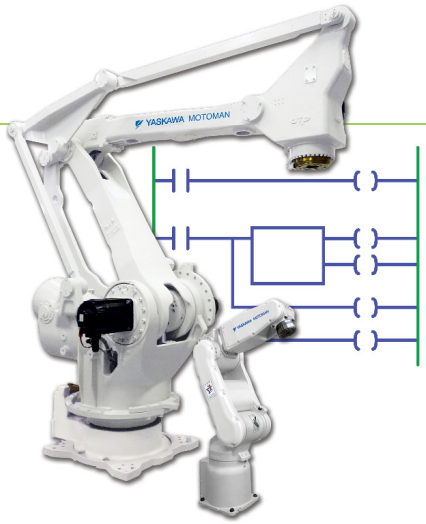
YASKAWA
MOTOMAN ROBOTICS

PLC Integrated Robots

THE CASE FOR UNIFIED ARCHITECTURE



ABSTRACT

Robots are becoming an integral part of the manufacturing floor, whether it is the automotive, electronics or consumer packaged goods industry. During the last five decades, the automotive sector has had a solid working base of robots, but robots are relatively new to the consumer packaged goods industry. It is often observed that CPG manufacturers find robotics a necessary evil, primarily because for them, “owning” a robotics system is a myth. This paper focuses on how robotics can be a friend on the floor and how manufacturers can really own their robotics systems.

PLC CONTROLLED ROBOTS?

Traditionally, Programmable Logic Controllers (PLC) are used as supervisory controls for approximately 90 percent of manufacturing systems. These PLCs control conveyors, filling systems, sealing and forming systems and most of the equipment in the plant.

Even in a typical robotics system, the PLC controls the entire operation of the cell. However, robot operations and path planning are done on a different controls platform that is proprietary to the robot manufacturer. As with any proprietary system, robots require specially trained professionals to program, control and interface them with the PLC for major operational commands. These specially trained technicians are in high demand but short supply, especially when needed unexpectedly for emergency repairs or adjustments. Even qualified robot technicians are usually familiar with only one or two – of many – brands of robots, and not necessarily the ones that you have. This specialization contributes to the technical skills scarcity and related delays and downtime. In most cases, manufacturers rely on their systems integration house or the robot manufacturer for troubleshooting, service and support. This reliance on outside resources is the reason robot “ownership” has been a myth.

In comparison to the scarcity and specialization of robot experts, PLC experts are much more accessible because the programming concepts and foundations remain the same no matter what brand of PLC is being used. Insofar as most machinery in a plant runs on a PLC, there are naturally more PLC experts than robot experts. Also, PLC programming is commonly taught in technical schools, while robot programming is not. To solve this problem, manufacturers and industrial and process engineers sought a way for robots to be programmed and controlled entirely through a PLC. Their work led to the development and implementation of the PLC-integrated robot control concept, also known as Unified Controls Architecture.

UNIFIED CONTROLS ARCHITECTURE

The definition of Unified Controls Architecture changes based on the usage context. In production and packaging systems, we define Unified Controls Architecture as a single unified primary controls platform for the entire workcell, so that the programming, diagnosis and troubleshooting is done in a single place. Unifying controls simplifies the system design because it decreases the number of cables, communication nodes and controls that are necessary in a traditional system’s architecture. A reduction in components leads to a reduced number of failure points and spare parts required.

The Unified Controls Architecture approach promotes greater inter-operability among components and systems, both upstream and downstream in the packaging line. Unified controls make the system more user-friendly because there is only one programming language to learn and maintain throughout the manufacturing plant. Robots become more maintenance staff-friendly as troubleshooting of the entire system happens in one place, in one language. Multiple programming languages are no longer required. With the advent of smart sensors such as vision systems, the unified architecture makes it simple to integrate sensor guidance and line tracking options that may be required for packaging applications.

The Unified Controls Architecture benefits the end users of the automation by providing maintenance-friendly systems. And it offers tremendous advantages to system integration houses, since programming the robots and all of the peripheral equipment happens in one place. Additionally, a single person can usually both program and debug the systems. This approach makes the system development more efficient in comparison to a traditional approach.

Another key benefit that Unified Controls Architecture offers is the ability to redeploy assets with your own maintenance staff. As the robots in this architecture are programmed, taught and controlled entirely through a PLC, your resident experts could easily redeploy them into another application or perform required upgrades as needed.

Therefore, a Unified Control Architecture makes robotics system ownership a practical reality.

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motoman.com

Yaskawa America, Inc. | Motoman Robotics Division
100 Automation Way | Miamisburg, OH 45342
Tel: 937.847.6200 | Fax: 937.847.6277