



100% Real Time Print Defect Detection System

Translation of the Original Operating Manual

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1 Introduction

1.1 General

- The *SHARK 4000* 100% real time print defect detection system must be mounted and operated only according to the knowledge of the relevant operating manual.
This will help avoiding hazards and preventing damages to the system caused by improper assembly or operation.
- This operating manual must be read and applied by every person that has been assigned with the installation, commissioning, operation and maintenance of the *SHARK 4000* 100% real time print defect detection system.
- This operating manual, and particularly the safety instructions must be observed by all persons working on or with the print defect detection system.
- Before commencing with the commissioning work, the system operator must ensure that the safety instructions listed in chapter 2.2 of this operating manual have been read and understood.
- Changing or loading firmware on this system must be carried out **exclusively** by **BST personnel** or personnel duly **authorised** to do so by BST. Non observance of this may cause the loss of the warranty rights!
- The values and data shown in this assembly and operating manual (e. g. in the display) are to be considered as examples, unless otherwise expressly stated.
- The current version of the operating manual for the *SHARK 4000* 100% real time print defect detection system in all available languages can be found on the Internet at the following address:

<http://www.bst-international.com>

1.2 Symbols used

1.2.1 Representation of buttons

This operating manual includes screens of buttons of the *SHARK 4000* user interface. Most of these buttons can be in the active or inactive status. This status is shown as follows:



Button cannot be selected (function not available)



Button in inactive status (function not switched on)



Button in active status (function switched on)

1.2.2 Tips for use

The following symbol is used in this operating manual in order to clearly indicate particularly important places.



Indicates general instructions, useful tips for application and recommendations for working that do not have any influence on the safety and health of the personnel.

2 Safety

This chapter describes the safety guidelines that must be observed under all circumstances when commissioning, operating and maintaining the *SHARK 4000* 100% real time print defect detection system.

2.1 Safety relevant information

In this operating manual, the following symbols will draw your attention especially to hazards, risks and safety relevant information:

DANGER	
	Indicates an <u>immediate</u> dangerous situation. Non-observance of the warning instructions will lead to severe personal injury or death.
WARNING	
	Indicates a <u>potentially</u> dangerous situation. Non-observance of the warning instructions may lead to severe personal injury or death.
BEWARE	
	Indicates a <u>potentially</u> dangerous situation. Non-observance of the warning instructions may lead to slight or medium personal injury.
NOTE	
	Indicates a situation that may lead to property damage.

2.2 General safety instructions

When operating the *SHARK 4000* 100% real time print defect detection system, do not only observe the safety instructions in this operating manual, but also the generally applicable safety relevant information in accordance with EN ISO 13857, DIN EN 349 and the industry-sector-specific accident prevention regulations (UVV).

Non-observance of the safety instructions listed in the following chapters can lead to personal injuries or to damage to the *SHARK 4000* 100% real time print defect detection system.

2.2.1 Operation

WARNING	
	Use of the 100% real time print defect detection system in potentially explosive areas may lead to death or cause life threatening burns. The <i>SHARK 4000</i> 100% real time print defect detection system does not have an ATEX approval. Do <u>not</u> use the 100% real time print defect detection system in potentially explosive areas.
WARNING	
	Sharp edges of moving webs of material may cause severe cutting injuries. Never touch the edges of moving webs of material!
WARNING	
 	Moving machine parts can lead to death or crushing, cutting, entrapment, winding, pulling in, trapping and impacts of limbs. Never reach into the area of moving rolls!

WARNING



Life-threatening electrical voltage

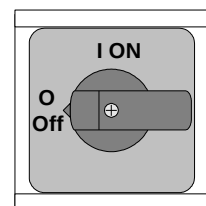
can lead to death or cause severe personal injuries due to electric shocks.

Before any maintenance or cleaning work ensure the system is electrically isolated and at zero potential.

- Turn off the system with the main switch on the operating desk. Make sure that the lights on the main switch are off.



- Switch the system free of voltage using the black service switch inside the PCO control cabinet. Turn the service switch to the **OFF** position. Make sure that the service switch cannot be switched on again.



- Switch off the automatic circuit breaker inside the operating desk. To do this, move the switch to position "O" (bottom switch position). Make sure that the automatic circuit breaker cannot be switched on again.



- Wait **10 minutes**, to allow dangerous residual voltages in the mains filter and capacitors to discharge.
- Check the equipment is voltage-free.
- Ground the system.
- Cover or shield any adjacent parts that are still live.

Only then you can carry out the relevant work.

It is not sufficient to just switch the system off!

If it becomes necessary to work on the open equipment with voltage applied, then only protection class IP 00 is provided. There is always increased danger because of the mains voltage!

WARNING	
	Blinding from LED radiance (Class 2 LED) may result in injuries to the eyes. Do not stare directly into the illumination units of the camera modules. After staring into the LED lighting temporary reduction in visual acuity and afterimages can occur, leading to irritation, annoyance, visual impairment, and even accidents, depending on the situation. If the illumination units are not completely covered by the web of material, the system operator must ensure that no light can escape in an unimpeded manner by taking suitable measures (e.g. installation of web back-up plates).

NOTE	
	Unauthorized opening of the camera module housings may result in damage to the components due to dirt ingress or misalignment. Never open the housings of the camera modules. Within the camera modules there are highly sensitive electronic and optical components, which have been precisely adjusted in the factory.

NOTE	
	Operating the touch screen using pointed, hard or rough objects (e.g. ballpoint pen, gloves) can cause damage to the surface of the touch screen. Only operate the touch screen using the finger.

- Disconnect the cable connections between the specific components of the *SHARK 4000* 100% real time print defect detection system only when the system is no longer connected to the mains supply.
Any infringements will result in the warranty claim being invalidated.

2.3 ESD protection

NOTE	
	<u>E</u>lectro <u>S</u>tatic <u>D</u>ischarge (ESD) can cause damage to electronic components. The unit contains components which can be damaged by electrostatic discharge. These components can receive permanent damage, which can lead to loss of performance, failure or destruction of the part, if they contact electrostatically-charged persons or objects. • Open the system component housings only at an ESD-protecting workplace (ESD workplace in accordance with DIN EN 61340-5-1). If there is no ESD-protected workplace available, ESD precautionary measures in accordance with DIN EN 61340-5-1 must be taken to ensure that electrostatic charges are carefully discharged. • With the return shipments of electronic components or assemblies, observe the regulations in accordance with DIN EN 100 015 "<i>Protection of electrostatically-endangered components</i>". • When transporting, use only the appropriate and correspondingly labeled electrically conductive ESD packaging.

BST International GmbH is not liable for any damages caused by the nonobservance of the ESD protective measures described here.

2.4 Personnel qualifications

WARNING	
	Installation, commissioning, operation and maintenance by insufficiently qualified personnel may cause death or lead to severe personal injuries. Only use qualified specialist personnel for installing, commissioning, operating and maintaining the <i>SHARK 4000</i> 100% real time print defect detection system.

The *SHARK 4000* 100% real time print defect detection system must only be transported, mounted, connected, commissioned, operated and maintained by qualified and trained specialist personnel and only after they have read the corresponding operating manual!

Qualified and trained specialist personnel are persons

- with the respective professional education in their field of activity
- with comprehensive instructing in the functionalities and the operating conditions of BST print defect detection systems
- with knowledge of the respective applicable standards, guidelines, directives and accident prevention regulations
- with knowledge of the relevant electrical engineering guidelines
- with training in use and maintenance of appropriate safety equipment
- with adequate instruction and supervision by specialist electrical staff
- with the ability to recognize and prevent risks

The specialist personnel must be authorized to undertake the necessary work by the system safety supervisor of the machine in which the system should be installed.

The trained specialist personnel must only perform work in the scope of their specialist training.

3 Description

3.1 Intended use

The *SHARK 4000* 100% real time print defect detection system may be used to check the print quality of running webs on web-fed printing presses with web widths up to 2040 mm.

You are only allowed to use BST print defect detection systems to check the print quality of web-shaped materials (e.g. those made from paper, film, cardboard, etc.).

The objects (e.g. print motifs, barcodes, register marks or other print and processing features) utilized for the analysis must contrast sufficiently with the background.

If this is not ensured then the corresponding analysis and the results will only be of limited use or unusable (analysis out of operation).

The *SHARK 4000* 100% real time print defect detection system has been designed to be installed in another machine or to be integrated with other machines to form a single system in compliance with directive 2006/42/EU (Machinery Directive).

It is forbidden to commission the system until the user/operator has determined that the machine in which the system has been installed, complies with the specifications given in this directive.

The system and all of its components are only intended for commercial use.

The *SHARK 4000* 100% real time print defect detection system must only be operated using the components that belong to the system. *BST International GmbH* will not be liable for any damage that results from operation using third party components (e.g. components of other BST systems or other manufacturers).

The lamps included in this system are special products in accordance with the EU Directive 1194/2012/EC, Art. 2, Paragraph 4. The lamps are only intended for use as specified above as part of this system. Any use in other applications as those specified here is not permitted.

The *SHARK 4000* 100% real time print defect detection system must never be installed and operated in potentially explosive areas.

BST print defect detection systems have been designed and built in accordance with state-of-the-art standards and the recognized safety rules. Nevertheless, its use may constitute a risk to life and limb of the user or of third parties or damage the BST print defect detection system and other equipment. Therefore BST print defect detection systems are only to be used if they are working correctly and in a safe technical condition. Any part found to be working incorrectly must be replaced immediately. Only original spare parts are to be used for this. Spare parts obtained from third parties cannot be guaranteed to comply with the design and manufacturing conditions and safety regulations.

In this case any guarantee claims made against the BST print defect detection system will be invalidated.

Only qualified personnel who have been trained on the system are allowed to undertake any work required on the BST print defect detection system (i.e. installation, commissioning, operation, maintenance, etc.).

Intended use also includes adhering to the instructions given in this operating manual. Using the machine for purposes other than those mentioned above is contrary to its intended use.

BST International GmbH does not accept liability for any damage resulting from this type of use.



This device is a PC-based system which performs a consistency check and a reorganization of the database after every new system start in order to maintain the optimal system performance.

This can only take place when no other program is running on the PC.

As such, please shut down the system once every 24 hours and then re-boot it again in order to guarantee the functional reliability.

3.2 Disclaimer

Rights arising from product defects shall not apply insofar as the fault is attributable to non-compliance with one or more of the following points:

- No virus scanners, firewalls or similar items may be installed on any products of *BST International GmbH*. Furthermore, no virus scanners or other scanning or registration programs may (be able to) access BST products via networks.
- The writing, deleting or changing of data and files on BST products via networks is not permitted. Excepted from this is service work carried out at the instruction of *BST International GmbH*.
- Access by any form of third-party software via networks to BST products is not permitted.
- USB memory sticks may only be used together with BST products if they are free of viruses and harmful software.
- Under no circumstances may products or software supplied by *BST International GmbH* be modified without authorisation.

Furthermore, no rights arising from product defects shall apply if the fault is attributable to one or more of the following causes:

- Non-compliance with operating, maintenance or installation instructions
- Inappropriate or improper use of the product or use in a manner other than that intended
- Operation of the product in inappropriate surroundings
- Operation of the product without complying to the statutory safety regulations applicable to the installation location
- Non-compliance with the warning and safety instructions contained in all of the documentation relating to the product
- Operation of the product under inappropriate safety and protection conditions
- Malfunctioning of the product due to the effects of connected or neighbouring third-party equipment
- Disasters and acts of God
- Incorrect or negligent treatment on the part of the customer
- Natural wear and tear
- Interference with the product on the part of the customer or third parties
- Malfunctioning of the product due to inappropriate operating resources, replacement materials, chemical, electrochemical or electrical influences

In the cases listed above *BST International GmbH* shall not be liable (for damages) unless the loss/damage results from a wilful or grossly negligent breach of duty on the part of *BST International GmbH* or its legal representatives or vicarious agents or the loss/damage is associated with injury to life, body or health and results from a wilful or grossly negligent breach of duty on the part of *BST International GmbH* or its legal representatives or vicarious agents or the form of loss/damage can usually and typically be insured against by means of third-party liability insurance taken out by *BST International GmbH* on reasonable conditions.

This applies in particular to claims for damages associated with fault or negligence occurring before or upon conclusion of the contract, the infringement of secondary obligations and claims associated with impermissible actions; this does not affect claims asserted in accordance with the German Product Liability Act or those associated with a guarantee.

In all other respects the corresponding licence conditions of *BST International GmbH* apply.

Supplied software not compiled by *BST International GmbH* is subject to the respective licence and liability agreements of the producer.

3.3 System description

3.3.1 Function

The *SHARK 4000* 100% real time print defect detection system enables the reliable detection of both randomly occurring and also recurring print defects on web-fed printing presses.

The detected print defects are automatically classified by the system according to the defect type. The system differentiates between four common types of print defects (splash, structure, streaks, hazing).

When setting up a new job (*Job Setup*) the operator captures a reference image of the print and defines the areas of the repeat that will be checked for print defects.

The print defect detection sensitivity can be set for each control area at one of three levels.

In *Automatic Mode* the system continuously compares the actual print with the captured reference image (*Golden*).

Detected differences are examined, graded and presented on the monitor using colour marking frames. The results of the defect analysis are displayed as a separate defect grade for each defect type. In addition the operator can change print defect detection sensitivity during operation.

Inspection Mode offers additional special inspection functions, that allow the operator to perform a detailed visual inspection of the current print and comparison with the saved reference image.

The *View Only Mode* makes it possible to display the live image of the running web when the print defect detection is switched off, without having to carry out a *Job Setup* beforehand.

The *Defect History Mode* provides the operator with a detailed overview of all print defects, which the system has detected during a job. After calling up *Defect History Mode* a graphical defect overview (*Virtual Reel*) appears, into which the system automatically enters every detected defect.

After selecting a defect entry in the defect overview, the appropriate defect image and the corresponding section of the reference image are displayed side by side in two comparison windows.

This enables the operator a comfortable visual comparison of the current print with the saved reference image.

The *Job Report* offers the user a powerful tool for internal and external documentation of the quality of the print results.

The report function creates a separate report for each inspected reel. In addition to the general job data and a repeat overview, each reel report contains a reel overview in which the analysis of the selected reel and a summary of the analyses of all reels within the job are shown. The overview of the sensitivity settings documents the defect sensitivity settings used for the various types of defect. The event and flaw list of the reel report lists each change of status (e.g. start and stop of the report or a change of operator) and all defect messages. In addition to this, the relevant defect image is shown for detected print defects.

3.3.2 Job Setup

The system offers two different versions for setting up print jobs:

- **Job Setup**

The Standard Job Setup offers the complete functional scope for setting up a new print job. The setup procedure is divided into seven steps, which must be sequentially implemented by the operator.

The *Standard Job Setup* is described in detail in chapter 7.8.

- **Fast Job Setup**

This version of the Job Setup reduces the setup times for printing jobs. Only the most frequently used setup functions are available in Fast Job Setup. All other settings (e.g. determination of the control areas and sensitivity settings for print defect detection) are specified by the system and cannot be edited.

In Fast Job Setup, all settings can be carried out in one menu, thus saving time.

The *Fast Job Setup* is described in detail in chapter 7.9.

3.3.3 Special functions

The *SHARK 4000* print defect detection system can be adapted to the individual application using the following special functions.

The setting up of the individual functions can be carried out as required by BST service.

3.3.3.1 Repeat Length Monitoring

This function enables continuous monitoring of the repeat length during the printing process. In this manner, tendency toward deviation in the repeat length can be detected early.

The function automatically and continuously measures each repeat length printed and compares the value measured to the repeat length specified in the Job Setup. The repeat length measured and the deviation determined are displayed on the main screen.

If the repeat length measured is less or more than a tolerance range set in the system settings, this is signaled by an alarm display.

On request, the repeat length deviations determined can be transferred as defect entries in the defect history and job report. For documenting the print quality, the measurement result can also be logged in a file.

The *Repeat Length Monitoring* function is described in chapter 9 of this operating manual.

3.3.3.2 Manual marker

The function is used for entering manual markings into the job report using an external input signal. These can be used, for instance, for the marking of waste areas or for the synchronization of the web with the job report.

3.3.3.3 Flagger control

The signal output permits the controlling of an external web marking device (*Flagger*). The flagger is used, for instance, to mark faulty areas by placing adhesive labels on the web of material. A corresponding entry of the event is automatically generated in the job report for each marking.

3.3.3.4 Signal input for barcode reader

The signal input enables the processing of the signal from an external barcode reader. A corresponding entry of the event is automatically generated in the job report for each input signal.

3.3.3.5 Signal input for reel change signals

The configurable signal inputs enable the evaluation of the reel change signals which are issued from the unwinding and rewinding of the printing press. For each reel change a corresponding entry of the event is automatically generated in the job report.

- Unwinding:
In order to avoid undesired detection of print defects caused by web tension fluctuations during the reel change, the print defect detection is temporarily switched off after input of the reel change signal from the unwinder.
- Rewinding:
The evaluation of the reel change signal from the rewinder of the printing press enables the creation of separate reel reports for the individual reels of a print job.

3.3.3.6 External Position Link (EPL)

This function enables the remote control of the camera position for a connected BST video web inspection system from the *SHARK 4000* user interface.

After touching the desired area in the repeat overview of the *SHARK 4000* display window, the camera unit of the video web inspection system traverses automatically to the relevant position in the repeat and records an image.

The evaluation of the image is carried out by the machine operator or, if available, by the analysis software of the web inspection system.

3.3.3.7 Workflow

The *LECTOR 4000* workflow management software permits the display, evaluation and the further processing of the job reports generated by the *SHARK 4000* print defect detection system. It allows the quality manager of commercial printing businesses to carry out a quick test and evaluation of the detected defects.

3.3.3.8 Signal output for additional monitor

The signal output is used for the live display of the repeat overview on an additional monitor.

3.3.4 Print defect detection

3.3.4.1 Detectable defect types

The system detects four different categories of print defects:

1. **Splash**
Colour splashes, runs, or small areas of unevenness in a homogenous printed or unprinted area
2. **Structure**
Register errors, missing type or surplus type in structured areas in the artwork
3. **Streaks**
Streaks extending in web running direction (e.g. doctor blade streaks)
4. **Hazing**
Extensive changes in the colour and also in unprinted areas in the artwork



The four defect detection algorithms are optimized for the corresponding defect types. However it is possible that the allocation of a detected defect to another defect type occurs. For example a large splash may be detected as a colour difference. This is not a malfunction of the system!

3.3.4.2 Detectable defect sizes

The size of print defects that can be detected by the system, is dependent on a series of different factors:

- Camera resolution across the web running direction (X-direction)
- Web speed
- Web fluctuations
- Contrast ratio
- Material (structure, transparency, ...)
- Print quality
- Location of defects
(in structured or homogeneous areas)
- ...



The minimum detectable defect sizes given are thus only standard values!

The values valid for your particular application can only be determined by BST after an individual consultation taking into consideration all the relevant influencing parameters.

Standard values for minimum detectable defect sizes:

- In structured areas: 15 pixels
(e.g. text, barcodes, edges, ...)
- In homogeneous areas: 10 pixels
(e.g. colour surfaces)

3.3.4.3 Requirements for optimum defect detection

To ensure optimum defect detection the following pre-conditions must be met:

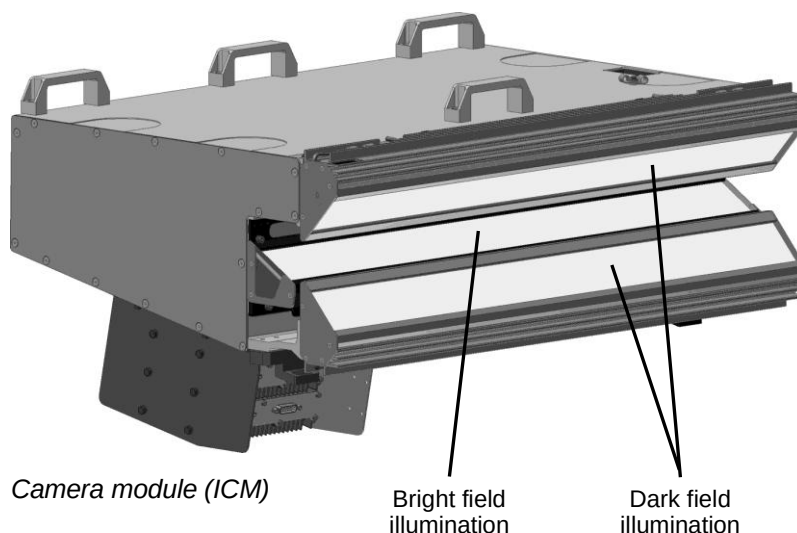
- The web in front of the camera unit is free from ripples and folds.
- Horizontal and vertical web oscillations in front of the camera unit should be minimized.
When inspecting opaque (light absorbing) materials, the camera unit should be mounted above a deflection pulley.
- Camera unit vibrations should be prevented.
- The diffuser panes of the illumination units and the viewing windows of the camera modules must be kept clean.
- When inspecting transparent materials, the background of the web (e.g. web back-up plate or optional back light illumination) must be kept clean.
- Maintenance intervals must be adhered to.

3.3.5 System components

The *SHARK 4000* 100% real time print defect detection system consists of the main components described in the following chapters.

3.3.5.1 Camera unit

The camera unit (*Image Capture Unit, ICU*) of the system consists of one to three camera modules (*Image Capture Module, ICM*), which are integrated in a shared frame.



The number of camera modules depends on the width of the web to be inspected (see chapters 4.3.2 and 4.3.3). Two types of camera modules with different resolutions are available:

Camera module	Scan width	Resolution*	Typical range of application
ICM 680	680 mm	0.285 mm	Flexo printing
ICM 510	510 mm	0.150 mm	Gravure printing

* resolution across the web running direction (in X direction)

Every camera module is equipped with three illumination units (2x dark field illumination, 1x bright field illumination) per default. The separate activation and intensity setting for the individual illumination units enables optimum adaptation of the illumination to all sorts of materials.

NOTE



Unauthorized opening of the camera module housings

may result in damage to the components due to dirt ingress or misalignment.

- Never open the housings of the camera modules. Within the camera modules there are highly sensitive electronic and optical components, which have been precisely adjusted in the factory.

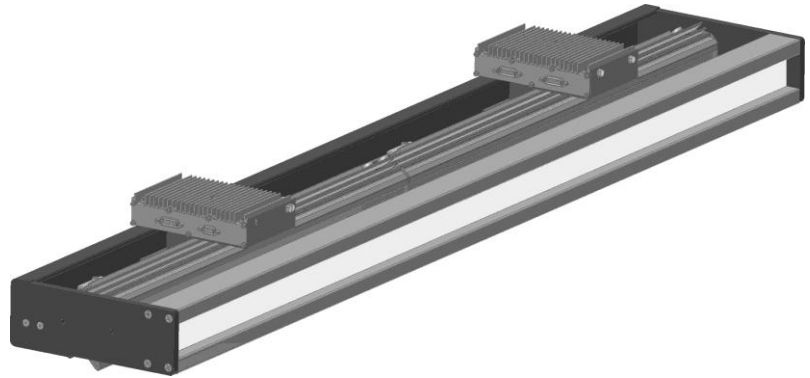


With stopped print defect detection, all illumination units of the system switch off automatically after approx. five minutes.

The automatic switch-off is responsible for saving energy and ensures a longer operating life of the illumination units.

When restarting the print defect detection, all activated illumination units are started again automatically.

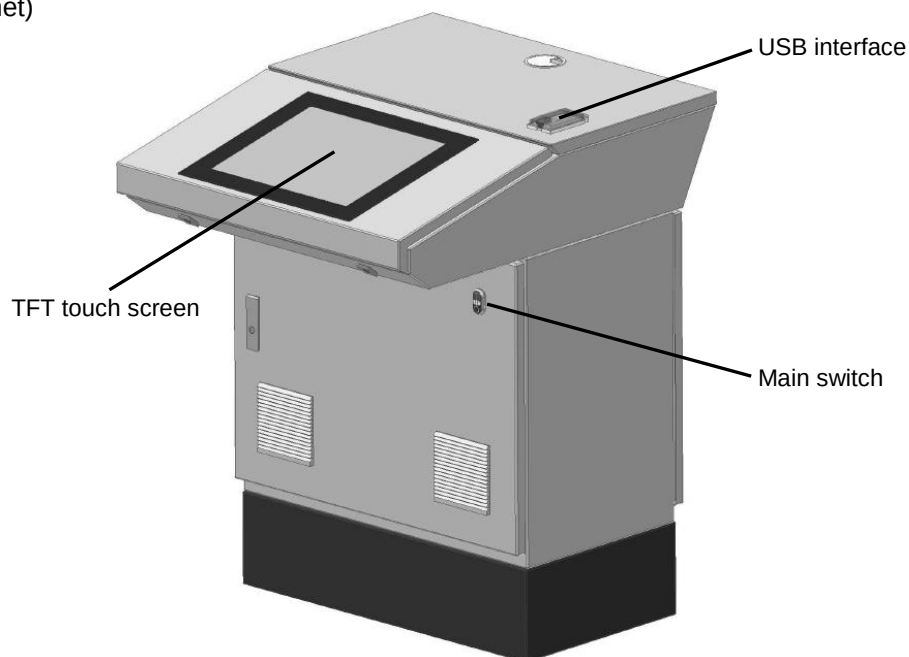
3.3.5.2 Back light illumination (option)



Back light illumination

For the inspection of transparent (translucent) materials the camera unit can be equipped with an optional back light illumination. This is mounted exactly opposite to the camera unit and illuminates the web of material from the back side.

3.3.5.3 Operating desk (OCO control cabinet)



The operating desk (OCO control cabinet) contains the following main components:

- Operation controller (OCO) for system control
- Synchronisation interface for synchronisation with the printing press
- I/O interface for customer specific signals or for outputting an alarm
- Mains wiring with service switch, automatic circuit breaker and service socket
- 19" TFT touch screen
- Main switch
- USB interface
- Service keyboard

NOTE



Using the service socket in the operating desk as a power supply for external loads

can cause system failures by triggering the external (customer) protection.

- Only use the green service socket in the operating desk for service purposes.

NOTE

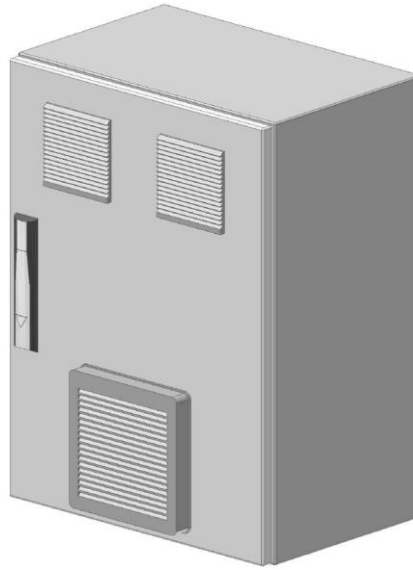


Using the USB interface as a power supply for external loads

can cause damage to the industrial PC.

- Only use the USB interface for data exchange.
- Do not subject the USB interface to a load of more than 300 mA.

3.3.5.4 PCO control cabinet



The PCO control cabinet of the system contains the following main components:

- One image processing controller (PCO) for every camera module
- One power pack for every camera module
- Mains wiring with automatic circuit breaker



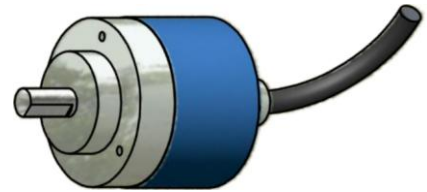
The PCO control cabinet must be installed directly alongside the camera unit, since the length of the connecting cable between camera unit and PCO control cabinet is limited to 10 m for technical reasons.

The maximum cable length between PCO control cabinet and operating desk is 30 m.

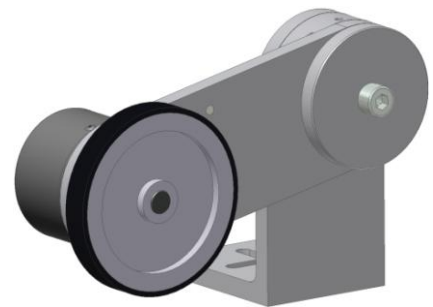
3.3.5.5 Encoder

Two different encoder types can be used for synchronising the *SHARK 4000* 100% print defect detection system with the printing press.

1. Encoder



2. Friction wheel encoder



3.3.6 Name plates

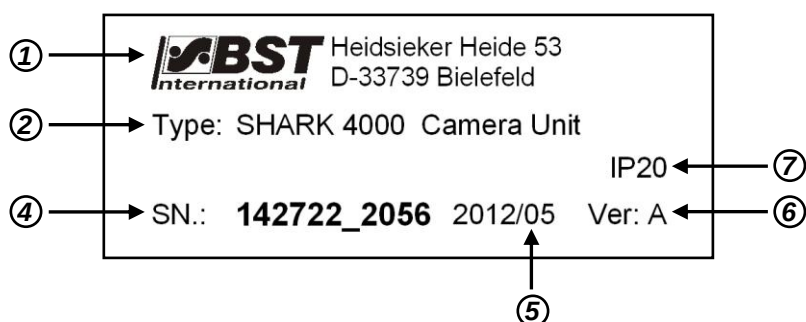
On the name plates on the system components you will find all the details required should you have any queries with BST.
For more information, see also chapter 14.

- | | |
|--------------------------|-------------------------------------|
| ① Manufacturer's address | ⑤ Date of manufacture (year / week) |
| ② Type ID | ⑥ Hardware version |
| ③ Electrical data | ⑦ Protection class |
| ④ Serial number | |

The data entered on the name plates shown below are to be taken as an example.

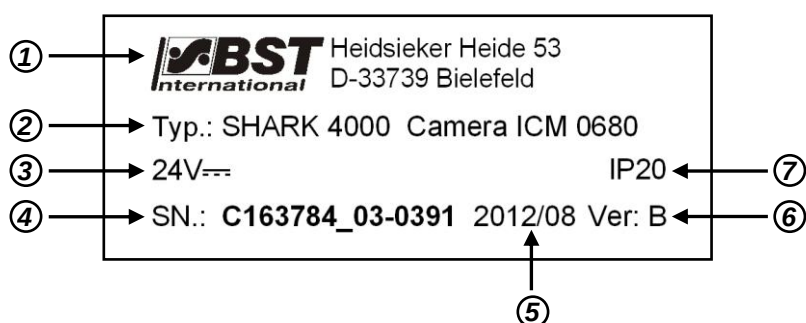
Name plate camera unit (ICU)

The name plate is located on the side of the supporting frame of the camera unit.



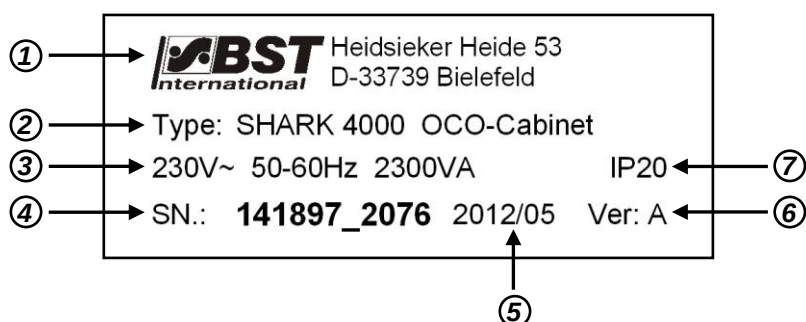
Name plate camera module (ICM)

The name plate is located on the bottom side of the camera module.



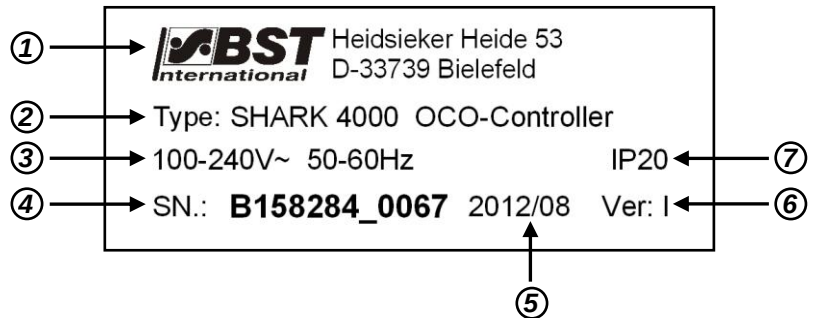
Name plate OCO control cabinet

The name plate is located on the outside of the control cabinet door.



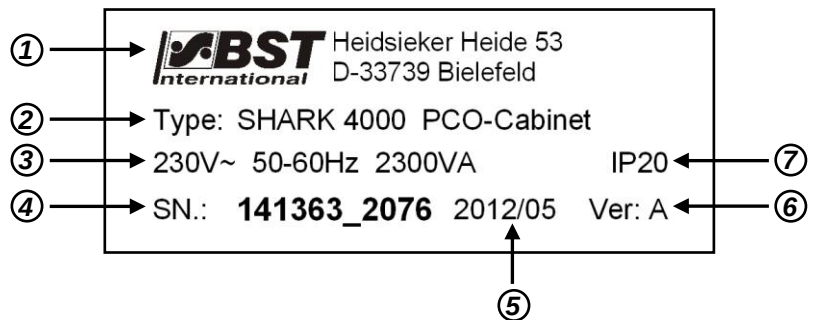
Name plate operation controller (OCO)

The name plate is located on the front side of the housing.



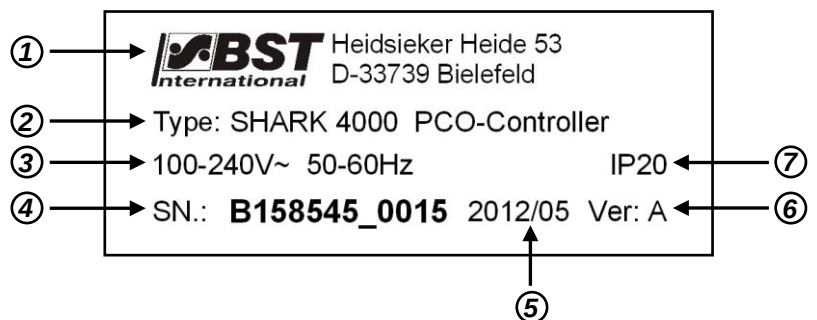
Name plate PCO control cabinet

The name plate is located on the outside of the control cabinet door.



Name plate image processing controller (PCO)

The name plate is located on the front side of the housing.



3.3.7 System number

BST Service can clearly identify your system with the help of the system number. You will find the system number on a label which is fitted on every system component directly next to the name plate.

The label contains the following information:

- ① Manufacturer's address
- ② Type ID
- ③ System number
- ④ Date of manufacture (year / week)

The data entered on the label shown below are to be taken as an example.



4 Technical Data

4.1 Ambient conditions

Environment temperature in operation	min. 5 °C (41 °F) max. 40 °C (104 °F) <i>Touch screen monitor, see separate operating manual provided by the manufacturer</i>
Storage temperature	-10 to + 55 °C (14 to + 131 °F)
Air humidity	20 – 80%, without condensing
Place of installation	closed, dry building, height above sea level < 2000 m

4.2 Power supply

Power supply	100 – 240 V~, 50/60 Hz
Power consumption of the complete system	1 camera module: approx. 1,300 W 2 camera modules: approx. 1,800 W 3 camera modules: approx. 2,300 W
Protection	External protection: 16 A Internal protection: 16 A Service socket: 16 A The specifications apply for 115 V~ and 230 V~ power supplies
Surge voltage protection	Unit fine protection (cannot be reset) of class III as per VDE 01805-305-4:2006. Suitable class I and II arresters must be connected upstream! Class I: Lightning current arrester Class II: Surge arrester Class III: Unit protection

4.3 Print defect detection

4.3.1 General information

Web speed*	min. 24 m/min max. 600 m/min
Movements of the web position:	horizontal (across the web running direction): max. ± 4 mm vertical (height run out of the web): max. ± 1.0 mm
Material ripple	max. ± 0.5 mm
Max. number of defects	Per job: 30,000 Per reel: 2,000 Per lane: 1,000
Register deviation	max. ± 5 pixels in and across the web running direction, can be compensated (dependent on the resolution)

* dependent on the application and the desired resolution in web running direction (Y direction)

4.3.2 Standard resolution (ICM 680)

Scan width camera module	680 mm
Max. web width	1 camera module: 680 mm 2 camera modules: 1,360 mm 3 camera modules: 2,040 mm
Resolution in X direction (across the web running direction)	0.285 mm

Web speed	Resolution in Y direction	Repeat length	
		min.	max.
300 m/min	0.30 mm Px	500 mm	2,330 mm
350 m/min	0.35 mm/Px	590 mm	2,720 mm
400 m/min	0.40 mm/Px	670 mm	3,110 mm
450 m/min	0.45 mm/Px	760 mm	3,500 mm
500 m/min	0.50 mm/Px	840 mm	3,890 mm
550 m/min	0.55 mm/Px	930 mm	4,270 mm
600 m/min	0.60 mm/Px	1,000 mm	4,660 mm



If the actual repeat length is below the given value for the minimum repeat length, the system automatically brings together several repeats into one single repeat.

4.3.3 High-resolution (ICM 510)

Scan width camera module	510 mm
Max. web width	1 camera module: 510 mm 2 camera modules: 1,020 mm 3 camera modules: 1,530 mm
Resolution in X direction (across the web running direction)	0.15 mm

Web speed	Resolution in Y direction	Repeat length	
		min.	max.
300 m/min	0.42 mm Px	700 mm	3,240 mm
350 m/min	0.49 mm/Px	820 mm	3,780 mm
400 m/min	0.56 mm/Px	940 mm	4,320 mm
450 m/min	0.63 mm/Px	1,050 mm	4,860 mm
500 m/min	0.70 mm/Px	1,170 mm	5,400 mm
550 m/min	0.77 mm/Px	1,290 mm	5,940 mm
600 m/min	0.84 mm/Px	1,400 mm	6,480 mm



If the actual repeat length is below the given value for the minimum repeat length, the system automatically brings together several repeats into one single repeat.

