in foreign elements that are necessary when performed as supporting operations to the main elements of the job. Second, through the addition of time, they bring the accomplishment of the task within the range of the efforts of the average experienced employe in the allowed time, and provide further incentive for task achievement.

Allowances may be grouped under one of two classes according to the purpose they fulfill. I call the first incidental and the second standard allowances. Incidental allowances are readily measurable from the standpoint of time and, therefore, the experienced time study engineer encounters little difficulty in effecting their solution.

Mr. T. R. Hough, chairman of our Chicago Time Study Standardization Committee, in a lecture before the students of industrial engineering at Northwestern University, described the incidental allowance thus: "Incidental allowances are generally required and may be defined as time allowances which compensate the worker for an element of a task which occurs intermittently, incidentally, and which usually is of a nature thoroughly dissimilar in its motions to the one prescribed in the regular operation detail." These are many and varied, depending upon the industry. A few examples follow: stockup, machine care, tool care, truck handling, chip removal, gauging, inspection, coolant attention, permissible waiting, preparation time, etc.

Incidental allowances may be expressed in minutes consumed per day in the performance of one of these elements. Thus machine care may require fifteen minutes per eight hour day or three and one-eighth per cent of the total time. Stockup may be expressed in terms of time per piece, by dividing the stockup time by the number of pieces stocked up, and the percentage to be added to standard time thus determined.

The time study engineer must have good judgment in order to discern foreign elements of a major task, segregate them from the task and decide whether to treat them as incidental percentages of the base time or to set up a task standard to cover the otherwise incidental operation. In each shop there will be different factors to consider in making this decision.

The second of the two classes of allowances—the standard allowance—is calculated to compensate for fatigue, personal care, job flexibility and profit. It contains much of an empirical nature and is therefore subject to various interpretations and methods of determination.

It is obvious that the standard allowance percentage values, since they contain the element of incentive and profit, are materially affected in their synthetic structure by the policy the company wishes to pursue regarding the relation of the earned wage of the average first class workman to the basic wage rate for the occupation he is engaged in. It follows logically then that each of the component elements of the standard allowance must be analyzed, a value put upon it and its effect tested when applied to the actual performance of any group of operators.

In an effort to determine the influence to be accorded each factor in the standard allowance computation, let us analyze the separate factors in the order of their importance.

The Personal Allowance Factor

Though the items which come under this heading are limited in number, they are influential enough to warrant attention. In its baldest and most usual interpretation the term personal allowance covers only the worker's physical organ activities as influenced by his toil.

In my mind, this percentage factor should vary according to the nature of the job at hand. For example, when a man leaves work at the end of the day dripping with perspiration as a result of his work in a rubber mill room, it is good hygiene that he be permitted to bathe before leaving. The fact that thousands of workers still do otherwise does not lessen the hazard but only stresses the importance of our guarding our employes' health. Time spent in this way is not chargeable to fatigue, but has a direct bearing upon personal care. It should, therefore, not be a loss to the worker, but should be allowed, together with his other average physical requirements, as a condition of his task, and added to the calculated standard time in the form of a scientifically determined constant percentage.

I cite the above as an example to point out the possible variations encountered in determining allowances. Most specialized tasks need only a body care factor, and in that event the needs of the normal person should be determined and considered a constant percentage of the standard allowance time.

The Fatigue Factor

In accounting for the fatigue factor it is always necessary to reckon with job conditions, surrounding conditions and the length of the operation at hand. During the last few years the question of fatigue has been widely discussed. Various formulas and theories have been advanced as to ways of measuring and counteracting industrial fatigue. These discussions have shown that fatigue is tied up with the formation of various chemical substances, the nature of which is still very indefinite and uncertain. A large percentage of fatigue measuring devices have been tried out only on laboratory experiments, and are not directly applicable to industrial fatigue allowance calculation.

It follows that the one best way of measuring industrial fatigue on the job is through a long time study. To illustrate, let us assume we are working on a product whose handling time is constant and that a correct basic standard of six one-hundredths of a minute has been established. Upon observing the operation over a long period of time we note that the operation base time rises from six to eight and nine one-hundredths of a minute. This loss, if reasonable, is the loss attributable to cumulative fatigue and must be compensated for in the allowance factor. Repeated computations can be made the source of fatigue allowance curves to cover short cycle operations on similar types of work.

Studies revealing tasks in which the conditions of the job are such that cumulative fatigue results require attention from two sources. First, as a temporary measure the men enduring the hardships should be compensated by a fatigue allowance factor for the losses incurred. Second, the fatigue producing conditions surrounding a given task should be scientifically studied to determine what corrective measures may be effected to reduce the evil and maintain the required flow of production. We are still very hazy as to the real nature of industrial fatigue, and more study on the subject is necessary.

The Profit Factor

Assuming the company policy to be a constant factor we must, when dealing with the profit factor, consider two elements, first, the proficiency attained by the worker, and second, the physical conditions surrounding the task that he is working on.

When an established standard is to be used as a means of determining incentive wages the use of a profit factor is advocated. This factor provides an incentive for the average workman to increase his proficiency and thereby his margin of gain. The time included in the determined base time, plus the several previously mentioned percentages or time allowance factors will, when properly installed, allow an employe to break even upon achievement of a given task. To provide an incentive for bettering the calculated task requirement, a profit factor, which will enable the worker to run over his occupational rating for better than standard production, should be incorporated into the standard.

The percentage of allowance to be attributed to the profit factor is usually out of the control of the time study engineer. Because of its concern with the problem of how much to pay for over standard production on distinctive jobs, it is a matter of house policy.

At present, judgment is the best method by which to determine the profit factor. The skill required to handle the job, as well as the conditions surrounding the task, provide concrete information upon which to calculate the profit factor for a certain type of work.

The Flexibility Factor

Minor unavoidable delays caused by inconsistencies in labor, material and operating conditions, necessitate the consideration of an allowance to cover this flexibility. The nature of work and the conditions surrounding the particular task are not always within the control of the worker. In the event of variations in materials, interruptions by foremen, production men, or engineers, or minor delays at various points on the product's route, delay allowances must be worked out to cover this loss in time.

The only correct way to determine the percentage to adopt is by an actual time study which will show up these variations. In ordinary practice it is often hard to detect the difference between fatigue and flexibility on short cycle operations. A means of checking worker's effort is through the test operator. However, from a personnel standpoint this is not always considered good practice,