WALK-THROUGH SURVEY REPORT:

HVLV CONTROL TECHNOLOGY FOR MACHINING AND HAND GRINDING AT:

AMETEK, Inc.
Haveg Division
Wilmington, Delaware

REPORT WRITTEN BY:

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16. Abstract (Limit: 200 words)

The state of the art of high velocity low volume (HVLV) technology and its successful application was surveyed on March 21, 1983 at Haveg (SIC-3079), Wilmington, Delaware. The facility employed 15 to 20 workers in the machine shop and fabrication activities. The company produced a molded corrosion resistant plastic by mixing viscous liquid phenolic or furfuryl alcohol resins with fiber filler and reinforcing agents. The potential hazard in machining the plastic was assoicated with dust and fibers. The HVLV exhaust system was originally designed to meet the OSHA asbestos criteria of two fibers per cubic centimeter. It has been maintained and operated to control the dust. Suction was maintained by two 150 horsepower blowers. The system had 35 to 40 attachment points, 7 of which were located at hand tool stations. The system supported 16 active outlets simultaneously. The joints in the duct piping were replaced periodically due to wear of abrasive materials in the high velocity air stream. Disposable dust masks were available to workers during dusty jobs. Other unique practices included the use of improvised deflectors to aid the HVLV pickup of material during lathe operations. Management expressed overall satisfaction with the HVLV system.

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PLANT SURVEYED:	Haveg 900 Greenbank Road Wilmington, Delaware 19808
SIC CODE:	3079 (Miscellaneous Plastic Products)
SURVEY DATE:	March 21, 1983
SURVEY CONDUCTED BY:	Bruce A. Hollett, C.I.H., P.E.
EMPLOYER REPRESENTATIVES CONTACTED:	Mr. H. Dudley Burton, General Manager (302) 995-0401 Mr. Frank Smiley, Engineer Ms. Betty Tull, Employee Relations
EMPLOYEE REPRESENTATIVES CONTACTED:	Mr. Richard Squire, Machinist and Steward, United Textile Workers, Local 266A

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 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 these potentials in the molded resins industry.

II. PLANT AND PROCESS DESCRIPTION

PLANT DESCRIPTION

In the 1800's, this plant site was originally a metal works. In the early 1900's, it became Diamond Fiber Company manufacturing vulcanized fiber products, and Haveg, a molded corrosion-resistant plastic was produced here beginning in 1933. In 1955, the Haveg product line was split from the rest of the production and Haveg Industries, Inc. was formed while the remainder of the company was sold to the Budd Company. In 1964, Hercules acquired Haveg. In 1980, AMETEK acquired Haveg.

Haveg is a trade-name which describes various synthetic resins which have been blended with reinforcing materials selected for maximum chemical resistance and physical strength. Haveg has manufactured chemical equipment products for over 50 years. This includes thermosetting plastic pipe, fittings, valves, tanks, towers, agitators, and other types of process equipment. They specialize in handling of sulfuric, hydrochloric and phosphoric acids, and chlorinated solvents.

The physical properties of filament-wound fiberglass resin systems are extraordinarily high, having strength-to-weight ratios of 4 times that of carbon steel. By applying this over the standard grade of Haveg as an external reinforcing agent, the resultant composite structure combines corrosion and temperature resistance with strength.

They also manufacture Siltemp(R), a family of high-silica textiles available in cloth, rope, tape, and sleeving forms. These are resistant to high temperatures. They are used primarily as asbestos replacement materials for protection against molten metal splatter from welding and burning. It is also used for thermal and electric insulation.

Haveg employs about 250 during full production, 100 of whom are salaried. Their current payroll is around 175. The machine shop and fabrication activities ranges from 15 to 20 workers during full production.

PROCESS DESCRIPTION

Haveg is produced by mixing viscous liquid phenolic or furfuryl alcohol resins with fiber filler and reinforcing agents making a puttylike material. This puttylike material is molded in open molds and cured in an autoclave after which it can be machined, drilled, or sanded. The HVLV exhaust systems are installed in the machining department.

This process differs from conventional molding practices through the use of lightweight, inexpensive molds. This permits the production of large size equipment, molded in single pieces without joints or welds. Tanks can be produced in one seamless piece as large as 12 feet in diameter and 15 feet long. The process is adaptable, thus complicated or nonstandard designs offer few manufacturing difficulties.

