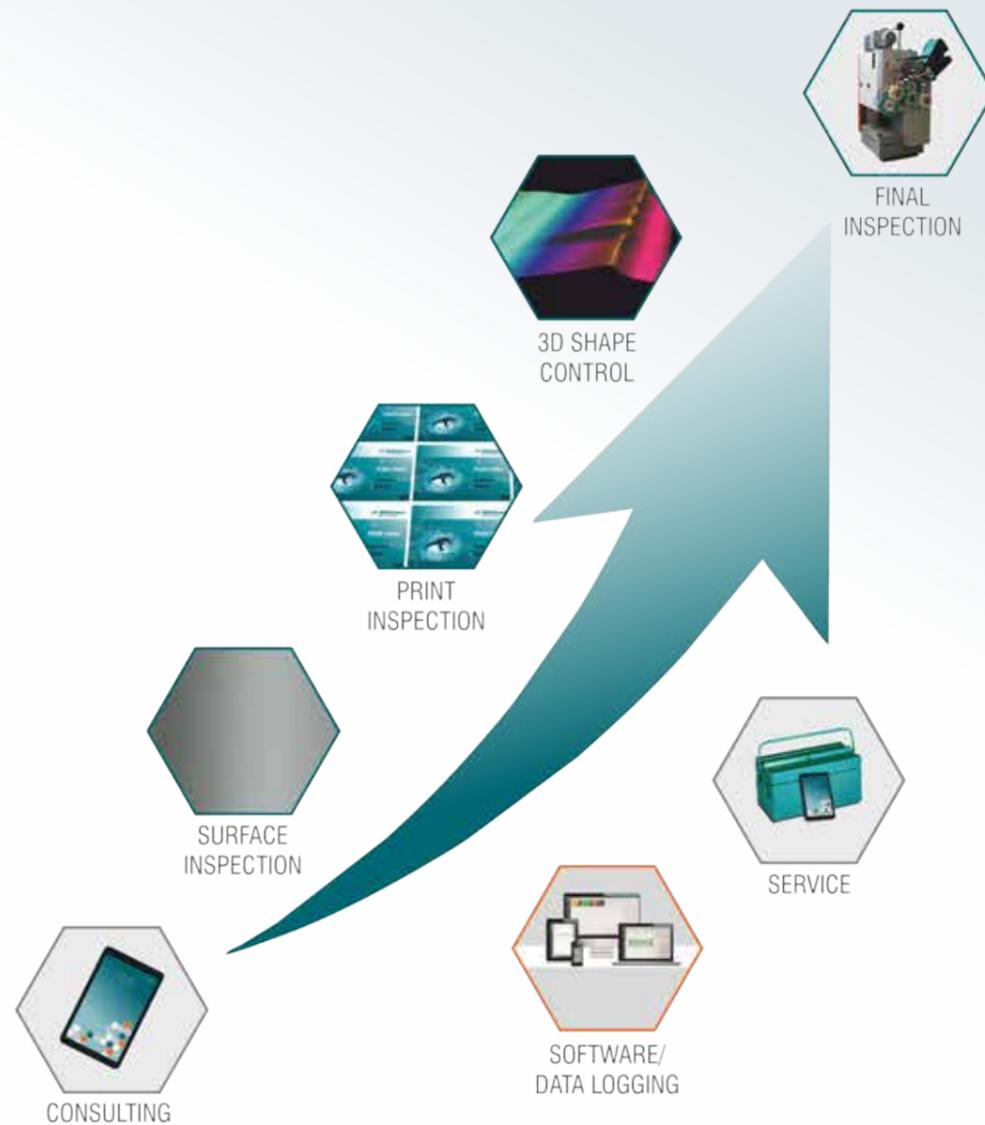
EXPERIENCE & INNOVATION

As a part of the business unit AUTOMA-
TION, TEMA Vision is the brand for one-
stop, turnkey inspection solutions based
on years of experience and constant in-
novation.

COMPETENCE – ALL ALONG THE LINE

TEMA Vision system solutions accompa-
ny each step of the manufacturing pro-
cess – from semi-finished materials over
finished products to the final decoration.
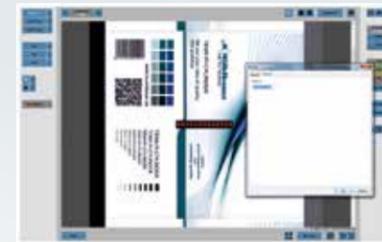
THE ONE-STOP, TURNKEY PRINCIPLE

TEMA Vision inspection solutions are fully
integrated into the production equipment.
Planning and consulting are integral parts
of the scope of work.

THE CONSISTENT GUI

The graphical user interfaces of all TEMA
Vision inspection systems are based on
the same design. The operator can rapidly
get acquainted with different TEMA Vision
applications.

INTUITIVE OPERATION

System operation is simple and trans-
parent while always enabling the optimal
setup. The operator is supported by wiz-
ards, useful defaults and previews.

THE ECONOMIC FACTOR

With cost-efficient, high-performance
standard systems and special solutions,
TEMA Vision offers the best price-per-
formance-ratio for a zero-defect policy.
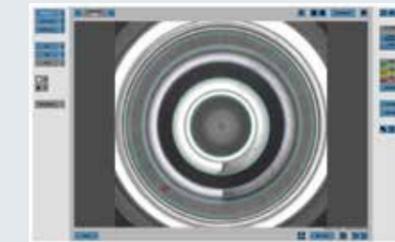
THE 3 MAIN BENEFITS

TEMA Vision inspection solutions help
to achieve optimal results in terms of
product quality, production costs and
process optimization.

YOUR LIFETIME PARTNER

Mühllbauer has the potential to be your
reliable, long-term partner for planning,
realizing and running quality assurance
projects – whatever your visions of
quality may be.
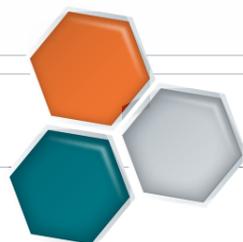
INDUSTRY 4.0 – NETWORKING

