

which in reality may be far from such, both those for securing the work and those for doing the machining, or whatever else is to be done; and you will find that if he calls on his foreman for assistance this overworked functionary is just then too busy with the clerical part of his duties to give him sufficient attention, if, indeed, any at all. You will also find that there is something or other the matter with his machine—not enough to make it impossible to do the work on it, but just enough to make him lose a good deal of time making the best of it.

REAL MANAGER LOOKS AFTER THESE DETAILS

More than this, you may find that the work he has to do is not that for which his machine is best suited; or that, if it is so in design, it is not so speeded as to allow the work to be done in even approximately the time in which it ought to be done; or if it is, that the man, even though a first-class mechanic, very naturally does not know enough about the art of cutting metals to select the most economical feed and speed for his work. In fact, there is no end to the things that you may thus find which, if you think about them rightly, you will conclude that it is really your part of the business as a true manager to have looked after in a careful and systematic manner in order to get the most out of your machines and their attendants and make these feel that you have their general comfort and ease of mind at heart.

PIECEWORK TIME UNCERTAIN REDUCTIONS FORCED UPON EFFICIENT

You will also realize what a haphazard and uncertain thing the time for doing a piece of work is under existing conditions and that no end of records of what this time has been can be a real indication of what it should be, and hence that no system or plan for paying a man for his job which has such records for its basis can constitute a satisfactory contract between yourself and your employees, although the worst part of such contracts, whether in the form of piece rates or premium time allowances of one kind or another, is the fact that you almost invariably stand ready to force your employee to accept readjustments of them when he, either through exceptional good luck or by extraordinary efforts, has succeeded in doing a little too well.

Nor is the matter materially improved by any such ingenious, automatic, premium-regulating plan as that first invented by Mr. Rowan, of England, to guard against the possibility of a workman ever carrying too much of his employer's money away in his pay envelope, and thus also to avoid the irresistible temptation to reduce a time allowance or a piece price which in this manner has proven itself such a treacherous thing to the management.

VARIOUS PLANS ARE COMPARED

At this point of our argument it may perhaps be of some interest to make a comparison of the original Halsey premium plan and the modification made of this by Mr. Rowan as just referred to. We do this by means of figure 1, in which the Halsey plan is represented both with

¹Not printed.

a premium equal to one-third of the time saving effected, as favored by Mr. Halsey himself, and with a premium of one-half of this time, as favored by other champions of this plan. The diagram is made out for a job with a time allowance of 15 hours and shows all the theoretically possible earnings on all three premium plans referred to, the day wage portion of these and the percentages that the premium bears to the latter. It will be seen that the premium for reducing the time allowance to 10 hours, or by one-third, amounts to 3½ hours by the Rowan plan, 2½ hours by the Halsey plan with premium of one-half the time saved, and to 1½ hours by the Halsey plan with the premium of one-third. Also, that in percentages of the time actually worked, these various premiums amount respectively to 33½ per cent, 25 per cent and 16½ per cent. It will further be seen that, for the Halsey plan with premium of one-half the time saved, this premium is exactly the same as for the Rowan plan when the time is reduced to 7½ hours, or in other words, cut in half; also that this premium, which amounts to 3¾ hours, or 50 per cent of the time actually worked, is the maximum absolute premium that can be earned on the Rowan plan. Similarly the Halsey plan, with the premium of one-third the time saved, gives the same premium as the Rowan plan when the time allowed is reduced to 5 hours, i.e., by two-thirds; and it will be seen that it amounts to 3½ hours, or 66½ per cent of the time actually worked.

WORKMAN MAY SCENT REAL PURPOSE

A further study of this diagram will make it apparent that the Rowan plan can not be very successful in inducing a workman to give away the time in which he can do a piece of work when the time allowance for this is excessive; for it is then so easy for him to earn a substantial increase over his day wages by only moderate exertions that the slightly higher relative increase that further exertions would net him will not appear to be worth his while. Of course, I do not mean to say that a workman will read this into the mathematical rule for figuring the premium on the Rowan plan the first time he is put to work on it, but experience will soon teach him to do so and to view it in its true light, i.e., an ingenious plan to induce him, without adequate remuneration, to disclose the real time required for the execution of a piece of work about which the management has shown its complete ignorance.

Compared with this scheme, either of the original Halsey plans provides a more moderate premium where only moderate exertions are required to reduce materially the time allowance; but one which increases at a sufficiently high rate with increasing time reduction to constitute a real incentive for a man to take advantage of it, provided he has no reason to fear that the handsome premium thereby earned will weigh so heavily in the manager's stomach as to induce him to take what he believes to be the right remedy for this kind of indigestion, viz., reduction of the time allowance for the job—only later to discover that what temporarily was medicine to him was poison to the workman.

