

# MB AUTOMATION®

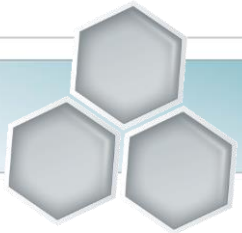
Inspection Technology

Ulf Porth





# VISION INSPECTION – TODAY & TOMORROW



## A

### Inspection integrated into printing equipment

#### Pros:

- No extra sheet transport required
- No extra space required

#### Cons:

- Inspection must conform to space and hardware conditions
- Inspection only for the current stage of product completion
- Inspection only for documents printed on this particular machine

## B

### Independent inspection machine

#### Pros:

- Hardware optimal for inspection
- Design open for different inspection requirements
- Suitable for different prints (banknotes, passports, etc.)
- Inspection on the final product

#### Cons:

- Extra sheet transport and floor-space required.
- One extra step in the production process



Reasons



In recent years the focus has shifted towards independent inspection machines.



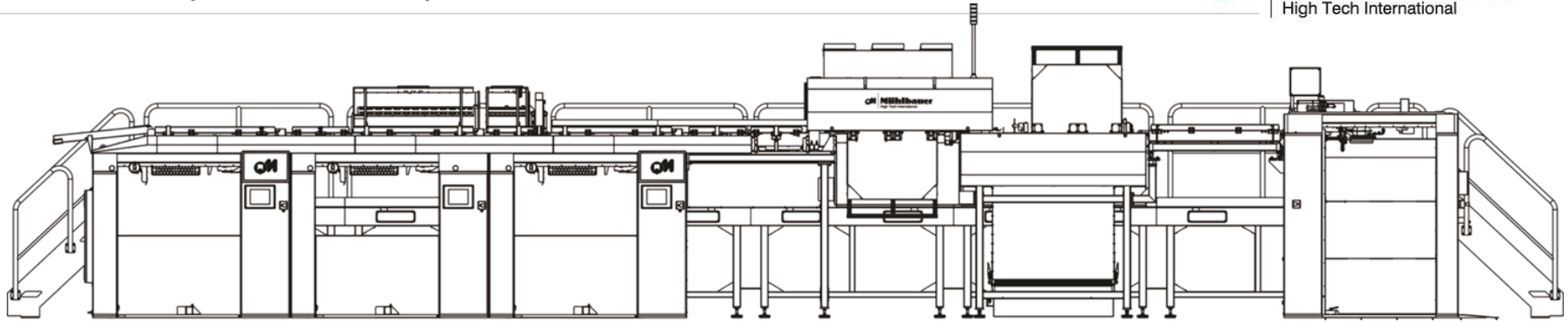
The willingness to invest increases in developing and newly industrializing countries.



Rising quality standards and dynamic technology developments in security printing have established higher demands on quality inspection.



# Final Inspection: Example SHEET INSPECT



Sorting/stacking

Vacuum transport (face up and overhead)

Alignment

Sheet feed

10000  
sheets/h

Barcode reader

Barcode reader

Marking

Vision: transmissive, white light,  
UV light, IR light, MIRU

Tracking - Counting

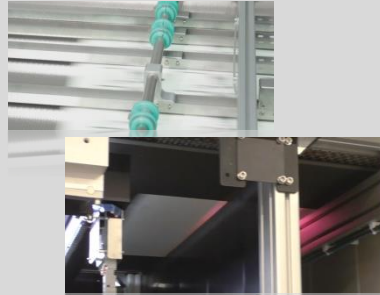


## Separation from stack – feed into the machine



- Continuous feed 10,000 sheets/hour
- No double sheets, paper jams, dog ears etc.
- Machine stop if necessary

## Alignment + vacuum transport for double-sided inspection



- Smooth and precise sheet transport 10,000 sheets/hour
- Sheet tracking/counting
- Easy adjustment

## Sheet and note marking according to the inspection results



- Marking of sheet
- Marking of single notes (up to 11 print heads)
- Marking on sheet margin

## Sorting and stacking



- Reject of defective sheets
- Precise stacking
- Intended purpose of stackers adjustable



