



# Equipment Technical Specification

Equipment	Smart Material Rack
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## 一、 Preface

Background Description: This smart material storage rack is an innovative device designed for the SMT industry. It enables rapid storage and retrieval of electronic materials, manages complex search processes, and solves operational challenges caused by the diversity of electronic components. The intelligent storage and retrieval functions significantly enhance efficiency. Additionally, the device seamlessly integrates with MES/ERP systems for real-time data synchronization, improving smart and precise production management.

## 二、 Scope

Application scenarios include the control of electronic materials in warehouses/dedicated areas for storage, issuance, and return, achieving full-process management of electronic materials from incoming inspection, storage, issuance, return, re-storage, to inventory counting.

## 三、 Terms and Definitions

Term	Definition
PCBA	Printed Circuit Board Assembly
ESD	Electrostatic Discharge
SMD	Electrostatic Discharge
SMT	Surface Mount Technology
REEL ID	Unique material identification code
ERP	Enterprise Resource Planning
FEEDER	SMT Machine Component

## 四、 References

ANSI/ESD 20.20 *Electrostatic Discharge Management Standard for the Electronics Industry*

## 五、 Equipment Overview

### 5.1 Scope of Application

Usage Area: Warehouse/Dedicated zones

### 5.2 Equipment Functions

Full-process control of electronic materials (incoming, storage, retrieval, return, inventory).

