

Electronics Assemblers Takes the Heat Out

The folks at Electronics Assemblers Inc. (EAI), a cable and harness manufacturer in Oregon's Columbia gorge town of Hood River, try hard to keep the heat out of their customer relations by continually providing products of the highest quality at the lowest possible cost. More recently, EAI decided it was time to take some heat out of an existing process and make it safer for operators to perform. The result was a tool for processing heat-shrink tubing as applied to electrical cables. This came as a result of a successful project that partnered them with Oregon OSHA and the Oregon Manufacturing Extension Partnership (OMEP). Funding for the project came from Oregon's Department of Consumer and Business Services, administered by Oregon OSHA, whose "Worksite Redesign" grants were intended to design and develop equipment to address ergonomic, safety or health issues.

Many of EAI's electrical and cable harness assemblies incorporate heat shrink, a material that provide strain relief and environmental protection. In the past, standard "pistol style" heat guns were the only tool used at EAI to perform this function. While the process produces quality results, the guns were more suited to light production or contractor use and could be unsafe and unergonomic in full production environments such as EAI's. A solution that would allow an operator to perform his work in a neutral position with a higher degree of safety would enhance this process.

In the course of the grant application process, a search was conducted to ensure that a suitable tool was not already in existence. There were several solutions available that offered alternative processes to heat guns, such as heat-shrink conveyors. However, these would process only a small portion of EAI's products. Among several criteria, a key characteristic was to have the unit function manually for low volume or difficult to process products and "automatically", similar to a toaster, for high-volume applications. After the grant was approved, OMEP and EAI teamed with Engineering and Prototype Services in Portland, OR to design and build a unit that met the criteria identified in the application.

The first step in completing a design began as determining the proper processing system. As an alternative to convected high-temperature heat as used in heat guns, the group identified a glass-enclosed heating element that worked well with the various types of heat shrink used at EAI. After building a first-run prototype, it was apparent that while the unit processed heat shrink tubing well, further changes were needed to improve the ergonomics and safety of the design. One unanticipated problem arose, as it became apparent that a glare shield would be required since operators complained of eyestrain after viewing the elements for extended periods of time. Also, the controls and heat shrink processing unit were combined on the first unit, which did not allow great flexibility to position the heat elements in proper proximity to the operator. The subsequent unit incorporated an adjustable glare shield (smoked Lexan®) and separated the processing unit from the controls. The elements were also placed on a tiltable table to allow optimum adjustment for each operator. At the control station, the operator can select the heat setting and switch between continuously on or timed heat. If timed heat is selected, the operator sets the time (up to 30 seconds) and initiates the heat cycle by pressing a foot switch. The elements will heat up nearly instantaneously, close, and then turn off at the end of the timed cycle. Also, there are two pairs of elements. Normally, one pair is used but longer sections of heat shrink tubing may require both pairs.

After the second design was complete and tested, a post-ergonomic evaluation was performed per the grant's requirements. This would be the real test as to whether or not any substantial improvement had been made as the original process was documented to be the benchmark. The final report indicated that awkward postures, static postures, forces and loads, repetition, pressure points and safety hazards had been eliminated or greatly reduced. There is still opportunity to place additional guarding around the heat elements but the primary hazard of accidentally dropping the tool or misdirecting the heat has been greatly reduced.

To duplicate the device from existing drawings would cost approximately \$4,000 for a single unit, which would decrease for multiple quantities. EAI contributed in-kind efforts on this program, part of which involved testing the unit for proper operation in production that also ensure durability. Although the grant program is not currently being funded for additional projects, the design rights for this project are in the public domain and can be obtained from Oregon-OSHA. The Oregon Manufacturing Extension Partnership wrote the application on EAI's behalf and managed the project completion which included writing the specifications for the design of the unit, coordinating all activities and managing the grant monies. Additionally, while completing this project, another project for a hand-held or bench-top wire stripping tool at EAI was completed as well by OMEP.

Information about developments and the status of this program can be obtained from Oregon OSHA (www.orosha.org).

Phone: 1-800-922-2689.

<http://www.cbs.state.or.us/osha/grants/worksitere design.htm>

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