

Rockwell Reliance Electric uses EMS RFID systems by Datalogic Automation for Electric Motor Production

Using Escort Memory Systems industrial RFID solutions, the Reliance Electric team achieved total traceability through their facility and improved the plant's bottom line as well.



Rockwell's Reliance Electric Division is required by government regulation to have cradle-to-grave traceability of electric motors produced at their manufacturing facility. Using Escort Memory Systems industrial RFID solutions, the Reliance Electric team achieved total traceability through their facility and improved the plant's bottom line as well.

The electric motor business is a highly competitive world-wide industry that Reliance Electric US manufacturing operations continues to thrive in against competitors in Asian manufacturing facilities. How do they do it? One answer lies in the industrial RFID systems from Escort Memory Systems that Rockwell uses to control and identify motors as they flow through the production facility. US regulations require that each motor has cradle-to-grave traceability and this complex requirement is met within the manufacturing line through the use of durable RFID tags that identify each motor at every step of the build process.

Arriving at an RFID Solution

After significant experimentation the best solution has proved to be industrial RFID. Escort Memory Systems' HMS150 passive RFID tag (operating at 13.56 MHz with 712 bytes of read/write memory) is mounted in the base of each motor manufacturing pallet. A unique identification is written to each tag as it enters the manufacturing cycle using an Escort Memory Systems HMS827 reader/writer. The tag identity is fed upward to an Allen Bradley PLC running DeviceNet via an Escort Memory Systems CM81 communications interface module.

An HMS827 reader/writer installed at each processing station automatically notifies the manufacturing host as a motor/pallet arrives for processing. Reliance Electric's WIP (work-in-process) system then sends the process instructions (recipe)

for that motor to the process tool and operator. The pallet is held at a station until the WIP system confirms that the processing is complete and that the parameters for that operation are within specification. The process data from each step is then recorded into the WIP system database and is associated with the specific motor serial number. Thus, detailed process information is recorded and stored with the serial number for permanent retention. The pallets are recycled after each use back to the beginning of the line to await the next motor start.

Results: Human Error vs RFID

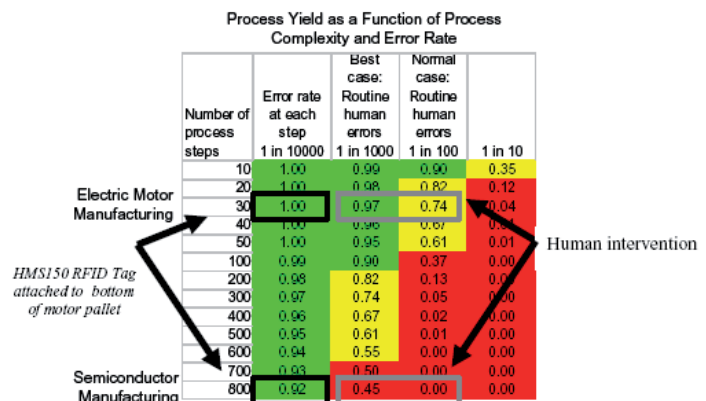
The processing details for each of the thirty manufacturing steps required to build a motor often vary based on the requirements of the order so that very few identical motors are actually built. Motors must be scrapped or reworked if any one of the process steps deviates from the defined processing.

A process with thirty steps allows for a minimum of thirty chances for a motor to be built incorrectly. Studies have shown that humans make a mistake anywhere from 1% to 0.1% per operation under ideal situations (no stress). Statistically, a process with thirty steps and an error rate of 1% at each step has a final yield of 74% or a 26% scrap/rework rate. Well designed RFID automation systems such as Reliance Electric's motor plant reduce the error rate to well below the 0.1% level. With the RFID enabled pallets, Reliance Electric's engineers insure that motors are not processed until the pallet RFID number, work order number and associated operation codes are correctly displayed to the operator at each process step with no manual data entry.

The chart below shows how error rates affect yields for complex processes. Simple manufacturing processes such as electric motor production can achieve significant benefits in reduced scrap and rework rates while more complicated manufacturing processes such as semiconductor manufacturing have very limited yield until human error is eliminated.



Looking at the Numbers: RFID ROI

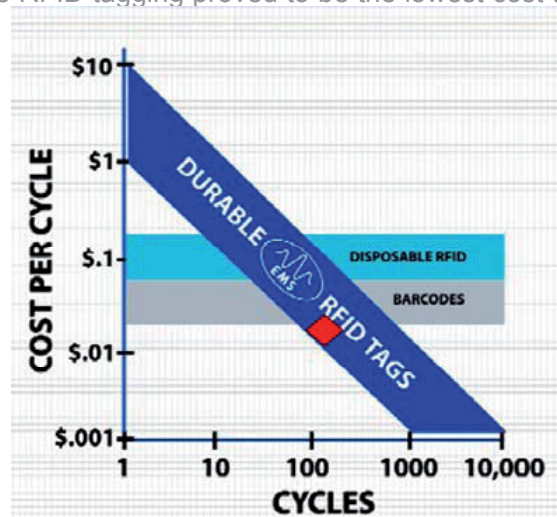


Payback periods for automation for plants like Reliance Electric’s Motor plant can be calculated by looking at the minimum 3% improvement in yield anticipated when moving to RFID based automation. Requiring a six month payback period for an RFID upgrade yields a budget of \$11M for this automation upgrade. This cost-of-ownership chart shows how durable RFID tags compare to other technologies in closed loop situations where

Motors per day	Average price per motor	Yield improvement	Daily improvement	6 month improvement
200	\$12,000	0.03	\$72,000	\$11,232,000

tags can be re-used. Reliance Electric cycles each of these pallets through their manufacturing line approximately five times per day. This makes the break even point for RFID tags relative to other technologies is 20-30 days. RFID technology from Escort Memory Systems provides a crucial component in Reliance Electric’s automation scheme that eliminates loss due to human errors within their complex facility while enabling compliance with cradle-to-grave traceability for their electric motor products. For Reliance, utilizing automation with RFID technology ensures that the company remains competitive in a tough world market.

Durable RFID tagging proved to be the lowest cost technology



solution that met all the requirements for a highly reliable WIP identification system.