4.4 Camera module (ICM)

Camera type	CCD RGB linescan camera
Camera resolution	ICM 680: 2,440 pixels/line ICM 510: 3,392 pixels/line
Line frequency	20,000 Hz
Data transfer rate	60 MHz
Zoom	10x, digital
Protection class	IP 20
Illumination	Bright field illumination: 40 W, high-performance LEDs Dark field illumination: 2 x 40 W, high-performance LEDs Back light illumination (option): 40 W, high-performance LEDs Lifetime approx. 10 000 h
Case dimensions	<i>See dimensional drawings in the SHARK 4000 documentation folder</i>
Weight	ICM 510: approx. 28 kg ICM 680: approx. 35 kg
Connecting cable length	10 m

4.5 Operating desk (OCO control cabinet)

Data interfaces	• 2x USB size A acc. To specification 2.0 • 1x Ethernet • 56k modem (for remote maintenance)
Outputs	• 6x optocoupler output max. 24 V_~, max. 50 mA
Inputs	• 6x input max. 24 V_~, 4 mA • 1x encoder connection 14 V_~
Touch screen monitor	19" TFT touch screen monitor <i>Technical data see the separate monitor manufacturer's operating manual</i>
Protection class	IP 20
Case dimensions	<i>See dimensional drawings in the SHARK 4000 documentation folder</i>
Weight	approx. 130 kg

4.6 PCO control cabinet

Protection class	IP 20
Case dimensions	<i>See dimensional drawings in the SHARK 4000 documentation folder</i>
Connecting cable length	30 m
Weight	approx. 100 kg

4.7 Encoder

	Encoder	Friction wheel encoder
Resolution	4,096 impulses per rotation	
Power supply	14 V _{DC}	
Protection class	<i>See the separate encoder manufacturer's operating manual</i>	
Case dimensions	<i>See dimensional drawings in the SHARK 4000 documentation folder</i>	
Connecting cable length	Standard: 2 m	Cable extension (optional): 30 m

4.8 Emissions

A-rated equivalent continuous sound level	< 70 dB(A)
---	------------

4.9 RoHS conformity

RoHS

We hereby declare that the SHARK 4000 100% real time print defect detection system does not exceed the hazardous substance limits stipulated in EU Directive 2002/95/EU*.

* EU Directive for restricting the use of specific hazardous substances used in electrical and electronic equipment, "RoHS Directive" (Restriction of Hazardous Substances).

5 Transport, unpacking and storage

5.1 Transport

The *SHARK 4000* 100% real time print defect detection system has been designed to be installed in a web-fed printing press.

The system is either supplied as part of the printing press or as a stand-alone system with the following pre-mounted components:

- Camera unit
- Operating desk (OCO control cabinet)
- PCO control cabinet
- Encoder
- Connecting cables
- Camera calibration scales

The system components must only be transported when they are packed in the original BST transport packing.

NOTE	
	Improper transportation can cause damage to the system components. • Transport the packing only in the position marked. • Avoid damaging the packaging. Replace damaged packaging with suitable new packaging to avoid subsequent damage to the system components.

BST International GmbH cannot be held liable for damage to the 100% real time print defect detection system which is caused by an inappropriate transport packaging!

5.1.1 Transport by hand

WARNING	
	Danger of personal injury! Transport goods which fall down can lead to severe injuries (e.g., crushing and broken bones). • Use suitable lifting, transferring and depositing method.

Take note of the following points when transporting system components by hand:

- When lifting heavy components there is a danger of damage to your health.
The weight lifted for a short period should not exceed 15 kg for women and 25 kg for men.
- Place transport goods down carefully to avoid damage.
- Wear personal protective equipment (work gloves, safety shoes).
- When lifting the camera modules only use the bow-shaped handles on the housing intended for this purpose.

5.1.2 Transporting using a lifting cart or forklift

WARNING	
	Danger of personal injury! Transport goods which fall down or topple over can lead to severe injuries (e.g., crushing and broken bones). • Ensure that the transport goods are in a stable position during transport.

Take note of the following points when transporting system components with a a lifting cart or forklift:

- Secure the transport goods in such a way that they cannot unexpectedly move out of position.
- If necessary, use suitable tensioning belts and an edge protector.
- Ensure that the load bearing capacity of the lifting cart or forklift to be used is sufficient to be able to transport the goods without risk.
- Wear personal protective equipment (work gloves, safety shoes).

5.1.3 Transport with lifting device

WARNING	
	Danger of personal injury! Transport goods which fall down can lead to severe injuries (e.g., crushing and broken bones). • Use a suitable lifting device for the transport. • Never stand under the transport goods while they are being transported.

Take note of the following points when transporting system components with a lifting device:

- Ensure that the load bearing capacity of the lifting device is sufficient to be able to transport the goods without risk.
- Ensure that the transport goods are in a stable position during transport.
- Fix all load bearing equipment to the lifting device only using suitable and adequately dimensioned slings.
- Secure the lifting straps so that they cannot slip and the transport goods cannot tip over or fall down.

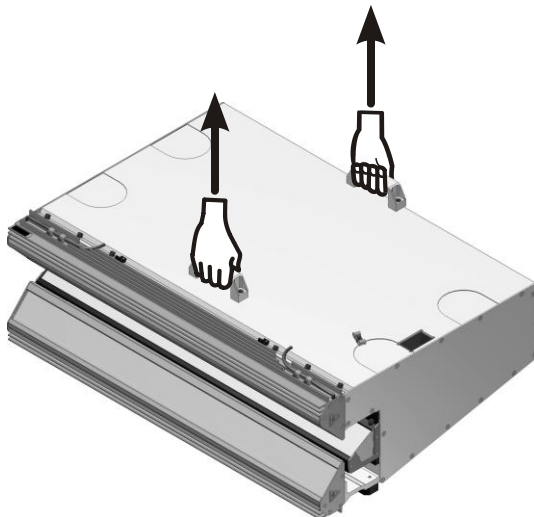
5.1.4 Transport of the camera modules

The handles on the camera modules are solely intended for transport by hand and for manual placement of the modules into the equipment. The handles are **not** permitted to be used as an anchorage point for lifting equipment (such as lifting straps or chains).

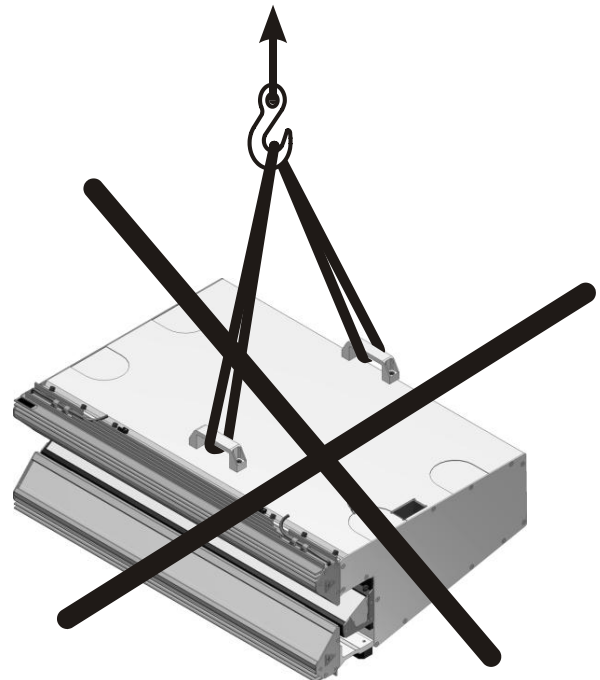
WARNING	
	Danger of personal injury! Camera modules which fall down can lead to severe injuries (e.g., crushing and broken bones). Do not use the handles on the camera modules for the fixing of lifting equipment.

BST International GmbH will not be liable for damage to materials or persons caused by incorrect transportation of the camera modules.

Permitted



Not permitted



5.2 Unpacking

Upon delivery, immediately check the shipment for completeness and any transport damage.

NOTE	
	Damaged packaging can cause damage to system components. • Remove the damaged packing in the presence of a representative of the shipping company and check the contents for damage.

Unpack the components in a dry room immediately before commencing with the installation.

The parts supplied will depend upon your order.

- Before commencing with the installation, check whether all required components are present.
Arrange all the packages / cartons delivered as part of your order in front of you. Open the packages / cardboard boxes one after the other and carefully take out the packaging material and system components.
Pay particular attention to cables and additional parts, which may be packed in the packaging / cardboard boxes.
- Inspect all components delivered for damage (e.g. dents, scratches, loose parts, defective cables, etc.). Defective or deformed components must be replaced immediately as trouble free function of this part cannot be guaranteed over a longer period.
- In case the components should be forwarded, keep the original packaging. The components must only be transported when they are packed in the original BST transport packing.
Otherwise dispose of the packaging material in accordance with local disposal regulations.

5.3 Storage

If the system components will not be incorporated immediately, they must be stored in a dry room until installation.

Storage conditions:

Temperature:	10°C to a max. 55°C (14°F to a max. 131 °F)
Air humidity:	20 - 80%, no condensation

6 Installation/ Start-up

WARNING	
	Incorrect assembly and start-up of the <i>SHARK 4000</i> 100% real time print defect detection system can cause serious personal injuries or property damage. • The <i>SHARK 4000</i> 100% real time print defect detection system should be installed or started operating only by BST personnel or by personnel from the machine manufacturer, trained by BST!

For handling faults and damages due to neglecting this provision,
BST International GmbH will accept non liability.

7 Operation

7.1 General

WARNING	
	Incorrect operation of the <i>SHARK 4000</i> 100% real time print defect detection system can cause serious personal injuries or property damage. • Operation of the <i>SHARK 4000</i> 100% real time print defect detection system must be carried out only by trained personnel!

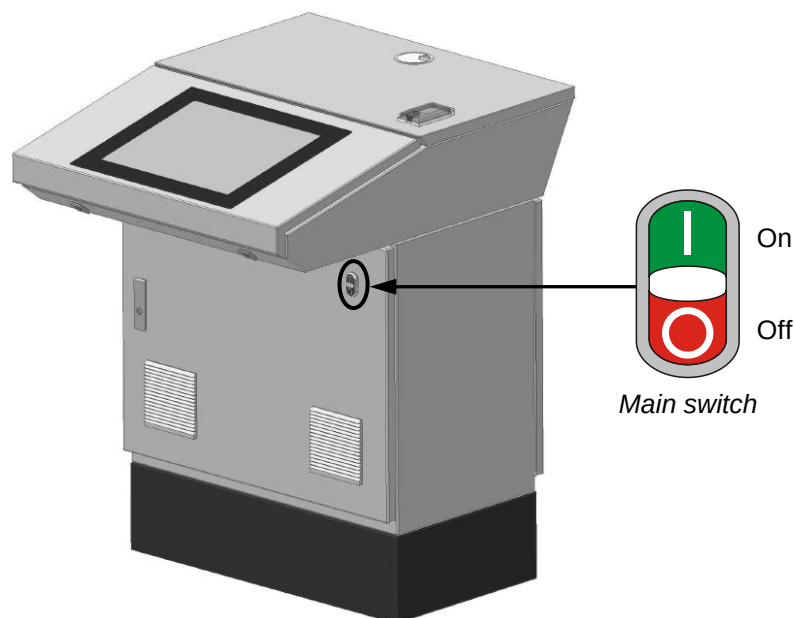
For handling faults and damages due to neglecting this provision, *BST International GmbH* will accept non liability.

NOTE	
	Operating the touch screen using pointed, hard or rough objects (e.g. ballpoint pen, gloves) can cause damage to the surface of the touch screen. • Only operate the touch screen using the finger.

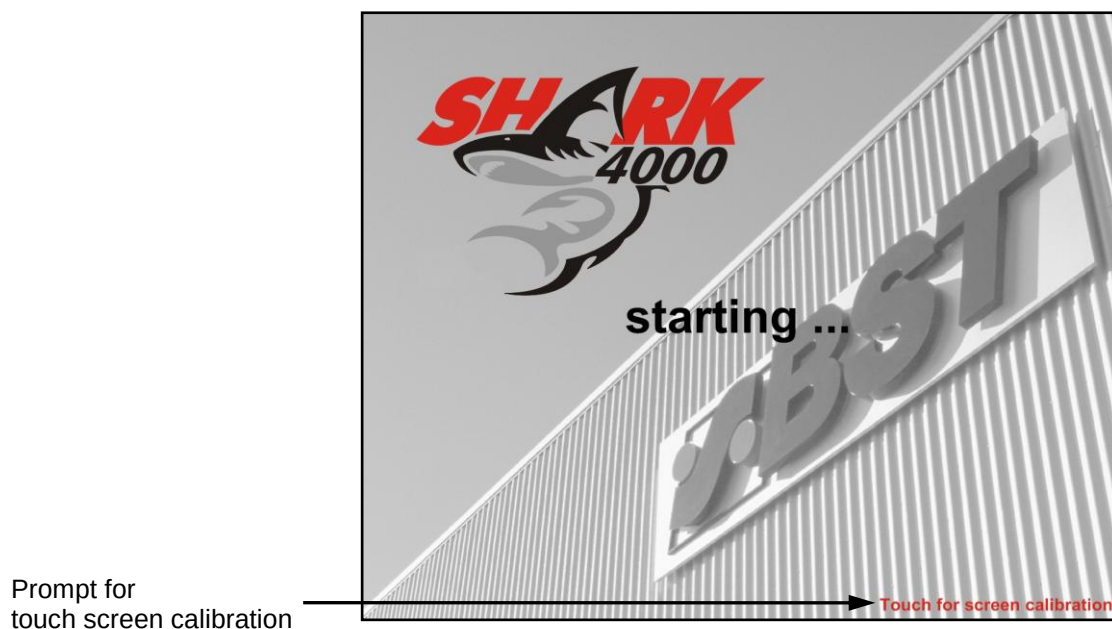
7.2 Switching on the system

Procedure:

- Switch on the main switch on the operating desk.



The operation controller of the system boots up.
 This process can last for some seconds.
 During system start-up the following start screen appears on the touch screen monitor for approx. 10 seconds:



A prompt to calibrate the touch screen is displayed in the lower right-hand corner of the start screen.



Calibration of the touch screen monitor must be carried out only once during commissioning of the system!

The calibration procedure is started automatically by touching the touchscreen at any point.

The procedure for calibrating the touchscreen is described in detail in chapter 7.3.



If the system detects a new touch screen monitor after starting (e.g. after replacing a defective monitor), it is imperative that the new touch screen be calibrated!

If the touch screen is not touched, the main screen of the SHARK 4000 user interface appears automatically after a waiting period.



The system then makes the Ethernet connection between the operation controller (OCO) and the image processing controllers (PCO). During this process the relevant messages will be displayed in the display window of the main screen. After creation of the connection, the messages are removed. The system is ready for operation.

7.3 Calibrate touch screen

A one-off calibration of the touch screen monitor must be carried out during commissioning of the print defect detection system. Generally, it is not necessary to repeat the touch screen calibration!

Touch screen calibration is started immediately after switching on the system.



If the system detects a new touch screen monitor after starting (e.g. after replacing a defective monitor), it is imperative that the new touch screen be calibrated!

Procedure:

1. Turn on the system.
During system startup, the following start screen appears on the screen of the touch screen monitor for approx. 10 seconds:

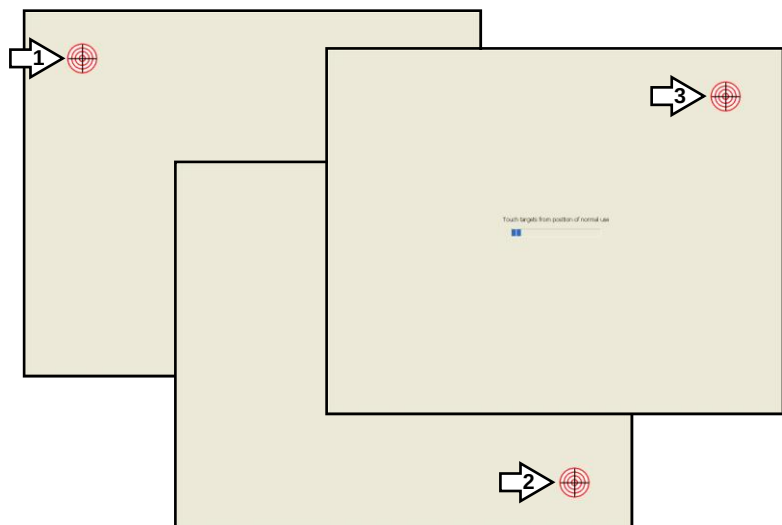


2. Touch the touch screen at any point with your finger.
The following screen appears:



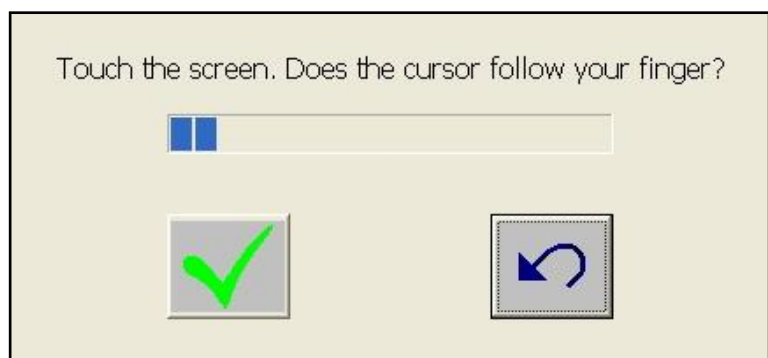
3. To start touch screen calibration, touch the touch screen at any point with your finger.

The calibration function is started.
Three cross-wires appear sequentially on the screen.



4. Using your finger, touch each of the cross-wires on the touch screen in the centre one after another.

After touching the third cross-wire, the following message appears:

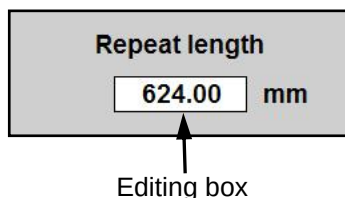


5. Touch the touch screen at different points with your finger.
If the touch screen is calibrated correctly then the cursor must follow the finger's touch movements on the screen exactly.
6.  To check the calibration settings press the **Back** button.
The calibration steps are run through again.
-  To end the calibration function press the **OK** button.
The touch screen calibration is complete.
The main screen of the *SHARK 4000* user interface appears.

7.4 Input options

7.4.1 Entries in editing boxes

Numeric or alphanumeric input in editing boxes is required for some functions/settings.



Procedure:

- Tap on the editing box on the touch screen.
A window opens with an alphanumeric keyboard.

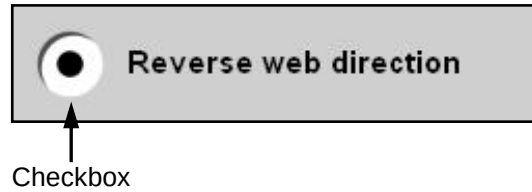


In the upper part of the window, an editing box appears with the corresponding label (in the example *Repeat length*).
Keys which are not needed for the input are deactivated and are shown grayed out.

- Undertake number or alphanumeric input by tapping on the corresponding keys on the keyboard.
The entered character appears in the editing box.
- To correct an entry, tap on the appropriate position in the editing box. The cursor changes to the selected position.
-  To delete the last entered character, tap the **< BACK** key. The character before the current cursor position is deleted.
-  To delete all entered characters, tap the **reset** key. All characters in the editing box are deleted.
-  To end input, tap the **RETURN** key.
The keyboard will be closed. The entered characters are imported into the editing box.
-  To cancel input, tap the **Close** key.
The keyboard will be closed, without the entered characters being imported.

7.4.2 Checkbox

Tapping a checkbox on the touch screen causes the corresponding function to be activated or deactivated.



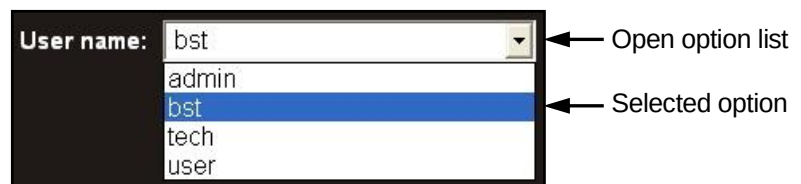
Function is activated



Function is not activated

7.4.3 Option list

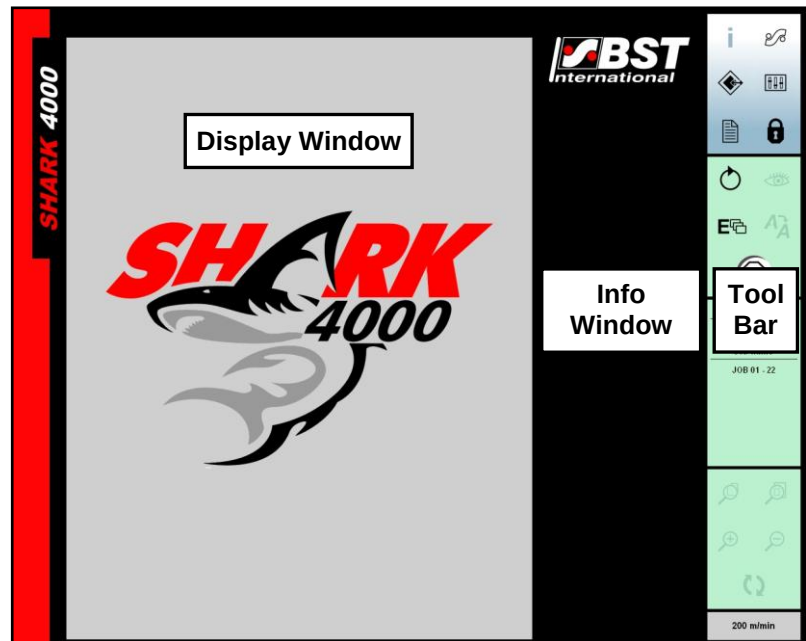
An entry from a default list can be selected from an option list.



Procedure:

-  Press the adjoining button at the right edge of the editing box.
 A list opens with all the available options.
 The currently selected option is highlighted in blue.
- Select the desired option by tapping the corresponding list box on the touch screen. The option list is closed.
 The selected option is taken over into the editing box.

7.5 Design of the main screen



The main screen of the user interface is divided into three areas:

- Display Window
- Info Window
- Tool Bar

7.5.1 Display window

When setting-up a new print job, the captured reference image is shown in the display window.

Coloured marking lines are used to define the repeat borders, lanes and control areas (see chapters 7.8.8 to 7.8.10).

In Automatic Mode the display window shows the image of the last detected defect (*Defect*), the corresponding section of the reference image (*Golden*) and the live image of the complete repeat (*Repeat Overview*) (see chapter 7.11.1.1).

In Inspection Mode the display window shows alternatively the live image of the repeat or the reference image (see chapter 7.11.2.2).

In View Only Mode the display window shows the live image of the running web (see chapter 7.11.4.2).

In Defect History Mode a graphical overview of all detected print defects (*Virtual Reel*) appears in the lower part of the display window (see chapter 7.10.3.1). The two comparison windows in the upper part of the display window allow visual comparison between live, reference and defect image of a selected defect (see chapter 7.11.3.2).

7.5.2 Info window

When setting-up a new print job, the input masks to enable definition of job-specific settings and the control elements for fine positioning of the marking lines and frames appear in the info window.

During print defect detection the defect detection results are displayed.

7.5.3 Tool bar

The tool bar includes all control elements (*buttons*), needed to control the operation of the print defect detection system. Buttons for operations that are currently unavailable are grayed out.

See chapter	Function	Control element	Function	See chapter
7.13.1	Open system status window →	 	← Call up system settings	10.2
7.10.2	Open job memory →	 	← Set up job (Job Setup)	7.8.2
8.3	Call up job report →	 	← Operator login/logoff	7.6
7.11.1	Activate Automatic Mode →	 	← Activate <i>Inspection Mode / View Only Mode</i>	7.11.2, 7.11.4
7.11.3	Activate Defect History Mode →	 	← Teach-in defect (Re-Master Function)	7.11.1.4
			← Stop current operation	7.12
		- Logged User - printer 1	← Display of the logged in user	7.6.1
		- Actual display - Live image	← Display of the active display mode	7.11.2.2, 7.11.3.2
		Job name JOB 01 - 22	← Display of the job name	—
9.4	Display of - repeat length deviation - measured repeat length →	Dev.: -0.57 mm  Repeat: 499.5 mm Webshift: 0.0 mm	← Display of the web shift across web running direction	7.11.1.9
7.7.2.1	Set maximum magnification (Quick Zoom in) →	 	← Set minimum magnification (Quick Zoom out)	7.7.2.1
7.7.2.2	Increase magnification (Zoom in) →	 	← Reduce magnification (Zoom out)	7.7.2.2
			← Toggle display mode	7.11.1.2, 7.11.2.2, 7.11.3.2
		200 m/min	← Display of the current web speed	7.11.1.9

7.6 User administration

Every user who would like to work with the system has to login before.

Exception: With activated *Auto Login Function*, a pre-set user is automatically logged in when the system is started each time. The *Auto Login Function* is described in chapter 10.5.2.

If no user is logged in, all buttons in the tool bar of the main screen are deactivated. The buttons are grayed out.



Only users can login for whom the administrator of the system has previously created a corresponding user name and a password (see chapter 10.8.3). Each user change (login and logout) is recorded in the job report.

7.6.1 Login

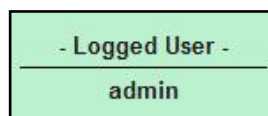
Procedure:

1.  Press the adjoining button in the tool bar. The following window appears in the display window (here with opened option list *User name*):



The image shows a 'Login' dialog box with a dark background. It contains two input fields: 'User name:' and 'Password:'. The 'User name' field has a dropdown menu open, showing a list of options: 'admin', 'admin', 'tech', and 'user'. The 'Password' field contains the text 'tech'. At the bottom of the dialog, there are two buttons: 'Login' and 'Cancel'.

2. Open option list **User name** and tap the desired user name in the list of available user names.
The list is closed and the selected user name appears in the editing box.
3. Tap on the editing box **Password** and enter password via the on-screen keyboard.
4.  Press **Login** button.
The login process is completed.



The image shows a green rectangular status bar with a black border. It contains the text '- Logged User -' in black, and below it, the username 'admin' in black.

The username of the logged in user appears in the display panel in the middle of the tool bar.

If an unknown username or a wrong password was entered, the following error message appears:

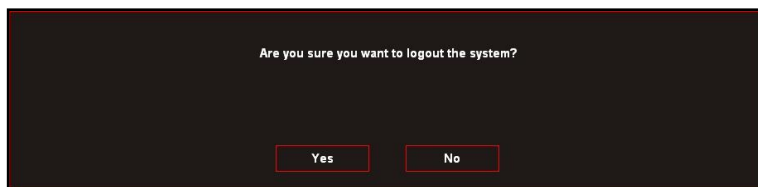
"Login failed, login data are incorrect"

Press the **OK** button to confirm the error message and repeat entry.

7.6.2 Logout

If the user has finished his work on the system or the work shall be continued by another user, the current user must logout as follows:

1.  Press the adjoining button in the tool bar.
The following message appears on the screen:



“Are you sure you want to logout the system?”

2. Press the **Yes** button in the window.
The last user is logged out.
All buttons in the tool bar are deactivated.

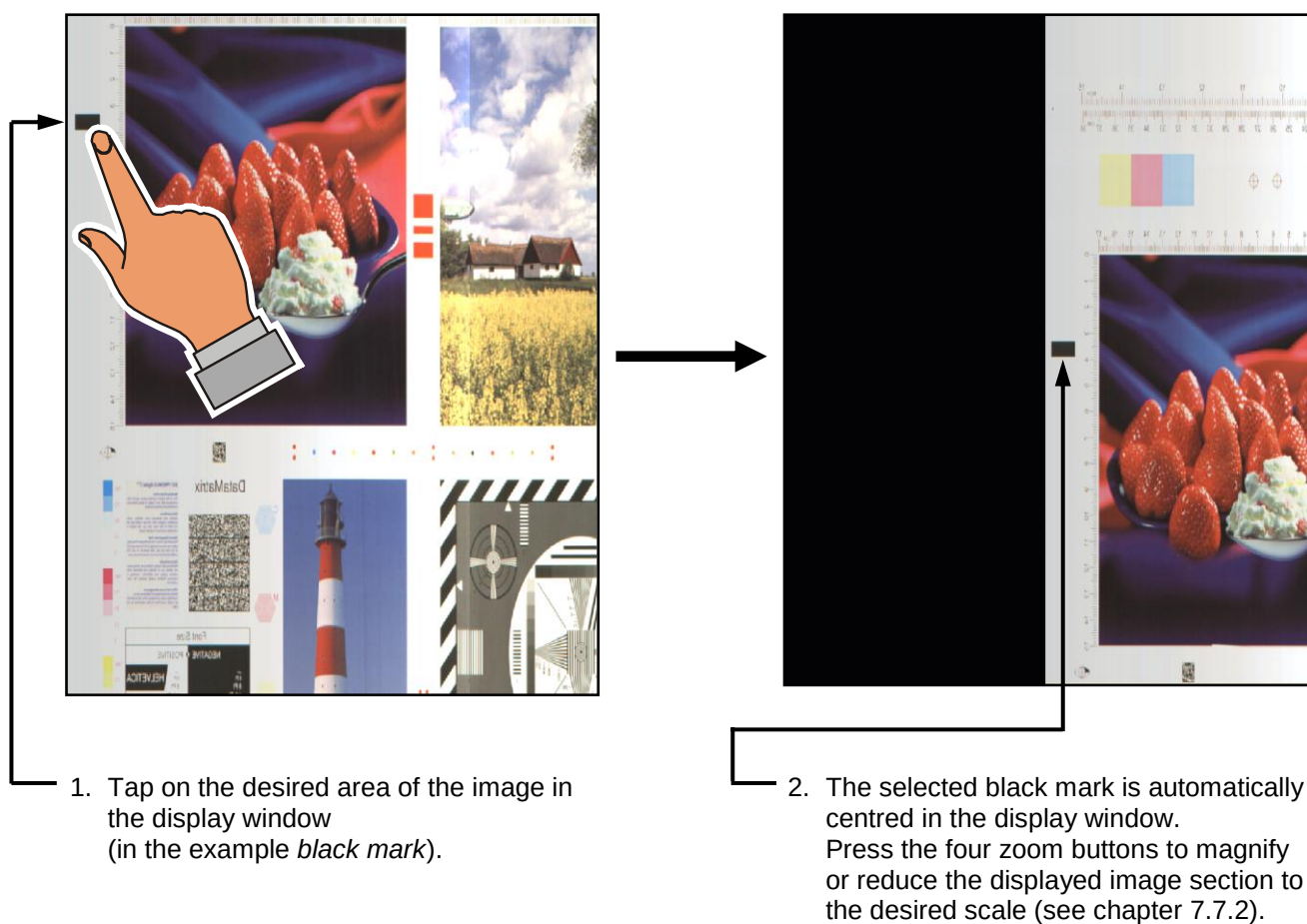
7.7 Image navigation and zoom setting

7.7.1 One-touch image navigation

The one-touch image navigation enables comfortable navigation within the image shown in the display window.



One-touch image navigation is only available in steps 2 (*Illumination*) and 3 (*Capture Golden*) of the setup process (Job Setup) as well as in Inspection Mode and in View Only Mode.



7.7.2 Magnification setting (Zoom)



The four **zoom buttons** in the tool bar are used to magnify or reduce the image section in the display window (magnifying function).



The four zoom buttons are only active in steps 2 (*Illumination*) and 3 (*Capture Golden*) of the setup process (Job Setup) as well as in Inspection Mode and in View Only Mode. Inactive zoom buttons are grayed out.

7.7.2.1 Quick Zoom

The two upper **Quick Zoom buttons** allow to adjust the following zoom settings with just a single button-press.



Zoom max.: Maximum magnification



Zoom min.: Minimum magnification

7.7.2.2 Magnification setting (Zoom)

Magnification is adjusted between minimum and maximum values using the two lower **zoom buttons**.



Zoom in: A smaller image section is shown in the display window, i.e. more detail can be seen.



Zoom out: A larger image section is shown in the display window, i.e. less detail can be seen.



Magnification factors > 1 are achieved using the system digital zoom, which provides an up to 10-times electronic magnification of the captured image.

7.8 Job Setup

7.8.1 General

The standard procedure for setting up a job (*Job Setup*) offers the complete functional scope for setting up a new print job.

The setup procedure is divided into seven steps, which must be sequentially implemented by the operator. The settings of the currently loaded job are changed in the seven steps of the Job Setup. If another job is to be edited, then it must first be loaded.



To setup a new job, we recommend loading of an existing job that is similar to the job to be set up. Afterwards the job settings can be adjusted in the seven steps of the Job Setup (see chapters 7.8.5 to 7.8.11).



For the fast setup of uncomplicated print jobs, we recommend using the *Fast Job Setup* (see chapter 7.9).

7.8.2 Open Job Setup

Condition:

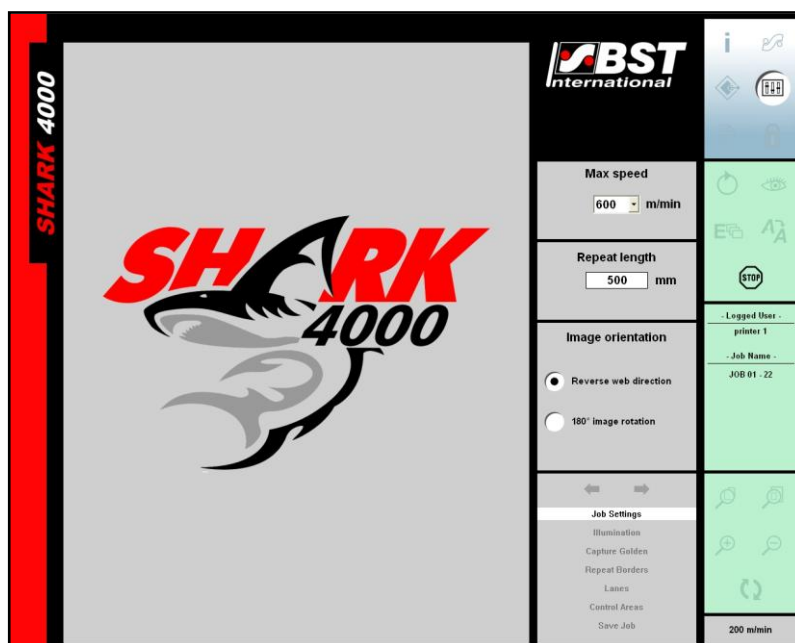
- Print defect detection is stopped.

Procedure:

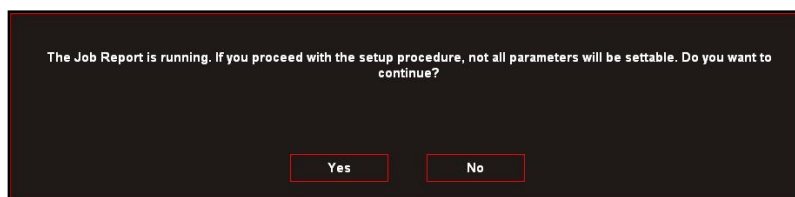


Press the **Job Setup** button in the tool bar for at least a half a second.

The Standard Job Setup dialogue for setting up a new job or changing the currently loaded job appears in the info window.



If the Job Setup is started while the job report recording is running (see chapter 8.5), the following window appears on the screen:



"The Job Report is running. If you proceed with the setup procedure, not all parameters will be settable. Do you want to continue?"

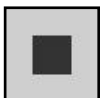
Continue Job Setup:

-  Press the **Yes** button in the window. The Job Setup dialogue appears in the info window.



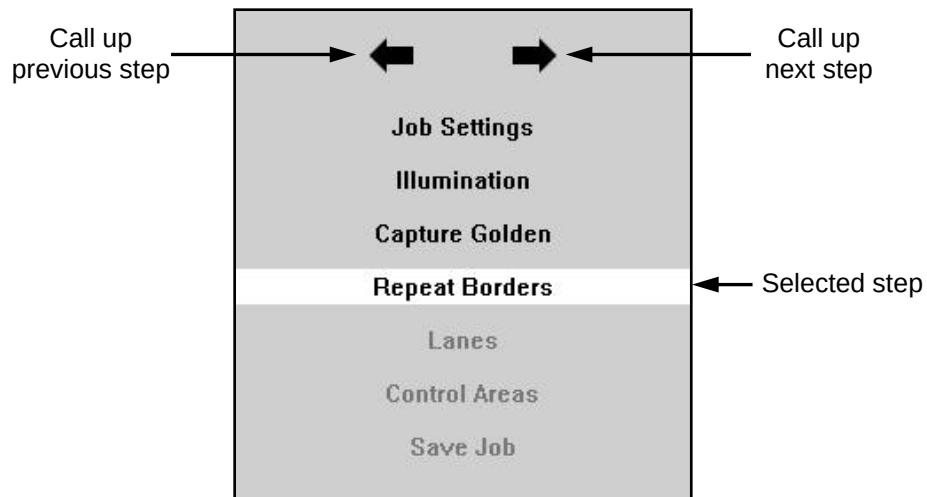
If all parameters are able to be changed in the Job Setup menu, the job report recording must be ended before starting the Job Setup as described below.

