

**Appendix to the Agreement:
Test scenarios for FAT and SAT
acceptance testing.**

Specification

- Revision 0.4 -

**Web-Fed Rotary Machine for Rewinding
and Clearing Data Matrix Code Bands**

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1. Revisions

Revision:	Date:	Prepared by:	Description
0.1	22 June 2020		
0.2	14 December 2020		
0.3	28 January 2022		
0.4	15 March 2024		

2. Abbreviations used

No.	Abbreviations:	Description:
1	FAT	Factory Acceptance Tests
2	SAT	Site Acceptance Tests
2	SW	Production Software
3	VS	Vision System

3. Related documents

No.	Description	Date	Author
[1]	Final version of the ordered machine's technical specification - ToR	--	--
[2]	List of comments following FAT/SAT testing	--	--

4. Information about the document

The purpose of this document is to provide a detailed list of tests to be performed during the machine's FAT and SAT acceptance testing.

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5. Introduction

This document specifies the tests to be performed during the FAT and SAT acceptance testing. The document defines the parameters to be measured together with the measurement method to demonstrate the machine's conformity with the Technical Specification [1].

After the FAT and SAT testing, the Supplier and the Purchaser shall approve and sign the printed version of the FAT and SAT testing in two identical copies. If there are issues that need to be resolved, these issues are listed in the FAT/SAT Testing Comments List [2].

The testing is divided into two parts.

1. Part 1 - FAT: will be carried out at the Supplier's premises. The machine will operate in offline mode. All process and IT tests to be carried out using the tools installed on the machine.
2. Part 2 - SAT: will be carried out at the Purchaser's premises. The machine will operate in offline mode. All process and IT tests to be carried out using the tools installed on the machine or the service laptop. The testing will be extended to allow the machine to import the generated reports into the Purchaser's system – SAP.

The purpose of the FAT and SAT testing is to demonstrate the purchased machine's conformity with the Technical Specification for a band rewinding and clearing machine, hereinafter referred to as the Technical Specification, and the requirements of the end user.

5.1. Test materials and test operations

All tests are carried out using test material compatible with the final product. The test material is supplied by the Purchaser (PWPW).

Number of bobbins / bands	Band type	Used in item
6x10,000 2x5,000	<ol style="list-style-type: none">1. The test will be carried out using bobbins with wound 2D-coded and numbered self-adhesive test labels measuring 32.5x12 mm and 50x16mm in vertical (R1) and horizontal (R2) arrangement (roll code) of approximately 10,000 pieces and 5,000 pieces.2. I type of bands: web width for vertical arrangement is 16.3 mm, reel diameter of approx. 275 mm. Web width for horizontal arrangement is 39.3 mm, reel diameter of 195 mm.3. II type of bands: web width for vertical arrangement is 20 mm, reel diameter of approx. 250 mm. Web width for horizontal arrangement is 54 mm, reel diameter of 210 mm.4. A minimum of 2 bobbins each in horizontal and vertical arrangement will be used for the test.5. Test labels will be prepared on paper secured with a watermark and security fibres. Weight of the individual layers of the self-adhesive test label:<ol style="list-style-type: none">a. Siliconised paper – approx. 60 g/m²b. Glue – approx. 24 g/m²c. Base paper – approx. 75 g/m²6. Test materials in the form of bobbins with labels on secured paper will be provided by PWPW.	For FAT and SAT testing

The machine is operated by the Supplier's engineers during all tests. The client will witness all tests. The machine will be tested in Offline mode unless other arrangements are made.

5.2. Requirements for SAT testing

PWPW will only start the SAT procedure after the machine has been successfully transported and planted at its destination.

SAT testing must be carried out:

- with the anti-virus software enabled (if possible),
- with all stations switched on, except for tests carried out to check the correct operation of individual module simulations,
- with the device control software installed and enabled (if possible),
- with the DATA MATRIX code reading vision system enabled and compliant with [1],
- The test product will fully comply with the Technical Specification contained in [1],
- The machine's operating system compliant with [1] has the latest updates and security patches installed.

5.3. General information on testing

The results of the FAT and SAT testing are summarised in the table according to the formula provided below. All testing should be carried out within 2-3 days.

