occurred in this district. Gruesome and sobering. They highlight need of greater caution on the highways.

16. *Undefeated Football Season vs A Perfect Safety Record.* Comparisons may be drawn for top supervision, foremen or working man.

The comparison of the undefeated football team to the perfect safety record is particularly useful during the football season and we can discuss briefly the part which applies to supervision. They are the coaches of the safety program. They must surround themselves with capable assistants (foreman) if they are to be successful.

Just as the coach must plan his job so must they plan. As he must select the best players for each position so must they as far as circumstances permit, place their workers in the jobs to which they are best suited. As the coach must explain the rules and the plays so must they teach rules, working procedures, and so on all down the line. There are literally dozens of comparisons and correlations which may be drawn in this connection.

There is one thing which holds as true for them as for the coach. If they do not get into the job whole heartedly, if the do not give it the best they have available from an equipment, training and follow up view points, they can look for the same poor results the coach undoubtedly will get.

In using any of these props, the idea is to sell the individual on incontrovertible facts which the props are meant to indicate. This is just plain common sense. If you draw the proper comparisons and correlations with your thoughts on safety, the worker will buy safety too.

Our actions are governed by our last thought. In addition to our many well known *Safety First* Slogans, I leave this recommendation, *let your last thought be of safety*

Automation—Its Effect on Accident Prevention

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If safety engineers know the mechanical and operational details of an operation in a given process, their training and experience will enable them to develop the safety engineering features required. Knowledge of the process would lead them to recognition of the advantages as well as of the hazards. Subsequently, their knowledge and experience would develop appropriate protective measures and improvements.

On this assumption, therefore, I have planned to paint a word picture of automation, what it is, how it works, to give a little better understanding of the operational details of automated processes.

Industry is in the midst of a continuing plant expansion and facilities improvement program. The program started during World War II and has continued through the decade of 1940 to 1950. Last year American industry pledged a record of $28.5 billion for new and improved plants and other capital outlay. It is expected that almost that much will be pledged again this year for capital improvement.

This plant expansion took place due to war needs and was influenced by immediate demands for goods both for war and for domestic consumption. Fortunately, during this period a considerable amount of plant expansion for the production of domestic products was possible to take care of our expanding population.

Immediately after World War II the emphasis was often on production without regard for long term modernization of plant and production processes. Since then, however, there has been sufficient time to plan for many facilities which are new from the ground up and which utilize the latest known devices for producing at a lower cost and a higher quality.

Some of these facilities have been publicized in the newspapers, magazines and trade journals of the country and many people have the impression that a large number of automotive factories are now completely automatic.

This is not the case and we feel that the completely automatic factory is still some distance in the future. However, the expansion program of Ford certainly is proof that we believe the future will see new plants with greater percentage of automatic operations as the manufacturing engineers and the builders of machinery and equipment take advantage of the experience gained in the latest programs.

Other companies and industries, not to overlook magazine publishers, also seem to foresee the development of automation for the future. Interest is very high. It is highly probable that you will be exposed to it if you have not been already.

In Ford, as it probably would be in other companies, the extent of automatic handling (or automation as we prefer to call it) is largely determined on the basis of engineering studies based upon our experience and the experience of the machinery industry in general. These, coupled with an economic analysis, determine how far it is practical to extend automatic handling operations.

In our discussion of automation as it is related to the safety engineer, there are two main subjects which we feel should be defined to some extent in order that a clear understanding of the problems involved may be obtained.

First: Transfer type machinery built with automation in mind. The transfer type machine combines similar operations to be performed on a part into one continuous machine with automatic indexing between work stations.

Second: "Automation," which is a coined word, meaning the automatic handling of parts between progressive production processes. It is a separate and distinct phase of manufacturing engineering which coordinates the efforts of various departments in our plants, and the machinery can become in effect, one large transfer type machine with facilities to handle the parts as well as the scrap generated.

To illustrate the techniques used in the use of the transfer type machinery, we can consider the production of automotive crankshafts. One portion of our machining process involved the drilling of six oil holes, six metering holes, six lightening holes, and an inspection of the operation.

Ten or twelve years ago, twenty-nine separate machines would have been required, while today the same department would require only three transfer type machines of eight stations each. The part would be loaded at one end and unloaded at the other end with all operations in between being completely automatic.

I'd like to try and draw a word picture of what automation is and how it works.

Automation, as we refer to it, applies to the automatic handling of parts between operations. Automation devices are designed to move parts into and out of production machines, turn the part over, rotate it, remove scrap and chips and perform other related functions. These devices are interlocked with the process and are ordinarily completely automatic while in operation. A finished piece of automation equipment is made up largely of standard elements such as conveyors, air, hydraulic and electrical control mechanisms arranged to obtain the proper movement for elimination of unnecessary manual handling operations.

A wide variety of materials can be handled with the elimination of hazardous handling such as in large stamping, heat treat operations, forging operations and others. In many respects automation is the extended usage of conveyors which played an important part in the early development of mass production of automobiles.

By introducing a series of electric nerve-centers to direct the work, engineers have gone beyond the use of control buttons, for the most part, as a method of plant operation. Now switches located in the automation are principally operated by the weight of the work units.

Electric nerve-centers direct the products by mechanical arms and fingers, from one point to another in much the same manner that a policeman or traffic light directs traffic.

A particular nerve center receives hundreds of bits of information continuously from electric switches acting as lookouts. It compiles the data, makes the best possible decision as to course of action, then turns on the power to put the machinery to work.

One lookout may inform the brain that a particular machine is ready to go to work, another that work is available and another that steel arms and fingers are in position to move the work into the machine.

When all conditions are correct, the brain sets the process in motion. Then it concen-