THINKING ON A LARGER SCALE
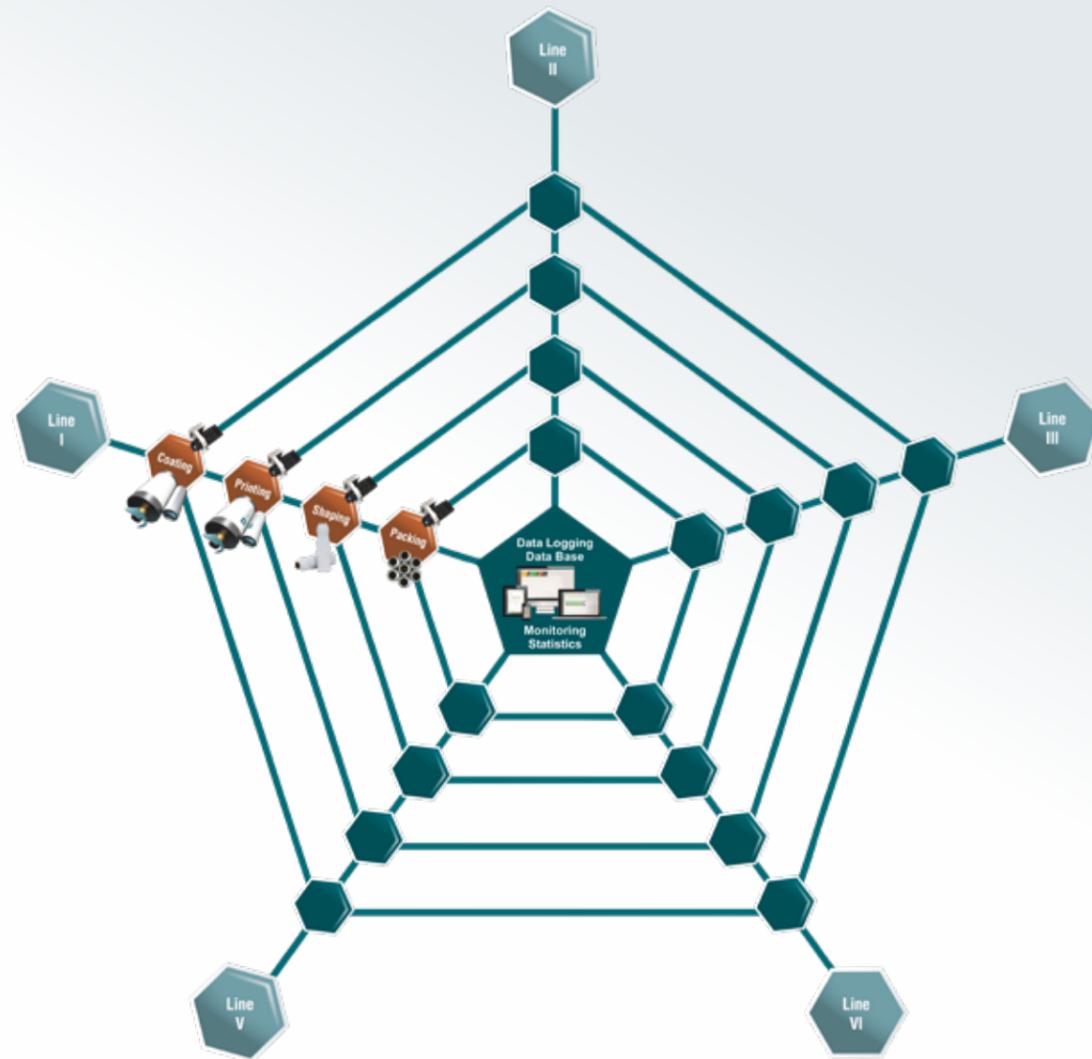
Looking at the production as a whole, with all its data generated along the line, you can see a complex network of interrelated processes. Our quality inspection concept is a vital part of this network. The industry's focus is moving away from isolated solutions towards broad interacting inspection concepts which support the automation of your plant.

- Monitor your production in real-time and understand coherences through the historical analysis of the logged data.
- Gain comprehensive data to investigate, understand and portray process flows and production results.

SOFTWARE & DATA LOGGING
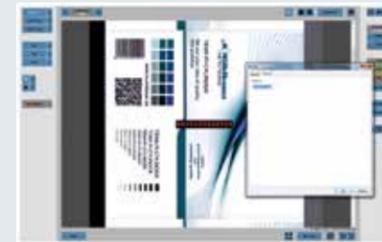
Features
- Wizard step by step
- Automatic image alignment
- No fonts required - pixel comparison
- Detection of all deviations in the inspection area
- Highlighting of deviations
- Detailed report, input field for comments
- Indication of defects according to defect level (major first, minor last)

DESIGN MATCHER

The DESIGN MATCHER software tool ensures that the final print result matches the contents of the initial design file. It is used in both the pre-press and printing process.

Comparison
- PDF file against PDF file
- PDF file against TIF file (or comparable)
- PDF file against BMP file (or comparable)

Benefits
- Quick reliable detection of mismatch
- Comparison of artwork with the printed reference
- Directly accessible from print inspection PI-CYLINDER software
- Creation of an evidence document
- Results can be analyzed and archived

Features
- Real-time big data handling
- Network over the whole production line
- Real-time performance monitoring
- Statistics for quick overview of performance figures in relation to time, shift and production line
- Printable report
- Adaptable to any end device

MB PALAMAX®

The new web-based, modular data logging and information tool for total process transparency which turns data into information.

Benefits
- Monitoring of performance figures at a glance
- Structuring of data through configurable displays, reports & filters
- Easy integration into existing IT infrastructure
- Future-oriented & flexible solution
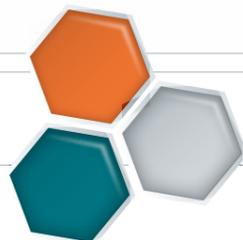
TEMA PI-WEB & PI-SHEETS

## PRINT INSPECTION SOLUTIONS FOR WEB/SHEET MATERIAL

Mühlbauer's TEMA Vision print inspection systems for web material and sheets are inline solutions integrated into the production line. They can individually be adapted to specific requirements, e.g. different material widths, layouts of print subjects, inspection areas, throughput rates and special conditions of the substrate, e.g. reflective metal or high-glossy foil.

RELATED PRODUCTS
- TEMA CCI (see page 28/29)
- TEMA CCI-PRINT (see page 30/31)

AREAS OF INTEREST
- Complete decoration
- Edges
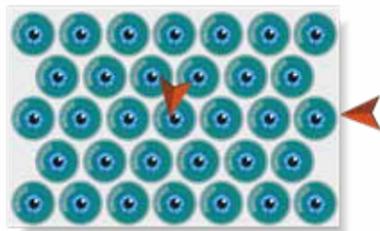
DESIGN
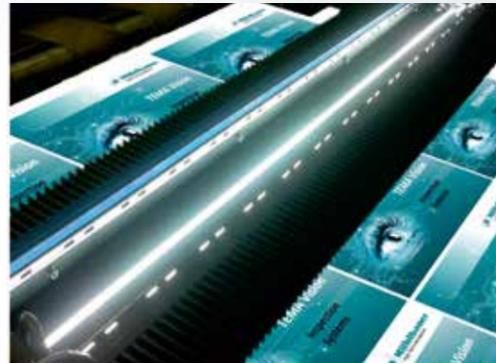
INSPECTION CRITERIA
- Color variations
- Out of register/offset/double print
- Blurred print
- Stains, blobs, smear
- Voids, missing print
- Misprint
- Surface defects as far as visible
- Dimensional deviations (optional)
- And similar

- Inline solution
- Modular concept (type & number of cameras optional)
- Integrated into printing machine
- High-resolution prism color line scan camera(s) (type & quantity according to application)
- Super-bright LED line lighting with broad spectrum for matt or reflective surfaces
- Closed camera/lighting housing
- Separate control cabinet (climate-controlled)
- UPS (uninterruptible power supply)
- Operator terminal with touch screen (number of monitors optional)
- Keyboard & mouse (optional)

PERFORMANCE DATA

- Width/thickness: depending on application & system configuration
- Speed: average: 1000 meters/min.

