

ANCHOR MARK PVT. LTD.

Manufacturer of Pharmaceutical Machineries

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ANCHOR MARK PVT. LTD.

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JUNE 2024

I recently had the privilege of visiting Anchor Mark Pvt. Ltd., an ISOQAR-certified manufacturer specializing in pharmaceutical machinery. With their headquarters located in Kandivali and a state-of-the-art manufacturing facility in Vasai, the company is a key player in the production of sophisticated equipment for the pharmaceutical sector. As someone with a background in robotics, I am naturally drawn to automated systems, and I eagerly seize any opportunity to deepen my understanding of new technologies.



ABSTRACT

Anchor Mark Private Limited was founded in 1980 as Anchor Mark with a mission to manufacture and market machinery for the pharmaceutical, food, beverage, and cosmetics industries.

Initially specializing in manual and semi-automatic capsule filling machines, the company has since evolved into a fully integrated manufacturing enterprise with two production facilities in Mumbai. Today, Anchor Mark offers a complete infrastructure for producing high-performance, energy-efficient equipment, all of which adhere to cGMP (current Good Manufacturing Practices) and various regulatory standards.

Featuring advanced, innovative designs customized to user needs, Anchor Mark's diverse range of equipment serves prominent clients across the pharmaceutical, food, beverage, and cosmetics sectors.

The entire manufacturing process is guided by MRP (Material Resource Planning) systems, with stringent controls at each stage to ensure seamless integration and oversight of all procedures. Quality and service remain uncompromised at every level of production.

During my visit to their manufacturing plant, I had the chance to observe their LIQUID BOTTLING PLANT, a setup they were preparing for a client in the pharmaceutical industry. While bottling plants can serve a variety of purposes, this particular system was designed specifically for the pharmaceutical sector. It involved a series of intricate processes: cleaning the bottles, filling them with medicine of varying quantities, performing quality checks, sealing, labeling, capping, and finally packaging the bottles into individual boxes and shrink-wrapping them for shipment.

This paper primarily focuses on the bottling process for pharmaceutical products. As the system in question is a patented innovation, Anchor Mark graciously shared with me the conceptual technology behind it—primarily pneumatic and hydraulic mechanisms—while refraining from disclosing specific details about the hardware or software components.

The various machines integral to a liquid bottling plant include:

01. Loading Platform
02. Rotary Bottle Washing Machine
03. Empty Bottle Inspection Unit
04. Automatic Rotary Volumetric Liquid Filling and Head Cap Sealing System
05. Filled Bottle Inspection Table
06. Variable Frequency Drive Unit for Labeling
07. Automatic Self-Adhesive Rotary Sticker Labeling Machine
08. No Label Detection and Rejection System
09. Measuring Cup Placement Machine with Cup Pressing Unit
10. Packing Conveyor Belt

In the manufacturing of these machines, a critical and mandatory standard in the pharmaceutical industry is that any machine components directly in contact with the final product must be made from stainless steel (referred to as S.S.). Stainless steel is favored due to its resistance to corrosion, ensuring the medicine remains uncontaminated. A minimal amount of mild steel (referred to as M.S.) is used in parts that are easily replaceable and never come into contact with the medicine, primarily to reduce the overall production cost of the machinery.

1. Stainless Steel (S.S.) Turntable 36" diameter with Loading Platform

The main stand is constructed using S.S. 304 pipes, strips, and mild steel (M.S.), with mounting plates for the gear box, all encased in stainless steel sheets. The primary rotary plate is made from an aluminum base, overlaid with stainless steel sheets. The bottle guide rails on the turntable are crafted from stainless steel strips. Additionally, the bottle loading platform is made from stainless steel and equipped with a bottle-swiping flapper for efficient handling.



SS TURNTABLE WITH LOADING PLATFORM

2. Rotary Bottle Washing Machine Model RW 180 with PLC, Touch Screen HMI and one set of Change part

The Rotary Bottle Washing Machine is designed to effectively rinse bottles using pressurized water for thorough internal and external cleaning. It features an S.S. conveyor belt, a bottle-feeding worm, inlet and outlet star plates with guides, a bottle gripper assembly, an inverter unit, and high-pressure water jet nozzles connected to a rotary valve.