Test no.	TEST name	SAT result OK / NOK
6.1.1.	Checking that the machine complies with the Specification [1].	
6.1.2.	Machine emergency shutdown – UPS software test	
6.1.3.	Machine Backup Test – complete system image restore for all computers (including licenses) when replacing a hard drive with another one	
6.1.4	Computer supplied – hardware and software	
6.1.5	Additional components supplied – hardware and software	
6.1.6	Components supplied – documentation (according to general technical requirements)	
6.1.7	Installation of Device Control software (if possible)	
6.1.8	Starting up the machine with the product	
6.1.9	Running the machine control application – authentication levels	

6.1.10	Switching off the selected production machine module	
6.1.11	Recording of the vision system's readings	
6.1.12	Running the machine control system – multi-level access	
6.1.13	Software license	
6.1.14	Checking for Windows updates	
6.1.15	Checking the correctness of installed devices in the system	
6.1.16	Checking the system logs	
6.1.17	RAM memory	
6.1.18	Hard drive (SSD and HDD)	
6.1.19	Setting up the vision system	
6.1.20	Backup of vision system settings	

	Integration testing	
6.2.1	Reports on the bands read	
6.2.2	Import of a report on the bands read	
6.2.3	Import of a report on the bands read (after manual modification – addition of another range of bands read)	

	Process testing	
7.1	Checking that the device conforms to the specification provided by the supplier and is complete	
7.2	Production machine start-up	
7.3	Testing the ability of bi-directional band rewinding	
7.4	Checking the machine's performance (rewinding within a set time)	
7.5	Verification of the vision system's effectiveness	
7.6	Checking the machine's performance (rewinding within a set time with checking the range of bands to be deducted by the machine as entered by the operator)	
7.7	Checking the implemented mechanics in the machine for proper positioning, proper web tension maintenance and proper web	

	alignment on the second bobbin winding drum.	
7.8	Checking the band rewinding speed with the band code reading	
7.9	100% quantitative band clearing (every single piece).	
7.10	Checking the machine's operation in the band return clearing mode	
7.11	Checking the machine's operation in the issue mode	
7.12	Checking the printed labels.	
7.13	Checking the machine's software functions in accordance with the Specification [1].	

5.4. List of participants

First name and last name (first name, last name)	E-mail address	Company	Participant	
			Software integration	FAT/SAT

6. Web-Fed Rotary Machine for Rewinding and Clearing Data Matrix Code Bands – FAT testing

6.1. Machine testing

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.1
Title	Checking that the machine complies with the Specification [1]
Test case description	Verification of all machine components as listed in [1] or the accepted offer
Assumptions	<ul style="list-style-type: none"> • Verification of switches • Verification of service laptop and ability to make remote connection, software installed, • Verification of installed label printer and installed software • Verification of installed UPS and software • Verification of the PLC controller • Verification of cabling • Verification of the machine's power supply • Verification of authorisation and accounts (operator, administrator, technical service) • Verification of the Device Control software • Verification of updates • Verification of security scans • Verification of Backup capability • Verification of the antivirus system • Verification of the control of devices and data carriers ("whitelisting" of devices) • Verification of device logs • Verification of machine condition monitoring capability • Verification of the ability of making a remote service call using a service laptop with the necessary software • Verification of machine and operator panel performance • Verification of BIOS settings • Verification of the licence of the software installed on the machine, purchased for the Purchaser • Verification of the duration of the Guarantee and clarification of its coverage • Verification of the documentation provided (including the translation quality) • Verification of the supplied control software copy with a backup of the entire computer • Verification of the operating system installed on the control computer • Verification of the installed hard drive • Verification of the installed processor Checking the hardware platform.
Expected result	The machine's specification complies with the Specification set out in [1] or the accepted offer.
Actual result / error description	
Error type (Critical/High)	
Comments	The machine should comply with the Specification set out in [1] or the accepted offer.