### 5.3 Process Design

1. Equipment Operation Flow Diagram:

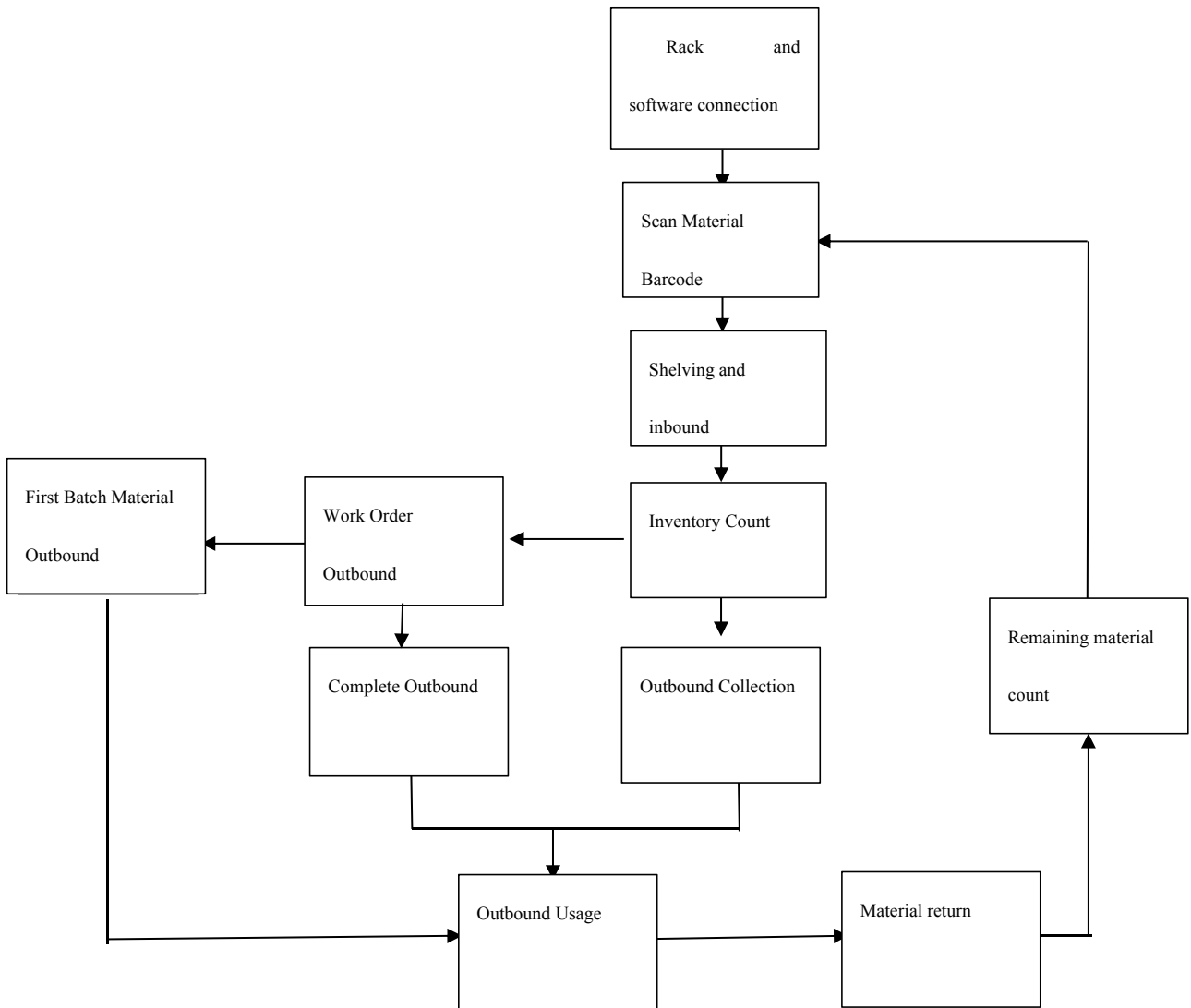
1) Quick Storage

- Scan material Reel ID, place in any available slot on the rack, system automatically records storage location.
- Materials can be placed in any empty slot on the rack.

2) Quick Retrieval

- Input information in the inventory interface, the corresponding rack will automatically light up to indicate picking location.

2. Basic Business Process Description:



#### 5.4 Basic Design Requirements

1. Error-proofing requirements: Alarm prompts for illegal storage, illegal retrieval, wrong material retrieval, and overtime storage
2. Material warning requirements: Inventory warning, shelf-life warning
3. Main equipment parameters of the rack:
  - 1) Material dimensions: 7-inch 12mm ~ 13-inch 80mm
  - 2) Single-unit storage capacity: 240~1400
  - 3) Rack material: SPCC with anti-static spray coating
  - 4) Storage method: Scan-to-store
  - 5) Code reading method: PDA or barcode scanner
  - 6) Barcode type: 1D or 2D barcode (select one)
  - 7) Material retrieval: Light-directed picking
  - 8) Material return: Scan-to-store
  - 9) Retrieval principle: Manual/system selection, system retrieves in sequence
  - 10) Retrieval printing: Automatic label printing upon retrieval
  - 11) Operation permissions: Three-level permissions
    - Level 1: Administrator - Can configure all functions.
    - Level 2: Configurable, e.g., storage and query.
    - Level 3: Configurable, e.g., retrieval.
  - 12) Permission identification: Password
  - 13) Abnormal alarm method: Three-color warning light + buzzer + message prompt
  - 14) Control method: Computer/PDA/barcode scanner
  - 15) MES system: Standard MES/WMS connectivity
  - 16) Data reports: Record query, status query
  - 17) Information traceability: Scan-to-query, bidirectional traceability.
  - 18) Inventory warning: Minimum/maximum stock alerts
  - 19) Log: Log storage function, operational status and exceptions can be queried
  - 20) Large-screen display: Dashboard display
    - a) Inbound/outbound data

- b) Work order material issue data
- c) Empty slot distribution
- d) Exception data distribution

## 5.5 Vision System (N/A)

## 5.6 Hardware Module Functions

### 1. Module Functional Requirements

#### 1) Mechanical Structure

- ① Cold-rolled carbon steel plate, 3D laser precision cutting and bending for rapid forming
- ② Whole rack anti-static powder coating technology
- ③ Anti-static casters/Foma wheels for flexible, stable movement and fixing
- ④ Three-color indicator lights
- ⑤ Digital display for storage locations
- ⑥ Dual protection with sensors/sensing plates

#### 2) Electrical System

- ① High-sensitivity transmitting and receiving sensors
- ② Control box (switch, control module, power supply, control module branch board)
- ③ Power: 50W

#### 3) Control Software:

- ① Sensing control firmware: Signal acquisition, polling monitoring, LED lighting control
- ② Rack control software: Operating system, data storage

#### 4) Voice broadcast function: None

## 5.7 Software Functions

### 一、Storage

1. Quick storage via PDA: First scan rack QR code, then scan reel QR code, place reel in any empty slot to complete storage;
2. For subsequent storage: Scan reel QR code, place reel in any empty slot to complete storage.