- Wizard-guided setup for one print subject - automatically applied to all other print subjects
- Design Matcher (comparison pdf-pdf, pdf-tif, pdf-bmp)
- Individual parameters for each inspection zone; layer technology
- High-accuracy color inspection of full decoration (automatic color correction)
- Grid-based defect detection
- Input/output as RGB & L*a*b* values
- 1D- & 2D- barcode verification
- Color monitoring - pre-warning for gradual defects
- Layout measurement
- Protocol/statistics - grid-based report function
- Remote service via internet connection
- Determination of sheet size/print position on the sheet/web width (optional)
- Other configurations & features on request

reference offset color deviation voids smear spots

TEMA SI-CYLINDER

SURFACE INSPECTION ON UNDECORATED CANS, BOTTLES & TUBES

TEMA SI-CYLINDER is Mühlbauer's inline solution for surface inspection on tubes and cans in almost any type of printing, base coating or trimming unit. After the surface scan and quality assessment is completed, the inspection system provides a signal to the PLC which, in case of a detected defect, can be used for initiating a warning signal, a reject or a machine stop, if necessary.

RELATED PRODUCTS

- TEMA PI-CYLINDER (see page 14/15)
- TEMA CTI-NECKER bs. (see page 16/17)
- TEMA CTI-CONVEYOR (see page 18/19)

AREAS OF INTEREST

- Complete exterior side wall

DESIGN

INSPECTION CRITERIA

- Score marks
- Scratches
- Grooves
- Dents
- Stains & spots
- Coating defects
- Deformations
- Holes
- And similar

- Inline solution
- Integrated into the printing machine / base coater / trimming machine
- Available in combination with print inspection PI-CYLINDER
- High resolution line scan camera, b/w
- Super-bright LED line light system for matt or reflective surfaces
- Contactless encoder (if required)
- Separate control cabinet (climate-controlled)
- UPS (uninterruptible power supply)
- Operator terminal with touch screen (mobile, floor-mounted or with swivel arm)
- Keyboard & mouse (optional)

PERFORMANCE DATA

- Diameter: up to 90mm   (more available on request)
- Length: up to 260 mm   (more available on request)
- Speed: approx. 350 units/min.

- Easy-to-use graphical interface
- Wizard-guided setup
- Automatic detection of tube length
- Precise full scan of the exterior side wall
- Detection of mechanical & optical defects
- Distinction of mechanical defects against optical defects
- Special version for decorated surfaces available
- Special version for tube tip incl. thread available
- Live images/defect image storing
- Protocol/statistics
- Printable report
- Remote service via internet connection
- Other configurations & features available on request
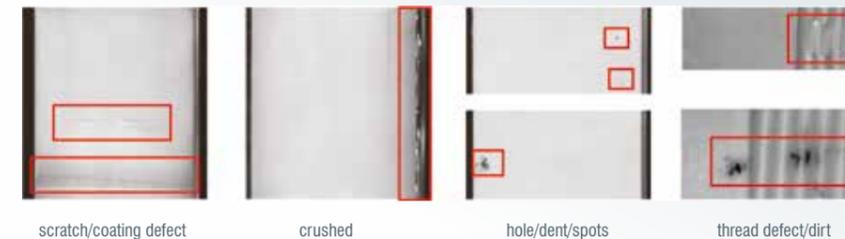
| scratch/coating defect | crushed | hole/dent/spots | thread defect/dirt |

TEMA PI-CYLINDER 2.0

PRINT INSPECTION ON TUBES, CANS, CARTRIDGES & BOTTLES

TEMA PI-CYLINDER 2.0 is Mühlbauer's print inspection solution based on long-term experience and continuous innovation which can be used for almost any type of print techniques, print/capping machines and tubular bodies. With features like 1D- or 2D- code verification, design comparison, color correction, pre-warning and L*a*b* values TEMA PI-CYLINDER 2.0 is best suitable wherever print is applied.

RELATED PRODUCTS

- TEMA SI-CYLINDER (see page 12/13)
- TEMA CTI-NECKER bs. (see page 16/17)
- TEMA CTI-CONVEYOR (see page 18/19)
- CIM-12 (see page 20/21)

AREAS OF INTEREST

- Decorated surface

DESIGN

INSPECTION CRITERIA

- Color variations
- Out of register/offset/double print
- Blurred print
- Stains, blobs & smear
- Voids, missing print, blocked nozzle
- Misprint
- Surface defects (as far as visible)
- Print-to-edge variations (optional)
- Cap defects (optional)
- And similar

- Inline solution
- Integration in printing or capping machine
- High-resolution prism line scan camera, color
- Super-bright LED line light system with broad spectrum for matt & reflecting surfaces
- Separate control cabinet (climate-controlled)
- UPS (uninterruptible power supply)
- Camera upgrade (4096 pixel/line) (optional)
- Clock-object signal (optional)
- Object tracking & reject (optional)
- Contactless encoder, if required (optional)
- Operator terminal with touch screen (mobile, floor mounted or with swivel arm)
- Keyboard & mouse (optional)

PERFORMANCE DATA

- Diameter: up to 90mm   (more available on request)
- Length: up to 260 mm   (more available on request)
- Speed: approx. 300 units/min.

