

Innovative Packaging Solutions for Pharmaceuticals, Cosmetics, Medical Devices, and Consumer Goods

Application Brief (AB0312007)

Diagnostic Test Kit Assembly and Inspection

Application: Automated Assembly and Inspection of Diagnostic Test Kits

Products Used: RWB Assembly Machine
TaskMate Robotic Tray Loader with FANUC LR Mate 100iB Robot



The Challenge:

A supplier of intestinal diagnostic test kits needed to automate a manual assembly and inspection process. The required assembly and inspection rate equaled 40 test kits per minute. The cassette halves used in the test kit were a proprietary design with very tight design tolerances. ESS engineers worked with the cassette supplier to design equipment that efficiently handled the cassettes and met the tolerances required by the application.

The Solution:

ESS engineers designed a complete system that assembles the test kit at a speed of up to 40 kits per minute. Using an RWB assembly machine as the base of the system, the ESS automated test kit assembly machine moves the test kit components through a series of stations that assemble the kits, inspect them for correct assembly, and then robotically load correct assemblies into trays for downstream processing and packaging. Incorrect assemblies are rejected by the robotic system prior to tray loading.

How it Works:

Station # 1 detects the orientation of the cassette top, correctly rotates the part, and places it in a puck that carries it through the assembly process. At Station # 2, a reactive fabric is reel-fed to a knife which cuts the membrane; a vacuum-style pick-and-place system places the square of reactive material in the cassette top in the correct position. At Station # 3, the cassette bottom is placed on the cassette top. A custom automated tamping device at Station # 4 snaps the two halves of the cassette together, and sensors at Station # 5 verify that the cassette is correctly closed. Station # 6 flips the assembled cassette over for inspection, which occurs at Station # 7 via an integrated vision system that verifies the correct placement of the membrane within the cassette. Station # 8 inserts a chemical reagent into the cassette, completing the assembly process. A TaskMate Robotic System, comprised of a FANUC LR Mate 100iB robot and an ESS-designed vacuum-type end effector, unloads the pucks. The end effector picks four cassettes at a time, and discards incorrect cassettes. Correct assemblies are placed in an accumulation area. After kits accumulate, the robot picks eight correct cassettes and places them in a stainless steel tray. Full trays are automatically discharged from the system and empty trays are automatically put into the system. Full trays are transferred to the lyophilization process prior to final packaging.

The Results:

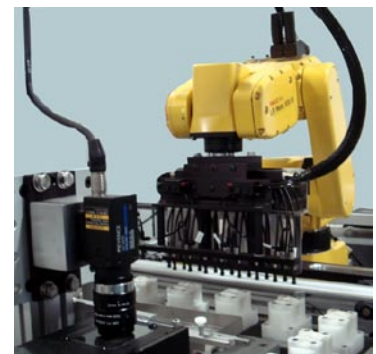
The diagnostic test kit assembly system produces 40 test kits per minute and automates both the assembly and inspection processes. In addition, the system reduces the number of required personnel from six people to one person.



Cassette Top and Bottom and Completed Test Kits



Cassette Halves are Joined to Complete the Test Kit Assembly



Vision System and TaskMate Robotic Tray Loader with LR Mate 100iB Robot



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