

Cooling Shirts for Workers in Hot Environments



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SYSCOM: Office of Naval Research
 (ONR)

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 Submarine Program of Record

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 United States Marine Corps, United
 States Army, Naval Air Systems
 Command (NAVAIR)

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THE CHALLENGE

Naval shipyard welders frequently work in hot/humid environments. They wear heavy personal protective equipment (PPE) and the large steel plates that they weld together to form the hull are preheated to 150-200oF. All together, these factors mean that shipyard welders can only work for a limited amount of time (~45 minutes) before they need to leave the welding area, remove their PPE, and cool down. This dramatically reduces their productivity.

THE INNOVATION

TDA's cooling shirt is worn beneath the PPE and uses patented technology to drastically increase sweat evaporation (and therefore cooling) efficiency. TDA's shirts are lightweight and comfortable, and do not restrict mobility. They never overcool the wearer and can work for four straight hours on a single battery charge. The batteries are swappable so that workers can run the suit indefinitely. The shirts will keep the wearer cool in nearly any environment on earth.

THE NAVY BENEFIT

TDA's cooling shirt was specially designed for shipyard welders, who are highly skilled workers with commensurately high pay. Reducing the heat load on these workers improves their safety and comfort; and also reduces the number of needed breaks, increasing productivity and reducing the costs for shipyard personnel. This technology can be applied to a huge number of other applications. Anywhere personnel are subjected to hot environments, TDA's cooling shirt will improve safety, comfort, and productivity. TDA has tested its shirt at the Personal Protective Technology Laboratory (NPPTL) and recorded significant reductions in core body temperature (thus eliminating the threat of heat stroke) using their sweating thermal manikin.

THE FUTURE

TDA has a cooperative research and development agreement (CRADA) with several naval shipyards for testing the cooling garment. The shipyard personnel have provided extremely positive feedback about the shirt's cooling effectiveness and stated that personnel are extremely excited about wearing TDA's shirts. They are also providing important feedback for improving the designs. TDA is working with U.S. suppliers to set up a small-scale manufacturing line and are interested in potential customers who want to test the shirts and partners who can help scale up garment manufacturing. TDA is working with the USMC on a variant of our cooling shirt for EOD personnel. We are in talks with the Army to develop a cooling vest for their EOD personnel and are talking to contacts at NAVAIR about additional applications for our cooling shirts.