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GLASS & CERAMICS and RUBBER

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GLASS AND CERAMICS SECTION

ALUMINUM HEAT REFLECTING EQUIPMENT

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The manufacture of alloy and glassed steel equipment for corrosive service is a highly specialized industry. As such it follows that the problems incurred through the use of heat in the necessary production operations, require special handling. To this end, protective devices utilizing aluminum have been used with great effect.

Most of the published literature on problems of decreased worker efficiency due to heat exposure deals with methods of controlling the velocity, temperature, or moisture content of the air. Recognized but relegated to a secondary role has been the influence of the mean radiant temperature of solid surroundings. The use of ventilating systems, fans, water-washed air systems, and air conditioning installations have, as a consequence, become widely recommended as satisfactory relief measures in most industries. In our particular industry and to a large extent in the metalworking industries, greater benefits are derived through the control of radiant heat exposure.

In some respects we have been fortunate in that the nature of the operations involved in the manufacture of glassed steel equipment preclude the use of monitored air systems. Realizing this, investigation of such systems has been limited and our efforts directed towards methods for controlling radiant heat exposure. A brief look at the operations required for the production of this equipment will serve to illustrate this.

The glassing operation is closely related to the porcelain enameling of steel. The major differences are that the glass used is considered more of a true glass than is porcelain enamel and that the equipment design is considerably more complex. While porcelain enameling deals with gauge sized steel and uniform sections, glassed steel equipment utilizes steel plate one quarter inch to two inches thick with wide variances in section thickness. The finished glass thickness is substantially heavier than that encountered in porcelain enameling.

As in porcelain enameling, two basic methods of application are used, dry process and wet process. Regardless of the type of application method used, sudden or spot cooling such as might be introduced by special blowers or man-cooling fans would result in high rejection rates.

In wet process methods each individual coat of glass is applied by spraying or other suitable method, dried, fired, and cooled to room temperature. With these methods, individual operators are seldom required to approach the hot ware for prolonged periods of time. The radiant heat exposure problem therefore is not great.

Of much greater concern is the degree of radiant heat exposure arising from our dry process operations. In this type of operation, only the initial coat is sprayed or otherwise applied and dried. After firing of this initial coat, all subsequent coats are applied while the ware is at temperatures of 1500° Fahrenheit or higher. In these subsequent application operations, the workers may be required to work within inches of the hot ware. The time required for application may reach 25 minutes.

When not actively engaged in the glassing operations the operators are continually exposed to radiant heat from their solid surroundings. This is generally felt to be of little consequence and is compensated for through the use of normal ventilation. In addition the operators have built up a tolerance for this imposed heat load over a period of years.

This heat load is frequently increased due to the close proximity of our furnaces. While one crew may be in between operations, that of an adjacent furnace may be engaged in the dry processing of ware.

In the dry process method of application, the glass is applied in the form of finely milled particles. If the surrounding air velocity is too great, application of the glass is made difficult and uniformity of application is affected. In addition, the temperature

of the ware may decrease to the point where it is impossible to complete the glass application.

In the fabrication operations preceeding the actual glassing, radiant heat exposure is also a problem. The various hot forming operations are generally such that monitored air systems would reduce their effectiveness.

A good share of the alloy equipment produced for severe corrosive service requires the use of high temperature annealing following fabrication. In addition, dependent on the particular alloy used, rapid quenching from these high temperatures is required. In such instances it is frequently necessary for personnel to work in close proximity to the ware. Since the temperatures encountered are considerably higher than those used in the glass lining process, the heat exposure problem is more acute.

Protective clothing and protective shields for personnel have been the most effective means found to date for reducing discomfort due to radiant heat. Over a period of years the design and choice of materials used for protective clothing have undergone many changes. These revisions are being made continually. As new materials appear on the market, trials are made. Changes in design are frequently made on the advice of the individual operator.

At present the bulk of our protective clothing is made up of aluminized asbestos cloth backed up with felt or other insulating material. Each operator is equipped with mitts, leggings, aprons, coats and/or jackets, helmets, and special arm sleeves. The operator selects the various items of apparel to be used for a specific operation.

There are several factors that must be taken into consideration when designing protective clothing for such use. We have found the following to be of most consequence:

1. The maximum amount of protection the base material will afford. The greater the ability to reflect radiant heat the higher the degree of protection obtained.
2. The weight of the material. This is extremely important in order to prevent the imposition of an undue fatigue load on the operator. In connection with this we try to cut out or eliminate material in those areas where exposure is not a problem. For instance the back of our coat is open. In place of material, leather straps are used to hold the back together.
3. Flexibility of the material is very important. The material must be flexible enough to permit unrestricted movement of the operator and to reduce the fatigue factor.
4. The equipment must be tailored to fit the operator properly. Ill fitting equipment affects the performance of the operator.

In addition to the above, such factors as initial cost, life expectancy, and maintenance are also considered.

As mentioned earlier, we are continually seeking better materials of construction for our clothing. At present we are investigating such materials as aluminized fibreglass, aluminized cotton duck, and aluminum sprayed asbestos.

While protective clothing has been the major area of interest, we have used, with great success, protective shields faced with aluminum. These shields when interposed between areas of high radiant heat emissivity and personnel, have been highly successful. In addition to their effectiveness, the ease and low cost with which they may be erected has been particularly satisfying.

In general these shields have consisted of a wood frame faced with light gauge metal or plywood. This facing, in turn, is covered with aluminum foil. In some instances cardboard has been used for the backing material. The weight of the aluminum foil used is determined by the degree of physical abuse the shield is apt to absorb. If the shield is to be portable or semi-portable, foil having a thickness in the range of .006 to .010 of an inch is used. On permanent shields, foil having a thickness of .004 of an inch is used.

These shields were introduced gradually to our personnel and have now gained universal acceptance. The proof of their success has been evidenced by the reactions of the workers and their requests for other shields. In past years the men would request blowers or fans whereas they now request aluminum faced shields.

A most effective combination, where vision

is a prerequisite, has been the use of aluminum faced shields equipped with windows of infra-red reflecting glass.

At present we have approximately 1,500 square feet of aluminum faced shielding installed. Conservatively speaking, this area will have been increased to 3,000 square feet within the next six months.

CONSTRUCTIVE DISCIPLINE

By J. E. MORRISON
Asst. Manager, Safety & Plant Protection, Pittsburgh Plate Glass Co., Pittsburgh, Pa.

Our discussion today is to be in the area of supervisory safety training. Since this subject is rather broad in scope, we should narrow it to one category and try to be as specific as possible. We shall discuss *Constructive Discipline*. There is no area of supervisory training more important and which has been more neglected.

In all probability discipline is one word in the English language which is greatly misunderstood. Not enough has been done to clear up its meaning and its application to the supervisory situation.

It is impossible for any supervisory employee to fulfill his responsibility to management without full knowledge of the use of discipline. He cannot be a good leader, hold his costs down, and get maximum production with safety without a knowledge of the fundamentals of discipline.

Perhaps we should define discipline before further discussion. Webster defines it as:

> A branch of knowledge or learning; training that develops self .control, character, or orderliness and efficiency; the result of such training, self control and orderly conduct; acceptance of or submission to authority or control; a system of rules or methods for the conduct of a group and treatment that corrects or punishes.

Perhaps most of us would think of discipline as the application of punishment, but you see Webster puts that at the end of his definition. This implies that it should be used only when the member of a group fails to accept training or refuses to behave according to the rules of conduct prescribed for the group. Punishment will, therefore, be discussed less than other aspects of discipline.

The so-called atmosphere or climate we hear so much about is nothing more than a well disciplined situation, where the management has made its expectations, rules and policies known to employees and conducts itself accordingly, and where employee understanding and acceptance is obtained.

There is only one reason for the existence of a business. That reason is to provide a service in order to make money. Where there is poor discipline, profits are likely to be low and the maintenance job, the production job and the safety job cannot be done well. Probably most other jobs will not be done well.

The central thought of our discussion is *constructive discipline is the greatest need in safety today*. Much of the reduction in frequency is the result of mechanization or automation. If we expect to prevent accidents we must have discipline as well as engineering improvement. We are lagging in this respect.

We talk of atmosphere and climate. We should establish a better understanding of the terms. Perhaps one of the best ways to understand them would be to outline the conditions under which we as supervisors do our best work. Do we work better in a confused atmosphere where we are permitted to flounder, make our own rules, follow our own inclinations and to work when we feel like it? Do we do our best where there are no real expectations of us or when there are no reasonable standards set for us? Do we really like a disorderly or confused atmosphere?

Do we want to be held to correct attitudes, or do we like to continually be making excuses for our shortcomings? Do we want

to work for a supervisor who is so permissive as never to give any real professional guidance to us?

No well-trained supervisor could answer these questions in the affirmative. All of us know that we work best when we have a definite task, know what is expected of us and are honestly appraised and corrected. We work best when we have a definite goal or task, the achievement of which will give us the satisfaction which comes from accomplishment. We work best and are happiest in an orderly atmosphere with known and accepted standards, rules and policies. We dislike guesswork and uncertainty, and we want a place for everything.

If we like these elements as a part of our work climate, then we may safely assume that our workers would also like them. They cannot work properly without orderly routines, systematic guidance, a warmly cooperative emotional climate, and an understanding kind of authority which should be manifested in our personality and our methods of supervising.

No one condones lack of discipline in the work situation. When it exists, it may be because of poor understanding of what good discipline is, or changing philosophy or the mistaken belief that good procedures are being followed or we have inadvertently discarded good work discipline. Many highly meritorious methods have been discarded, not because of inherent weakness, but because of misuse.

Properly conceived, the modern work situation must be a well-regulated, orderly place, that invariably affects good worker adjustment and in which the supervisor consistently functions as the understanding leader. This is a prerequisite to a maximum effectiveness and ease of operation.

The correct kind of atmosphere has always included certain essentials concerning the supervisor and the worker.

The supervisor should be the mature, experienced and professionally trained guide who knows the general objectives of good supervision, has specific objectives for his workers, knows their abilities and needs, plans carefully and suitably, maintains an active and well-organized work climate or atmosphere at all times, recognizes workers as individuals and treats them accordingly.

Such a supervisor presents himself by his voice and attitudes and work behavior as a desirable model for his workers, encourages whenever possible the degree of democratic participation consonant with good judgment and within the framework of company policy. He knows that what he is doing is for the best interest of the company and its employees and transmits his own sense of confidence and security to his workers.

The worker who knows exactly what is expected of him is surrounded by an atmosphere of sincere respect in which he can do his best work. He knows he is expected to work up to his own capacity and is encouraged to develop his own special talents and aptitudes. He receives deserved praise and warranted criticism as constructive contributions to his own development. He recognizes his rights and privileges, obligations and limitations and feels secure about his place in a harmonous group which is working effectively with the supervisor toward the achievement of objectives considered to be worthy.

The kind of discipline that flourishes in an atmosphere characterized by these essentials is *constructive discipline*. Basic to constructive discipline is the systematic development of routines in the work situation wherever possible. Such systematic organization of work detail will release the energy of the supervisor for the best possible creative work. He can more efficiently devote his energies toward teaching job skills, communicating with workers, sharing experience and knowledge and developing social consciousness among his workers.

The social value of constructive discipline is of inestimable importance. It helps employees learn to work and live together, first in the work situation, then in the community. It teaches self respect, mutual respect and social adjustment as necessitated in the work environment. It gives them by repetition an understanding and appreciation of certain elements essential to democratic living that we often consider to be so simple as not to warrant listing with other lofty generalizations in this connection.

These so-called lofty generalizations are commonly accepted and agreed upon as fundamental characteristics of democracy. Some of them are the sanctity of the individual, respect for variations in the individual, fair

and equal treatment, equality of opportunity to develop capacities, concern for happiness and welfare of everyone in the group, self direction rather than by external authority as much as possible and encouragement of self expression.

No serious discussion of democracy, its attitudes and processes could be considered to be sound without reference to and inclusion of most of these fundamentals.

In the work situation the so-called simple elements are probably equally significant and important to the understanding of the workers. Because of their simplicity and their fundamental nature, they are sometimes overlooked.

Some of these simple elements are learned much better through work experience than in any other way. Some of them might be listening cautiously to employees, being alert but relaxed to enhance attention, reaching decisions by talking things over, addressing one another by name, using clear and pleasant speech, making contribution to group rather than to one's self, inviting opinions of others, defending and refuting statements calmly and objectively, challenging another point of view in good faith, using good manners, accepting criticism graciously, solving real problems of concern to individuals and the group and evaluating what has been done.

Many supervisors do not fully realize that in teaching these apparently simple skills and attitudes they are in fact building in their employees a solid foundation for democratic citizenship, rather than merely directing the men.

Continuing the discussions on systematic procedures and routines, we may consider two areas. One is the so-called management aids area and the other the work procedure or work routine.

The number of management aids should be kept to the minimum in order to save time and cut red tape. Some of these can be self-imposed although much of it can be due to requests from others in the organization. The number of these in use will depend upon policy. They include records, reports, ratings, rules of conduct, rules of safety, promotion schedules and other kinds of personnel procedures.

Some additional aids may necessarily be developed by the supervisor, such as job plans, instructions, methods, use of time cards, inspection reports, tool checks, requisitions and even accident investigations. Some of these aids are used as a matter of material control, but this is another form of discipline. The use of such aids promote uniformity of conduct among employees.

The supervisor can best set the moral tone or atmosphere he desires by proper management of good work procedures and routines. The basis for this is good preparation and a well-planned supervisory program. Many bad habits can be prevented. Patience is one of the supervisor's most important attributes, and much of it may be required for older employees who may be set in their ways or who may be near retirement age.

Good supervision or leadership is a process of "pulling" which requires great stability of character. The development of routine and procedures takes time. More than that, it takes time to get them firmly established and keep them operating effectively.