# Final Inspection for Different Types of Security Prints

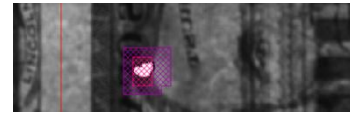
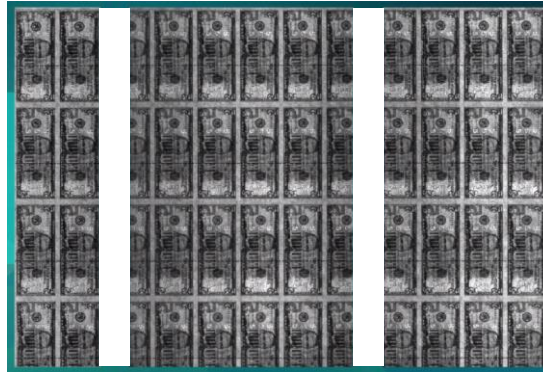


And more ...

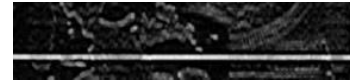




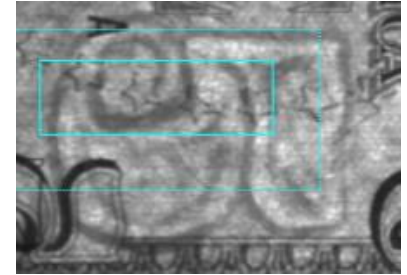
- 3-Chip b/w line scan cameras
- LED line lighting transmitted light



Substrate



Security threads

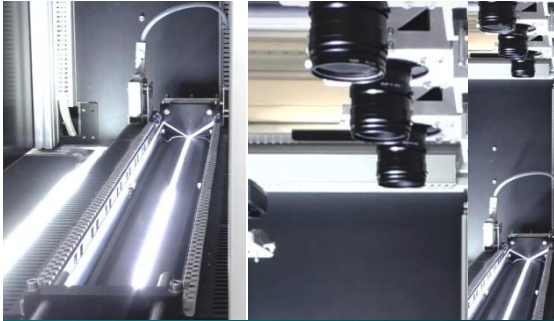


Watermarks

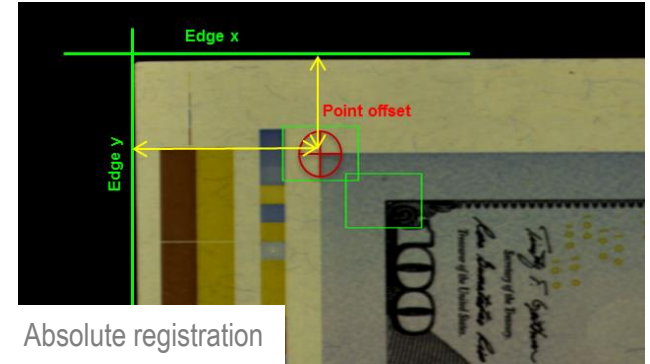




# Inspection with White Light (Incident Light) – Front and Back

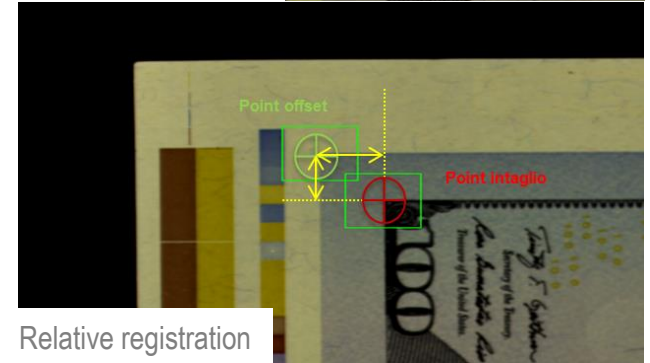


- Prism color line scan cameras
- LED line lighting incident light



Absolute registration

Register defects:



