

Automated Flex Circuit Bonding and Inspection



Challenge

A consumer products manufacturer needed an automated system to bond and inspect flex circuits in under two minutes per press.

Solution

This tool uses recipe-controlled temperature and pressure to bond a printed flex-circuit onto a metallic substrate containing pre-applied adhesive. Flex circuits are handloaded onto carriers stacked in an automated elevator, while substrates enter on trays loaded at the input rack.

A set of compliant grippers transfers a single flex circuit to the align-and-stake assembly, while a custom X-Y-THETA robot transfers a tray with substrate from the loading rack to the vision inspect station. As the substrate moves toward the vision station, a barcode reader identifies the substrate type and selects the appropriate recipe. Prior to vision inspection, a peeler tool lowers and then grips-and-strips the protective cover layer from the glue surface on the substrate.



At the vision station, a Cognex camera inspects and confirms the shape and orientation of previously applied glue dots on the face of the substrate. The robot then moves the substrate and tray to the staker assembly, where three additional cameras verify alignment before temporarily staking the flex to the substrate. The robot transfers the tray and staked assembly to the next available press assembly, per-product recipe, where heat and pressure are applied to complete the bonding process. After bonding, the robot transfers the tray and bonded assembly to the output rack for operator removal.

Result

The automated system attaches flex circuits with **20-micron accuracy**, simultaneously processing different products at a rate of **two parts per 180-second cycle**. Each cycle includes pick-and-place, assembly, vision identification and orientation, bonding, and final inspection.

About DWFritz Automation

Established in 1973, DWFritz Automation provides world-class build-to-print manufacturing capabilities to clients, in addition to designing, building, and supporting engineered-to-order automation systems and high-speed, non-contact metrology products.