Instead of the original three E's of safety —engineering, education and enforcement— we should now consider six: *engineering, enactment, education, enforcement, enthusiasm* and *example*. In all of these, discipline is involved.

We must discipline ourselves to the laws of nature, for nature herself is a stern disciplinarian. To conform with her laws results in satisfaction and positive rewards. When we identify our own best interest with natural laws and strive to conform, we derive the greatest satisfaction and this is an example of constructive or positive discipline.

Failure to conform with natural laws brings about deprivation, want and at times great suffering and even death. If we have to live in a frigid climate, we must dress adequately or freeze, when driving a car around a curve we have to do so with a speed consistent with safety for we cannot defy the law of gravity without paying for it.

Nature's method of discipline for man has but one message, namely *certainty* and not necessarily *severity*. Engineering concerns itself with discipline for it cannot defy the laws of physics and nature in the design of tools and machines and equipment.

The other five E's involve discipline. Rules and policies must be enacted, educational programs must be provided, enforcement

must be sure and certain, fair, firm and consistent, enthusiasm and interest must be evident and the *entire management* team must set the example for the work force. We cannot expect others to obey the good rules of conduct or laws of management if we fail to do so ourselves. Most of what is learned on the job comes through the example and coaching of the management team, more especially the immediate supervisor. This goes all the way to the top of the organization.

Being a management employee imposes certain duties and standards on a supervisor. One of these is self training and self discipline. Everything he does is an example. His attitude and standards on and off the job influence many people. If he is often late to his job, or guilty of wasting time and material, or reflects laziness, untidiness, if he fails to plan and prepare for his work, or is impatient, unstable or abuses privileges, displays disloyalty to his superior or his company, he is one who could never build positive discipline among his workers for he exerts a moral influence on them through improper guidance and example.

The supervisor who finds it necessary to reprimand his men finds himself deeply involved. When using the reprimand there are two principles which have bearing on its effectiveness. First is the knowledge of company policy and second is his own personal emotions. He holds a position of vantage in the situation which he should not allow to become weakened by lack of knowledge or information on policy or the failure to enforce it or by displaying emotional weaknesses. We should repeat at this time that the supervisor is the example for his men, and he could never expect to accomplish any satisfactory results if he reprimands ineffectively.

Positive discipline emphasizes the motivating factor of incentive; negative discipline emphasizes the fear of punishment. The positive approach provides clear-cut directions and expectations; negative discipline tends to confuse. Negative discipline when used, and often times it is necessary, must always be accompanied by an explanation of desirable behavior. The procedure for penalties to be most effective must be a matter of policy. It must be fair and equitable, and everyone must understand it, including the workers.

Let us repeat again that to be effective, discipline must be consistent and certain and without conflicting standards. Nothing is more disturbing than to see a person espouse one set of standards and follow another for himself. And we cannot enforce safety rules one month and ignore them for eleven. There should be no need for the extension of sympathy on the part of the supervisor when applying the reprimand.

Positive discipline tends to clarify what is expected of an employee and to establish follow-up procedures to insure it is invoked as prescribed. The merit rating procedure, for example, is a tool used to accomplish this. There should be fixed time limits for evaluating progress of an employee. They should be followed by prompt evaluation by the supervisor and the employee should be informed of the results.

In conclusion, let me repeat the central thought in our discussion; *constructive discipline is the greatest need in safety today.* If we expect to continue to make progress in accident prevention we *must have* constructive discipline as well as engineering improvement.

Like begets like. We tend to conform to our supervisor's expectations provided he has told us what they are. We try to figure how our supervisor wants us to behave and modify our behavior accordingly.

When the history of our industrial revolution has been written, much of the credit for better employee relations will be given to safety. It is the basis for all human cooperation in industry because it carries a strong appeal so that management and the workers can be brought closer together.

If the safety program works, other employee relations programs will follow along with it. Maybe the same could be said for some of the other programs, but safety has enough appeal to make it a leader.

The safety program must be vigorous; management must maintain the initiative. It should be aggressive and so sound that one can have the slightest opportunity to criticize it.

The climate or atmosphere set by supervision and constructive discipline as established by management will promote readiness in the minds of workers for safety on and off the job.

We have to step out in front and lead the way, to set the example for others, to practice what we preach, for this is the basis for constructive discipline.

None of this is intended to create the idea that because we are advocating kindness and consideration on the part of the supervisor that we will make weaklings of them. A good friend once told me that kindness is not a mark of weakness because it can and should always be accompanied by firmness, fairness, consistency and certainty.

Safety and accident prevention has only one purpose, and that is the removal of *accident causes.* Accident causes cannot be removed in an atmosphere of confusion and misunderstanding. They can be removed only when people are disciplined to the work situation.

INTRODUCING SAFETY TO NEW EMPLOYEES

By D. W. GIBSON
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Creating a good safe working attitude in a new employee is an important undertaking.

After a man has been hired, he is put through an elaborate system of processing in order to acquaint him with all of the important phases of his new job. Many things are told to the employee at this time, and he usually has to complete a variety of forms and cards, all of which contribute to a state of confusion for a new man. Those of us associated with the safety of employees realize this more than anyone else.

Often the new man gets into difficulty on his job, and on many occasions it is the name of the new employee that crosses our desks on an accident report.

Realizing that much must be done in training and building the proper attitude in the new man, we at the Columbia-Southern Chemical Corporation have taken a new approach in our safety indoctrination program, utilizing pictures to reinforce the spoken word during lectures and classes.

Most programs on safety are concerned with the three "E's"—education, engineering, and enforcement. We have added two additional factors—enthusiasm and example. We believe that if we do a good job on the positive factors, enforcement will be needed only as a last resort.

A series of 87 slides has been developed at our Barberton plant to give a picture story of our safety program. Before the new employee reports to his foreman, he is shown the slide series. Each slide is narrated by a member of the safety department, and ample time is permitted for questions.

The slide series covers everything from safety glasses to safety locks, safety meetings to plank and ladder testing, etc. Actual demonstrations are made with first-aid and fire equipment, and the new man has an opportunity not only to see this equipment, but to handle it himself.

Special emphasis is placed on management's interest in the creation of safe working conditions and the prevention of fires. It is our hope to creat in the minds of new employees a sense of belonging in a group of people who are interested in their safety as well as that of their fellow workers.

After the series of slides is shown, the new employee is then introduced to his foreman who takes him on a tour of his department. At this time the departmental operating conditions are discussed and a special check sheet is used by the foreman to make certain that all departmental conditions are covered.

The foreman encourages the employee to ask questions and drives home the

point that when he is in doubt, he should ask before proceeding on the job.

We feel that the use of our safety slide series and the cooperation of our foremen have been a great assistance in adding to the success of our safety program.

The slide series presentation is not expensive. The total cost was less than $100, and the time involved to present this indoctrination program is 35 minutes. We feel certain that it will pay for itself many times.

GLASS & CERAMICS SAFETY IDEAS

(A Panel Discussion)

John Fullen, Kopp Glass, asked for discussion on the representative companies' disciplinary procedure when a safety rule is violated and an injury occurs. He stated he had not been satisfied with answers he had heard on this subject at previous sessions, and further that he did not feel that forgiveness was the proper solution.

Russ Frank, Ferro Corp., said his company's disciplinary procedure becomes effective after recovery from the injury. He said his company allows two minor offenses before discharge. If, however, a third minor offense takes place, discharge is automatic. In the event of a major offense, in the company's consideration, immediate discharge follows.

Bill Price, Owens-Corning, asked how many of the companies had union contracts which spelled out disciplinary actions and procedure involving safety infractions?

Only a few companies present indicated they had such arrangements. The question was then asked how many establish a safety committee from members in the bargaining unit? Again, a few companies replied in the affirmative. *Russ Frank, of Ferro Corp.,* said his union contract permits management to establish safety rules which may be changed at the option of the company and as a result of changes in operations, procedures, etc. A union-management committee meets once a month at the option of the company. He emphasized strongly that this committee is not permitted to officially investigate accidents.

P. H. Wickhorst, Owens-Corning, asked, "Does the union have anything to do with the establishment of penalty?" Those who replied, answered in the negative.

A discussion then ensued on the matter of intoxication. *P. H. Wickhorst* cited an instance at his plant where a man suspected of being intoxicated was stopped at the gatehouse and the steward and department foreman were called to decide whether or not he was in shape to work. There then followed discussions from other members of the group during which specific instances of drunkenness and resulting actions were recalled for the benefit of the group. In most instances, drunkenness resulted in discharge; however, several extenuating circumstances involving drunkenness were discussed where discharge was not the outcome.

Bill Price asked whether, as a lever during negotiations, did any companies offer to wipe the slate clean for violators of safety rules?

D. T. Quigley, North American Refractories, said his company's policy was that all violations were withdrawn yearly. He explained further, however, that this presented no problem to the company as no one took advantage of the fact that they could have several infractions during the course of a year, have them wiped out at the end of the year, and begin again.

John Skendall, Harbison-Walker Refractories Co., said this procedure also was followed at one of his company's locations.

Bill Price then asked, with respect to outside contractors coming into the plant, how are they affected by plant safety rules; what action, if any, is taken in the event of violations of plant safety rules, and how do you get a contractor and his men to adhere to plant safety rules?

C. Doan Noce, Pittsburgh Plate Glass, said that in his company the first step is to check contractor's compensation insur-

ance. Secondly, his company has a policy to furnish no materials to the contractor, pointing out that if the contractor furnishes all his own materials, the question never could be raised that something went wrong as a result of faulty material furnished by the employer. If safety violations are not observed, a proper representative of the company immediately goes to the contractor, requesting that such practices be corrected immediately. He said this approach got very satisfactory results.

The question was raised as to whether any of the companies required "hold harmless" clauses with respect to outside contracting work. One member said his company's procedure was to require the acknowledgment of a "hold harmless" clause and furthermore there was a stipulation in the agreement with the outside contractor whereby observance of plant safety rules was made mandatory.

Joe Morrison, Pittsburgh Plate, said that in his area there is an industrial relations group, sponsored by local industry, which has published a manual of safety procedure. This manual is given to the outside contractors at the onset of their work in any of the member plants.

John Skendall, Harbison-Walker, said a proper compensation check up, a correct legal writeup, that is, contracts with "hold harmless" agreement included, and the selection of good contractors should be all that is necessary toward eliminating the problem of safety violations and accident hazards when work is given to outside contractors.

The discussion brought out the fact that most outside contractors have their own safety procedures, which they require their men to follow.

John Skendall stated that if the safety department is advised of pending work within a plant, they can immediately get on it and, before it has started, work out any potential problems.

Clyde Ruddick, Pittsburgh Plate, said his company has a printed booklet of procedure, relative to safety and accident policies within his plant, that is given the contractor before he commences work.

After this discussion the consensus was that the problem could best be solved and accidents generally avoided if a procedure was properly set up prior to the use of independent contractors.

Bill Price asked what is considered the mandatory area of eye protection?

One of the glass representatives answered that in any area where glass was being broken, goggles were required. He was then asked about hot areas; his reply was goggles were only required where constant watching was required of the operator or where a flareup could be expected.

Someone asked, where in the ceramic industry are goggles required?

Lee Hawthorne, A. P. Green Co., said that in his company goggles were required in machine shop where grinders are used and where crating is being done.

Dick Stein replied there was no compulsory program of eye protection at his company, American Standard.

Elwood Knepper, Hazel Atlas, said eye protection at his company was based on statistics. In other words, a survey of the plant indicates where eye protection is most necessary and it is accordingly required at that point.

Russ Frank said that in his organization certain selected personnel in each of the plants are required to wear eye glasses.

The question was then raised—how many plants of 100 per cent eye protection are there? It appears that in some instances everyone in the production area is required to wear glasses. *John Skendall* stated that at their large machine shop they have practically 100 per cent participation, altho the program is voluntary.

Does the company defray the cost of prescription glasses? Discussion developed that in some of the glass companies a subsidy is worked for fitted safety glasses. Eye examination costs, however, are borne by the employee, except, stated *Frank Russ,* at one plant where $5 of the cost is paid by the company.

Dick Stein asked for discussion on company safety shoe programs and whether or not any of the cost was subsidized by the companies. *John Skendall* of *Harbison-Walker,* indicated that in some of their plants they have a stipulation in their local agreement making the use of safety shoes mandatory.

D. T. Quigley said North American Refractories Co. has in effect a voluntary program, and that from 70 to 80 per cent of the employees do wear safety shoes. It was further pointed out that shoes are made available to the employees at company cost and, in some instances, a store of shoes is kept at the plant. He brought out further, however, the great success of the program was attributed to the fact that safety shoe representatives had been coming to the plants and displaying a large quantity of shoes, answering all questions and had been successful in signing up many employees.

Bill Koppert, of *Owens-Corning*, said his company had used the mobile safety shoe unit with some success. He said about 40 per cent of the people in his plant were sold safety shoes through the use of the mobile display.

Clyde Ruddick said that, largely through the efforts of John Skendall, a move is under way to get the safety shoe manufacturers or an association of manufacturers to recognize men who have been saved from injury as a result of the use of safety shoes. Then, there was distributed at the table a "golden slipper" certificate. This idea is in the nature of the Owls Club and Turtle Club and is recognition of an individual who, because of his use of safety shoes, has been spared injury.

J. J. Hobaugh, Pittsburgh Plate, asked how are shoes fitted? *Mr. Adcock* said in his plant the storekeeper measures the individual's feet. *Mr. Hatfield*, of *Pittsburgh Plate Glass*, stated that in his contract there was a provision citing that safety appliances required for company use would be furnished "free of charge." He asked what this can lead to. This question was developed along the lines that if safety shoes are promoted, will companies eventually be faced with the problem of bearing the complete cost? A discussion revealed that no one felt this would be true until and unless there was an absolute mandatory safety program requirement set forth by a company.

