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NATIONAL SAFETY COUNCIL • 425 NORTH MICHIGAN AVE. • CHICAGO 11, ILL.

PRINTED IN U.S.A.

430015702

CURRENT SAFETY TOPICS — Volume 16



1956 TRANSACTIONS

METAL PRODUCTS

(Automotive and Machine Shop Industries,
Power Press and Forging Operations)

44th National Safety Congress

(October 22-26, 1956, Chicago, Ill.)

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NATIONAL SAFETY COUNCIL

425 N. MICHIGAN AVENUE, CHICAGO 11, ILLINOIS

**Current Safety Topics in the
METAL PRODUCTS INDUSTRIES—AUTOMOTIVE and
MACHINE SHOP INDUSTRIES, POWER PRESS and
FORGING OPERATIONS** *(Continued from cover)*

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Safety Supermarket

Each fall, some 12,000 safety experts from all over the U.S. and many foreign countries gather in Chicago to discuss safe attitudes, methods and equipment. It isn't just a gossip session. There's serious thought and talk on how to prevent the tragic accidents—on the job, off the job, in the home, on the streets and highways—which claim about 95,000 lives every year.

Each edition of the Transactions is a handy reference to the up-to-the-minute ideas and experiences of these top men in all fields of accident prevention.

Safety people everywhere have found in the Congress Transactions much useful ammunition to aid them in the war on accidents.

The National Safety Congress Transactions are published in volumes, each covering a phase of the safety picture, along with a General Sessions and Detailed Index to all volumes. The volumes of the 1956 Congress Transactions are listed on the last page of this volume. In preparing these Transactions, the proceedings of the Congress have been condensed and edited for reference purposes. Complete original manuscripts, with any charts or illustrations which were used, are available in National Safety Council files. Views expressed at the Congress or in this record are those of the Congress participants and are not necessarily those of the National Safety Council.

AUTOMOTIVE & MACHINE SHOP SECTION POWER PRESS AND FORGING SECTION

This volume is a record of the sessions held at the 1956 National Safety Congress by the Automotive and Machine Shop Section and Power Press and Forging Section. The conduct of these Congress sessions each year is only one of the many cooperative activities which the Automotive and Machine Shop Section and Power Press and Forging Section carry on in behalf of their members, and for the benefit of accident prevention work in automotive and machine shops and power press and forging operations. These Sections give guidance in the preparation of a great variety of technical and educational material useful in the day-to-day safety programs of plants operating automotive and machine shops and power presses.

The activities of these Sections are under the direction of their Executive Committees, the members of which are listed at the close of this volume.

white lead, and using a xylol vehicle, were sprayed on metal panels then moved through banks of infra-red lights with natural ventilation only.

The fumes from the infra-red oven were rising and moving into the upper area of one end of a large bay. The work in this portion of the bay necessitated the use of a crane and operator for extended periods. The crane operator was affected by headaches, loss of appetite, plus the problem of poor and sometimes dangerous crane operations.

Since you undoubtedly have formulated an answer for this problem and know the results, this will merely be a confirmation of your solution. A large blower, pending more adequate control ventilation was placed near the top of the infra-red oven and the contaminants moved out of the building.

Result—No more ill health and a safer crane operation.

CASE 2. High noise levels were being caused by the air noise from an air hoist. The overall noise level was 114 decibels. A muffler was installed on the air release of the hoist and the noise level dropped down to 87 decibels, or a reduction in noise level of 27 decibels, which is in noise talk a whale of a reduction and in this case economical.

CASE 3. A crane operator was being affected by vapors from a fluoride salt being dumped into a steel ladle containing molten steel. This was solved rather ingeniously by changing the size and shape of the fluoride salt crystals. At any rate, there were no more complaints from the crane operators.

There is no end to the number of successful source control cases that could be cited. However, it is not always possible to control the hazard at its source so the next best thing to do it to supply protection to the employees who may be affected by the hazard. Such was the case of the crane operator over a soaking pit operation in a steel mill.

The temperature of the soaking pit was 2,200F. The steel in the pit was removed by the crane and placed on a conveyor. Some infra-red heat was radiated and when this infra-red was considered, temperatures ranging upward to 140F. were found in the crane cabs.

A new crane cab was designed having

double glass walls, insulated floors and ceiling and covered on the outside by aluminized paint. An air conditioned unit supplied air to the inside of the cab at the rate of 720 cubic feet per minute with a velocity through the grill inlet of 300 feet per minute.

After this crane was placed in operation the crane cab temperature ranged from 86 to 90F. Quite a reduction from 140F. maximum to a 90F. maximum with a subsequent drop in heat fatigue.

Briefly, there is a second phase of industrial health at high plant levels.

In machine shops, and other metal processing industries, you will find solvents of all kinds, some much more toxic than others; you will find plastic resins and their catalysts, new cooling and new coating materials are common place.