Bottles are conveyed along the belt and fed into the inlet star plate by the feed worm. From there, the gripper unit secures each bottle, inverts it, and initiates the washing process. After the cleaning cycle, the bottles are returned to an upright position by the inverter assembly and transferred to the discharge conveyor belt via the discharge star plate for the next phase of operation.

The machine performs three washing cycles with the following sequence:

- 1. First wash:** Fresh water
- 2. Second wash:** Purified water
- 3. Third wash:** Air or demineralized (D.M.) water

Key features include:

- No bottle, no wash function
- Automatic machine stop if no bottle is detected at the inlet
- Front and rear door interlocks
- Water level sensors in the holding tanks
- Automatic stop if bottles jam at the discharge end

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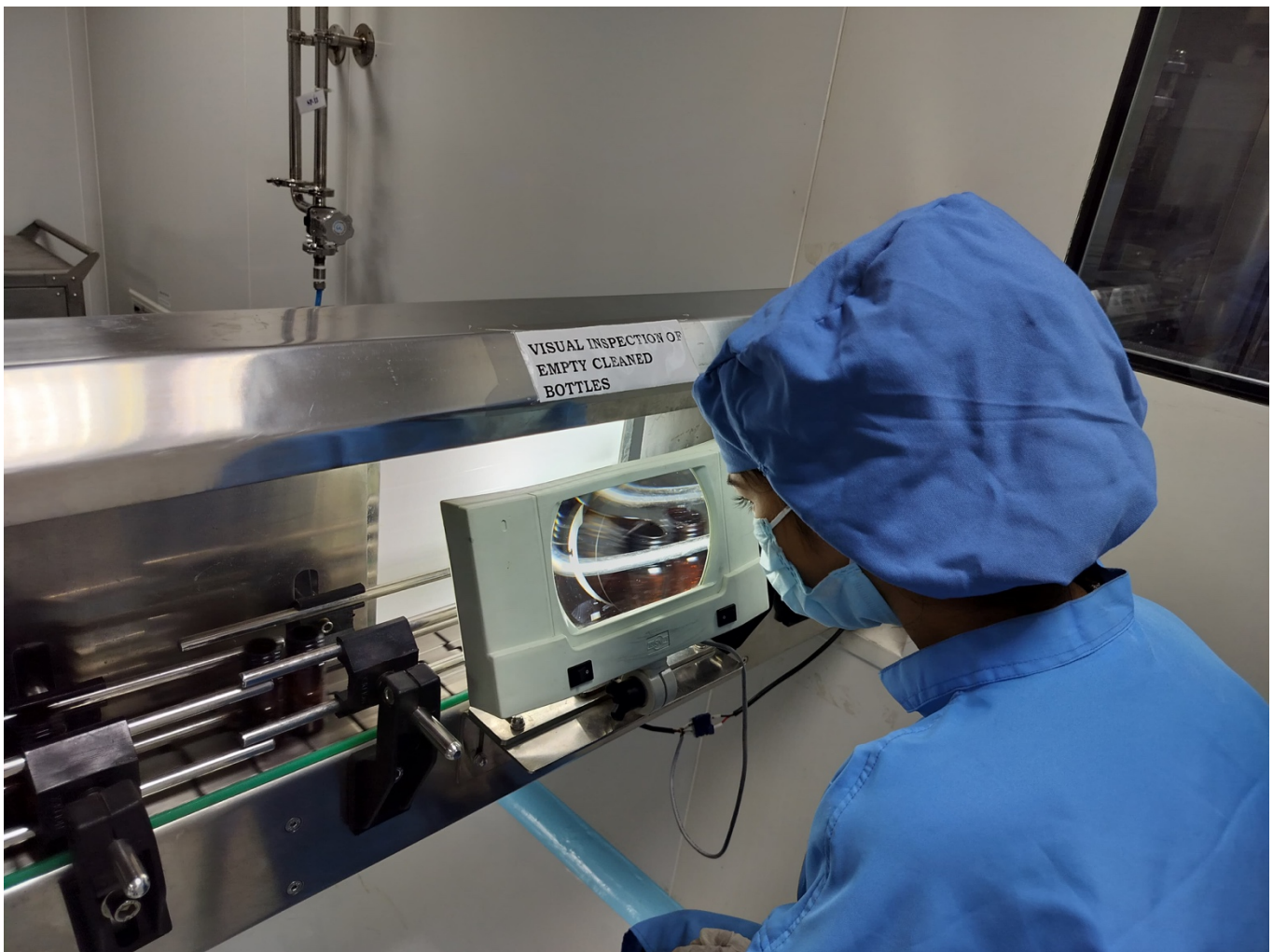
The machine can process 100 to 150 bottles per minute, depending on the size, shape, and diameter of the bottles. It comes with one set of change parts to accommodate a specific bottle size. Note that the output decreases by 15-20% when processing PET or plastic bottles.