Stop report recording:

-  Press the **No** button in the window. The display changes to the main screen.
-  Press the **Job Report** button in the tool bar. The job report menu is opened in the info window (see chapter 8.3).
-  Press the **Stop Report** button in the info window. The report recording is stopped (see chapter 8.9).
-  Press the **OK** button in the info window. The job report menu will be closed (see chapter 8.4). The display changes to the main screen.
-  Press the **Job Setup** button in the tool bar. The Job Setup dialogue appears in the info window.

7.8.3 Job Setup Wizard

The Job Setup Wizard in the lower part of the info window guides the operator through the seven steps of the Job Setup.



Navigation through the individual steps of the Job Setup takes place using the two arrow keys on the upper edge of the Job Setup Wizard.



By pressing the **right** arrow key the operator accesses the next step of the Job Setup.



By pressing the **left** arrow key the operator returns to the previous step of the Job Setup.

The field of the selected step is highlighted by a white background.

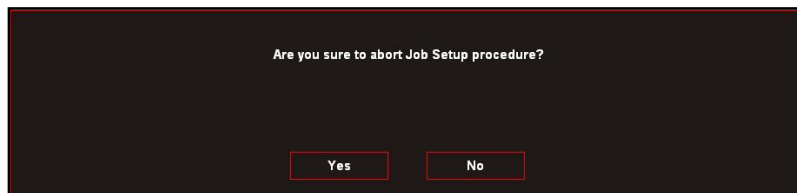
The names of the steps of the Job Setup, which were already called up by the operator, are represented in black letters. These steps can be called up again by tapping the corresponding field in the Job Setup Wizard.

The seven steps of the Job Setup are described in detail in chapters 7.8.5 to 7.8.11.

7.8.4 Abort Job Setup



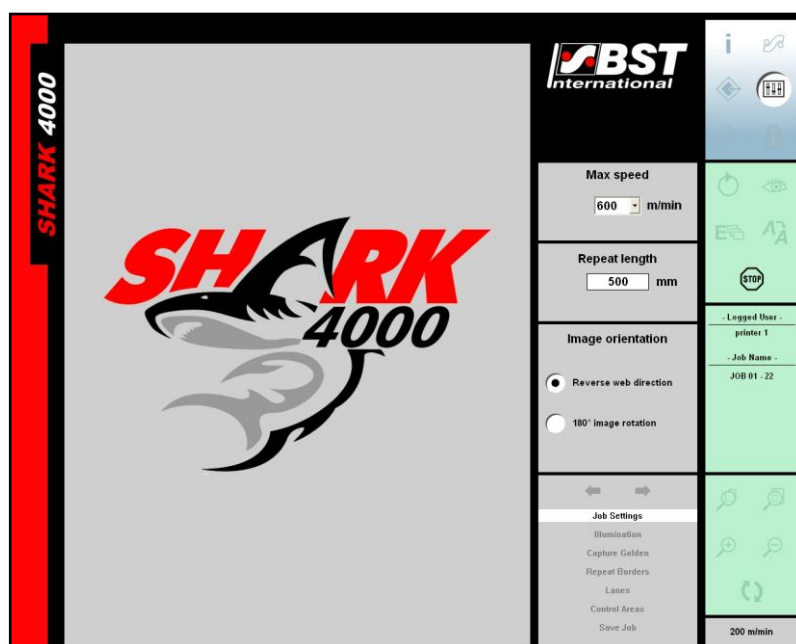
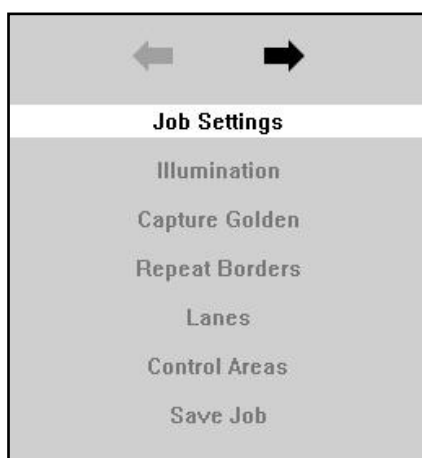
The process for setting up a new job (*Job Setup*) can be aborted any time by pressing the **STOP** button in the tool bar. The following message appears on the screen:



"Are you sure to abort Job Setup procedure?"

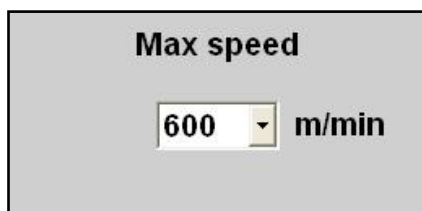
- Press the **Yes** button in the window.
The display changes to the main screen.

7.8.5 Step 1: Set Job Settings



The job specific parameters are set via the corresponding editing boxes and checkboxes in the info window in the first step of the Job Setup.

7.8.5.1 Maximum web speed



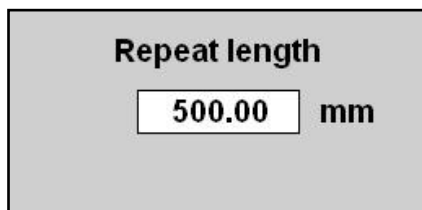
The maximum web speed (production speed) determines the resolution of the print defect detection in web running direction (Y direction). The higher the maximum web speed, the lower the resolution and with it the print defect detection quality.

Adjustment range: 300, 350, 400, 450, 500, 550, 600



When the actual web speed exceeds the displayed maximum web speed during defect detection or capturing of the reference image, print defect detection is no longer possible. A corresponding error message appears in the info window.

7.8.5.2 Repeat length



The web length that is printed for each rotation of the impression cylinder. The repeat length corresponds to the circumference of the impression cylinder.

The repeat length is automatically determined by the system from the print image and displayed in the **Repeat Length** editing box. The repeat length displayed can be overwritten by entering a new value in the editing box.



The adjustable maximum repeat length depends on the selected maximum web speed (see chapter 7.8.5.1).



If the actual repeat length is below the given value for the minimum repeat length, the system automatically brings together several repeats into one single repeat (see chapters 4.3.2 and 4.3.3).

Example:

Problem:

The length of the repeat to be inspected is **550 mm**.

Print defect detection shall be carried out at maximum web speed of 600 m/min.

For the repeat length this results in an adjustment range of **min. 1,000 mm to max. 4,660 mm** (see chapters 4.3.2 and 4.3.3). The length of the repeat to be inspected (550 mm) therefore is below the adjustable minimum value (1,000 mm) for the repeat length!

Solution:

Two repeats each with a length of 550 mm are joined together in a single repeat by the system.

The new repeat length is 1,100 mm now and thus is within the adjustment range.

7.8.5.3 Reverse web direction



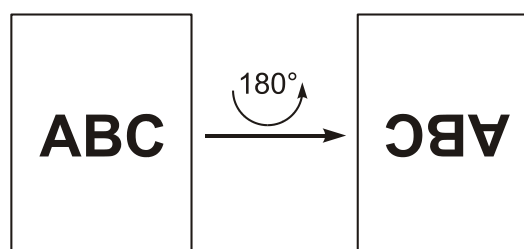
The standard web running direction in front of the camera unit is defined during system start-up in the system settings.

If the web running direction changes (e.g. when working with an alternative web threading in front of the camera unit), then the checkbox must be activated.

7.8.5.4 180° rotation



Electronic 180° rotation of the image shown in the display window.



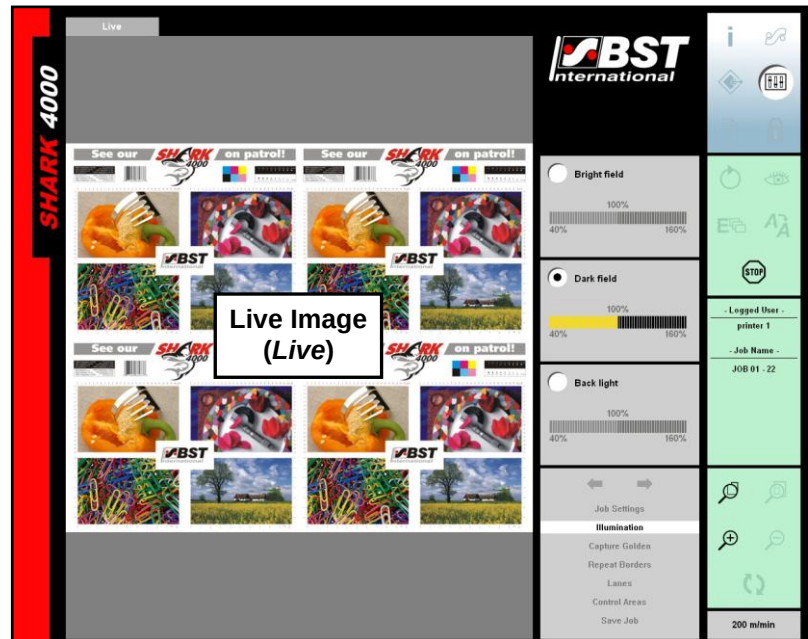
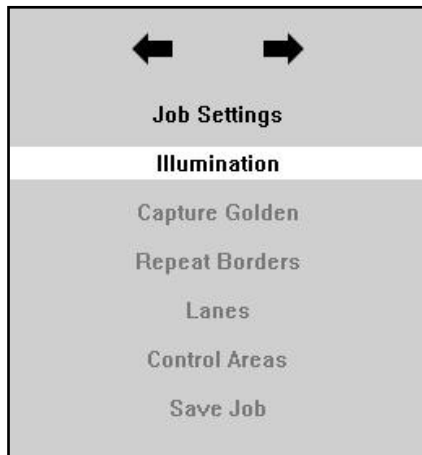
7.8.5.5 Onwards to step 2 of the Job Setup



Press the **right** arrow key in the Job Setup Wizard, to progress to the next step of the Job Setup.

The system performs a validation of settings.
If all settings are valid, the display proceeds to the next step of the Job Setup. If the system recognises invalid settings, a corresponding error message is shown in the display window.
The invalid setting has to be corrected.

7.8.6 Step 2: Set Illumination



The illumination units of the system are set up in the second step of the Job Setup.

Every camera module of the camera unit has two different illumination units (bright field illumination and dark field illumination) per default. In addition every camera module can be equipped with an optional back light illumination. The different illumination units are activated or deactivated independently of each other.

The following table shows the recommended illumination settings for the different materials.

Illumination	Material			
	opaque (e.g. paper)	reflective (e.g. metalized film)	transparent (e.g. transparent film)	translucent (e.g. semi-transparent film)
Dark field	X		X	X
Bright field		X		
Back light (option)			X	X

X = illumination unit is activated



Simultaneous activation of the bright field illumination and the optional back light illumination is not possible.



With stopped print defect detection, all illumination units of the system switch off automatically after approx. five minutes.

The automatic switch-off is responsible for saving energy and ensures a longer operating life of the illumination units.

When restarting the print defect detection, all activated illumination units are started again automatically.

The intensity of every illumination unit is adjusted separately. The individual adjustment of the illumination units enables optimum adaptation of the illumination to all sorts of materials.

After calling up the second step in the Job Setup, the system automatically records a new image. This can take several seconds. During the image capture the following message appears in the display window:

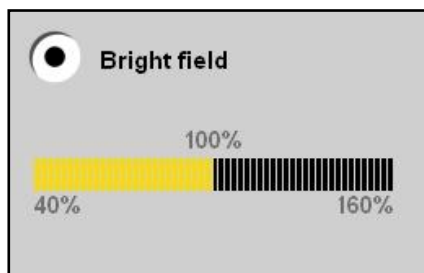
Image Acquisition started, please hold on.....

The picture of the captured live image in the display window enables the operator to observe the effects of the met illumination settings directly on the screen.

7.8.6.1 Image navigation and zoom setting

The one-touch image navigation and the four zoom buttons in the tool bar are active in this step of the Job Setup. Operation of the one-touch image navigation and zoom buttons is described in detail in chapter 7.7.

7.8.6.2 Bright field illumination



Activation and intensity setting for the bright field illumination.

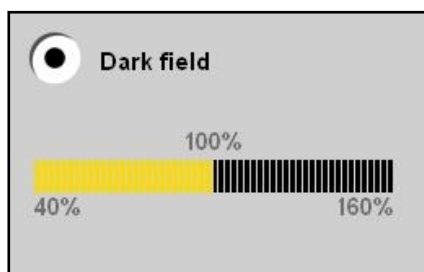
1. Tap on the checkbox to activate the bright field illumination.
2. Set the desired intensity for the bright field illumination by tapping the corresponding position on the brightness control.

Adjustment range: 40 ... 160 % (100 % = calibration value)



If bright field illumination is switched on, the optional back light illumination may not be activated!

7.8.6.3 Dark field illumination

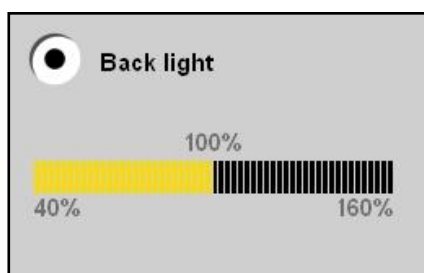


Activation and intensity setting for the dark field illumination.

1. Tap on the checkbox to activate the dark field illumination.
2. Set the desired intensity for the dark field illumination by tapping the corresponding position on the brightness control.

Adjustment range: 40 ... 160 % (100 % = calibration value)

7.8.6.4 Back light illumination (option)



Activation and intensity setting for the optional back light illumination.

1. Tap on the checkbox to activate the back light illumination.
2. Set the desired intensity for the back light illumination by tapping the corresponding position on the brightness control.

Adjustment range: 0 ... 100 % (100 % = calibration value)



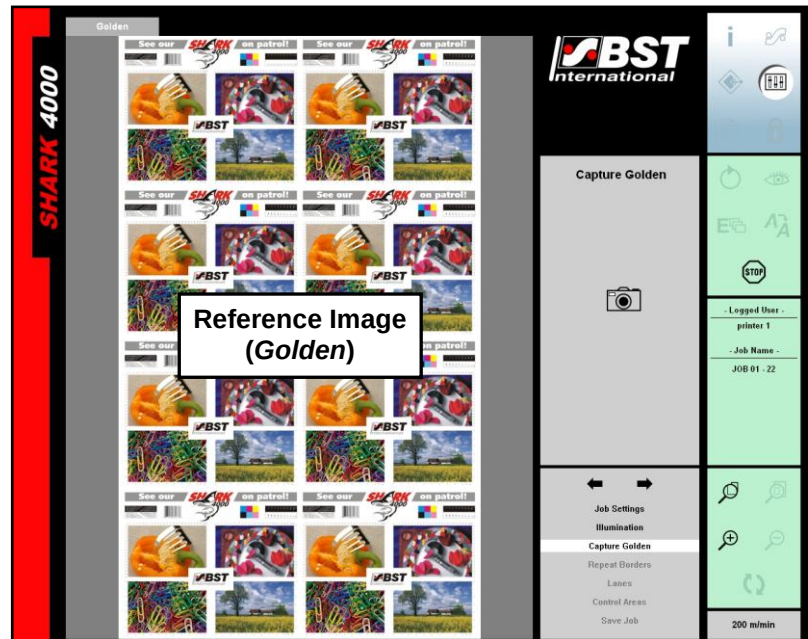
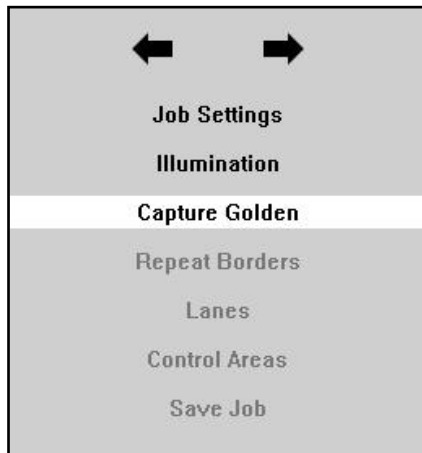
If bright field illumination is switched on, the optional back light illumination may not be activated!

7.8.6.5 Onwards to step 3 of the Job Setup



Press the **right** arrow key in the Job Setup Wizard, to progress to the next step of the Job Setup.

7.8.7 Step 3: Capture Golden



After activating this step of the Job Setup the reference image (*Golden*) for print defect detection is captured automatically. This process can take some seconds. During the image capture the following message appears in the display window:

Image Acquisition started, please hold on.....



Print defects already existing in the captured reference image will not be detected later on during print defect detection!
Therefore ensure that a defect-free repeat is recorded when capturing the reference image.

7.8.7.1 Image navigation and zoom setting

The one-touch image navigation and the four zoom buttons in the tool bar are active in this step of the Job Setup. Operation of the one-touch image navigation and zoom buttons is described in detail in chapter 7.7.

7.8.7.2 Assume reference image

If the captured reference image is to be assumed, then no further settings need be undertaken in this step of the Job Setup.



Press the **right** arrow key in the job setup wizard, to progress to the next step of the Job Setup.

7.8.7.3 Capture new reference image



As longitudinal and lateral stretching of the material web can occur during operation of the printing press depending on the web speed, it is strongly recommended to record the reference image at production speed.

If a new reference image is to be captured, the following procedure is to be followed:

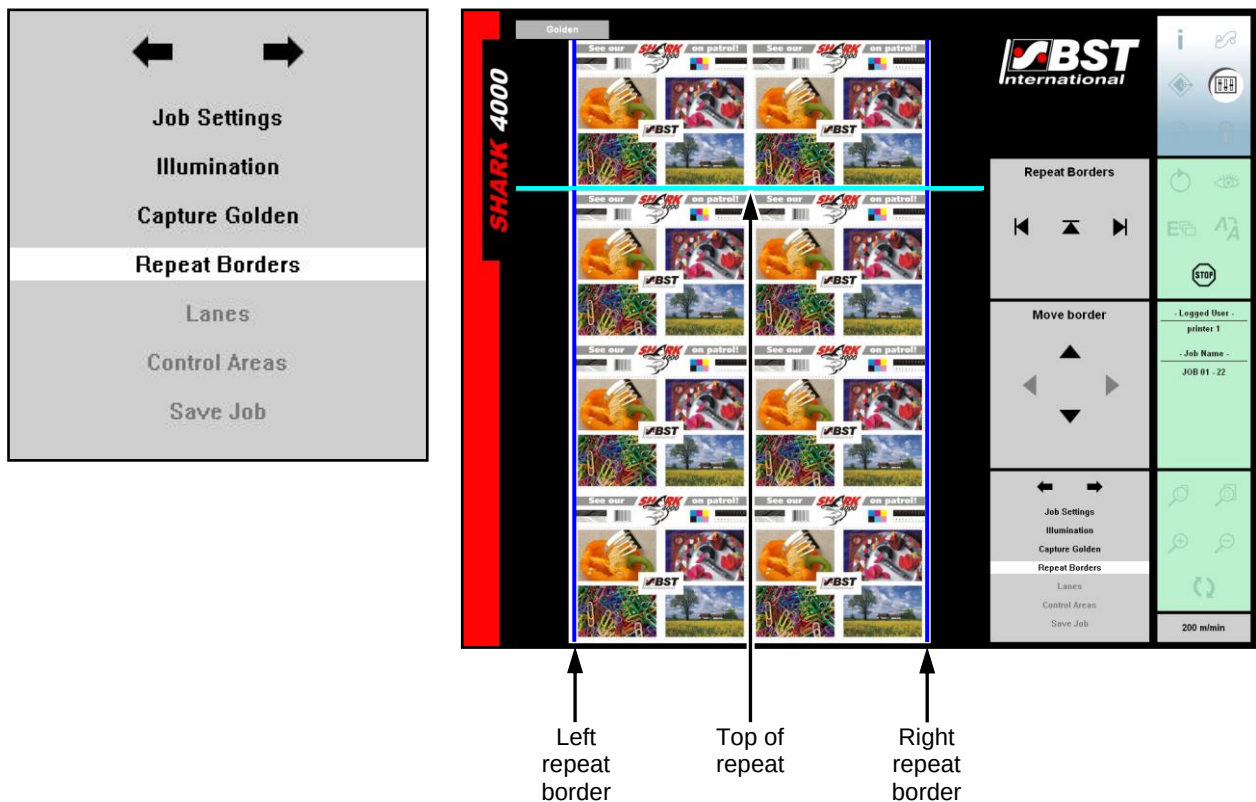


Press the **Capture Golden** button in the info window. The new reference image is captured and appears in the display window.



Press the **right** arrow key in the Job Setup Wizard, to progress to the next step of the Job Setup.

7.8.8 Step 4: Set Repeat Borders



The repeat borders (top of repeat, left and right repeat border) are defined in the fourth step of the Job Setup. In subsequent steps of the Job Setup only the area of the printed pattern, which is within the defined repeat borders, appears in the display window.

The repeat borders are marked by blue lines in the display window. The selected borderline is highlighted in cyan. The repeat borders can be moved by touching the desired new position on the touch screen or using the arrow keys in the info window.

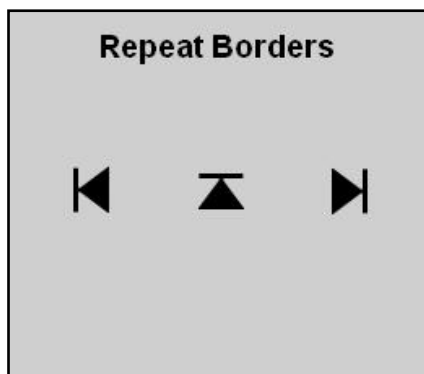
For saved jobs (repeat jobs) the system adopts the saved repeat borders. The operator can accept the saved borders or modify the border positions as described in chapter 7.8.8.2.

7.8.8.1 Image navigation and zoom setting

The one-touch image navigation and the four zoom buttons in the tool bar are not active in this step of the Job Setup.

7.8.8.2 Set repeat borders

The position of the repeat borders can be set using the buttons in the info window as follows:



1. Select the desired repeat border by pressing the appropriate button in the upper part of the info window.



Left repeat border



Upper repeat border (top of repeat)

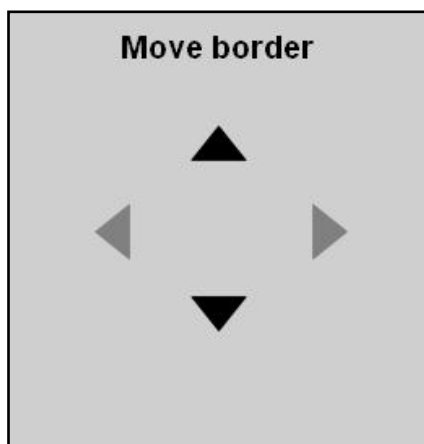


Right repeat border

The system enters edit mode.

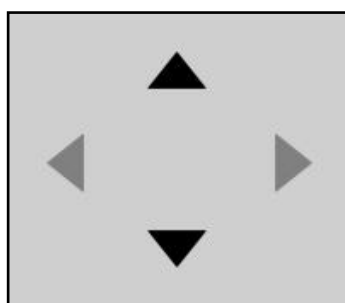
The selected borderline is highlighted in cyan.

2. Carry out **coarse positioning** of the selected repeat border. Move the cyan line to the desired position by touching the touch screen. The cyan line follows the touch movement of the finger on the touch screen.

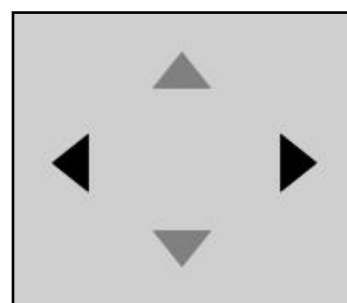


3. Carry out **fine positioning** of the selected repeat border. To do this, move the cyan line in the desired direction by pressing the appropriate arrow button in the info window.

If the upper repeat border (top of repeat) is selected, the two vertical arrow keys are active.



If the left or right repeat border is selected, the two horizontal arrow keys are active.

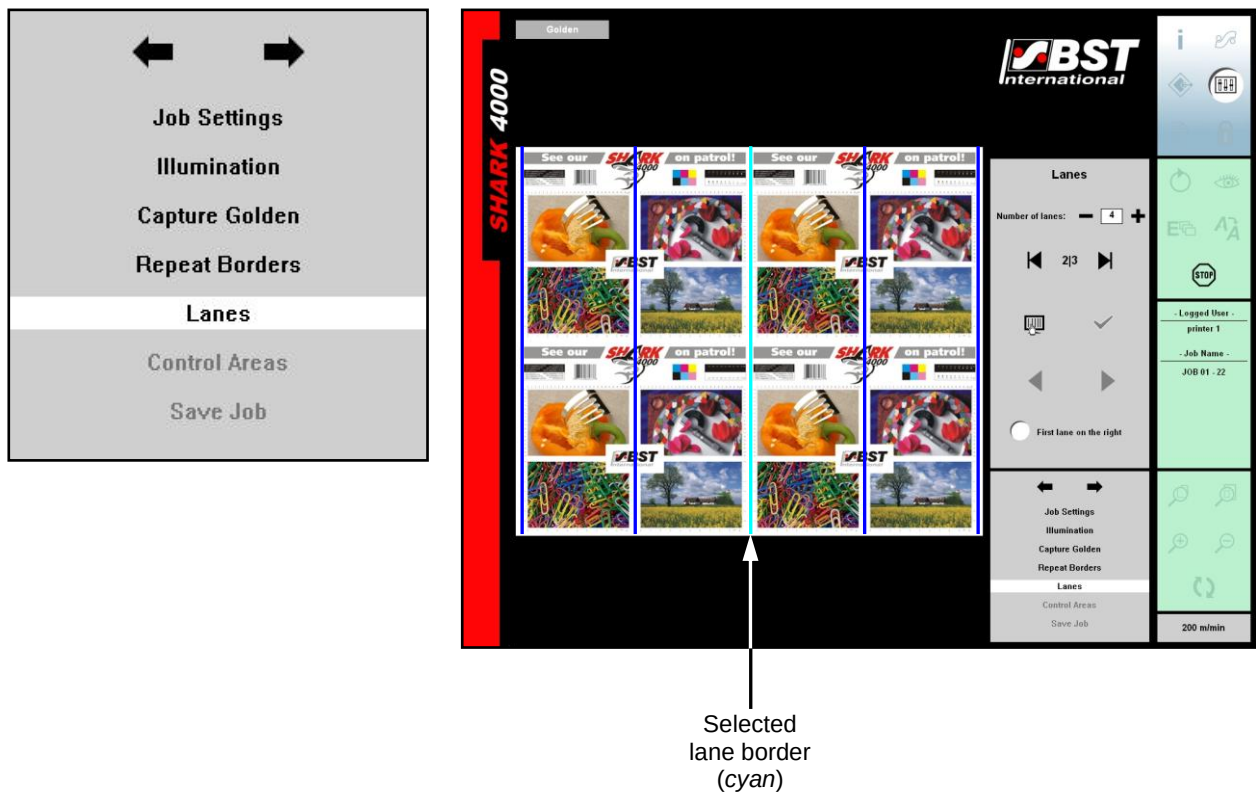


7.8.8.3 Onwards to step 5 of the Job Setup



Press the **right** arrow key in the Job Setup Wizard, to progress to the next step of the Job Setup.

7.8.9 Step 5: Set Lanes



The repeat can be divided into several lanes in the fifth step of the Job Setup. Subdividing wide webs in lanes makes it easier to find detected print defects within the repeat.

After calling up step 5 of the Job Setup, a complete repeat appears in the display window. Vertical blue lines mark the borders between the individual lanes. The lane border selected is represented in cyan.

7.8.9.1 Image navigation and zoom setting

The one-touch image navigation and the four zoom buttons in the tool bar are not active in this step of the Job Setup.

7.8.9.2 Set lanes



The number and the position of the lanes is defined as follows with the help of the editing box and the buttons in the info window:

1. Set number of lanes

- Enter the desired number of lanes into the **Number of lanes** editing box.



Adjustment range: 1 ... 30

If a new value is entered into the **Number of lanes** editing box, the system automatically divides the repeat into the corresponding number of lanes with identical width. Then, the position of the individual lane borders can be modified manually (see point 3 to 6).

2. Define numbering direction of the lanes

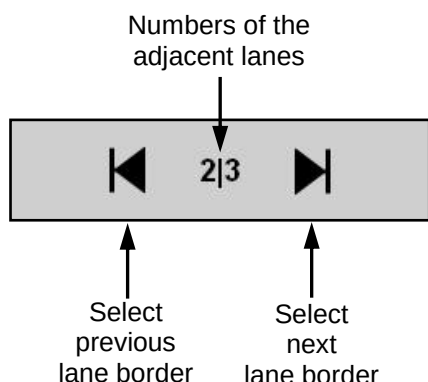
- Set the desired numbering direction by activation/deactivation of the **First lane on the right** checkbox.



Lane 1	Lane 2	Lane 3	Lane 4



Lane 4	Lane 3	Lane 2	Lane 1



3. Select lane border

- Use the two arrow keys in the upper part of the info window to select the desired lane border.

or

- Tap the desired lane border in the display window.

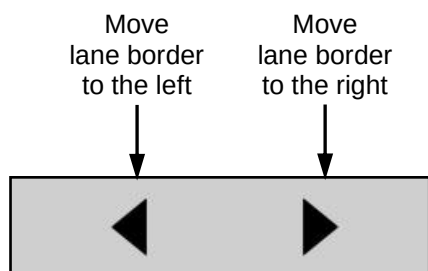
The selected lane border is highlighted in cyan.
The display field between the two arrow keys shows the numbers of the two lanes, which are adjacent to the selected lane border.

4. Enter edit mode

-  Press the **Edit** button in the info window.
The system enters edit mode.
The selected lane border is highlighted in red in the display window and the two lower arrow keys in the info window are activated.

5. Change position of the selected lane border

- Carry out **coarse positioning** of the selected lane border in the display window.
Move the red line to the desired position by touching the touch screen. The red line follows the touch movement of the finger on the touch screen.
- Carry out **fine positioning** of the selected lane border.
To do this, move the red line in the desired direction by pressing the appropriate arrow key in the info window.



6. Terminate edit mode

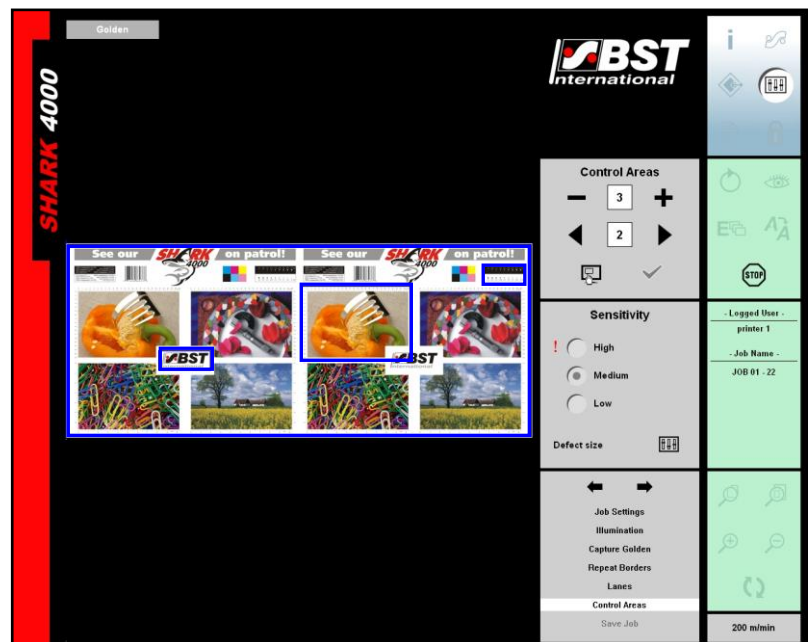
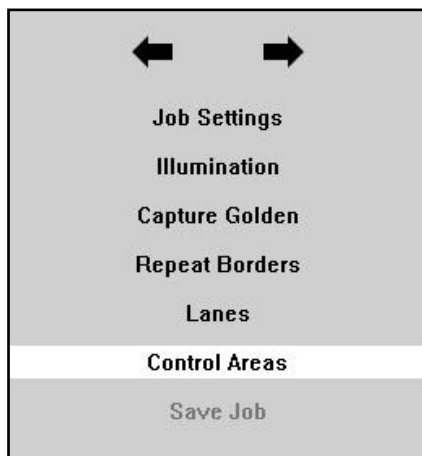
-  Press the **OK** button in the info window.
The edit mode is terminated.
The current positions of the lane borders are saved.

7.8.9.3 Onwards to step 6 of the Job Setup



Press the **right** arrow key in the Job Setup Wizard, to progress to the next step of the Job Setup.

7.8.10 Step 6: Set Control Areas



The control areas for print defect detection are defined in the sixth step of the Job Setup.

Using the control areas, the operator defines the areas of the repeat that will be checked for defects.

Defect detection sensitivity can be set separately for each control area at one of three levels. This allows inspection of particularly critical print areas with higher sensitivity.

Control areas are marked by coloured outlines in the display window.

Colour of the outline	Significance
blue	Defined control area
cyan	Selected control area
red	Control area being processed (edit mode)

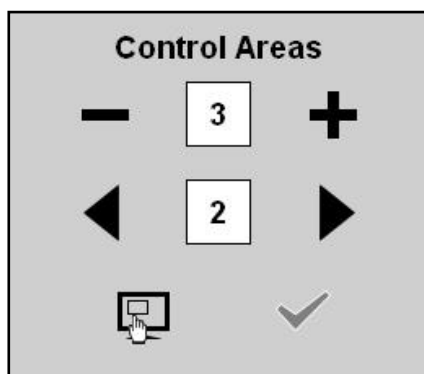
After calling step 6 of the Job Setup, a single repeat appears in the display window.

7.8.10.1 Image navigation and zoom setting

The one-touch image navigation and the four zoom buttons in the tool bar are not active in this step of the Job Setup.

7.8.10.2 Add control area

This chapter describes the procedure for adding a new control area.



1. Enter edit mode



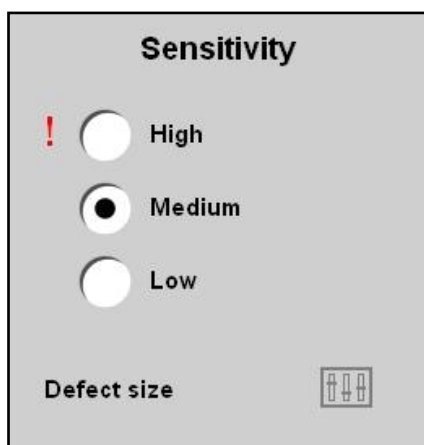
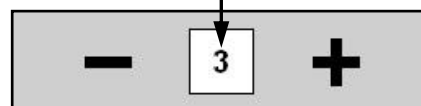
Press the **Plus** button in the upper part of the info window. The system enters edit mode.

A red frame appears in the display window marking the new control area.

The three checkboxes for the sensitivity adjustment in the middle part of the info window get active.

The total number of defined control areas is shown in the display field between the plus and the minus buttons.

Total number
of defined
control areas



2. Set sensitivity of the new control area

- Select the desired defect detection sensitivity in the new control area by activating the appropriate checkbox in the middle part of the info window.

The separate three level sensitivity setting (*high*, *medium*, *low*) for each individual control area enables inspection of particularly critical print pattern areas with a higher sensitivity.



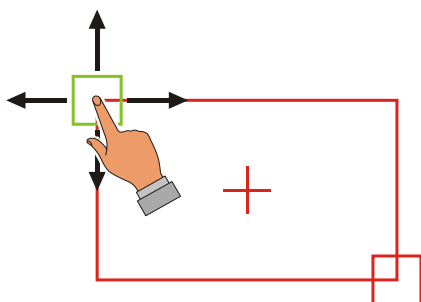
If control areas overlap, high defect sensitivity takes precedence over low defect sensitivity.



A red exclamation point in front of a checkbox signals that for this sensitivity level one of the base settings for defect detection (size, contrast) was corrected by the system automatically to the optimum value. An automatic correction occurs if the pre-set sensitivity level for the currently selected maximum web speed is outside the given limits.



- Press the **Defect size** button.
A window opens up in which the base settings of the print defect detection for the three sensitivity levels can be displayed (see chapter 7.8.10.5).

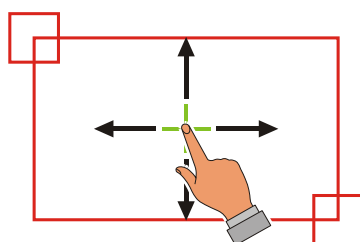


3. Change size of the new control area

- Touch the vertex (small red square) of the outline on the touch screen.
The colour of the square changes from red to green.
- Move the vertex to the desired position.



Moving a vertex beyond the borders of the display window is not possible.



4. Change position of the new control area

- Touch the red cross in the centre of the marked control area on the touch screen.
The colour of the cross changes from red to green.
- Move the control area to the desired position.

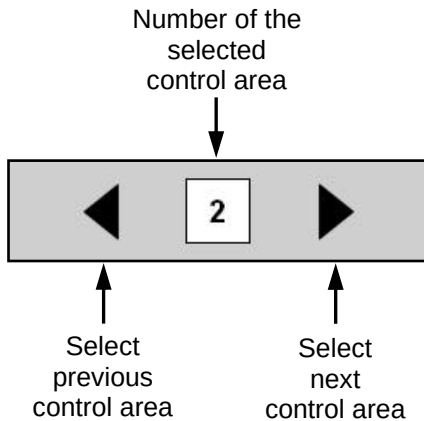


Moving a selected control area beyond the borders of the display window is not possible.

5. Adopt the new control area

-  Press the **OK** button in the upper part of the info window. The marked control area is imported.
The colour of the outline changes from red to cyan.
The edit mode is terminated.

7.8.10.3 Change control area



This chapter describes the procedure for changing the properties of an existing control area.

