WALK-THROUGH SURVEY REPORT:

HVLV CONTROL TECHNOLOGY FOR AIRCRAFT RADOME AND CANOPY REPAIR AT:

Naval Air Rework Facility
Alameda Naval Air Station
Alameda, California

REPORT WRITTEN BY:

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NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
Division of Physical Sciences and Engineering
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PLANT SURVEYED:	Naval Air Rework Facility Alameda Naval Air Station Alameda, California 95401
SIC CODE:	3721 (Assembly of Complete Aircraft)
SURVEY DATE:	June 15,1983
SURVEY CONDUCTED BY:	Bruce A. Hollett, C.I.H., P.E.
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EMPLOYEE REPRESENTATIVES CONTACTED:	No Employee Representatives

I. INTRODUCTION

The National Institute for Occupational Safety and Health (NIOSH) is the primary Federal agency engaged in occupational safety and health research. Located in the Department of Health and Human Services (formerly DHEW), it was established by the Occupational Safety and Health Act of 1970. This legislation mandated NIOSH to conduct a number of research and education programs separate from the standard setting and enforcement functions carried out by the Occupational Safety and Health Administration (OSHA) in the Department of Labor. An important area of NIOSH research deals with methods for controlling occupational exposure to potential chemical and physical hazards. The Engineering Control Technology Branch (ECTB) of the Division of Physical Sciences and Engineering has been given the lead within NIOSH to study the engineering aspects of health hazard prevention and control.

Since 1976, ECTB has conducted a number of assessments of health hazard control technology on the basis of industry, common industrial process, or specific control techniques. Examples of these completed studies include the foundry industry; various chemical manufacturing or processing operations; spray painting; and the recirculation of exhaust air. The objective of each of these studies has been to document and evaluate effective control techniques for potential health hazards in the industry or process of interest, and to create a more general awareness of the need for or availability of an effective system of hazard control measures.

These studies involve a number of steps or phases. When the perceived need for research requires further definition, a pilot study is undertaken to assess the need for bench research and/or validation of existing capabilities. If it is determined that field studies are needed, a series of walk-through surveys is conducted to select plants or processes with effective and potentially transferable control concepts or techniques. Next, in-depth surveys are conducted to determine both the control parameters and the effectiveness of these controls. The reports from these in-depth surveys are then used as a basis for preparing technical reports and journal articles on effective hazard control measures. Ultimately, the information from these research activities builds the data base of publicly available information on hazard control techniques for use by health professionals who are responsible for preventing occupational illness and injury.

The objective of this pilot study is to determine the state-of-the-art of High Velocity Low Volume (HVLV) technology and to what extent it has been successfully applied in various industries. It will provide an assessment of the need for research and/or validation of existing capabilities and their potential for transfer to other industries. The purpose of this visit was to explore the potential for use of this technology in aircraft glassfiber radome and plastic canopy maintenance.

II. PLANT AND PROCESS DESCRIPTION

Plant Description:

This is one of five Naval Air Rework Facilities (NARF). These are large industrial depots responsible for major repairs and overhaul of U.S. Navy aircraft. The two areas presently equipped with HVLV sanding equipment are the glassfiber shop and the plastic shop. The glassfiber shop is primarily a radome repair facility. They have a portable HVLV system. The plastic shop is primarily a plexiglass canopy repair shop. They have a hand tool equipped with a self-contained venturi powered dust collector bag. Both shops have a variety of ventilation booths and hoods available for their use.

Process Description:

The fiberglass sanders are used to remove paint and to refinish fiberglass surfaces. The radome is a large work piece which requires several hours of sanding even when a larger 8" diameter sander is used. The vacuum system was in the tool room at the time of this survey. The workers differed in their assessment of the value of the system in controlling fiberglass dust and in the HVLV sanders relative merit compared to other available tools.

The plastics sanders are used to refinish the plexiglass canopies. The canopies are sanded to remove scratches and then refinished with successively finer grades of abrasives until the polished canopy is again transparent. The venturi sanders were used primarily on work pieces which could not be done in the walk-in ventilation booth. These self-powered dust collectors were generally agreed to be helpful in controlling the plastic dust.