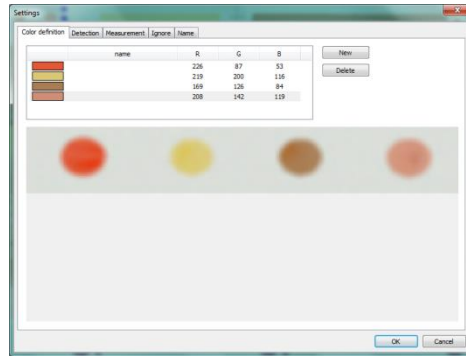
Relative registration



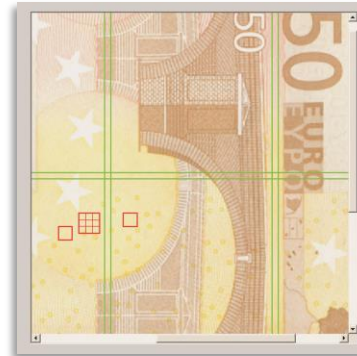
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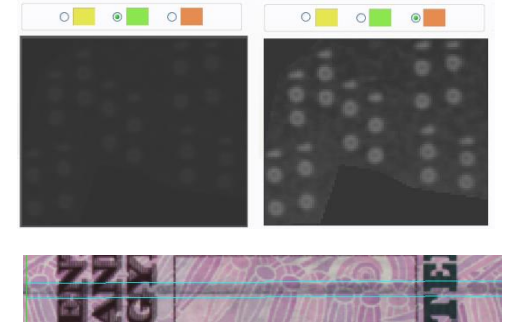
Color variations

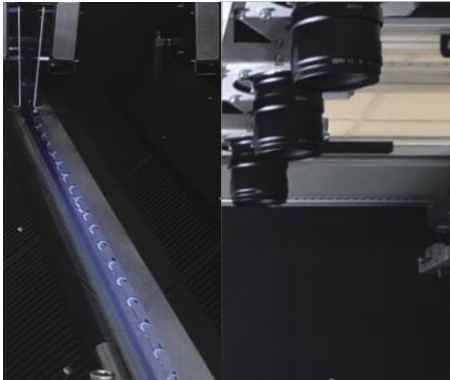


Print defects  
(visible light spectrum)



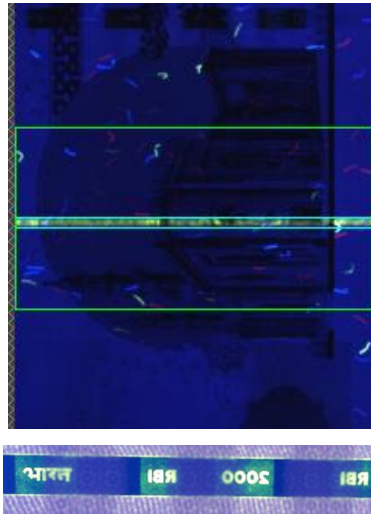
Special print,  
visible security features