- Suitable for various materials & print techniques (incl. digital print)
- Design Matcher (comparison pdf-pdf, pdf-tif, pdf-bmp)
- Wizard-guided setup, previews & useful pre-settings
- Individual parameters for each inspection zone; layer technology
- High-accuracy color inspection of full decoration/automatic color correction
- Field of view infinitely adjustable (from 250 mm to 90 mm)
- Input/output as RGB and L*a*b* values
- 1D- & 2D-barcode verification
- Color monitoring, pre-warning for gradual defects, layout measurement
- Serial defect detection
- Statistic tool for process analysis
- Printable report with all inspection data
- Remote service via internet connection
- Determination of distance print-to-edge (optional)
- Integrated cap check (optional)
- Other configurations & features available on request
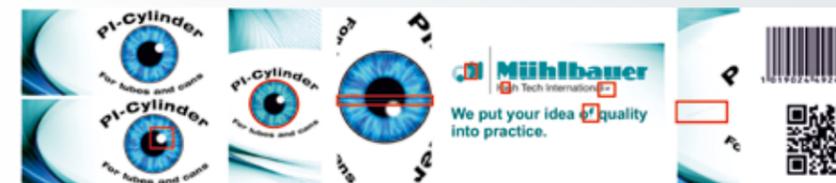
offset   color deviation   blocked nozzle   voids, spots & smear   scratch   code
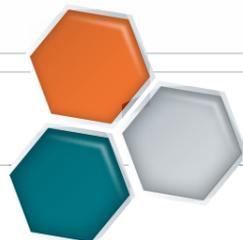
TEMA CTI-NECKER bs

TOTAL CURL & SHOULDER/NECK INSPECTION

TEMA CTI-NECKER bs is Mühlbauer's patented system solution for inspecting top, side and backside of the curl together with the can shoulder or bottle neck in one camera and analysis image. The inspection unit is installed inside the necking machine like a tool. Switching between can and bottle inspection is quick and easy. TEMA CTI-NECKER bs communicates with the PLC and gives a defect signal every time a can/bottle has to be ejected.

RELATED PRODUCTS

AREAS OF INTEREST
- Curl
- Shoulder/neck

DESIGN

INSPECTION CRITERIA

Curl (top, side & backside)
- Cracks, split curl, burrs, dents, deformation
- Material overlap
- Oil/color stains, pollution
- And similar

Neck/Shoulder
- Print defects
- Oil/color stains, pollution
- Dents, deformation & cracks
- Coating defects
- And similar

- Inline solution
- Integration into the necking machine
- Installed like a necking tool (easy mechanical setup)
- High-resolution matrix camera, b/w
- Tool-free camera adjustment (optional)
- Dual LED lighting system (for curl & shoulder)
- Collector for extended view (side & backside of curl)
- Exchange module for bottles
- Self-cleaning unit
- Separate control cabinet (climate-controlled)
- UPS (uninterruptible power supply)
- Operator terminal with touch screen (mobile, floor mounted or with swivel arm)
- Keyboard & mouse (optional)

PERFORMANCE DATA

- Diameter: up to 66 mm (more available on request)
- Speed: approx. 300 units/min.

- High-accuracy surface inspection of curl, neck & shoulder (extended view)
- Real print inspection
- Suitable for cans & bottles (quick switch via bayonet lock)
- Wizard-guided setup
- Pre-settings for inspection sensitivity
- Individual parameters for each inspection zone
- Optical defect magnification in extended view for increased detection reliability
- Curl measurement & seam detection
- Pre-warning for gradual defects
- Protocol/statistics
- Printable report
- Remote service via internet connection
- Other configurations & features available on request

curl defect/bottom waviness (invisible in normal top view) dented shoulder material overlap, split curl print defect/spot
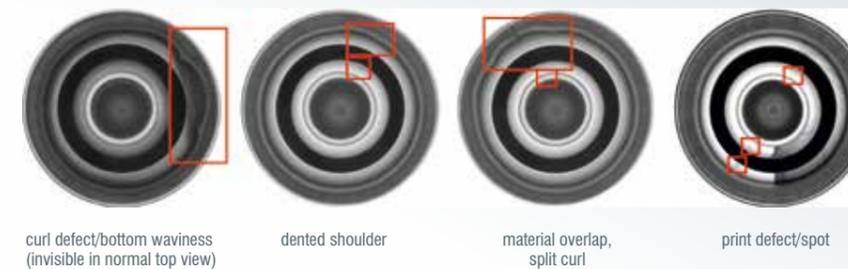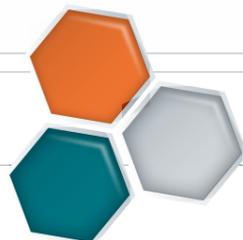
TEMA CTI-CONVEYOR

CURL & SHOULDER INSPECTION WITH EXTENDED VIEW

TEMA CTI-CONVEYOR is Mühlbauer's proven system solution for curl and shoulder inspection at the output conveyor. It is equipped with a collector for extended view. The autonomous can tracking sensor system controls the exact camera trigger and the reject of defective cans/bottles. The system is height-adjustable and can be delivered with a vacuum conveyor for exact positioning of the can/bottle.

RELATED PRODUCTS

- TEMA SI-CYLINDER (see page 12/13)
- TEMA PI-CYLINDER (see page 14/15)
- TEMA CTI-NECKER bs (see page 16/17)
- CIM-12 (see page 20/21)

AREAS OF INTEREST

- Curl
- Shoulder/neck

DESIGN

INSPECTION CRITERIA

Curl (top, side)
- Cracks, split curl, burrs, dents & deformation
- Material overlap
- Oil/color stains, pollution
- And similar

Neck/Shoulder
- Print defects
- Oil/color stains, pollution
- Dents, deformation & cracks
- Coating defects
- And similar

- Inline solution
- Integration at output conveyor
- Vacuum conveyor (optional)
- High-resolution matrix camera, b/w
- Dual LED lighting system (for curl & shoulder)
- Collector for extended view
- Compact camera/lighting housing, height-adjustable
- Can alignment unit
- Sensor system & reject station
- Separate control cabinet, climate-controlled
- UPS (uninterruptible power supply)
- Operator terminal with touch screen (mobile, floor mounted or with swivel arm)
- Keyboard & mouse (optional)

PERFORMANCE DATA

- Diameter: up to 66 mm (more available on request)
- Speed: approx. 300 units/min.

- High-accuracy surface inspection of curl, neck & shoulder (extended view)
- Real print inspection
- Exact can positioning with vacuum conveyor (optional)
- Wizard-guided setup
- Pre-settings for inspection sensitivity
- Individual parameters for each inspection zone
- Optical defect magnification (in extended view) for increased detection reliability
- Curl measurement & seam detection
- Pre-warning for gradual defects
- Protocol/statistics
- Printable report
- Remote service via internet connection
- Other configurations & features available on request

spot on shoulder   dented shoulder   cracked curl   material overlap
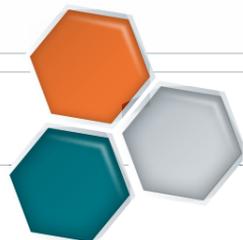
CIM-12

FINAL CAN/BOTTLE INSPECTION

CIM-12 is Mühlbauer's fully-automatic inspection unit for final inspection of aerosol cans and aluminum bottles. It is usually integrated into the production line at the output conveyor of the necking machine and consists of a high-performance can handler and up to three vision systems: can top inspection, lateral surface & print inspection and 3D-shape measurement.