The supplier, for the most part, recognizes the hazards of these materials and issues instructions designed to minimize or eliminate the danger of injury from the use of his product. We have been asked by many plants to determine the source of health injuries and in the course of our surveys, would find that the cause of the injuries were due to violations of the instructions from the supplier. In many of the instances, the safety engineer had not been informed of the presence of the offending material.

Based on field experience, you, as a safety engineer, should continue to ask yourself these questions:

1. Do I have a knowledge of the materials being used in my plant?
2. Have I checked the list of materials recently to see if new ones have been added?
3. Have I checked my plant to see if new toxic materials are being used that have not been called to the attention of the safety department?
4. Are the toxic materials in my plant being used in accordance with the suppliers instructions or as prescribed by Industrial Hygiene personnel?

If you can answer these questions in the affirmative, you have eliminated a sizeable number of your industrial health problems. You will also find that in this case your overhead will be coming down which in my way of thinking is Industrial Health at a high plant level.

Joint Meeting with the Power Press and Forging Section

Machining Metal with Safety

By WILLIAM A. ISAACSON

Divisional Safety Supvr., Stamping Div., Tank Plant, Chrysler Corp., Detroit, Mich.

What does metal machining mean to you? Metal machining can be defined as an operation or operations, performed most commonly by machine tools, in which metal is cold worked by progressively removing metal in the form of chips.

Injuries that result from the operation of these machine tools most often result from unsafe practices or because of incorrect procedures which are basically problems of training and supervision. In general, the three causes of accidents and injuries are unsafe practices, unsafe conditions, and unsafe attitudes.

Before going into the methods of accident prevention on machine tools, we should first explain some of the different types of operations and some of the most common causes of accidents on each. The National Association of Machine Tool Builders has classified some two hundred types of machine tools into five basic groups:

- I. Milling
- II. Turning
- III. Planing
- IV. Grinding
- V. Boring

Milling Machines

Milling consists of machining a piece of metal by bringing it into contact with a rotating cutter with multiple cutting edges. The work is held on a table and fed past or into the cutter.

Statistics reveal that milling operations are generally low in accident frequency, but high in severity. About two thirds of the milling machine accidents occur when operators are unloading or attempt to make adjustments. Other causes of injuries experienced with use of this type of machinery include:

1. Measuring or calipering the work when the machine is operating.

2. Using a rag to clean excess oil off the table while the cutter is turning.
3. Wearing gloves, ties, or loose clothing.
4. Failure to draw the job back to a safe distance when loading or unloading.
5. Adjusting the coolant flow while cutter is turning.
6. Using a jig or vise which prevents close adjustment of the guard.
7. Failure to clamp the work securely.
8. Leaving hand tools on the work table.

Turning Machines

Turning consists of shaping a rotating piece by means of a cutting tool, which is mounted on a carriage that provides infeed or cross-feed of the tool. Work is commonly rotated between centers or while held by a chuck, face plate, or fixture.

Some of the most common causes of injuries resulting from this type of operation are:

1. Using calipers or gauge on the work while the machine is in operation.
2. Using the hand instead of a stick to hold emery cloth against the work or filing the rotating piece right-handed.
3. Flying metal chips or attempting to clean chips when machine is in operation.
4. Contact with projections on face plates, chucks, or lathe dogs.
5. Hand braking of machine.

Planing Machines

Planing operations are primarily intended for machining flat surfaces but can be arranged for machining many kinds of curved, odd, or irregular surfaces also.

Shapers although generally classified as planing machines, differ slightly from the planer machines in that the work is fastened into a vise or fixture and the cutting tool is passed back and fourth over the work.

Planers work on the same principal, except the cutting tool is held stationary and the work is mounted on a reciprocating table which passes under the tool or tools.

Other machine tools coming within this classification are slotters and broaches.

The most frequent causes of planer accidents appear to result from inadequate training and supervision. They are:

1. The exposure of the hand or fingers between the tool and the metal being machined.
2. Allowing the hand to come in contact with sharp edges.
3. Obtaining measurements while the machine is in operation.
4. Failure to secure tool or clamp work prior to starting operation.
5. Riding the job.
6. Having insufficient clearance for the work.
7. Coming in contact with reversing dogs.
8. Failure on the part of the operator to insure that the current is turned on a magnetic chuck prior to operating.

Broach operations may be safeguarded during normal operations by the use of supplementary controls. The most widely used safeguard for broaches is a standard two-hand constant pressure control. Also, an emergency shut-off device should be installed for the convenience of the operator.

Grinding Machines

A grinding machine utilizes an abrasive wheel revolving at high speed to cut a piece of metal. The process may be internal grinding, external cylindrical grinding, or surface grinding, and includes such methods as polishing, buffing, and honing.

The abrasive grinding wheel is probably the most universally used power tool in all industry. Because of the wide and common use of abrasive wheels and their frequent use under conditions where safety-minded supervision is lacking, frequent injuries result from this operation. Some of the causes of injuries on abrasive wheels include:

1. Failure to use personal eye protection equipment.
2. Cleaning, adjusting or gauging work while the machine is in motion.
3. Wheels or transmission parts not properly guarded.

