

Car Maker Dresses Up Manufacturing Robots

Even when brand new, today's top-of-the-line industrial robots can experience disturbingly high failure rates, triggering downtime that costs thousands, even tens of thousands of dollars per minute. Often, the cause is defective or prematurely worn hoses or cables. Recognizing that conventional cabling is often the Achilles' heel of the whole robot assembly, automakers such as Mitsubishi Motors North America (MMNA) are retrofitting assembly line robots with all-in-one umbilical dresspacks that deliver superior performance, reliability, and durability when compared to the typical hodgepodge of single power/control cables and pneumatic/hydraulic hoses — the "spaghetti" array, which has been the standard "dress code" in robotics for more than 30 years.

Production had hardly begun on a new line at MMNA's Normal, IL, assembly plant when it was decided to begin retrofitting approximately 10 percent of the 823 robots in the plant's body shop with umbilicals designed and manufactured by LEONI EPS of Troy, MI. "The robots selected for the retrofit were real troublemakers," says Lou Zwaga, PE body supervisor for Mitsubishi at the Illinois plant. "Ongoing headaches included the fatigue of a servo gun seventh axis pulse encoder cable, which failed as frequently as once every five days due to the severe bending and stretching it received on FANUC Robotic's 2000i series of 165 kg and 200 kg floor mount robots."

Spaghetti Send Off

The 2.4 million square foot MMNA plant can produce up to 240,000 cars a year. Several Mitsubishi, Dodge, and Chrysler models are intermixed at this

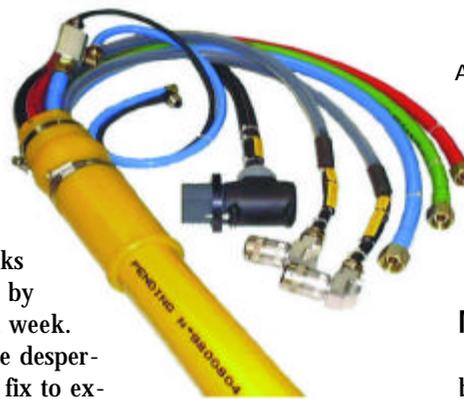
plant. The poor performance of some of the spaghetti cabling was the cause of persistent failures almost as soon as the new production line was started last year.

Within eight weeks of startup, some of the spaghetti arrays were being phased out. A retrofit package was designed by LEONI for pneumatic welders, servo welders, material handlers, and servo welders with material handlers. MMNA required a warranty — in this case one year — that would include cables and hoses, which are normally considered consumables. The warranty was granted because with proper installation, umbilicals can increase cable and hose life tenfold.

The first LEONI dresspack underwent trials starting with the ninth week of production, and general replacement

with dresspacks followed by the 13th week. "We were desperate for a fix to extend the lives of our pulse encoder cables and eliminate the downtime related to cable failures," Zwaga says. "The first trial (with umbilicals) was an unqualified success. Once the retrofits were complete, we were finally able to cut back on production related overtime and meet our jobs-per-hour targets."

Each retrofit took approximately eight hours and was done during scheduled non-production time. Mitsubishi/Illinois has modified its standard robot dressout to incorporate LEONI's umbilical package on all new



A dresspack with interior components (mix of cables and hoses.)

robot purchases intended for spot welding and/or material handling, according to Zwaga.

Minimizing Mistakes

The LEONI dresspacks bundle all robotics cables and all pneumatic and hydraulic hoses within a highly flexible, polyurethane (PUR) jacket. At LEONI, the cables and hoses are extruded into the shell to form a linear spring system that absorbs and distributes the stresses and loads throughout the entire module. The dresspack shields the cabling from abrasion, weld sparks, and bending stress. The custom assembly — post, brackets, boots and umbilicals — is designed to absorb kinetic energy generated by the robot's operations.

David Jack, lead technician at LEONI EPS, trained and worked with the MMNA floor team. Each class of robot needs a different umbilical, he says. "Servo welding guns are more complex electrically due to the separate communication for the servo encoder and for powering the servo motors required to operate the weld gun. In addition to the hoses and servo cables, an I/O cable and weld power cable are also packaged into a dresspack."

"The Mitsubishi project also added quick disconnects, making the entire dresspack a plug-and-play module between the robot axis three junction point and the end-of-arm tooling," Jack continues. "So when a failure does occur, repair time is minimized."

Each umbilical requires less space and provides improved reliability, ergonomics, and precision and extreme repeatability. Though more expensive than spaghetti cabling, ultimately, it provides a higher return of capital. LEONI EPS

Use **InfLINK** 4H2008 or call 800-287-9964



A "dressed out" robot in the body shop at Mitsubishi Motors North America.