11-TTAG-009

Company Name	Molex Little Rock Connector
NAICS	334417
Address	801 Murphy Drive
City	Maumelle
State	AR
ZIP	72113
County	Pulaski
Number of Employees	775
Year Established	1984
Company Web Site	http://www.molex.com
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Project Area	Advanced Materials and Manufacturing Systems - 1 - Electronics
Project Area Brief Description	Electrical Safety
Federal Agency	- Not Applicable -
Project Title	11-TTAG-009 - Arc Flash Hazard Assessment & Mitigation – Phase 2 of 2
Competitive Challenges	Molex is a leading one-source supplier of interconnect products. Our team of highly skilled experts is focused on the design, development and distribution of innovative product solutions that touch virtually every walk of life. Our portfolio is among the world's most extensive, with over 100,000 reliable products, including everything from electronic, electrical and fiber optic interconnects to switches and application tooling. We leverage extensive worldwide resources to meet customer needs on a local, regional and global level. Molex offers well-established sales, product development, manufacturing and logistics resources in Asia, Europe and the Americas. Our engineering, development and manufacturing capabilities are organized into three product divisions, all serviced by the Molex Global Sales and Marketing Division. Competing in the global market is an ever changing and challenging environment. To stay competitive, especially with today's economic challenges, Molex must continue to reduce costs while maintaining the superior product quality and service that customers and partners expect while providing a manufacturing environment that attracts, and retains, a highly talented and productive workforce.
Specific Problem	OSHA has recently published its Electrical Safety Standard: Final Rule. This standard became effective on August 13th, 2007 and established the National Fire Protection Association (NFPA) 70E as the national consensus standard for electrical safety in the workplace. The NFPA 70E is a comprehensive guide to electrical safety and requires that electrical hazards be quantified and labeled in order for employees to be able to identify, and understand, the hazards associated with their job duties. These new standards are being driven by the fact that utility companies are increasing the capacity of their service to meet growing demand and arc flash incidents are killing more employees on a daily basis (CapSchell, Inc.) than shock hazard or electrocution. Understanding the electrical hazards identified by this project will enable employees to select the

	appropriate PPE that will protect them from these hazards thus reducing the chance of suffering serious injury or death. Molex has an immediate need to complete these mandated assessments.
Solution	Until recently, quantifying arc flash incident energy levels, and the subsequent heat and pressure developed by the arc flash, was done by hand and was very time consuming and difficult. There are approximately 14 variable attributes that must be considered when quantifying arc flash and blast hazards. Software developers and electrical engineers have been working together to produce software that enables these assessments to be completed relatively quickly, accurately, and with less chance of human error. The software used in this project was developed by ESA, in Clackamas, Oregon and allows the user to model an electrical distribution system and estimate incident energy levels based on IEEE 1584 and NFPA 70E standards. The incidents energy levels are expressed in calories per centimeter squared (cal/cm2) and are used to designate, or select, the appropriate PPE to protect employees working on or near energized electrical equipment. This overall process involves: gathering electrical equipment installation data, electrical system modeling, short circuit assessment, protective device coordination, arc flash assessment, equipment labeling, and electrical safety program implementation. The first phase of this project will include gathering necessary data, modeling the electrical system, and calculating available short circuit current throughout the system. The short circuit current will then be used in the second phase which will include: protective device coordination, arc flash assessment, labeling, and program implementation.
Implementation Plan	Leiver Technical Services, LLC will systematically analyze the electrical distribution system at Molex's facility in Maumelle, Arkansas. The analyses require that a great deal of data be obtained by on-site assessment. The gathered data will then be entered into a commercially available software program that will allow the short circuit currents, arcing currents, device coordination, and arc flash hazards to be calculated. The end result not only quantifies the electrical hazards but also identifies these hazards via labeling and ultimately provides a method to designate the appropriate PPE to protect employees.
Maintenance Plan	After the assessments have been completed, electrical equipment labeled, and appropriate PPE purchased, an Electrical Safety Program based on the NFPA 70E will be developed. This comprehensive program will outline the electrical safety program procedures, controls and principles. The solution will be maintained in accordance with these principles which include periodic audits and assessments of the equipment and personnel.

Step 1	PERFORM PROTECTIVE DEVICE COORDINATION STUDY The first step of the second phase will be to perform a protective device coordination assessment. Using the short circuit current values calculated from the first phase, Time-Current Curves (TCCs) will be obtained and/or developed. These curves allow for the estimated opening time of the protective device (circuit breakers and fuses) to be determined. The time that it takes for the device to open, or clear the fault, is a crucial variable attribute that has a tremendous impact on the incident energy levels generated in the event of a short circuit. The protective device coordination assessment allows for the balance of equipment availability, equipment protection, and safety.
Step 1 Time	15.00
Step 1 Budget	$1,500
Step 2	PERFORM ARC FLASH HAZARD ASSESSMENT The second step will be the arc flash hazard assessment. The incident energy levels are estimated by the software program and take all aspects of the electrical distribution system into account. The assessment produces available incident energy levels in calories per centimeter squared (cal/cm2) which are then used to determine the appropriate PPE that must be worn by the employee when working on the individual energized bus. The appropriate PPE is expressed by category (0 through 4) as defined by the NFPA 70E 2009 edition. An added bonus of the software program is the ability to print updated single-line diagrams of the electrical distribution system that may be referenced for troubleshooting and lock/tagout procedures.
Step 2 Time	15.00
Step 2 Budget	$1,500
Step 3	LABEL EQUIPMENT & IMPLEMENT PROGRAM After all of the assessments have been performed, labels will be printed and affixed to the affected equipment and the electrical safety program will be implemented. The program will include hazard identification, how to read the warning labels, and how to select and properly wear the appropriate PPE. The software program enables the user to print individual equipment labels with the pertinent data for that piece of equipment. The label includes such items as: arc flash boundary, incident energy level, PPE category, itemized PPE, shock hazard, and shock hazard boundaries. Labeling standards are outlined in both the NFPA 70E and the National Electric Code (NFPA 70).
Step 3 Time	20.00
Step 3 Budget	$2,000

Increased Sales	$0
Retained Sales	$0
CS Inventory	$0
CS Labor	$52,416
CS Materials	$520,000
CS Other	$0
II Plant	$12,000
II IS	$0
II Workforce	$2,000
II Research	$0
II Other	$0
AUI	$0
SOI	$0
Job Retention	0
Job Creation	0
YN 90Days	Yes
YN Affiliation	No
YN Agreement	Yes
YN Total Project Price	Yes
Explain Total Project Price	
YN Cash Match Agreement	Yes
Copied	No
TTAG ID	11-TTAG-009
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Include in Batch	Yes
Batch Number	NA
Application Status	Pending
Organization	AMS
BatchTest	Processed
Batch Date	
Set Batch Number	
Lvl4	Yes
Application Description	5-Strategic/Business Management/Planning Services
SBIR-STTR	No