ROTARY BOTTLE WASHING MACHINE

3. Empty Bottle Inspection Unit with infeed conveyor - 7'

The S.S. slat conveyor belt, measuring 7 feet in length, is equipped with a magnifying glass and lighting arrangement for the inspection of empty bottles. The drive system is powered by a 0.5 H.P. Bonfiglioli geared motor with a variable frequency drive (VFD). The stand is constructed from stainless steel pipes and angles, clad with S.S. sheets for durability. The slat width is 3 1/2 inches with a 1 1/2-inch pitch, and rod-type guide rails are included to ensure proper belt alignment.



EMPTY BOTTLE INSPECTION UNIT

4. Automatic Twelve Head Rotary Volumetric Liquid Filling and Eight Head Cap Sealing Machine (Monoblock) Model: Rotofill FS-180 with Cap elevator and feeder unit and one set of change part

The Rotofill machine is composed of several key sub-assemblies:

- A robust M.S. body, clad in stainless steel sheets for durability.
- S.S. slat conveyor belt with a synchronized bottle-feeding worm mechanism.
- Bottle feeding, sealing, and discharging turrets with guiding systems.
- Twelve 200 ml reciprocating piston-type syringes made from S.S. 316, capable of filling volumes from 60 ml to a maximum of 200 ml.
- A product storage tank equipped with a liquid level sensor.
- A “No cap in chute” detection system that automatically stops the machine.
- Elevator-type cap feeding hopper.
- 8-head rotary cap sealing mechanism.

This machine integrates both filling and sealing functions. Washed bottles are conveyed along the slat conveyor and fed into the filling star plate by the synchronized worm. The star plate positions the bottles at the filling station, where the predetermined liquid volume is automatically dispensed. The machine includes 12 reciprocating piston-type syringes, each with a 200 ml capacity. The volume in all syringes can be adjusted simultaneously using a single adjusting screw.

After the filling process, the bottles are conveyed to the cap sealing section. Caps are loaded into the cap elevator hopper and are automatically oriented and placed on the bottles via the elevator belt mechanism. The sealed bottles are then discharged by

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the star plate guide for the next stage of production. The entire machine is enclosed in polycarbonate sheets for protection.

The machine can process 100–150 bottles per minute, depending on the size, shape, and diameter of the bottles, as well as the nature of the liquid being filled. Note: The output will be reduced by 15–20% when handling PET or plastic bottles.

