

Application Notes

Electric Water Pump Assembly Line



Industry Insight

In the automotive sector, the production of high-precision electrical components requires assembly lines capable of managing multiple processes with short cycle times and consistent quality. The electric pump featured in this case study is a critical component that requires accurate assembly, surface treatments, sealing, welding, and functional testing integrated into a single production flow.

The growing demand for reliability and traceability in the automotive industry requires flexible systems, already prepared for future expansions and automation, capable of minimizing operator intervention while maintaining the highest quality standards.

Handled Parts



The automated system manages the assembly and functional testing of an electric pump for the automotive sector:

- Electric pump with precise assembly tolerances and component orientation requirements
- Dispensing materials applied in specific positions
- Membranes subjected to flow testing for functional verification
- Configuration prepared for future integration of automatic component loading

The components require precise management of orientation and assembly sequence. The vision system accurately determines the position and orientation of each part to ensure correct picking and assembly.

The Configuration

The design and development of this special machine required significant research and development activities aimed at achieving the project's performance and quality objectives.

The main activities included the design and construction of prototype equipment for process validation, advanced simulations on robots and control systems to optimize cycle times, as well as tests and technical evaluations to select the most suitable technologies for dispensing, plasma surface treatment, leak testing, membrane flow testing, vision systems, hot riveting, ultrasonic welding, and laser welding.

The project also included the development of an innovative palletizing system for handling thermoformed trays and the integration of the electrical test system supplied by the customer, with the objective of creating a highly efficient, reliable, and production-optimized solution.



FlexiBowl® 500 Standard Mode

The solution was developed by **SAMAC** and is centered on the integration of a **FlexiBowl® 500** as a feeding system combined with a **6-axis KUKA** robot for picking, assembly, and testing of the assembled component.

The configuration includes:

- **FlexiBowl® 500 flexible feeding system:** FlexiBowl® combines vibration impulses and surface rotation to orient and singulate components without the need for dedicated mechanical tooling.
- **6-axis KUKA robot:** Ensures a high-speed picking cycle with excellent repeatability. It sequentially manages component handling, picking from the FlexiBowl® based on the coordinates provided by the vision system, assembly, and functional testing.
- **Vision system:** Integrated into the picking cycle, it identifies the position and orientation of each component and provides coordinates to the robot, ensuring correct assembly orientation.
- **Functional testing stations:** Resistance testing, membrane flushing, leak testing, and MOL testing performed inline within the machine cycle.
- **Plasma treatment:** Surface plasma treatment to ensure optimal adhesion of dispensing materials.

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The SAMAC module offers:

- Cycle time of **14 seconds per pump**, expandable down to **8 seconds** with future integrations.
- **1 direct operator** for component loading/unloading.
- Line prepared for integration of **automatic component loading systems** (full automation).

- Complete integrated process: assembly, plasma treatment, dispensing, welding, and functional testing.
- Flexibility to process similar products in the future with higher productivity.

Key Points



Automotive



KUKA Robot



Assembly Process



14 ppm