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.2
Title	Machine emergency shutdown – UPS software test
Test case description	Manually switching off the power supply to the production machine.
Assumptions	<ul style="list-style-type: none"> connected UPS to the computers controlling the production machine, UPS control software installed on these computers.
Expected result	Automatic shutdown of the machine control computer by the UPS software when the UPS batteries are nearly discharged or after a predetermined time (e.g. min. 10 minutes).
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.3
Title	Machine Backup Test – complete system image restore for all computers (including licenses) when replacing a hard drive with another one
Test case description	Using the programme supplied by the manufacturer with the RESCUE medium.
Assumptions	<ul style="list-style-type: none"> a complete backup of the computer(s) is created, the machine is started up from the RESCUE medium (CD/DVD), the back-up of all computers is restored.
Expected result	Restoration of the backup using the RESCUE medium is possible, as well as restoration of the author's software licence on a dedicated computer.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.4
Title	Computer supplied – hardware and software
Test case description	Checking that the supplied control computer complies with the specification [1]
Assumptions	<ul style="list-style-type: none"> the computer(s) controlling the machine complies with the Specification [1] or the Supplier's accepted offer.
Expected result	Required components in the machine computers in accordance with the Specification [1] or the Supplier's accepted offer.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.5
Title	Additional components supplied – hardware and software
Test case description	Checking that the supplied control computer complies with the technical specification [1]
Assumptions	<ul style="list-style-type: none"> Where the offered solution includes additional components or elements of the ICT infrastructure, these shall be provided and be in accordance with the accepted offer and the Specification [1]
Expected result	The supplied components/elements comply with the Specification [1] or the Supplier's accepted offer.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.6
Title	Components supplied – documentation (according to general technical requirements)
Test case description	Visual check of the documentation's delivery.
Assumptions	<ul style="list-style-type: none"> technical documentation for the IT department, mechanics documentation of the machine control system, min. English, vision systems' documentation, documentation provided in Polish and in original English on CDs/DVDs and as hard copies, transferring the necessary passwords to the machine administrator's accounts, backup system's documentation
Expected result	Presence of the required documentation accompanying the entire machine and its components in accordance with the Specification [1].
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.7
Title	Installation of Device Control software (if possible)
Test case description	Check that all peripherals are correctly connected after installing the device control software.
Assumptions	<ul style="list-style-type: none"> check that all peripheral devices are visible in the device manager after software installation, the machine has initialised correctly, creation of a whitelist of devices for downloading reports the machine is operating correctly without a drop in performance as defined in the general specification for the purchase of machinery [1].
Expected result	The device control software's installation does not affect the machine's correct operation. The software supports encrypted media such as USB flash drives.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.8
Title	Starting up the machine with the product
Test case description	Checking the correct machine start-up.
Assumptions	<ul style="list-style-type: none"> • a properly running production machine, • initialisation of all machine modules. • checking the automatic initialisation with the bobbin in the machine's web on both servomotors.
Expected result	The machine is ready to operate again after initialisation; the message about the placed bobbin is shown. The machine starts operation from the last known position before shutdown and shows records in the same report.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.9
Title	Running the machine control application – authentication levels
Test case description	Running the machine control application by entering the username and password.
Assumptions	<ul style="list-style-type: none"> • correct communications of the application and the control machine, • application divided into access levels, • added users (operators, inspectors, administrators). • access to the vision software and its settings blocked for the operator • access to the machine control application settings blocked for the operator
Expected result	The user logs in to the application according to the authorisation granted. For start-up, minimum authorisation is required to display the basic system functions. Logging in a user with higher authorisation results in greater access to functions in the application/system.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.10
Title	Switching off the selected production machine module
Test case description	With the machine running, the Administrator switches off one of the modules in order to bypass the selected production line process.
Assumptions	<ul style="list-style-type: none"> • vision system deactivation.
Expected result	The deactivation of the vision system does not affect the production machine's operation. There is also the ability to rewind bobbins.
Actual result / error description	
Error type (Critical/High)	
Comments	Verification of the authorisation that enables operation.

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.11
Title	Recording of the vision system's readings
Test case description	The read Data Matrix codes are stored in an SQL database. Production reports are saved in a folder with authorisation to read and save them from the Operator account.
Assumptions	<ul style="list-style-type: none"> • correct communications with the SQL database, • authenticated user in the application.
Expected result	Saving the read data to an SQL database and ability to read it using an SQL client. Password-secured database. It is possible to re-generate a bobbin band reading report.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.12
Title	Running the machine control system – multi-level access
Test case description	Running the machine control application by entering the username and password.
Assumptions	<ul style="list-style-type: none"> • correct communication of the operating system with the control machine, • the user logs into the system with the minimum authorisation to enable operation.
Expected result	The user logs into the system according to the authorisation granted. With the authorisation granted at different levels, the user gains access to the relevant functions in the system.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.13
Title	Software license
Test case description	Comprehensive licence check in accordance with the Specification and the accepted offer.
Assumptions	<ul style="list-style-type: none"> • correct system start-up, • an installation version of the supplied system with a key and a licence sticker, • English or Polish language version system, • the machine control application's and the vision system's start-up after the replacement of the hard drive with another one conforming to the Specification [1].
Expected result	The licences required for the entire agreed machine specification were delivered.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.14
Title	Checking for Windows updates
Test case description	Checking the date of the latest operating system updates fixing critical software security vulnerabilities.
Assumptions	<ul style="list-style-type: none"> checking the status of updates, system update in accordance with the patches supplied by the machine manufacturer, either offline or online.
Expected result	Installation of the latest critical security patches and Windows updates.
Actual result / error description	
Error type (Critical/High)	
Comments	Verification of system logs.

