RFID keeps Johnson Controls in the driver seat

The difficulties of being a JIT supplier are numerous. Most importantly, a supplier must make certain that parts being delivered correspond with the manufacturer's request. Johnson Controls receives seat orders every hour via a modem transmission from NUMMI, in the form of a serial number list. This list is used to determine the order in which seats are loaded onto the trucks at Johnson Controls. The loading must correspond with the order of automobile production in the NUMMI plant. Accuracy in this process is crucial. Johnson Controls has two separate seat production lines: one produces truck cab seats, the other produces car seats. When the seats reach the inventory/packing stage of the facility these two lines become one, mixing truck and car seats together on the same conveyer. If the NUMMI plant has an order that goes: car, truck, car, and Johnson Controls loads a delivery truck in the order of: car, truck, truck, NUMMI's production line will be brought to a standstill. Add to this the numerous different models of both truck and car seats being produced and you have a potentially disastrous situation. A car/truck cannot continue on NUMMI's production line without seats, nor with the wrong type of seats. Johnson Controls therefore must use a system to insure that they always load seats onto their trucks in the correct order.

Fred Zaske, Electrical Engineer at Johnson Controls explained the problems that the production plant was experiencing, "Our previous ID system involved basic clipboards and checklists, located with operators at each station of production, inventory and shipping. The main reason we invested in RFID was to eliminate the human error that was prevalent with an operator ID system." NUMMI allows only a certain amount of mistakes each year, and Johnson Controls was barely able to keep itself from going over the allotted error margin. In order to keep their contract safe from being closed; a new ID system was needed. "We looked first at a barcode system, but because of the dirty and often abrasive conditions on the production floor we were worried about barcodes being dirtied or scraped, rendering them useless. Bar Codes were also more susceptible to misreads, and would cost us a great deal of time to troubleshoot while on the line." explained Zaske. At a trade show Fred came across Escort Memory Systems' booth, advertising the precise accuracy and relative simplicity RFID offers.

When setting up an RFID system, EMS recommended the HMS series of products initially. Johnson controls first installed the HMS system on the truck seat production line, as well as the inventory/shipping section of the plant. On the truck seat production line HMS tags were installed on the bottom of the truck seat pallets. The tags are written to in the first stage of production with recipe information. In subsequent stations, as the seat continues down the production line, the pallet passes over an HMS827-04 antenna at each operator station.

Operators reference a touchscreen PLC at their station that indicates seat type as well as needed alterations. If a seat requires work, the operating system won't let the seat continue down the line until the operator has made and verified all necessary adjustments. The antenna then writes to the tag, updating it with whatever modifications have been made to the seat.

The car seat production area, however, utilized a different type of RFID. Read-Only tags and antennas were chosen for the car seat production area of the plant. The car seat assembly area uses EMS' RS line of RFID readers and the ES series of tags. This technology was chosen for a couple reasons. First the production of the car seats involves many more steps than that of the truck cab seats. By using RS read only technology, the pallets can move faster over the readers than with HMS, because the writing function is not being executed. Second ES650 G007 tags are custom programmed with a serial

number when sold. Johnson Controls uses numbers 1-32 in their ES tags. Each tag number corresponds with a recipe for a particular car seat in the operating system. The production of the car seats is a fascinating process. Above the shop floor you can't help but notice the revolving maze of foam car seats. These seats seem to levitate above your head indefinitely until they reach a point in the maze where they begin their earthly decent. Upon reaching the shop floor the car seats are fitted to a small metal pallet. As the foam inserts travel down the early stages of the production line, the headrests are attached, seatbelts secured, and airbags, if necessary, are installed. At each of these stations in the production line, there is an antenna on the conveyer that reads the tag attached to the bottom of the pallet.

It is quite remarkable to think about what this innovation allows you to do. Whereas previously each type of car seat had to be separated and sent through the line in matching groups, Johnson Controls is now able to have all different types of car seats on the same production line. As a seat reaches a station, the tag is read. If the pre-programmed tag number (which is referenced by the operating system and corresponds to a seat type) indicates that the seat doesn't need to undergo a particular station's modification, the system will tell the conveyer to continue moving the pallet past the station. Only those seats whose tag indicates that modifications are necessary will stop at the station. At each one of these stations an operator uses a touchscreen PLC to initiate commands. After reading a screen in front of them, they press a button to select the appropriate materials for modifications (e.g.head rest type). The automated system then selects the appropriate materials and applies them to the new seat, often with operator assistance.

Johnson Controls operating system also features a rather unique safety check. When the tag is read at each of the above mentioned stations, the operator's power tools,(e.g. torque guns), will not operate until the operator has verified the type of seat and the appropriate modifications and materials for that particular station. Zaske commented regarding the safety net system, "By putting a system in place where an operator cannot begin modifying a seat until they have selected the correct components we've been able to minimize production error significantly."