RELATED PRODUCTS

- TEMA SI-CYLINDER (see page 12/13)
- TEMA PI-CYLINDER (see page 14/15)
- TEMA CTI-NECKER bs (see page 16/17)

AREAS OF INTEREST

- Curl
- Shoulder/neck
- Lateral surface incl. print
- Thread
- Shape

DESIGN

In cooperation with sprimag

INSPECTION CRITERIA

- Curl & shoulder/defects incl. print
- Shape defects like dents, holes, grooves & deep scratches
- Lateral surface/print defects like oil/grease, major surface defects, color variations & print defects
- Thread defects like dirt & cracks

- Stand-alone inspection machine
- Infeed drum, vacuum disk
- Vacuum chuck holder plate with 12 chucks
- Outfeed drum
- Infeed & outfeed conveyor (optional)
- TEMA CTI-NECKER bs (see page 16/17)
- TEMA SPI-CYLINDER (see pages 12 - 15)
  - » 2 x monochrome line scan camera 4096 pixel/line
  - » Prism color line scan camera 4096 pixel/line (optional)
- TEMA SHAPE CONTROL
  with laser (max. scan width 270 mm) & 3D camera

PERFORMANCE DATA

- Diameter: up to 66 mm
- Length: up to 270 mm
- Speed: approx. 200 units/min.

- High-precision can handling
- Stroke movement for dipping the can/bottle into the lighting unit
- Centering for can top inspection (CTI)
- Can top/bottle top inspection with extended view (see page 16/17)
- Rotation for surface/print inspection & 3D-measurement
- Print/surface inspection on can/bottle body, surface inspection on neck/thread & side area of curl
- 3D surface measurement - defect detection & measurement values
- 3D view
- Wizard-guided setup
- Individual parameters for each inspection zone
- Protocol/statistics
- Printable report
- Remote service via internet connection
- Other configurations & features available on request

| split curl can top inspection CTI | smear SPI-CYLINDER | crack in thread SPI-CYLINDER | dents SHAPE CONTROL | accuracy deviations SHAPE CONTROL |
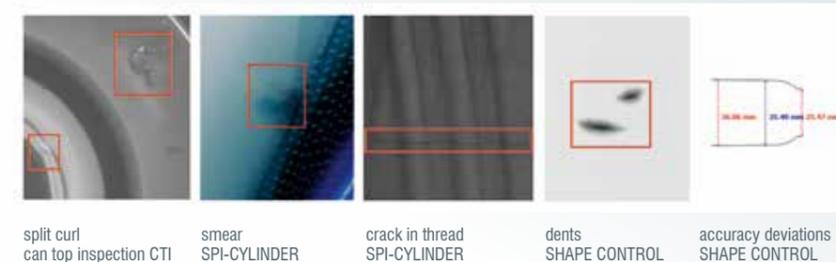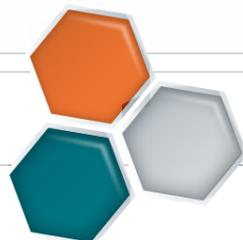
TEMA PI-CUP

PRINT INSPECTION ON ROUND, CONICAL CUPS INSIDE CUP PRINTERS

TEMA PI-CUP is Mühlbauer's print inspection solution integrated into printers for round, conical cups. This vision system combines high speed and high accuracy in an unparalleled way. The conical shape of the cup has no disturbing influence on the inspection performance. Barcode verification is available. Defects are reported to the PLC and lead to a warning signal, a reject or even a machine stop, if necessary.

RELATED PRODUCTS
- TEMA PI-CUP square (see page 24/25)
- TEMA ISI-CUP (see page 26/27)
- TEMA PI-LID (see page 32/33)

AREAS OF INTEREST
- Decorated surface

DESIGN

INSPECTION CRITERIA
- Color variations
- Out of register/offset/double print
- Blurred print
- Stains, blobs & smear
- Voids, missing print & blocked nozzle
- Misprint
- Surface defects (as far as visible)
- And similar

- Inline solution
- Integration in cup printer
- High-resolution prism line scan camera, color
- Super-bright LED line light system with a broad spectrum
- Separate control cabinet, climate controlled
- Camera upgrade (4096 pixel/line) (optional)
- Clock-object signal (optional)
- Object tracking & reject (optional)
- UPS (uninterruptible power supply)
- Operator terminal with touch screen (mobile, floor mounted or with swivel arm)
- Keyboard & mouse (optional)

PERFORMANCE DATA

- Diameter: up to 180 mm
- Print height: up to 200 mm
- Speed: approx. 600 units/min.

- Suitable for various materials & print techniques (incl. digital print)
- Design Matcher (comparison pdf-pdf, pdf-tif, pdf-bmp)
- Wizard-guided setup, previews
- Useful pre-settings; reject can temporarily be suspended during setup
- Individual parameters for each inspection zone; layer technology
- High-accuracy color inspection of full decoration (automatic color correction)
- Input/output as RGB and L*a*b* values
- 1D- & 2D-barcode verification
- Color monitoring, pre-warning for gradual defects
- Serial defect detection
- Statistics tool for process analysis
- Printable report with all inspection data
- Remote service via internet connection
- Other configurations & features available on request

| offset | color variation | double print | spots | voids/smear | code verification |
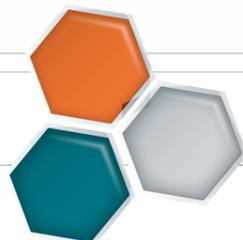
TEMA PI-CUP square

PRINT INSPECTION ON RECTANGULAR CUPS INSIDE CUP PRINTERS

TEMA PI-CUP square is Mühlbauer's inspection solution in printers for square cups. According to the printing process one vision unit inspects the long sides while the second vision unit checks the front and rear side of the cup. The quality of each cup side is determined by comparing the print image against one out of two stored reference images. The defect signal can trigger a warning, a reject of the cup or even a machine stop.

