SIMA San Diego Welders Reduce Risk of Injuries with Welding Power-Con Carrying Fixture

Repair and maintenance of Navy ships often requires welding operations to be performed onboard when parts cannot be removed from the ship to be worked on in shore-based workshops. Welders from the Welding Shop at the U. S. Navy's Shore Intermediate Maintenance Activity (SIMA) San Diego often have to transport equipment from the Welding Shop tool room to ships that are in dry dock. The welders push carts carrying their equipment down the piers to a ship, and then carry the equipment up the ship's ladder to the various locations aboard ship where they perform repair and maintenance tasks.

Welding aboard ships in dry dock is common at SIMA San Diego

A cumbersome and heavy piece of equipment used by the welders during most of their shipboard tasks is a power-con. The power-con, which weighs approximately 70 pounds, is a piece of equipment that provides electricity for welding operations — much like a power generator. The heavier the load that a worker has to lift, lower, or carry, the more strain that load exerts on muscles, tendons and ligaments in the worker's arms, shoulders and back, increasing the risk of musculoskeletal disorders (MSDs) or other injuries. MSDs are a category of injury caused by overburdening the soft tissues and connecting musculature, such as muscles, blood vessels, tendons, and ligaments. This overburdening may lead to fatigue, weakness, and discomfort. The discomfort often improves after discontinuing activities that weaken the affected muscles and getting medical treatment for the condition. Work-related MSDs, or WMSDs, result from ergonomic risk factors in the work environment.

Power-cons provide electricity for portable welding operations

Ergonomics is the science of fitting the work to the worker, instead of requiring the worker to adapt to existing working conditions. The goal of

an ergonomics program is to reduce the frequency and severity of WMSDs by redesigning work tasks or workstations using equipment, tools, and procedures that reduce stressors and minimize the risk of WMSDs. Applying ergonomic principals in the workplace also increases productivity and efficiency, reduces errors and waste, increases employee retention and satisfaction, and ultimately improves the overall quality of work and work products.

Welders reported muscle discomfort after carrying the 70 pound power-con

SIMA San Diego's Welding Shop portable welding operations presented opportunities to reduce the risk of WMSDs. Welders reported discomfort primarily of the arms, shoulders and back, which could be attributed, at least in part, to manually handling heavy equipment. The SIMA Ergonomics Program Manager - Safety Specialist Jorge Andrade – notified the Naval Facilities Engineering Command (NAVFAC) of the potential ergonomic problems in the Welding Shop and requested a site visit.

Under the Chief of Naval Operations' Hazard Abatement (HA) Program, NAVFAC provides ergonomic support services to Navy shore-based activities to prevent occupational disabilities by identifying and correcting ergonomic hazards at Navy worksites. The Chief of Naval Operations provides Hazard Abatement funding to abate occupational health and safety hazards for which other funding is not available.

Power-con fixture allows two welders to comfortably share the carrying load

Theresa Stack, a NAVFAC Hazard Abatement Certified Professional Ergonomist, performed an ergonomic evaluation at the SIMA San Diego Welding Shop. Mr. Andrade and Ms. Stack administered a *Job Requirements and Physical Demands Survey* (JR/PD) to SIMA Welding Shop workers to help assess ergonomic

risk factors to which they may have been exposed. Ms. Stack based her findings and recommendations on results of the JR/PD, observations of welding operations, interviews with welders and shop supervisors, and consultations with Mr. Andrade and SIMA San Diego Industrial Hygienist, Ms. Nancy Estrada. Providing equipment to reduce manual lifting of heavy loads and reduce the weight of equipment that must be lifted or carried was the solution to alleviate the ergonomic stresses for SIMA Welding Shop portable operations.

Sliding hoods locked down with wing nuts attach to each of the two power-con handles

The Navy HA Program sponsored a project for resolving ergonomic risk factors related to SIMA welders carrying heavy equipment onto ships and while welding aboard the ships. Specifically, the HA Program provided funding to test and develop a carrying fixture for the portable welding operation power-con. With the aid of Welding Shop workers, Mr. Jonnie Swayze - a SIMA Welding Shop supervisor - designed and developed the power-con fixture to make easier the difficult task of carrying and maneuvering the heavy power-con.

The close proximity of the handles on the power-con makes it impossible for two people to carry it. The carrying fixture, developed by the SIMA Welding Shop, effectively extends the handles of the power-con, so that two workers can share the carrying load of the power-con without difficulty, instead of one carrying the entire load alone. The power-con carrying fixture is made of light weight aluminum adding only about eight pounds of carrying weight to the 70 pound power-con. Sliding hoods attach to each of the two power-con handles and are locked down with wing nuts.

Power-con fixture reduces ergonomic stressors that cause WMSDs

Once the design of the carrying fixture was approved by NAVFAC, the SIMA Welding Shop used HA funds to build 15 of the power-con carrying

fixtures. Using the carrying fixture to lift the power-con, two people walking side-by-side or one behind the other, can now maneuver the power-con on ship's ladders and into ship spaces where portable welding operations take place.

Welders' fatigue is reduced by using power-con carrying fixture, resulting in increased job efficiency

The power-con carrying fixtures have eliminated the ergonomic stresses placed on welders who previously carried power-cons single-handedly. Workers have a reduced risk of developing WMSDs because forces on the spine and strain on back, arm, and shoulder muscles are reduced when two workers share the combined 78 pound power-con and fixture carrying load. There have been no complaints by the welders of arm, shoulder and back discomfort since they began using the power-con carrying device.

Prior to the introduction of the carrying fixture, welders needed time to regain their energy between manually carrying their equipment and starting work. Now, they show significantly less fatigue and increased efficiency on the job. The welders at SIMA San Diego are very satisfied with the power-con carrying fixture, and are especially pleased with the resulting relief from ergonomic stressors that the fixture has brought them. They would recommend the fixture for other applications throughout the Armed Forces.

Points of Contact: Cathy Rothwell, Ergonomic Program Manager,
Naval Facilities Engineering Command
Telephone: (619)532-2536
Email: RothwellCB@efdsw.navfac.navy.mil

Jorge Andrade, Safety Specialist/SIMA San Diego Ergonomic Program Manager
Telephone: (619) 556-2943
Email: AndradeJM@simasd.navy.mil