### 二、Retrieval

1. Filter by inventory conditions for retrieval. Can select lighting color
2. Import Excel for batch retrieval. Can select lighting color
3. Work order-based retrieval. Can select lighting color

### 三、Inventory

1. Multi-condition filtering: Material number, unique material code, in-stock status, near-expiry, expired, dormant, etc.
2. Retrieval function, export function, locking function, etc.

### 四、Exception Handling

For abnormally retrieved reels, information will be displayed in this module. Manual exception clearance is required to deactivate rack's red alarm light and buzzer.

### 五、Record Query

All inbound/outbound records are available here, can be searched and exported by conditions.

### 六、Work Order Management

1. Create new work order
2. Get work orders from MES
3. First set material issue, work order material issue, replenishment

### 七、Inventory Check

1. Light-guided inventory check
2. Cancel inventory check

### 八、Permission Management

Flexible multi-level permission settings

### 九、MES/WMS Integration

Standard and customized integration

### 十、Real-time Monitoring

Real-time monitoring of all storage locations with power-off memory

### 十一、Electronic Dashboard

#### 5.8 Software Selection

No.	Product Name	Qty	Unit	Party B's Recommended
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				Configuration Quantity
1	Smart Rack Monitoring Service	1	Set	1
2	Smart Rack Computer Front-end	1	Set	1
3	PDA Operation APP	1	Set	1
4	WebApi Interface	1	Set	1
5	Dashboard Program	1	Set	1
6	MES Interface	1	Set	1

### 5.9 Server Configuration

System: WIN10 64-bit Professional Edition (Simplified Chinese Version)、  
windows Server2016 or above (Simplified Chinese Version)

Network Port: Dual Network Ports (1 for company internal network, 2 for backup (can be used for rack network))

Hard Disk: SSD: 1T or above solid state drive

Processor: i7 11th Gen or above (standard voltage) 4 cores or above, or server with equivalent configuration

RAM:32GB or above

It is recommended to use more stable brand hosts such as Dell, HP, Lenovo, or provide Windows servers with equivalent configurations

### 六、 Special Requirements for Special Equipment

N/A

### 七、 Compatibility Design

N/A

### 八、 General Equipment Requirements

#### 8.1 Confidentiality Requirements

All equipment manufacturers must sign a Non-Disclosure Agreement (NDA) with the purchaser and comply

unconditionally.

### 8.2 Equipment Appearance Requirements

1. The overall appearance shall be elegant, aesthetic and coordinated. The color shall be H3C Gray RAL7035; warning areas shall use yellow, hazardous areas shall use red. No supplier names or logos are allowed on the markings.
2. The main structure and all components shall undergo anti-rust treatment. No scratches, paint peeling or rust defects are allowed. Welds shall be smooth without slag. All joints shall be neat and well-finished without sharp edges.
3. All equipment markings shall be standardized with bilingual (Chinese-English) labels using wear-resistant materials (e.g. power switch labels).

### 8.3 Equipment Safety Requirements

1. The equipment shall comply with national safety standards for electromechanical equipment and CCC certification requirements.
2. All operator stations shall have protective measures to prevent personnel from entering hazardous areas either intentionally or accidentally.
3. The standalone layout design shall consider the overall line layout requirements and provide convenient escape routes at operating stations.
4. For equipment involving laser applications, the supplier shall provide at least two sets of laser protection goggles.
5. If operators must enter the equipment, non-slip and step-free footplates shall be designed and installed inside.
6. All open connections shall be sealed for protection during shipment.
7. The appearance and structural design of protective devices shall be inspected item by item during design review. Subsequent processing and installation shall not cause mechanical interference, maintenance difficulties or safety issues.

