Industrial Robots for Automated Dispensing Systems

How Manufacturers Use Robots for Automated Dispensing Systems

Manufacturers use robots in **Automated Dispensing Systems (ADS)** to optimize processes such as dispensing, packaging, labelling, and managing inventory in pharmaceutical, healthcare, and other industries. These robots enhance efficiency, accuracy, and safety, while reducing human errors and labour costs. Here's how manufacturers use robots for automated dispensing:

Precise and Accurate Dispensing

- **Liquid Dispensing**: Robots are used to dispense precise quantities of liquid medications, chemicals, or substances into containers like vials, syringes, or bottles. In pharmaceuticals, liquid dispensing robots ensure uniform dosages and prevent contamination.
    - **Example**: Liquid filling machines like Groninger or Syntegon fillers dispense sterile solutions in exact amounts.
- **Solid Dose Dispensing**: Robots handle solid medications, such as tablets and capsules, counting them accurately and dispensing them into bottles or blister packs. Automated systems ensure exact counts and eliminate manual errors.
    - **Example**: Tablet counters like Cremer are used in pharmaceutical manufacturing.

Automated Material Handling

- **Pick-and-Place Robots**: These robots automate the transfer of items such as pharmaceutical containers, blister packs, or raw materials within the production line. They pick up, move, and place items into the next stage of processing, ensuring smooth workflows.
    - **Example**: Fanuc and ABB robots are commonly used for high-speed pick-and-place applications.
- **Palletizing and Packaging Robots**: Manufacturers utilize robotic systems to package products, label them, and palletize them for shipping. These robots automate the final stages of production, improving throughput and accuracy.
    - **Example**: KUKA and ABB palletizing robots' package pharmaceutical products and prepare them for distribution.

Increased Efficiency in Blister and Bottle Packaging

- **Blister Packaging**: Robots are used to automate the filling of blister packs with tablets, capsules, or ampoules. This process is highly regulated in pharmaceutical manufacturing to ensure dosage accuracy and prevent contamination.
    - **Example**: Uhlmann and IMA blister packaging machines automate this process for high-volume production.
- **Automated Bottle Filling**: Robots assist in dispensing tablets or capsules into bottles, labelling the bottles, and capping them. These systems can handle high throughput and different bottle sizes, improving the efficiency of the packaging process.
    - **Example**: Aylward tablet counters and bottle filling systems.

The Types of Robots Used for Automated Dispensing Systems

Automated Dispensing Systems (ADS) in healthcare and pharmacy settings use various types of robots and robotic systems to store, manage, and dispense medications. These robots enhance efficiency, reduce errors, and improve patient safety. The primary types of robots used in automated dispensing systems include:

- ❖ Automated Pharmacy Robots
- ❖ Robotic Dispensing Cabinets
- ❖ Robotic IV Compounding Systems
- ❖ Automated Tablet Dispensing Robots
- ❖ Pneumatic Tube Delivery Systems with Robots
- ❖ Automated Medication Packaging Robots
- ❖ Robotic Medication Management Systems

Automated Pharmacy Robots

- **Unit Dose Robots:** These robots automate the preparation and dispensing of individual doses of medication for specific patients. They handle packaging, labelling, and tracking of each dose.
    - **Examples:** Baxter Intelliflo, Swiss log Pill Pick.
- **Centralized Pharmacy Robots:** These are larger, centralized robotic systems used in hospital pharmacies for bulk medication dispensing and storage.
    - **Examples:** Omnicell, ScriptPro SP 200, Pyxis Med Station**.**

Robotic Dispensing Cabinets

- These are decentralized systems installed in nursing units, clinics, or patient wards for easy access to medications. Robots within these cabinets automate the storage and retrieval of medications.
    - **Examples:** Pyxis Med Station (by BD), Omnicell Automated Dispensing Cabinet (ADC), Med Select (by AmerisourceBergen).

Robotic IV Compounding Systems

- These robots are designed to safely and accurately prepare intravenous (IV) medications by mixing and dispensing sterile IV solutions.
    - **Examples:** RIVA (Robotic IV Automation by ARxIUM), BD Cato.

Automated Tablet Dispensing Robots

- These systems focus on automating the counting, labelling, and dispensing of tablets from stock bottles. Some of them integrate barcode scanning and prescription verification to minimize human errors.
    - **Examples:** ScriptPro Robotic Prescription Dispensing, Omnicell Automated Pharmacy Carousel.

Pneumatic Tube Delivery Systems with Robots

- In combination with robotic dispensers, pneumatic tube systems deliver medications across different hospital departments, integrating transportation with robotic dispensing.
    - **Examples:** Trans Logic Pneumatic Tube Systems.

Automated Medication Packaging Robots

- These robots automate the packaging process, filling blister packs or other medication containers for long-term care or outpatient settings.
    - **Examples:** McKesson PACMED, TCGRx ATP (Automated Tablet Packager).

Robotic Medication Management Systems

- These are fully integrated systems combining inventory management, dispensing, and reporting functions. They may include features such as automated restocking and barcode-based verification.
    - **Examples:** BD Pyxis Logistics, Omnicell XT Medication Management System.