1. Select control area

- Use the two **arrow keys** in the upper part of the info window to select the control area to be modified.

The selected control area is marked by a cyan outline in the display window. The display field between the two arrow keys shows the number of the selected control area.

2. Enter edit mode

-  Press **Edit** button in the upper part of the info window. The system enters edit mode. The outline of the selected control area is highlighted in red.

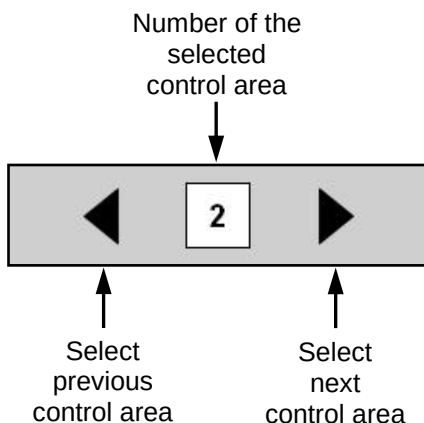
3. Modify properties of the control area

- Modify properties of the control area (defect sensitivity, size, position). See chapter 7.8.10.2.

4. Terminate edit mode

-  Press the **OK** button in the upper part of the info window. The edit mode is terminated. The colour of the outline changes from red to cyan. The modifications are saved.

7.8.10.4 Remove control area



This chapter describes the procedure for removing an existing control area.

1. Select control area

- Use the two **arrow keys** in the upper part of the info window to select the control area to be removed.

The selected control area is marked by a cyan outline in the display window. The display field between the two arrow keys shows the number of the selected control area.



If the selected control area would not be entirely visible in the display window, the system automatically moves the image so that the control area is shown in the center of the display window.

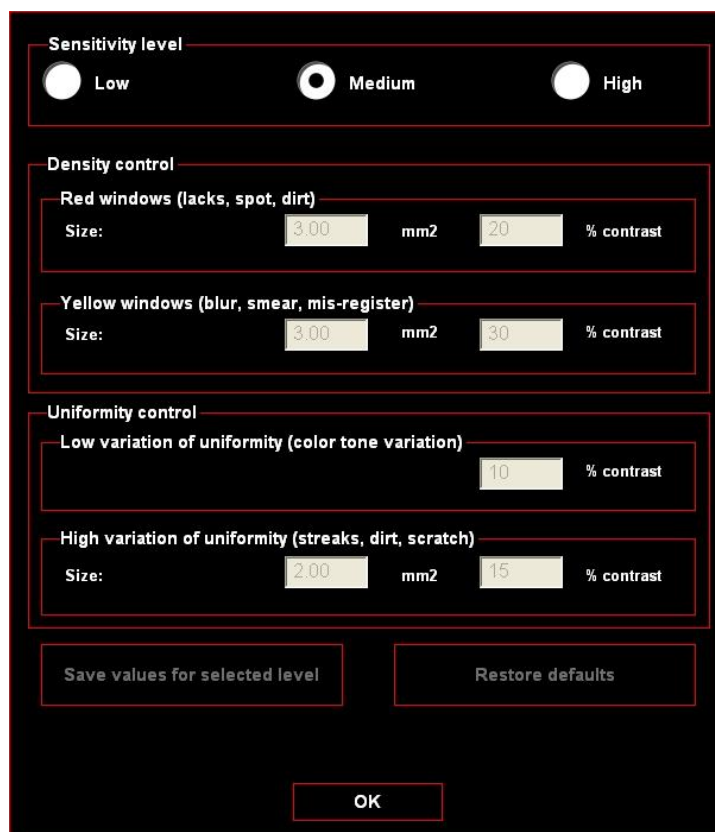
2. Remove control area

-  Press the **Minus** button in the upper part of the info window. The selected control area is removed.

7.8.10.5 Display the base settings of the print defect detection



- Press the **Defect size** button in the info window.
The following window is opened:



The window displays the following settings:

- Sensitivity level:** Three radio buttons for Low, Medium (selected), and High.
- Density control:**
 - Red windows (lacks, spot, dirt):** Size: 3.00 mm2, 20 % contrast.
 - Yellow windows (blur, smear, mis-register):** Size: 3.00 mm2, 30 % contrast.
- Uniformity control:**
 - Low variation of uniformity (color tone variation):** 10 % contrast.
 - High variation of uniformity (streaks, dirt, scratch):** Size: 2.00 mm2, 15 % contrast.
- Buttons:** Save values for selected level, Restore defaults, and OK.

- Select the desired sensitivity level by activating the appropriate checkbox (*low, medium, high*) in the upper part of the window.

In the editing boxes the current base settings of the print defect detection are displayed for the various defect types. The meaning of the editing boxes is described on the following pages.



The values in the editing boxes can only be changed by users of the type **Administrator** or **Technician**.



When setting up a new job the system takes up the base settings of the previously loaded job.
If the value for the maximum web speed was changed in step 1 of the Job Setup (see chapter 7.8.5.1, the system automatically uses the optimal base settings for the new web speed which are stored in the system.
The values in the editing boxes are suitably adjusted.

Meaning of the editing boxes:

Size:	3.00	mm2	20	% contrast
-------	-----------------------------------	-----	---------------------------------	------------

Size

Minimum defect size.

The system only detects print defects whose size is above the set value.

The smaller the value is set, the more sensitively the print defect detection reacts.

Contrast

Sensitivity of the system to color tone variations.

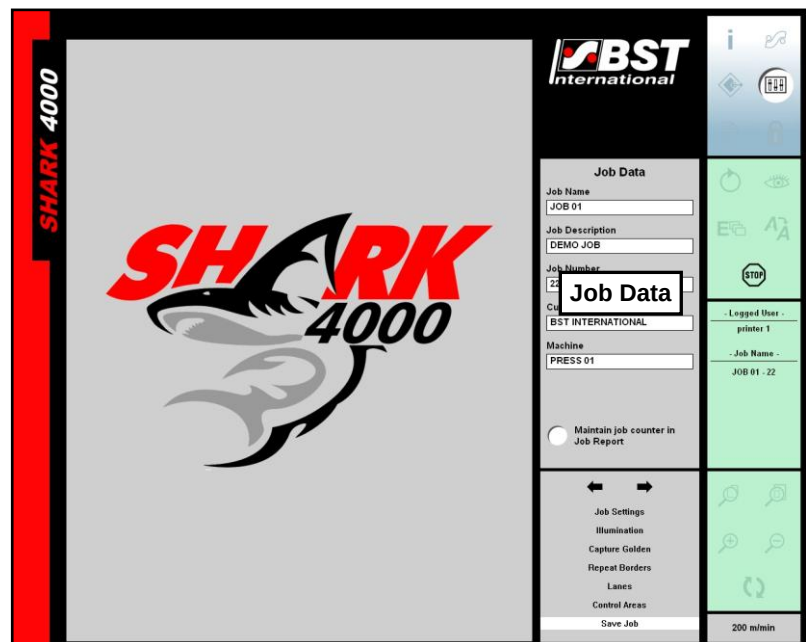
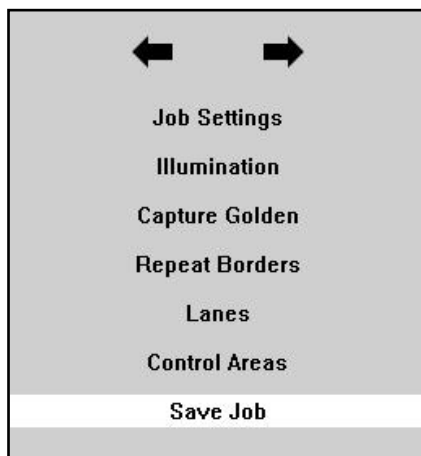
The smaller the value is set, the more sensitively the print defect detection reacts to color tone variations.

7.8.10.6 Onwards to step 7
of the Job Setup



After all the control areas have been defined as described above, press the **right** arrow key in the Job Setup Wizard, to progress to the next step of the Job Setup.

7.8.11 Step 7: Save Job



The job data (*job name, job description, job number, customer, machine*) are entered in the seventh step of the Job Setup. Afterwards the job with all the relevant settings (reference image, control areas, sensitivities, job data) is saved.

7.8.11.1 Enter job data

The job data must be entered first into the editing boxes in the info window before saving the job.

After calling step 7 of the Job Setup the management data of the job, which was loaded at the start of the Job Setup, appears in the editing boxes.

The meaning of the individual editing boxes is described on the following page.

Job Name JOB 01
--

Job Name

Name, under which the new job is to be saved.



This editing box must be filled in without fail because the system uses the entered job name as part of the file name for saving the job.

Job Description DEMO JOB

Job Description

Short description of the new job (job-related remarks).

Job Number 22
--

Job Number

Number of the new job.



This editing box must be filled in without fail because the system uses the entered job number as part of the file name for saving the job.

Customer BST INTERNATIONAL

Customer

Name of the customer, for whom the job is being produced.

Machine PRESS 01

Machine

Name of the machine used for the production of the new job.

7.8.11.2 Maintain job counter in Job Report

☒ Maintain job counter in Job Report

If the checkbox is activated, the system automatically takes up the current counter values (printed reel meters) for the running job when starting the report recording.



If the Job Setup is started while the job report recording is running (see chapter 8.5), the checkbox is always activated. The setting cannot be changed. After ending the Job Setup and a subsequent restart of the print defect detection the running report will be automatically continued.

7.8.11.3 Save job



Press the **right** arrow key in the job setup wizard.

The system begins data analysis.

The grey bar of the status indicator in the lower part of the display window shows the progress of the data analysis.



After the process is completed, the job is saved.

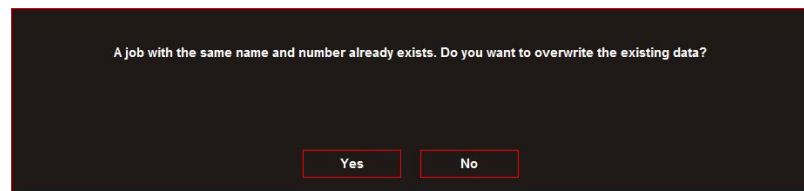
Job Setup is now complete.

The main screen of the user interface appears.

Print defect detection in *Automatic Mode* is started automatically.



If a job already exists in the system job memory with the entered job name or job number, the following message appears:

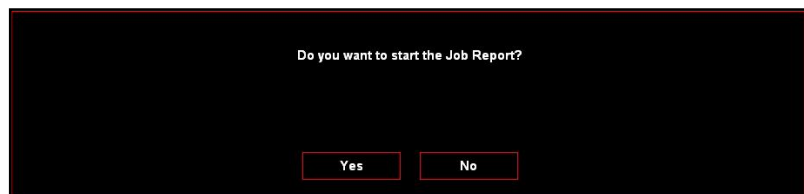


*"A job with the same name and number already exists.
Do you want to overwrite the existing data?"*

- If the existing job is to be overwritten by the current job, press the **Yes** button.
- If the current job is to be saved under another job name, press the **No** button and enter a new name in the **Job Name** editing box.



If the *Automatic start of Job Report at the end of Job Setup* function is activated in the system settings, the following message appears:



"Do you want to start the Job Report?"

- Press the **OK** button to start the *Job Report* function.

7.9 Fast Job Setup

7.9.1 General

This version of the Job Setup reduces the setup times for printing jobs. Only the most frequently used setup functions are available in Fast Job Setup. All settings are carried out in one menu, thus saving time.

When using the Fast Job Setup, the system automatically determines the total repeat as the only control area for the print defect detection. The monitoring is always carried out using the medium sensitivity level.



In the Fast Job Setup several settings are specified by the system and cannot be edited (e.g. determining the control areas and sensitivity settings for print defect detection). If these settings are to be edited then a Standard Job Setup has to be carried out (see chapter 7.8).

In the following description of the *Fast Job Setup*, we expect that the operator is familiar with the operation of the *Standard Job Setup*.

7.9.2 Open Fast Job Setup

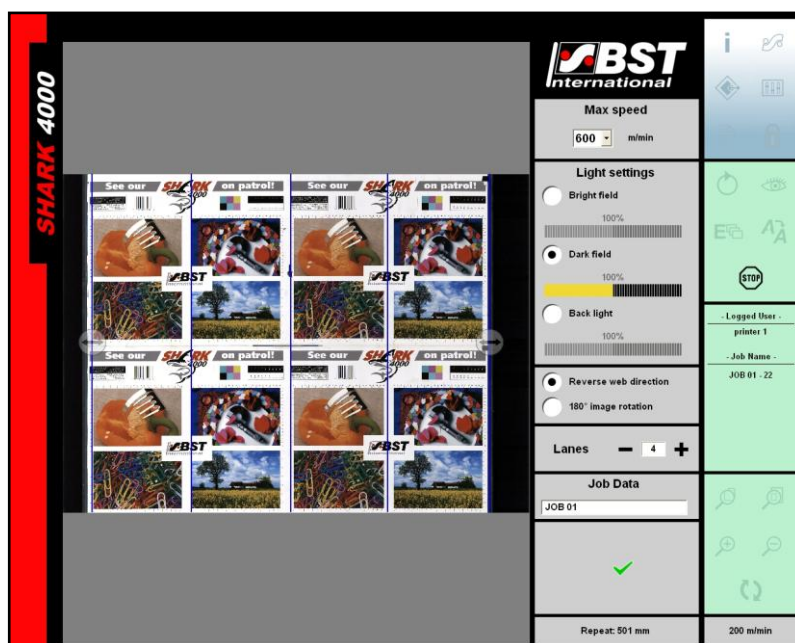
Condition:

- Print defect detection is stopped.

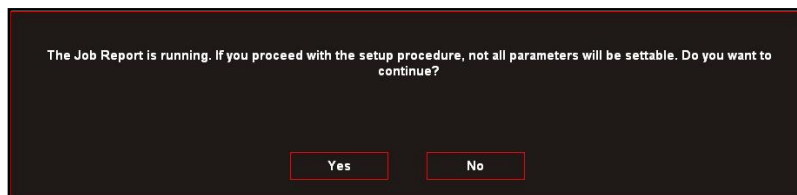
Procedure:



Press the **Job Setup** button in the tool bar briefly. The Fast Job Setup dialogue appears on the screen. When the printing press is running, the live image being recorded is represented in the display window.



If the Fast Job Setup is started while the job report recording is running (see chapter 8.5), the following window appears on the screen:



“The Job Report is running. If you proceed with the setup procedure, not all parameters will be settable. Do you want to continue?”

Continue Fast Job Setup:

-  Press the **Yes** button in the window. The Fast Job Setup dialogue appears in the info window.



If all parameters are able to be changed in the Fast Job Setup menu, the job report recording must be ended before starting the Fast Job Setup (see chapter 7.8.2).

7.9.3 Select maximum web speed

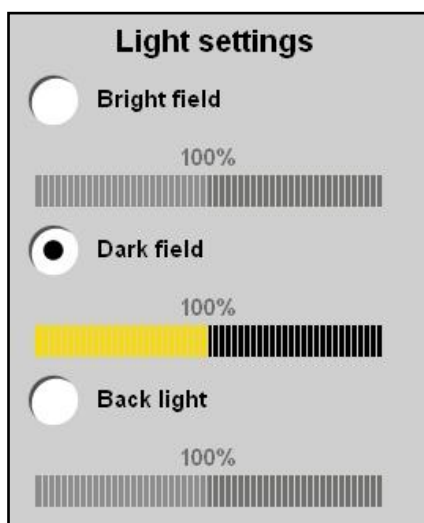


- Select the maximum web speed (production speed) from the option list.

Adjustment range: 300, 350, 400, 450, 500, 550, 600

For detailed information see chapter 7.8.5.1.

7.9.4 Set illumination



- In the **Light settings** area, activate the required illumination units (bright field illumination, dark field illumination, back light illumination) and set the desired intensity of the lighting.

For detailed information see chapter 7.8.6.2 to 7.8.6.4.

7.9.5 Set image orientation



- Where required, using the **Reverse web direction** and **180° image rotation** check boxes, set the orientation of the live image in the display window.

For detailed information see chapter 7.8.5.3 to 7.8.5.4.

7.9.6 Set number of lanes



- Enter the desired number of lanes into the **Lanes** editing box.

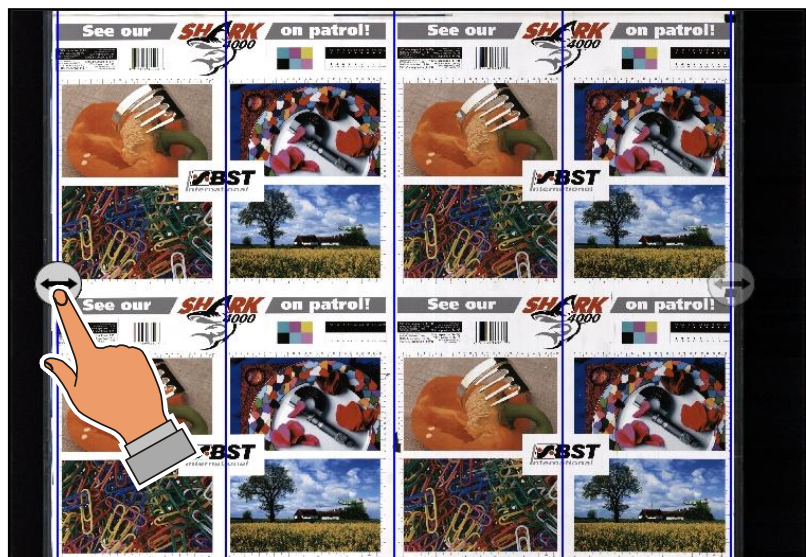
Adjustment range: 1 ... 30

If a new value is entered into the **Lanes** editing box, the system automatically divides the repeat into the corresponding number of lanes with identical width.

For detailed information see chapter 7.8.9.2.

7.9.7 Set repeat borders

Determine the left and right print repeat borders in the display window as follows:



-  Press the adjoining button on the touchscreen. The button is active.
- Move the print repeat border selected (vertical blue line) to the desired position on the touchscreen using your finger. The system automatically sub-divides the print repeat between both print repeat borders into the specified number of lanes with identical width.

7.9.8 Set top of repeat

This function enables changing the representation of the print repeat in the display window. For this purpose, the position of the top of repeat is determined manually.



The manual determination of the top of repeat does not have any influence on the print defect detection.

- Using your finger on the touchscreen, touch the point that marks the top of repeat.

7.9.9 Set repeat length

Repeat: 499 mm

The print repeat length is automatically determined by the system from the print image and displayed in the adjoining display field at the lower edge of the info window. The repeat length displayed can be overwritten manually.

- Touch the display field on the touchscreen and enter the new value for the repeat length.

7.9.10 Enter job data



In order to prevent waste, we recommend that you already enter the job data before starting the printing process when the printing press is standing still.

Job Data

JOB 01

- Touch the **Job Data** editing box.
The **Job Settings** menu appears on the screen:

Job Settings

Job Name

Job Number

Job Description

Customer

Machine

OK

Cancel

In the editing boxes the job data for the job that was loaded when starting the Fast Job Setup appear.

- Enter the desired job data into the editing boxes.
For detailed information see chapter 7.8.11.1.
- To confirm, press the **OK** button.

7.9.11 Save job

-  To save the job, press the **OK** button in the info window. After analyzing the data, print defect detection in *Automatic Mode* is started automatically.



If a job already exists in the system job memory with the entered job name or job number, this is overwritten automatically.

7.10 Job memory

The system job memory enables the saving and recalling (loading) of jobs. All jobs are saved on the system hard disk in the directory **D:\JobPath**.

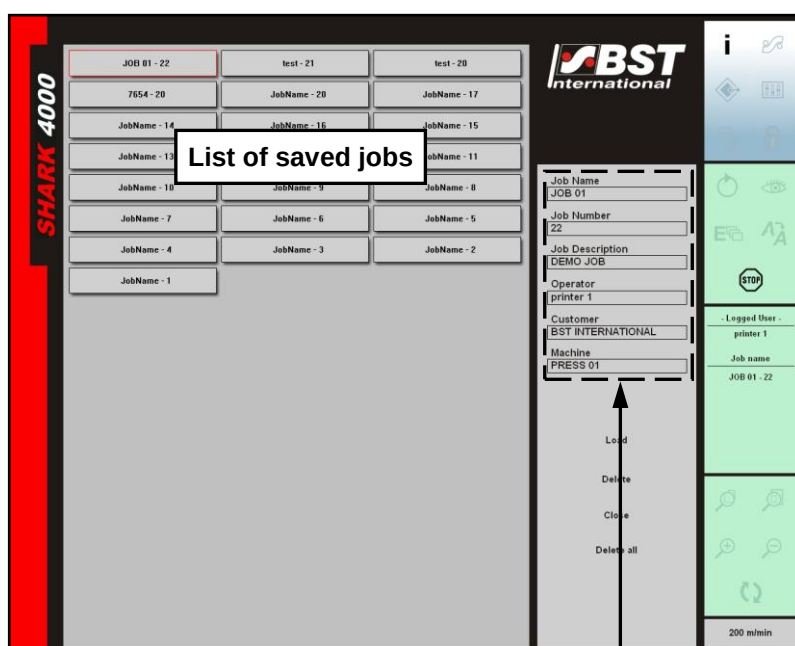
7.10.1 Save job

Saving of a new job takes place in step 7 of the Job Setup (see chapter 7.8.11.3).
For each job, all relevant settings made during setting up are saved (reference image, job data, control areas, sensitivity, ...).

7.10.2 Open job memory



Press the **Job Memory** button in the tool bar.
A list of all saved jobs appears in the display window.



7.10.3 Load job

1. Open job memory (see chapter 7.10.2).
2. Select the desired job by tapping the corresponding field in the list of saved jobs on the touch screen.
The field of the selected job is marked by a red frame in the list.
The job data of the selected job appear in the upper part of the info window.

3.  Press the **Load** button in the info window.

The selected job is loaded.
The main screen of the user interface appears.

7.10.4 Delete job

The number of jobs which can be stored depends on the capacity of the hard disk. To avoid an unnecessary seizure of storage, we recommend deleting jobs from the job memory which are not needed any more.



The buttons for the deletion of jobs (**Delete**, **Delete all**) only appear if a user of the type **Administrator** or **Technician** is logged on to the system.



After deleting a job **all** job data are lost and **cannot** be set-up again!

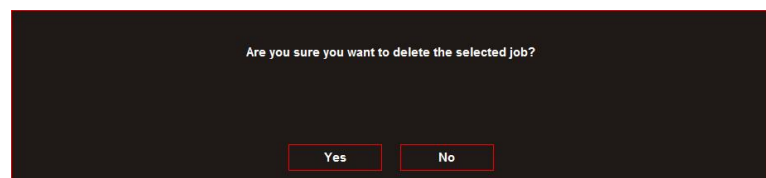
7.10.4.1 Delete single job

This chapter describes the procedure for the deletion of a single job.

1. Open job memory (see chapter 7.10.2).
2. Select the desired job by tapping the corresponding field in the list of saved jobs on the touch screen.
The field of the selected job is marked by a red frame in the list.
The job data of the selected job appear in the upper part of the info window.

3.  Press the **Delete** button in the info window.

The following safety query appears on the screen:



“Are you sure you want to delete the selected job?”

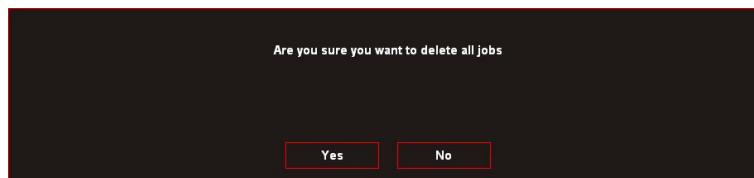
Press the **Yes** button.
The selected job is deleted.
The main screen of the user interface appears.

7.10.4.2 Delete all jobs

This chapter describes the procedure for the deletion of all jobs present in the job memory.

1. Open job memory (see chapter 7.10.2).
2.  Press the **Delete all** button in the info window.

The following safety query appears on the screen:



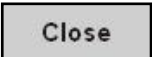
"Are you sure you want to delete all jobs?"

Press the **Yes** button.

All jobs are deleted from the job memory.

The main screen of the user interface appears.

7.10.5 Close job memory

-  Press the **Close** button in the info window.

The job memory is closed.

The main screen of the user interface appears.

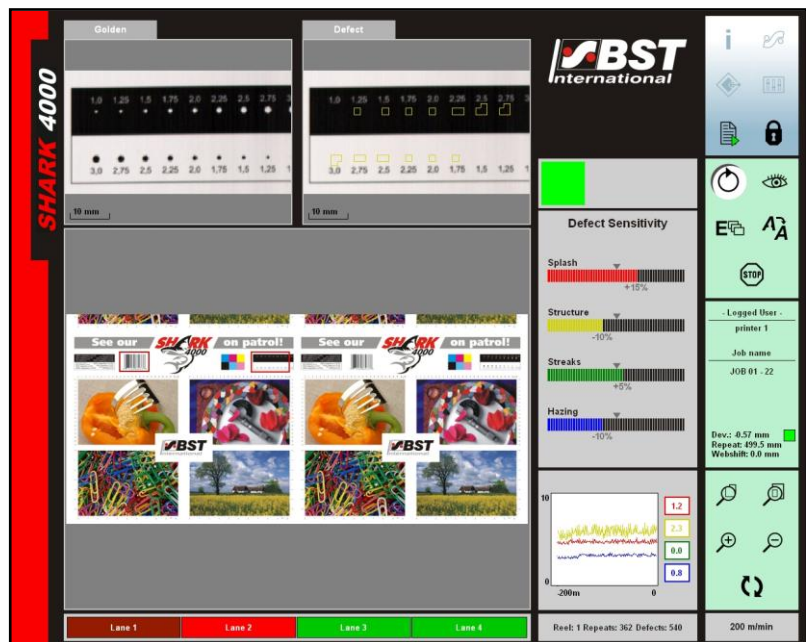
7.11 Defect detection modes

The print defect detection system can be operated in the following defect detection modes:

- Automatic Mode, see chapter 7.11.1
- Inspection Mode, see chapter 7.11.2
- Defect History, see chapter 7.11.3
- View Only Mode, see chapter 7.11.4

In operating modes *Automatic Mode*, *Inspection Mode* and *Defect History* 100% print defect detection is utilized.

7.11.1 Automatic Mode



After pressing the adjoining button in the tool bar, the system changes to *Automatic Mode*.

During 100% print defect detection, the system continually compares the actual print with the stored reference image. Detected differences are examined by the system and graded. If the determined defect grade of a defect type exceeds the limit value, then the defect is labelled in the display window of the main screen with the help of a colour marking frame. The results of the analysis are displayed as a separate defect grade for each defect type.

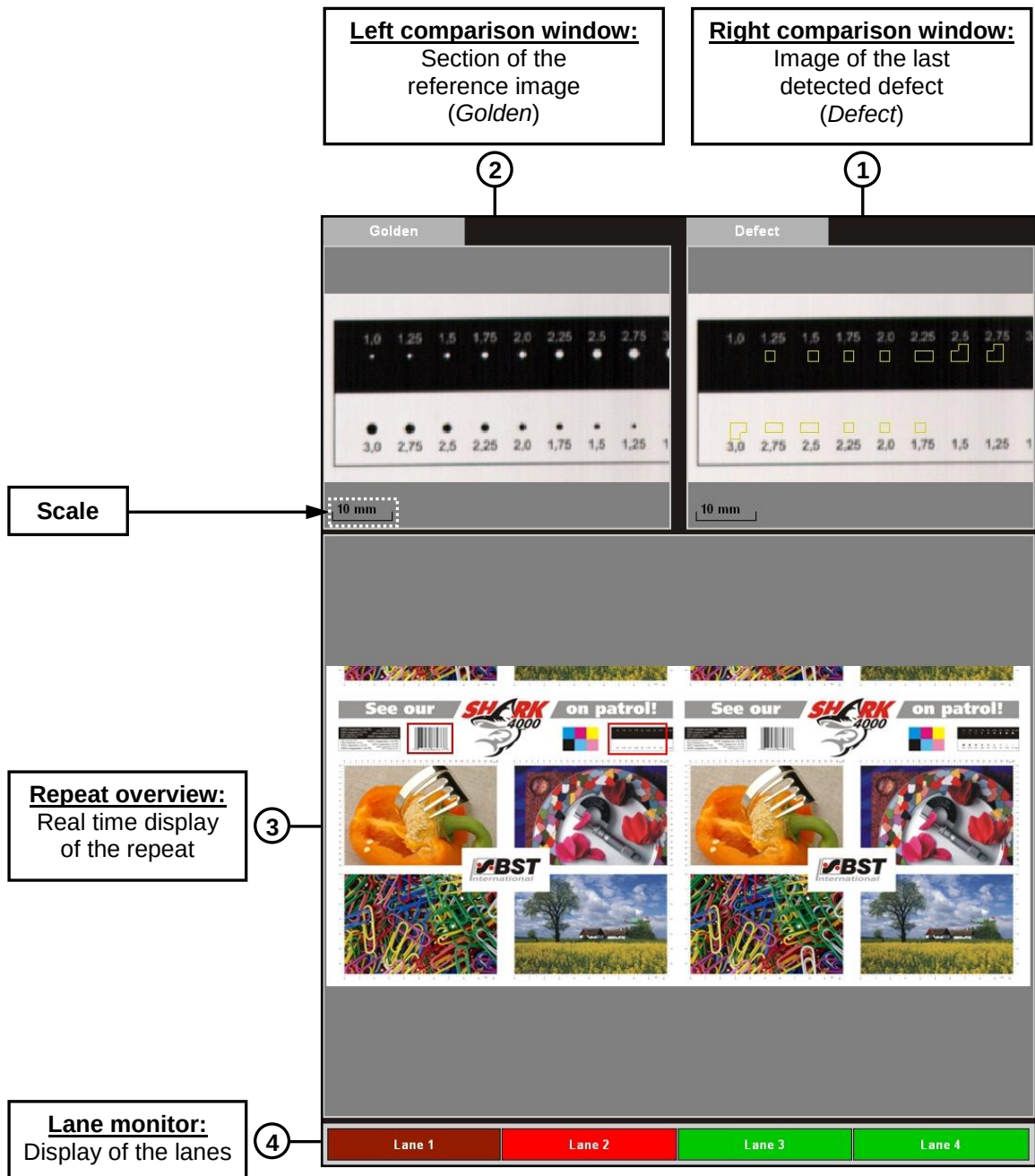


If the maximum number of defects per job, reel or lane is exceeded during the print defect detection, the respective message is displayed on the screen. No defect images can be saved from this time!

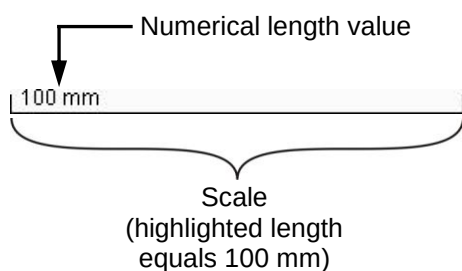
The individual control and display elements are described in detail in the following chapters.

7.11.1.1 Design of the display window

In *Automatic Mode* the display window is divided into the following four areas:



The four areas are described on the following page.



Scale:

Displays the current display scale

In the lower left-hand corner of the two comparison windows the current display scale for the image shown in the corresponding window is shown.

The numerical length value (in the example: *100 mm*) is displayed above the graphical scale. The scale below the length value highlights the area of the image displayed that corresponds to the length value.

① Right comparison window (Defect): **Image of the last detected defect**

In the right comparison window the system marks detected defects using colour frames.

The colour of these frames depends on the detected defect type.

The colour of these frames depends on the detected defect type:

yellow frame	=	structure defects
red frame	=	colour splashes
blue frame	=	hazing
green frame	=	streaks

② Left comparison window (Golden): **Display of the corresponding section of the reference image**

The left comparison window shows the corresponding section of the reference image (*Golden*).

This allows the operator to make a visual comparison of the defective area of the actual print (right comparison window) with the corresponding area of the reference image (left comparison window).

③ Repeat overview: **Real time display of the repeat**

The lower part of the display window shows a real time image of the full repeat (*live image*).

Red frames mark the areas in the repeat, in which the system has detected a defect.

A light red frame marks the area in the repeat, which is shown enlarged in the two comparison windows.

If the system has identified multiple defects in the repeat then the comparison windows display the defect with the highest defect grade. All other faulty areas are marked in the repeat overview with a dark red border.

If the system has not detected any defects in the current repeat, then in the right comparison window the defect image of the last detected defect will continue to appear. The relevant area is marked in the repeat overview with a blue border.

④ Lane monitor: Display of the lanes



The system marks the individual lanes of the repeat under the repeat overview using colour rectangles.

Colour of the rectangle	Significance
grey	Print defect detection in this lane is disabled.
green	No print defect was detected in the lane.
dark red	A print defect was detected in the lane.
light red	A print defect was detected in the lane. The print defect has the highest defect grading of all detected print defects.

Disable print defect detection for individual lanes:

- Touch the rectangle under the lane in which print defect detection is to be disabled in the lane monitor.
The following confirmation request is displayed in order to prevent accidental deactivation:



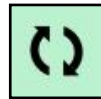
“Are you sure you want to switch off this lane?”

- Press the **Yes** button.
Print defect detection in the selected lane is disabled.
The colour of the rectangle under the lane changes to grey.
- For reactivating print defect detection, touch the corresponding rectangle in the lane monitor again.

7.11.1.2 Image toggling (reference image ↔ defect image)

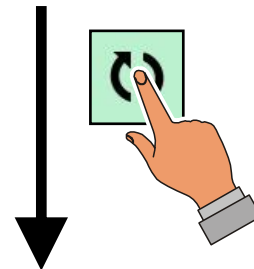
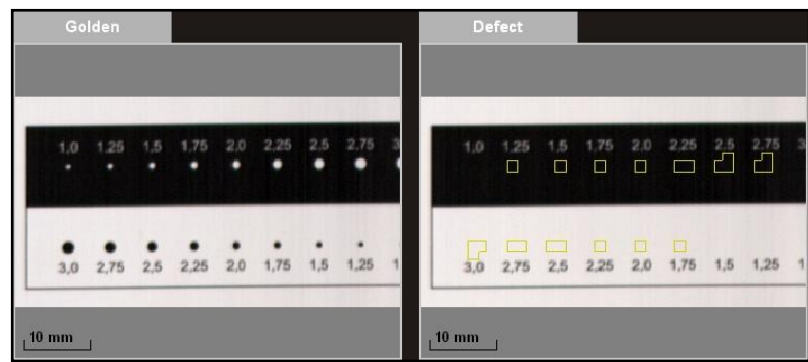
The image toggling function for the left comparison window enables the operator a comfortable comparison of the current print with the saved reference image.

Operation:

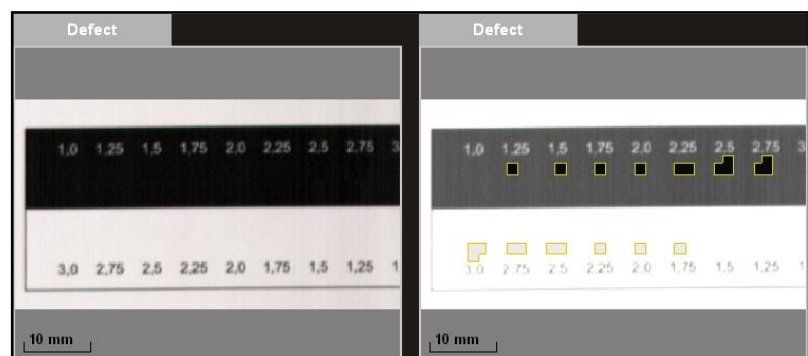


Pressing the adjoining button in the tool bar, you can toggle between the display of the the saved reference image (*Golden*) and the captured defect image (*Defect*) in the left comparison window.

Comparison between *Golden* and *Defect*



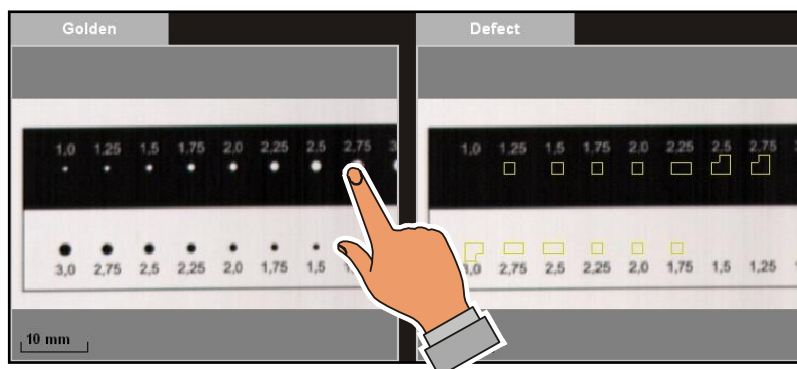
Comparison between *Defect* and *Defect*



7.11.1.3 Image navigation and zoom setting

For a detailed monitoring of defects navigation and zooming can be carried out in the two comparison windows (*Golden* and *Defect*) as follows:

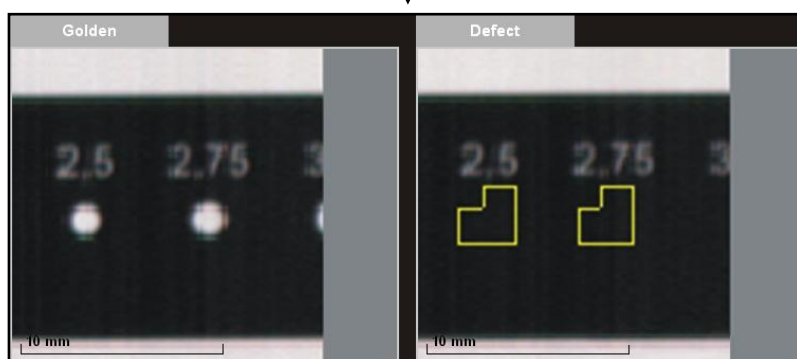
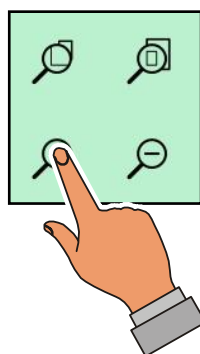
1. Tap with the finger on the desired area of the image (e.g. defect) in one of the two comparison windows.