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.15
Title	Checking the correctness of installed devices in the system
Test case description	Running the device manager.
Assumptions	<ul style="list-style-type: none"> correct launch of the device manager and no driver errors from within Windows, correct device configuration in BIOS.
Expected result	No hardware conflicts or information on incorrect operation.
Actual result / error description	
Error type (Critical/High)	
Comments	Verification of system logs, application logs

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.16
Title	Checking the system logs
Test case description	Running the event log administration tool.
Assumptions	<ul style="list-style-type: none"> correct launch, no messages or warnings in the bluescreen viewer.
Expected result	No entries related to critical system, security, application issues, etc.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.17
Title	RAM memory
Test case description	Running the memory error detection tool
Assumptions	<ul style="list-style-type: none"> correct launch, Linux disc, memtest software.
Expected result	No memory errors.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.18
Title	Hard drive (SSD and HDD)
Test case description	Running the hard drive error detection tool.
Assumptions	<ul style="list-style-type: none"> • correct launch, • Linux disc, CrystalDiskInfo software, • SSD-dedicated software installed (which allows SMART reading and FirmWare updates).
Expected result	No hard drive errors.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.19
Title	Setting up the vision system
Test case description	Setting up the vision system for the reference band (for the machine's operating conditions) and arranging the bands from different bobbins for verification.
Assumptions	<ul style="list-style-type: none"> • correctly configured camera (the Administrator account providing the ability to change parameters, such as: shutter, brightness, gain, edge and Gaussian filters, Data Matrix code interpretation algorithm settings), • initialised vision system, • verification of the readability of 30 bands with different code qualities (from 1.5 to 4 according to ISO 15415).
Expected result	All bands are correctly read by the vision system once the camera and software have been physically set up. A report is produced for each of the bands with the Data Matrix code read.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.1.20
Title	Backup of vision system settings
Test case description	The vision system settings will be backed up. Changes will be made to the camera settings. The last copy of the vision system settings from the backup using the Manufacturer's proprietary backup software will be restored.
Assumptions	<ul style="list-style-type: none"> • The vision system settings will be backed up, • Change of camera parameters to unusable (no Data Matrix code reading from the band), • Restoring the camera settings from the last backup. • Correct band code reading
Expected result	Backup and restoration of the settings to enable the correct reading of Data Matrix codes from the bands.
Actual result / error description	
Error type (Critical/High)	
Comments	

6.2. Integration testing

Tests of report generation, viewing and modification, and import into the SAP system.

