

may be made. If this is not done standards will become lax.

Last, the divisions of time should be small enough, as Mr. Thompson has very ably brought out, so that unit times can be established and built-up standards, as well as built-up costs on new merchandise, be made from them. This is, I think, what the factory manager expects.

Stewart M. Lowry.¹¹ Important as time study is, it is merely a tool of industry and subordinate to industry. We cannot hope to revamp industry to fit any theory of time study. We must make time study fit industry.

For that reason it seems to me that we have got to take operators as we find them—good, bad and indifferent—and study them, getting what results we can. We must make our time study system such that we can secure accurate results regardless of the type of operator.

It seems to me that there is a fundamental weakness in averaging observations. The average of a poor operator's performance certainly will not give the same result as the average of a good operator's performance. Yet we want to establish a standard time.

Skill, effort and working conditions must be taken into consideration. They undoubtedly affect the time required by an operator to perform an operation, and I do not see how we can avoid considering them. Good skill, good effort and good working conditions will produce an entirely different result from fair skill, fair effort and improper working conditions.

The aim, after we have observations, whether we get them out of the foreman's head or whether they are made scientifically and accurately, is to arrive at a time which is correct; in other words, a standard that we can expect a man of average ability to meet, a man of little ability not to meet, and a man of exceptional ability to improve. We cannot find that average man on every operation. I know it is impossible from my experience. Therefore, if we take a study of a man who is not average we must have some way of raising or lowering, or bringing to a common level, his values so that they will be applicable to any operator who is fitted for that class of work.

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Let us start with the fundamental principle that every one who is at all qualified to perform a given operation falls into a different level. Imagine a pyramid. At the peak is, let us say, the superman, a man who is one in a thousand and very seldom found in every day experience. He is a man who probably cannot keep up a sustained performance, day after day and hour after hour, of what he might do at his best. At the other extreme, or at the bottom of the pyramid, there is a level, which is a much longer line, representing the people who are just within the classification of people qualified to do the job. As we taper up, approaching perfection, our field is gradually narrowed down and the number of people limited as ability increases. In other words, the number of people available decreases in proportion as ability increases. Somewhere about midway in the height of the pyramid is a line which should represent average performance and which, in my opinion, should be used as the standard for establishing time values. If we select an operator, working on a particular operation at a machine or a bench or with any type of tool, who is above this average level of ability, we must bring his standard down to average if it is to apply to every other operator. In order to do this we must be able, as we are making the study, to classify the man. There are three important factors that must be taken into consideration in doing this—skill, effort and working conditions. It is possible to conceive of many different combinations of these three factors. A man may have excellent skill, superskill you might call it, and if he chooses, he can show very little effort. And at the same time working conditions may be good, bad or indifferent.

Let us take skill and divide it into six classifications; namely, superskill, excellent, good, average, fair and poor. Let us define these classifications and fix in our minds what qualities belong to each so that, when we observe a man from the time study observer's point of view, we can put him in a class. Do the same thing with effort; with working conditions. When we have put him in his class we have established his level in relation to the average level that we are trying to arrive at. Let us consider the average level as one. Anything above that will be plus one or more points and anything below will be minus one or more points. This gives us a factor by which we can multiply the average

values arrived at from his own performance. Thus we can correct his performance to arrive at the standard that can be used for everybody.

That, briefly, is the principle that I advocate for adjusting time values.

Richard A. Feiss.¹² The most important things time study is expected to accomplish are accomplished without the use of time study. In other words, time study is a method for arriving at detailed information concerning results obtainable under conditions previously established and under control. The establishment and standardization of these conditions and the introduction of methods necessary for their control are accomplished without the use of time study and in themselves obtain a greater part of the results desired. It is not only necessary to standardize equipment, tools, etc., and to establish proper methods for handling and routing materials, but it is also essential to establish methods of supervision and instruction which will make it possible to maintain conditions and to train operators to follow instructions and attain the standards that may be set. These must all be provided before time study standards can be established.

A great deal has been said about the principles underlying time study methods. These discussions do not concern themselves so much with the matter of making observations as they do with the technique of using the results of observations. These differences are of no great importance. But it is essential that the standards and the methods by which they are arrived at be readily understandable by the people to whose work they are applied. It also is important to establish a technique that is applicable to every operation in a given industrial establishment. Only when this is done will time study and time study standards be acceptable to the employes of an organization.

Time study becomes acceptable only where it has been demonstrated to be an instrument for analyzing the processes of work and studying the conditions surrounding them with a view toward their standardization and for the purpose of equalizing the work and earning opportunity. This point of view is of the utmost importance. It involves both in principle and fact that the management assumes the responsibility for establishing and

¹²Richard A. Feiss, Inc., Boston, Mass.

maintaining those conditions which are essential to an even flow of work and to the attainment of that efficiency of the individual which is required.

Above all, time study must be a definite and fair instrument for measuring attainment and establishing equitable earning opportunity. My personal experience has shown that it is acceptable to the working force on this basis. I can recollect more than one instance in which operators in the plant I formerly managed came to me to request that their operation be time studied so that it would be on the same basis as that of their fellow workers.

Of course, other things besides time study are essential to achieve such results. There must be a job classification which defines operations in terms of earning opportunity. Control of operation balances and work in process is of utmost importance both in the scheduling and control of materials and in establishing conditions prerequisite to setting time study standards. Time study may be used in this connection. The use of time studies in this and other ways tending to improve the conditions of operation should precede time studies for setting standards of performance. By doing so, the working force becomes accustomed to the use of the time study method—a thing that is advisable if not essential.

The point I wish to make is that the matter of efficiency of the individual is not a thing by itself to which a single technique such as time study can be applied in order to obtain results. Time study is the last of various techniques of analysis to be applied to any given situation. In many instances the application of other techniques is more important. In all instances they must be applied before the technique of time study can be used.

Joseph A. Piacitelli.¹³ There have been several points of view expressed here today. If I take the point of view of the time study man, I can say "amen" to all that has been said, but if I take the point of view of one who is interested in, reducing the enormous waste of human effort, then I cannot do so.

Mr. Thompson has touched on the subject of analyzing methods—and I believe that this point should be emphasized a little more strongly. To my mind, the method employed in performing an

¹³Barber Asphalt Company, Maurer, N. J.