The selected area of the image is automatically centred in both comparison windows.



2. Use the four zoom buttons in the tool bar to magnify or reduce the image section displayed in the two comparison windows to the desired scale (see chapter 7.7.2).



7.11.1.4 Teaching-in defects (Re-Master Function)

The teach-in function allows to modify the reference image (*Golden*) for print defect detection during printing.

If for example a recurring deviation occurs in the print image that does not have any effect on the final quality of the print, this deviation can be added (*re-learned*) into the reference image subsequently. In this way the printer can avoid unnecessary alarm messages.



The number of defects, that can be re-learned into the reference image using the Re-Master Function, is limited to 15.

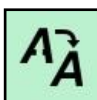


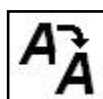
If the print defect detection is stopped and restarted, all areas that have been re-learned into the reference image using the Re-Master Function will be lost.

Teach-in defect

1.  As soon as the defect that must be re-learned into the reference image is displayed in the right comparison window, press the **Re-learn defect** button in the tool bar.

The defect image in the right comparison window is *frozen* for about 2 seconds (the display is not refreshed). This time can be used to check the defect image.

2.  Press the **Re-learn defect** button again. The defective area is taken over (*re-learned*) into the reference image.



Reference images, that have been re-learned the deviations, are marked in the upper left corner of the left comparison window (*Golden*) by the adjacent symbol.

7.11.1.5 Alarm indicator

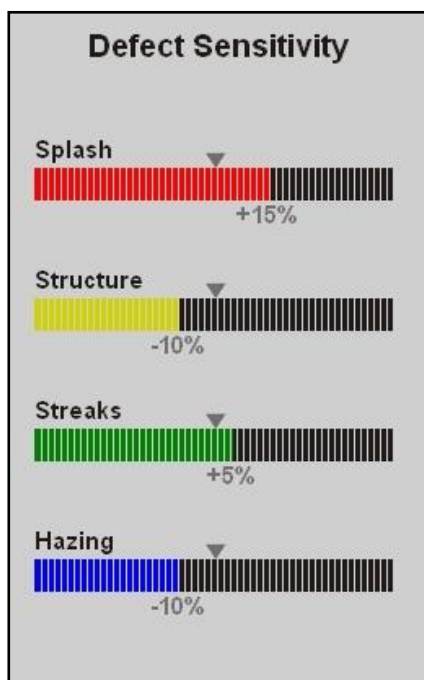


An alarm indicator appears in the upper part of the info window.

The alarm indicator changes colour dependent on the highest defect grade detected by the system in the last inspected repeat.

Defect grade	State	Colour of the alarm indicator
0 ... 4,9	PRINT OK	green
5,0 ... 5,9	WARNING	yellow
6,0 ... 10,0	ALARM (defect)	red

7.11.1.6 Adjustment of defect sensitivity



Defect detection sensitivity for the individual defect types can be adjusted by the operator independently of each other with the help of the four sensitivity controls in the middle part of the info window.

The larger a set value is, the more sensitively the system responds to differences between the actual print and saved reference image.

- Set the new sensitivity value by tapping the corresponding position on the desired sensitivity control on the touch screen.

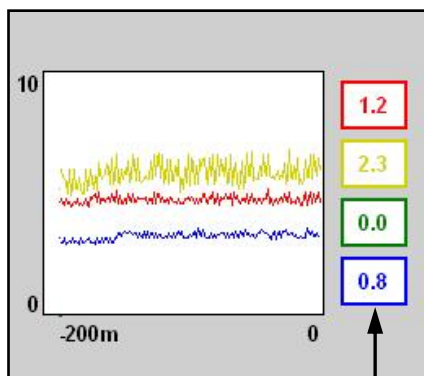
The sensitivity values adjusted currently are shown under the controls.

Adjustment range: -50 ... +50 %

If the set tolerance of a defect type is exceeded, then the detected defect is marked in the display window and the colour of the alarm indicator changes to red.

Set the desired intensity for the bright field illumination by tapping the corresponding position on the brightness control

7.11.1.7 Defect grade trend chart



Detected defect grades

The trend chart in the lower part of the info window shows graphically the defect grades (0 to 10) detected during the last period of inspection. The length of the displayed inspection period can be specified in the system settings.

An individual defect curve appears for each defect type.

The four fields on the right of the trend chart show numerically the currently detected defect grades for the four defect types.

Touching a field on the touch screen causes the corresponding curve of the trend chart to be displayed or not.

The four curves and the outlines of the fields are coloured according to their defect type:

1.2	red	= colour splashes
2.3	yellow	= structure defects
0.0	green	= streaks
0.8	blue	= hazing

The trend chart is scrolling left during operation, so that the right end of the chart always shows the currently detected defect grades.

If the detected defect grade of a defect type exceeds the specified warning or alarm level, then the corresponding display field is filled yellow or red respectively.

Defect grade	State	Background colour
0 ... 4,9	PRINT OK	white
5,0 ... 5,9	WARNING	yellow
6,0 ... 10,0	ALARM (defect)	red
—	Curve faded out	grey

7.11.1.8 Display of the inspection results

Reel: 1 Repeats: 362 Defects: 540

The inspection results are displayed in the status display on the lower edge of the info window. The display shows an aggregate (summed) indicator of all the results since start of print defect detection.

Signification of the display fields:

Reel: Current roll number

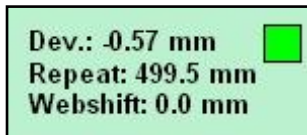
Repeats / Dist.: Number of inspected repeats or reel meters



If required, the number of checked reel meters can be displayed in place of the number of checked repeats. The activation of the reel meter display is made in the **SHARK 4000** system settings in the **GUI Configuration** menu (see chapter 10.5.3).

Defects: Number of defective repeats

7.11.1.9 Display of the repeat length and web shift



The adjoining display panel in the tool bar shows the measurement results of the *Repeat Length Monitoring* function and the web shift.

Dev.: The meaning of the two repeat length monitoring display panels is described in chapter 9.4.

Webshift: Web shift across the web running direction
Measured displacement of the web of material across the web running direction. The system determines the web shift by a comparison between the current image position and the image in the reference image recording.

7.11.1.10 Display of web speed and system loading



The adjoining display panel in the tool bar shows the current web speed. The background colour of the indicator changes dependent on the system loading.

Green: Web speed OK.
The current web speed is below the maximum allowed web speed.

Yellow: Warning.
The current web speed is at the upper limit for the maximum allowed web speed.

Red: Web speed not permitted.
The current web speed is above the maximum allowed web speed. The system is overloaded.

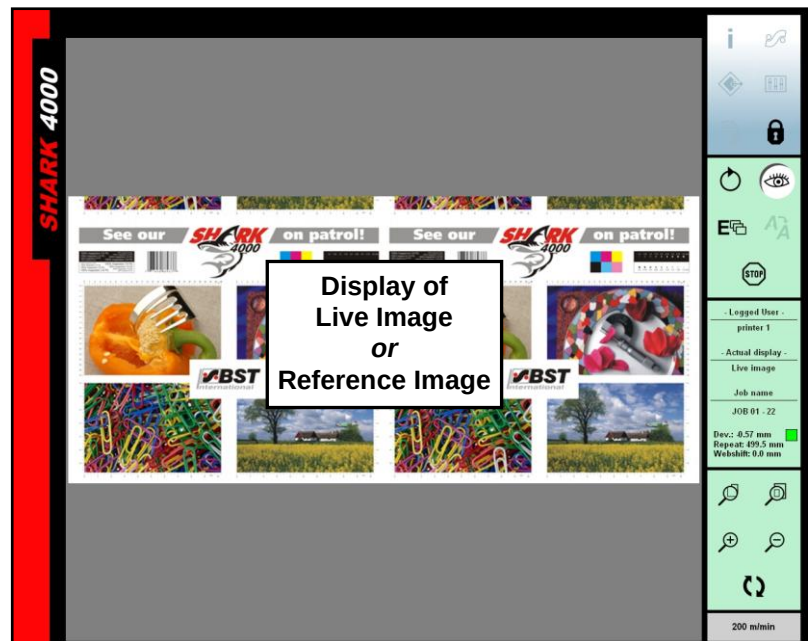
Print defect detection is no longer possible!



The maximum allowed web speed is defined during setup of a job in the first step of the Job Setup (see chapter 7.8.5.1).

The system loading is determined by the number of control areas and the current web speed. If the system is overloaded, the web speed or the number of control areas must be reduced.

7.11.2 Inspection Mode



When the print defect detection is active, after pressing the adjoining button in the tool bar, the system changes to *Inspection Mode*.



The *Inspection Mode* can only be activated if the print defect detection is switched on. If the print defect detection is switched off, after pressing the button the system changes to the *View Only Mode* (see chapter 7.11.4).

Inspection Mode enables 100% print defect detection. In addition *Inspection Mode* offers special inspection functions (one-touch image navigation, zoom setting), that allow the operator detailed visual inspection of the current print and comparison with the saved reference image.

7.11.2.1 Image navigation and zoom setting

The one-touch image navigation and the four zoom buttons in the tool bar are active in *Inspection Mode*. Operation of the one-touch image navigation and zoom buttons is described in detail in chapter 7.7.

7.11.2.2 Design of the display window

The info window is hidden in *Inspection Mode*. An enlarged display window appears on the touch screen in which, if desired, the currently recorded live image or the saved reference image is displayed.

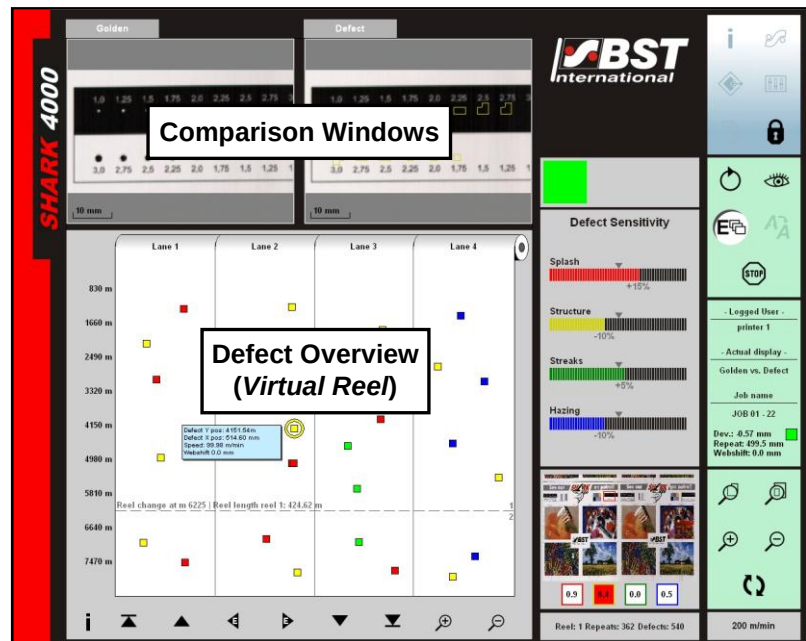


With the help of the adjoining button in the tool bar the display can be toggled between the live and the reference image.



The adjoining display panel in the tool bar signals to the operator which display mode (*Live image* or *Golden image*) is active.

7.11.3 Defect History



After pressing the adjoining button in the tool bar, the system changes to *Defect History* mode.

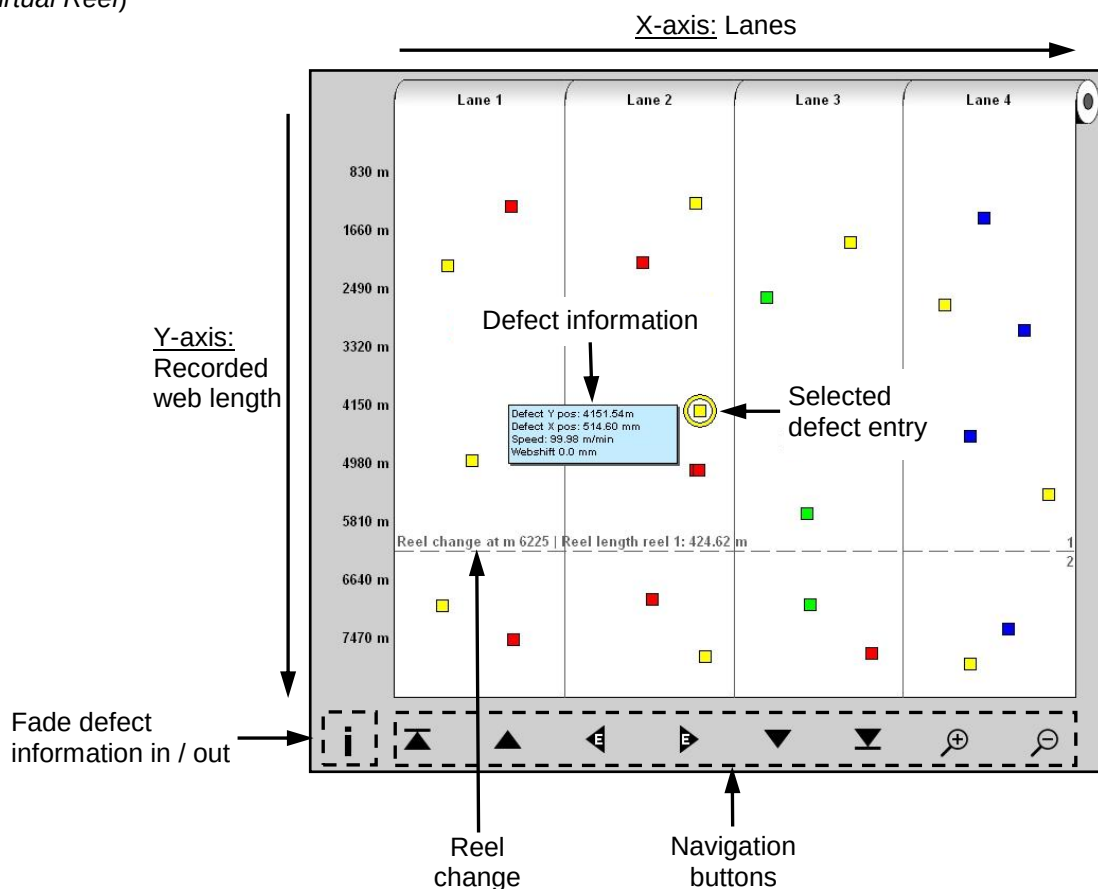
Defect History mode enables 100% print defect detection.

In addition *Defect History* mode provides the user with a detailed overview of all print defects, which the system has detected during a job.

After starting *Defect History* mode, a defect overview appears in the lower part of the display window, into which the system automatically enters every detected defect.

Recording of the data is continued until the end of the job.

7.11.3.1 Defect overview (Virtual Reel)



A graphical defect overview (*Virtual Reel*) appears in the lower part of the display window in which all print defects detected by the system are marked.

The web lanes are shown on the X-axis of the defect overview, while the Y-axis shows the recorded length of the web from the start of the print defect detection.

Each detected defect is marked by a coloured square. The colour of these squares depends on the detected defect type:

Square colour	Detected defect type
yellow	structure
red	splash
blue	hazing
green	streak
brown	repeat length



Print defects of the type *Repeat Length* are only displayed in the defect overview when the respective function is activated in the system settings (see chapter 9.3).

The square of the actual selected defect entry is marked by an enclosing circle.

A reel change is marked in the defect overview by a dashed horizontal dark grey line, which extends over all lanes. The numbers of the two accompanying reels appear on the right edge of the overview. Above the line detailed information on the reel change is displayed.

Display of defect information



By pressing the adjacent button on the left under the defect overview additional information on the currently selected defect is shown.

Defect Y pos: 4151.54m
 Defect X pos: 514.60 mm
 Speed: 99.98 m/min
 Webshift 0.0 mm

If the display of the defect information is activated (the LED of the button lights up green), then a blue box appears next to the selected defect entry with the following information:

- Defect Y pos:** Position of the selected defect
in web running direction

- Defect X pos:** Position of the selected defect
across the web running direction
(distance from the left web edge)

- Speed:** Web speed at the time the selected defect was detected

- Webshift:** Detected displacement of the web of material
across the web running direction
at the time the selected defect was detected

Navigation buttons

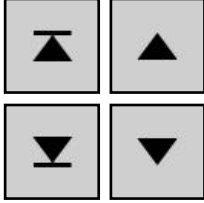


The eight navigation buttons on the lower edge of the display window are used to navigate within the defect overview and to change the resolution of the overview in web running direction.

Button	Function
	Display the <u>first</u> page of the defect overview
	Display the <u>last</u> page of the defect overview After <u>double-click</u> on this button, the system always selects the <u>last</u> detected defect automatically.
	Display the <u>previous</u> page of the defect overview
	Display the <u>next</u> page of the defect overview
	Select the <u>previous</u> event/defect entry
	Select the <u>next</u> event/defect entry
	<u>Increase resolution of the defect overview</u> A shorter web section is displayed in the defect overview.
	<u>Reduce resolution of the defect history</u> A longer web section is displayed in the defect overview.

Selecting a defect entry

Selection of a defect entry from the defect overview is effected by touching the corresponding square on the touch screen.

1.  Use the navigation buttons to move to the desired position in the defect overview.

2.  Increase the resolution of the defect overview until the square of the desired defect entry can be clearly identified.

3. Touch the square of the desired defect entry on the touch screen. The selected square is marked by an enclosing circle.
The display window and the info window show the following detailed information for the selected defect:
 - Defect image and corresponding section of the reference image (see chapter 7.11.3.2)
 - Sensitivity settings at the time of defect detection (see chapter 7.11.3.4)
 - Detected defect grades for the four defect types (see chapter 7.11.3.5)

Maximum defect quantity

The number of defect entries that can be displayed in the defect overview is limited to the following value:

Number of defects per lane: max. 1,000
Number of defects per reel: max. 2,000



If one of these values is exceeded, no more defects are displayed in the respective lane or no more defect images are saved. The print defect defection continues to work unaffected by this.

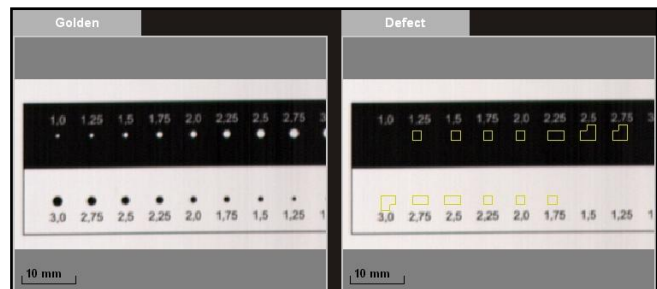
7.11.3.2 Comparison windows

The two comparison windows above the defect overview enable the operator a visual comparison of reference image (*Golden*), live image (*Live*) and defect image (*Defect*).



Pressing the adjoining button in the tool bar, you can toggle between the following four comparison options:

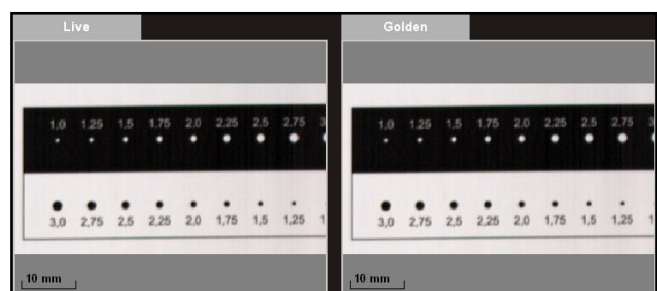
1. Comparison between **Golden** and **Defect**



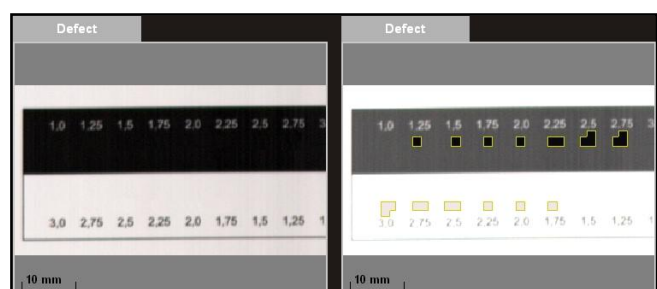
2. Comparison between **Live** and **Defect**



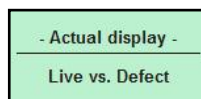
3. Comparison between **Live** and **Golden**



4. Comparison between **Defect** and **Defect**



After selecting an entry in the defect overview, the two comparison window show the corresponding images automatically.

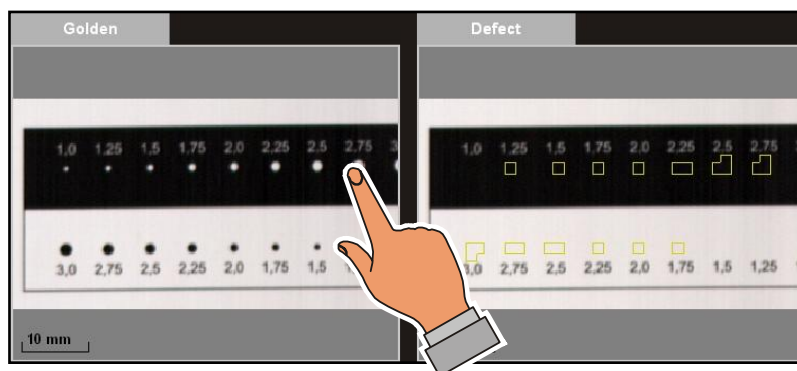


The adjoining display panel in the tool bar signals to the operator which comparison option is activated.

7.11.3.3 Image navigation and zoom setting

For a detailed monitoring of defects navigation and zooming can be carried out in the two comparison windows (*Golden* and *Defect*) as follows:

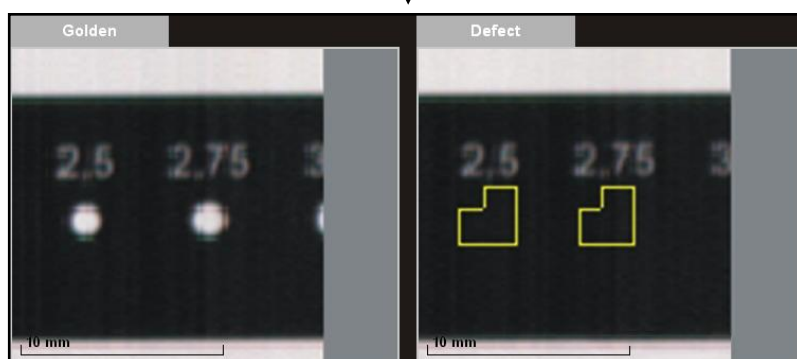
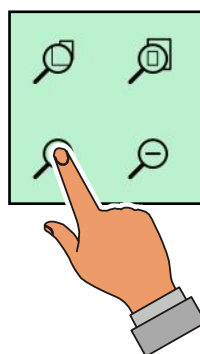
1. Tap with the finger on the desired area of the image (e.g. defect) in one of the two comparison windows.



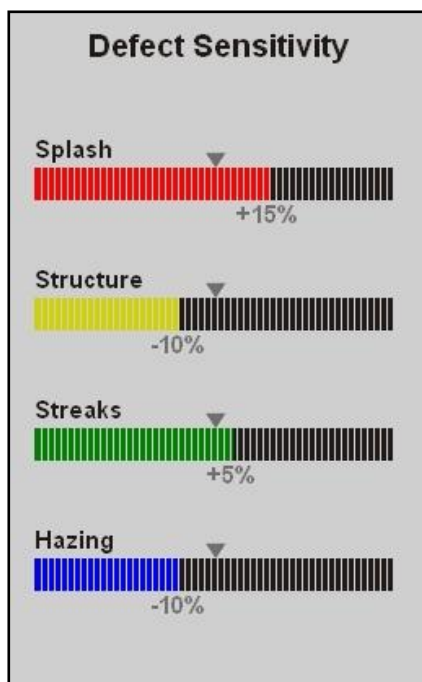
The selected area of the image is automatically centred in both comparison windows.



2. Use the four zoom buttons in the tool bar to magnify or reduce the image section displayed in the two comparison windows to the desired scale (see chapter 7.7.2).



7.11.3.4 Display of the adjusted defect sensitivity



After selecting an entry from the defect overview, the sensitivity settings for the four different defect types are displayed in the middle part of the info window.

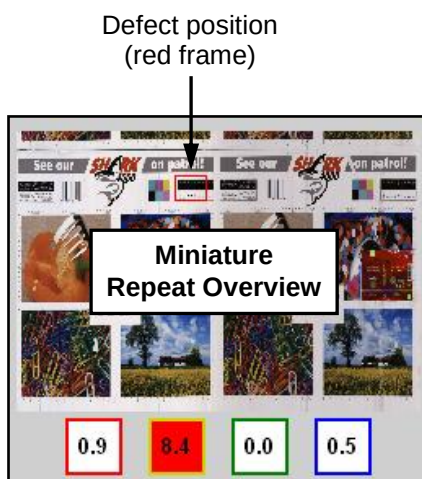
The positions of the sensitivity controls correspond to the settings that were active at the time the selected defect was detected.



The sensitivity controls are for indicating purposes only. No adjustments to the defect sensitivities can be made in *Defect History* mode!

The meaning of the four sensitivity controls is described in detail in chapter 7.11.1.6.

7.11.3.5 Miniature repeat overview



After selecting an entry in the defect overview, the position of the defect in the repeat is marked with a red frame in the miniature repeat overview in the lower part of the info window.

The detected defect grades for the four defect types are displayed below the miniature repeat overview.

0.9	red	= splash
8.4	yellow	= structure
0.0	green	= streak
0.5	blue	= hazing

If the defect grade of a defect type exceeds the specified warning or alarm level, then the corresponding display field is filled yellow or red respectively.

Defect grade	State	Colour display field
0 ... 4,9	PRINT OK	white
5,0 ... 5,9	WARNING	yellow
6,0 ... 10,0	ALARM (defect)	red

7.11.3.6 Quit Defect History

To quit *Defect History* mode press one of the following three buttons in the tool bar:

**Automatic Mode**

The system changes to *Automatic Mode*.

**Inspection Mode**

The system changes to *Inspection Mode*.

**Stop**

Print defect detection is stopped.

7.11.4 View Only Mode



When the print defect detection is deactivated, after pressing the adjoining button in the tool bar, the system changes to the *View Only Mode*.



The *View Only Mode* can only be activated if the print defect detection is switched off. If the print defect detection is switched on, after pressing the button the system changes to the *Inspection Mode* (see chapter 7.11.2).

The *View Only Mode* makes it possible to display the live image of the running web when the print defect detection is switched off, without having to carry out a Job Setup beforehand.

7.11.4.1 Image navigation and zoom setting

The one-touch image navigation and the four zoom buttons in the tool bar are active in *View Only Mode*. Operation of the one-touch image navigation and zoom buttons is described in detail in chapter 7.7.

7.11.4.2 Design of the display window

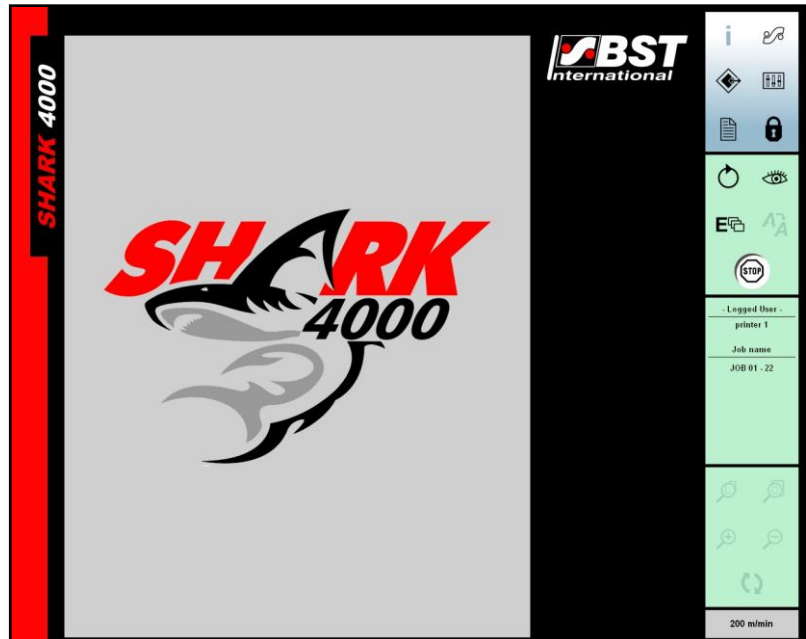
The info window is hidden in *View Only Mode*. An enlarged display window appears on the touch screen in which, the live image of the running web is displayed.

Above the display window the ***View Only*** information text blinks. It signals that the print defect detection is switched off.

7.12 Stopping the print defect detection



Pressing the **STOP** button in the tool bar, print defect detection in *Automatic Mode*, *Inspection Mode* or *Defect History* mode is stopped.
The system reverts to the main screen.



7.13 System status window

The system status window shows all warning, information, service and error messages generated by the system during operation. The time (*date and time*) when each event has occurred appears in front of each message.

The listed information makes it easier for the service personnel to carry out trouble shooting.

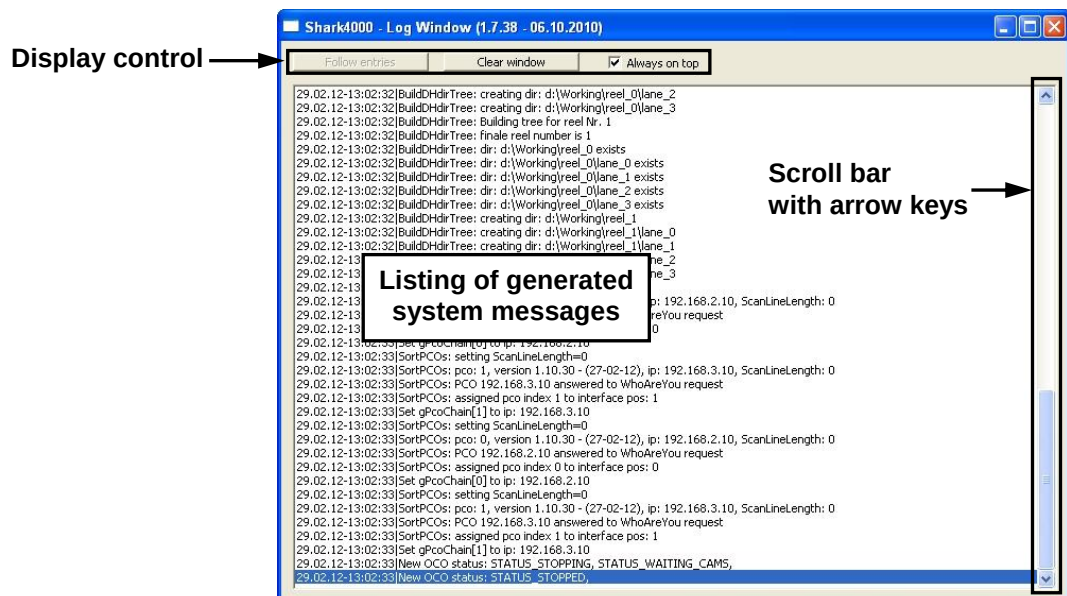
7.13.1 Open system status window



The **Info** button to open the system status window is only active if a user of the type **Administrator** or **Technician** is logged on to the system.



Press the **Info** button in the tool bar. The system status window appears on the screen.



Use the scroll bar or the arrow keys on the right side of the display window to scroll up and down the screen in view as the listing of the generated system messages will be longer than the height of the display window in many cases.



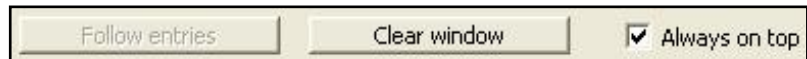
The display of the system messages in the system status window depends on the filter settings selected in the **Diagnostics** system menu.

Only those messages are displayed for which type the relevant filter is activated (see chapter 10.7).



Where error messages or problems occur that cannot be rectified by the customer alone, and therefore require support from **BST International GmbH**, please have the error message(s) text in the system status window ready.

7.13.2 Display control



Above the list of the system messages are two buttons and a checkbox which can be used to control the display of the system messages as follows.

Switch the automatic scroll function on / off



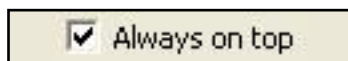
- Select the part of the list that interests using the scroll bar or the arrow keys.
- Press the **Follow entries** button.
The automatic scroll function is switched off.
The display of system messages then remains fixed on the selected area, independent of whether new messages are incoming or not.

Delete system messages



- Press the **Clear window** button.
All entries in the list of system messages are deleted.

Display the system status window in the foreground



- Activate the **Always on top** checkbox.
From the next call up the system status window is always displayed above the *SHARK 4000* user interface (in the foreground).

8 Job Report

8.1 Description

The *Job Report* offers the user a powerful tool for internal and external documentation of the quality of the print results.

The report function creates a separate report for each inspected reel. In addition to the general job data and a repeat overview, each reel report contains a reel overview in which the analysis of the selected reel and a summary of the analyses of all reels within the job are shown. The overview of the sensitivity settings documents the defect sensitivity settings used for the various types of defect. The event and flaw list of the reel report lists each change of status (e.g. start and stop of the report or a change of operator) and all defect messages. Detailed information (e. g. position and type of the defect, derived level of the defect, etc.) and the relevant defect image are presented for detected print defects. In this way any faulty material can be removed before being shipped.

The display mode selection provides the operator with the ability to easily control the outputting of the report data.

In the first step the job report is shown in PDF format in the display window of the touch screen. After the job has been completed the data is saved for the operator as a PDF and XML-file (Extensible Markup Language). This enables the respective report to be electronically processed as well as being printed out.

Optionally, in addition to the extensive job report, an *overview job report* can be generated. This shortened version of the job report only contains general data on the reels produced and the settings of the print defect detection (report header, reel overview, sensitivity settings, defect classification).



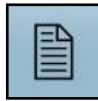
Activation of the function for generating an overview report can be carried out on request during the commissioning of the print defect detection system by BST Service.

8.2 Requirements

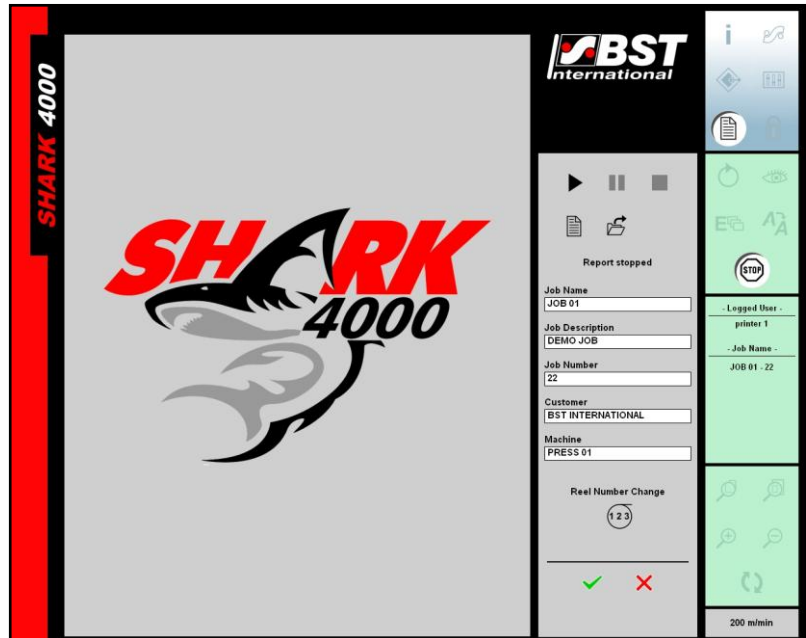
The operator must take the following requirement into consideration in order to ensure unrestricted utilisation of the job report function:

- A reel change signal is required for a reel related job report. As a rule, the reel change signal is distributed by the printing press control automatically to the print defect detection system. We advise against trying to use the job report without a reel change signal present.

8.3 Control elements

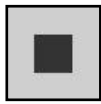
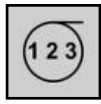


Pressing the adjoining button in the tool bar will open the job report menu in the info window.



The menu includes five buttons used for control of the job report functions, an input mask for the job data and a button used to change the reel number (see chapter 8.4).

Signification of the control elements:

Button	Function	See chapter
	Start report	8.5
	Pause report (pause)	8.6
	Stop report (stop)	8.9
	Display current report	8.10
	Open saved report	8.13
	Change reel number	8.11

8.4 Enter job data

Job Name	JOB 01
Job Description	DEMO JOB
Job Number	22
Customer	BST INTERNATIONAL
Machine	PRESS 01

The general job data entered by the operator when saving the job (see chapter 7.8.11.1) are shown in the input mask of the job report menu. The entries in the individual editing boxes can be changed if required.

The two buttons at the bottom of the menu are used to exit the job report menu.



Close the job report menu.
The changed job data will be saved.



Close the job report menu,
without saving the changed job data.

Explanation of the editing boxes:

Job Name	JOB 01
-----------------	--------

Job Name

Name of the job for which the report is being set up.

This name will be displayed in the report header (see chapter 8.14.1). The job name will also be used for the name of the report file (see chapter 8.7). The name should be as clear as possible for this reason.

