WALK-THROUGH SURVEY REPORT:

CONTROL TECHNOLOGY FOR GRINDING AND CUTTING

AT

FAIRCHILD REPUBLIC CO.
FARMINGDALE, NEW YORK

REPORT WRITTEN BY:
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NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
Division of Physical Sciences and Engineering
Engineering Control Technology Branch
4676 Columbia Parkway
Cincinnati, Ohio 45226

PLANT SURVEYED:	Fairchild Republic Co. Farmingdale, NY 11735
SIC CODE:	3729 (Aircraft Parts and Auxillary Equipment)
SURVEY DATE:	March 25,1983
SURVEY CONDUCTED BY:	Bruce A. Hollett, C.I.H., P.E.
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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 are 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 the aircraft manufacturing industry.

II. PLANT AND PROCESS DESCRIPTION

PLANT DESCRIPTION

Historically, the company originated in the 1930's under the name of Suversky, it became Republic Aviation Corporation in the 1940's, and Fairchild bought controlling stock in 1965. It hit a peak employment during the Korean war of around 30,000 workers. In the mid 1970's it reached a peak of around 7,500 workers. At present there are about 4,500 employees at the Farmingdale facility. They manufacture parts and assemble aircraft subassemblies.

PROCESS DESCRIPTION

There are a large number of activities under one roof in each bay area. The three areas of interest to this study were: (1) A-10 wing Plank; (2) SAAB/Fairchild SF340 gear door trim; and (3) Boeing flap trim.

Area No. 1 activity involved finishing aluminum castings. Tools used were small hand grinders and sanders. The vacuum hose was positioned near the point of tool application and intermittently used to vacuum the accumulation of dust. The HVLV blower was inoperative due to a drive linkage misallignment the previous afternoon.

Area No. 2 involved sawing and sanding Kevlar resin materials. There were two workers using a hand jigsaw and a rotary sander. The worker held the vacuum hose while the other operated the tool. The small number of pieces to be hand fitted would not justify installing a permanent exhaust at this work station. However, the availability of the portable unit provided temporary controls during this period of intermittent activity.

Area No. 3 involved sawing and drilling fiberglass materials. This area was not in operation at the time of this survey. However, a demonstration of the fiberglass sawing was provided. The worker wore a respirator while conducting this activity. The flexible duct was held in one hand while the saw was held in the other.

POTENTIAL HAZARDS

The hazard in Area No. 1 was identified as total dust levels in excess of half the TLV. This condition existed in another building prior to moving into the present location. The high dust levels resulted in a very dirty work area. The control objective was to reduce the overall dust level.

The hazard in Area No. 2 is resin dust and fibers similar to fiberglass. The task being performed is trimming a part to fit properly into the assembly. This is not a high volume activity; however, the portable unit was brought to help control fibers and dust during this phase of construction.

The hazard in Area No. 3 is from fiberglass dust and fibers. This area is utilized by three workers on the average of two hours every other day. There were complaints about the accumulation of white powder in the surrounding area prior to the installation of the HVLV unit.

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 insure 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 at the Fairchild Republic plant is discussed below.

ENGINEERING CONTROLS

The large bay areas are heated by steam blast heaters. There are a large number of local exhaust systems and replacement air vents. They had no estimate of the volume exhausted; however, they believe there are between two and four air changes per hour.

All three of the HVLV systems were built by Lamson. The design capacity was estimated to be 400 cfm per tool; however, no overall flow rates or system operating vacuum criteria were readily available.

Area No. 1 activity involved grinding aluminum castings. This area had nine work stations, each with two HVLV vacuum ports. The vacuum port valves are actuated by a pneumatic sensor which turns on the vacuum whenever the air tool is operated. The system was designed to support 8 to 10 tools at once. This system had vibration problems due to direct mounting on the floor. The vibration resulted in misalignment of the motor/blower coupling. The problem was alleviated by installing vibration isolation mounts under the motor. The central dust collection device had self-shaking bags and a 40 Hp blower. The cost of this system was around $65,000, complete.

Area No. 2 involved sawing and sanding Kevlar resin materials. There were two workers using a hand jigsaw and rotary sander. The HVLV vacuum system was a portable unit with two vacuum ports and a 7.5 Hp motor. The cost of this system was around $6,000.

Area No. 3 involved sawing and drilling fiberglass materials. The HVLV system was a much smaller, permanently-installed unit with four vacuum ports and a 15 Hp motor. The bags in this unit are automatically shaken daily and the hopper is dumped once a week.

WORK PRACTICES

HVLV system were not being used as they were designed to be used. Workers in all three areas used the flexible vacuum hose held adjacent to their cutting tool to remove dust and debris from the work area. All felt that the system, as it was being used, made a big improvement over the conditions prior to installing the HVLV. The areas were noted to be reasonably free from accumulations of dust.

In Area No. 1, the employees were well aware of the intended tool shroud configuration. However, they found the shroud got in the way of their work in close angles, and the hose was an additional encumberance which made it difficult to feel the grinding wheel contact with the work piece. They felt that they must feel their work to do the job properly. This group had improvised means of fastening the flexible duct to the work piece so that it would be near the cutting surface to collect the dust generated.

In Area No. 2, the employees did not have the shroud attachment available with the portable unit. They were likely stored in the shop area where the portable unit is kept.

In Area No. 3, there were no shroud attachments in evidence.

MONITORING

There are two full-time industrial hygienists on staff. No environmental monitoring was reported in the areas of interest since the instillation of the HVLV systems. The dust problems were perceived to have been solved.

Medical monitoring is provided by a full-time physician, two staff nurses, and six part-time RN's. Employees are given pre-employment physicals including a baseline audiogram. Periodic x-rays and pulmonary function tests are given annually to workers in dusty areas. Foundry workers receive blood lead screening.

PERSONAL PROTECTION

Eye protection is required throughout the work areas. Ear defenders are required in high noise areas.

OTHER UNIQUE PRACTICES

The safety program includes training in job hazards. A hazardous noise training program was in progress during this survey.

OTHER OBSERVATIONS

The areas of interest were not operating at full production during this survey.

IV. CONCLUSIONS AND RECOMMENDATIONS

The HVLV system installed in this facility would appear to have been a major effort to improve the work environment. None of these three systems are being utilized entirely as they were designed to be used. The low level of activity and maintenance problems at the time of this survey did not allow a full observation of the employees reported difficulties with the system. It was clear, however, that the hoods had been in disuse for some time. The fact that in each area, employees were going to considerable effort to make use of the free standing exhaust hose, indicates their recognition of a need for dust control. They also expressed an appreciation for the improvement the vacuum system had made, even in its modified usage.

It is concluded that the perceived encumberance of the vacuum hose and tool shrouds has resulted in the disuse of the tool mounted shrouds. Therefore, improvements are needed in the HVLV design to achieve complete implementation of this control system.

Further observations should be made in similar applications to determine the extent to which these work practices are based on a unique application, workers misperceptions, the specific hood design deficiencies, or a more general unsuitability of HVLV hood designs to date.