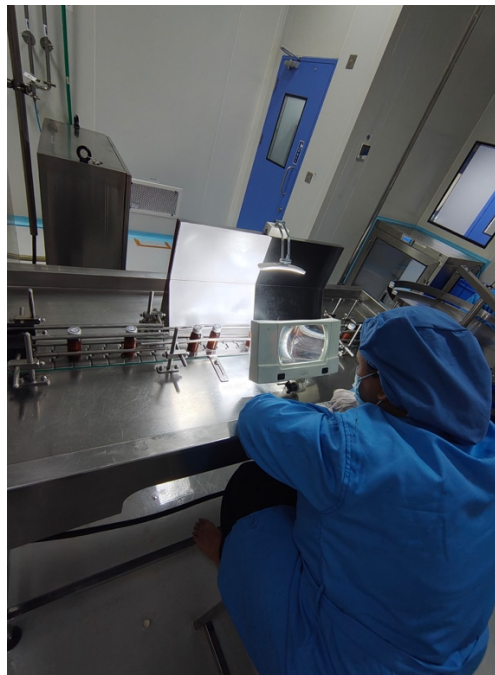


AUTOMATIC TWELVE HEAD ROTARY LIQUID FILLING AND CAPPING MACHINE

5. Filled Bottle Inspection Table with 11' conveyor length and 7' table length (4 Track)

The table is specifically designed for the visual inspection of filled bottles. It features a four-track conveyor system, allowing the bottles to pass through in both upright and tilted positions. This design enables the bottles to be diverted on either side of the tracks for thorough inspection. An inspection lamp is provided to assist operators in identifying any defective bottles, which can then be placed on the designated platform along the slat conveyor. Two magnifying glasses with integrated lighting are included to enhance the inspection process.

The stand is constructed from mild steel (M.S.) angles, with stainless steel pipe legs for stability. The motor and gear guard are also made from stainless steel sheets, ensuring durability and compliance with hygiene standards.



FILLED BOTTLE INSPECTION TABLE

6. Stainless Steel Turntable 36" dia with Variable Frequency Drive unit (for Labelling Machine)

The main stand is constructed from S.S. 304 pipes, strips, and mild steel (M.S.) with mounting plates for the gearbox. The entire structure is encased in stainless steel sheets. The primary rotary plate is crafted from aluminium, clad in stainless steel sheets, while the bottle guide rails on the turntable are made from stainless steel strips for enhanced durability and precision.



SS TURNTABLE WITH VARIABLE FREQUENCY DRIVE UNIT

7. Automatic Self-Adhesive Rotary Sticker Labelling Machine Model ASL-150 with No Label On Bottle Detection System and Rejection System

The machine comprises the following sub-assemblies:

- **Infeed Conveyor:** Designed for bottle transportation, driven by a Mitsubishi AC motor with a Mitsubishi variable frequency drive (VFD).
- **Main Star Wheel:** Powered by a Bonfiglioli gear motor with a Mitsubishi VFD.
- **Pressing Belt:** A timing belt coated with sponge rubber, driven by the main drive through the star wheel.
- **Label Applicator:** A high-speed label dispenser equipped with a label roll holder and empty paper winding, driven by a 750-watt servo motor.
- **Output:** Up to 150 bottles per minute.

Label Detection System:

- Features a “No Label on Bottle” detection system utilizing two Banner make luminous sensors that check for the presence or absence of labels during the online labelling operation (note: only paper labels are detected; plastic labels are not).
- Bottles without labels are automatically rejected by the rejection system.

Online Bottle Ejection Unit:

01. Used for rejecting bottles, functioning in conjunction with the “No Label on Bottle” detection system and/or the vision inspection system.
02. Activated by the labelling operating system upon receiving a rejection signal from the vision inspection system or the no-label detection system.

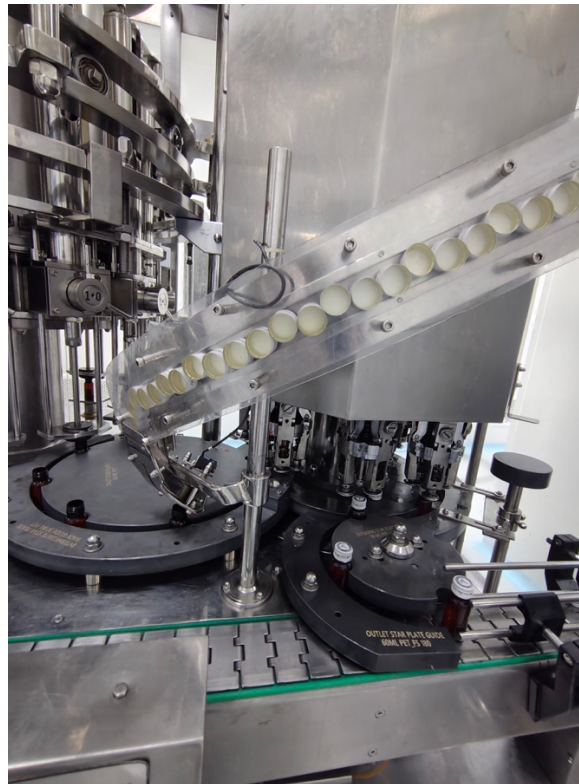
03. The rejection system identifies defective bottles and uses a pneumatic cylinder to push the rejected bottles into the rejection tray.



