

for personal delay and rest. Except that allowed for personal needs, no time is included that is not actually taken by the operator during observation. No indefinite percentages need be used.

Accuracy of Time Study

On work well standardized as to methods and employing skilled workers, the accuracy with which standard times can be fixed is astonishing. When rates are set by the ordinary methods of past performance and judgment, the earning power of the same operator on different kinds of work usually varies from the average by twenty-five to sixty per cent. On the other hand, when rates are set by unit time or motion studies, as outlined in this paper, this variation is actually reduced in practice to well under five per cent.

In other words, time study is really scientific and a fairly exact art. Of course, different individual workers on the same job do, and should, produce widely different outputs. Furthermore, in the case of jobs that were formerly on slovenly day work, the standards set will naturally be improved upon as the experience of the workers increases. This improvement should not be sufficient to be unreasonable, as far as technique is concerned, however. Time study men vary in their methods. Test after test, however, has shown that really skilled time study men, using different methods, will nevertheless attain similar standard times.

Measured Production an Essential to Progress

To achieve advancement it is necessary to have a gauge of comparison. The scientist must have records of what has been done in the past. The business man must know what has been and what can be done. A man is measured by his accomplishments. A factory worker must be able to show his capacity, his skill and his initiative by comparison with others and with his own past performance.

As a matter of fact, a measure of accomplishment is essential in any line or phase of business. On the other hand, the lack of satisfactory measures is responsible for a vast number of business failures and for much of the friction between labor and employers.

These are bold statements. But note the continuous unrest in the needle industries where un-

systematic business methods and ill adjusted wage payments prevail. Note the attempts in the shoe industry to bargain for what should be a matter of fact record. Note the constant friction in the coal mining industry. But note especially, those of you who employ labor of any kind, the frequent undercurrent of dissatisfaction arising out of inequalities of earnings due to insufficient measurement of production or to inaccurate production control.

All of these facts emphasize the importance of the proper use of "time study" as a tool to correct and develop certain fundamental phases of business management.

Discussion

A. L. Kress.* It is difficult if not impossible to reconcile the point of view of the factory manager and the engineer on time study technique. The factory manager is always interested in results and he usually considers time study simply as a basis for rate setting. The engineer naturally wants to do the best job that he can. I am sure some of those to follow me will go into greater detail as to the proper time and sequence in which to take time studies. A large part of the engineer's job is in educating the management to the long run value of those time studies.

An important point that Mr. Thompson makes is that time study is a measurement of progress. Any industry which has come to realize that time study and job analysis are aids in formulating intelligent decisions as to methods has taken quite a step forward.

Concerning technique, I feel that the engineers are somewhat on the defensive, even if time study has been in use for a great many years. No two engineers use the same time study technique if they can help it. We claim, for example, that such questions as allowances are scientific, but I think we all know that they are not particularly so, and it seems to me that this question of allowances is pretty much the joker in the deck. The questions of whom to time and what to time are also matters which call for considerable thought; and here again we find widely differing practices.

Mr. Thompson fairly states that there can be no set system of time study, and yet much of the

*U. S. Rubber Company, New Haven, Conn.

energy spent by engineers on the subject has been devoted to an attempt to perfect a formula for it. There is a question in my mind as to whether its advocates have not done it considerable harm, first in pretending it is more scientific than it really is, and second in attempting to reduce it to formulae which presumably can be used even by novices.

No time study policy is intelligently conceived which does not have for its goal the building up and accumulating of basic elementary standard times. Mr. Thompson has emphasized that where time study is in use for rate setting only one can usually find many studies which are useless for future reference. They are not accompanied by job analysis. They represent individual studies from which individual conclusions have been drawn without reference to any previous standards of performance. Hence they are valueless.

Some fifteen years ago Hoxie made certain criticisms of time study technique which he felt invalidated its scientific standing. Those of us who believe time study is the only fair method for the determination of output will do well to heed Hoxie's criticisms. Unless we are to be on the defensive as to its scientific character, we should agree on uniformity of practice. We should continually labor to improve our technique, particularly as it involves the question of allowances. After all, it is not the stop watch which determines the standard time, but the judgment, experience and fairness of the time study man.

E. H. Eresian.* There is just one point I wish to discuss and that is the effect of time study on the worker. As Mr. Thompson says, ultimately it will help the worker to better himself, but I think it is essential that the thing be sold to the worker in the first place. In order to sell the thing to the worker, educational work must be done.

I think his idea of emphasizing the control feature of time study work is excellent from the educational standpoint. When time studies are used to better methods and get standards for control, the workers realize that time study is a tool for analyzing problems. I find that once the workers see that the management also is being measured, they readily appreciate the value of time study and co-operate in the making of studies for the purpose of determining standards and rates.

*Dennison Manufacturing Company, Framingham, Mass.

E. A. Teeson.[†] Mr. Thompson has given the industrial engineer's point of view and Mr. Kress has pointed out that sometimes the factory manager's is not the same. I am going to take the stand of the factory manager. In the first place, the factory manager looks at the time study primarily as a means of furnishing an incentive method of payment. It is absolutely essential, I think, that time study be the basis of such an incentive method of payment but it furnishes only the quantitative measure of performance and not the qualitative measure. By "qualitative" I mean how much the job is worth. As part of any incentive method of payment I think there should be a job rate that provides for paying the workers not only for what they turn out as measured by the time study, but also for the experience and skill that is needed to do the job.

The one best way, as Mr. Gilbreth used to put it, of doing a job should also be pointed out. I, personally, think that time study should be used first as a means of finding an incentive method of payment, and second as a follow-up on your progress in finding the best ways of doing the different jobs.

I am a great believer in putting the foreman into business for himself by giving him all his costs—of labor, materials and overhead—and making him feel that he is a part of the management rather than a production man only. You can do this by using your standard of time as a measure of efficiency. Time study also provides a way of fixing standards and gives the factory manager a chance to compare the particular performance of one department with that of other departments.

Technique is not for the factory manager to determine. There are, however, certain essentials on which he must insist. The first is that the workers be sold on time study, and that the time study man have their absolute confidence. They must not feel that time study is being used to cut piece prices or standard times, but rather to help them to do the job right and to increase their earnings. Second, it is essential that there be an accurate recording of job conditions. A great many times the conditions in a plant change without any one knowing that they are changing. No one should be allowed to make such changes without notifying the time study department in order that proper studies

[†]American Optical Company, Southbridge, Mass.