The entered job name can differ from the file name under which the job has been stored.

Job Description	DEMO JOB
------------------------	----------

Job Description

Description of the job for which the report is being set up.

This name will be displayed in the report header (see chapter 8.14.1).

Job Number	22
-------------------	----

Job Number

Number of the job for which the report is being set up.

This name will be displayed in the report header (see chapter 8.14.1).

Customer	BST INTERNATIONAL
-----------------	-------------------

Customer

Name of the customer, for whom the job is being produced.

This name will be displayed in the report header (see chapter 8.14.1).

Machine	PRESS 01
----------------	----------

Machine

Name of the machine used for the production of the job for which the report is being set up.

This name will be displayed in the report header (see chapter 8.14.1).

8.5 Starting a report

After the job data have been entered (see chapter 8.4), the job report can be started.



Press the **Start Report** button.

The message *Report running* is displayed below the four report control buttons.



The green symbol **Report started** is shown on the **Job Report** button in the tool bar.

Symbol *Report started*

The relevant events according to the user-defined settings will be recorded from the time the job report was started.

8.6 Pausing a report (Pause)

The system has an option that can interrupt the recording of a running report.



Press the **Pause report** button.

As long as recording of the report is interrupted, the message *Report paused* is displayed below the four report control buttons.



The green symbol **Report paused** is shown on the **Job Report** button in the toolbar.

Symbol *Report paused*

The times that the pause was started and the restart of recording will be saved in the report.



To restart report recording, press the **Pause Report** or **Start Report** button.



Never use the Stop Report function if you want to pause the report, as a report that has been stopped cannot be restarted!

8.7 Saving a report

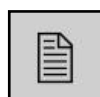
The job report is saved automatically on each of the following button operations:



Stop print defect detection



Terminate job report



Display the current job report

The job report will be stored on the hard disk of the system in the following directories:

File format of the job report	Storage location
PDF	<i>D:\Report</i>
XML	<i>D:\Report\Reports</i>

The file name cannot be selected by the user, but is instead set by the system.

The file name supports the following conventions:

Report_[Job name]_[Year]-[Month]-[Day]_[Hour]-[Minute].pdf

File name example:

Report_JOB123_2006-01-01_15-45.pdf



On request, the format of the file name can be adapted to the customer's special requirements by BST service.

The date and time entries in the file-name are dependent on the report start time.

To improve the understanding of stored files when a new job is to be set up, we suggest it is given an easy-to-understand job name (see chapter 8.4).

If the report has been saved, then it can subsequently be called up at any time from the Windows user interface of the industrial PC.

8.8 Exporting a report

On request, BST Service can configure the print defect detection system during commissioning so that when a job report is saved, a copy of the report is automatically stored at a predefined storage location (e.g. in the customers network).

8.9 Stopping a report

The report recording can be stopped if the job to which the running report refers has been finished.



Press the **Stop Report** button.

The message *Report stopped* is displayed below the four report control buttons.

Report recording is terminated.

The job report is saved automatically.



Never use the *Stop Report* function to temporarily pause the report, as the data recording cannot be continued after the report has been stopped! Use the *Pause Report* function to temporarily interrupt the report recording (see chapter 8.6).

8.10 Displaying a report

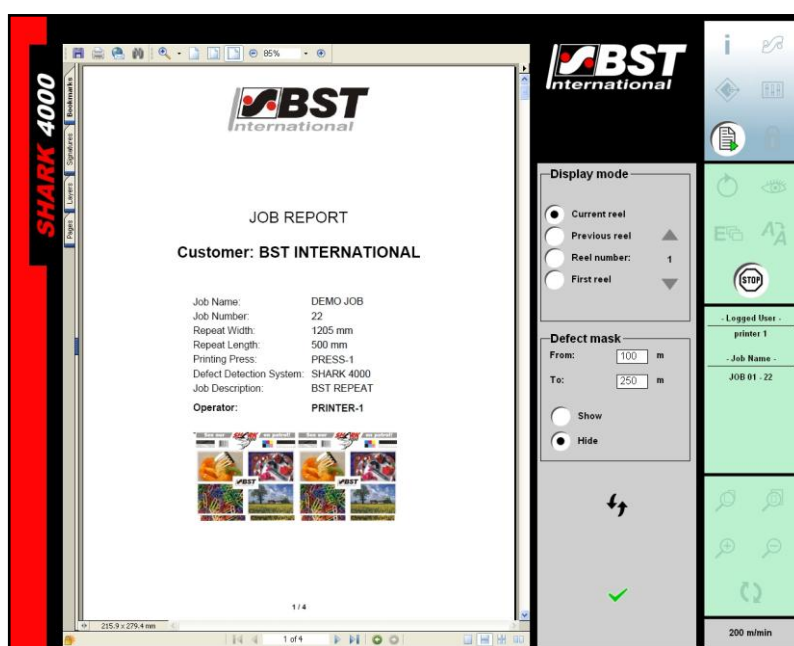
The report data can be displayed whilst the report recording process is running as well as after the report has been stopped. Running a full evaluation only makes sense after the recording has been finished.



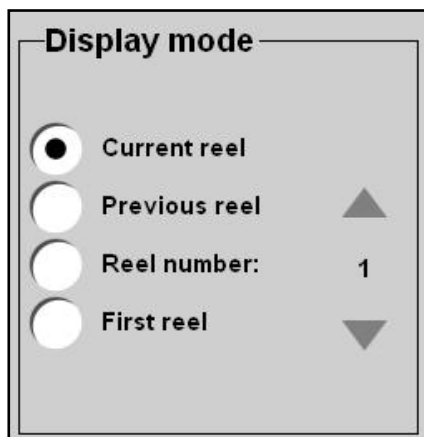
Press the **Display report** button.

The current job report is opened and shown in the display window in PDF format.

A menu will be opened up simultaneously in the info window, from which you can select the different report output display modes (see chapter 8.10.1).



8.10.1 Display mode selection



After opening a job report, the **Display mode** menu appears in the info window.

Activating a checkbox the operator selects the reel of the job for which the inspection results shall be displayed.

One of the display modes described below can be selected.



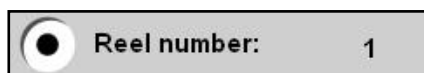
Current reel

Only the report data for the current reel (whilst the job is running) or the last reel (report has been closed down) will be displayed.



Previous reel

Only the report data for the previous reel will be displayed (with respect to the current reel or the last reel).



Reel number

Only the report data for the selected reel will be displayed.



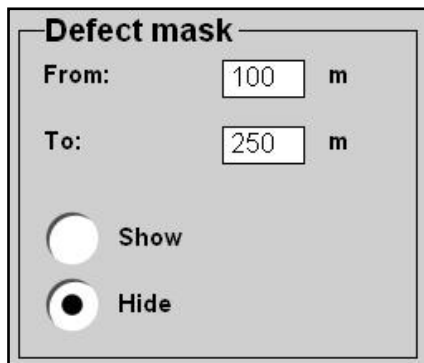
The reel is selected by using the two vertical arrow keys.



First reel

Only the report data for the first reel recorded in the report will be displayed.

8.10.2 Suppressing defects



The 'Defect mask' dialog box contains the following elements:

- From:** A text input field with the value '100' and a unit dropdown menu set to 'm'.
- To:** A text input field with the value '250' and a unit dropdown menu set to 'm'.
- Show:** A radio button that is currently unselected.
- Hide:** A radio button that is currently selected.

This function is used to select one web section of the job, for which no event and defect entries will appear in the report. However, the hidden entries for the section will always be saved in the report and can be displayed on the screen at any time.

Suppressing the defects reduces the length of the report. This is useful, for example, if the same defect occurs frequently in specific job sections.

Procedure:

- Activate the **Hide** checkbox.
- Set the beginning of the web section to be suppressed in the event and defect list of the report by entering the appropriate value in the **From** editing box.
- Set the end of the web section by entering the appropriate value in the **To** editing box.
- Update the report display (see chapter 8.10.3).
The selected web section is removed from the event and flaw list of the report.
- The section can be displayed in the event and defect list of the report once again by activating the **Show** checkbox.



The length entries for the section that has to be suppressed refer to the total job length and not to separate reels.

8.10.3 Updating the report display

After changing settings in the **Defect mask** area, the display of the report must be updated so that the changes get effective.



Press the **Update display** button in the info window.

The display of the report in the display window will be updated according to the current settings.

8.10.4 Exiting display control



To exit the menu press the adjacent button at the lower edge of the info window.

8.11 Changing the reel number

With this function the currently produced reel can be assigned a smaller reel number.

Application example:

During the setting up of a print job two reels of waste are printed.

Problem: The first two reels of the job (waste) should not appear in the relevant job report which the customer receives.

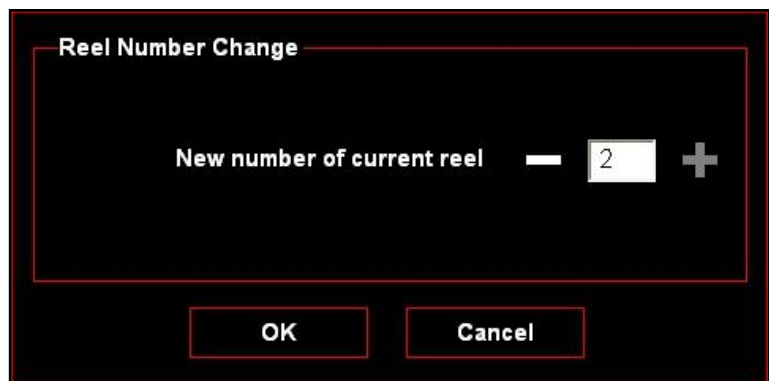
Solution: With the *Reel number change* function the currently produced reel 3 is assigned the new reel number 1. The two reels with the old reel numbers 1 and 2 are automatically removed from the job report. The revised job report subsequently begins with the new reel 1 (old reel 3). The recorded data for the removed old reels 1 and 2 are not deleted but are stored in the following directory:

Report\Reports\ReplacedReports

Procedure:

-  Press the **Change reel number** button.

The **Reel Number Change** window opens.



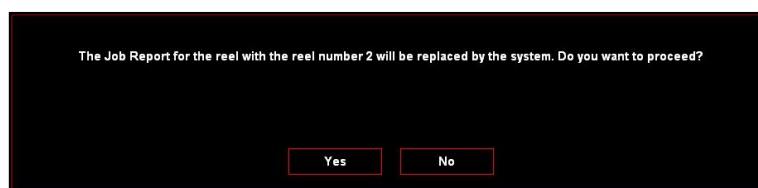
- Select the desired new number for the currently produced reel in the editing box.



The new reel number in the editing box must be **lower** than the number of the currently produced reel. If the currently produced reel is the first reel of the job, a change of reel number is **not** possible!

-  To accept the new reel number press the **OK** button in the window.

The following safety question appears:



“The Job Report for the reel with the reel number X will be replaced by the system. Do you want to proceed?”

-  To confirm the reel number change press the **Yes** button in the window.

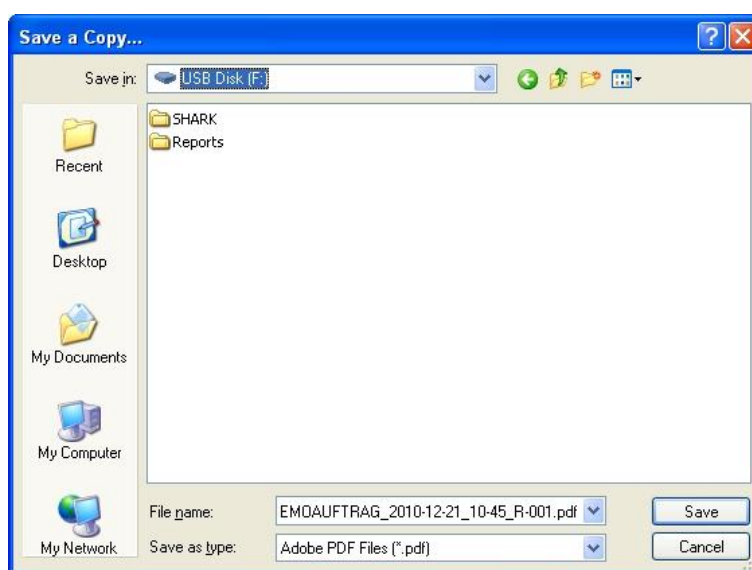
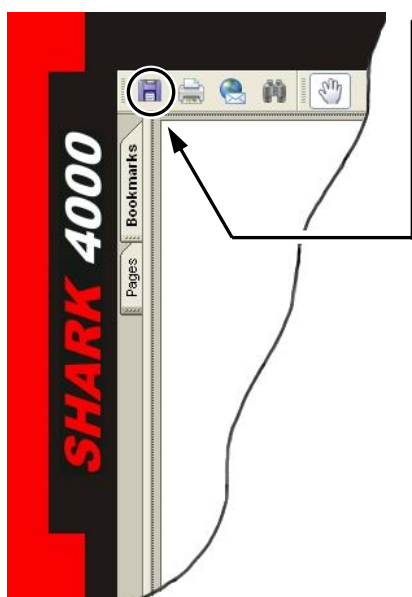
The reel number change is concluded.

8.12 Saving the job report to a USB stick

The system provides the option of saving the report data from a saved job report to a USB stick (not included in the scope of delivery).

Procedure:

1. Open the desired job report (see chapter 8.10).
2. Connect a suitable USB stick to the USB interface on the operating desk.
3. Press the **Save** button on the user interface of the *Adobe Acrobat Reader* in the display window.
The following window appears on the screen:



4. Select the USB stick as the target drive when saving the report data.
5. Press the **Save** button in the window.
The report data is saved to the USB stick with the file name shown in the **File name** editing box.
6. Remove the USB stick.

8.13 Opening a saved report

This function is used to show saved job reports in the display window.

Open report

1.  Press the **Open report** button.
A list of all saved job reports appears in the display window.



2. Select the desired job report by tapping the corresponding field in the list of saved reports on the touch screen.
The field of the selected job is marked by a red frame in the list.
3.  Press the adjoining button in the info window.
The selected job report is opened and shown in the display window in PDF format (see chapter 8.10).

8.14 Evaluating the report data

After the report data have been called up (see chapter 8.10), the job report can be evaluated.

The following chapter explain the design of the report and the meaning of the listed information.

8.14.1 Report header

The job report starts with a report header.



JOB REPORT
Reel 1
Customer: BST INTERNATIONAL

Job Name:	DEMO JOB
Job Number:	22
Repeat Width:	1205 mm
Repeat Length:	500 mm
Printing Press:	PRESS 1
Defect Detection System:	SHARK 4000
Job Description:	BST REPEAT
Operator:	PRINTER-1

The report header lists the reel number, the customer name and the general job data.

If, in place of the BST logo, your own logo is to be displayed in the report header, please contact *BST International GmbH*.

The general job data are followed by a picture of the repeat.



8.14.2 Reel overview

The reel overview follows the report header.
The analysis of the currently displayed reel is presented in the middle column of the table (in the example reel 1 of a total of 2 reels).
In the last column of the table there is a summary of the analysis of all reels within the job.

Reel Overview		
	Reel Number: 1 of 2	All Reels
Start Time	07.03.2012 08:59	07.03.2012 08:59
End Time	07.03.2012 09:07	07.03.2012 09:14
Start Length	0,00 m	0,00 m
Stop Length	991,52 m	1980,20 m
Total Length	991,52 m	1980,20 m
Inspected Length	803,00 m	1648,20 m
DD Flaws	1,20%	1,20%

Explanation of the different sections:

Start Time

Start of the report recording (date, time)

End Time

Time that the report recording was stopped (date, time)

Start Length

Length of the full job at the start of the report recording

Stop Length

Length of the full job at the end of the report recording

Total Length

Overall reel length or sum of all the job's reel lengths

Inspected Length

Length of the inspected reel or complete job sections

DD Flaws

Portion of defective repeats in percent

8.14.3 Sensitivity settings

The reel overview is followed by the overview of the sensitivity settings for print defect detection.

The overview lists the defect sensitivity settings being used for the different types of defects. The listing is carried out separately for each of the three sensitivity levels (*high, medium, low*).

Sensitivity Settings							
Level	(a) Structure		(b) Splash		(c) Hazing	(d) Streaks	
	Size [mm ²]	Contrast [%]	Size [mm ²]	Contrast [%]	Contrast [%]	Size [mm ²]	Contrast [%]
high	3,00	30	2,50	20	8	1,00	12
medium	4,50	30	3,00	22	10	2,00	15
low	6,00	30	4,00	25	15	3,00	18

Explanation of the different sections:

- (a) Structure**
Sensitivity settings being used for the detection of defects in structured areas (e.g. mis-register, blur, smear).
- (b) Splash**
Sensitivity settings being used for the detection of defects in homogenous areas (e.g. spots, lacks, dirt).
- (c) Hazing**
Sensitivity settings being used for the detection of fine colour tone variations.
- (d) Streaks**
Sensitivity settings being used for the detection of strong colour tone variations (e.g. ductor streaks, scratches, dirt).

8.14.4 Defect classification

The system classifies detected defects in three groups (*small, medium, large*). The table shows the assignment between the defect size and the three defect classes.

Defect Classification	
Defect Size	
Classification	Size [mm²]
small	0.00 - 8,10
medium	8,10 - 24,30
large	24,30 - ∞



The defect size ranges for the three defect classes can be adjusted by BST Service to the individual desires of the customer.

8.14.5 Event and flaw list

The job report's event and flaw list shows each status change (e.g. report start and stop or operator change) and all defect reports. Also noted are the times at which the event (defect or status report) occurred and the appropriate length position on the reel. The related lane(s) and defect specifications will also be documented for the defects.

Reel 1							
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Distance from Job Start	Distance from Reel End	Time	Repeat	Lane	Defect	Sensitivity	Defect Image
0,00 m	991,52 m	08:59:45	2069	(i) Report started			
61,97 m	929,55 m	09:00:13	2193	Defect detection started			
61,97 m	929,55 m	09:00:13	2193	Automatic mode activated			
109,94 m	881,58 m	09:00:35	2289	4	Streak - medium	medium + 0	
111,82 m	879,71 m	09:00:36	2293	2	Hazing - large	medium + 15	
112,71 m	878,81 m	09:00:37	2295	2	Splash - large	medium + 10	
114,71 m	876,81 m	09:00:38	2299	3	Streak - small	medium - 10	
117,24 m	874,28 m	09:00:39	2304	3	Structure - small	medium + 0	
127,24 m	864,28 m	09:00:49	2324	Repeat Length: Deviation: -3,45 mm = -1.09% expected: 314,00 mm			
966,54 m	24,99 m	09:07:11	3981	Reel change			
991,52 m	0,00 m	09:07:23	4031	Defect detection stopped			
991,52 m	0,00 m	09:07:23	4031	Report saved			

The meaning of the individual fields is described on the following page.

Explanation of the different sections:

- (a) Distance from Job Start**
The distance the event/defect occurred from the start of the job.
- (b) Distance from Reel End**
The distance the event/defect occurred from the end of the reel.
If the reel isn't finished yet, then the indicated value corresponds to the distance of the event/defect from the last stop of the report process.
- (c) Time**
The time the event/defect occurred at.
- (d) Repeat**
Number of the repeat during whose inspection the event/defect occurred.
- (e) Lane**
Lane in which the defect occurred.
- (f) Defect**
Type and size of the detected print defect

<u>Type:</u>	Structure:	Structure defect (mis-register, blur, smear)
	Splash:	Colour splash (spots, lacks, dirt)
	Hazing:	Fine colour tone variation
	Streak:	Strong colour tone variation (doctor streaks, scratches, dirt)
	Repeat Length:	Repeat length deviation (<i>Repeat Length Monitoring</i> function) Deviation = measured deviation of the repeat length in [mm] and [%] expected = Reference repeat length (setpoint repeat length)



Print defects of type *Repeat Length* are only displayed in the job report when the respective function is activated in the system settings (see chapter 9.3).

<u>Size:</u>	small	= small defect
	medium	= medium defect
	large	= large defect

g Sensitivity

Adjusted defect sensitivity at the time of the detection of the defect and magnitude of the change of sensitivity carried out during operation in Automatic Mode.

Sensitivity: low = low defect sensitivity
medium = medium defect sensitivity
high = high defect sensitivity

The defect sensitivity for each individual control area is set during setup of a new print job (see chapter 7.8.10.2).

Change of sensitivity: -50 ... +50

In Automatic Mode the adjusted defect sensitivities for the individual defect types can be changed independently of each other during operation in the range of -50% to +50%. The larger a set value is, the more sensitively the defect detection responds (see chapter 7.11.1.6).

h Defect Image

Defect image of the detected print defect.
Detected defects are marked using a colour frame.

i Event

Event report
(e.g. *Report started* or *Defect detection started*).

Maximum defect quantity

The number of defect entries that can be displayed in the job report is limited to the following value:

Number of defects per lane: max. 1,000

Sum of the saved defect

images for all lanes: max. 2,000



**If one of these values is exceeded, no more defects are displayed in the respective lane or no more defect images are saved.
The print defect defection continues to work unaffected by this.**

9 Repeat Length Monitoring

9.1 Description

The *Repeat Length Monitoring* function enables continuous monitoring of the repeat length during the printing process. In this manner, tendency toward deviation in the repeat length can be detected early.

The option automatically and continuously measures each repeat length printed and compares the value measured to the repeat length specified in the Job Setup. The repeat length measured and the deviation determined are displayed on the main screen.

If the repeat length measured is less or more than a tolerance range set in the system settings, this is signaled by an alarm indicator.

On request, the repeat length deviations determined can be transferred as defect entries in the defect history and job report. For documenting the print quality, the measurement result can also be logged in a file.

9.2 Requirements

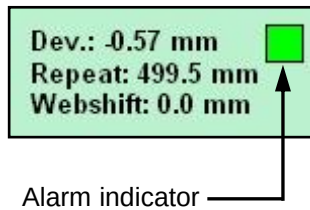
The following requirements must be ensured for achieving optimum measurement results:

- In step 3 of the job setup (*Capture Golden*) a reference image with a defect-free printed repeat was captured.
- During commissioning of the print defect detection system, BST service has carried out a calibration for the resolution in the Y direction (in web running direction).

9.3 Activation and basic settings

The activation and determination of the basic settings of the function is carried out in the system settings in the *Repeat Length Monitoring* menu (see chapter 10.4).

9.4 Display of the repeat length



When print defect detection is active, the measurement results of the *Repeat Length Monitoring* function are shown in the adjoining section of the tool bar.

Dev.: Repeat length deviation

Difference between the length of the printed repeat and the repeat length specified in the job setup

Repeat: Measured length of the printed repeat

If the measured repeat length is outside the specified tolerance limits then the colour of the alarm indicator changes to red. An arrow indicates if the repeat length measured is above or below the tolerance range.



Repeat is too long



Repeat is too short

10 System Settings

10.1 General

During commissioning the system is matched to its particular application using the system menus and auxiliary functions. Generally the system is supplied as part of a printing press. In this case, the basic project-dependent settings will already have been made in the factory. No further settings need be made in the system menus.

If system components are changed on site (e.g. a camera module), then, if necessary, settings are to be adjusted in individual system menus.



Attention!

Changing of parameters in the different system menus has a direct effect on the functioning and quality of print defect detection.

Therefore changing of system settings must only be carried out by BST service personnel or by trained service personnel from the machine manufacturer. For damages due to unauthorized use of the system menus, *BST International GmbH* will accept no liability.

10.2 Calling up auxiliary functions and system menus

Condition: - Print defect detection is stopped.



Press the adjoining button in the tool bar.

A button bar appears in the info window, with which the various auxiliary functions and system menus are called up.



Buttons, which would be used to activate auxiliary functions or system menus which are not available at the moment or the user logged in does not have any user rights, are greyed out.

The meaning of the individual buttons is described in the table on the following page.

Button	Function	Available for user type*
System Settings	Change basic system settings	T, A
Defect Detection Settings	Change basic print defect detection settings	T, A
Synchronisation	Activate locator and rewinder mode	O, T, A
Repeat Length Monitoring	Activate repeat length monitoring	O, T, A
GUI Configuration	Activate on-screen keyboard and Auto Login Function	T, A
Configuration Memory	Manage system configuration	T, A
Calibrate Camera Alignment	Calibrate camera alignment	T, A
Camera Test Mode	<i>Function is not available at the moment</i>	—
Diagnostics	Display messages generated by the system	O, T, A
User Administration	Add, edit or remove users	T, A
Operating Manual	Display operating manual	O, T, A
About	Display installed firmware versions	O, T, A
Exit	Exit system software	O, T, A
Special Functions	Activate special additional functions	A, T
OK	Close button bar	O, A, T

* O = Operator, T = Technician, A = Administrator



In the following chapters of this operating manual, only those functions will be described that are available for the user of the user type **Operator** or are required for the user administration of the system.

10.3 Synchronisation

Synchronisation

Activation of the locator and the rewinder mode.

1. Press the **Synchronisation** button in the info window.
The following menu appears on the screen:



2. Carry out the desired settings in the menu (see chapter 10.3.1 to 10.3.2).
3.  Press the **OK** button at the lower edge of the window. The modified settings are saved.

10.3.1 Enable locator

Enable Locator



This checkbox is used to activate the locator function in web running direction.

The print defect detection system is equipped with an image stabiliser (*Locator*), which compensates to pixel accuracy, image displacement in and across the web running direction caused by transverse movement of the web or web tension variations, using electronic image position correction.

When printing endless materials, where their print image information do not allow image position correction in web running direction (e.g. paper hangings with longitudinal strips), the locator function in web running direction can be deactivated.

10.3.2 Enable rewinder mode

Enable Rewinder mode



When using the print defect detection system on a rewinder this checkbox is used to activate a special synchronisation mode for which an external reset signal is used to synchronise the system with the rewinder.



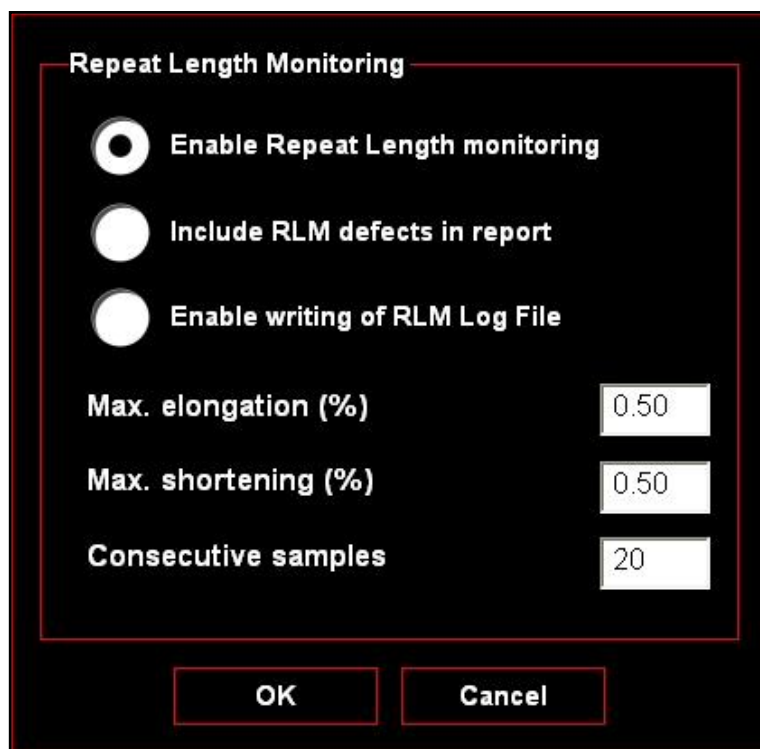
Activation of the rewinder mode is carried out during commissioning of the system by BST Service.

10.4 Repeat Length Monitoring

Repeat Length Monitoring

Activation of the *Repeat Length Monitoring* function and determining the basic settings.

1. Press the **Repeat Length Monitoring** button in the info window. The following menu appears on the screen:



Repeat Length Monitoring

☒ **Enable Repeat Length monitoring**

☐ **Include RLM defects in report**

☐ **Enable writing of RLM Log File**

Max. elongation (%)

Max. shortening (%)

Consecutive samples

OK **Cancel**

2. Carry out the desired settings in the menu (see chapter 10.4.2.1 to 10.4.2.4).
3. Exit the menu using the two buttons at the lower edge of the window.

OK

Close the menu.
The modified settings are saved.

Cancel

Close the menu, without saving the modified settings.

10.4.1 Activate repeat length monitoring



Enable Repeat Length monitoring

To activate the *Repeat Length Monitoring* function, activate the checkbox above.



If the checkbox is deactivated, all other checkboxes and editing fields of the menu cannot be edited.

When the print defect detection is activated, the value determined for the repeat length deviation and the measured repeat length are displayed in the tool bar (see chapter 9.4).

10.4.2 Perform basic settings

10.4.2.1 Include RLM defects in report



Include RLM defects in report

This checkbox is used to determine if the defect type *Repeat Length* is shown in the job report and in the defect history.

Checkbox is deactivated (factory setting)

- Defects of type *Repeat Length* **are not** displayed in the job report and in the defect history.

Checkbox is activated

- Defects of type *Repeat Length* are displayed in the job report and in the defect history.

10.4.2.2 Activate logging of the measurement results



Enable writing of RLM Log File

The logging of the measurement results is activated with this checkbox.

When the repeat length monitoring is activated, the function continuously saves all measurement results in a file that can be used, for example, as verification for the print quality. In doing so, a separate file is created for each roll.

The files generated are saved on the directory **D:\Log**.
The file name cannot be selected by the user, but is instead set by the system.

The file name supports the following conventions:

[job name]_[job number]_[ReelXXX].txt
XXX = reel number

File name example:
job01_22_Reel001.txt

The following information is saved in the file:

- Running web meter [m]
- Repeat number
- Web speed [m/min]
- Repeat length [mm]

10.4.2.3 Determine tolerance limits

Max. elongation (%)

0.50

Max. shortening (%)

0.50

The tolerance limits for the repeat length monitoring are determined with both editing boxes. The entry of the limit values is carried out in percent with relation to the set print repeat length.

Max. elongation (%): maximum permissible repeat length

Max. shortening (%): minimum permissible repeat length

10.4.2.4 Determine the number of repeats for the average value calculation

Consecutive samples

20

When determining the repeat length, the system forms an average value from the measured lengths of the last repeats printed. The number of repeats for the average value calculation is determined in the editing box.

Adjustment range: 1 ... 100



In order to minimize the fluctuations during repeat length monitoring for the measurement result, caused by synchronisation, we recommend carrying out an average value calculation over several repeats.

10.5 GUI Configuration

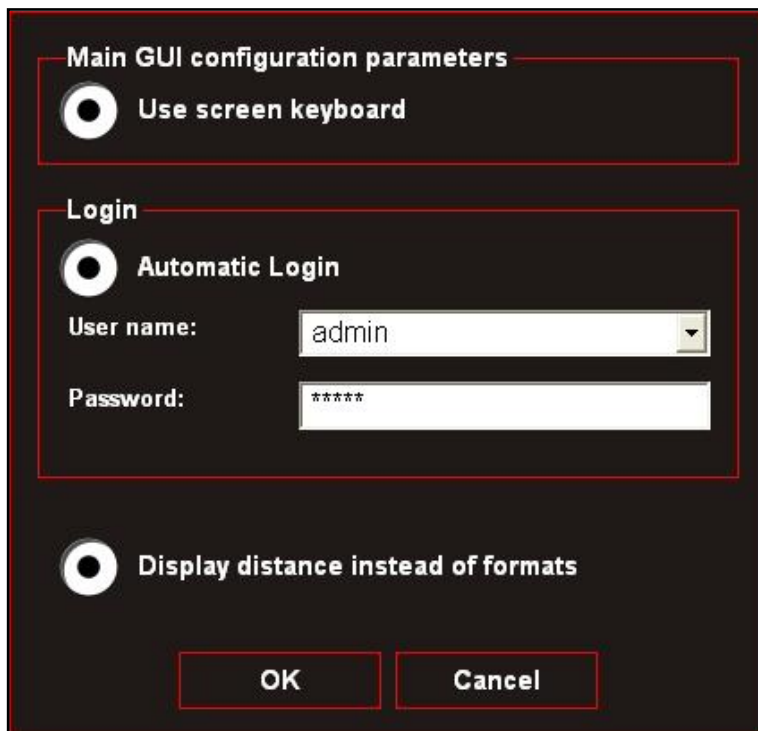
GUI Configuration

Activation of the on-screen keyboard and the Auto Login Function.



The **GUI Configuration** menu is only available for the user of the user type **Technician** or **Administrator**.

1. Press the **GUI Configuration** button in the info window.
The following menu appears on the screen:



The screenshot shows a dark-themed configuration window titled "Main GUI configuration parameters". It contains three sections:

- Use screen keyboard**: A radio button that is currently selected.
- Login**: A section containing:
 - Automatic Login**: A radio button that is currently selected.
 - User name:** A text field with "admin" and a dropdown arrow.
 - Password:** A text field with "*****".
- Display distance instead of formats**: A radio button that is currently unselected.

 At the bottom are two buttons: "OK" and "Cancel".

2. Carry out the desired settings in the menu (see chapter 10.5.1 to 10.5.3).
3. Exit the menu using the two buttons at the lower edge of the window.

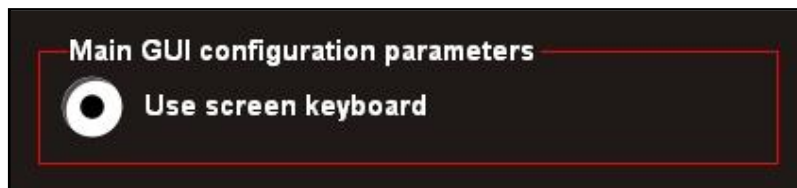
OK

Close the menu.
The modified settings are saved.

Cancel

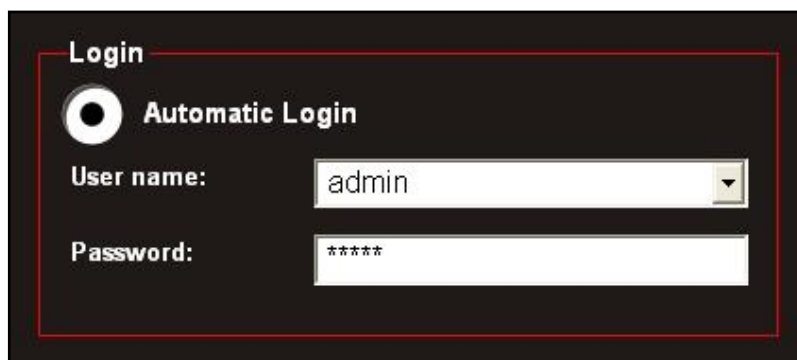
Close the menu, without saving the modified settings.

10.5.1 Activate on-screen keyboard



If this checkbox is activated, then after touching an editing box on the touch screen, an input keyboard is superimposed with which the operator can enter the desired characters into the selected editing box.

10.5.2 Activate Auto Login Function



If the *Auto Login Function* is activated, a pre-set user is automatically logged in each time when the system is started.



With activated *Auto Login Function*, each operator has access to all functions that are available for the user that has been logged in automatically! If, e.g. the Administrator is logged in automatically, all users have an unrestricted access to all auxiliary functions and system settings.

Activate Auto Login Function:

1. Select the user from the ***User name*** option list, that should be automatically logged in when the system starts.
2. Enter the password for the selected user into the ***Password*** editing box.
3. Activate ***Automatic Login*** checkbox.

10.5.3 Display distance instead of formats



Display distance instead of formats

If this checkbox is activated, in the display of the inspection results in the operating mode *Automatic Mode* or *Defect History* the number of checked reel meters appears instead of the number of checked repeats (see chapter 7.11.1.8).

10.6 Configuration memory

Configuration Memory

Function for saving and calling back up (loading) the system settings.

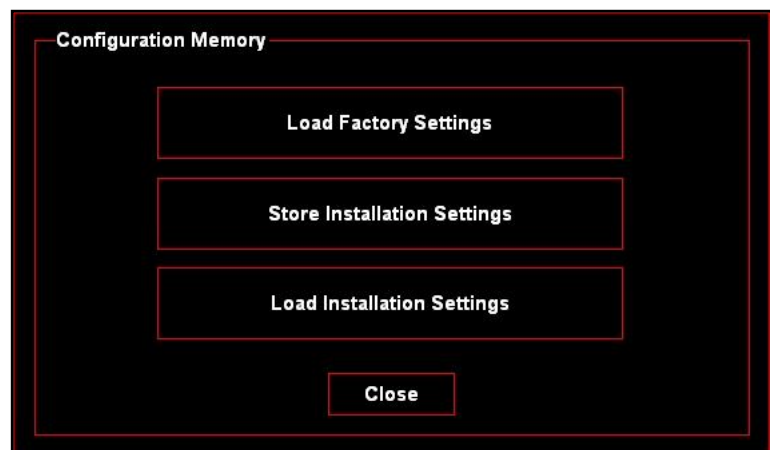


The **Configuration Memory** function is only available for the **Administrator** and **Technician** users. Saving and loading of system settings must only be carried out by trained specialist personnel or BST service.



The **Configuration Memory** function can, e.g. be used to save the customer specific installation settings that deviate from the factory settings after commissioning the system.

1. Press the **Configuration Memory** button in the info window. The following selection window appears:



2. Start the desired action by pressing the corresponding button in the window.

Load Factory Settings

Press the **Load Factory Settings** button.

The following confirmation request appears on the screen:

Are you sure you want to set the system back to factory defaults?

Yes

No

“Are you sure you want to set the system back to factory defaults?”

After pressing the **Yes** button, the current parameter values in the system settings are overwritten with the factory settings.

