

possible amount of water from our pulp before it is shipped. It shows the relationship between the moisture test and the number of minutes that the low pressure is kept on the hydraulic cylinders. To explain this a little further, it will be necessary for me to describe briefly how our pulp is handled in this operation. The pulp, after it is cooked, is first washed, then screened and finally bleached. After the bleaching operation it comes to the wet machines, where it is taken off in sheets. The wet-machine operators allow the pulp to gather on a press roll until it reaches a certain thickness, then they cut it off and fold it up. These separate folded laps are stacked up on a press pan, with cocoa fibre mats between them, until the proper height is reached.

The mats are for the purpose of allowing the water to pass out at different points in the package. After this package (or "cheese" as it is called) is completed it is pushed under the hydraulic press and a pressure of 750 pounds per square inch is turned into the hydraulic cylinder. After this pressure has compressed the cheese fairly well, the high pressure of 4,000 pounds is turned on and maintained until the pressing operation is completed. If the low pressure is kept on too long a time, the full benefit of the high pressure will not be obtained and the moisture test will drop. On the other hand, if the high pressure is put on too soon the water will squirt out of the pulp so rapidly that it will tear the cheese apart and break the cocoa fibre mats, and the moisture test consequently will be low. Our problem was to determine the best length of time to keep the low pressure on, as the high pressure is governed entirely by the production coming from the wet machine. After having determined that three minutes of low pressure, as illustrated by the chart, gives the maximum moisture test, we furnished each man on the wet machines with a clock and asked him to leave this low pressure on just three minutes. As long as the foremen kept constantly after their men and vigilantly followed them up we obtained some slight increase in the test; but it required a constant urging upon our part to focus the attention of the men upon this three minute time of low pressure. Of course, we made a time study of the situation, taking into consideration various factors such as time lost between the pressing operations, etc., but these I do not mention for lack of time, as the efficiency of the low pressure is the most important. I will simply say we realized finally that in order to get the results we were after, it was necessary for us to produce a desire upon the part of our men to do this work in the proper way,—in other words we had to pass from the natural or generic field into the field of the will of man,—so we designed an instrument which would give us a record of the time lost between pressing operations, also the

number of minutes the low pressure was kept on. It took us something over a year to perfect this machine, but after it was finally perfected and a record of the operations made, we found that the men actually were operating at an average efficiency of 42 percent and our moisture test was running about 54 percent. Our next step was to post a daily record of the relative standing of the men in the machine room, putting the men who had the best record at the top of the list, in the order of their weekly average efficiencies. (The efficiency of low pressure, which proved to be the most important factor, was computed by calling three minutes of low pressure 100 percent and two minutes either way 0 percent). As a result of simply posting this record our efficiencies rose to over 60 percent and our moisture test increased a little less than one percent. Some of the best and most skilled men had an efficiency of over eighty percent, but quite a large percentage of them were down below 50 percent. We therefore decided that it was necessary to have the foremen give more detailed information to the men as to what the machine meant and how their efficiencies were obtained, and to put the instrument which did the recording into a glass case in the machine room where all the men could see it. Each foreman took a portion of the chart and one of the celluloid scales by which we obtain the efficiencies and explained in detail to each one of the men how their records were calculated. As a result of this our efficiency rose from 60 percent to 80 percent in less than four weeks and it has remained at 80 percent ever since, enabling us to get a moisture test of over 56 percent.

This was accomplished without resorting to piece work, task or bonus, or any of the regular special methods of payment, our men being paid by the day throughout the entire plant. The interest that was taken in the work came absolutely because the men were being furnished with a record of what they were accomplishing, and in the formation of this record there was opportunity for them to express themselves.

In other words, we were working with "The Will" and producing a desire on the part of our men to get the results we were after. A spirit of emulation was brought about through the posting of the records; but, based upon our experience in this and also in other departments, we know that most of the increased effort came from the joy the men were obtaining by being able to see the result of their work.