RELATED PRODUCTS
- TEMA PI-CUP (see page 22/23)
- TEMA ISI-CUP (see page 26/27)
- TEMA PI-LID (see page 32/33)

AREAS OF INTEREST
- Decorated long sides
- Decorated front & rear sides

DESIGN
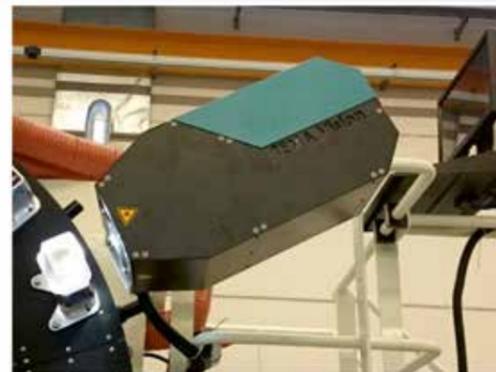
INSPECTION CRITERIA
- Color variations
- Out of register/offset/double print
- Blurred print
- Stains, blobs & smear
- Voids, missing print & blocked nozzle
- Misprint
- Surface defects as far as visible
- And similar

- Inline solution
- Integration at two wheels of the cup printer
- High-resolution prism line scan cameras, color
- Super-bright LED line light system with a broad spectrum
- Compact camera/lighting housing
- Camera upgrade (4096 pixel/line) (optional)
- Separate control cabinet, climate-controlled
- UPS (uninterruptible power supply)
- Operator terminal with touch screen (mobile, floor mounted or with swivel arm)
- Keyboard & mouse (optional)

PERFORMANCE DATA

- Length/width: max. 150 mm/120 mm
- Print height: max. 130 mm
- Speed: approx. 400 cups/min.

- Suitable for various materials & print techniques (incl. digital print)
- Design Matcher (comparison pdf-pdf, pdf-tif, pdf-bmp)
- Wizard-guided setup & previews
- Useful pre-settings
- Individual parameters for each inspection zone; layer technology
- Multi-reference mode
- High-accuracy color inspection of full decoration (automatic color correction)
- Input/output as RGB & L*a*b* values
- 1D- & 2D-barcode verification
- Color monitoring, pre-warning for gradual defects
- Serial defect detection
- Statistics tool for process analysis
- Printable report with all inspection data
- Remote service via internet connection
- Other configurations & features available on request

| color variation | voids/overinking/spot/smear | offset | code verification |

TEMA ISI-CUP

INTERIOR SURFACE INSPECTION OF PLASTIC CUPS

TEMA ISI-CUP, Mühlbauer's solution for interior surface inspection of rectangular or oval cups, is typically used with a vacuum conveyor to transport the cups (bottom up) to the inspection unit. Side wall and bottom are captured and analyzed in one image. Inspection parameters are exactly adapted to the cup shape and size. A reject signal is given for defective cups. Ejection is separately monitored for 100% reliable results.

RELATED PRODUCTS

- TEMA PI-CUP (see page 22/23)
- TEMA PI-CUP square (see page 24/25)
- TEMA PI-LID (see page 32/33)

AREAS OF INTEREST

- Interior bottom
- Interior side wall
- Rim
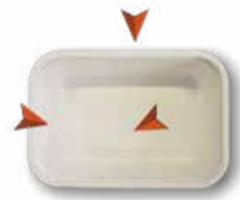
DESIGN
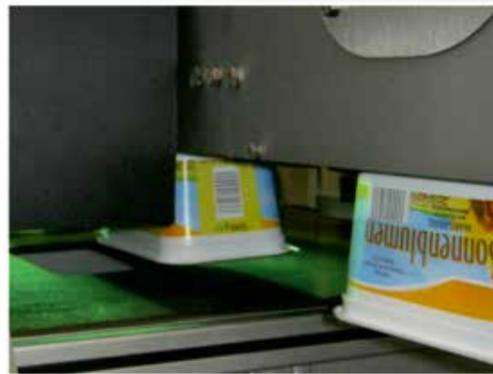
INSPECTION CRITERIA

- Color splatter, blobs
- Print inside
- Dirt
- Foreign bodies
- Holes, cracks
- Shape deformation
- And similar

- Inline solution
- Integrated in a vacuum transport system
- High-resolution matrix camera, b/w
- Super-bright LED lighting, flashable with diffuser
- Camera/lighting housing, unbreakable transparent pane
- Separate control cabinet (climate-controlled)
- UPS (uninterruptible power supply)
- Operator terminal with touch screen (mobile, floor mounted or with swivel arm)
- Keyboard & mouse (optional)

### PERFORMANCE DATA

- Length: up to 140 mm (filling quantity: 500 gr.)
- Speed: approx. 900 cups/min. (depending on transport)

- Wizard-guided setup
- Easy-to-use graphical interface
- Individual parameters for each inspection zone
- High-accuracy defect detection on side wall & bottom
- Detection of shape variations
- Continuous object tracking
- Monitoring of reject process
- Protocol/statistics
- Report function
- Defect classification
- Remote service via internet connection
- Other configurations & features available on request

| ink inside cup | crack | dirt inside cup | shape deformation |
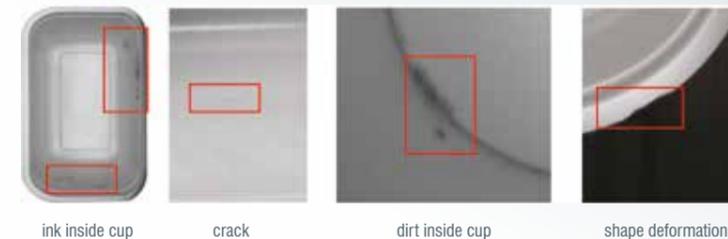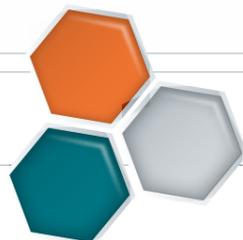
TEMA CCI

SURFACE/INSIDE INSPECTION FOR ENDS, LIDS, CAPS OR CANS

TEMA CCI, Mühlbauer's versatile inline solution for surface inspection on caps, ends and lids, as well as for the interior inspection of cans, covers a wide range of products. A suitable conveyor and a reject station can be included in the scope of supply, if required. With different hardware options, the inspection system CCI can perfectly be tailored to customer-specific applications. Each object is tracked; the reject process is monitored separately.

RELATED PRODUCTS

- TEMA CCI-PRINT (see page 30/31)
- TEMA PI-LID (see page 32/33)

AREAS OF INTEREST

- Face panel
- Rim, compound area & curl
- Special areas (e.g. ring pull)
- Interior of cans/caps
- Outside wall of caps

DESIGN

INSPECTION CRITERIA

- Compound defects/liner defects
- Scratches, dents & stains
- Curl defects
- Defective rivet or ring pull
- Off-center or perforated membrane
- Dimensional deviations (outline, lug, corrugation)
- Interior defects
- And similar

- Inline solution
- Conveyor & reject unit (optional)
- Hardware options for a great variety of products
- Single or twin system (multi-lane)
- Compact design, height-adjustable
- High-resolution matrix camera, b/w
- Super-bright LED lighting unit/additional bottom light
- Different lenses (e.g. pinhole or pericentric lens)
- Separate control cabinet, climate controlled
- UPS (uninterruptible power supply)
- Operator terminal with touch screen (mobile, floor mounted or with swivel arm)
- Keyboard & mouse (optional)

PERFORMANCE DATA

- Diameter: up to 230 mm
- Speed: up to 2700 units/min.