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.2.1
Title	Reports on the bands read
Test case description	The reports on the bands read are saved as a *.csv or *.xlsx file together with the date the report was generated. The structure and data contained in the report are in accordance with [1].
Assumptions	<ul style="list-style-type: none">• The production report is in the form of a single file for one bobbin,• It is possible to save (export) the report to an encrypted FlashDrive (e.g. Kingston DataTraveler USB sticks),• It is possible to edit such a report from a notepad or NotePad++ program with correct writing (without adding unnecessary end-of-line characters).
Expected result	Once the bobbin rewinding process is complete, the operator is able to save the report as a single file and seamlessly export (copy) it to an external encrypted medium with a USB interface.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.2.2
Title	Import of a report on the bands read
Test case description	The report of the read bands is verified via Notepad and imported into SAP. The structure and data contained in the report are in accordance with [1].
Assumptions	<ul style="list-style-type: none">• The production report is generated as a single file for one or more bobbins,• The report is verified using Notepad or NotePad++.• The report is correctly imported into the Purchaser's SAP system.
Expected result	The process of importing bands read from the machine is correctly loaded into the SAP system without errors.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	6.2.3
Title	Generation of a machine report with verification of the duplicate (re-read bands) numbering on the machine
Test case description	The report of the bands read for a given range (time and numbering) is verified by the programme creating the output report for duplicates. The structure and data contained in the report are in accordance with [1].
Assumptions	<ul style="list-style-type: none"> • A bobbin with Data Matrix code number reading for 500 pcs is rewound. • The same bobbin with Data Matrix code number reading for 50 pcs is rewound (numbering range is the same as for 500 pcs) • The production report is generated as a single file for one or more bobbins. The report does not take into account the duplication of a re-read number. Report for 500 pcs • The report is verified using Notepad or NotePad++ • The report is correctly imported into the Purchaser's SAP system.
Expected result	After completing the rewinding of the same bobbin twice for two numbering ranges, the operator is able to save the report as a single file (without duplicating the re-read numbers) and seamlessly export (copy) it to an encrypted external medium with a USB interface. The report is correctly imported into the Purchaser's SAP system without errors.
Actual result / error description	
Error type (Critical/High)	
Comments	The machine manufacturer's software should verify duplicate ranges of read band numbers.