The question was then proposed, "how are safety shoes handled?" *Russ Frank* said that where other than normal fitting was involved or required, his company used a chiropodist to insure the best possible fit, or employees may be referred to a foot doctor. *Mr. Frank* said cases of this kind were considered as part of the medical department costs.

John Fullen asked about the use of safety gas cock controls on furnaces. All answers indicated that automatic safety cocks were used in all instances and require that delivery of power, fuel and air must be right before the safety cocks can be reactivated. Reactivation of all controls is done manually.

Dick Stein asked "How many companies use their own employees as guards and how many use outside agencies?" *John Fullen* reported that he had thoroughly investigated the use of outside agencies and felt that, while he was making no specific recommendation, the outside agency program seemed appealing from a cost standpoint.

Russ Frank said *Ferro* uses three systems: (1) night men who are not fully occupied, (and this he recommends); (2) the use of full time regular employees, and (3) the use of outside private agencies. With this latter group he has had great dissatisfaction because, as he points out, outside men do not comprehend fully the involved nature of operating a plant and, consequently, are of little use in an emergency involving operations. *P. H. Wickhorst* said he had found from experience that outside agencies have no personal interest in what goes on in a plant. *John Skendall* reported that *Harbison-Walker* uses both setups and finds outside people have worked out very well.

Dick Stein asked, "Does anyone have any gimmicks or individual approaches to safety programs, contests, etc.?"

D. T. Quigley said his company uses a contest figure named "Archie Accident," depicting a workman, to demonstrate how much money is lost in wages through plant accidents. Each accident is cataloged and at the end of the contest period, that amount of money attributed to the legs, arms, trunk, hands, etc., is totalled. A contest is then held whereby the employees attempt to estimate how much total money has been lost as a result of accidents. The three employees coming closest to the correct figure are awarded prizes at a banquet. Quigley said he felt this approach had been quite suc-

cessful in that it had brought out the seriousness of accidents to the employees in the language of wages which, he feels, they most completely understand.

One of the glass representatives said they had a safety contest in which safety shoes were put into a caked block of ice. The men guessed how long it would take the ice to melt.

John Fullen reported that on the back of his pay checks; i.e., the detachable portion thereof, a safety slogan is printed. He states this slogan is changed monthly and that he feels this is an excellent way to get across the safety message.

The last thing mentioned here was the sweepstakes contest. *Joe Morrison* explained that seven tickets per day were given out by the general supervisor for noteworthy safety deeds performed. The recipient fills out the ticket and drops it in a collection box. These boxes are emptied into a revolving barrel. At the end of six months the tickets are thoroughly mixed and one ticket drawn which entitled that person to $150.

RUBBER SECTION

ENGINEERING SAFETY INTO MANUAL AND AUTOMATIC CURING EQUIPMENT

By L. E. SODERQUIST
Vice President and Director of Engineering,
McNeil Machine Engineering Co., Akron, Ohio

Tire curing is inherently dangerous! We must work with high mechanical pressures in conjunction with high pressure steam, high pressure water, electricity and compressed air.

Prior to the Bag-O-Matic, the first major advance toward safety and efficiency in the curing of tires was the development of the individual curing press. The mold halves were permanently bolted into the vulcanizer and were controlled during opening, closing, and clamping pressure by electric or hydraulic means. Even with the advent of the individual press, possible injuries to operating personnel still prevailed. The most common cause was that of an explosion resulting when the presses were allowed to open while internal pressure still remained inside the curing bag. Curing bags were of the same design as a very heavy wall inner tube usually having one small valve stem.

To overcome the potential danger of such explosions, a pressure switch was used on the internal line to prevent the press from opening as long as pressure existed at the switch. This device was patented and universally adopted.

A great deal of engineering time and money was spent in the development of better pressure switches. One of the problems in using this type switch was that it reacted only to the pressure at the switch. Of necessity, usually the pressure switch was installed outside of the press, resulting in a rather long line from the switch to the curing bag containing the pressure. The fact that the valve stem was small created a restriction that was subject to being clogged by oxidized rubber from the inside of the curing bag. When this occurred the pressure switch could not operate. The press would open with pressure in the curing bag and an explosion would result. This condition was so common that it was considered a necessary evil.

A strain safety switch was developed to guard against the hazard of explosion. The design of this switch is relatively simple and makes use of two inherent features. First, the clearance between the shaft and the bearing, and second, the fact that the load on the bearing reverses during normal operation.

As the press opens, the first slight movement of the toggle releases the push-down or squeezing pressure of the mold. The continued movement of the top link picks up the top half mold and all of the retaining parts. This reverses the load on the bearing. If pressure exists in the curing bag, the bag itself lifts up the top half mold and retaining parts and there is no reversal of the bearing load. By inserting a sensitive switch at this point, we have an instrument that will stop the press from opening as long as pressure exists in the curing bag regardless of the cause.

This switch was very reliable and sensitive to low pressure, however, its relation to internal pressure was a little beyond the scope of the average mechanic and the switch was not properly set in many cases.

In the Bag-O-Matic press, an integral, barrel-shaped diaphragm is used instead of a curing bag. Here it was possible to use two large internal lines with no restriction. The pressure switch could now be used as a reliable safety instrument and the need for the strain gage switch was not as predominant. As an added safety feature, two switches could be used, if desired.

In tire curing by individual press methods, the operators were forced to handle considerable weight during a complete forming and curing process . . . first, the weight of the unshaped tire plus the weight of the

curing bag . . . then the combined weight of tire and bag from the shaper to a conveyor . . . also, the combined weight of the tire and bag from the conveyor into the press. Following this, the combined weight of tire and bag from the press to a conveyor, and finally, the tire and bag from a conveyor into a debagging unit where the curing bag was removed from the finished tire.

In passenger tire curing, this sequence of operations represented an approximate total of 350 lbs. The weights increased proportionately as the tire section became larger in passenger and truck tires. This sequence also involved many manual operations in which the operator was in contact with moving parts, thus increasing the hazards.

With the development of the Bag-O-Matic press, the rubber industry was able to bag, cure, debag, and eject a finished tire all within the Bag-O-Matic press. Not only did this machine effect substantial savings in curing time and handling, but it provided a much wider latitude for safety engineering in the process of tire curing.

The operator was called upon to lift only the weight of the uncured tire in loading the Bag-O-Matic and the weight of the finished tire in unloading. The complete cycle in weight handled by the operator was reduced from 350 pounds to approximately 52 pounds on passenger tires. Even the 52 pounds has been eliminated in new, fully automatic operations. This reduced the possibility of muscular strain, back injury, hernia and other physical injury.

The shaping diaphragm, being an integral part of the Bag-O-Matic press, made it unnecessary for the operator to make any steam or hot water connection for the curing of a tire. This did away with the possibility of an operator being severely burned when disconnecting the old type steam or hot water connections from the conventional bag.

Another safety feature engineered into the Bag-O-Matic press was the location and placement of steam or high temperature water lines running to the mold area. In all possible instances these lines were run from the rear of the press to the mold position or in some manner the lines were protected to keep the operator from any possible physical contact.

All of our presses, whether manual or automatic, are equipped with safety bars. This bar extends the full length of the press across the mold positions preceding the top half mold during the closing operation of the press. Upon contact with any foreign object the press is immediately stopped and reversed. This bar makes it almost impossible for an operator to close the press on his person or on a foreign object lying in the front mold area.

In the interest of safety, all modern presses today should be equipped with a clearly marked, operational switch which reads as follows: "Off — Mold Change — Manual — Automatic." When the switch is placed on any one of these functions, all other functions that are not necessary for the operations are completely disconnected. For example, when the switch is placed at "Mold Change" position, only those functions necessary for changing a mold are in operation. All internal and external pressure lines are electrically disconnected.

With the development of the Bag-O-Matic, due to the ease of positioning a green tire, we were able to create auxiliary units to provide for fully automatic loading and unloading of the tires. This development allows each press to be used to its fullest capacity and efficiency giving the particular tires in that press the minimum allowable curing. The automatic loading feature prevents operator fatigue as the tires are fed into the mold position by a conveyor and loading chuck assembly. The removal of the finished tire is also fully automatic. The lifting arms remove the tire from the curing bag assembly, elevate it to proper position, and slide the tire out of the rear of the press onto a roller conveyor.

The automatic unloading becomes a more important feature in the handling of the large truck tires as the press operators were previously called upon to lift tires weighing 160 pounds or more.

A great step in safety has been accomplished by automatic operation without the presence of an operator.

Considerable progress has been made in the design of the electrically operated mechanical goods presses. These presses incorporate many of the features already discussed. In addition to these, there are certain other features that affect safety to the operator as well as increase efficiency of

operation. The common method of producing compression molded mechanical goods products embraced the use of an individual press unit and several individual molds. These molds were manually loaded into the press, manually removed from the press, and then broken open by hand or some mechanical aid which resulted in operator injuries due to mold halves falling closed, or mold slipping from the conveyor onto the operator's legs or feet.

In the new, electrically operated, mechanical goods presses, the molds are bolted securely against the upper and lower platens. The mold remains in the press during all operations including opening, closing, loading and unloading. This also provides sufficient access during the loading operation and prevents burns as well as any possible injury caused from molds falling due to gravity.

Another safety feature engineered into the mechanical goods line is that of ejection equipment. The manual unloading of mechanical goods parts prior to the ejection equipment necessitated the removal of the hot cured part by the operator and sometimes required the assistance of compressed air to aid in stripping the part from the mold cavity. I will not attempt to elaborate upon the dangers of using compressed air for such operations as you are all familiar with the eye injuries, etc., that have resulted from debris, surplus material and even finished parts being blown into the operator's eyes causing injury or infection. Mechanically actuated ejection equipment on the new mechanical goods presses actually strips the molded product from the mold cavity so that it can be easily and quickly removed from the press without the use of any auxiliary service, such as compressed air.

In engineering curing equipment for use in the rubber industry, we constantly keep uppermost in our minds the fact that the humidity conditions, high pressure steam, water, and other services so necessary for vulcanizing operations require moisture-proof and dirt-proof control equipment such as timers, electrical controllers, etc. We also attempt to anticipate careless actions of operating personnel in an effort to design the maximum of protection into all of our equipment.

SAFE OPERATION OF BANBURY MIXERS

By ALAN S. McLEOD
Engineering Dept., U. S. Rubber Co., New York, N. Y.

I have been invited by your program committee to describe work we have done at United States Rubber Company to insure the safe operation of our Banbury mixers. Our objective is to prevent recurrence of conditions that could result in an accident like that which occurred at Los Angeles on January 21, 1955 where six men were severely burned, four of whom died from their burns.

At Los Angeles hot gasses erupted from an overheated batch of low temperature GR-S while being mixed in a Size 11 Banbury. The gases combined to form an incandescent fire ball which escaped up through the Banbury feed hopper opening to burn the six men who were within its path.

Prior to this accident, the Banbury mixer had been considered incapable of a disaster of such type or magnitude. Heretofore, we, in common with the rubber industry, had not associated the safe operation of Banbury mixers with the fact that rubber compounds, when worked above specific critical temperatures, will emit fumes similar in characteristics to natural gas. This is particularly true with respect to synthetic rubbers.

Investigation following this tragic accident at Los Angeles clearly determined it to have been one of human error. Examination of the mechanical and electrical equipment failed to find any defective parts. The batch temperature recorder was found to be in good operating condition. The stuck discharge gate functioned properly when the overheated Banbury had cooled. Since those immediately concerned have died we will

probably never comprehend why they seemed to have neglected reference to their batch temperature recorder even when the instrument's needle ran off the chart after passing its 400 degree Fahrenheit maximum scale reading.

It was further evident that instruction and training of operating and supervisory personnel will not, alone, insure against the possibility of human failure. The area supervisor and a technical man were present and are among the dead.

Study of our findings lead us to the conclusion that the Los Angeles accident could have been averted had there been a single purpose batch temperature monitoring device, capable of acting to stop the Banbury motor when an unsafe temperature was reached. Such a device would remove from the discretion of an operator the decision as to whether danger of fire in a Banbury mixing chamber exists or not.

Based on this conclusion and recommendation the management of United States Rubber Company requested its central engineering and central safety departments to develop, procure and install batch temperature monitoring devices for the over-temperature protection of all production size Banbury mixers within the company and its affiliates.

Firstly, we decided that the Banbury temperature limiting device should be a thermocouple type pyrometer instrument modified to meet our special requirements. A thermocouple type pyrometer was selected so that we could employ the same method for sensing mixing chamber batch temperatures most generally used by all Banbury mixers. We proposed to do this by the addition of a second thermocouple in a standard probe so that the operator's recording instrument would be showing the identical temperature being monitored by the temperature limiting device. We specified that the temperature limiting instrument must be—

1. Enclosed in dust-resistant and locked case.
2. Transistorized to eliminate need for vacuum tube and with minimum moving parts.
3. Instrument to fail safe in event of component failure by automatically stopping Banbury.
4. Temperature adjustment possible only by authorized personnel.
5. Instrument to be resistant to impact and vibration.
6. Simple method for manually checking operating condition.
7. Plug-in features for rapid replacement in event of failure.
8. Instrument to require minimum of maintenance attention.

A canvass of manufacturers disclosed many thermocouple type pyrometer temperature controls, no one of which was designed as a purely safety instrument. For instance, adjustments were always on the outside and the instruments were not tamper-proof. While satisfactory for industrial controls such as oven temperatures, and so forth, the devices were definitely unsatisfactory for our special purposes.

During November, 1955, the Thermo Electric Company, Inc., located in Saddlebrook, New Jersey, offered to work with us to develop and manufacture a thermocouple type pyrometer modified to meet our special requirements. There followed over two years of intensive collaborative engineering effort to develop and test the transistorized thermocouple type pyrometer safety instrument that we have named the "Banbury Temperature Limiter." The first of our newly developed safety devices were completed ready for installation during the past winter with most of our domestic installations completed during the spring of this year.