### 8.4 Items Delivered Randomly

1. The seller shall provide equipment-related documentation, drawing in CAD format, including but not limited to:

No.	Name	Qty	Description	Remarks
1	Operational	1	Electronic	Including: 1.Test operation instructions; 2.File

	Manual			configuration and parameter modification instructions; 3.Data export instructions; 4.Common troubleshooting, etc.
2	Wear Parts List	1	Electronic	Including: Wear part names, quantity per unit, specifications, model numbers or drawings, brands, estimated lifespan, prices, etc.
4	Test System Debug Report	1	Electronic	Detailed records of debugging process
5	Equipment Interface Definitions	1	Electronic	
6	Factory Inspection Qualification Report	1	Electronic	

2. The equipment/materials shall include commonly used spare parts delivered to Party A. Refer to the attached form for the spare parts list format. Party B shall provide at least one set of each spare part according to the equipment's wear parts list.

No.	Name	Application	Min. Qty	Unit	Remarks
1.	PCB Board	Rack Sensing	40	pcs	10 boards per type *4types
2.	Controller	Rack Main Control	4	pcs	
3.					
4.					

## 九、 Equipment Acceptance Requirements

### 9.1 Seller's On-site Pre-acceptance

1. After design review and before manufacturing, both parties shall jointly establish and confirm the pre-acceptance criteria and the list of documents to be provided by the seller during pre-acceptance.
2. The pre-acceptance date shall be determined according to the project schedule or a mutually agreed date through communication.
3. Manufacturing process: After completion of equipment selection and related accessory design, the seller

shall promptly provide relevant interface personnel to Party A for approval before implementation. For equipment manufacturing and production, Party B shall assign dedicated personnel to strictly control the quality of processing and assembly. If Party A personnel identify any problems or non-conformities during processing, assembly or debugging according to the technical terms of the equipment and actual conditions, Party B must immediately arrange for the equipment to meet operational and full-line integration conditions, or perform rework.

4. Before pre-acceptance, the seller shall complete self-inspection and provide a self-inspection report. Pre-acceptance shall proceed after notification and confirmation by the buyer.
5. Measurement equipment, instruments, calibration tools, etc. required for pre-acceptance shall be resolved through negotiation between both parties before pre-acceptance.

## 9.2 Buyer's On-site Acceptance

1. The equipment shall be delivered by the seller to the buyer's designated location, where the seller shall perform installation and debugging at the buyer's factory. The equipment must be inspected and confirmed by the buyer's relevant departments and personnel, meeting the conditions for preliminary production acceptance. The conditions for entering trial production preliminary acceptance are as follows:
  - a) Main equipment/components are installed completely, with no important equipment/components affecting production left uninstalled.
  - b) Single-unit debugging of main equipment/components is completed, with no important equipment/components affecting production left undebugged.
  - c) Training for main equipment is completed, with no important equipment/components affecting production left untrained.
  - d) Operation manuals are provided as required.
  - e) The first batch of materials has completed the last process according to normal procedures.
  - f) Submit preliminary acceptance application, including all preliminary acceptance debugging reports.
  - g) Submit debugging reports: All documents shall be provided in Chinese.
  - h) Submit equipment operation manual.
  - i) Before operation training (prior to trial production), provide operation manuals (in Chinese), which

shall at least include: equipment operation guide, (software) program manual, equipment maintenance guide, equipment troubleshooting and repair manual, and supplier contact information.

j) Provide all wear parts according to the list previously confirmed by both parties.

