

NAVSEA Improves Shipboard Plastic Waste Management

Enhanced Onboard Equipment Is 50 Percent More Reliable

ON AN AVERAGE day during deployment, a U.S. Navy nuclear-powered aircraft carrier generates up to 1,500 pounds of plastic waste. Smaller surface ships produce almost 80 pounds each day. Take into account the average 32-gallon recycling container used at home holds about six (6) pounds of plastic and you begin to understand how important it is for U.S. Navy ships to effectively process plastic waste—for storage until it is either offloaded to a support vessel during underway replenishments every three to four weeks or to a shore-side disposal facility when the ship is in port. The Chief of Naval Operations' Environ-

The National Defense Authorization Act for Fiscal Year 1994 directed the U.S. Navy to install Plastic Waste Processors (PWP) on surface ships larger than FFG 7 Class by the end of 1998. The PWP is a piece of equipment that melts and compresses plastic waste into circular discs so they can be efficiently and safely stored aboard ship, while enabling ships to conduct their mission unrestricted throughout the world. Development of the legacy PWP (Mod 0) technology began in 1993 at the Naval Surface Warfare Center—Carderock Division (NSWCCD) in the Environmental Quality (EQ) Division (Code 63). The Mod 0 PWP reduces

within NSWCCD Code 635 states, “After getting significant feedback from the Fleet, we assessed the legacy system’s complexity, corrosion patterns, and component failure rates.” As a result, in Fiscal Year (FY) 2000, the Afloat EQ Program Office within the Naval Sea Systems Command directed NSWCCD’s EQ Division to improve the Mod 0 PWP design, with the primary objectives to reduce equipment operational and maintenance man-hours without modifying the shipboard interfaces. This was a collaborative effort between NSWCCD Code 634 (West Bethesda, MD) and Code 635 (Philadelphia, PA).

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mental Readiness Program Manual (OPNAVINST 5090.1 series) prohibits the overboard discharge of plastic garbage worldwide, making the management of the shipboard generated plastic waste stream critical.

the volume of plastic waste by a 30:1 ratio. Between 1995 and 1998, more than 600 Mod 0 PWP's were installed throughout the U.S. Navy Fleet.

Paul Schwegler, who is the Solid Waste Equipment Technical Expert

Mr. Schwegler continued, “Parts with high failure rates were removed or replaced in the re-design. We also improved the materials used to reduce corrosion and maintenance, and revamped the electrical and drive systems to enhance reliability

All of the improvements made were internal to the equipment, so no changes were required for existing foundations or electrical, air and water interfaces.

and increase processing rates. The lower frame of the unit was redesigned to simplify cleaning. All these changes improved reliability and streamlined operational and maintenance processes.”

Replacement components were designed, fabricated, and tested for performance, reliability and suitability

in the laboratory. Pre-production units were tested in the laboratory for hardware and software functionality and failure modes, safety, reliability, maintainability, and availability, as well as operability and performance. Subsequent shipboard underway operational evaluations were conducted on CVN 68, LHA 1 and DDG 51 Class ships. All of the improvements made were internal to the equipment, so no changes were required for existing foundations or electrical, air and water interfaces.

Overall, NSWCCD’s new design (Mod I PWP) in comparison to the Mod 0 PWP has one-third fewer components, nearly twice the processing rate, half the maintenance time and a 50 percent increase in reliability. The requirement to overhaul the Mod 0 PWPs every 2,000 cycles was also eliminated. The Mod I PWP prototypes installed in 2003 onboard USS Harry S. Truman (CVN 75) had more than 15,000 cycles when they were replaced with Mod I PWP production units in 2011. Furthermore, changing to the Mod I PWPs provided a direct cost savings since the increased processing rate allowed the Navy to



LEFT: Mod I PWP onboard USS Laboon following completion of MACHALT 600 installation in FY05.

Paul Schwegler



USS Laboon (DDG 58).

Paul Farley



ABOVE: Mod I PWP (left) and legacy (Mod 0) PWP (right) onboard USS Milius.

Paul Schwegler

reduce the number of PWPs required on ships. For example, the amphibious assault ship USS Makin Island (LHD 8) went from six (6) Mod 0 PWPs to four (4) Mod I PWPs, a cost savings of more than \$100,000. This also results in reduced footprint requirements to house the new Mod I PWPs.

Installation of Mod I PWPs to the in-service Fleet began in FY05. To date, NSWCCD has completed the back-fit of Mod I PWPs on 130 U.S. Navy ships, and the remaining



USS Milius (DDG 69).
Senior Chief MC Joe Kane

The amphibious assault ship USS Makin Island (LHD 8) went from six Mod 0 PWPs to four Mod IPWPs, a cost savings of more than \$100,000.

two installations are scheduled to begin on the USS Carl Vinson (CVN 70) in San Diego, CA and USS McCampbell (DDG 85) in Yokosuka, Japan during the first and second quarters of FY13, respectively. New construction ships requiring plastic processing technology will receive the Mod I PWPs during construction.

The installation of Mod I PWPs provides significant benefit to the U.S. Navy in operation and workload savings, ship cleanliness, while preserving the ship's ability to meet Navy environmental discharge requirements. ⚓

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