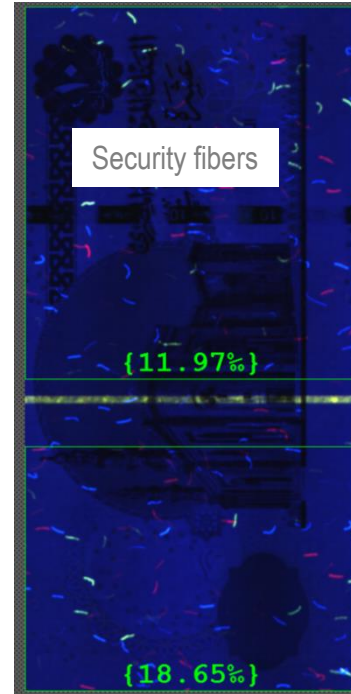


- Prism color line scan cameras
- LED line lighting UV light 365 nm

Thread color

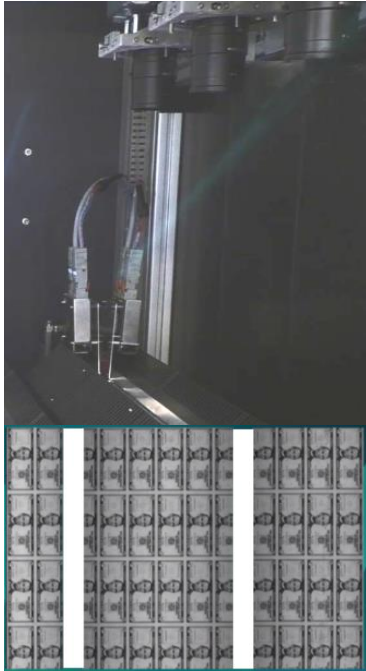


Security fibers

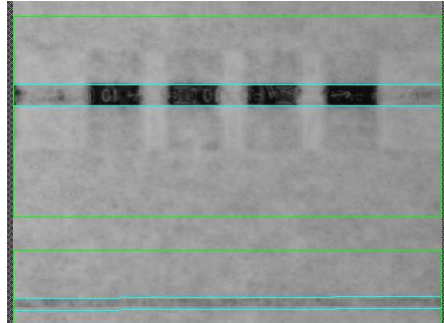


UV Printing

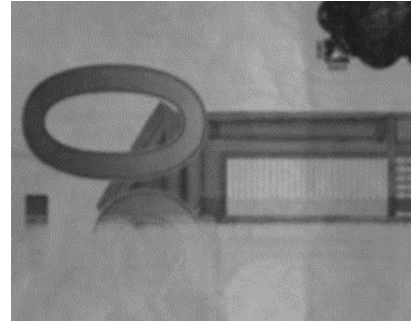




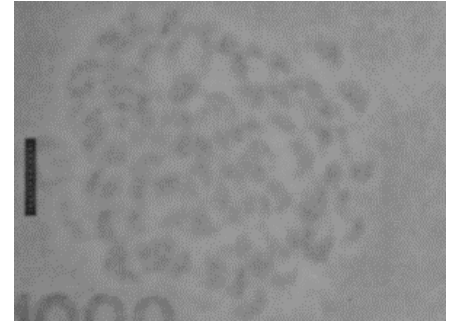
- 3-Chip b/w line scan cameras
- LED line lighting IR 900nm