- Continuous object tracking
- Wizard-guided setup
- Easy-to-use graphical interface
- Area-specific inspection methods
- Virtual object orientation (e.g. for reliable rivet inspection)
- High-accuracy surface & interior inspection
- Exterior side wall inspection with pericentric lens
- Detection of shape variations
- Monitoring of reject process
- Protocol/statistics, defect classification
- Report function
- Remote service via internet connection
- Other configurations & features available on request
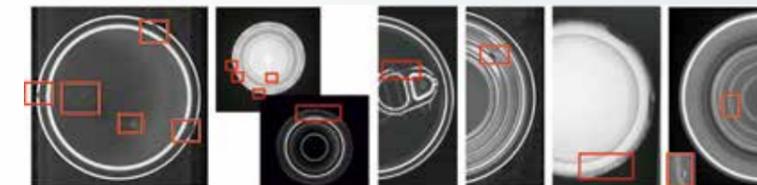
scratch, dent, rim defect   rim defect, spot, folded sleeve   ring defect   dent/hole   missing lug   dent/hole in can
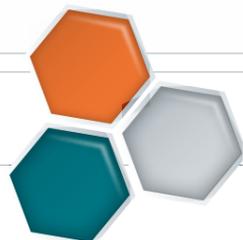
TEMA CCI-PRINT

PRINT INSPECTION ON CONTAINERS, LIDS, CAPS & CLOSURES

TEMA CCI-PRINT is Mühlbauer's print inspection solution for caps, ends and closures and can be used in tandem with TEMA CCI surface inspection. Each object is tracked and automatically oriented by virtual rotation for comparison with the reference image. A defect signal initiates the reject. Ejection is separately monitored to ensure a 100% reliable inspection result.

RELATED PRODUCTS
- TEMA CCI (see page 28/29)
- TEMA PI-LID (see page 32/33)

AREAS OF INTEREST
- Decorated top face
- Curl

DESIGN

INSPECTION CRITERIA
- Color variations
- Stains & blobs
- Smear
- Out of register/out of center
- Voids & missing print
- Misprint/double print
- Scratches
- Dimensional defects
- And similar

- Inline solution
- Conveyor & reject unit (optional)
- Compact design, height-adjustable
- Single or twin system (multi-lane)
- High-resolution matrix camera, b/w or color
- Super-bright LED lighting unit (different versions available)
- Hardware for clocked & asynchronous processes
- Separate control cabinet, climate-controlled
- UPS (uninterruptible power supply)
- Operator terminal with touch screen (mobile, floor mounted or with swivel arm)
- Keyboard & mouse (optional)

PERFORMANCE DATA

- Diameter: up to 113 mm (other dimensions available on request)
- Speed: up to 1080 units/min.

- Design Matcher (comparison pdf-pdf, pdf-tif, pdf-bmp)
- Continuous object tracking
- Wizard guided setup
- Easy-to-use graphical interface
- Area-specific inspection methods
- Virtual object orientation for reference comparison
- High-accuracy print inspection
- Two objects in one image (e.g. for tampon print)
- Detection of shape variations
- Pre-warning for gradual defects
- Monitoring of the reject process
- Protocol/statistics, defect classification
- Report function
- Remote service via internet connection
- Other configurations & features available on request

reference   off-center   color deviation/underinking   spot/smear/voids/ curl defect
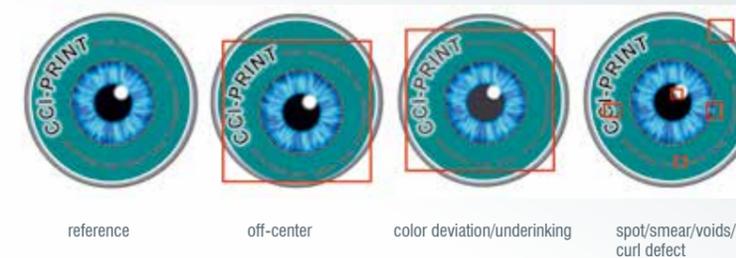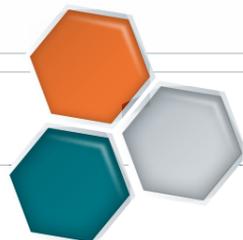
TEMA PI-LID

PRINT INSPECTION FOR INTEGRATION IN LID PRINTERS

TEMA PI-LID is Mühlbauer's compact print inspection solution for integration in lid printers. PI-LID uses a line-scan camera and a double line lighting for optimal visualization of the inspection object. The print image is compared to a reference image. Defects are reported to the PLC.
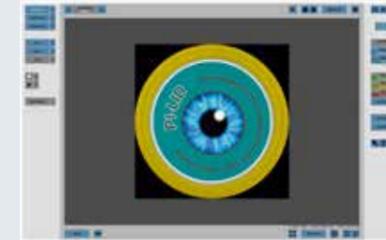
- Diameter: 50 mm - 250 mm (other dimensions available on request)
- Speed: approx. 3.6 m /sec.

- Suitable for various materials & print techniques (incl. digital print)
- Design Matcher (comparison pdf-pdf, pdf-tif, pdf-bmp)
- Wizard-guided setup, previews
- Useful pre-settings
- Individual parameters for each insepction zone: layer technology
- High-accuracy color inspection of full decoration (automatic color correction)
- Input/output as RGB & L*a*b* values
- 1D- & 2D-barcode verification
- Pre-warning for gradual defects
- Serial defect detection
- Statistics tool for process analysis
- Printable report with all inspection data
- Remote service via internet connection
- Other configurations & features available on request

RELATED PRODUCTS

- TEMA CCI (see page 28/29)
- TEMA CCI-PRINT (see page 30/31)

AREAS OF INTEREST

- Decorated top face
- Curl
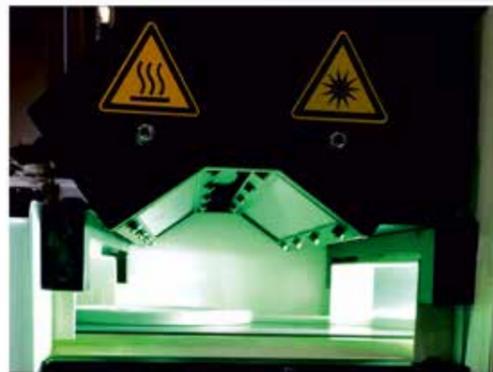
DESIGN

- Inline solution
- Integration in lid printer
- Compact design
- High-resolution prism color line scan camera
- Camera upgrade (4096 pixel/line) (optional)
- Super-bright double LED line light system with broad spectrum
- Separate control cabinet (climate controlled)
- UPS (uninterruptible power supply)
- Operator terminal with touch screen (mobile, floor mounted or with swivel arm)
- Keyboard & mouse (optional)