Not only was it necessary to develop a specialized instrument but also to redesign the conventional Banbury batch temperature sensing thermocouple probe. The special probe required for operating of the temperature limiter is of the same shape and size as our standard probe, with exception that it carries three thermocouples at its tip. One thermocouple connects directly to the temperature limiter. The second thermocouple connects directly to the conventional operator's batch temperature recording instrument. The third thermocouple is available for such of our factories that have both indicating temperature instruments for the operators and remotely located instruments in supervisors' offices.

To facilitate rapid replacement in case of damage to the new temperature limiter, thermocouple probes are equipped with a

permanently connected link of flexible conduit terminating in a quick coupling which correctly separates the three thermocouple circuits.

As I previously mentioned, we decided the temperature limiter should operate from the same point used for the Banbury operator's temperature indicating instrument. By this means we insured that the temperature limiter will always monitor the identical temperature being watched by operator. Probes placed at different locations within a Banbury mixing chamber will, in any given instant, generally register sometimes over 20° difference in temperature.

If the temperature limiter is to be relied upon as a safety device for the protection of Banbury operating personnel we consider it to be essential that temperature limiter setting, inspection, operating, and maintenance procedures be precisely regulated and enforced. To accomplish this, we have prepared a standard practice for the temperature limiter, copies of which have been issued to each factory where temperature limiters are installed. Copies of this standard practice will be available for distribution to those interested.

Our standard practice requires that each plant set up and maintain a standing committee to be called the Banbury safety committee, this committee to include representatives from production, laboratory, engineering and safety departments, who are given the responsibility for establishing the maximum safe temperature for the setting of each temperature limiter. We do not recommend having a specific temperature setting for each compound but rather establishing an overall safe temperature to cover all compounds where possible. Exceptions of course are for plants processing radically different compounds such as both rubber and plastics.

We like to describe the temperature limiter as a sort of sprinkler head, a device to stop the Banbury only when sufficiently elevated temperatures are reached that could cause danger of fire or explosion. By setting the safe operating temperature where possible at least 50° above maximum operating drop temperatures, interference with production operation can be overcome.

The standard practice establishes procedures for the setting of authorized safe temperatures and for the periodic inspection and testing of each temperature limiter installation. We consider it of prime importance that at least once every six weeks the plant safety supervisor witness a Banbury shut-down by running a test batch up to the pre-set maximum safe temperature. By this means we can be assured the equipment is in operating condition in the event of emergency.

The standard practice prescribes procedures following over-temperature shut-down to be followed by the Banbury operator and the supervisory staff.

The safety standard practice establishes procedures for emergency maintenance including removal of a failed instrument and of failed thermocouple probe.

We, currently, in U. S. Rubber Company now have 71 Banbury temperature limiters installed for the protection of Sizes 3A, 9, 11, and 27 Banbury mixers within our domestic plants and plants of our affiliate, Dominion Rubber Company in Canada.

We purposely have delayed installation of temperature limiters at our off-shore facilities until we were certain the installations would prove satisfactory. We are now ready to recommend use of the Banbury temperature limiter on off-shore installations.

The average cost of a Banbury temperature limiter installation, including necessary equipment and plant installation costs, has ranged from $1,500-$2,000 depending upon local conditions.

NEW DEVELOPMENTS IN SAFETY OF CALENDERS AND TIRE TEST EQUIPMENT

By EVERETT PERLBERG
Technical Representative, Adamson United Co., Akron, Ohio

"Speed kills" is a slogan heard throughout the country. It kills in factories as well as on the highways.

Many of us recall airplanes whose take-off and landing speeds were phenomenally fast when they reached 75 miles per hour.

Even in today's flying, commercial planes like the DC-3 have take-off speeds of 75 miles per hour, while more modern equipment such as DC-7's have take-off speeds and landing speeds in excess of 100 miles per hour, and some military planes are landing at speeds over 200 miles per hour.

Every mile per hour increase in take-off or landing speed of an airplane would necessitate longer runways. Longer runways are expensive, so efforts are made to increase the rate of acceleration and deceleration to permit the planes to get into the air faster, and to come to a stop faster.

This has led to rates of acceleration for aircraft tires which are coming surprisingly close to overcoming the force of gravity. The latest tire test machine built for the Wright Field Air Development Center is designed to accommodate tire testing at rates of acceleration and deceleration of approximately 24 ft./sec/sec.

By comparison, the acceleration of gravity on a free falling body is 32 feet/sec/sec. To power the test wheel, peak loads of up to 9,000 horsepower are required. The heat generated by this size motor is enough to stagger the imagination when one realizes that its full power is put into a 120" diameter steel inertia wheel and a tire.

An example of the energy which can be built up in a machine of this type is best explained by what recently happened on an installation in which a 200 mph machine was driven by a 400 hp motor. The objective of this particular test was to run the tire and brake assembly to destruction.

The brake had made numerous full emergency stops and had become considerably overheated, causing the wheel to fail. The rim exploded and a fragment of the rim, approximately 8" long and half as wide, pierced the safety glass in the protective fence. The glass was 2¼" thick. After passing through the glass, it traveled some 150 feet and embedded itself in a brick wall. Incidentally, the fragment of magnesium, when passing through the safety glass, melted the glass as easily as if it had been wax.

Every major tire producer in the country has at least one high speed test machine for aircraft tires, and every tire company in the country has a test machine for automotive, truck and bus tires.

Yet, in many tire factories either worker ignorance or laziness of management inattention has permitted operation of these test units with less than maximum safety.

In one plant recently visited, every gate on every test wheel, for passenger car tires was left open. Gates and doors on aircraft wheel testers were left open. In fact, at some points during the test, operators freely walked into and out of the test room, despite the fact that the rooms had heavy steel doors with safety glass peep windows.

Safety in this plant could have been improved by using interlocks between the safety drive motors and the safety doors and gates. Here, actually all of the advantages of accident protection were being ignored.

Photographs indicate the destructive force of tires and rims, with the tremendous energy stored in them.

The best protection of employees and expensive control equipment adjacent to the test wheel can be made by the installation of safety fences, interlocks and common sense.

A safety fence to restrain thrown treads and flying portions of the aircraft wheel can be constructed of various combinations of submarine netting, wire mesh screens and baffles. The baffles are usually of the swinging type, designed to absorb energy and deflect flying pieces downward.

If it is desired to reduce the rubber and brake dust from spreading through the

laboratory, the safety fence can be covered with sheet metal, but if this is done, hinged panels opening outward must be provided for the release of tire pressures in the event of a blowout.

Inspection windows may be provided and bullet proof glass up to 2½" thick has been used. All access doors into the main test room should be interlocked with the test motor so that opening any of these doors will not permit the test to start or continue.

Further protection can be gained by locating the operator's control panel so that the carriages lie between the operator and the tire. Tire inflation or deflation and temperature measurements should be remotely controlled from the exterior of the safety enclosure.

On completion of a test, the reduction of pressure in the tire to approximately one-half test pressure is a safeguard before permitting personnel into the test enclosure.

The use of closed circuit television to watch the tire test without subjecting personnel to the possibility of accident from physical exposure is a safety measure that merits serious consideration.

In order to make the tires which can be run at these speeds, we require accuracy in manufacturing. Most firms have installed beta ray gauges to record, measure and help to control the accuracy. Many firms have installed more accurate equipment such as calenders and curing presses to produce better products.

Speeds of 80, 90, 100 and 120 mph are putting stresses into the tire that even accurately controlled production will not withstand. However, normal speeds are approaching the 80 mph mark in the East and Midwest, and exceed it in other areas.

To get this quality control we have made numerous improvements in calenders. The calender which coats the fabric must be extremely accurate. It should produce a rubber sheet which is uniform in thickness to a tolerance of only tenths of thousandths variations. It must provide for a wide range of product thicknesses and be able to coat fabric, not only for tires, but also for conveyor and transmission belting, for life rafts and yet be versatile enough to make packings, hospital sheeting and other mechanical goods.

These accomplishments we have attained through the use of drilled rolls and circulating water systems for temperature uniformity, through crown correction by means of roll bending and roll crossing, through floatless rolls in preloaded bearings and improved lubrication systems, and all of these have been accomplished with speed increases ranging from 500 to 700 per cent.

Calenders of the 1920's were designed for speeds of 20-30 ypm and had motors of up to 200 hp. Calenders of the 1950's have speed ranges to 150 ypm and motors of up to 700 hp.

How much time can a calender operator afford to close his eyes while running at these speeds? Can an operator dare to take time out to reflect on last night's bowling, or the poker game he finished early this morning? Can he decide, while working, that he should have answered his wife differently in this morning's verbal breakfast battle?

With all of the improvements in technique, no significant safety changes have been made since the introduction of dynamic braking.

How advantageous is it to be able to mechanically stop a calender in a tenth of a second if there is no readily available safety means for the injured worker to activate the stopping mechanism.

The United States Rubber Company has recently worked with the Adamson United Company in designing a calender with a number of safety features. The calender developed was for a general purpose offshore installation, and was a 3-roll unit capable of frictioning, skim coating and sheeting of gum stock. This calender, unlike most 3-roll units, was fed above the operator's head with practically no chance for hands or fingers to be caught in the nips. To eliminate the necessity for pushing the stock into the bite of the top and center roll, the top roll was rotated so that it was only 30° off the horizontal plane, or 60° out of the vertical plane. This permitted gravity to replace manpower in pushing the stock into the nip.

Most existing calenders are designed so that the rubber is applied to the fabric at a point approximately 40 inches from the floor line. This means that to change rolls of fabric and refeed the calender with the new roll, the operator must squat and work with arms and hands extended. In this

position, he is off balance and much easier prey to an accident than he would be if he were standing fully erect.

In the calender under discussion, the fabric is fed into the nip of the middle and bottom roll at a height of 66 inches from floor level. This eliminates the need for men with eyes where their belly buttons are.

To further reduce the possibility of accident, the U. S. Rubber Company designed a finger trip safety bar. This bar is so arranged that the thickness of a man's hand between it and the calender roll will rotate the bar a sufficient number of degrees to trip a disconnect switch.

Unfortunately, calenders and their accessories are not uniform enough to permit standardization of design for these finger trip bars, but they can be designed especially for each installation. Since that first one the U. S. Rubber Company has designed at least three other units for existing calenders, all of which are now in successful operation.

If the operator is dreaming while working, the spring pressure of the bar and switch, which is adjustable, might be just enough to awaken him to the realization of danger.

Without any great sacrifice in production, the fabric letoff and liner windup roll have been removed from the working side of the calender and floor mounted. This eliminates the necessity of the operator having to lean forward over rolls to get at the work area on the calender.

In plastic calenders, operating at even higher speeds than rubber equipment, finger bars are not practical because of the rotating banks, unless the calender is used for a coating operation. However, other systems can be used.

For example, a rail should be placed around all of the drive motor sections to keep personnel from tripping on the raised concrete bases. Drop gates can be provided at speeds in excess of any reasonable speed, such as 35 yards per minute. Safety cables should and could be made much more accessible to the operators.

Drums in the cooling train must be provided with not less than 3-inch clearances. Gears and chain must be shielded and kept shielded, and windups of the automatic type should cut away from and not towards the operator.

Speed is a killer, but there is little doubt that speed, like sex, is here to stay. To make planes and cars and trucks go faster, we must build better tires and rubber products. To make services and products available to the most people, which means greater productivity, we must make our equipment more accurate, more productive and, of course, faster. We cannot afford to give a part of a man every ton of rubber or plastics.

To increase safety is the joint responsibility of the machinery user and machinery builder. We, at Adamson, are willing to go all out and we are always willing to work with safety engineers as well as with production personnel.

Copies of the photographs and general arrangement drawings of this calender, or the safety device used on it, are available to any firm upon request, through the cooperation of the U. S. Rubber Company and the Adamson United Company.

THE PROBLEM DRINKER AND THE SAFETY PROGRAM

By J. E. LAUGHLIN
Plant Protection Manager, Firestone Tire & Rubber Co., Akron, Ohio

A disturbing factor in any company operation is the problem employee. His reactions create many situations which affect other employees, supervision, the union, and even the customers. These can be reflected in personal matters, public relations, accidents and sick absenteeism.

Common types of problem employes are

those with uncomplicated nervous conditions, personality disturbances, or drinking problems. The employee with a drinking problem is the most complex, since the effects of drinking are often hidden and attributed to other causes.

Alcoholism is costing industry and business millions of dollars.

Its costs can be measured in scrap materials, wasted man-hours, lost customers and executive inefficiency. The problem drinker—and there are about two million of them in industry—has become a major industrial relations problem.

What is a problem drinker?

He is a person whose excessive drinking repeatedly interferes with his health or personal relations and whose work is thereby reduced in efficiency and dependability. He may be a key executive, an engineer, a foreman or a skilled worker. Problem drinkers are not necessarily alcoholics; all alcoholics are problem drinkers.

The problem drinker can be helped but, as in any disease, the symptoms must be recognized before help can be given. The steps of an alcoholic's progress show a definite pattern of drinking behavior. By recognizing these steps and taking early action, industry can cut its losses due to problem drinking.

Let us look at a profile of the problem drinker as prepared by the Yale Center of Alcoholic Studies under the direction of Mr. Ralph C. Henderson, industrial consultant.