Window thread

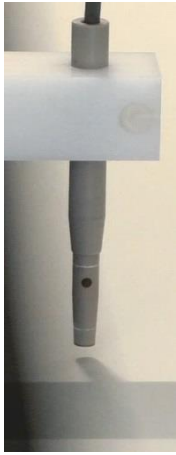


UV print



Watermark

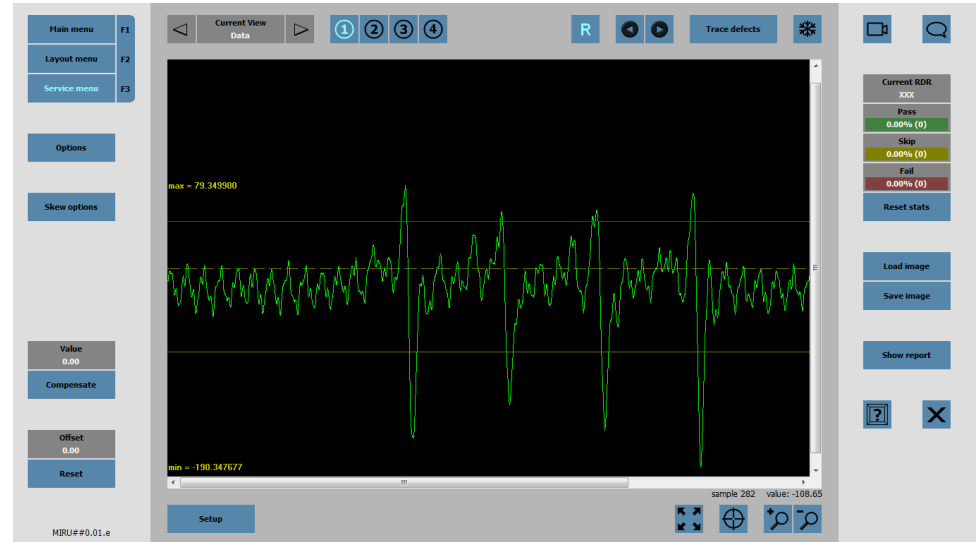


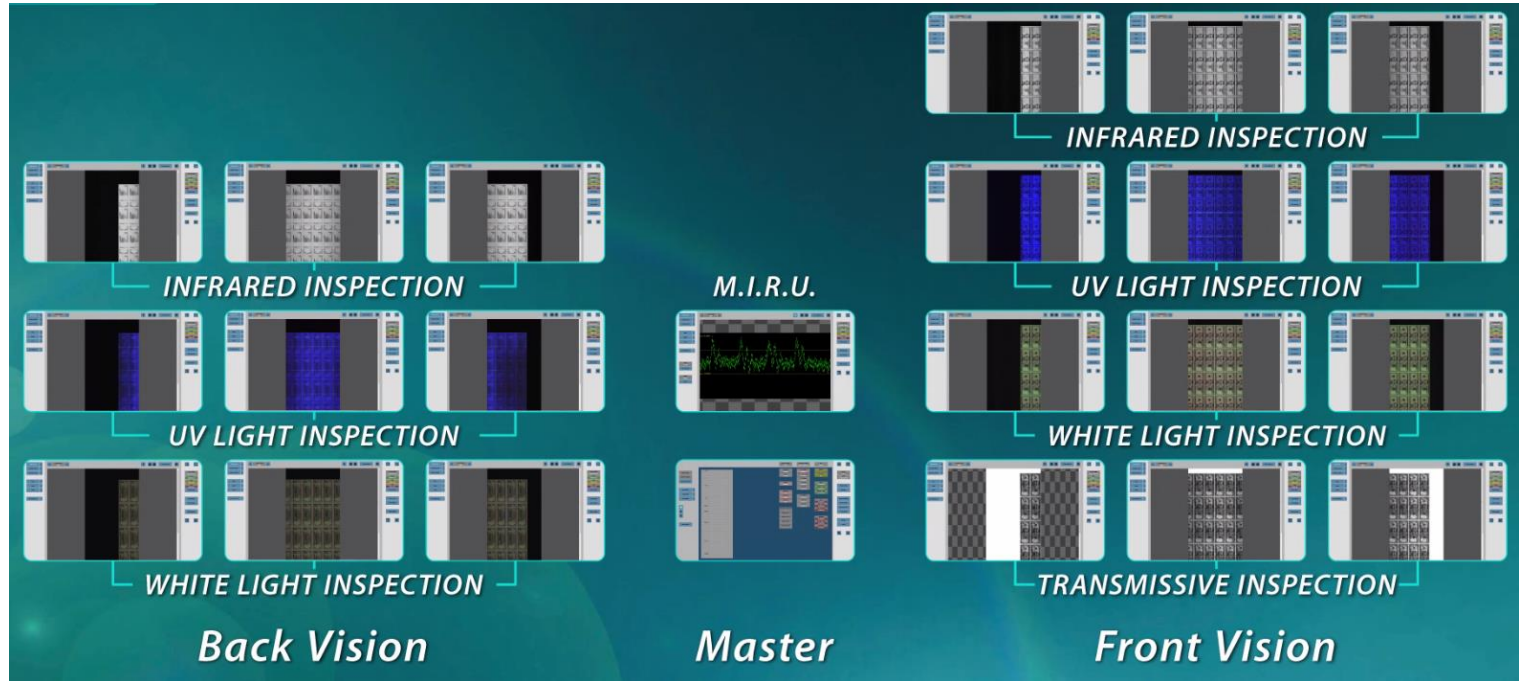


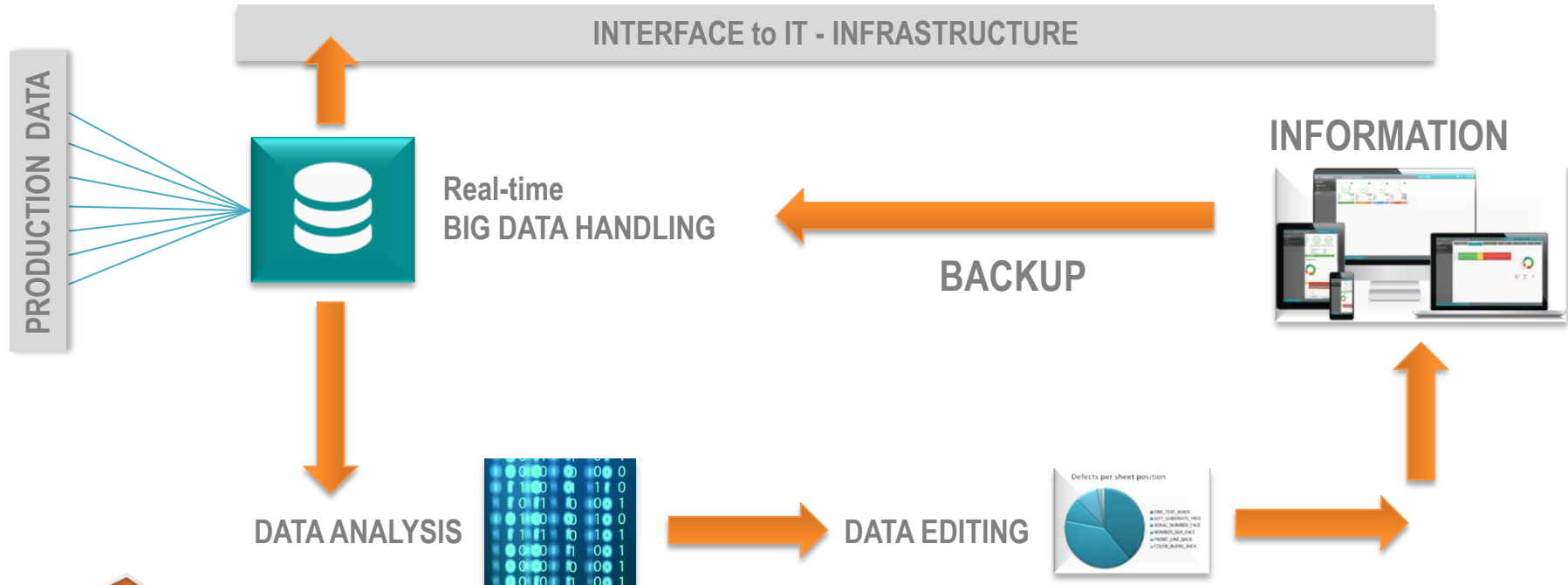
- Sensor for contact-free measurement of magnetic flux density

Detection:

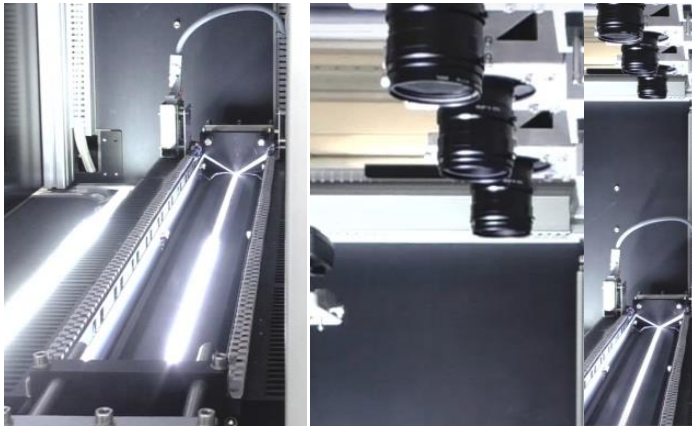
- Presence of magnetic ink
- Intensity of magnetic ink







Increase resolution without slowing down the processing speed



For a sheet width of 850 mm:

- Standard-camera: 2048 pixel per line (30 kHz) – res. 150  $\mu\text{m}/\text{pixel}$
- High resolution: 4096 pixel per line (60 kHz) – res. 100  $\mu\text{m}/\text{pixel}$





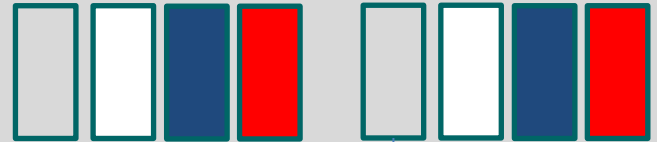


## Challenges:

- Very small print
- Interfering background print

Solution: transmitted light (white, UV, or IR) combined with monochrome line scan camera, 16 K, 100 kHz

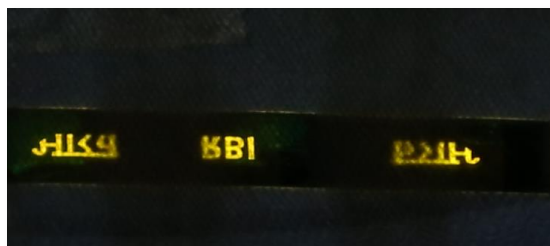
## Integration: Second TIS inspection unit



Inspection of  
micro text in thread



# Micro-print on Thread: Examples





*Thank You!*



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