Potential Hazards:

Glassfiber is a primary irritant while plastic dust is classified as a nuisance dust. The occasional removal of paint in the glassfiber shop presents a potential for exposure to paint additives including lead and chromates.

III. CONTROLS

PRINCIPLES OF CONTROL

Occupational exposures can be controlled by the application of a number of well-known principles, including engineering measures, work practices, personal protection, and monitoring. These principles may be applied at or near the hazard source, to the general workplace environment, or at the point of occupational exposure to individuals. Controls applied at the source of the hazard, including engineering measures (material substitution, process/equipment modification, isolation or automation, local ventilation) and work practices, are generally the preferred and most effective means of control both in terms of occupational and environmental concerns. Controls which may be applied to hazards that have escaped into the workplace environment include dilution ventilation, dust suppression, and housekeeping. Control measures may also be applied near individual workers, including the use of remote control rooms, isolation booths, supplied-air cabs, work practices, and personal protective equipment.

In general, a system comprised of the above control measures is required to provide worker protection under normal operating conditions as well as under conditions of process upset, failure and/or maintenance. Process and workplace monitoring devices, personal exposure monitoring, and medical monitoring are important mechanisms for providing feedback concerning effectiveness of the controls in use. Ongoing monitoring and maintenance of controls to ensure proper use and operating conditions, and the education and commitment of both workers and management to occupational health are also important ingredients of a complete, effective, and durable control system.

These principles of control apply to all situations, but their optimum application varies from case-to-case. The application of these principles in the NARF radome and canopy maintenance is discussed below.

Engineering Controls:

In the radome shop, the workers are provided a Dual Flex portable vacuum model 770 and an 8" Dual Flex sander equipped with the perforated pad exhaust.

In the canopy shop, the Hutchins venturi system utilizes the air-powered tools exhaust to collect the dust and blow it into a cloth bag hung behind the tool.

Work Practices:

There was a difference of opinion among the glassfiber shop workers on the relative merits of the sanders. The Dual Flex system was considered to be faster by one of the operators. However, he recommended a HVLV sander that he had used in prior employment in autobody shops. The DA sander was reportedly much smaller and lighter while doing about the same job. It is noted that a similar recommendation was received from a plastic shop worker at the Kenworth Truck Company in Seattle, Washington.

The canopy sanders had been in service for over 10 years. The workers found them acceptable for the work that could not be taken into the walk-in booth.

Monitoring:

The Navy requires baseline measurement in all facilities and periodic monitoring is accomplished on a priority basis for beryllium, asbestos, lead, and isocyanates. It was reported that exposure measurements were taken in both shops. The fiberglass measurements show exposures are below the control limits even without use of the HVLV system. The plastics dust can exceed the limit without the use of the venturi dust collectors.

Occupational physicals are required annually for workers potentially exposed to toxic dusts, solvents, and paints.

Personal Protection:

Workers in these shop areas are required to wear safety shoes, safety glasses, or other appropriate face protection as posted. Workers are provided disposable masks and are required to wear high effective particulate filters when sanding paint.

Other Unique Practices:

There are plans to provide HVLV systems for paint removal facilities at several locations. The Navy industrial hygienist conducted a test of the proposed HVLV system during a demonstration by the Dual Flex representative in the Navy paint shop. Personal breathing zone and area samples were collected during periods of sanding with the Dual Flex and with the unventilated tool. The comparison indicated a reduction of exposure levels by a factor of 5 using the Dual Flex sander. The personal exposure was 0.087 mg/m^3 versus 0.21 and the area measurement was 0.130 versus 0.562 mg/m^3. This reduction is appreciable, however, it was concluded that additional controls may be required to provide full protection.

Conclusions and Recommendations:

The existing portable system is apparently used rather infrequently by the glassfiber sanders. The venturi system is used routinely to control plastics dust to accepted level. The proposed installation of a larger HVLV exhaust system in this facility would provide for connection of these tools to the central vacuum. This would likely increase the utility and efficiency of the existing units.

Should these new installations be approved, it would be desirable to obtain documentation of the full extent of the reduction in exposure achieved. Possibly, by a comparison study of exposure measurements taken before and after the improvements.