

fail as a leader. To the extent that management fails in either of these requisites it becomes mismanagement.

Professor Karabasz offers us a discussion of the standing order for the maintenance department which is especially interesting. He says:

"After standards have been established for the maintenance of plant and equipment, as indeed for any phase of the business, the development of a standing order is an invaluable aid in maintaining that standard. The standing order for the maintenance department explains in detail the purpose of the maintenance department, its functions and its method of operation. It serves as a means of placing before the members of the maintenance department the basic ideas behind maintenance work and in instructing them in the standard method of carrying out these ideas. As a device to aid in maintaining standards the standing order has been of no small importance."

We say this particular part of his paper is especially interesting because here can be found the fundamentals upon which all the rest is built. To begin with we are reminded again of the fact that even though the application in this instance is to the maintenance of standards in the department controlling the maintenance of plant and equipment, the principle is capable of general application. In addition to this we have set up in this quotation the fundamental concepts of good management and some idea of their relationship. The goal and complete instructions for arriving at that goal; the ideal and the inspirational advice as to the means for reaching that ideal; the standing order and the maintenance of standards, these should all be the same in the hands of competent management.

Of course, we are not expected to infer from the quotation that the purpose of the department does not emerge until after the standards are set. It simply marks the first appearance of the purpose of the department in this particular form. It must be further understood that the standards of the maintenance department cannot very well be properly established until the purpose of the department is very clearly defined. This applies as well to other departments.

We have then the necessity of knowing what the purpose of the department is and when the purpose is once set up in clear and unmistakable terms, but

not necessarily in spoken or written words, the route to be followed in accomplishing it may be discovered.

On the leader or manager rests the responsibility of knowing and interpreting the purpose of individual effort. It is he who must discover for the individuals the paths which are to be followed to accomplish that purpose. The methods of outlining these paths vary through a wide range. All the problems of time and space and humanity are concerned. Some of the tangle is so difficult that the paths are quite uncertain. In other cases, for at least a part of the way, the direction of progress is so clear and is traveled so often that it can be charted and maintained as a standard just as definitely as we map and maintain our national highways.

Albion N. Doe.²⁶ After reading Professor Karabasz' paper I talked with several of my friends in industry in an effort to get their experience in the field of standards maintenance. The general consensus of opinion was that the important elements in the problem are that standards be right before they are accepted, that they be enforceable and that there be those in the organization with continuous authority to get them enforced.

King Hathaway.²⁷ I am interested in the whole subject of standards—their establishment and maintenance—and especially in one rather narrow phase of the subject. The discussion has so far been on such a broad plane that this has not been particularly stressed.

Since I presented a paper on maintenance before the Taylor Society back in 1914 I have been hoping that someone would present in complete detail the technique or mechanism of preventive maintenance worked out by Taylor and since applied with varying thoroughness by various managers and engineers. It is not sufficient that the Taylor Society point out that standards should be maintained or even what standards should be established. It should actually place at the disposal of industry the experience that some of us have had in applying the principles of scientific management to the working out of definite techniques or systems. We are apt to assume a knowledge of the details of techniques on the part of others. This does not exist, and there is a real need for their presentation

²⁶Industrial Engineer, New York, N. Y.

²⁷Manning, Maxwell & Moore, Inc., New York, N. Y.

in a form understandable not only to the general manager, but to the superintendent, the lesser executives and others of the operating group.

In my own experience I have felt this need very keenly during the past few years. While I was in Japan I undertook to assist a company to improve its practice in the cutting of metals and I had the greatest difficulty in laying my hand on data which would enable me to advise them on the proper feeds and speeds at which their machines should be run for the various classes of work on different metals. I felt the need for a practical handbook on the cutting of metals. If any of you should go into a machine shop today and start to check feeds and speeds you also will realize this need. You will find that to the average works manager or superintendent such expressions as preventive repairs, maintenance of machines, the establishment of standards and standing orders for maintaining them mean very little. If machinery is to be so maintained so as to allow workers to do their work in accordance with the best performance standards which have been established, there must be a well worked out system, such as those in several instances worked out and applied in accordance with Mr. Taylor's principles. We need the details of such systems to supplement Mr. Karabasz' paper.

An outstanding example of this, namely, the care and maintenance of leather belting was first described by Taylor in his paper, "Notes on Belting." I have with me a copy of the standing order describing the system which was originated by Taylor and further developed by his associates for the maintenance of leather belting.²⁸ It embodies in a simple form all the elements of a complete maintenance system, including the planning and performance of repairs to avoid breakdowns and interruptions to production. This one example might serve as a basis for developing a complete maintenance system.

I have also a copy of a standing order defining the functions of the maintenance department in the plant of one of my pre-war clients.²⁹ It, too, falls short of being a description of a complete system. Again I hope someone will take up the task of making such a complete description.

Professor Karabasz might have given more weight to the moral effect on the workman of well-maintained standards of equipment and conditions. If workmen

know that their machines and tools are kept in first-class condition they proceed with greater confidence and are more certain to attain the production standard than if they lack that confidence.

One thing that must be carefully guarded against is the tendency to discard maintenance and inspection systems at the first sign of depression. Management has a tendency at such times to take every opportunity to cut down expense. They find repair bills are low and immediately want to cut down on inspection. If they do so it is the beginning of serious trouble.

I want in closing to stress again the importance of making specific techniques as well as the principles and philosophy of scientific management available. It is of equal, if not greater, importance to tell people *how* a thing should be done as to point out *what* should be done. So much has been done that should be placed at the service of all in charge of industry. I had a funny experience when I visited a plant the other day. A new manager showed me a printed form of route sheet which he had discovered in another plant and thought pretty good. He was going to adopt it and I had to inform him that the form had originated in his own plant in 1910. That shows how great is the need for keeping before people the work that has already been done.

I hope you will all give more thought to the presentation of the techniques of scientific management in such form as to enable people to apply them.

We often refer to the three divisions of planning: (1) *determination* of function; (2) *how* the functions are to be performed; (3) *when* they are to be performed. We have pointed out in the paper and discussion this morning what should be done. The next thing we should take up is *how* it is to be done. Supplementary papers might be worked out on the maintenance of machinery, of tools and of other conditions affecting the performance of work, on the maintenance of quality or inspection, etc. We may know a lot about these things but we have considerable difficulty in getting our ideas across to the works manager unless we give him concrete examples of application.

Professor Karabasz pointed to the importance of maintaining a system after it is set up. Through neglect and failure to check, these systems fall into disuse. The example of the man who discovered his own form in another plant is a case in point. If the Taylor Society would devote itself to the task of carrying on the discussion of this subject it would be rendering a real service to industry.

²⁸It is not possible to include these important papers in this discussion. It is, however, planned to print them as separate papers in a subsequent issue of the *Bulletin*.