

premium. These different variations of the Halsey plan have more or less advantage for employer and employee.

STANDARD TIME DETERMINATION.

In connection with wages, F. W. Taylor introduced the new principle of standard time determination. By means of a time study the exact time is determined in which any job, of any kind whatever, ought to be done. Standard time can be applied to day work, or to piece work, or to premium work. A standard amount could be determined for a day's work, and the worker be credited with his pay when it was done whether sooner or later. In such a case by means of standard determination day work passes over into piece work. Having determined time, Mr. Taylor paid an increased rate if the tale of pieces was turned out in this time. He therefore paid an extra reward above the piece rates for standard performance.

Mr. Gantt also established standard time, guaranteed day rates, and paid a bonus for doing the task in standard time. The bonus line is on the Halsey principle of giving to worker higher pay per hour the more he does. The Santa Fe bonus system also used standard time determinations, and applied them to a slight modification of the Halsey plan. The linking of scientifically determined standard time with wages, whether paid by the day, by the piece, or with a premium, constituted a great advance.

THE EFFICIENCY PRINCIPLE.

The adoption of the efficiency principle in connection with all shop operations of every kind and description constitutes a further advance. The method of paying employees not by the day or by the piece, but for their efficiency over a long period of time, irrespective of what jobs they are doing, is part of an advanced system of shop management and shop control. Efficiency is the relation between what is and what ought to be. It is of universal applicability.

If a train is scheduled to run from New York to Chicago in 18 hours and carry 125 passengers and it actually takes 20 hours and carries 100 passengers, the time efficiency is 90 per cent. and the carrying efficiency is 80 per cent. Efficiency is, however, preferably applied to the records of a whole month rather than to those of a single train. Efficiency can be applied to a day rate system, to a piece rate system or to any of the Halsey premium plans. In day rate, if for example the monthly hours are 250, and the worker was present only 200, his day's efficiency is only 80 per cent., and we could well pay him an increased bonus up to 100 per cent. attendance using the Santa Fe curve for this purpose. If the man is working on piece rate we can determine that his output ought to be 1,000 a month, and if it is only 800, his efficiency as a piece worker is 80 per cent., and we could pay a bonus for increased efficiency. Efficiency, however, has been most extensively applied to the Halsey premium methods.

THE EFFICIENCY PRINCIPLE ANALYZED.

Under "efficiency" three questions that are usually jumbled together are carefully separated and each one studied and settled without reference to the other. The jumbling of these problems is responsible for most of the difficulties between employer and employee. These three questions are: 1. Current rate of wages. 2. Standard times for given work. 3. Individual efficiency.

1. It is to be assumed that current rates of wages will fluctuate. There will always be bargaining between employer and employee, or the employer may decide what rates he will pay per hour and employ only those willing to work at this rate, or a union may decide that none of its members can be employed at less than a given rate.

No employer can force wages downward in a time of great industrial activity and employees cannot force wages upward in a time of great industrial depression.

2. The scientific, accurate and constantly corrected determination of standard time for any and all work is probably the most important yet most neglected part of modern shop control. We know perfectly well what furnaces, boilers, steam engines, dynamos, machine tools, race horses, bicycle riders, and athletes ought to be able to do, and similarly there is not a job in any manufacturing plant in the United States that cannot be more or less accurately standardized, most of them with extreme accuracy. In work under my direction my assistants have had to give standard times for the repairs of an exploded locomotive and have succeeded within 5 per cent. Standard times compared with actual times show exactly where the losses are, why output is costing more than it should.

3. In a given standard time of 5 hours one man will always take 3 hours or less, another will always take 10 hours or more. The standard time is all right, but the men vary in ability, skill, energy, ambition and persistence. This quality of the man is his own private property, and under this latest system we may pay a man day wages, but we also determine his individual efficiency, so that we knew what men are 120 per cent. men and what men are 50 per cent. men, not as single job, but as to a whole week's or month's or year's work. To pay a man a bonus related to his efficiency is an easy way of securing his co-operation.

A SQUARE DEAL ESSENTIAL.

I do not care how strongly a shop is unionized, no union can consistently object to or prevent either standard time or efficiency statements of employees, provided the intention is a "square deal." They can and do object to a time study of their jobs or to particular forms of bonus. As both of these matters are capable of being met in many different ways the objections accomplish nothing. The main thing for the employer to know is the exact measure of the men and the efficiency of results. The particular method of encouraging efficiency and eliminating the unfit is a question to be handled according to local conditions. It may be encouraging to know that when the square deal was kept in view the handling of the men has always been the easiest part of the problem. Certain men by character and disposition are normally 100 per cent., others normally 110 per cent.

No schedules average correctly which pull down a 110 per cent. man below this figure; no schedules are correct which give a 110 per cent. man an efficiency of 125 per cent. Schedules are tabulated and followed just as closely as men. Schedules that prove uniformly too high on a good man are reinvestigated, and, if necessary, corrected. Schedules that prove uniformly too low on a 100 per cent. man are also investigated and bad conditions are either eliminated so that the schedule comes up, or after full investigation if neither men nor conditions are at fault, it is raised.

The higher a man's efficiency, the lower the cost of his output. If a man falls in efficiency, up goes cost; if a man increases in efficiency, down goes cost and up goes pay, so that any man who is not treated fairly can drop his efficiency and punish his employer. Even if he drops to 90 per cent. he may still be a very good man, but the loss to the firm is severe.

This system applied to a shop of about 1,000 men brought the average efficiency of the shop as a whole up from 60 per cent. to 101 per cent., increased output 67 per cent. and lowered direct labor and overhead costs 36 per cent., although the pay of the men increased an average of 20 per cent.