

ilation. Instead, high velocity ventilating apparatus should be installed, functioning as closely to the point of generation of the harmful substance as is possible.

Individual machines should be so equipped if possible. Baffles may be introduced to prevent air stream disturbances or to increase the intake efficiency at the nozzle. Down-draft systems should be preferred for the collection of dust or gases of high specific gravity.

Even after the installation of exhaust systems, the engineer must study the type of maintenance required to keep them operating at peak efficiency. Nozzles should not be permitted to become clogged nor moved out of proper position. Exhaust piping must be kept dust tight. Blower efficiencies must be constantly checked to insure that intake velocities are proper. The best ventilating system is a false protection if it does not function properly or if it is so poorly maintained that it falls below its designed rating. The engineer must exercise extreme care to provide a clean source of replacement air for the work place. He may find it necessary to install filtering and heating devices. The engineer must study the proper disposal of the collected or expelled material to be positive it will not drift back into the work place.

Employee Protection. While the primary engineering means of protection against possible occupational diseases should be mechanical correction, the engineer will find instances where even the best systems must be supplemented by individual protection. He must carefully study such exposures to provide the highest efficiency of protection, yet obtain a device easy for the operator to wear continuously. When the engineer has been successful in obtaining such a device, he must educate workers to use it.

Sanitation. Clean washing facilities and toilets should be provided. Lunch rooms should be not only clean but also well lighted and attractive and should be under the supervision of the plant physician.

Scientific Tests. Up to this point the engineer has deduced that an exposure exists, and from accumulated data has devised his means of prevention. How-

ever, the engineer interested in ascertaining not only exposure but also efficiency of control should realize control cannot be fully effective nor the efficiency of any protective device determined without scientific tests. Assumption, guesswork, unscientific procedure or apparatus have no place in an engineering program. The engineer must test each step unless it has been previously proved, carefully calculating in advance to avoid false protection.

He must be familiar with dust counting, air sampling, and chemical analysis technique, having such determinations made by established and proper methods. If such tests are beyond the scope of his ability or equipment and if the engineer considers such tests absolutely essential, then his executives should permit him to obtain experts qualified to make such surveys as his problem may require. The need for an accurate engineering approach to any control measure cannot be over-emphasized.

Conclusion. Every engineer realizes control of any industrial disease exposure is divided, part of such control falling within the jurisdiction of the industrial physician and part within his own engineering province. Medical knowledge is invaluable in the detection of early symptoms and in the administration of suitable preventive treatment. The engineer should gladly obtain the services of an industrial physician to make a study of the plant, to assist in the classification of the hazardous operations and working locations. By such coordination he will speed control of the exposure.

Each individual occupational disease exposure must be studied, analyzed, and controlled individually. While general data may be available upon common exposures, the solution can be found only in individual treatment. Such exposures cannot be compared to ordinary safety engineering efforts. A circular saw is a circular saw wherever it may be operating, but industrial disease exposure varies within plants and certainly varies between different manufacturing establishments, even though they may produce a like product or article.

ADJOURNMENT

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Safety Belts

TUESDAY AFTERNOON SESSION

October 6, 1936

This session was called to order by the Detroit Edison Co., Detroit, Mich., Chairman George Opp, Safety Engineer, who introduced the successive speakers:

Safe Design and Construction of Safety Belts

By DR. M. F. SKINKER

Assistant Director of Research, Brooklyn Edison Co., Brooklyn, N. Y.

Safety belts for linemen and for infrequent repair work will always be justified. This does not appear to be true of window cleaners' belts. Window cleaner accidents are so frequent that insurance costs as much as one dollar per day per man. This should be avoided by designs that would make window cleaners' belts unnecessary.

Failure of a lineman's belt in service and of a new lineman's belt before going into service prompted our investigations. Many of the belts we had in service were found to be inadequate to meet an emergency of reasonable expectancy. A study of the safety belt specifications and test data at that time made it apparent that safety belts were designed with tensile strength sufficient to hold a man securely while doing his task but with no definite requirement to allow for slipping or other accidents. The hardware was tested to 1,500 pounds but the leather seldom reached 1,000 pounds. This seems ridiculous since the leather deteriorates and the metal does not.

We purchased new fabric belts and tested all our old leather ones to destruction. In general the tough old leather one had little elongation and those leather belts with considerable elongation did not have the proper strength.

In changing to fabric belts we had another reason of more fundamental im-

portance. As legal evidence of adequate safety protection, records of periodic proof tests are much better than of visual inspections. Fabric in good condition may be given repeated proof tests without injury to itself. Defective belts can be removed from service by such proof tests plus inspection. In contrast with this, leather is not uniform, and always stretches under test which will gradually wear out the belt; leather does not have the original strength and it takes an expert to inspect leather even when new. In our experience, linemen's fabric safety belts that look badly worn and are discarded have over 60 per cent of their original strength.

Leather for this service must have suitable tanning and oiling to discourage dry rot and moisture. Similarly, fabric should be protected against mildew by rubber or by impregnation with suitable rot-proofing compound. In practice it is difficult to tell what compound is best because of the many variable factors.

To get the full use from the belting material the method of fastening the hardware is of importance. There is considerable advantage in using large diameter rolls for any terminal equipment. If the roller or bar is small the outer layer of the material may take all the load and break, then the second layer and so on