Classification, Filing and Use of Time Study Data

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BEFORE entering upon a discussion of the subject assigned to me, I wish to take a moment to congratulate the directing heads of the Taylor Society on their selection of "Time Study" as the general subject for this convention. They have visualized the heart of scientific management. Take the element of time measurement out of scientific management and what remains to hold the various branches of the science together? Planning, scheduling and routing could not justifiably exist, certainly could not function efficiently, without accurate knowledge of the time required to do things. Improvements in manufacturing methods would develop much more slowly, and many never would develop, without the aid of time study. After all, assuming the result to be the same in each case, how can one method be said to be better than another, from a purely economic standpoint, except as it saves time.

Secondly, I desire to express my sincere appreciation of the invitation to participate in your meeting with full recognition of the honor which accompanies that privilege.

In approaching the subject which has been assigned to me, "Classification, Filing and Use of Time Study Data," I shall assume that the time study has been made according to an approved scientific method and that the elemental values secured are correct. Much of the discussion which has preceded this paper has been, and some to follow it will be, concerned with time study technique—how to make reliable time studies. I shall endeavor to confine myself to consideration of how best to use the data thus secured.

It is recognized that time study is useful in laying out schedules, prediction of costs, determination of equipment capacities and so on. By far its most important usefulness, however, or at least that in which it has had most extensive application, is on wage incentive work. For the purposes of this discussion, I shall consider only this application.

Many time studies are made with no other object than to establish a time value for the one particular job under consideration, and with this done, there is apparently no other immediate use for them. They are accordingly filed away against the time when some future use for them may develop.

This file should be maintained so that the individual time studies may be readily found for reference purposes. There are various methods of filing time studies, depending upon local plant conditions and subdivisions of manufacturing operations. In one case, it may be best to file studies by the departments in which the work was performed; in other cases, classification according to classes of work or types of machine tool equipment may be best.

This file will be comprised largely of miscellaneous studies on various lines of work on which sufficient studies have not been made to make possible the compilation of standard data or the construction of a formula, because of the low activity of the work or because of an insufficient number of trained time study men in the organization to do more than take care of immediate pressing demands. Some of the individual studies will probably be independent of and have no relation to the others, having been made with no other object than to determine a time allowance for one particular job. To make a time study with this single purpose in view may be justifiable, and it may even be justifiable to do it again and again, but if there are frequent repetitions on similar jobs that fall in the same general class of work, the uses of the data secured from representative studies may be extended to cover the entire class of work. This may be done by compiling standard data or by constructing formulas by which the time value may be readily determined for any job in the class, without the necessity of actually making a separate time study.

A compilation of standard data is merely a list of all the different elements that have occurred in all the time studies made on a given class of work and the corresponding time values for each. Every element that differs even slightly from every other element has its own time value. When a job comes up on which no time value has been previously established, the standard data are referred to and a time value selected for each of the elements of the job. It is generally necessary to go on the floor and make an analytical motion study in order to determine the elements that are required for the operation. It may be found that some of the elements of the jobs are not included in the standard data because they had not previously occurred in any of the studies from which the list was made. In this case, those elements should be studied or values interpolated from available data and included in the standard data.

The standard data method is frequently used to advantage on machining operations where a considerable part of the time for the operation is cutting time, which can be calculated from the speed, feed, and depth of cut. A list is generally made up for each type of machine tool, and this list includes values for the various motions necessary for the manipulation and operation of each particular machine. In other words, a study is made of the machine rather than the work. The merit in this plan is readily seen when one considers that the piece upon which the work is being done will have little, if any, influence on the time required to manipulate the different parts of the machine, because they have a definite mechanical relation to each other. For example, such elements as "start machine," "stop machine," "release power feed," "remove tool," and "adjust stops" probably will require the same amount of time regardless of differences in pieces being worked upon. The work that can be done on a particular machine tool is limited by the physical characteristics and dimensions of the machine. Hence, it is logical that the machine itself should be made the basis of study on work of this kind rather than the piece or part being made.

I have in mind a particular set of standard data which was compiled for setting time values on sensitive drill press operations. It includes time values for all elements that might be performed in making set-ups and in drilling and tapping cast iron, steel or brass parts, using either carbon steel or high speed steel tools. Thus it is possible to establish time values by merely noting what elements must be performed, determining the number, size and depth of holes drilled and applying the appropriate standard values.

Where the variation in time required is chiefly influenced by physical characteristics of the work, of which there may be innumerable combinations, it is frequently found that formulas furnish better mediums for the most advantageous use of time study data.

A formula may be defined as the expression of a general fact, rule, or principle by algebraic symbols. It is a convenient way of expressing the manner of variation between two or more interdependent variables. When all but one of the variable quantities are known for a given set of conditions, it is quite easy to find the unknown quantity by substitution in and solution of an algebraic formula. It must be remembered that the formula is only a convenient way of expressing a rule and is not the rule itself. In using formulas in general, there is a tendency to substitute and solve blindly, without first examining the rule expressed by the formula and ascertaining whether or not it is applicable to the case under consideration.

The algebraic formula was probably first confined to the field of mathematics. Its convenience and conciseness were readily apparent, and it was naturally extended to physics, mechanics, electricity, and all branches of applied science. Hence, we are not surprised to find it in time study.

When time study was first introduced into industry, a separate study was taken on each job as it came along. This required considerable time and effort and led to the feeling that time study could be applied only to standard lines of work where quantities were large and operations few. It is readily conceivable that the taking and working up of time studies on work of a varied nature might require nearly as many time study men as operators.

It is by no means necessary, however, to time study every job that comes through the shop. Time-study men were quick to recognize that certain elemental operations in a given class of work were constant, regardless of the nature of the piece upon which work was being done. Other elemental operations varied with certain characteristics of the work.

The recognition of these facts led to the compilation of standard data. It then became apparent that certain operations were performed on every piece worked, that others were performed when the piece had certain characteristics, and that the time for doing still other operations varied in a definite manner with certain variable characteristics such as length, area, or volume. The next step, that of resolving standard data into algebraic formulas, followed as a matter of course upon the realization of these facts.