Store Installation Settings

Press the **Save Installation Settings** button.

The following confirmation request appears on the screen:

Are you sure to save current system configuration settings?

Yes

No

“Are you sure to save current system configuration settings?”

After pressing the **Yes** button, the current parameter values in the system settings are saved permanently in a database. In doing so the installation settings saved in the data base are overwritten with the current settings.

The saved settings remain unchanged, even after the system has been switched off and can be loaded again when required using the **Load Installation Settings** function.

Load Installation Settings

Press the **Load Installation Settings** button.

The following confirmation request appears on the screen:

Are you sure to load previously stored system configuration settings?

Yes

No

“Are you sure to load previously stored system configuration settings?”

After pressing the **Yes** button, the current parameter values in the system settings are overwritten by the saved installation settings.

10.7 Diagnostics

Diagnostics

Using the diagnostic function, all warning, information, service and error messages generated by the system during operation can be displayed on the screen.

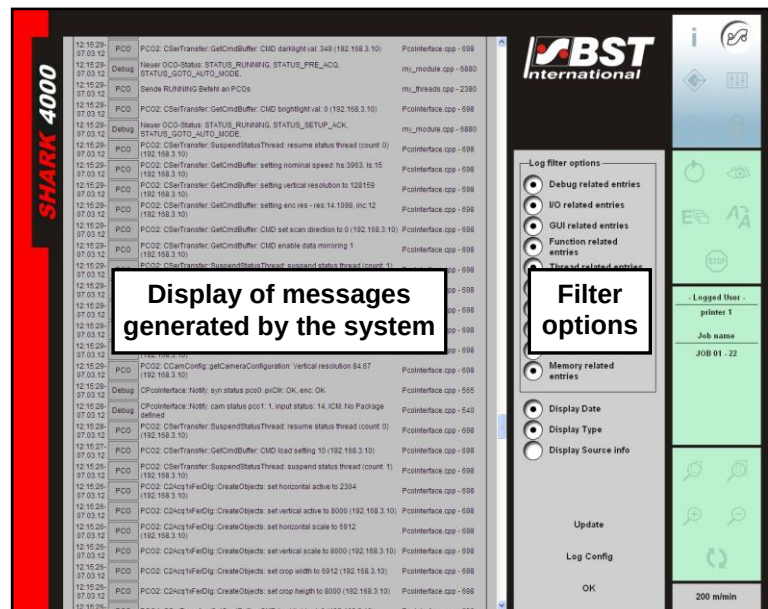
Where error messages or problems occur that cannot be rectified by the customer alone, the listed information makes it easier for BST Service personnel to carry out troubleshooting.



Reading-out the generated system messages using the diagnostic function should only be performed by the support of the BST Service (e.g. in the scope of remote maintenance carried out by telephone).

Display system messages:

1. Press the **Diagnostics** button in the info window.
The following display appears on the screen:



After calling up the diagnostic functions for the first time, no system messages will be shown in the display window.
The display must be updated first (see step 3).

2. Select the desired filter options by activating the corresponding checkboxes in the info window.



If filter options are changed, the display of the system messages must be updated to enable the changes to take effect.

3. **Update** Press the **Update** button in the info window.

The messages generated by the system are listed in the display window. The time (*time and date*) when each event has occurred appears in front of each message.

Use the scroll bar on the right side of the display window to scroll up and down the screen in view as the listing of the system messages will be longer than the height of the display window in many cases.

4. To quit the diagnostic functions, press the **OK** button in the info window.

10.8 User administrator

User Administration

Adding, editing and removing of users.



The **User administration** menu is only available for users of the user type **Technician** or **Administrator**.

10.8.1 General

The *SHARK 4000* user administration differentiates between three user types (*Technician*, *Administrator*, *Operator*) with different user rights.

When creating a new user, the administrator of the system allocates the user with one of three user types and thus determines his user rights (see chapter 10.8.3).

The three user types with the corresponding user rights are shown in the following table.

User Type	User Rights	Default Password
Operator	Access to auxiliary functions	
Technician (tech)	- Unlimited access to <u>all</u> available auxiliary functions and system settings - Adding, editing and removing of users	
Administrator (admin)	- Unlimited access to <u>all</u> available auxiliary functions and system settings - Adding, editing and removing of users	ADMIN

Each user is provided with his own password, that is assigned when creating the user (see chapter 10.8.3).



Only use the indicated default password for the user type *Administrator* for the first login of this user type. Enter a new password after the first login. This protects the system settings against unauthorized access.



Make sure that the passwords are only known to the authorized personnel!
***BST International GmbH* is not liable for damage arising from the incorrect use of the passwords.**

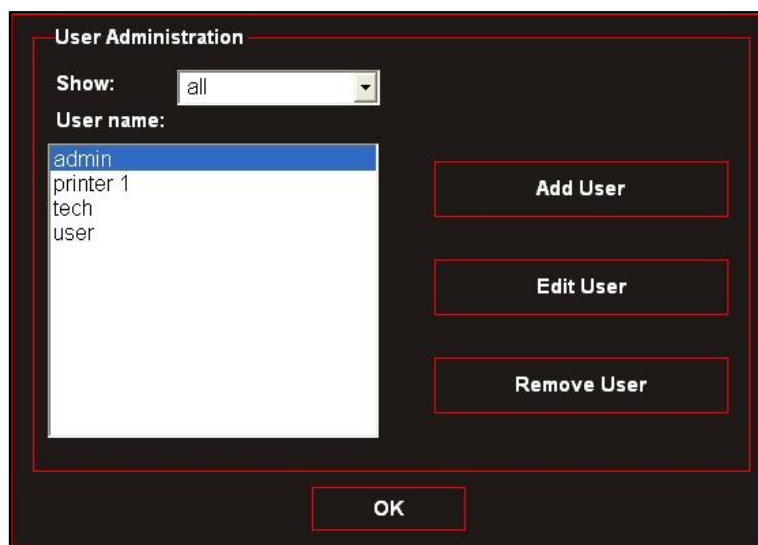
10.8.2 Open user administration

Conditions:

- Print defect detection is stopped.
- An user of user type *Technician* or *Administrator* is logged in.

Procedure:

1. Press the **User Administration** button in the info window.
The **User Administration** menu appears on the screen.



The menu offers the following possibilities for administrating users:

- Adding a new user (see chapter 10.8.3)
- Editing the user data of an existing user (see chapter 10.8.4)
- Removing an existing user (see chapter 10.8.5)

2. Select the desired user type from the **Show** option list.



The following display options can be selected:

- *all*
- *only admins*
- *only techs*
- *only operators*

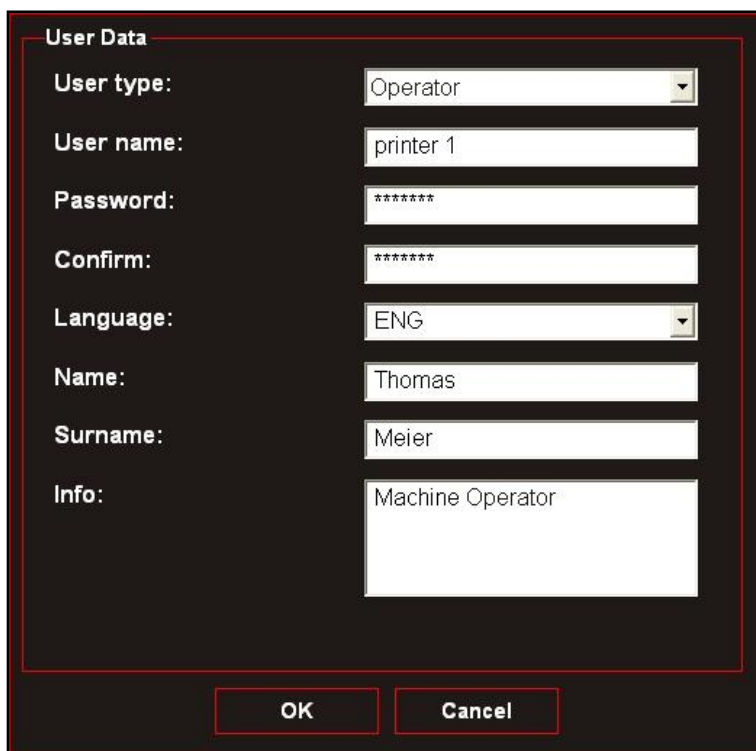
Only users of the selected user type are displayed in the **User name** list.

10.8.3 Adding a new user

Procedure:

1. Open user administration (see chapter 10.8.2).
2.  Press the **Add User** button in the **User administration** menu.

The **User Data** menu appears on the screen.



The screenshot shows the 'User Data' menu with the following fields:

- User type:** Operator (dropdown menu)
- User name:** printer 1 (text box)
- Password:** ***** (password box)
- Confirm:** ***** (password box)
- Language:** ENG (dropdown menu)
- Name:** Thomas (text box)
- Surname:** Meier (text box)
- Info:** Machine Operator (text box)

At the bottom of the menu are two buttons: **OK** and **Cancel**.

Using the editing boxes and option lists of this menu, the user data is determined for the new user.
The meaning of the individual fields is described below.

User type



The screenshot shows the 'User type' dropdown menu with the following options:

- Operator
- Administrator
- Technician
- Operator (highlighted)

Selection of the user type for the new user.
This selection determines which user rights the new user has.
The user rights of the three user types can be obtained from the table in chapter 10.8.1.

Adjustment range: *Administrator, Technician, Operator*

User name

User name:

User name of the new user.
The user name entered here appears in the user administration.



This editing box must be filled in without fail!

Password

Password:

Password for the new user.
The password entered here must be entered by the user when logging into the system.



This editing box must be filled in without fail!

Confirm

Confirm:

Repeat the password entry (password confirmation).



This editing box must be filled in without fail!

Language

Language:

ENG

DEU
ENG
ESP
FRA
ITA
TUR

Selection of the operating language
(language of the user interface).

Adjustment range:

DEU	(German)
ENG	(English)
ESP	(Spanish)
FRA	(French)
ITA	(Italian)
TUR	(Turkish)

Name

Name:

Firstname of the new operator.

Surname

Surname:

Surname of the new operator.

Info

Info:

General information regarding the new operator.

3. Exit the **User Data** menu using the two buttons at the lower edge of the window.

OK

Close the menu.

The user data entered for the new user are saved.

The display will change back to the **User Administration** menu.

The new user name appears in the **User name** list.

Cancel

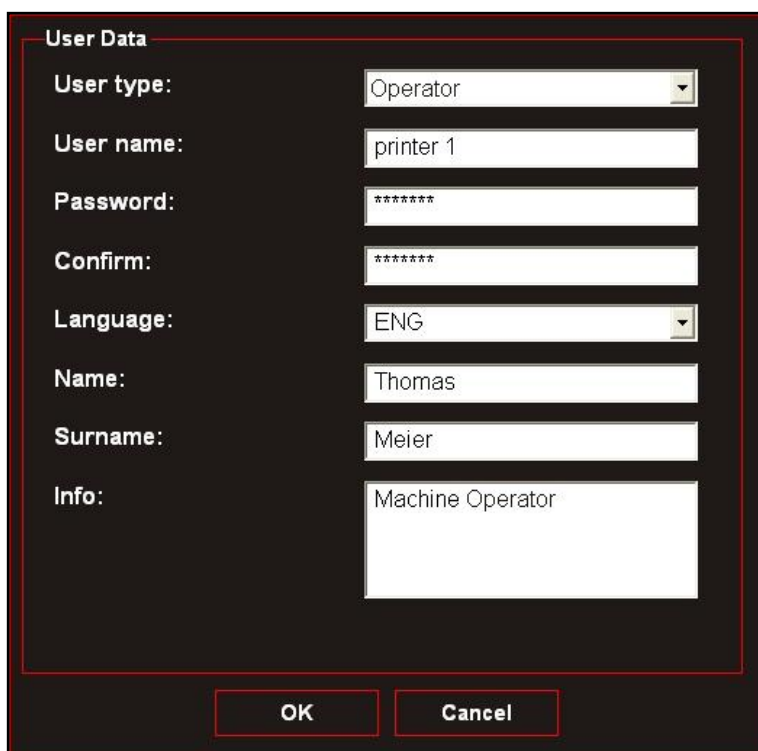
Close the menu, without saving the entered user data.

10.8.4 Edit user data

Procedure:

1. Open user administration (see chapter 10.8.2).
2.  Press the **Edit User** button in the **User Administration** menu.

The **User Data** menu appears on the screen.



The screenshot shows the 'User Data' menu with the following fields and values:

Field	Value
User type:	Operator
User name:	printer 1
Password:	*****
Confirm:	*****
Language:	ENG
Name:	Thomas
Surname:	Meier
Info:	Machine Operator

At the bottom of the menu are two buttons: **OK** and **Cancel**.

The meaning of the individual editing boxes and option lists is described in detail in chapter 10.8.3.

3. Carry out the desired changes in the respective editing boxes and option lists.
4. Enter password in the **Confirm** editing box.
5. Exit **User Data** menu using the two buttons at the lower edge of the window.

 Close the menu.
The modified user data are saved.
The display will change back to the **User Administration** menu.

 Close the menu, without saving the modified user data.

10.8.5 Remove user

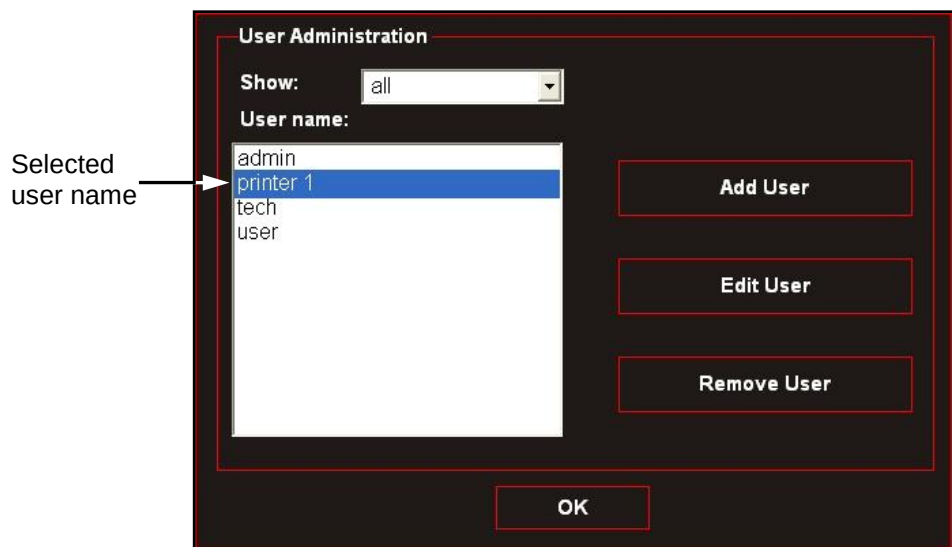


The button **Remove User** is only active if a user of the type **Administrator** is logged on to the system.

The user with the user name **admin** cannot be removed.

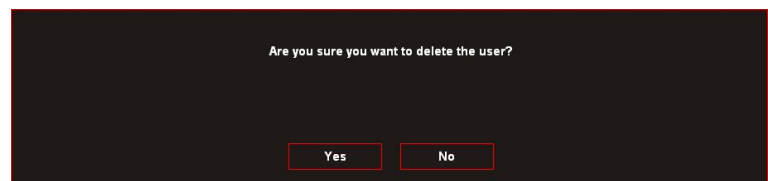
Procedure:

1. Open user administration (see chapter 10.8.2).
2. Select the user name of the user that should be removed from the **User name** options list.
The selected user name is highlighted in blue.



3.  Press the **Remove User** button.

The following safety query appears on the screen:



"Are you sure you want to delete the user?"

Press the **Yes** button.

The selected user name is removed from the **User name** list.

4.  To exit the **User Administration** menu, press the **OK** button at the lower edge of the window.

10.9 Display firmware versions

About

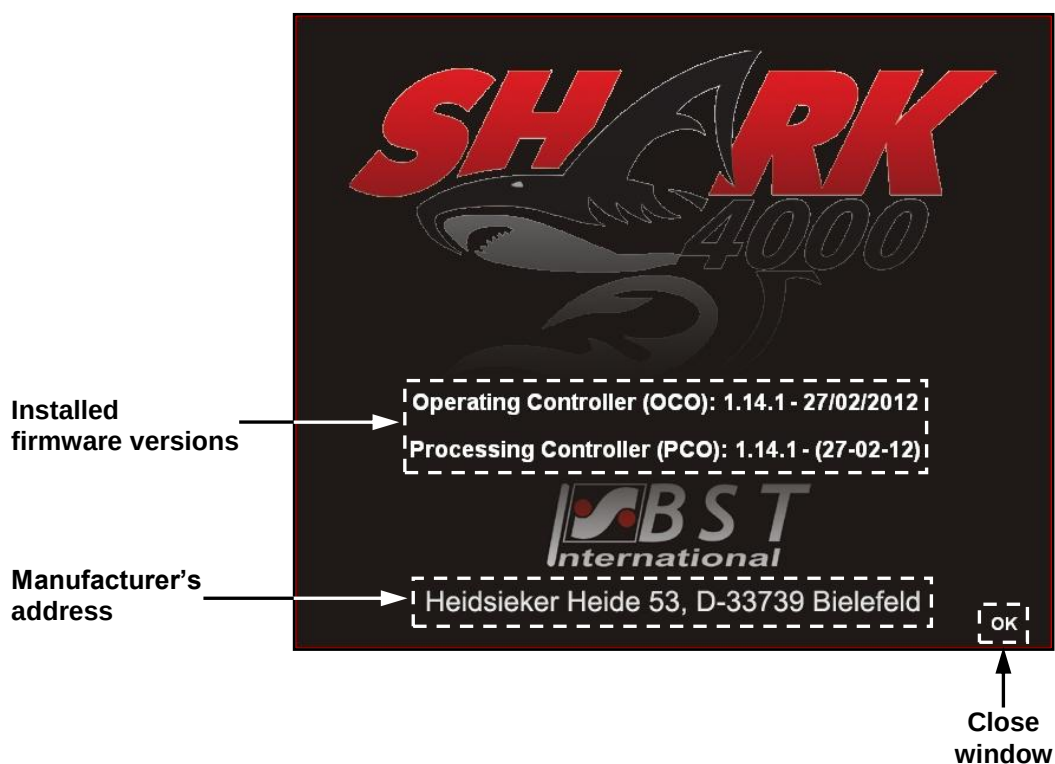
Display of the installed firmware versions for the operation controller (OCO) and the image processing controllers (PCOs).



Where error messages or problems occur that cannot be rectified by the customer alone, and therefore require support from *BST International GmbH*, please have the installed firmware versions ready.

Display firmware versions:

1. Press the **About** button in the info window.
The following menu appears on the screen:



2. To close the window, press the **OK** button on the right lower edge of the window.

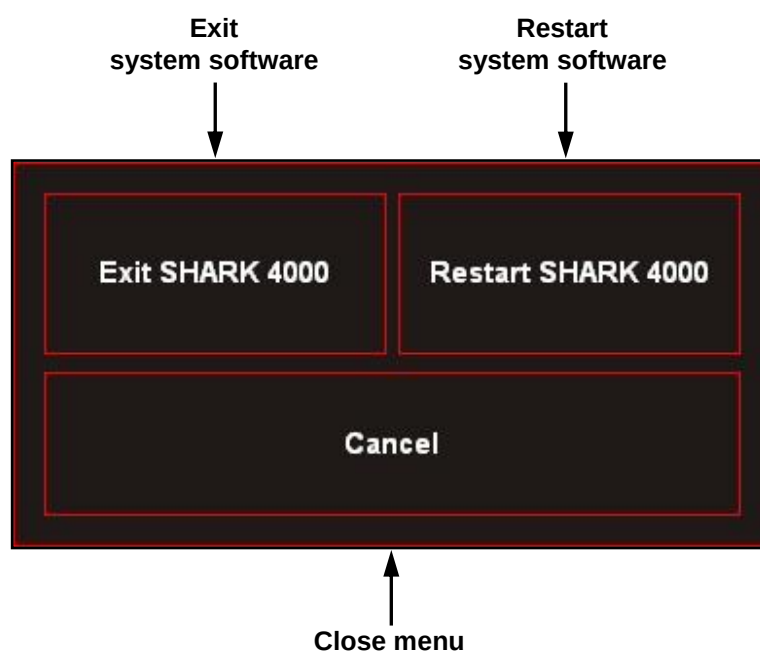
10.10 Exit system software

Exit

Exit system software.

Procedure:

1. Press the **Exit** button in the info window.
The following menu appears on the screen.
The system software is quit or restarted using the two upper buttons.



2. Press the **Cancel** button to close the window.

11 Trouble Shooting

WARNING	
	Incorrect troubleshooting can cause serious personal injuries or property damage. Malfunctions must only be repaired by qualified specialist personnel!

For handling faults and damages due to neglecting this provision, *BST International GmbH* will accept non liability.

11.1 System start-up

Fault	Possible cause	Solution
The system does not run up after being switched on.	- Local power supply is not turned on. - The main cable of the operating desk (OCO control cabinet) has not been plugged in. - The main cable of the operating desk (OCO control cabinet) is defective. - The circuit breaker in the operating desk (OCO control cabinet) has tripped. - The power unit of the operation controller (OCO) in the operating desk (OCO control cabinet) is defective. - Loose cable connections in the operating desk (OCO control cabinet).	- Turn on local power supply. - Connect the main cable. - Replace the main cable. - Reset the circuit breaker. - Replace the power unit (BST service). - Check the cable connections inside the operating desk.
Connection between the operation controller (OCO) and one or more image processing controller(s) (PCO) could not be made.	- The main cable has not been plugged in. - The main cable is defective. - The circuit breaker in the PCO control cabinet has tripped. - The power unit of one image processing controller (PCO) is defective. - Loose cable connections in the PCO control cabinet.	- Connect the main cable. - Replace the main cable. - Reset the circuit breaker. - Replace the power unit (BST service). - Check the cable connections inside the PCO control cabinet.

Fault	Possible cause	Solution
The screen of the touch screen monitor remains dark after the system has been switched on.	- The touch screen monitor has been set too dark. - The main cable of the touch screen monitor has not been connected. - The main cable of the touch screen monitor is defective. - The video signal cable of the touch screen monitor has not been connected. - The power unit of touch screen monitor is defective. - The touch screen monitor is defective.	- Reset the touch screen monitor brightness and contrast. See the separate monitor manufacturer's operating manual. - Connect the main cable of the touch screen monitor. - Replace the main cable of the touch screen monitor. - Connect the video signal cable of the touch screen monitor. - Replace the power unit. - Replace the touch screen monitor.
During the system start unusual error messages are displayed and the <i>SHARK 4000</i> system software fails to start automatically.	- Hardware components are not correctly configured. - Hardware components are not recognized. - The image of the operating controller (OCO) is defective.	- Write down the error message and inform BST service. - Check the configuration of the hardware components and correct if necessary (BST service). - Check that the cards in the operating controller (OCO) are firmly in place (BST service). - Reinstall the image (BST service).

11.2 Touchscreen operation

Fault	Possible Cause	Solution
The system is out of control or fails to respond to key operation on the touch screen monitor.	The touch screen has not been calibrated.	Calibrate the touch screen. See chapter 7.3.
The system does not respond to any key operation on the touch screen monitor.	- The touch screen connecting cable has not been plugged in. - The touch screen connecting cable is defective. - The touch screen monitor is defective.	- Connect the touch screen cable. - Replace the touch screen connecting cable. - Replace the touch screen monitor.

11.3 Image recording

Fault	Possible Cause	Solution
The image in the display window of the touch screen monitor is too dark.	• Illumination units (bright field illumination, dark field illumination, optional back light illumination) are not activated. • Intensity of the illumination units has been set too low. • Maximum magnification has been set for a dark image. • An illumination unit is defective. • LEDs of an illumination unit have reached the end of their useful life (approx. 10 000 h). • The dark/white calibration of the camera modules (ICM) was not performed correctly. • A camera module (ICM) is defective. • The camera unit is in maintenance position.	• Activate the illumination units (see chapters 7.8.6.2 to 7.8.6.4). • Increase intensity of the illumination units (see chapters 7.8.6.2 to 7.8.6.4). • Reduce the magnification. See chapter 7.7.2. • Replace the defective illumination unit (BST service). • Replace the illumination unit (BST service). • Carry out dark/white calibration (BST service). • Replace the camera module (BST service). • Swivel the camera unit into the inspection position. See chapter 12.3.2.3 or 12.3.3.3).
The image in the display window of the touch screen monitor is too bright.	• Intensity of the illumination units has been set too high. • Maximum magnification has been set for a white image.	• Reduce intensity of the illumination units (see chapters 7.8.6.2 to 7.8.6.4). • Reduce the magnification. See chapter 7.7.2.
The image in the display window of the touch screen monitor is unevenly illuminated. Transitions between the camera modules are visible.	• The dark/white calibration of the camera modules (ICM) was not performed correctly. • An illumination unit is defective.	• Carry out dark/white calibration (BST service). • Replace the defective illumination unit (BST service).
The image in the display window of the touch screen monitor contains vertical streaks.	• The camera viewing window of one camera module (ICM) is dirty. • The diffuser pane of one illumination unit is dirty. • Defective LED of an illumination unit.	• Clean the camera viewing windows of all camera modules. See chapter 12.4.2. • Clean the diffuser panes of all illumination units. See chapter 12.4.2. • Replace the illumination unit (BST service).

Fault	Possible Cause	Solution
The image in the display window of the touch screen monitor is displayed with horizontal stripes or the image is distorted.	Signal transfer via the data cables of the camera modules (ICM) is disturbed by external interference (e.g. from nearby high-voltage cables or the machine's frequency converter).	Check the routing of the data cables of the camera modules. Lay the data cable again if necessary.
The colours in the display window of the touch screen monitor are displaced (similar to a register error).	The web running direction has not been set correctly.	Set the web running direction in the Job Setup. See chapter 7.8.5.3.
The image in the display window of the touch screen monitor is mirrored.	No fault.	- Check the web threading. - Check the settings in the system setup.
The image of the print motive shown in the display window of the touch screen monitor is upside down.	The web running direction has not been set correctly.	Set the web running direction in the Job Setup. See chapter 7.8.5.3.
The image in the display window of the touch screen monitor is wavy, starts to move or is distorted.	An electrical unit that emits a strong magnetic field has been placed too close to the touch screen monitor.	- Remove the unit that emits strong magnetic fields. - Reposition the operating desk (OCO control cabinet).
The image in the display window of the touch screen monitor is fuzzy / unsharp.	- The camera viewing window of a camera module (ICM) is dirty. - The camera unit is not positioned exactly parallel to the web or the distance between the web and the camera unit is incorrect.	- Clean the camera viewing window of all camera modules. See chapter 12.4.2. - Check that the camera unit is installed correctly.
The image on the complete touch screen monitor is distorted.	The touch screen monitor has not been set up correctly.	Reset the touch screen monitor. See separate monitor manufacturer's operating manual.
Shadowing on the image in the display window of the touch screen monitor.	- During inspection of transparent material the optional backlight illumination is not active. - The intensity of the optional back light illumination has been set too low.	- Activate optional back light illumination. See chapter 7.8.6.4. - Increase intensity of the optional back light illumination. See chapter 7.8.6.4.

Fault	Possible Cause	Solution
The print defect detection (image recording) cannot be started. An error message appears on the screen.	• The data cable of a camera module (ICM) has not been plugged in correctly. • The data cable of a camera module (ICM) has not been plugged in. • The data cable of a camera module (ICM) is defective. • The power supply cable of a camera module (ICM) has not been plugged in. • The power supply cable of a camera module (ICM) is defective. • A camera module (ICM) is defective. • The power unit of a camera module (ICM) is defective. • The frame grabber is defective.	• Check connection of the data cables to the camera modules and the image processing controller (PCO). • Connect the data cable to the camera module and the image processing controller (PCO). • Replace the data cable. • Connect the power supply cable to the camera module. • Replace the power supply cable. • Replace the defective camera module (BST service). • Replace the power unit in the PCO control cabinet (BST service). • Replace the image processing controller (PCO) (BST service).

11.4 Operation

Fault	Possible Cause	Solution
In the operating mode <i>Defect History</i> no defect images are displayed for selected defects.	• Maximum number of defects per lane or per reel was exceeded. No further defect images are saved.	• End job report and re-start. See chapters 8.9 and 8.5.
In the event and flaw list of the job report no defect images are displayed after a particular point in time.	• Maximum number of defects per lane or per reel was exceeded. No further defect images are saved.	• End job report and re-start. See chapters 8.9 and 8.5.
The print defect detection is automatically stopped.	• Maximum number of defects per job was exceeded.	• End job report and re-start. See chapters 8.9 and 8.5.

11.5 Synchronisation

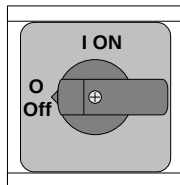
Fault	Possible cause	Solution
The image in the display window of the touch screen monitor is running free.	- Encoder is incorrectly fitted. - Slip between the web of material and roller on which the encoder is mounted. - Slip between the web of material and the friction wheel encoder. - The coupling between the encoder and the machine shaft has come loose.	- Fit the encoder on a shaft of the machine that runs synchronously with the web feed. - Ensure that the encoder is aligned correctly and then secure it in place. - Fit a press roller. - Check the contact pressure of the friction wheel and correct if necessary. - Replace the friction wheel. - Check the coupling.
The image in the display window of the touch screen monitor "pumps" (shrinking and expanding of the image in the web running direction).	- Slip between the web of material and roller on which the encoder is mounted. - The coupling between the encoder and the machine shaft is defective. - Slip between the web of material and the friction wheel encoder.	- Fit a press roller. - Replace the coupling. - Check the contact pressure of the friction wheel and correct if necessary. - Replace the friction wheel.
The images in the two comparison windows are displayed offset in the web running direction (position error).	Image information is insufficient to determine the position (locator defect).	Redefine the repeat borders in the Job Setup. See chapter 7.8.8.

12 Maintenance

12.1 General

WARNING	
	Incorrect maintenance of the <i>SHARK 4000</i> 100% real time print defect detection system can cause serious personal injuries or property damage. Maintenance of the <i>SHARK 4000</i> 100% real time print defect detection system must be carried out only by qualified specialist personnel!

For handling faults and damages due to neglecting this provision, *BST International GmbH* will accept non liability.

WARNING	
	Life-threatening electrical voltage can lead to death or cause severe personal injuries due to electric shocks. Before any maintenance or cleaning work ensure the system is electrically isolated and at zero potential. - Turn off the system with the main switch <u>on the operating desk</u>. Make sure that the lights on the main switch are off.  - Switch the system free of voltage using the black service switch <u>inside</u> the PCO control cabinet. Turn the service switch to the OFF position. Make sure that the service switch cannot be switched on again.  - Switch off the automatic circuit breaker <u>inside the operating desk</u>. To do this move the switch to position "O" (bottom switch position). Make sure that the circuit breaker cannot be switched on again.  - Wait 10 minutes, to allow dangerous residual voltages in the mains filter and capacitors to discharge. - Check the equipment is voltage-free. - Ground the system. - Cover or shield any adjacent parts that are still live. The maintenance or the cleaning of the system must only take place, after carrying out these steps (exception: functional test of the ventilators, see chapter 12.5.2).

WARNING	
	Sharp edges of moving webs of material may cause severe cutting injuries. • Stop the printing press before carrying out repair or maintenance work. Secure the printing press against reactivation. • Never touch the edges of moving webs of material!

12.2 Maintenance schedule

The maintenance or cleaning intervals specified in the maintenance schedule depend on the ambient conditions at the installation site.
If the customer is processing very dusty materials then the maintenance/cleaning intervals must be reduced accordingly.



To ensure correct and lasting functioning of the print defect detection system, the maintenance intervals specified in the maintenance schedule must be observed without fail!

System component	Maintenance work	Maintenance interval	See chapter
Camera module(s)	- Clean housing	1 week	12.4.1
	- Clean camera viewing window	1 week	12.4.2
	- Clean diffuser panes of the illumination units	1 week	12.4.2
	- Replace illumination units (BST service)	approx. 10 000 h	12.4.3
Back light illumination (option)	- Clean housing	1 week	12.4.1
	- Clean the diffuser panes	1 week	12.4.2
	- Replace illumination units (BST service)	approx. 10 000 h	12.4.3
Control cabinets	- Clean housing	1 week	12.5.1
	- Check function of the ventilators	1 month	12.5.2
	- Clean/replace filter mats of the ventilators	1 month	12.5.3
Operation controller (OCO)	- Clean/replace filter mat of the ventilator	1 month	12.6.1
	- Replace hard disks	2 years	12.6.2
Image processing controller (PCO)	- Clean/replace filter mat of the ventilator	1 month	12.7.1
Touch screen monitor	- Clean screen	1 week	12.8
Encoder/ Friction wheel encoder	- Clean housing	1 week	12.9.1
	- Check friction wheel (friction wheel encoder)	1 week	12.9.2

12.3 Maintenance position of the camera unit

12.3.1 Versions of the camera unit

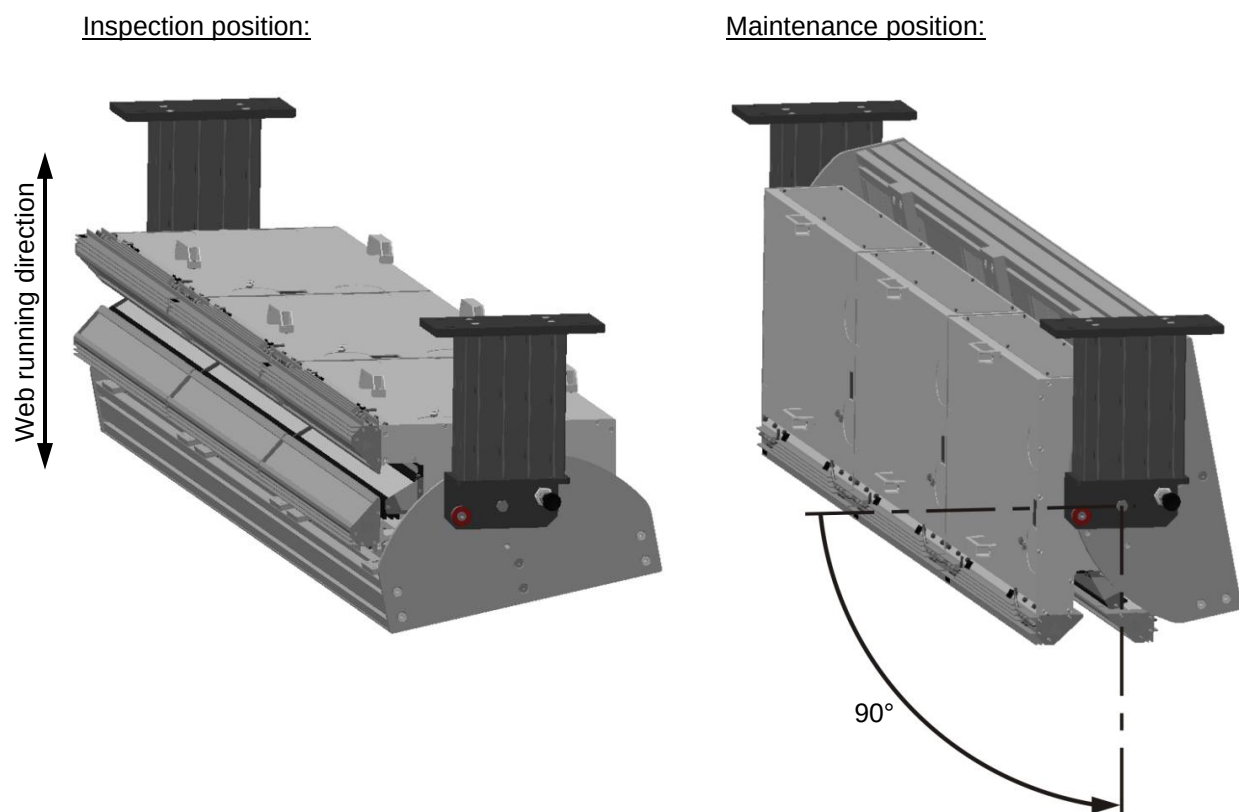
The *SHARK 4000* camera unit is available in two versions:

- Camera unit without sliding unit (standard)
- Camera unit with sliding unit (option)

12.3.2 Camera unit without sliding unit (standard)

12.3.2.1 Maintenance position

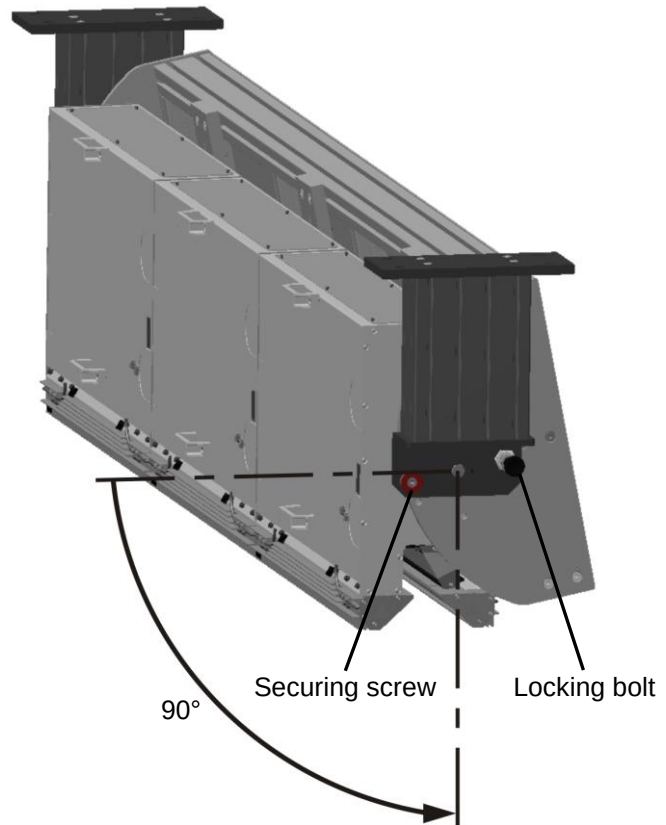
The standard camera unit without sliding unit is mounted pivoted in the mounting point. For maintenance work it is pivoted by 90° into the maintenance position. In this position the illumination units of the camera modules are freely accessible and can be cleaned.