### 9.3 Final Acceptance Criteria

1. All equipment is delivered and installed.
2. All equipment has completed process debugging.
3. All corrective actions are implemented, with no major unresolved issues. Minor issues not affecting production must be resolved within a defined timeframe.
4. All equipment documents are submitted and handed over.
5. All equipment debugging reports are completed and handed over.
6. Certificates of conformity and factory calibration reports for all instruments are provided.
7. Product quality meets the technical specifications and is confirmed by the buyer's relevant departments.
8. If the seller's self-inspection results and debugging results comply with construction specifications, acceptance criteria and process specifications and are approved by the buyer, the buyer shall agree to conduct final acceptance of the equipment. After successful acceptance, both parties shall sign a preliminary acceptance certificate. If there are defects in individual project quality that do not affect the final acceptance result, and after both parties confirm a rectification item plan, the seller shall carry out rectification according to this plan, complete the rectification before final acceptance, and then submit a new debugging results report to the buyer as part of the final acceptance documents.
9. The equipment shall undergo continuous trial operation for more than one month, during which all technical indicators and performance must meet the requirements of this technical specification without any major safety or quality incidents. Party A shall then initiate the acceptance review. If the acceptance conclusion is qualified, Party A shall issue an acceptance summary report and initiate the acceptance payment process. For any outstanding acceptance issues, Party B shall commit to resolving them. If the acceptance is unqualified, Party A and Party B shall negotiate a solution: 1) Re-acceptance: A preset deadline shall be established, during which Party B shall complete rectification of the equipment, after which Party A shall reorganize the acceptance; 2) Return: If the rectification is not completed within the deadline, or if the re-acceptance is unqualified, Party A shall initiate the return/replacement process.

## 十、 Installation, Debugging and Training

1. Before shipment, Party A conducts pre-acceptance per checklist. After factory acceptance, Party A notifies Party B to commence installation. Party B shall prepare all site entry procedures, equipment arrival confirmation, and train personnel to comply with Party A's regulations.
2. The seller is responsible for equipment positioning line marking, installation, debugging and system integration.
3. The seller shall arrange work shifts per buyer's requirements (typically synchronized with production schedule), including night shift personnel if needed.
4. After installation/debugging completion, Party B shall issue qualification report to commence trial operation period. Party A coordinates resources to address operational issues while Party B implements rectifications and documents results. For equipment defects causing Party A significant losses during trial period, Party B shall submit rectification report and assume corresponding liabilities.
5. The seller shall provide free training to the buyer's relevant personnel. The training content includes normal equipment operation, maintenance, fault analysis and troubleshooting, operational safety, and emergency procedures.

## 十一、 Quality Assurance and After-sales Service

1. After equipment commissioning and deployment, the supplier shall arrange on-site support personnel with a support period of 30 days.
2. During the 3-year warranty period, monthly, quarterly, and annual maintenance services shall be provided once each per year.
3. The warranty period for the equipment is three years, commencing from the date of formal acceptance. During this period, Party B shall provide free repair services for equipment failures and damages, as well as compensation for product damage or scrapping. For faults or damages caused by Party A's improper operation, Party B is obligated to assist Party A in equipment repairs, with the associated costs borne by Party A. The determination of accident liability shall be jointly assessed by technical personnel from both parties, who shall reach a mutually agreed and scientifically validated conclusion.
4. Upon receiving notification of equipment failure from Party A, if the issue cannot be resolved

through remote technical assistance within 2 hours, Party B shall dispatch personnel to the site within 4 hours and resolve the problem within 8 hours.

5. Service Fee Standards

(1) During the warranty period:

① Fault repairs, annual maintenance, and other labor costs are entirely free except on national holidays, during which the national holiday standards apply.

① Replacement of damaged materials (excluding damage caused by human factors or force majeure) is entirely free of charge.

② Additional software functionalities will be billed based on the working hours of software development personnel.

(1) Outside the warranty period:

① Additional software functionalities will be billed based on the working hours of software development personnel.

② Additional software functionalities will incur service fees based on the working hours of software development personnel (standards as follows).

6. On-site Service Billing Hours:

① Base Fee: Each service call is billed on a per-day basis (the specific start time shall be determined based on customer confirmation, the same applies below).

② Standard Billing Rates:

1) After-sales service personnel: RMB 1,500 per person per day

2) Software development personnel: RMB 2,000 per person per day;

c.Hourly rate is 1.5 times the standard rate between 18:00PM and 8:00AM

d. Billing rate is 2 times the standard rate during weekends

e. Billing rate is 3 times the standard rate during national holidays

f. Starts when the technician departs for service and ends when the repair is completed and the technician leaves the site

g. Post-Warranty Billing Rates (if revised, separate notice will be provided).

Note: National holidays refer to the following statutory holidays: May Day (Labor Day), National Day (Oct 1st), Qingming Festival, Dragon Boat Festival, Mid-Autumn Festival, New Year's Day, and Lunar Chinese New Year. For international clients, local statutory holidays shall apply.