Pre-Alcoholic Stage

The first step toward alcoholism begins when drinking is no longer social but psychological—a release from tension and inhibition. Though in reasonable control of his drinking, the problem drinker begins to show a definite behavior pattern. Pre-alcoholic symptoms include:

1. Gross drinking behavior
2. Blackouts
3. Gulping and sneaking
4. Chronic hangover

Early-Stage Alcoholism

Until now, the problem drinker has been drinking heavily but not always conspicuously. More important, he is able to stop drinking when he chooses. But beyond this point, he will develop symptoms of early-stage alcoholism with increasing rapidity. These include:

5. Loss of control
6. Alibi system
7. Eye openers
8. Changing the pattern
9. Anti-social behavior
10. Loss of job and friends
11. Seeking medical aid

Late-Stage Alcoholism

Until he reached this point, the alcoholic had a choice: To drink or not to drink, though once he began he had no control of his drinking. In the later stages, there is no choice; he must drink however and wherever he can. Symptoms of this stage are:

12. Benders
13. Tremors
14. Protecting the supply
15. Unreasonable resentments
16. Nameless fears and anxieties
17. Collapse of the alibi system
18. Surrender process

Are these problem drinkers safe? What is the relationship of alcoholism and accidents?

Authorities disagree on this matter. However, the consensus seems to be that the accident rate of alcoholics exceeds that of non-alcoholics. It is well known that alcohol slows down the reflexes, interfering with the efficient performance of both mental and physical activities.

Let us take a look at a few actual cases.

Case No. 1 is 43 years old, married and father of four children. He is a good mechanic and has worked at the same company for 16 years. During this time he has gradually developed into a problem employee due to his increased drinking. He has also developed an anti-social attitude toward fellow employees or anyone who tries to discuss his problem with him.

He has been warned about his behavior by his supervisor and the industrial relations department. Fellow employees continue to cover up for him as do his family and friends. One day he reported for work exceptionally hung over from the night before. During the hours of work he was assigned to repair an elevator gate. He was in a hurry to finish the work and get out of sight and his mental activities were not up to par. He did not check to see that

the elevator was shut down but climbed up on the gate and stuck his head in the shaft just as the elevator came down.

Fortunately, he escaped with a broken jaw and head lacerations. This disabling injury would not have happened if he had been in possession of his faculties.

Case No. 2. A 28-year employee reported to the medical department that he had fallen against some machinery. He complained of chest pains and an examination showed two fractured ribs. Since he had a record of problem drinking, an investigation was made. It showed that he had been drinking and, while attempting to wash windows at home, had fallen off a stepladder, striking his ribs on the edge of the ladder. A short time after reporting for work he claimed a job injury. But for the investigation his injury would have been classified as a lost-time case and charged against the record.

Many similar cases could be cited. However, there is a scarcity of evidence about the problem drinker and industrial accidents. In 1946, Dr. E. M. Jellinek, then director of the Yale School of Alcoholic Studies, stated that:

"Surveys made by our research group and by other investigators showed that the 1,370,000 inebriate laborers in the industries accounted for 1,500 fatal accidents at work and 2,850 fatal accidents at home, in public places and in traffic, or a total of 4,350 fatalities. This is a fatal accident rate of 321 per 100,000 men, or more than twice that of alcoholic laborers in the same occupation."

The figures applied to 1943—a war year. Whether the employee was killed on or off the job makes no difference; the loss to industry is the same in that the services of the employee are lost. A company has an investment in each employee. The loss is serious also from the insurance and hospital angle as well as for industrial compensation paid for by industry.

The 1957 report of the National Council on Alcoholism shows:

Alcoholism strikes 4,712,000 Americans.

One out of every 13 men age 20 and over is an alcoholic.

Three out of four alcoholics are between 35 and 55 years of age.

At least 1,650,000 problem drinkers are in industry.

Alcoholics lose a total of more than 36,000,000 working days each year.

Annual loss in wages alone due to excessive drinking is $432,000,000.

Alcohol cost to society in one year—more than $1 billion dollars.

Firestone's Program

In 1955 Firestone decided to recognize the problem drinker as a sick person and a policy was developed to try to help these people rehabilitate themselves. As now constituted, the policy calls for early recognition of the problem and handling as follows:

I. Attention is called to the fact that an employee may be drinking excessively by these signs:

1. He starts missing a lot of time from work. In checking on his absences the investigator from the company finds that he is drinking excessively.
2. Supervision notes a distinct change in the employee's behavior. His attitude may become anti-social. He may have repeated accidents on and off the job. Absenteeism increases.
3. The guard at the plant gate notices that he is under the influence and refuses him admission.
4. He comes to or is taken to the plant hospital after starting his shift and is found to be under the influence of alcohol.
5. He reports for work under the influence and is sent home by his foreman or supervisor.

II. Action taken when employee has been found to be drinking excessively:

1. First step:
   (a) For employees designated in items I-1 and I-2, when attendance of an employee is poor, his supervisor will take disciplinary action in line with that taken in any case of excessive absenteeism. If the supervisor knows or is reasonably sure that excessive drinking is a primary cause, he may wish to counsel the employee.
   (b) For employees designated in items I-3, I-4 and I-5, if an employee is refused admission or sent home, as under the influence of alcohol, he must, before returning to work, report to the person

in the plant who handles the rehabilitation program. In our Akron plants, this person is the head of the plant protection department. The staff person selected for this job may vary from plant to plant, depending on the qualifications of various staff members.

The person handling the program discusses the drinking problem with the employee, stressing the importance of being on the job in a safe condition every day, the danger to himself and others of being under the influence of alcohol on the job. He also points out that time lost when refused admission or sent home counts as a suspension. Finally, the employee is warned that if he does not straighten himself out, more drastic action will be taken.

In reporting the condition of the employee stopped at the gate or checked in at the plant. The term "under the influence of alcohol" is used rather than "drunk" or "intoxicated." This is a rather technical point but it is often important since the condition of being drunk or intoxicated is often difficult to prove.

The discussion with the employee is written up and copies go to the industrial relations department, the insurance department and the plant manager.

2. Second step.

If the employee continues to drink excessively to the point of affecting his work and attendance, he is instructed to report to the company person designated for an interview before returning to work. At this time, the action taken depends on the employee's attitude, his sincerity in trying to correct his problem, his willingness to cooperate, his service record with the company, and the period since his last difficulty.

The industrial relations department is contacted and agreement reached on disciplinary action. The employee may be suspended for three days unless the time lapse since the previous interview is substantial and his subsequent record has been good. In such a case he may get off with a warning.

At the time of this interview, the management representative offers to get a representative of Alcoholics Anonymous to help the individual correct his habits if he admits he is an alcoholic and wants help. He also offers help through counseling.

The employee is warned that unless he corrects his difficulty he can expect more drastic action next time.

3. Third step.

If it is necessary to call the employee in again, he is suspended for seven days. At this time, the president of the local union is notified that the employee is on the critical list and that further use of alcohol that affects his work or attendance will be cause for discharge.

Again the employee is offered help through A. A., or he may elect to handle his problem by himself. If he chooses the A. A. program, he is instructed to report to the management representative with his sponsor after he completes the treatment. If he prefers to handle the problem himself, he must also report at the end of the seven-day suspension period.

In either case, before returning to work he is told by the management representative in the presence of the industrial relations department representative, and his sponsor, if he has gone through the A. A. program:

(a) He must report off under the regular reporting-off procedure any time he is to be absent.

(2) He is not expected to work when ill but all illnesses must be supported by a doctor's statement, showing dates he is unable to work, dates treated, and cause of illness.

(c) All absences will be investigated by a company representative

(d) Any violations of requirements 1 and 2 will be cause for discharge, as will failure to follow through in correcting his drinking habit.

As in the case of all interviews, a written record is made and copies sent to persons in the company concerned with the case.

Many large corporations have adopted new attitudes toward the problem drinker and set up programs through their medical or industrial relations departments to handle rehabilitation through consulation clinics, community service committees, Alcoholics Anonymous, etc.

It is my belief that if industry and the community pull together, the problem drinker can be rehabilitated and be an asset to his community, with tremendous savings to industry, the community and families.

A COORDINATED SAFETY PROGRAM FROM TOP TO BOTTOM

By JEAN SONNHALTER
Editor, Firestone Non-Skid, The Firestone Tire & Rubber Co., Akron, Ohio

Right at the outset, I would like to put the plant publication in its proper place within the framework of an overall safety program.

There are some people—editors and safety men, even members of management—who feel that there is not very much that can be done to promote industrial safety with the printed word and pictures.

I could take violent exception to that idea. Let it suffice, however, for me to say that that idea simply is not so.

On the other hand, there is a tendency among people in my line of work to overemphasize the importance of the plant publication. I suppose this feeling is understandable. But, really, the plant publication is not as important as these editors think it is.

In my opinion, the plant paper, is a valuable element in a safety program. But it is one of several. In other words, the plant publication is less than the hub of the program and more than an auxiliary which may be used when someone thinks about using it.

Let's say that of the many elements in any good safety program, a well edited, hard-hitting plant publication that comes out regularly and carries safety features, is as important as any other element in the program.

I want to talk about the things we do on the Firestone Non-Skid and our reasons for doing them. And then I want to draw a few conclusions about the results. But first, I want to relate the plant paper to the overall safety program.

The program itself is the most important element. Obviously, if a plant publication is part of a poorly developed and poorly executed safety program, its potentially effective work is drastically limited. If, on the other hand, the program is a good one, executed with vigor, enthusiasm and imagination, then the potential of the plant paper can be fully realized. It can play the vital role it was designed to play—to get management's point of view across to the employees so forcefully that they will be compelled to act in a safe manner, not only on the job, but off the job as well.

Our industrial safety program, as it now exists, dates from late 1944. Judged by results—and they are really the only basis for any judgment—we feel that Firestone has the best safety program in the rubber industry. That sounds like bragging, doesn't it? Well it is. We are immensely proud of our program and of the results we have obtained. An accident frequency rate of 1.1 in the rubber industry is something to brag about.

But, to get back to 1944, and the beginning of the program which reduced our accident frequency rate from 11.1 in 1945 to 1.1 in 1957.

There was a war going on in 1944. Every facility of the company and every one of its employes were devoted completely to war production. Our safety program, judged by the standards of 1944, was a good one. *And then we had an accident.*

This accident, happened on Tuesday, May 16, 1944, on top of Plant One, Akron, in a small pilot plant where experimental work was being done on synthetic rubber.

Every known precaution had been taken for the protection of the three scientists who were running the experiments. And still—there was an explosion. A quantity of butadiene—the principal constituent of synthetic rubber—blew up. To this day, no one knows why or how. The three men were injured badly by burns and shock. Fortunately, first aid was immediately available. And in less than an hour the three scientists were being treated in Akron City Hospital. All of them recovered.

The first executive to hear of the accident was our industrial relations director, who, immediately after the injured men were cared for, went to the president of the company, Mr. Harvey S. Firestone, Jr., who is now chairman.

Within 30 minutes, the top brass of Firestone was in a huddle. They were stunned by three obvious facts. One, that three men

had been seriously injured. Two, that vital research had been brought to a halt when the country could least afford it. And three, the accident happened where every known precaution had been taken.

At that meeting there was one man whom I am sure you all know—J. E. Trainer, our executive vice-president. He has been in the forefront of the movement for industrial safety—on the national scene—for years. And there is nothing academic about his attitude on safety. Back in 1915, before he joined Firestone, when he was a young engineer just out of Pratt Institute, he got it, accidentally—a mashed ankle that put him in the hospital for 27 weeks. Even today he limps a little.

Firestone's top executives met for two hours and out of that meeting came a big decision. It was a decision to launch the biggest, most intensive safety educational program ever devised, and then to do the greatest selling job on it that could be done.

Mr. Trainer took command of the overall program. And he appointed Glen Cross as the full-time safety director for the company, to co-ordinate the program from top to bottom. It may have been symbolic that that appointment was made on June 6, 1944. That was D-Day in Europe. And it certainly was D-Day for safety in Firestone.

What has happened since is history—a story of unremitting, day-in-day-out pounding away at the idea of safety from every conceivable angle, and with results which speak for themselves.

Our plant papers have played their part in making the idea of safety an ever-present, real, living concept in the mind of every man and woman at Firestone. As an illustration of just how safety-minded our people are, let me tell you what happened to me a few months ago.

I have to go into the plants occasionally. I was in Plant One on a picture assignment and one of the men noticed that I wasn't wearing safety shoes. He took me to task for it. Well, I don't work in the plants and go into them only once in a while. But that explanation was not enough. About a week later, a pair of safety shoes (the right size too) arrived at my office with the compliments of my friends in Plant One. A card with the shoes admonished me to wear them whenever I went into any plant. I'm wearing them right now.

In my opinion, ours is a successful program for several reasons. Probably the most important is the fact that we have the unqualified backing of top management. Next, we have a fine program which involves everyone in some way. And we have a great many dedicated people working on the program.

This co-ordination of effort involves the Non-Skid, frequently, and quite directly.

I imagine that the majority of you represent companies which have some sort of publication for employees. Today there are about 9,000 such publications with total circulation in the millions.

This is really a huge audience. It represents a tremendous area in which the country's various plant publications can work effectively for safety, not only on the job, but off it as well.

Let us consider, for a moment, a new employee coming into a plant. His supervisor will explain the safety rules. The plant safety engineer will hammer away at the matter day-in and day-out. Bulletin boards will yell this and that safety messages at him. And the editor of the plant paper or magazine will—through words and pictures—throw a safety article or message at him with almost every issue. In this way, the plant publication contributes its weight in carrying forward the safety education of every employee, new and old.

To get an efficient job done, the editor and safety director must first establish a firm, cooperative relationship. The necessity for this relationship is obvious.

And I'm quite proud—and happy to say that insofar as the relationship goes between the Non-Skid and its staff with our director, Glen Cross, and our manager of safety, Mike Batche, there is nothing to be desired. They make life easy for us—and we, in turn, try to further the job they are doing with everything we have.

The safety man knows better than anyone else the areas which must be approached and covered. He knows specifically where what department is weak, and in what phases of safety particular groups of employees must be educated. When this information is passed along to the editor, the editor then knows what to do and can therefore cooperate fully to get the job done.

On the other hand, if an editor comes up with a brilliant idea for a safety story or

series of stories, he or she can count on the full co-operation of the safety department in getting, quickly and accurately, the material necessary for an article.