The procedure for setting the maintenance or inspection position is described in chapters 12.3.2.2 and 12.3.2.3.

12.3.2.2 Setting the maintenance position

Maintenance position:



WARNING



Loitering in the swiveling area of the camera unit

may lead to personal injury caused by crushing, cutting, entrapment und impacts on limbs.

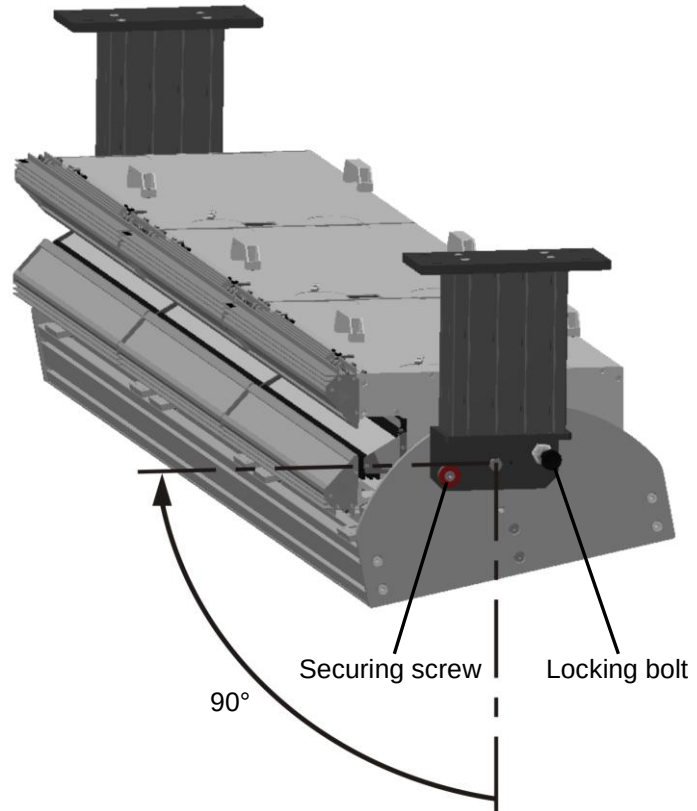
- Before swiveling the camera unit ensure that no persons are present in the swiveling area of the camera unit.

Procedure:

1. Unscrew the securing screw (knurled screw) on both sides of the camera unit.
2. Unlock the locking bolts on both sides of the camera unit. For this purpose pull out the locking bolts and turn by 90°. The bolts are fixed in the unlocked position.
3. Carefully swivel the camera unit by 90° into the maintenance position.
4. Lock the locking bolts on both sides of the camera unit into place. For this purpose turn the bolts by 90°.

12.3.2.3 Setting the inspection position

Inspection position:



WARNING



Loitering in the swiveling area of the camera unit

may lead to personal injury caused by crushing, cutting, entrapment und impacts on limbs.

- Before swiveling the camera unit ensure that no persons are present in the swiveling area of the camera unit.

Procedure:

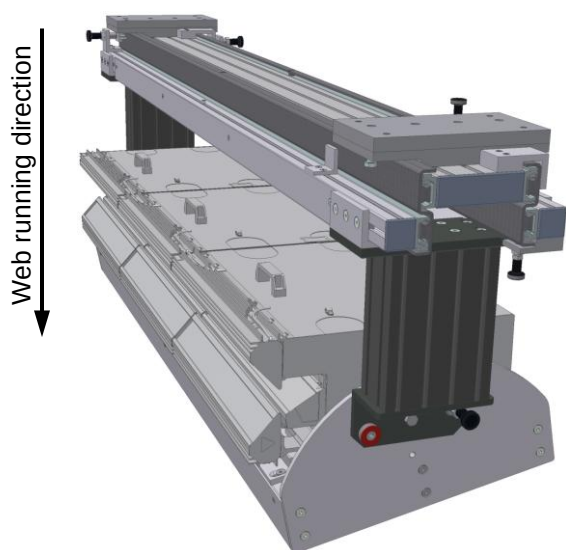
1. Unlock the locking bolts on both sides of the camera unit. For this purpose pull out the locking bolts and turn by 90°. The bolts are fixed in the unlocked position.
2. Carefully swivel the camera unit by 90° into the inspection position.
3. Lock the locking bolts on both sides of the camera unit into place. For this purpose turn the bolts by 90°.
4. Screw in the securing screw (knurled screw) on both sides of the camera unit.

12.3.3 Camera unit with sliding unit (option)

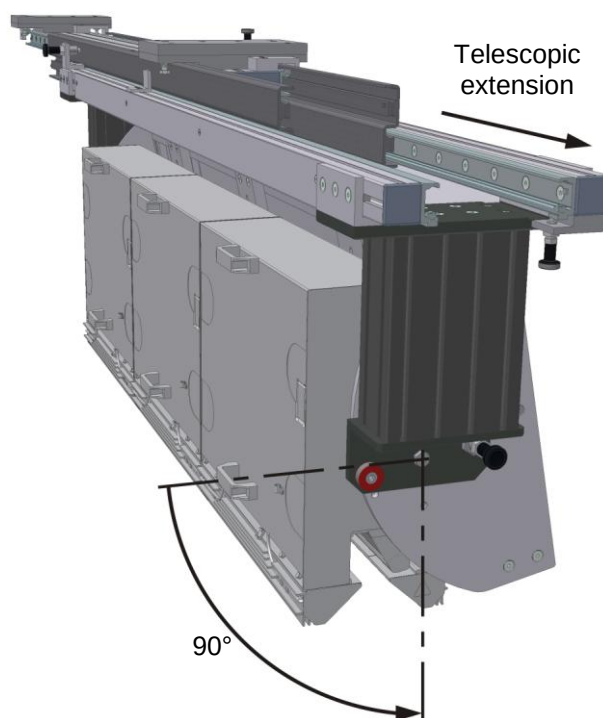
12.3.3.1 Maintenance position

The camera unit with an optional sliding unit is fitted with a two-stage telescopic extension. For maintenance work the complete camera unit is pulled out of the side of the printing press and swiveled by 90° into the maintenance position. In the maintenance position the lighting units of the camera modules are freely accessible and can be cleaned.

Inspection position:

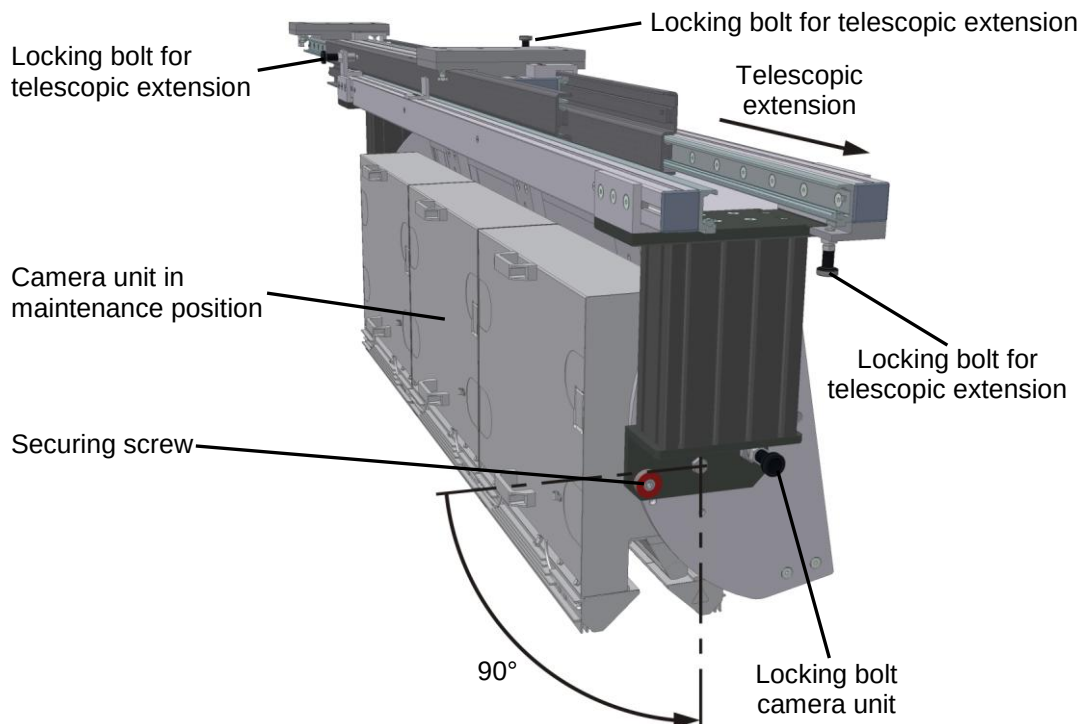


Maintenance position:



The procedure for setting the maintenance or inspection position is described in chapters 12.3.3.2 and 12.3.3.3.

12.3.3.2 Setting the maintenance position



WARNING



Loitering in the traversing area of the telescopic extension and in the swiveling area of the camera unit

may lead to personal injury caused by crushing, cutting, entrapment and impacts on limbs.

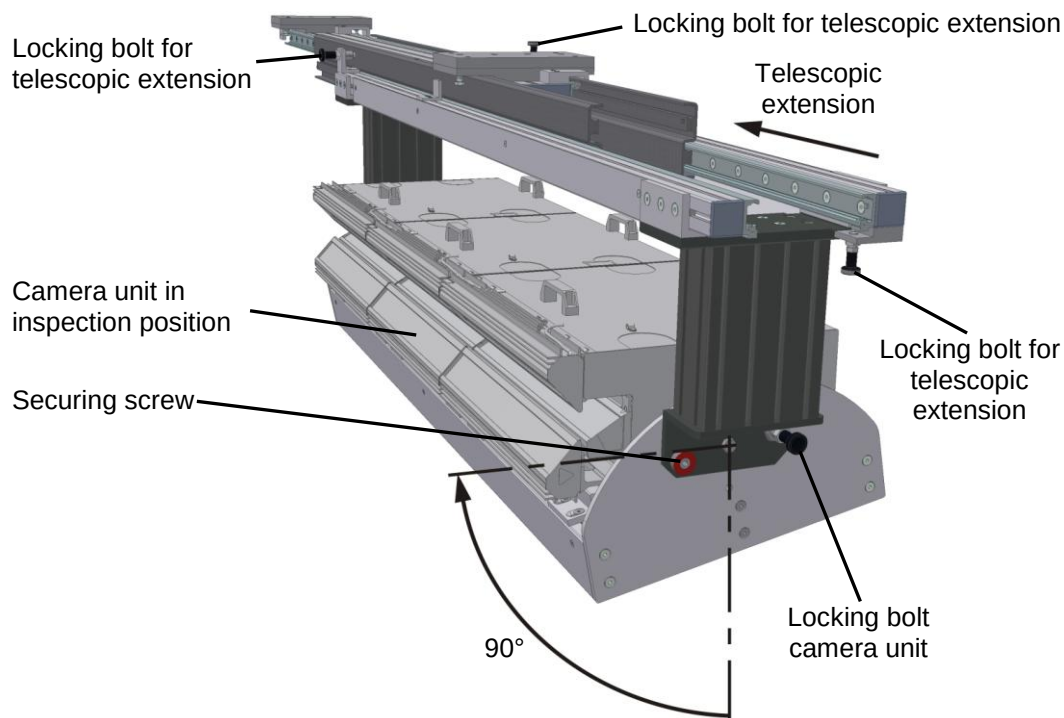
- Before traversing and swiveling the camera unit ensure that no persons are present in the traversing area of the telescopic extension and in the swiveling area of the camera unit.
- Never reach into the traversing area of the telescopic extension.

Procedure:

1. Unlock all fitted locking bolts on the telescopic extension. For this purpose pull out the locking bolts and turn by 90°. The bolts are fixed in the unlocked position.
2. Pull the camera unit carefully out of the printing press until all the camera modules are accessible for the maintenance work.
3. Unscrew the securing screw (knurled screw) on both sides of the camera unit.
4. Unlock the camera unit locking bolts on both sides of the camera unit. For this purpose pull out the locking bolts and turn by 90°. The bolts are fixed in the unlocked position.
5. Carefully swivel the camera unit by 90° into the maintenance position.
6. Lock the camera unit locking bolts on both sides of the camera unit into place. For this purpose turn the locking bolts by 90°.

12.3.3.3 Setting the inspection position

After carrying out the maintenance work the camera unit must be brought back into the inspection position as described below.



WARNING



Loitering in the traversing area of the telescopic extension and in the swiveling area of the camera unit

may lead to personal injury caused by crushing, cutting, entrapment und impacts on limbs.

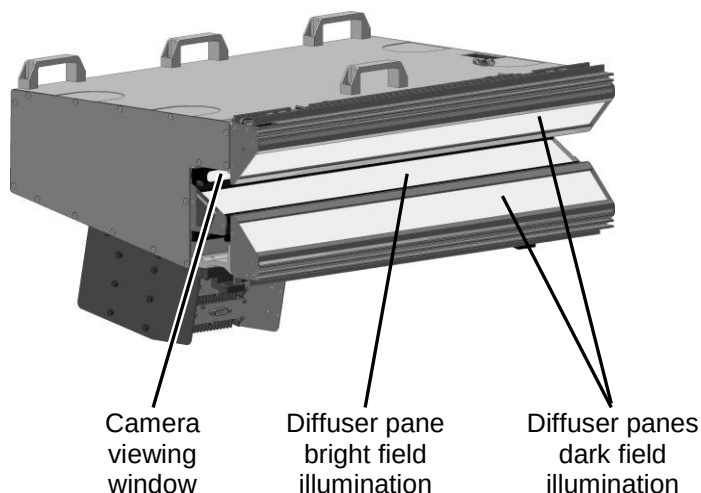
- Before traversing and swiveling the camera unit ensure that no persons are present in the traversing area of the telescopic extension and in the swiveling area of the camera unit.
- Never reach into the traversing area of the telescopic extension.

Procedure:

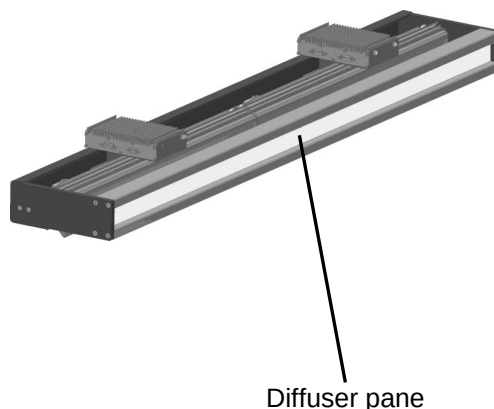
1. Unlock the camera unit locking bolts on both sides of the camera unit.
2. Carefully swivel the camera unit by 90° into the inspection position.
3. Lock the camera unit locking bolts on both sides of the camera unit into place.
4. Screw in the securing screw (knurled screw) on both sides of the camera unit.
5. Carefully slide the camera unit back into the printing press.
6. Lock all fitted locking bolts on the telescopic extension into place.

12.4 Camera module, back light illumination

Camera module



Back light illumination (option)



12.4.1 Cleaning the housing

Cleaning of the housings of the camera modules and the illumination units should be carried out **once weekly** using a dry, clean and soft cloth in order to avoid overheating of the cameras and the illumination units. Commercial liquid cleaner may be used if the housings are very dirty.

12.4.2 Cleaning the camera viewing windows and the diffuser panes

Cleaning of the camera viewing window and the diffuser panes of the illumination units should be carried out **once weekly**.

WARNING



Touching the hot surfaces of the diffuser panes

can cause burn injuries.

- After switching of the print defect detection system wait for **approx. 10 minutes** until the diffuser panes of the illumination units have cooled.
- Do not begin cleaning work until after the waiting period is over.

NOTE



Cleaning the diffuser panes with solvent containing cleaner can cause damage to the diffuser panes.

- Only use commercial glass cleaner to clean the diffuser panes.

Procedure:

1. First wipe over the camera viewing window and the diffuser panes of the illumination units with a dry, clean and soft cloth (e.g. spectacles cleaning cloth or linen/micro-fiber cloth).
2. Then wipe the camera viewing window and the diffuser panes with a silicon-free, commercial glass cleaner and a soft linen cloth.
3. Finally wipe over the camera viewing window and the diffuser panes with a dry, clean and soft cloth.

12.4.3 Replacing the illumination units

After approx. 10 000 operating hours the illumination units of the camera modules and of the optional back light illumination should be replaced.



To ensure homogeneous light distribution, both illumination units of the dark field illumination must always be replaced!

Replacement of the illumination units may only be carried out by BST-Service.

NOTE



Incorrect replacement of the illumination units

can cause damage to the camera modules and the optional back light illumination unit.

- Replacement of the illumination units may only be carried out by BST-Service.

12.5 Control cabinets

12.5.1 Cleaning the housing

Cleaning of the housing of the two control cabinets (OCO and PCO control cabinet) should be carried out **once weekly** using a dry, clean and soft cloth. Commercial liquid cleaner may be used if the housing is very dirty.

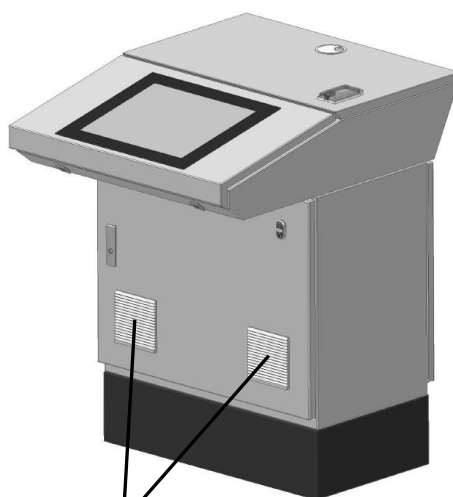
12.5.2 Checking the ventilator function

In principle, all ventilators and blowers of the control cabinets must either be covered or protected.

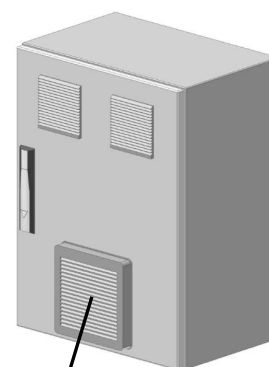
Checking the function of the ventilators in the control cabinet doors should be carried out **once a month**.

Operating desk (OCO control cabinet)

PCO control cabinet



Ventilator covers



Ventilator cover

To check if the ventilators work properly, the system must remain switched on, differently from the other maintenance operations.

WARNING	
	Life-threatening electrical voltage can lead to death or cause severe personal injuries due to electric shocks. • Never introduce objects in the venting slots to check the ventilator function.

- To check the ventilator function hold your hand in front of the ventilator covers. The ventilators are working properly, if a clear draught or air can be felt.

12.5.3 Cleaning the filter mats of the ventilators

The filter mats of the control cabinet ventilators should be cleaned **once a month**, or accordingly sooner if in a particularly dirty environment.

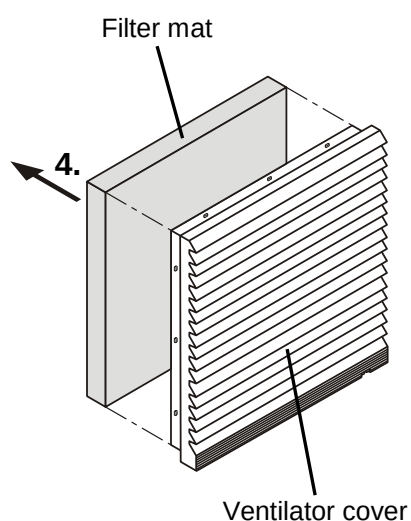
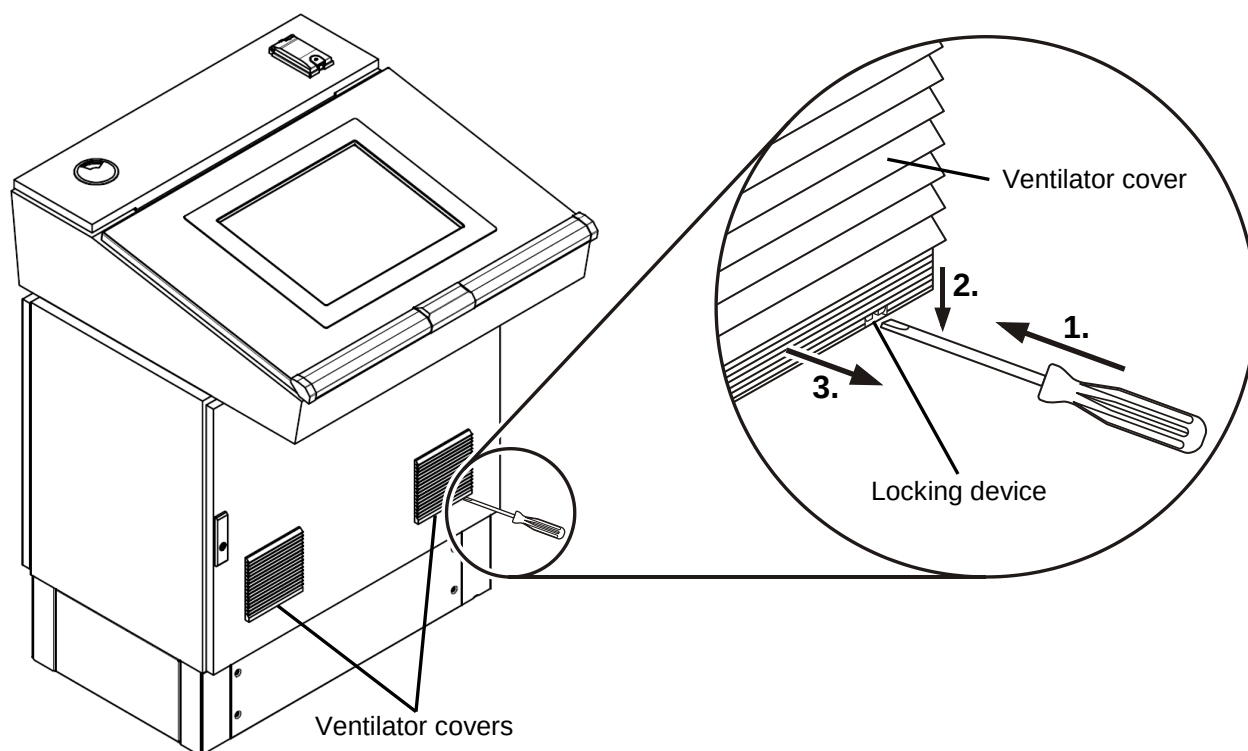


Attention!
Dirty filter mats increase the temperature in the control cabinets, which can cause the system to malfunction.

WARNING	
	Life-threatening electrical voltage can lead to death or cause severe personal injuries due to electric shocks. • Switch the print defect detection system free of voltage before removing the ventilator covers (see chapter 12.1).

The procedure for cleaning the filter mats is described on the following page.

12.5.3.1 Cleaning the filter mats of the operating desk (OCO control cabinet)



Procedure:

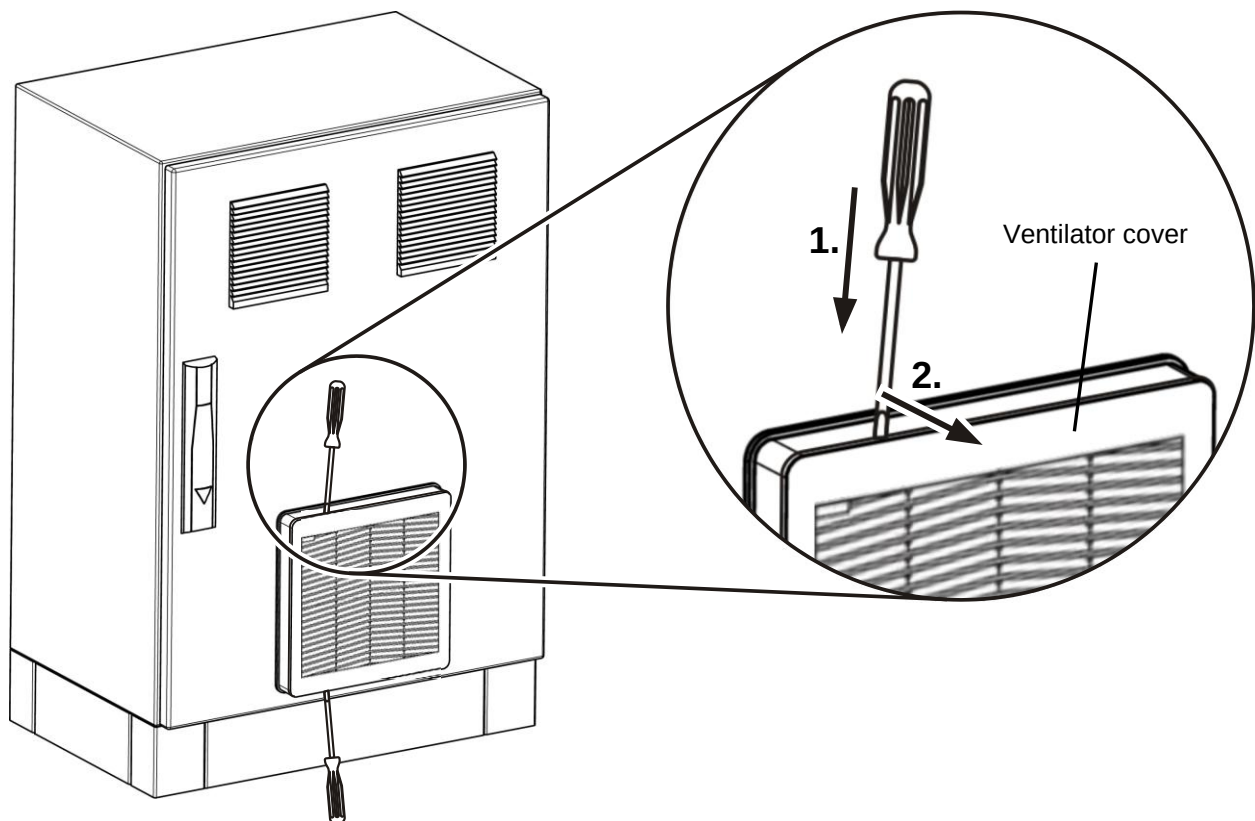
- Remove the filter mats from the two ventilators as follows:
 1. Insert a screwdriver into the locking slot on the ventilator cover.
 2. Press the screwdriver downward in order to release the lock.
 3. Pull the ventilator cover off to the front.
 4. Remove the filter mat from the ventilator cover.
- Tap the filter mats or use compressed air to blow them clean. Replace the filter mats if they are very dirty.



Only BST original spare filter mats (order number 125 666) are to be used when replacing the filter mats. Any guarantee claims will be invalidated if third party parts are used.

- Replace the cleaned or the new filter mats in the ventilator covers.
- Replace the ventilator covers.
Ensure that the locks on the ventilator covers click into place.

12.5.3.2 Cleaning the filter mat of the PCO control cabinet



Procedure:

- Remove the ventilator cover as follows:
 - Insert a screwdriver into the slots intended for this purpose on the upper and lower side of the ventilator cover.
 - Press the screwdriver carefully forwards in order to unlock the ventilator cover.
 - Pull the ventilator cover off to the front.
- Remove the filter mat from the ventilator cover.
- Tap the filter mat or use compressed air to blow it clean.
- Replace the cleaned filter mat in the ventilator cover.
- Replace the ventilator cover.
Ensure that the locks on the ventilator cover click into place.

12.6 Operating controller (OCO)

12.6.1 Cleaning/replacing the filter mat of the ventilator

The filter mat of the ventilator should be cleaned **once a month**, or accordingly sooner if in a particularly dirty environment. Replace the filter mat if it is very dirty.



Attention!

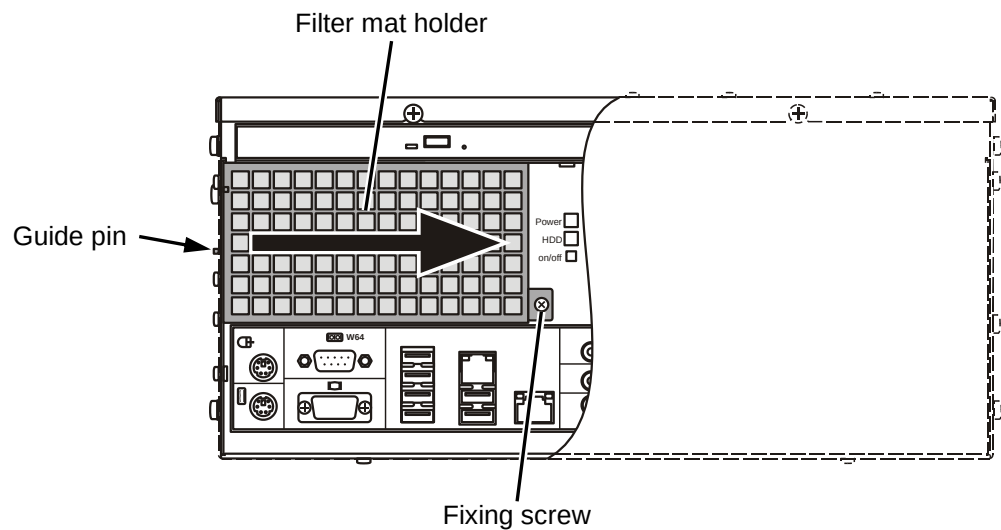
A dirty filter mat leads to impermissible overheating of the operating controller (OCO), which can cause the system to malfunction.



Only BST original spare filter mats (order number 118 082) are to be used when replacing the filter mat. Any guarantee claims will be invalidated if third party parts are used.

WARNING	
	Life-threatening electrical voltage can lead to death or cause severe personal injuries due to electric shocks. Switch the print defect detection system free of voltage before cleaning / replacing the filter mat (see chapter 12.1).

The procedure for cleaning or replacing the filter mat is described on the following page.



Cleaning/replacing the filter mat:

- Open the door of the operating desk (OCO control cabinet).
- Unscrew the fixing screw for the filter mat holder on the operating controller (OCO).
- Push the filter mat holder in the direction indicated by the arrow until the guide pin has been completely removed from the bore hole in the casing of the operating controller.
- Remove the filter mat holder.
- Remove the filter mat from the filter mat holder.
- Tap the filter mat or carefully blow it clean with compressed air. Replace the filter mat if it is very dirty.
- Replace the cleaned or the new filter mat in the filter mat holder.
- Mount the filter mat holder.
Push the guide pin on the filter mat holder into the bore hole in the casing of the operating controller.
- Screw in the fixing screw for the filter mat holder.

12.6.2 Replacing the hard disks

To ensure correct operation of the print defect detection system we recommend to replace the hard disks of the operation controller (OCO) **every two years**.



Replacement of the hard disks must only be carried out by trained BST personnel!
If replacing of the hard disks is carried out incorrectly, it can result in a loss of data!

12.7 Image processing controller (PCO)

12.7.1 Cleaning/replacing the filter mat of the ventilator

The filter mat of the ventilator should be cleaned **once a month**, or accordingly sooner if in a particularly dirty environment. Replace the filter mat if it is very dirty.



Attention!

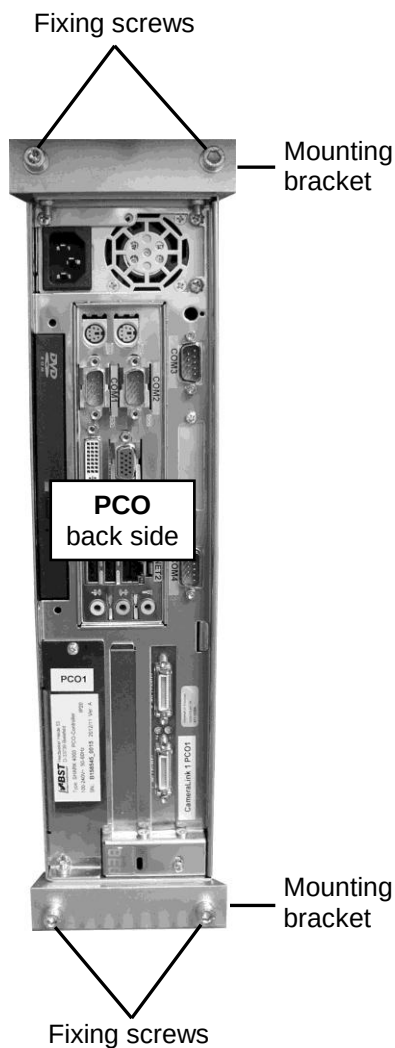
A dirty filter mat leads to impermissible overheating of the image processing controller (PCO), which can cause the system to malfunction.



Only BST original spare filter mats (order number 118 082) are to be used when replacing the filter mat. Any guarantee claims will be invalidated if third party parts are used.

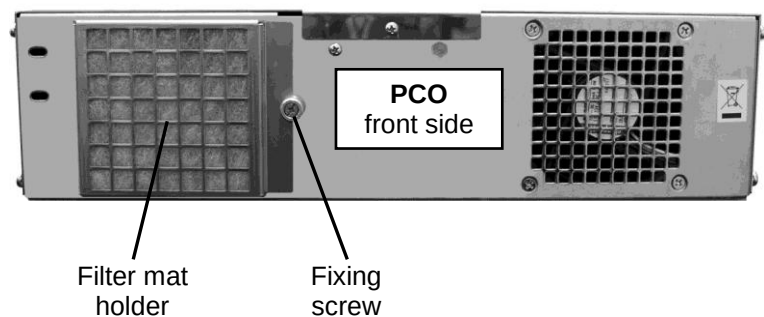
WARNING	
	Life-threatening electrical voltage can lead to death or cause severe personal injuries due to electric shocks. • Switch the print defect detection system free of voltage before cleaning / replacing the filter mat (see chapter 12.1).

The procedure for cleaning or replacing the filter mat is described on the following page.



Cleaning/replacing the filter mat:

- Open the door of the PCO control cabinet.
Depending on how the system is equipped, there are one to three image processing controllers arranged next to each other in the PCO control cabinet.
- Remove the plug connections on all connecting cables on the rear side of the image processing controllers.
- Unscrew the fixing screws on both of the mounting brackets.
- Pull the image processing controllers carefully out of the PCO control cabinet.



- Unscrew the fixing screw for the filter mat holder on the front side of the image processing controller.
- Remove the filter mat holder.
- Remove the filter mat from the filter mat holder.
- Tap the filter mat or carefully blow it clean with compressed air. Replace the filter mat if it is very dirty.
- Replace the cleaned or the new filter mat in the filter mat holder.
- Mount the filter mat holder.
- Screw in the fixing screw for the filter mat holder.
- Slide the image processing controllers carefully into the PCO control cabinet.
- Screw down the fixing screws on both of the mounting brackets.
- Replace all the cable connections.

12.8 Touch screen monitor

The dust deposit collected on the screen should be cleaned off **once weekly** in order to ensure trouble-free touch screen monitor operation.

For cleaning the screen we recommend using a commercial antistatic screen cleaner.

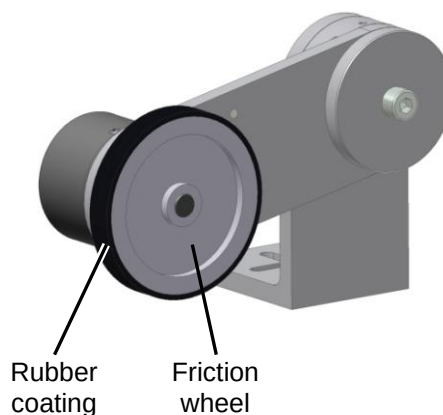
The instructions in the separate operating manual of the touch screen monitor manufacturer are to be observed.

12.9 Encoder/ Friction wheel encoder

12.9.1 Cleaning the housing

Cleaning of the housing of the encoder or friction wheel encoder should be carried out **once weekly** using a dry, clean and soft cloth. Commercial liquid cleaner may be used if the housing is very dirty.

12.9.2 Checking the friction wheel (friction wheel encoder)



Where a friction wheel encoder is used check the rubber coating on the friction wheel for visible signs of damage **once a week**. Replace a damaged friction wheel.

13 Decommissioning

Decommissioning (scrapping) of the print defect detection system must be carried out in together with the entire machine.

The necessary procedures must be prepared by the manufacturer of the machine. You must take into consideration that the print defect detection system is generally considered to be an electrical/electronic device, which must be disposed of in accordance with the current legal requirements.

You might also be able to return the print defect detection system to *BST International GmbH*, but the corresponding agreement must be made first.

14 Service / Support- assistance by BST

Where error messages or problems occur that cannot be rectified by the customer alone, and therefore require support from the *BST International GmbH*, please have the following information ready:

- BST order number (see cover sheet of the documentation folder)
- System number (see chapter 3.3.7)
- Serial numbers and hardware versions of the following system components. You will find the data on the name plates (see chapter 3.3.6).
 - Camera unit (ICU)
 - Camera module (ICM)
 - OCO control cabinet
 - Operating controller (OCO)
 - PCO control cabinet
 - Image processing controller (PCO)
- Firmware versions of the operating controller and the image processing controllers (see chapter 10.9).
- Exact wording of the displayed error message(s), detailed error description

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