AUTOMATIC SELF-ADHESIVE ROTARY STICKER MACHINE

8. Dosage (Measuring) Cup Placing Machine with Cup Pressing Unit, Model DCP-220 with Cap elevator and feeder unit, PLC, Touch Screen HMI and one set of change part

The machine features an S.S. slat conveyor belt, an elevator-type cap feeder, and a cup pressing unit. The stand is constructed from mild steel (M.S.) and is finished with an epoxy paint, covered with stainless steel sheets for durability. A quantity of caps can be loaded into the cap elevator hopper, from which they are delivered to the bottles in the proper orientation through an elevator belt mechanism. The machine is operated using a Mitsubishi PLC system paired with a Beijer touchscreen HMI. Its output ranges from 160 to 220 bottles per minute, depending on the size and shape of the cups.



MEASURING CAP PLACING MACHINE WITH PRESSING UNIT

9. Packing Conveyor Belt with stand 16' Length

The packing conveyor belt measures 840 mm in width and has a minimum height of 915 mm, with an adjustable height of 75 mm. It features a Sampla Belt (Italy) U-10, a green PVC-coated nylon endless belt that is 230 mm wide, allowing for a clear working space of 305 mm on either side of the table. The stand is constructed from stainless steel angles and pipes, and the tabletop is equipped with a platform made of S.S. 304.



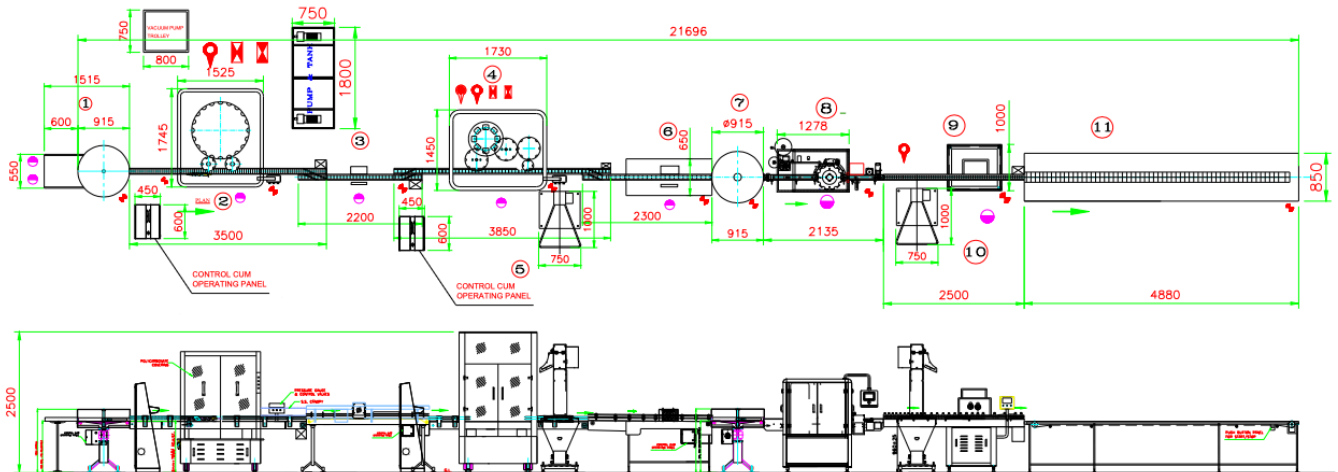
PACKING CONVEYOR BELT

ACKNOWLEDGEMENT

I would like to extend my heartfelt thank you to Mr. Glenn D'Souza, Director, Anchor Mark Pvt. Ltd., for taking the time to personally show me around Anchor Mark's manufacturing unit during my recent visit.