7. Web-Fed Rotary Machine for Rewinding and Clearing Data Matrix Code Bands – Process testing

Component / Function Group	Process testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	7.1
Title	Checking that the device conforms to the specification provided by the supplier and is complete
Test case description	Verification of all machine components according to the specification provided by the Supplier and their completeness.
Assumptions	
Expected result	The machine complies with the Technical Specification [1].
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	Process testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	7.2
Title	Production machine start-up
Test case description	Connecting the production machine to the power supply and starting it up.
Assumptions	<ul style="list-style-type: none"> the machine is correctly positioned and assembled, machine control computer connected.
Expected result	Initialisation/sequence of all production machine modules.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	Process testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	7.3
Title	Testing the ability of bi-directional band rewinding
Test case description	Checking the bi-directional rewinding of bands from reel to reel. Checking for web breakage and that the resulting reel does not telescope.
Assumptions	<ul style="list-style-type: none"> the machine is correctly positioned a full bobbin (with approx. 10,000 or 5,000 bands) has been fitted and the silicon web is correctly connected to the second rotating drum running vision system for reading Data Matrix codes The operator is able to wind and unwind the web on the bobbin from the control application's menu
Expected result	The machine rewinds the bands from reel to reel without destroying the silicon web (no mechanical breakage). Bi-directional rewinding of bands from reel to reel with the ability of indicating the number of labels after which the machine should stop. When winding, it is important that the web does not break and that the resulting reel does not telescope.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	7.4
Title	Checking the machine's performance (rewinding within a set time)
Test case description	Performance tested on the basis of bobbin rewinding over a period of time in the mode with reading of all Data Matrix band codes.
Assumptions	<ul style="list-style-type: none"> the machine is correctly positioned A full bobbin (with approx. 10,000 or 5,000 bands) has been fitted and the silicon web is correctly connected to the second rotating drum the machine's performance is verified from its start-up and the START button use until the machine counts down a full minute and is shut down using the STOP button.
Expected result	The machine's performance complies with the Specification [1]. Complete reading report. 100% clearing of bands on the bobbin. The reading efficiency of the Data Matrix codes on the bands is 100%. The test should be carried out twice for bands stacked vertically and horizontally on the web for all sizes (band sizes).
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	7.5
Title	Verification of the vision system's effectiveness
Test case description	Verification of the vision system's effectiveness consists of verifying the Manufacturer's declaration of 100% clearing of the bands read. Effectiveness is verified by inserting into a single bobbin of a certain number of bands with the Data Matrix code blacked out with a permanent marker. The number of bands not read by the machine in relation to the bands blurred with a marker among the reports generated by the machine and the physical web is subject to verification. There must not be more reading errors than blurred Data Matrix codes on the bands in a given bobbin. The machine's effectiveness is expected to be 100%.
Assumptions	<ul style="list-style-type: none"> Vision system configured as in the previous test 100 bands are randomly selected to be blurred Checking the vision system's effectiveness when reading Data Matrix codes for the entire bobbin,
Expected result	The vision system's effectiveness when reading the Data Matrix codes on the band is 100%. In the generated bobbin rewind report, the system recognises all blurred Data Matrix codes on bands. No other errors occur during this process. The quantitative clearability of the bands is also 100%.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	7.6
Title	Checking the machine's performance (rewinding within a set time with checking the range of bands to be deducted by the machine as entered by the operator)
Test case description	Performance tested on the basis of bobbin rewinding over a period of time in the mode with reading of all Data Matrix band codes.
Assumptions	<ul style="list-style-type: none"> the machine is correctly positioned A full bobbin (with approx. 10,000 or 5,000 bands) has been fitted and the silicon web is correctly connected to the second rotating drum the machine's performance is verified from its start-up and the START button use until the machine counts down the given range of bands entered by the Operator and the machine's automatic shutdown.
Expected result	The machine's performance complies with the Specification [1]. Complete reading report. 100% clearing of bands on the bobbin. The reading efficiency of the Data Matrix codes on the bands is 100%. The test should be carried out twice for bands stacked vertically and horizontally on the web for all sizes (band sizes).
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	IT testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	7.7
Title	Checking the implemented mechanics in the machine for proper positioning, proper web tension maintenance and proper web alignment on the second bobbin winding drum.
Test case description	Test involving the verification of the absence of web breakage when the web is wound and unwound 5 times on both bobbins (left to right, right to left, left to right, ... etc.).
Assumptions	<ul style="list-style-type: none"> the machine is correctly positioned A full bobbin (with approx. 10,000 or 5,000 bands) has been fitted and the silicon web is correctly connected to the second rotating drum Vision system for reading Data Matrix codes switched off or in simulation mode. The operator is able to wind and unwind the web on the bobbin from the control application's menu
Expected result	The machine does not destroy the silicone web (no mechanical breakage) through the correct choice of speed of the two servomotors. Both bobbins are wound evenly. No so-called web telescoping occurs on any of the bobbins. None of the bands on the silicone web is peeled off or has changed position on the web. The degree of winding is verified after each rewind step from bobbin to bobbin. The full bobbin is checked after the fifth winding. 99.9% of the bands are intact on the web. The test should be carried out twice for bands stacked vertically and horizontally on the web for all sizes (band sizes).
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	Process testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	7.8
Title	Checking the bobbin rewinding speed with the band code reading
Test case description	Verification of the required rewind speed with a band code reading of min. 20 m per minute and adding the read alphanumeric information to the clearing system according to the winding sequence.
Assumptions	<ul style="list-style-type: none"> the machine is correctly positioned a full bobbin (with approx. 10,000 or 5,000 bands) has been fitted and the silicon web is correctly connected to the second rotating drum running vision system for reading Data Matrix codes The operator is able to wind and unwind the web on the bobbin from the control application's menu
Expected result	Required rewinding speed with band code reading - min. 20 m per minute
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	Process testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	7.9
Title	100% quantitative band clearing (every single piece).
Test case description	100% quantitative band clearing (every single piece).
Assumptions	<ul style="list-style-type: none"> the machine is correctly positioned a full bobbin (with approx. 10,000 or 5,000 bands) has been fitted and the silicon web is correctly connected to the second rotating drum running vision system for reading Data Matrix codes The operator is able to wind and unwind the web on the bobbin from the control application's menu
Expected result	<p>100% quantitative clearing (every single piece) of bands wound on bobbins with a min. web width of 16 mm, and a max. web width of 100 mm.</p> <p>100% efficiency in reading the code from each band (Data Matrix or QR) for the set minimum machine speed and adding the read alphanumeric information to the clearing system according to the winding sequence.</p>
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	Process testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	7.10
Title	Checking the machine's operation in the band return clearing mode
Test case description	In the band return clearing mode: checking the content of the reports to ensure that all the information read from the 2D code has been recorded; checking the removal of detected errors with the code reading or band shortages; checking the ability to easily and faultlessly merge web fragments, cut out shortages or cut off a specific number of pieces with an unambiguous indication of the merge or cut-off and checking that the operation was carried out correctly.
Assumptions	<ul style="list-style-type: none"> the machine is correctly positioned a full bobbin (with approx. 10,000 or 5,000 bands) has been fitted and the silicon web is correctly connected to the second rotating drum running vision system for reading Data Matrix codes The operator is able to wind and unwind the web on the bobbin from the control application's menu
Expected result	Quantitative clearing of the bands on the returned bobbin with recording of the information read from the 2D code, while maintaining the numbering sequence. Stoppage in the event of errors with code reading or band shortages (at a set value above the assumed value) with the ability to remove errors or fragments, while indicating the location of web cutting and merging. Ability to divide and merge bobbins with a final report containing the number of bands on the resulting bobbin and the numbering sequence read from the codes. Checking the correct numbering after cutting/merging. Reports for each wound bobbin and the entire production. 100% quantitative production clearing.
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	Process testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	7.11
Title	Checking the machine's operation in the issue mode
Test case description	In issue mode: verification of the countdown function of the preset number of bands in both directions with the recording of the information read from the 2D code, while indicating the location of web cutting and merging, verification of the correct cutting / merging and maintenance of the numbering sequence. Verification of the generation of reports for both bobbins (wound and unwound) and for the entire production.
Assumptions	<ul style="list-style-type: none"> the machine is correctly positioned a full bobbin (with approx. 10,000 or 5,000 bands) has been fitted and the silicon web is correctly connected to the second rotating drum running vision system for reading Data Matrix codes The operator is able to wind and unwind the web on the bobbin from the control application's menu
Expected result	<p>Countdown of the preset quantity to be unwound from the given bobbin with the recording of the information read from the 2D code, while indicating the location of web cutting and merging. It should be possible to count the bands down in both directions, i.e. from the smallest number to the largest and vice versa.</p> <p>Checking the correct numbering after cutting/merging. Reports for each wound bobbin and the entire production. 100% quantitative production clearing.</p>
Actual result / error description	
Error type (Critical/High)	
Comments	