4. Applying wheel too quickly or taking too large a cut.
5. Excessive wheel speed or bursting of wheels.
6. Holding the work improperly or too high above wheel center line.
7. Requiring operator to reach across equipment to control switches.
8. Work rest not provided or incorrectly adjusted.
9. Wrong type of wheel or improperly mounted.

Boring Machines

Boring operations consist of locating and finishing holes by means of drills, boring cutters, or reamers. The operations fall into two categories: Boring and drilling. Boring mills employ cutters, while drilling machines employ pointed or fluted cutting tools. The most prevalent causes of injury in boring operations are:

The most common causes of injury resulting from boring operations may be classified into two categories, contact with, or struck by.

1. Hair or clothing coming in contact with revolving components.
2. Hands coming in contact with tool or spindle.
3. Struck by broken tools, cutters, or flying chips.
4. Struck by work not clamped securely.

We have briefly discussed the basic operations of machine tools and have also enumerated some of the most common causes of injuries in each group. In general, the three causes of accidents and injuries are unsafe conditions, unsafe acts, and unsafe attitudes.

Providing Safe Equipment

Probably the first step in eliminating unsafe conditions is providing safe design of our machine tools. In addition, safety in operations can be provided by:

Safeguarding the Point of Operation

The first consideration of this topic should be whether provision can be made to keep the operator's hands out of the danger area. This can be accomplished by providing mechanical loading devices where feasible. Guards or cages may be built around the point of operation or danger zones. Where mechanical loading devices are not feasible, provisions may be made where the operator

reaches into the machine only when the machine is completely stopped or started only when the operator's hands are out of the danger zone. One method is to require two-button controls, requiring the operator to depress two buttons or switches at the same time, one with each hand.

Guarding Moving Parts

Present day machines and equipment generally come equipped with sufficient guards on all moving parts, however, it may be necessary to insure that all necessary guards are provided.

Safeguarding Controls and Machine Mechanisms

Starting buttons or levers may be guarded in several ways to prevent the machine from being accidentally actuated by the operators or falling objects. Another form of safeguarding controls may be to have certain guards hooked to the power source, so that the machine will not operate if the guard is not in the correct position.

Eliminating Unsafe Acts and Practices

Because most of the machine shop accidents are caused by the human element, it is necessary to constantly train and supervise the operators. Guards, controls, and design help to prevent accidents, but there is always that possibility of failure on the part of human beings to think and act safely. It is the responsibility of the Supervisors and Safety Representatives to constantly train, instruct, and assist the employees under their jurisdiction to look ahead to avoid hazards.

Utilize Mechanical Safeguards

Mechanical guards are of no value if they are not in the proper position and adjustment when machinery is being operated. Repairs, oiling, and adjustments should be permitted only when the machine is turned off and adequate precautions taken so that the machine is locked or tagged.

Proper Care and Use of Hand Tools

Many of our accidents in metal machining are caused by hand tools which are defective or used incorrectly, or used for purposes other than are intended. Hand tools should be made of the best materials to prevent them from breaking, cracking, or becoming dull quickly. It is imperative that hand tools receive constant maintenance.

Proper Clothing

Serious accidents can be prevented by proper dress. Loose clothing, ties, long sleeves, rings, etc., are easily caught in revolving machinery and should be prohibited in machine shops. Caps should be worn to cover long hair.

Requirement of Personal Protective Equipment

The use of personal protective equipment has, and can prevent, many serious accidents in a machine shop operation. Proper use of goggles, shields and helmets, have prevented flying chips, spark, and broken tools from entering the eyes and face, thereby preventing serious injuries.

A Clean Place Is a Safe Place to Work

Good housekeeping is of prime interest in safety and should be constantly brought to the attention of the employees. Floors should be kept in good repair, clean and free of oil, grease and dirt. Tools, material, waste and oily rags all should be placed in the container provided. Everything should have a place and everything kept in its place.

Awareness of Hazards

Much has been done in safety to guard mechanical equipment and provide personal protective equipment, but there are situations that are always a potential hazard. An example is sharp edge on a piece of metal or rotating parts that cannot be guarded. To prevent accidents in these situations, it becomes a problem of training and supervision. The employee must be instructed or trained that the steel should be handled with gloves or pads, that he must not reach into or across revolving parts until the machine is fully stopped.

Avoid Horseplay

Horseplay, fighting, and practical jokes cannot and should not be tolerated in any phase of industry, particularly in machine shops. Many injuries have resulted from startled employees being forced into dangerous areas. It is well to remember that machine tools do not have the ability to think. A machine shop is not a jungle in which you endanger your life by merely entering and becoming exposed to massive metal animals, but rather a place where accidents may occur if common sense, good judgement, training, and supervision are not exercised.

added help of all non-safety aspects involved, a program of press mechanization could very well be launched in your plant.

Industrial management is quick to recognize the improvement factor in new and re-

arranged facilities. We are also fortunate to be under the leadership of men who have placed new high values on good public relations, good labor relations, good citizenship, kindness and honesty.

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