Haveg has developed a technique of filament winding fiberglass reinforced epoxy resin which has resulted in a vast increase in the area of application of plastic chemical equipment, particularly in the field of pressure vessels.

POTENTIAL HAZARDS

The potential hazard in machining Haveg is dust and fibers. These contain resin and fillers. The early Haveg filler materials included asbestos which presented the primary risk. The asbestos has been replaced by silicates. The other fillers include talc and graphite. Fibrous glass is considered a primary irritant as well as a respirable hazard.

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 in the Haveg machining and fabrication areas is discussed below.

ENGINEERING CONTROLS

The control of asbestos has been achieved through substitution of other filler materials such as talc, silicates, and graphite. There is no plant makeup air system. Heating was formerly by steam and more recently by radiant heaters. The areas of interest in this survey have recently undergone renovation which included provision for gas heated replacement air. The HVLV exhaust system was originally designed to meet the OSHA asbestos criteria of two fibers per cubic centimeter. It has been maintained and operated to control the dust. Suction is maintained by two 150 horsepower blowers with a combined capacity of 9000 cfm at 12 to 14 inches of mercury. The system has 35 to 40 attachment points, seven of which are hand tool stations. The system will support 16 active outlets at one time. Originally the fabrication room was ventilated by a 100 horsepower blower which provided lateral exhaust along the walls. Overhead doors were used to partition off the area from the main building. One modification was made to the system. Haveg added a 50 gallon drum to the machine shop to trap long strands which might clog the ducts. There are two

types of flexable hose used to attach to the duct inlets. A heavy wire reinforced 2.5 inch diameter rubber hose, approximately 10-feet-long, is used throughout the system as the primary interface. This hose is used with or without hood attachments in the machine shop. A lighter weight reinforced vinyl hose is attached to provide a flexible hand disk grinder hood interface, this hose is expendable.

WORK PRACTICES

The "els" and "y"s in the duct piping must be replaced periodically due to the wear from abrasive materials in the high velocity air stream. Nearly half of this system has been replaced since its completion in 1976. This is partially due to a fire in one of the collectors. The cause of this fire is unclear but speculation is that it may have been an exothermic reaction in uncured resin dust from premature machining operations.

Management noted the advantages of the cyclone collection system which does not require bag cleaning or maintenance. The system has made handling of waste material safer and easier than in the past.

MONITORING

Asbestos monitoring was accomplished every 6 months as provided by the OSHA. No asbestos has been used in the plant since its sale to AMETEK in late 1980. Monitoring has been continued once a year. Hercules, the former owner, retained all of the asbestos monitoring records.

Employees who had asbestos exposure receive annual X-rays and pulmonary tests as well as annual physical examination. Similar medical examinations are available to the rest of the employees through Haveg; however, they do not receive X-rays annually. Audiometric testing is done.

PERSONAL PROTECTION

Disposable dust masks are available to workers doing dusty jobs, however supplied air hoods and Tyvek(R) protective clothing are required when working inside tanks.

OTHER UNIQUE PRACTICES

The employees representative considered the HVLV system beneficial and described some of the methods used in working with it. Lathe operators improvise deflectors to aid the HVLV pickup of material. Hand tool operators must modify their technique to maintain the tool as flat as possible on the work piece to optimize collection efficiency.

OTHER OBSERVATIONS

Management expressed overall satisfaction with the HVLV system. It reportedly achieved its intended purpose to meet OSHA asbestos control requirements.

Workers were motivated to use the system in lieu of requiring respirators throughout the plant. Its present application is to reduce overall dust levels as much as possible.

The day of this visit, the plant was experiencing some flooding during an unusually heavy period of rain. Activities in the plant were stated to be at a low level due to the economy. My in plant observations were very limited. The only hand grinding observed was an individual using a small cone grinder in one hand and holding an HVLV hose adjacent to the work piece with the other. It was noted that likewise the hoods are not always used in the machine shop.

IV. CONCLUSIONS AND RECOMMENDATIONS

It would be helpful to obtain survey data from Hercules to document the improvement made when the system was installed. Based on these observations it would be unlikely that this facility would be a suitable candidate for further detailed evaluation of HVLV effectiveness, although there is an extensive system in place which might be more extensively utilized when the plant returns to full production.