With this sort of cooperation, a plant publication is off to a flying start in accomplishing its mission on safety.

Of course, there is no use denying the fact that much safety material is pretty deadly. This sort of thing is not read and even if it is glanced over, it is hardly ever heeded because it carries no punch.

The point to be made here is this: that readers of company papers can be stopped in their tracks and made to read if the material is pertinent, interesting and well presented, with headlines, pictures and stories designed to catch and hold attention. This sort of layout gets attention. And, most important, it leaves a lasting impression that has its ultimate result in a declining accident frequency rate.

There are two approaches, generally speaking, to presenting safety to employees. One is the intellectual approach which appeals to a man's reason and his innate instinct for selfpreservation. The other approach is an emotional one. This is based on the same instinct every man has to preserve himself, but it is pitched to his emotions. In either case, however, the subject matter and its presentation must be directly related to the worker—and the more directly, the better.

There are, of course, certain types of stories and presentations which have both the intellectual and emotional approach and appeal already built into them.

Let me give you an example: There is the ordinary news story with a safety angle. Such stories—usually of winning an award locally, statewide or on a national basis; the results of contests; reports on relative safety standings of the various departments or divisions in a plant; these and other news stories have a basic intellectual approach. They merely state the facts: who won and who lost. But—and this is important—the reader of such stories relates himself in an emotional way to the facts as they are presented. For instance, if his department comes out on top in a safety contest, he immediately feels a surge of pride in his own contribution to that victory. And he becomes even more determined to win again. If his department came out in the cellar, he feels—we hope—let down—and resolves to put in a better performance the next time around. In either case, the cause of safety wins.

Almost all the straight educational material we use is pitched to the intellect. These stories on the proper method of accomplishing certain tasks, others on the proper use of materials and the use of safety equipment, are presented straight—simple and factual. (Red Tags. Clothing. Glasses. Shoes.) In such manner we also present material on off-the-job activities such as boating, swimming, safety at home and highway safety.

In addition to this approach and the emotional appeal—which I will come to in a moment—there is a humorous way of getting a safety message across to readers. Cartoons are always popular. Generally, they put a point across instantaneously. They are seldom, if ever, passed over. They help to brighten up a publication and they are also an effective means of brightening up a long piece of copy, both from a visual point of view and from the viewpoint of illustrating or dramatizing a point effectively. They also serve in place of photographs when these are not available.

Probably a cartoon's principal function—and its most important one—is to get across a serious safety message with a laugh. The cartoon is about the only device I know of that can accomplish that. And the old Chinese saying about a picture being worth 10,000 words is certainly true in this case.

The emotional appeal in our presentations is aimed at one target—with two bull's eyes. The first is that old instinct for self preservation. And the second is closely related; it involves what the reader holds dear to his heart—or to himself: his wife, children, family, reputation for good sense and intelligence—and any other tangible or intangible with which the reader, in an emotional way, closely relates himself.

Usually, stories and pictures with this appeal are based on imaginary situations that could result in a person's being injured. Basically, self-interest is appealed to. But the angle of the story or picture can dramatize the effect of an injury on someone else. (Can't fill daddy's shoes.) Thus, with a double barreled gun we can hit a double barreled target.

Moreover, photos of children are especially good attention getters. We use a lot of them—and they are usually pictures of the children of Firestone employees. ("Why I want daddy to work safely.")

Each type of story, each approach—news, education, emotion, humor—has a valid place in any company publication. As you have seen, the Non-Skid uses all of them—and not only for safety on the job. We have used them to promote safety off the job as well.

That is a subject I wish I had enough time to discuss. But time runs out. However, there is a relationship between on-the-job and off-the-job safety. And I'd like to touch on it for a moment.

For some time we have gone at the problem of promoting off-the-job safety in the same way we promote safety in the plant.

A survey, made for Mr. Trainer recently, of 100 people who had worked 16 years in a department without a lost-time accident, showed that their off-the-job accidents totaled 14 during the 16-year period while, according to statistics of the National Safety Council, the average figure was 64 for the same period. The relationship here is obvious. And we therefore plug off-the-job safety not only for itself—which is important—but for its carry-over affect on the job too.

Just how effective is all this publicity in reducing accidents?

There is no exact way to measure the effect. You cannot put the results on a scale and say—yes, this weighs ten pounds four ounces, as you might with a Thanksgiving turkey.

On the other hand, we all know about "The Power of the Press." We know, because we have seen, the effect—evil though it was—of certain propaganda machines in Germany and Russia. We know that the printed word has an authority far above the truth or falsity of its contents. These things we know. But we don't know the degree or the extent of the effectiveness of—propaganda, if you will.

A friend of mine—another industrial editor—made a survey of one firm and I quote from the results he found:

"Speaking of influence, many editors wonder sometimes whether a man reads and forgets, or whether he is influenced by what he reads. For my answer, I would like to discuss the three-year safety record of an Ohio company.

"In January, they started a plant-wide safety program. They held safety meetings, posted bulletins, appealed to employees; but in June, the record had not improved much. With 900 employees, their frequency rate was 46.4 for 175 lost-time accidents in 18 months—one out of every five employees. They felt the program needed something more. They started a campaign in their plant publication.

"They listed safety records of each department, ran special safety columns, printed articles written by foremen in which they discussed accident prevention, described individual accident cases and explained their causes.

"What were the results? A dramatic drop in lost-time accidents after the employee publication was put on the job. Their frequency rate dropped from 46.4 to 15.06 in three years. Here is positive proof of the influence of the plant publication during that time."

This seems to be an extreme case—but not too extreme. It does, however, prove, it seems to me, the effectiveness of the company publication in promoting safety.

The *Non-Skid* is proud of its job in promoting safety as an integral part of a big, well co-ordinated safety program. We firmly believe that the *Non-Skid* has been of great value not only in helping to create and further the cause of safety, but also in building and maintaining friendly relations and co-operation.

We have the wholehearted co-operation and support of Mr. Trainer and the others in the top echelon of the company and we are slowly but surely gaining the co-operation of every employee in the plants. We have a safety program, from top to bottom.

But the job has no end—there's no writing "30" to the job of safety promotion as writers do at the end of a story. . . . As long as there are men and women working around machinery . . . as long as that human element of carelessness is present—there will be a job to do in educating for safety. And the *Non-Skid* and other company publications will be in there pitching.

PLEASANT WAYS WITH INCENTIVES

By H. S. FRYBERGER
Plant Safety Advisor, The B. F. Goodrich Co., Akron, Ohio

Do incentive awards used in accident prevention programs pay off? At the B. F. Goodrich Company our answer is a very definite—yes!

A safety program can not succeed without a careful consideration of the role played by the individual workman. It is he, or she, who works safely or gets hurt. Therefore people are the most important part of our accident prevention approach. Education, engineering and enforcement all have their place in getting production with safety but you must have enthusiasm. Incentive awards add enthusiasm and get people into the act. This is a must.

To be effective incentive award programs should:

First—Be interesting, properly administered and varied.

Second—Be timed right. No program should be allowed to continue until interest and appeal are lost.

Third—Not be too complicated. Rules must be few and easily understood.

Fourth—The only active part the worker must take is that he work safely.

If the program meets the first three requirements you will receive the support of the employees in reporting unsafe acts, practices, procedures, equipment and conditions. This is one of the pleasant ways with incentives.

During the past 11 years, we at B. F. Goodrich have been using employee interest-incentive award programs effectively. During this period our company has reduced our injury rates 90 per cent. Our direct costs of injuries show a decline in spite of the inflation which has affected everything including the costs for having our people hurt. I say this not in the sense of boasting but to have you know that we have made incentives for greater interest pay off. For additional proof that incentive awards create a desire to work safely we were able during this period to complete the following runs free from disabling injury at our Akron plant:

32 runs of 1 million plus manhours
7 runs of 2 million plus manhours
1 run of 3½ million plus manhours

As previously stated incentive award programs must be varied. To accomplish this our programs are based on plantwide, divisional, departmental and department shift performance. The method for determining winners is also varied. In our plantwide program we paid off on a schedule of days clear from a disabling injury. Divisionally we used the best frequency rate improvement and in the departmental and department shift programs it was necessary to complete a predetermined period free from a disabling injury. Consequently our awards had to be varied in value and number. In all programs the cost of the awards was based on 50 to 75 cents per employee per year.

We started our incentive award program with a safety-sports contest which provided all-expense trips to three major sports events, the Kentucky Derby, World Series baseball games and Army-Navy football game. This was a divisional contest and winners were decided by showing the best frequency rate improvement by quarters with a drawing in the winning division. The foreman of the winning employee also received a similar trip for two persons. Following that we concluded that incentives should be spread to cover more people. Merchandise prizes worth about $10.00 retail value—items such as electric clocks, electric irons, fans, fruit juicers, etc. were given to lucky winners on all shifts free from disabling injuries for a month.

As a result of employee suggestion, we used the incentive idea spread still further by giving a candy bar each month to every factory employee free from disabling injuries on their shift. A percentage of the candy bars contained slips entitling the winner to a free pair of safety shoes by turning in the slip to his foreman. Persons who were on shifts having had a disabling injury received a package of chewing gum with a message "Sorry—no candy. Here's something to chew on—work safely and win

a chance on a pair of safety shoes free next month."

During 1952 we used U. S. savings bonds on a plantwide basis—$500 in $25 bonds for 15 days clear; $1,500 for 30 days and $2,500 for 45 days clear. We paid off for four runs of 15 days, each equivalent to over 1,000,000 manhours clear of disabling injuries.

In 1953 we combined an interest in spectator sports with our safety promotion program by providing all expense trips to Cleveland Indians ball games. The number to go on each trip was determined by a schedule of days clear plantwide. The winning individual was determined by a scheduled drawing and their immediate foreman went along. One of these trips required five buses, several bushels of peanuts, not to mention the hot dogs and drinks. Letters announcing this plan were mailed to the employees' homes from the town of Accident, Maryland.

One of our departmental programs which was quite successful—carried the slogan—"It's Silver For Safety." This provided a distribution of 500 silver dollars each month in departments free from disabling injury.

The incentive program used on a plantwide basis, I will next discuss, was one for promoting the selling and wearing of safety shoes. The purpose of this is not new to most of you, and in some of your plants a condition of work. We at the B. F. Goodrich company, Akron plants after a review of all our foot and toe injuries, disabling, or minor, are convinced that employees who wear safety shoes seldom have a foot injury.

A check for a four-year period showed we had 60 disabling foot and toe injuries—50 per cent or 30 of these could have been prevented if safety shoes had been worn.

During this period and for years before, safety shoes were available in our employees' store but without an incentive program to aid our foremen in selling this much needed toe protection.

Starting March 1, 1956, the B. F. Goodrich Foremen's Club Safety Committee, with the support of the safety department, put into effect a new plan for encouraging the wearing of safety shoes:

First—Factory employees (male) received a $2 discount slip from his foreman which could be used as a credit on any pair of safety shoes in the employees' store.

Second—As an additional incentive, recognition was to be given to departmental groups reporting to a floor foreman or foreman engineering, where the wearing of safety shoes met the following requirements:

40 per cent of male employees wearing safety shoes—free cokes, candy, or coffee as decided by foreman.

60 per cent wearing—Free cigarettes. (1 pack per employee)

80 per cent wearing—distribution of some merchandise item to all employees. (50c cost value)

100 per cent wearing—drawing for $25 Series E savings bond. (Based on one bond for each 25 employees or less).

During the first 12 months this program was in operation 1,989 pairs of safety shoes were sold. While this fell 17 per cent short of our target of at least 200 pairs per month we feel that we made all of our employees more conscious of the need for foot and toe protection.

In this same period 3,309 employees received free cokes, 644 free packs of cigarettes, and three small departments qualified for the 50c merchandise item. Many additional groups approached the 40 per cent wearing and a number of the 40 per cent groups 60 per cent wearing.

Safety shoe posters were placed on all safety bulletin boards once a month and, as a further aid to the program, we had a mobile-type display moving into each department on a scheduled basis. This unit had on display the type of shoes available, also the regular price of the shoes and employee price with the $2 credit slip. The display was well-lighted and had a motorized "Sammy Safety" for action. The latter can be obtained from National Safety Council.

A special and additional incentive award was developed by the general foreman of the Akron tire plant curing room to increase the wearing of safety shoes. It was quite successful, not only in his department, but also in one of the tire building units and the maintenance group.

To get the plan started the mobile unit was moved into the department at a loca-

tion where it could be viewed by the most people with a minimum of effort on their part. A large display board was also placed in the same area advertising the offer which was: In addition to the $2 credit slip, the general foreman offered to buy the old shoes (of those employees not wearing safety shoes) for $1 per pair for a period of 30 days.

In our curing room we sold 57 pairs in 30 days, and 39 pairs the month following withdrawal of the offer.

In our tire building room, 60 pairs were sold in 30 days, plus 10 pairs the month following withdrawal of the offer.

In the maintenance department, 24 pairs were sold in 30 days, plus 8 pairs the month following withdrawal of the offer.

In a period of 90 days we had 141 employees wearing safety shoes who previously had no toe protection. And the 57 pair of safety shoes sold after the special offer was withdrawn would indicate that the "Buy Your Old Shoes" program induces others to purchase.

During the second year we obtained a discontinued line of summer shoes which were offered at a special price and then later for a period of 10 days we allowed an additional $2 discount. Our total sales for the year 2,599 pairs.

Even with this progress we have not sold some of our employees who have since suffered foot and toe injuries, many of which could have been prevented by the wearing of safety shoes.

On the other side of the picture, however, are a number of employees we know of who, because they were wearing safety shoes, were saved from a painful injury and loss of wages. I am sure there were probably many more of which we did not hear. I just recently learned of an employee who, within a span of seven days, was saved a disabling injury to the toes of both feet because he was wearing toe protection. He told me he had worn safety shoes for 10 years and this was the only time he had ever had anything strike the toes of his shoes. The blow had cut the leather over the steel cap.