INSPECTION CRITERIA

- Color variations
- Stains & blobs
- Smear
- Out of register/out of center
- Voids & missing print
- Misprint/double print
- Scratches
- Dimensional defects
- And similar

double print   scratch & smear   color deviation/underinking   offset   misprint
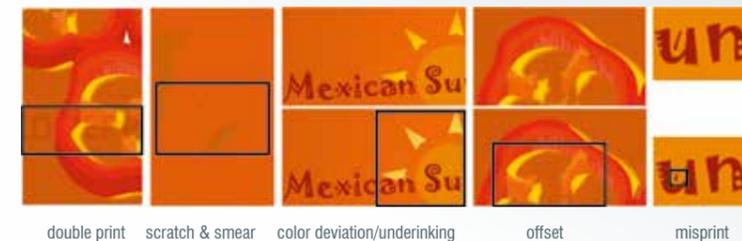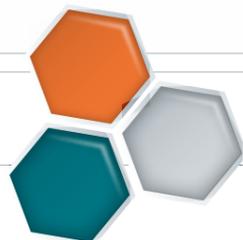
SPECIALS

EFFICIENT ADAPTATIONS & ADDITIONS

TEMA SI-PI-CYLINDER

Combine surface & print inspection for your tubes, cans or bottles!

Optimize your inspection performance and eliminate pseudo-rejects: TEMA SI-PI-CYLINDER is a combination of the proven TEMA Vision inspection solutions SI-CYLINDER and PI-CYLINDER. Two vision units are integrated in the printing machine (or base coater and printing machine). This twin system has been designed to perform both surface and print inspection using the best suitable hardware components and software algorithms for each specific task. The two vision units are connected to one control cabinet and can be operated at one user terminal with two separate monitors for optimal usability.

TEMA SI-PI-CYLINDER is the most reliable inspection solution to detect both surface defects (immediately prior to printing) and print defects (immediately after printing). Both inspection units operate within their best range.

PI-CYLINDER & CAP CHECK

**Inspect both print & tube cap in your capping machine!**

If installed in a capping machine, TEMA PI-CYLINDER can perform both print inspection and a 360 degree quality check of the cap. The software provides a separate inspection area in which individual algorithms and parameters tailored to this specific task are effective.

This is the easiest way to simultaneously check the print and the quality of the cap with only one inspection unit.

INDIVIDUALLY COMPOSED SYSTEM SOLUTIONS

If you have special requirements or ideas you can contact us. Together we will find a solution that suits your individual needs. Examples:

- Inspection of your moulded parts
- Inspection of transparent dome lids
- and many more ...

print inspection
on moulded parts

surface inspection
on dome lids
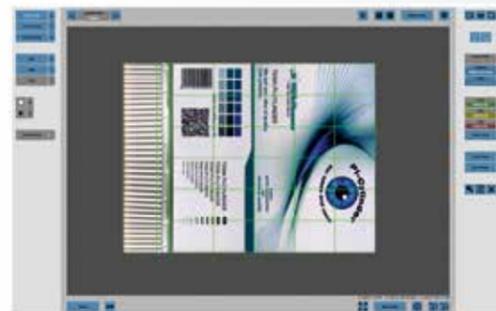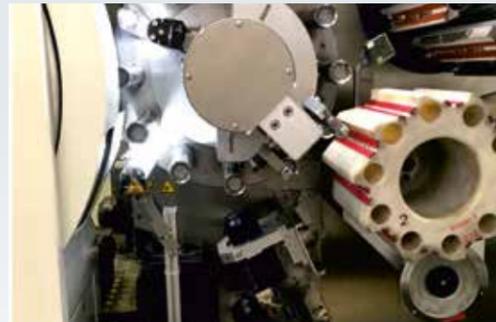
SECURITY

MÜHLBAUER SECURITY SOLUTIONS

BANKNOTE INSPECTION

Inspection of substrate, print & security features

SHEET INSPECT is Mühlbauer's high-precision inspection solution for sheets, designed to verify the quality of substrate, visible print, UV/IR print and security features. It perfectly combines Mühlbauer's machine expertise with the wide competence in inspection technology by TEMA Vision.

COIN INSPECTION

Quality inspection for blanks, minted coins & used coins

COIN INSPECT is Mühlbauer's flexible and configurable inspection machine for high-speed, double-sided inspection and measurement of blanks, minted coins and used coins. It is suitable for a great variety of alloys and shapes like disk, ring, polygon, bimetal and colored coins. It provides special features for coin fitness check and counterfeit detection.

![Mühlbauer High Tech International]
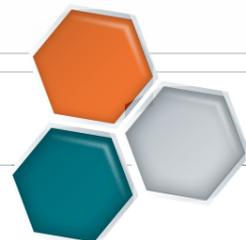
MÜHLBAUER GERMANY

Mühlbauer Group Headquarters
Josef-Mühlbauer-Platz 1, 93426 Roding, Germany
Phone: +49 9461 952 0, Fax: +49 9461 952 1101
info@muehlbauer.de, www.muehlbauer.de

MÜHLBAUER USA

Muhlbauer Inc.
226 Pickett's Line
Newport News, VA 23603-1366, USA
Phone: +1 757 947 2820, Fax: +1 757 947 2930
info@muhlbauer.com, www.muhlbauer.com

MÜHLBAUER MALAYSIA

Muehlbauer Technologies Sdn. Bhd.
No. 3 Jalan TU 62, Taman Tasik Utama,
75450 Melaka, Malaysia
Phone: +60 6 2517 100, Fax: +60 6 2517 101
info@muehlbauer.com.my, www.muehlbauer.com.my

MÜHLBAUER SERBIA

Mühlbauer Technologies d.o.o.
Evropska 17, 22300 Stara Pazova, Serbia
Phone: +381 22 215 5100, Fax: +381 22 215 5130
serbia@muehlbauer.de, www.muehlbauer.de

MÜHLBAUER CHINA

Muehlbauer Technologies (Wuxi) Co., Ltd.
No 23. Huayi Road, Wuxi New District
214135 Wuxi, Jiangsu, China
Phone: +86 510 8190 0100, Fax: +86 510 8190 0101
info@muehlbauer.cn, www.muehlbauer.cn

MÜHLBAUER SLOVAKIA

Muehlbauer Technologies s.r.o.
Novozámocká 233, 94905 Nitra, Slovakia
Phone: +421 37 6946 000, Fax: +421 37 6946 501
info@muhlbauer.sk, www.muhlbauer.com