



TIME STUDY

DETERMINING THE RATING FACTOR

IENG 301

FUNDAMENTALS OF
WORK STUDY AND
ERGONOMICS

[Determining Allowances]

- The normal time for an operation does not contain any allowances. It is merely the time that a qualified operator would need to perform the job if he/she worked at a normal tempo. However, it is not expected that a person will work all day without some interruptions. The operator may take time out for personal needs, for rest, and for reasons beyond his or her control. Allowances for such interruptions to production may be classified as follows:
 - (1) personal allowance,
 - (2) fatigue allowance, or
 - (3) delay allowance.

[Determining Allowances]

- The standard time must include time for all the elements in the operation and in addition it must contain time for all necessary allowances. Standard time is equal to the normal time plus the allowances.
- Allowances are not a part of the rating factor, and best results are obtained if they are applied separately.

[Personal Allowances]

- Every worker must be allowed time for personal needs. The amount of this allowance can be determined by making all-day time studies or work sampling studies of various classes of work. For light work, where the operator works 8 hours per day without organized rest periods, 2 to 5 percent (10 to 24 minutes) per day is about all that the average worker will use for personal time.
- Although the amount of personal time required will vary with the individual more than with the kind of work, it is a fact that employees need more personal time when the work is heavy and done under unfavorable conditions, particularly in a hot humid atmosphere. Under such conditions, more than 5% allowance should be made for personal time.

[Fatigue Allowance]

- In the modern well-managed plant so many steps have been taken to eliminate fatigue. In fact, fatigue is of such little consequence in some kinds of work that no allowance is required at all. There are many reasons for this. The length of the working day and the length of the working week have been shortened; machinery, mechanical handling equipment, tools, and fixtures have been improved so that the day's work is more easily done and the employee works in greater physical comfort than formerly.
- There are, of course, some kinds of work that still involve heavy physical exertion and are performed under adverse conditions of heat and humidity, and therefore require rest for the operator. Fatigue results from a large number of causes, some of which are mental as well as physical.
- There is no fully satisfactory way of measuring fatigue. Physiological measurements are the most objective means of determining the time and duration of periods of work and rest during the day.

[Fatigue Allowance]

- The problem of determining the amount of time to be allowed for rest is very complex. Time needed for rest varies with the individual, with the length of the interval in the cycle during which the person is under load, with the conditions under which the work is done, and with many other factors.
- Organized rest periods, during which time all employees in a department are not permitted to work, provide one solution to the problem. The optimum length and number of rest periods should be determined. Perhaps, the most common plan is to provide one rest period during the middle of the morning and one during the middle of the afternoon. The length of these periods ordinarily varies from 5 to 15 minutes each.

[Fatigue Allowance]

- If no wage incentive plan is used, employees are paid for the rest periods at their regular hourly base rate.
- If a wage incentive plan is used and if fatigue allowances have been incorporated in the time standard, employees are not paid for the rest periods as such. Workers merely take their fatigue allowance during the specified rest period rather than at intervals during the day at their own choosing.
- Fatigue allowance does not need to be made for much light factory work and organized rest periods, during the day, provide sufficient rest for another group of factory operations.

[Delay Allowance]

- Delays may be avoidable or unavoidable.
- Intentional delays will not be considered in determining the time standard.
- Unavoidable delays do occur from time to time, caused by the machine, the operator, or some outside force.
- It is expected that machine and equipment will be kept in good repair. When there is a **breakdown** or when repairs are necessary, the operator is usually taken off the job and such delays **do not enter into the time standard**. In such cases the operator is usually paid for waiting time at the hourly base rate.

[Delay Allowance]

- Sometimes, there are **minor adjustments**, breakage of tools such as drills and taps, or lost time due to occasional variation in material and interruptions by supervisors, and there **must be included in the time standard**.
- The analyst, and the supervisor should consider each unavoidable delay as a challenge, and every effort should be made to eliminate these delays.
- The kind and amount of delays for a given class of work can best be determined from all-day time studies or work-sampling studies made over a sufficient period of time to give reliable data.

[Applying the Allowances]

- Personal allowance is applied as a percentage of the normal time, and effects both handling time and machine time alike. For convenience, fatigue allowance is sometimes applied in the same way, although some believe that this allowance should apply only to those elements during which the operator works, and not to the machine time during which the machine works.

[Applying the Allowances]

- Delays are applied as a percentage of the normal time, or if entirely a machine-delay allowance, then on the machine elements only.
- If these three allowances are applied uniformly to all elements, they may be added together and applied together, necessitating but a single computation.
- Although, allowances have traditionally been applied as a percentage of the normal time to be added to the normal time to obtain the standard time, there is a trend toward considering allowances in terms of minutes allowed per working day. Thus, instead of referring to personal allowances as 5 percent, it would be referred to as 24 minutes per 8-hour day ($480 \times 0.05 = 24$). If this were the only allowance made, the working time in this case would be 456 minutes per day ($480 - 24 = 456$).

[Applying the Allowances]

$$\begin{aligned}\text{Standard Time} &= \text{Normal time} + (\text{Normal time} \times \text{Allowance in \%}) \\ &= \text{Normal time} \times [(100 + \text{Allowance in \%})/100]\end{aligned}$$

- Although **this equation** is used, it is **not absolutely correct**.
- A **better equation**:

$$\text{Standard Time} = \text{Normal time} \times [(100)/(100 - \text{Allowances in \%})]$$