Component / Function Group	Process testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	7.12
Title	Checking the printed labels
Test case description	Checking the printed labels.
Assumptions	Enabled thermal transfer label printer connected to the device.
Expected result	Label printed at the Operator's request for a bobbin (cleared or unwound and prepared for issue) with the number of pieces, numbering range and fixed information read from the codes (series, signature – year) and information on the device's operator. The device should automatically assign a unique bobbin number. This is the number of the next rewind with the prefix P. Label dimensions: 100x13 mm.
Actual result / error description	
Error type (Critical/High)	
Comments	Compliance of the printed label with the Specification [1]

Component / Function Group	Process testing on the web-fed rotary machine for rewinding and clearing Data Matrix code bands
Test case number	7.13
Title	Checking the machine's software functions in accordance with the Specification.
Test case description	Checking the machine's software functions in accordance with the Specification.
Assumptions	Ability to generate, transfer and print reports according to the Specification.
Expected result	Generation of detailed operating reports specifying the number of pieces, numbering range and fixed information read from the codes (series, signature – year), as well as information on the device's operator. Ability to combine production reports for a specific working time, a particular operator or recipient to which the return or issue relates. Summation of continuously numbered ranges. Generation of editable reports in flat files, i.e. txt, csv or xls, containing information on the numbering ranges obtained for individual symbols and band series.
Actual result / error description	
Error type (Critical/High)	
Comments	Support for encrypted storage media such as USB flash drives

8. Acceptance criteria

The FAT and SAT procedure is considered to have been **successfully completed** if all tests carried out receive a status of "OK" or "Limited OK" [conditional OK]. If one test results in "NOK" (Not OK), the FAT and/or SAT procedure is considered to have failed. The conditions for the re-testing required may differ from the standard test procedure described in this document and must be defined.

The testing is considered to have been carried out with the result "OK" when all test conditions have been met and the transport and reading of all test bands have proceeded without other errors.

The testing is considered to have been carried out with the result "Limited OK" [conditional OK] when the test conditions are met with a **small number** of minor errors (a minor error means an error that does not result in rejection of production), and the Supplier agrees to make modifications and repairs within a set amount of time (agreed directly during FAT and SAT), with the modifications and repairs to be documented and the documentation submitted to PWPW for verification.

The machine version status is established following a successful SAT procedure. No changes or modifications to the Software (SW) or Hardware (HW) are permitted after this time without the consent of PWPW and without the Supplier providing a detailed description of all parts to be modified. **This test specification contains correct and complete information on all the tests performed as listed above.**

List of comments following FAT and SAT testing (Appendix no. 2)

Test no.	Result [OK/NOK]	Error category [critical/non-critical]	Comments [error description]:

Comments

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