The posting of these records has been going on now for over two years and there has not been the slightest diminution in the interest the men are showing in their work. We have further noticed a very marked improvement in their attention to other factors in the machine operation, such as reduction in the

cost of machine clothing, general neatness of the room, etc. This is all due to the fact that the men are focusing their attention upon their work, because they have something to interest them.

I hope I have been able to indicate to you how we have made a very uninteresting and monotonous routine job interesting to our men, and hope that this illustration has made it clear to you just where we began to enter the second great field, which I have called "The Will of Man," and consciously utilized the individual creative power, which in so many cases is latent or actually working against progress in the organization.

While it is possible under certain conditions to compel obedience, there is no possible way in which a man can be compelled to do his work willingly and when he does it unwillingly he is very far from being efficient. He must have the opportunity to enjoy his work and to realize himself in its performance.

It is no longer necessary in our machine room for us to follow up the men and make them feel that pressure is being put upon them to get results. The desire, as it were, comes from within themselves and as this spirit permeates our whole organization it keeps the foremen and department heads busy leading the men in the right direction.

A remark I heard Mr. Babcock, manager of the Franklin Automobile company's works, make yesterday illustrates this point very clearly. Someone was asking him "who was boss in his shop" and while I do not recall the exact wording of his reply, it was to the effect that the men themselves ran the shop and the management was kept busy leading them in the right direction. I have never seen such wonderful esprit-de-corp in any machine shop as I saw during my recent visit to his plant, and I am sure that it is due to the fact that he is in every way cooperating with his men in making his time studies and determining standard practice methods.

In our plant we never make it a practice to arbitrarily determine standard methods for performing an operation, for we believe that the men who are actually doing the work have generally as much to contribute as the foremen and department heads in deciding standard practices; and because we give the workman a chance to have the most to say about the matter he is willing to conform to the standard, because it really represents a consensus of opinion of the men in his particular group.

Mr. Barth made the statement to me at our Ann Arbor meeting that he believed that fully eighty to ninety percent of the cooperation obtained from the men came from giving them a record of what they are accomplishing. I am sure that Mr. Barth, who is here, will not hesitate to correct me if I have misquoted him.

I do not wish to leave the impression that we do not believe in rewarding our men. We pay them much more than they are paid in any other branch of the paper industry and we are glad that the increased efficiency of the plant makes it possible for us to do this.

I am not necessarily opposed to piece work or task and bonus methods of payment. There may be cases when it is desirable to use these methods.

I do want to point out, however, that we have been able to obtain splendid results without resorting to a system of immediate money reward and that I believe we should seriously consider whether or not it is wise to keep the almighty dollar constantly before the workman, thereby stimulating his selfish instincts. Is it not perhaps better to pay him liberally so that he can forget this economic pressure and do good work because of the joy that comes from the consciousness of a work well done?

It is in the formation of standard practice and time study that we need to exercise the greatest care. The realm of positive science does not extend into this field. It is the field which is essentially occupied by the will of man, which we must never fail to recognize as free in essence. I believe the principle function of time study is to furnish some means for recording the progress of the workmen. This is the reason why it is necessary, in order to obtain the best results, to have the workman feel that the proceeding decided upon as best actually is the best and represents a consensus of opinion of the men on the particular job.

After several years experience as manager I have come to the conclusion that no matter how skillfully the management determines the one best way to perform an operation, it ceases to be the one best way if the workman does not want to do it that way.

This does not mean that in our plants in Berlin we allow our men to go ahead in their own way to find out how their work should be done. We do give them very careful instructions covering all we know about the operation they are about to perform; but in giving them these instructions we never allow ourselves to lose sight of the fact that they must not be in too much detail, and that freedom is given to the workman to leave the impress of his personality upon the work, or upon the formation of the progress record which indicates how near he conforms to the standards, which he recognizes as ideal. There can be no self expression otherwise and the purpose of carefully recording the progress of each operation is to enable the workman to know the effect of the conscious application of the creative urge, which lies at the very base of his individuality.

I hope that these illustrations of our methods, which I have just described, will convince you that it is