I truly appreciated the opportunity to learn about the intricate processes and technologies involved in the production of the Liquid Bottling Plant, especially how they adhere to the stringent standards of the pharmaceutical industry. Anchor Mark's insights and explanations greatly enhanced my understanding of the machinery and the commitment to quality that Anchor Mark exemplifies.

LAYOUT OF A LIQUID BOTTLING FILLING LINE



UTILITY REQUIREMENT:

- D.M. WATER LINE.
- FRESH WATER LINE.
- AIR INLET LINE.
- LIQUID INLET LINE.
- ELECTRICAL POINT.
- DIRECTION OF BOTTLE MOVEMENT FROM LEFT TO RIGHT.
- OPERATOR POSITION.

SPECIFICATIONS OF LIQUID PACKAGING LINE (FS-120 WITH RW-120):

NOTE: CONVEYOR HEIGHT FROM GROUND LEVEL MINIMUM 915 MM WITH 75MM ADJUSTABLE.

NOTE:- CONNECTING THE CONTROL PANEL TO THE SITES POWER GRID & POWER CABLING OF ALL MOTORS & BLOWERS IS IN CLIENT'S SCOPE.

<p>1.- TURN TABLE (36") WITH LOADING PLATFORM</p> <p>a. CONNECTED LOAD - 0.5 H.P.</p> <p>b. OVERALL DIMENSION - 1515Lx915Wx1300H</p>	<p>2.- ROTARY BOTTLE WASHING MACHINE WITH 2 PUMPS & TANKS (RW-120)</p> <p>a. CONNECTED LOAD - 8.5 H.P.</p> <p>b. VACUUM PUMP - 3.0 H.P.</p> <p>c. OVERALL DIMENSION - 3500Lx1745Wx2075H</p>	<p>3.- EMPTY BOTTLE INSPECTION SLAT CONVEYOR BELT</p> <p>a. CONNECTED LOAD-0.5 H.P.</p> <p>b. OVERALL DIMENSION - 2200Lx400Wx1300H</p>	<p>4.- ROTOFILL BOTTLE FILLING & SEALING M/C (FS-120)</p> <p>a. CONNECTED LOAD - 4.0 H.P.</p> <p>b. OVERALL DIMENSION - 3850Lx1450Wx2450H</p>	<p>5.- ELEVATOR TYPE CAP LOADER</p> <p>a. CONNECTED LOAD - 0.5 H.P.</p> <p>b. OVERALL DIMENSION - 750Lx1000Wx2250H</p>	
<p>6.- SINGLE TRACK TILTING TYPE INSPECTION TABLE</p> <p>a. CONNECTED LOAD - 0.5 H.P.</p> <p>b. OVERALL DIMENSION - 2300Lx650Wx1300H</p>	<p>7.- TURN TABLE 36"</p> <p>a. CONNECTED LOAD-0.5H.P.</p> <p>b. OVERALL DIMENSION - 915Wx1300H</p>	<p>8.- AUTOMATIC BOTTLE STICKER LABELLING M/C</p>	<p>9.- AUTO. DOSAGE CUP PLACING & PRESSING UNIT.</p> <p>a. CONNECTED LOAD - 1.5 H.P.</p> <p>b. OVERALL DIMENSION - 2500Lx1000Wx2100H</p>	<p>10.- ELEVATOR TYPE CUP LOADER</p> <p>a. CONNECTED LOAD - 0.5 H.P.</p> <p>b. OVERALL DIMENSION - 750Lx1000Wx2250H</p>	<p>11.- PACKING CONVEYOR BELT WITH S.S. TOP (16')</p> <p>a. CONNECTED LOAD - 0.5 H.P.</p> <p>b. OVERALL DIMENSION - 4880Lx850Wx915H.</p>