

The preliminary job analysis enables the observer to determine (1) if the job is ready to be studied, (2) what to time, (3) data as to machine speeds, specifications, etc., and (4) the type of study necessary.

The job is ready to be studied only when the best available methods and equipment are in use. If their introduction changes the sequence of elements or the way in which the job is done, a sufficient time should be allowed for the workmen to learn the new method.

Money can be, and is, wasted every day because time study work is not planned. It is important to decide what must be studied to bring out the salient facts. On one job which called for practically a year's time study work, the products were carefully compared as to parts and specifications. Decision was made as to what products were to be studied and these studies scheduled weeks in advance.

The nature of the operation determines how many studies must be taken. In the elementary time study all elements are classed as either constant or variable. A constant element is one where the elapsed time is the same regardless of the part, product or order being worked on. In other words, whenever the same element occurs one standard time is used. The more variable elements—those where the time varies according to the size, shape, area or weight of the part—the more studies are needed to ascertain the effect of the variable factor on the time.

Observations can be classified under two types: (1) elementary time studies and (2) overall time studies or production studies. Each serves its purpose.

#### Time Study Tools

The chief tool of the observer is the stop watch. There are many types on the market. The experienced observer uses a decimal dial watch, free from all trick attachments and dial designs. The dial may be graduated into hundredths of an hour or hundredths of a minute. We prefer the latter. Each has its advocates. Some use a watch graduated into sixty seconds. Hundredths of a minute are the simplest to work with.

It is preferable to have a printed form on which to record stop watch readings and other data. There is little uniformity of design in time study sheets. They consist, in general, of two types. The first

type was designed by Mr. Sanford E. Thompson. It is an eight and one-half by eleven inch sheet printed on one side. Over 250 readings can be recorded on one sheet. It is the most satisfactory for all around general use. The second type was designed primarily for use in machine shops. Usually it has one column for the elements, which are listed once in order of sequence. There are five, ten or twenty columns for stop watch readings, allowing ten readings for each element on one sheet. A board is necessary to hold the watch and sheet.

#### Taking the Study

In taking the elementary time study there are two methods of manipulating the watch: (1) continuous readings, and (2) individual readings.

In the former the watch runs continuously throughout the study and all lost time is accounted for. With the individual or "snap back" readings, the hand is snapped back to zero at the end of each element. Although this saves subtracting the continuous readings to get elapsed time, the continuous method is preferable. It is easier and more accurate than snapping back and allows for an overall check against a clock on total elapsed time.

At this point we are ready to begin our observations. The starting time of the study and the stopping time are recorded from a regular watch or clock. All necessary explanatory notes as to workman, clock number, tools, date of study, sketches, descriptions, must be entered on the sheets.

Where the type of time study sheet requires it, the elements must be symbolized. They can be given arbitrary letters of the alphabet in order of sequence or they can be given mnemonic letters such as "RR" for "remove roll." The latter is easier and better, since it is difficult to remember "remove roll" was "h," for example, under the first method.

Taking the study calls for accuracy, quickness and alertness on the part of the observer. To note and record stop watch readings of .02, .05, .10, .25 of a minute, steadily for an hour, two hours or even longer requires a technique of its own. The cycle may be broken by an unavoidable delay, an element performed out of sequence. It is always up to the observer to get an accurate study, under any circumstances.

The elements into which the operation has been analyzed should have clear cut starting and stopping points. They should be of not less than .02 or .03 minutes' duration nor more than 1.00 minute, unless the element involves "machine time" only. This enables the observer to judge the fairness of the elapsed time in setting standards.

Other than to point out that the time study is an original record and should be made with care and neatness, the steps in recording the readings are too obvious to call for any remarks. All elapsed time must be accounted for.

The question is often raised as to the length of the study. This depends on: (1) the importance of job, (2) how often it will be repeated, and (3) the elementary times available.

The practice of taking a ten or fifteen minute series of readings can, however, hardly be dignified by the term time study. What is wanted always is a typical performance, a cross-section of the day's work. Here again the nature of the process governs the length of the study. On a one hundred per cent hand operation a one or two hour study would be advisable. The observer must stay with a job long enough to be sure there are no unforeseen factors he has overlooked. The more highly repetitive the operation and the larger the group engaged, the more studies are needed to fix accurate standards.

Still another question regards the time of day to make a time study. No fixed rule can be laid down. We know the output curve rises from the first hour till the third or fourth and then drops back between ten-thirty in the morning and noon. It starts after the noon interval at about the eleven o'clock rate or less, gradually rises between two and three o'clock and then begins to drop. Where the elementary study is not checked against an overall study, it would be good policy to take one study between nine-thirty and ten-thirty and another between three and five o'clock.

#### Sizing Up the Workmen

The most important part of the observation covers the sizing up of the workmen. The observer must determine the kind of a demonstration he is getting. This is the most difficult part of the whole time study procedure. Any one with practice can take stop watch readings. Knowing what to do with them is the test of a good time study man.

There have been contributions made by engineers designed to supplement the observer's judgment. Messrs. Lowry, Maynard and Stegenert have endeavored to rate the time study as to skill, effort, conditions and consistency, applying an algebraic correction factor. Under the Bedeaux method, the observer rates each element as to speed and effort. Unquestionably something of the sort is desirable and helpful. We should favor the rating of each element rather than correcting the total time, since it is well known that the highly skilled worker does not perform every element in a shorter time than the less proficient worker.

Meanwhile, pending the perfection of such a plan, if it is ever perfected, there seems no alternative except to rely on judgment. After a while, one should accumulate enough basic standards to use for comparison.

#### Relations of Observer, Foremen and Workmen

The time study man can make his job easier by conforming to a few simple policies. He is in a foreman's department as a visitor and as such owes the foreman the common courtesy of letting him know when he is to be there, keeping the foreman informed, talking over the job with him and having all directions issued through the foreman. He must use tact and discretion in his dealings with the workmen. During the process of taking the studies the time study man establishes contacts with the men which can help or hinder the negotiations to follow. By his fairness and reasonableness he can show the men that the management stands likewise for fairness and reasonableness, without which no time study program can ever succeed.

#### Discussion

Hugo Diemer.<sup>15</sup> What has been said on each of the three topics of the day's discussion, makes it clear that there is a distinct inter-relation between each of them, that is, the selection of workers, the number of workers, and methods of observation are matters that have a distinct bearing on each other. This is clearly indicated if we bear in mind certain fundamental considerations brought out by Mrs. Gilbreth in her book, "The Psychology of Management." The following abbreviated state-

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