We have had reports and have seen the safety shoes of many who were saved from foot and toe injuries off the job—some from power mowers, dropping of heavy objects, cutting of wood with an axe, and, believe it or not, one in which a horse stepped on a man's toe.

All of these programs were sponsored on a plantwide basis.

Our incentive award program paid off at the Akron tire plant. The first was free cokes for everyone for a no disabling injury month. We paid off twice and failed on the third, next to the last day of the month.

On August 1, 1957 we revised the silver dollar program, paying off if employees could answer questions on safety information posted on a large gate sign and within the departments. By the 16th of the month we had two disabling injuries; however we then were able to compile a run of 185 days and 2,833,744 manhours clear of disabling injuries. The run was broken by a foreman, riding a "widget," who bumped his ankle on a skid resulting in a fracture.

Does all this pay? Remember we have been spending $6,000 to $11,000 every year for these incentive programs. The answer is that the B. F. Goodrich company does not spend money for nothing. And I do want to emphasize that when we have a disabling injury—that's it! We aren't making a paper record to kid ourselves, or think we are fooling you or anyone else about injury records.

Are such programs necessary?—It is easy enough to say—accident prevention is the responsibility of our foremen and we don't need a lot of gimmicks to get the job done. Aren't we kidding ourselves with this policy? The foreman is a busy man. He needs assistance in the form of stimulation, information and promotion sales help if he is to sell one of the most difficult of commodities—an intangible—safety.

Maybe you are convinced that we believe in incentives. Yes, we definitely do—but, and there is a big but. There are many pitfalls; there is no easy road to accident prevention as you well know. Incentives are the advertising and the sales props. All basic ideas in accident prevention should be used before you start asking people to buy a product of utmost importance to them—their own personal safety.

In conclusion, incentives are not a shortcut or an easy method. These cautions are important:

1. Incentives aren't the entire answer—all of the basic accident prevention know-how must be used.
2. In our opinion, a minor injury should not be penalized in any such program.
3. Design all programs so as to insure that foremen must make personal safety contacts.

We do believe our incentive programs (1) provide an effective tool for foremen to make a tactful approach to clock-card employees in securing their participation in accident prevention, and (2) that they are vital in promoting an intangible such as safety.

We emphasize that there is no pay-off unless results are produced.

CRUSADE FOR SAFETY

By FLOYD A. BURGNER
Safety Engineer, Firestone Tire & Rubber Co., Los Angeles, Calif.

Crusading for a cause is sure to bring results to some of those who hear or read about it. Evangelist Billy Graham is just about the best crowd attractor in his field. Of course his great success is due to the fact that those in his audience want to hear his message; therefore they listen to every word. Some go away unimpressed, some are won over to his cause—but you can be sure that his audience listened to his message. They wanted to hear him.

You probably all know about the gang of under-privileged kids in Mexico who won the Little League World's Series last year. They had been overlooked in the every-day scheme of things because they lived in the back country. Then along came a man with a great desire to help the kids. He taught them baseball and they listened. They wanted to play the game better than it had ever been played before. As a result they practiced the teachings of this fine man, and I am sure you have all read of their climb to the top.

One of the things they were taught illustrates well the thoroughness of their teacher. He made sure that the pitcher not only got the ball in the strike zone regularly, but also that there was enough stuff on the ball so that the batter had trouble hitting it. The pitcher was taught to field a bunt, cover first at times, and also to back up a teammate when needed. Each player on the team was taught similar team participation. Each one wanted to do a little more than his share.

Some crusades fall flat because the crusader hasn't reached the audience. We in the crusade for safety are faced with the ready-made audience. They assemble either because they are told to do so; or they are paid for the time they are listening. We are fortunate to have audiences and if we cannot arouse their interest and win a good part of them to our crusade, then we had better take another look at our message.

As you all know, a good safety message is not easy to prepare because we have the feeling that just about every angle already has been tried. Just about—but not all! We may think that there is no new approach to the selling of safety, but don't you believe it. There are as many new approaches as there are individuals with whom to talk.

Safety is just about the only field I can think of where there are no axes to grind. We have no secret formulas nor do we think that if it isn't our idea it won't work. In our crusade we *share* our experiences and our programs.

One of the most effective approaches we have used is the daily contact between the supervisor and his people. A contact chart goes to each supervisor and he enters on it each of his employee's names. Across the top of the chart a space is provided for each day of the month. At the bottom of the chart are listed sixteen to eighteen subjects to be used as a key for the supervisor in making his daily or weekly contact. Each subject is numbered and as

the supervisor contacts his employee he marks the number of the subject about which he spoke in the proper date column. He then has the employee initial the chart. The initialing is done as a check against the supervisor who may develop the bad habit of filling in the chart in his office. This bad habit, in fact, prompted us to start the initialing method. It has reduced the office routine. When the daily contact seemed to be losing its effectiveness, we changed the approach by telling the department heads that we did not care whether they used the contact method or some method of their own just so they were *doing* something about safety every day.

Of course, every plant has the right to use any approach they think will work and if their idea brings good results, it is passed along to the home office for use in other plants. We do not pretend to believe that once a program is in operation the crusade is won. On the contrary, we change programs at least once a year—or more often when it is felt to be necessary.

We developed a program for the use of red danger tags. Our program calls for every tradesman to carry a red tag with him at all times to be used on the master switch when it is necessary to work on any part of a machine. The program seemed fool-proof until we found that the production people were not calling the tradesman when a production plug-up occurred, and as a result, they were working on the machine to clear the plug-up without the protection of the red tag. Since then we have reissued the tags which have been reprinted with the various department names printed across the top of the tag.

Now each mechanical trade, as well as production, is spelled out on the tag. The tag is signed by its owner and hung on the master switch or valve. No one except the owner removes his tag. One of our plants uses a red metal tag in conjunction with a yellow metal tag. The yellow tag is used when the job is not completed at shift change. The supervisor places the yellow tag on the machine when the red tag is removed. This yellow tag states that the machine is out of service. We are using a padlock in conjunction with the red tag in some cases and will soon go 100 per cent to the locks. There are several types of red tags and several wordings, one available for each need for the tags.

In 1952 we started a program to educate our tractor operators. This was not a driving course, but a program to establish a set of rules whereby every tractor driver would know what to do under any given circumstance. We assumed that the operator knew how to operate his vehicle or he would not be driving it. We started our series of sessions by asking each operator to have an eye and ear examination as well as having his reflexes and reaction time checked. Out of 250 operators we found some 25 with poor vision or hearing and several whose reaction time was far too slow for safe operation. Incidentally, the 250 included alternate drivers from each department.

The main thought behind the training program was to have the employees agree that tractors could be operated safely and still get the job done. Prior to the program, the tractor damage to physical property and equipment ran into thousands of dollars a month for repair bills. After the 10-week program ended, and for a period of nearly 12 months, the damage was practically eliminated. We issued chrome-plated badges which were numbered. As a follow-up to this program we sent out regular bulletins to each of the tractor drivers. We also included any damage reports as well as accidents at our plant or any information from the Rubber Section News in which we felt they would be interested. Right now we have several men on the tractor jobs who are new to the program, due to a rash of job transfers resulting from our recent cutback in personnel. We will keep our fingers crossed and hope we can get them indoctrinated before an accident occurs.

Each year we have a safety slogan contest which is open to all employees. The rules are simple and the first prize is $100 in cash—so we get fine cooperation on this phase of our crusade for safety!

The same program cannot be used to best advantage in every division of our plant so we permit each division to plan and practice their own program. In one division for instance, there is a permanent safety chairman. Under him one supervisor acts as safety captain for a period of three months. This captain may have as many as three or four inspection committees under him and the same area may be in-

spected by each of the committees without the others' knowledge.

This of course may seem a bit top-heavy, but each committee reports something the other group has overlooked. They report unsafe conditions and unsafe practices. Every committee has at least one member from the department or section it inspects. The committees are changed every month so that, in due time, every supervisor of every department within the division has inspected every other section of the division.

I usually go along with each new safety inspection committee on its first tour to make certain its members are on the right track. No committee member is permitted to contact an employee while on the tour of inspection. All contacts must be made with the department supervisors. The entire group meets with the permanent chairman once a month and the division manager, as well as each department manager, is present. This has proved quite satisfactory in our Missile Division.

In another division, one supervisor is appointed to be in charge of safety for a period of one month. He, or she, wears a safety-supervisor badge and all unsafe conditions or practices are reported to that person. This safety supervisor handles all the safety activity for departments which are within a predetermined area. At the end of the month a meeting is held and all of the supervisors in the area attend to discuss the previous month's safety problems. Every department meets once a month and among the subjects discussed are unsafe conditions which have been found and corrected, accidents or injuries if any, and hospital passes.

The safety office provides each department with two charts. One explains the nature and bodily location of each injury, and the other chart shows the cause. These charts list the non-industrial injuries as well as those which occur at the plant. Each department investigates each of its industrial first-aid-type cases to determine the cause and to provide the proper means for its correction. The person involved is contacted and the hospital pass is gone over very thoroughly.

One division—mechanical—has each supervisor bring every hospital pass he has written during the month to the safety meeting. The supervisor explains what happened and must tell what he has done to correct the cause. This is one of the best ways we know to get and keep the supervisors on the ball.

We have mailed post cards to each employee's home asking them to include safety in their vacation plans. We wished the family a fine vacation and a safe return. This personal approach was well received.

The peculiar thing about all of this is that—we still have accidents! Our communications hold up for just so long; then without warning, the bottom falls out and we are in real trouble with a disabling accident.

We were in just such a trend early this year when a new safety film was shown in Los Angeles. Well, it wasn't actually new to everyone I guess, but it was to us. We were invited to see the film, "Knowing's Not Enough". You may be aware of the film because it has been in circulation for a year or more. It was made by the United States Steel Corporation and it is a dilly. I practically took the film away from the people who showed it for us. We arranged to show it to top management and they were as enthused about it as we were.

There was a great deal of promotional material available to be used with the film. A yellow flag played a very important role in the film so we had large yellow flags made which we hung throughout the plant. We had selected one section of the plant which was experiencing a really rough time with accidents in which to promote this program. We left the flags up without explanation for about 15 days. This was to arouse curiosity and stimulate interest for the program. We paid the employees for time spent in viewing the film and listening to a few well-chosen remarks from our plant manager. Immediately after showing the film, cartoon booklets giving the story of the film were sent to each employee's home. Then a follow-up program of posters was begun.

Each manager and general foreman had a yellow flag in a holder on his desk which will remain there throughout the entire period of the program. We changed our mechanic's red wipe cloths to yellow, painted the top rail and also the top and bottom risers of each stairway yellow, as well as all

skids and tractors. We gave each supervisor a pocket protector bearing the yellow-flag emblem and are planning on distributing small yellow-metal lapel flags to each employee at some appropriate time, perhaps calling it a yellow flag or tag day.

This program was so well received that during the showings of the film, which took several days, we found that employees from other departments were coming in to see the film on their own time. We have not as yet exhausted the possibilities of the program and we intend to milk it for all it's worth. We felt rather good about our efforts when a firm up north sent a plane load of their representatives down to Los Angeles to get some information on the manner in which we were presenting the program. Understand, we are not attempting to take a thing away from the United States Steel Corporation for their fine film—we believe it is the best method of safety communication we have seen to date.

To select any one approach to safety as the best and only one to use would be courting trouble. We are utilizing a personal-contact program right now which we feel is one of the best we have used. The contact team is made up of the plant manager and myself. Each week since May of 1957 we have met with various members of supervision. We have five divisions in our plant operations, so each week one supervisor from each division is invited to attend the meeting in the manager's office.

These meetings are quite informal and no set agenda is followed. They probably could be called "get-acquainted meetings." Mr. Hunnicutt, our plant manager, starts the meeting off with an explanation of the "why" of the meeting. He explains that he wants to be sure that everyone present understands his deep personal interest in safety. As the meeting progresses, those present are encouraged to join in the discussion. The conversation eventually gets around to how the different supervisors present handle the safety programs in their division. As soon as the people understand Mr. Hunnicutt's sincere interest in safety they begin to relate some of their problems, as well as what they have accomplished.

These meetings usually last for about an hour. Mr. Hunnicutt and I try to stagger the meetings so that we reach all of the shifts. We may hold a meeting in the middle of the night, or early evening, or high noon.

One of the various approaches we have used to meet with supervision is to take strolls through the plant—either planned tours—or we just start walking. We may stop a supervisor and ask him if he has any safety problems we could help him handle, or what has he done about safety today? We sometimes embarrass a supervisor who has nothing to say, or report, but you know he will be ready the next time we happen to stop him! On these jaunts we either work through one department, or make one or two stops in several departments.

Our crusade for safety is a never-ending one. If a book could be bought which would show the way to accident and injury-free industry, we would buy a copy for each employee and that would take care of the problem. We know that can never be—so our Crusade continues and we go on working in the hope that more and more people will hear the message of freedom from injury and suffering. We continue to have some very serious injuries, but most of these can be traced to human failure. However, armed with a constant, never-ending program of education for our employees—which is our Crusade for Safety—we hope that the more serious type of injury is on its way out.

We have a training program to acquaint our guard force and supervision with the handling of portable fire-fighting equipment. We also hold first-aid-training programs for our guards and firemen. We have a safety-suggestion program which provides a good outlet for the ideas of our employees.

In attempting to summarize our crusade, first we must be cognizant of the fact that every employee is a potential crusader. He must be sold on safety, and that selling can come about only through proper communications. Our management firmly believes that safety-in-industry is a program which can only be as good as its chain of communications. Our safety program is limited only by company policy and that is quite broad when it comes to safety. The finest of safety programs can—and will—fail if the chain of communications is broken at any level before it reaches its ultimate goal—the employee who is doing the job.

