

# Rhythm in Repetitive Work

## The Rhythm Chart as a Useful Tool

By O. A. ANDERSON  
Instructor, Stanford University, Calif.

THE MOST facile reader of these lines, the psychologist says, will be the one whose eyes make the longest and most even sweeps, with the fewest fixations or pauses across the lines and down the page. Similarly, the good penman, scientists affirm, is he who has a smooth-flowing rhythm of motion in guiding his pen. Just as truly, the good athlete is one who is endowed with good rhythm—the runner with a smooth and cadenced stride has an advantage over the one with a broken and irregular pace. And as smooth-flowing effort is an advantage in reading, writing, or in athletic sports, so it may be an important asset to workmen in the shop.

Rhythm is a needed quality when efficiency in effort is wanted. This is sought in micromotion study: there shall be proper timing and sequence of motions, arm movements shall be balanced, hesitation must be analyzed and the cause accounted for. Irregular movement calls for an abnormal use of energy; exertion when sustained is fatiguing, and output suffers in both quality and amount. Efficiency demands that needless movements be eliminated and that the ones retained be done in natural swing.

The ideal condition for repetitive work is to have the workman and his task in synchronous relation to each other. A great tragedy results when the innate rhythm of a workman and the cadence of his job are at odds. An example of such a maladjustment, as recently observed in a factory, might be given. One of the employes was so flushed and strained in the work of assembling and folding corrugated boxes that the danger of being seized with apoplexy seemed near. Arm and body movements were jerky and hurried; there was trouble in maintaining the pace required by the flow of material on the endless belt. Other employes engaged with the same type of task were cool and unhurried; they were "at swing" with their job.

Rhythm is an innate quality that is distinctive in each human being. What is an easy cadence for one may be abnormally fast for another. A child learns to walk at a rate and a swing of locomotion which is determined by his own peculiar make-up. An adult frequently becomes set in his rhythms so that they are not easily adapted to various types of repetitive tasks. He is a wise placer of men who tries to match men and jobs so that they are *en rapport* with each other.

Because rhythm is an inherent human trait, it serves as a clue for analyzing the effectiveness of repetitive work. If rhythm is absent or "spotty" there is some type of maladjustment to be traced and located, just as when the functioning of a gasoline motor is not smooth. In trouble shooting for causes of poor rhythm, on the part of a workman there are various sources of trouble to be checked, as indicated in Figure 1.

Step	MINIMUM-TIME CYCLES					Typical Time
	3	8	Cycle 14	17	18	
I	08	08	08	06	08	08
II	06	06	06	09	06	06
III	06	06	07	06	06	06
IV	05	05	05	06	05	05
V	05	05	05	05	05	05
VI	06	05	05	05	05	05

Figure 1

These causes of faulty performance are particular problems in themselves and have been more or less systematically discussed in management literature. The problem treated in this paper has to do with:

(1) repetitive work from the viewpoint of rhythm; (2) the standard of cadenced performance which is achievable in a task; (3) the use of the "Rhythm Chart" as a managerial tool.

Step Description	TIME STUDY RECORD																			
	Cycle																			
I Pick up piece	14	11	08	08	12	09	17	08	10	11	08	11	12	08	09	08	06	08	11	14
II Get in dia. set machine	13	09	06	23	14	16	10	06	10	07	12	08	09	06	08	11	09	06	10	12
III Get into set	07	06	06	07	07	08	06	06	06	08	07	06	07	08	07	06	06	08	07	
IV Change tool, start to cut	09	08	05	05	08	07	09	03	07	05	10	06	07	05	08	07	06	05	09	10
V Counterdrill	06	07	05	05	05	05	05	05	05	06	07	05	06	05	07	07	05	05	07	06
VI Remove the counter piece	08	05	06	07	08	09	09	05	05	08	05	09	05	06	07	05	05	09	06	08

Figure 2

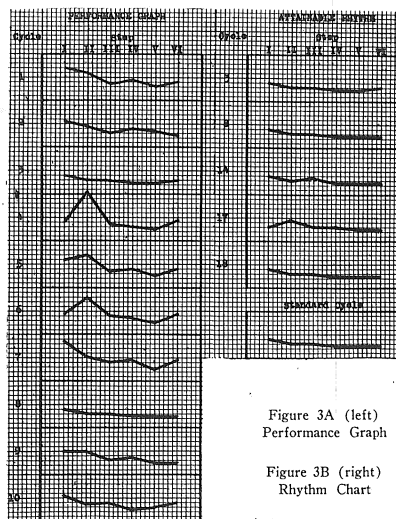


Figure 3A (left)  
Performance Graph

Figure 3B (right)  
Rhythm Chart

To begin with, a time-study record is needed. For purposes of illustration, a representative portion of a time-study report will be used. (Figure 2.) The various steps of a machine-shop operation are given, together with the time consumed for each step, through the course of twenty consecutive cycles. The individual time for each portion of the operation is given in terms of one-hundredth of a minute. Running time is not shown since the data are not pertinent to the topic of discussion. The

character of these data, in reference to regularity of rhythm, is revealed by the graphical chart which is furnished herewith. (Figure 3A.) Only the first half of the time-study report is graphically displayed, since the sampling is sufficient to bring out certain facts which are to be noted.

Inspection of the different curves brings the following deductions:

1. The time for the steps in the various cycles is erratic. Successive curves are dissimilar in appearance.

2. Step No. II shows a particularly wide disparity of time consumed in the various cycles. The same is true in lesser degree for steps I, IV and VI.

CAUSES OF FAULTY RHYTHM	
1.	The sequence of the elements in a task may be poorly arranged.
2.	The time duration of certain elements may be too long or too short.
3.	Arrangement of tools and materials may be inconvenient.
4.	There may be interfering variables in the conditions of work.
5.	The person studied may be inherently awkward.
6.	He may be nervous and out of condition.
7.	He may need training in skill.
8.	He may be "soldiering" while under time-study observation.
9.	His natural cadence and that of the job may be out of gear with each other.
10.	There may be a combination of causes.

Figure 4

In each of these cases there is preparation and handling on the part of the operator.

3. Steps III and V, which are practically automatic, have relatively small divergence in the amounts of time taken.

4. Certain cycles, such as 3 and 8, show relatively good time for the operation as a whole.

The most significant observation to be made is that at certain times the conditions of work and the movements of the workman were such that relatively good performance was obtained. In giving attention to rhythm, it is the good or minimum-time cycles for which one searches and they are the ones to be graphically displayed. In a work-a-day situation, the relatively poor cycles need not have been pictured. Rather, the time-study as a whole should be scanned and the basic cycles, giving evidence of minimum time and uniformity in