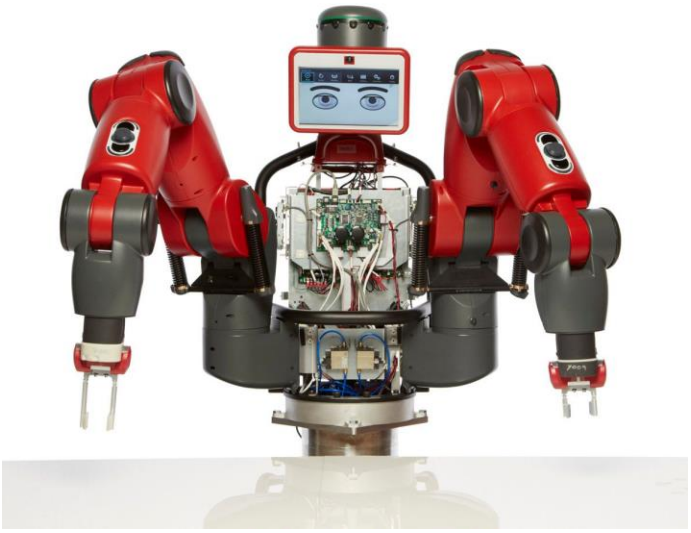
Technical Specifications for Automated Dispensing Systems

- Omnicell Automated Dispensing System
- Baxter Intellifill Dispensing Systems
- RIVA (Robotic IV Automation by ARxIUM)
- ScriptPro Robotic Prescription Dispensing System

Technical Specifications for Omnicell Automated Dispensing Systems:

Specification	Details
Models Available	XT, G4, Anesthesia Workstation, IVX Workflow System
Dimensions	Omnicell XT: Approx. 78" H x 30" W x 29" D; Modular design for customization
Weight	300 lbs to over 500 lbs, depending on model/configuration
Storage Capacity	Configurable for 600+ medications, customizable drawer sizes
Dispensing Capacity	High-capacity for various types (tablets, liquids)
Accuracy	High accuracy via barcode scanning and built-in checks
Interface	15" or larger user-friendly touchscreen
Power Requirements	110-120V AC, 500-1,000 watts
Connectivity	Ethernet, Wi-Fi; mobile device compatibility
Operating Conditions	Temperature: 15°C to 30°C (59°F to 86°F); Humidity: 20% to 80% RH
Safety Features	Automatic locking, low inventory alarms, audit trails
User Access Control	Biometric and password protection
Compliance	FDA, HIPAA, and other healthcare standards
Inventory Management	Real-time tracking and low stock alerts
Noise Level	≤ 50 dB, designed for quiet operation
Customization	Modular design for tailored workflows

Technical Specifications for Baxter Intellifill Dispensing Systems:



Specification	Details
Model	Baxter Intellifill System
Dimensions	Approx. 70" H x 30" W x 30" D (varies by configuration)
Weight	Approximately 500 lbs
Storage Capacity	Configurable for up to 800 medication items (depending on drawer configuration)
Dispensing Capacity	Up to 1,200 doses per hour
Accuracy	High accuracy with barcode verification; ±1% accuracy for doses
Interface	User-friendly touchscreen interface (typically 15" or larger)
Power Requirements	100-240V AC; power consumption varies based on configuration
Connectivity	Ethernet and Wi-Fi for data integration and remote access
Operating Conditions	Temperature: 15°C to 30°C (59°F to 86°F); Humidity: 20% to 80% RH
Safety Features	Secure access controls, alarm notifications for errors and low inventory
User Access Control	Biometric or password-protected access
Compliance	FDA approved, meets various healthcare regulations and standards
Inventory Management	Automated tracking with alerts for low stock levels
Noise Level	Designed for quiet operation, typically ≤ 55 dB
Customization	Modular design allows customization for specific pharmacy workflows

Technical Specifications for RIVA (Robotic IV Automation by ARxIUM):

Specification	Details
Model	RIVA (Robotic IV Automation)
Dimensions	Approx. 72" H x 48" W x 30" D (varies by configuration)
Weight	Approximately 600 lbs
Storage Capacity	Configurable for multiple IV bags and syringes; supports various sizes
Dispensing Capacity	Capable of preparing 60+ doses per hour
Accuracy	High accuracy with barcode scanning; ±1% accuracy for prepared doses
Interface	Touchscreen user interface with customizable dashboards
Power Requirements	120-240V AC; power consumption varies based on configuration
Connectivity	Ethernet and wireless options for integration with pharmacy and EMR systems
Operating Conditions	Temperature: 15°C to 30°C (59°F to 86°F); Humidity: 20% to 80% RH
Safety Features	Secure access control, alarm notifications for errors, and environmental monitoring
User Access Control	Biometric or password protection for secure access
Compliance	FDA approved, compliant with various pharmacy regulations and standards
Inventory Management	Automated inventory tracking with alerts for low stock levels
Noise Level	Designed for quiet operation, typically ≤ 50 dB
Customization	Modular and customizable design to fit specific pharmacy workflows

Technical Specifications for ScriptPro Robotic Prescription Dispensing System:

Specification	Details
Models Available	SP 200, SP 1000, SP Central Pharmacy Automation
Dimensions	SP 200: Approx. 75" H x 30" W x 36" D; varies by model
Weight	SP 200: Approx. 800 lbs; larger models can exceed 2,000 lbs
Dispensing Capacity	SP 200: Up to 150 prescriptions/hour; SP 1000: Up to 1,000 prescriptions/day
Storage Capacity	SP 200: 200-250 medications; SP 1000: 1,000+ unique medications
Accuracy	±0.01% dosing error rate with barcode verification
Interface	17" or larger touchscreen with customizable workflows
Power Requirements	120-240V AC; power consumption varies by model
Connectivity	Ethernet, Wi-Fi; integrates with pharmacy management systems (PMS)
Operating Conditions	Temperature: 15°C to 30°C (59°F to 86°F); Humidity: 20% to 80% RH
Safety Features	Secure access controls, audit trails, real-time inventory monitoring
User Access Control	Biometric, RFID, or password-protected access
Compliance	HIPAA compliant; adheres to FDA and DEA regulations
Inventory Management	Real-time tracking with alerts for low stock levels
Noise Level	≤ 60 dB during operation
Customization	Modular design, customizable to fit specific pharmacy workflows