A successful program, one which will result in a well-rounded and steady im-

provement both in the health level of the work force and in the reduction of accidents, must focus its emphasis, for the most part, on the personal factor—the individual employee himself. And in order to reach that individual, the chain of communications must be strong from top management to the man on the job. This means that top management must be truly sold on our safety programs, and stand firmly with us—their safety directors. They will then see to it that the superintendents and general foremen directly under them join the crusade and transmit the safety program and its messages to their respective shift foremen and supervisors.

If this much can be accomplished, these shift foremen and supervisors will in turn transmit the safety program to the individual employees with much the same degree of conscientiousness and enthusiasm which it had when it was given to them. Then—and only then—as the employee begins to understand how vital it is for him, as an individual, to assume responsibility for his own health and safety, he reduces enormously, not only his own chance of injury and mishap on the job, but that of his co-workers as well.

We believe that our weekly contacts with supervision help keep this vital chain of communications strongly linked together and open at all times for the transmittal of the messages of our crusade for safety. We preach the doctrine, "Don't worry about an unsafe condition, practice, or action — Do Something About It!"

SAFETY SPECIFICS

By L. E. DEQUINE, JR.
Manufacturing Manager, Chemstrand Corporation, Pensacola, Florida

I strongly suspect that safety people are as critical of operating men and some of their methods as operating people are of the safety people and their methods. This probably is a healthy situation as it serves to promote a practical approach to the common goal—of producing efficiently and safely a high quality product.

I have heard safety people say, "If we could only start from the beginning, we could have a safety program that really works". This is the kind of situation that I would like to describe to you today. I am convinced, however, that the same things could be done in an existing organization with proper safety leadership and a plant managership that accepts safe operation as one of their prime responsibilities.

I would prefer not to discuss generalities such as management backing; engineering for safety; safety rules, regulations and procedures; safety training; inspection; traffic enforcement and motor vehicle safety; committees; incentive contests, and all the other things that go to make a well-rounded safety program. This, I am sure, would be an old story to most of you. These are the things that you all know are necessary in varying degree if plant safety is to be successful.

I would rather show you some of the highlights and specific items of our safety program.

First, I would like to set the scene. Chemstrand is a wholly owned subsidiary of The American Viscose Company and Monsanto Chemical Company. The nylon plant in Pensacola is entirely concerned with the manufacture of nylon yarn and is the only fully integrated nylon yarn manufacturing plant in the world—that is, the complete process from raw material to finished product is carried out in one plant location.

We are located on a 2,000 acre tract with 200 acres fenced as plant site. The Escambia River borders the east side of our plant and serves as a barge route from the inland waterway for our major raw materials.

The manufacture of nylon yarn, oversimplified in advertising as a combination of coal, air and water, is at the outset a complicated chemical process in which nylon

salt is produced from the basic raw material cyclohexane. This material together with ammonia, nitric acid, hydrogen and numerous other chemicals are synthesized in what we call our intermediates or chemical section of the plant.

The nylon salt solution is processed into nylon yarn in the yarn plant building producing various denier sizes from 10 denier (fine hose yarn) to 15000 denier as used for rope.

Power house, water facilities, engineering and maintenance services, shipping, laboratories and technical staff and administration occupy the remaining buildings.

A carefully engineered and controlled waste disposal system assures no water contamination of the adjoining river.

Around 6,000 employees work on a 3-shift, 7-day-a-week continuous operation of the plant and we have been in operation about five years.

A completely equipped medical section with two full time physicians, nurses on each shift, and medical and X-ray technicians serve our Chemstrand employees in pre-employment physicals, periodic re-examinations and treatment of on-the-job injuries. We feel this service is a vital part of our overall safety program.

For the past five years we have had some measure of success with our safety efforts as illustrated by the fact that for these five years we have received the National Safety Council's Award of Honor. Other awards include a commendation from the Governor of Florida for having achieved the best continuing no-injury record in the state and the National Safety Council award for setting a new world's record for textile plants of 17,000,000 safe man-hours. Other awards include sectional awards and recognition from our insurance carrier. These are mentioned as a justification of some of the things we will discuss later although I will admit that all our people are very proud of these awards and they do represent recognition of their safety efforts.

Recognition of employee safety effort has been a feature of our whole program. Safety awards are presented to each one of our employees at the time of achieving a significant man-hour record—5,000,000; 10,000,000; 17,000,000 safe man-hours. The value of the awards depended on the particular goal reached and each employee was given a choice of award from a selected group.

The start-up of a plant of this kind presented a tremendous training job not only in safety but in all phases of job operation, quality, supervisory techniques and management, since for the most our people were recruited with little or no previous industrial experience of any kind. Safety plays a large part in all this training from the first day in induction, through job training, pre-supervisory training and refresher safety training.

A vital item in our safety training program is the six months' personnel performance review, during which a supervisor discusses various aspects of the job with each employee. Safety, job performance, quality and costs are all thoroughly discussed during these interviews.

It was necessary, of course, to provide a basis for this safety education and before the plant went into operation, safety rules were developed for the plant as a whole and for each one of the operating areas. The collection of these rules and safety procedures constitutes our Plant Safety Manual but to make these rules "alive", rather than something filed away in a supervisor's desk, every area has a set of the rules applying to their area displayed in a prominent location.

In order to show the completeness of these rules, we have picked some examples to mention.

One safety problem is the amount of yarn buggy traffic through our aisles. This single operation is covered by a number of job rules including one on how to grasp the handles of the buggy with the palms out to avoid knuckle injury.

Another item involves the handling of a brush used to handle thread lines and remove "wraps" from the machinery. The rule states that the hands must be kept behind a red line on the brush. This keeps the hands away from moving machinery or entangling thread lines.

In like fashion the handling of a calrod unit, an electrically heated rod used to burn off wraps of yarn from the machine, could be dangerous. One rule involved in handling this tool states that the hot element must be shielded by an asbestos glove at all times

when the unit is not actually being used to burn wraps. Other rules include the distance the operator must maintain from other operators when using the equipment.

Other rules cover the spotting, blocking and protection of railroad tank cars including the use of a target D-rail.

Maintenance work whether overhead or at working level must be barricaded, using highly visible traffic cones and stripped barricade rope. Violation of these barricaded areas is considered a serious safety violation.

Smoking in the plant is strictly limited to specified areas, for quality, housekeeping and safety reasons. In the yarn plant, smoking areas are designated by blue tape floor markings. Smoking areas in the production departments are purposely kept small to discourage congregating.

Another tape floor marking of particular significance in the plant is the "red-lined" eye protection areas.

In order to establish rules in chemical operating buildings, "building limits" are established around each building. Beyond these limits the safety rules apply for the wearing of hard hats, eye protection, no smoking and it is necessary for non-building personnel to "sign-in" in the control room and familiarize themselves with the building safety rules.

These are of course but a few of the established safety rules which are considered and included as standard operating procedures throughout the plant and extending to such items as the use of safety belts in company cars.

Some items of major potential hazard or importance cannot be adequately covered by safety rules and for those major items, safety procedures were established.

A comprehensive injury reporting and investigation procedure uses one form for all injuries including simple, single treatment first aid cases. An investigation and report is required from the foreman, including corrective measures, and these reports are reviewed by line supervision before being forwarded to the safety office for review, tabulation and analysis.

A hot work permit is required for any flame or spark producing equipment in our chemical areas or any welding or burning in any part of the plant.

A vessel entry procedure must be followed before a man is cleared to enter a tank, pit or manhole in any area at the plant.

An essential part of both permit procedures is a gas test—for flammable vapors in either case with an explosimeter and tests for oxygen and CO in the case of tank entry. Other specific tests may be run as necessary.

Another rigid procedure is the tag and lock-out procedure. Electrical lock-out for voltages over 440V—requiring the services of an electrician, normal electrical or mechanical tag and lock-out for operating switches, valves, operating levers, etc., and a "caution" tag for restricting operation to specified personnel or under certain stated conditions. You would find multiple lock-out on a disconnect switch where various trades or departments are involved—each one of which attaches his tag and lock.

In addition to the tag and lock on the disconnect switches, *danger* tags are attached to operating push buttons, starter switches or other control circuit equipment.

Other specific procedures exist for jobs involving misoperation hazards.

All these safety rules and regulations are backed-up by a positive enforcement procedure calling for a final warning employee contact for a serious violation. Another infraction within a year's time can result in termination.

And now a few words on our personal protective equipment program.

A typical woman employee in the yarn plant operates a drawtwist machine running nylon yarn. She is equipped with a hair net to completely confine her hair. Safety glasses are required equipment also within the machine aisles—a red lined area. Her apron is a compartmented bag for her tools —scissors, hook knife, doffers brush, etc. No rings, watches, jewelry or pins are allowed to be worn. The uniform, short sleeved and with calf length legs is required. On her right knee is a knee pad to allow pressure to be applied to the machine knee brake without injury. A pair of safety shoes completes the uniform. All these things are requirements of the job, except perhaps the safety shoes. However over 99 per cent of our girls wear safety shoes since, on their first day of employment, they are taken to the storeroom and fitted

with shoes without involved discussion. Shoes are sold at cost on payroll deduction.

Somewhat the same procedure is followed with eye protection although these are provided free. Each new employee who will need eye protection on his job (practically all production employees) is fitted with plano glasses on his or her first day, by a registered optometrist. If prescription glasses are required the employee brings his prescription on the first day of employment and the prescription safety glasses are ordered for fitting within a week by the optometrist. Each pair of prescription glasses is checked by the optometrist for correctness of prescription with a lensometer.

I have already mentioned the "red-lined" approach to eye protection, but other jobs are set up for eye protection where the red line is not applicable. For example a man strapping beams would not require eye protection for the major portion of his job, and so wears a face shield only while strapping.

A man reconditioning a beam wears eye protection and gloves while deburring and inspecting a returned beam.

The Safety Section operates a safety storeroom for stocking, issuing, repairing, maintaining and inspecting various items of safety equipment. All standby gas masks, stretchers, fire blankets, and other emergency equipment installed throughout the operating areas receive a monthly check and are sealed ready for emergency.

The variety of safety equipment is too great to cover in detail.

A boatman on the river water-sampling boat must wear his life jacket from the time he leaves the bank until he returns.

A large amount of chemical protective clothing is used. One complete acid suit has a hood fitted with an air supply connection for use when the suit is worn for longer periods or in unusually hot and humid conditions.

An employee would wear a chain mail or steel mesh glove on his left hand while cutting yarn off a bobbin with a knife in his right hand.

Other equipment and building provisions that affect safety are constantly being provided.

A standard safety shower installation is provided in all liquid chemical handling areas. The showers are designated by green and yellow floor and pipe markings and further spotted by a green light located over the shower. The showers are tested daily and a log entry made to that effect.

Good plant housekeeping in the plant is considered an important necessity not only for safety reasons but for quality and efficiency reasons.

Much of our safety concern is with internal plant traffic. We have already spoken of the buggy traffic. At blind corners, overhead mirrors are provided to assist operators in safely crossing or turning into intersections.

Even pedestrian traffic through double swinging doors presented enough of a problem to require a "keep to the right" marking.

Of course all these physical safety features and training would not do the job without some type of safety publicity.

There are over 60 safety bulletin board installations in the plant on which posters are changed weekly. Nearby are the area safety rule posting and the suggestion box. Safety suggestions represent the single greatest subject in this program and each one is investigated carefully with an answer sent to the suggester.

The bulletin boards are supplemented with jumbo safety posters in strategic locations around the plant. This poster program is shared with the quality control program and employee relations program with one safety poster displayed for a week each month. The posters are home-made in our own paint shop by a silk screen process.

The safety section publishes a monthly paper titled "Safety Information" covering current and interesting safety items, a discussion of the safety topic of the month and an accident analysis by departments and areas.

The overall accident experience results are summarized on a chart showing the overall plant lost time accident frequency and the comparison of all accident frequency by departments showing the comparison with their own frequency last month and year to date.

Each entrance to the plant has an illuminated safety record board giving the accum-

ulation of safe hours to date. Side panels show green as long as the record continues. When a lost-time accident occurs, the side panels, accident sign and clock face are illuminated in red and remain red for a 24-hour period.

A word about safety organization. We have a central safety committee, composed of both hourly and salary employees, which meets once a month under the chairmanship of our manufacturing manager for discussion of all and any pertinent safety items.

Due to the variety of operations and conditions in our plant no absolute pattern is established for departmental organization except that each must have some effective safety program. Some have safety committees, some have safety proctor systems, some hold regular safety meetings, others follow a system of individual employee safety contacts.

All report regularly on their activities and results to the safety department and keep their central safety committeeman informed.

The injuries which have broken our safety records are of interest in that they demonstrate the importance of personal safety thinking, rather than typical chemical or textile industry accidents.

At 2,000,000 safe man-hours, a river water sampler chose to sit on his life jacket rather than wear it as required by the safety rules. A swerve of the boat tipped him overboard and he was drowned.

At 17,000,000 safe man-hours a yard laborer slipped and fell on the swing blade grass cutter he was using and received a serious knee laceration.

At almost 5,000,000 man-hours, a mechanic had battery acid splashed in his eye while he was showing a fellow employee how he checked his own battery for dead cells. This incident had nothing to do with his job but it did occur on plant property.

Again at 5,000,000 man-hours a helper in our plant cafeteria, in violation of safety rules, attempted to clear the hopper on a hamburger patty machine while it was in operation and received a finger tip amputation.

I have attempted to give a broad but rather quick picture of our safety program. We in Chemstrand feel that these safety efforts return a profit to us in many ways.

A good safety record pays off tremendously in high employee morale and establishes our plant as a good place to work, both with our employees and the community as a whole. It is a well known fact that safety goes hand in hand with good housekeeping and a high quality product and without any one of the "big three," *safety, quality* and *work efficiency,* it is impossible for any plant to maintain leadership in its field.

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