APPLICATION OF PRINCIPLES GUESS METHOD DETERMINING TIME ALLOWANCE

Having thus made a brief review of the application of the two principal premium plans to a job for which the management has guessed, by aid of previous records or otherwise, that 15 hours would constitute a proper time allowance—such a guess method of determining a time allowance being the only one the originators of these premium plans ever had in mind—let us now also see how these may be applied, the same as Mr. Taylor's differential piece-rate system and Mr. Gantt's bonus system, to work done under a management which thoroughly cooperates with its employees, and which because of this cooperation, is able to set a task time limit on a piece of work such that if this cooperation results in the work being done within this time limit the workman receives his share of the good results obtained in the form of a substantial bonus or premium. Such an application of these premium plans, together with their comparison with the two cooperative task plans, is exhibited in another diagram.

MATHEMATICAL EXPLANATION OF DIAGRAMS

Figure 2¹ is made for a job for which 10 hours of work is known to the management to constitute a task for which a premium or bonus of one-third, or 33½ per cent, over and above regular day wages is a sufficient prospective reward for the workman to induce him to work hard and earnestly to accomplish his part of this task, with the possibility of his even doing somewhat better. Taking this time of 10 hours and this premium of 33½ per cent as our basis for figuring, we find the total time allowance necessary for the Halsey plan with a premium of one-third the time saved to be 20 hours; for the same plan with a premium of one-half the time saved to be 16¾ hours; and for the Rowan plan, with a premium equal to the time actually worked multiplied by the time saved and divided by the time allowed to be

$$15 \text{ hours; for } \frac{20 \text{ hours} - 10 \text{ hours}}{3} = 16\frac{3}{4} \text{ hours} - 10 \text{ hours} = 10 \text{ hours} \times \frac{15 - 10}{15} = 3\frac{1}{2} \text{ hours, or the premium}$$

to be established for 10 hours work on all three plans, all as clearly brought out in the diagram.

The Taylor differential piece-rate system is represented in figure 2 by a broken line, for which the time limit for the high rate of pay for the job under consideration is the same 10 hours for which we have made the premium 3¾ hours, or a total high rate equal to the man's wages for 13¾ hours.

The low rate of pay is here taken as five-sixths of the high rate, and it will be seen that the workman may be about 11 per cent behind the time limit for the high rate before

¹Not printed.

the low rate will amount to only his day wages; but also that, by further falling behind, he runs the risk of earning a substantial negative premium. Thus, for instance, if he should spend 15 hours on the job, or as much as the full time allowance on the Rowan premium plan, his earnings would be more than 25 per cent below his day wages.

TASK WORK VERSUS PREMIUM PLANS

It will be seen that, while Mr. Taylor's plan offers a greater inducement than any of the three premium plans to reduce even the task time of 10 hours, Mr. Gantt's plan does not offer as much, as it is rather interesting to note that Mr. Halsey's premium plan when the premium is made one-half the time saved, in this particular respect exactly splits the difference between the Taylor and Gantt task plans, while the Gantt bonus and the Rowan premium offer substantially the same inducement for any practically conceivable reduction of the task time. It will be seen that the greatest difference between the Taylor and the Gantt plans is that the latter guarantees the man his day wages, while the former penalizes him even severely when he runs too far behind. On the other hand, it will be seen that all of the three premium plans considered enable a workman to earn more than his day wages for small efforts, even if the time allowance is such as to demand the performance of a substantial task before a premium of as much as 33½ per cent can be earned, while the amount of this defect varies considerably among them, with the Rowan plan as least objectionable in this respect. However, it will also be seen that, in the neighborhood of the time for 33½ per cent premium, the three premium plans give results that differ but immaterially in this respect.

To overcome the defect of the premium plans when applied in connection with task work, as tacitly suggested by presenting them as in the diagram under consideration, all we have to do is to demand a certain amount of time saving before the premium figured will be allowed. Thus, if we wish to go the whole length and pay no premium unless the work is performed inside the 10 hours, we only add to the various rule that the premium figured by the mathematical part of the same will not be allowed unless the time saving amounts respectively to one-half on the Halsey plan with premium of one-third the saving, two-fifths on the same plan with premium of one-half the saving, and one-third on the Rowan plan.

COMPARISON OF PLANS ADVANTAGES OF HALSEY PLAN

The Halsey premium plan with premium one-half the time saved applied in this manner would seem to have the following advantages when compared with the other plans considered:

1. The premium earned when the time saving for any reason is enough to reduce the time below that set as the task, while greater than the fixed Gantt bonus, is not so great as the Taylor high rate, and thus meets the idea of the manager so frequently met with who insists that the greater the premium earned by the man the less should even be the flat labor cost to the employer.
2. It is mathematically the simplest of the three premium