

SIMA SAN DIEGO USES ANTI-VIBRATION SANDERS TO PREVENT HAND ARM VIBRATION SYNDROME

Repair technicians in the Antenna Shop at the Shore Intermediate Maintenance Activity (SIMA), Naval Amphibious Base, Coronado, CA



Antenna Shop personnel using a jitterbug sander that was not designed to be ergonomic or low in vibration to prepare an antenna for painting

sand radio antennas from Navy ships to remove corrosion and pitting and to prepare the antennas for repainting. The antennas can be as much as 35 feet long, and sanding one antenna may take up to a full eight-hour work shift to complete.

Repair technicians use pneumatically-powered *jitterbug* sanders for the job. The *jitterbug* sander is a type of orbital sander that is

typically used with one hand. These sanders are designed to sand surfaces to a smooth, fine finish. The basic feature is a rectangular pad which is covered with abrasive paper. The abrasive paper is driven round in small orbits on the pad. When Antenna Shop technicians reported numbness and tingling in their hands and fingers after a few hours of using a *jitterbug* sander, Mr. Alec Wong, an Industrial Hygienist with the Naval Medical Center San Diego (NMCS) assigned to provide industrial hygiene services to SIMA, suspected that the workers were being overexposed to hand-arm vibration while using the *jitterbug* sanders.

Overexposure to vibration for long periods of time can lead to progressive damage of the nerves, joints, bones, tendons, muscles, and blood vessels of the hands, wrists, and arms. This progressive damage from using vibrating tools may result in a particular cumulative trauma disorder (CTD) of the hand and arms known as Vibration-Induced White Finger Disease or Hand-Arm Vibration Syndrome (HAVS). In the early stages of HAVS, a worker using a vibrating tool may experience numbness, tingling, and loss of feeling and control in the fingers. Continued overexposure to vibration energy may result in blanching or whitening of

the fingers of the overexposed hand or hands. This whitening is a result of reduced blood supply to the fingers due to vibration-induced damage to the blood vessels. Advanced HAVS may be painful, disabling, and irreversible.

A second NMCS D industrial hygienist, Ms. Nancy Estrada, assisted Mr. Wong in measuring the vibration energy that Antenna Shop *jitterbug* sanders transferred to the hands and arms of the technicians when they were sanding. Vibration energy is typically measured in terms of acceleration to estimate the vibration exposure to the user.

Accelerometers, or vibration monitoring devices, were mounted to the sander handle in order to evaluate the vibration transferred from the orbital sander to the

technicians' hand and arm. Accelerometers collect and analyze data, taking into account changes in the hazard and frequency of the vibration energy.

Since there are three dimensions to the human body - length, width, and depth - the industrial hygienists used three

accelerometers to measure vibration simultaneously in all three dimensions, on

each technician, for each Antenna Shop sander.



Worker uses the ergonomically designed jitterbug sander to prepare surface for painting.

The industrial hygienists' vibration measurements determined that some of SIMA's *jitterbug* sanders generated vibration energy in excess of the American Conference of Governmental Industrial Hygienists' (ACGIH) recommended exposure limits. The ACGIH is a professional organization that publishes recommended exposure limits to protect workers from occupational overexposure to vibration. Ms. Estrada and Mr. Wong recommended the Antenna Shop only use the sanders that generated vibration levels within the ACGIH's recommended limits while they initiated a search for anti-vibration sanders for the Antenna Shop.

Ms. Estrada and Mr. Wong were instrumental in acquiring and evaluating four *jitterbug* sanders equipped with vibration damping as well as other comfort and safety features. The Antenna Shop repair technicians evaluated the demonstration sanders to determine which they preferred. At the same time, the industrial hygienists measured the vibration exposure of each of the demonstration sanders. One of the four test sanders demonstrated the least transfer of vibration to the hands and arms of the repair technicians who tested them. The model that generated the lowest vibration levels was also the sander that the technicians had identified as the most comfortable to use. The industrial hygienists used the vibration measurement data and the workers' preferences to determine which sander to purchase as replacements for the *jitterbug* sanders with an unacceptable vibration level. The model of sander that had been shown to generate the least vibration was determined to be the best overall *anti-vibration jitterbug* sander for the shop; the Navy's Hazard Abatement Program funded ten new sanders for SIMA's Antenna Shop.



Anti-vibration jitterbug sander prevents HAVS and is most comfortable for SIMA's Antenna Shop.

If the high-vibration sanders had not been replaced with the new *anti-vibration jitterbug* sanders, the NMCS D Industrial Hygiene Department estimates that within two and a half to four years, approximately one third of the Antenna Shop repair technicians could have experienced the symptoms of the early stages of HAVS.

Since the new *anti-vibration jitterbug* sanders have been in use, Antenna Shop repair technicians have reported that they no longer experience numbness or tingling in their hands or fingers during or after sanding. As an added bonus, the shop supervisor reported that Antenna Shop productivity has improved due to the new sanders' larger sanding surfaces and the increased comfort of the technicians who use them.

Point of Contact: Mr. A. Wong, Industrial Hygienist, Naval Medical Center San Diego (NMCS D)
Telephone: Commercial (619) 556-8847, DSN 526-8847
Email: aywong@nmcsd.med.navy.mil