

# Emerging Technology in Wire Processing Automation

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Technological change has become routine in our daily lives. Barely a week passes that we do not hear of an announcement of the latest device, feature or application to make our lives better.

We are not immune to technology change in the Wire Processing Industry. In fact we have grasped change for many years. In the 3 decades our company has served the wire processing industry, we have seen automation progress from mechanical systems with long set up times through the development of linear wire feeds, programmable servo driven robotic systems and quick change tool adaptors. All of these innovations were made to reduce set up time and improve the accuracy and precision of the machine output. These changes are driven by smaller lot sizes requiring quicker set up time and very little machine down time.

In recent years, change in technology has become more subtle. Even though there are improvements in processing speed, adapting to change in materials is more prevalent than improving overall pieces per hour of output. The spread in wire range is becoming greater with

increased demands to automate this larger range of wire sizes. With a drive towards reducing weight in automobiles, new materials such as aluminum wire and ultra thin insulation are becoming more commonplace. Electric and hybrid electric automobiles require high current carrying wire assemblies. At Wire Process Specialties, we have been working on applications which are representative of some of these changes. Here are a few examples.

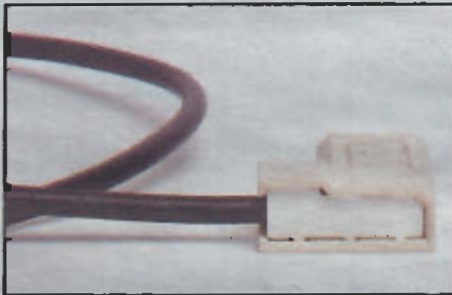
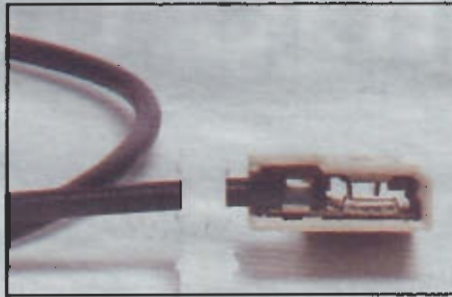
## Closed Back Insulated Connector from ETCO

Processing a wire lead with multiple steps is not new to automated wire processing. For example applying a weather seal to a wire prior to termination has been part of automation in wire processing for a long time. Finding new ways to maximize the use of an automation system is a high priority with the end user and supplier. ETCO Incorporated was at the forefront of insulated terminal technology in the late 1980's with the introduction of their open barrel insulated terminal series. These connectors have been widely adopted by the appliance industry. The introduction of a closed back assembly on the ETCO insulated flag terminal allowed the

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exposed open side to be fully closed off. A secondary process to the primary crimp and insulate cycle became necessary and due to the high volumes, automating is required. Through our partnership with ETCO and Schaefer Megomat, we successfully mounted the applicator and closed back assembly operation onto a next generation wire processing machine. The result is a new process that will meet the volume and quality demands from the appliance industry on this connector type.

## Laser Wire Stripping

Wire construction is constantly

changing to meet the demands of electrical components. Most wire can be processed using typical V blades or more wire specific radius or tangent radius forms. But there are a few wire types which cannot be effectively processed using typical or specialized blade designs. Laser wire stripping is used on irregular wire profiles and difficult to strip wires. Through our partnership with Schaefer Megomat and Control Laser Corp we have assessed applications to mount laser wire strippers to Schaefer automated processing machines. The result is another method of stripping wire which can extend the use of multi-station processing machines. As wire insulation changes to meet the requirements of new electrical and electronic components, new wire stripping methods such as laser will become more prevalent in every day wire processing.

## Plant Wide Crimp Quality Process Validation, Monitoring and Data Collection

Pre-process validation of machine set up, real time process monitoring of crimp quality and data collection requirements are driven by quality standards such as USCAR21 for the automo-

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tive industry. Quality systems requirements include validation of the right materials (wire, terminals, seals) and proper application tooling (crimp tooling and seal applicators) for a given job. Validation of materials and process tools along with measurement of quality parameters such as crimp height, crimp width, pull test and terminal cross sections are required prior to commencement of production. In some cases, production machines are locked out until

process validation is complete. These pre-production steps reduce the possibility of human error such as the wrong materials being introduced or production tooling used. Pre-Production quality requirements and production data are typically stored on a network server.

OEM machinery suppliers provide dedicated quality monitoring systems for their own machine models. In general these systems as effective as they are within their own ecosystem, do not communicate

with machines from other suppliers. This can be a challenge considering a typical factory floor has differing machine types (bench top and automation) from multiple sources. The solution is a cross platform system with common data collection devices on each processing machine or inspection stations adjacent to a machine cell. Examples of testing equipment are crimp height micrometers, pull testers and crimp cross section systems. Real time monitoring systems include crimp force

monitoring, seal detection and most recently cameras for crimp measurement and profiling. A plant wide networked system of validation, monitoring and data collection provides a common quality management solution for the crimp process.

These are three examples of multi station processing, alternate wire stripping methods and quality validation and monitoring which extend the use of automation in a wire harness facility. As materials and production demands change so must the process equipment change. The process to adapt to a changing market requires a strategic partnership between several groups including the material and processing equipment suppliers, the wire harness manufacturer and the end user of the wire harness. Organizations like the Wire Harness Manufacturer's Association play a critical role in the success of partnerships such as these.

Terry Curtis is owner of Wire Process Specialties. His website and blog is located at [www.wire-process.com](http://www.wire-process.com). Terry has been in the wire processing industry for over 30 years.