

for maintaining a uniform (not a minimum) time for cooking. This plan does not by any means take away the initiative from the workman since in order to accomplish the results attained, it is necessary for him to exercise skill and judgment in manipulating the valves, taking the tests, and handling all of his operations. It does give him, however, definite standards for which to work, so that he may have a feeling of satisfaction when these standards are attained; and it gives him a money bonus for proper accomplishment.

In other departments of the pulp mill, the bonuses are of a similar nature, based always on features for which the men are themselves responsible. In acid making, a given strength of acid is required. In the wet-room, the density of the pulp, that is, the percentage of water, must be maintained within definite limits so as to produce a uniform pulp. In the machine-room are the requirements of uniform thickness of sheets of pulp, uniform moisture, and so on. In other words, all of this means a working to definite standards, which test and experience have shown will produce the required results both as to quality and output. As a result, the men take greater interest in their work, are more careful; and when carrying out the work in proper fashion, they are duly rewarded. The effect is shown in the quality and output of the pulp produced.

I have been interested in listening to Mr. Wolf's discussion of the paper. I agree with him that to maintain the interest of the men in the mill, they must be encouraged to exercise their initiative and to feel that the work is not simply the carrying out of a mere routine. I think Mr. Wolf will agree, however, that the working to such standards as I have indicated does not destroy the initiative of a man; in fact, I noticed during a recent visit to Mr. Wolf's mill that he has prescribed very definite standards over a large portion of his plant and that the workmen are expected to work to these standards.

MR. KEPPELE HALL<sup>1</sup>: I have had some very interesting experiences in my association in this work of management with one of the concerns which has been mentioned here, from the time that the work of developing this system was started up to the present. The particular part of the work in which I have been chiefly employed has not been in the manufacturing of the paper itself. I have been more in the finishing department, rather an outside department. I do, however, know of the conditions that are encountered in the making departments, and I think that anyone who knows what these conditions are in any particular mill, appreciates the more the work done by Mr.

Green in his very careful study of the beating proposition.

I think I might possibly clarify matters in your minds a little if I go into some detail in regard to the beating of paper as we have been doing it in the plant of the Eastern Manufacturing Company. Each paper machine is fed, as you might say, by a line of beaters. There are in a number of cases four beating engines in a line. Each engine is filled with various ingredients which go to make up the paper. After the material is sufficiently beaten in the engines it is put in the chest and then taken to the paper machines themselves. The management has now practically the entire responsibility for the furnish. When to make up any grade of paper, formerly rested entirely in the hands of the beating engineer, subject to the rule of the president of the mill. Each grade of paper was supposed to contain about so much wood pulp, so much rags, so much coloring matter, etc. Each grade of paper was supposed to be beaten about a certain length of time. There were no fixed standards as to the things that went into the furnishes or as to the time during which they should be beaten. The consequence was that half the paper was not uniform in strength, finish or other qualities, and the miracle to me is that they came as near to uniformity as they did. It required a great amount of ingenuity.

I have seen samples of paper taken off machines and handed to the president to examine. I don't know what he finds. He takes hold of the paper, wrinkles it between his fingers, holds it up to the light, and then hands it back to the engineer. He turns to the engineer and says, "How much rag is there in this?" The engineer says, "I put in three and a half cars." The president says, "In the next batch put in four." If the engineer had said "Four cars" the president would have said, "The next time put in five." It was a case of guess work to a large extent.

When Mr. Thompson started this work and said to these people that it was possible for them to make standards for these furnishes, they thought of him with pitying contempt. He was frowned upon by the various people who had always done this work, and who said, "The idea of suggesting such a matter of this kind. Work would be taken out of the hands of men who had been making and beating paper for ten or fifteen years." It came to a matter of some sort of a definite written instruction as to just how much of this or that was to be used, and they thought it could not be done; but nevertheless, this was done. Mr. Thompson has spoken of the moisture in the material as being a great factor. The moisture in the material makes it more important than ever to determine just how much of the ingredients go into each particular grade of paper. The kind of materials in this rag

stock, and the moisture in the stock, are determined before it is sent to the beater, and accurate amounts are put into the furnish. This results in a much more uniform product, both in quality and strength. This matter of beating has been so standardized that the beating engineer is given his ticket, instructing him that a certain beater is used for certain paper, that the furnish is beaten for a certain time, under certain conditions, and, after a certain time, is taken out of the beater and put into the stuff-chest. Previously that was determined by the sense of touch. The time was practically determined by the sense of touch. The beater engineer would put his hands in the mixture and say that he thought it had better run another half hour. You can imagine that the personal feelings of the beating engineer, the way he felt when he got up that morning, was bound to determine to some extent his feelings when he put his hands in this mixture. That was supposed to be the only way, and the idea of saying that it was possible to beat paper under certain other conditions was tommy-rot. While that is being done by several concerns, we have a regular routing system for beating the paper which differs from some systems. The routing usually is made out in advance for every order, and the beater on which it is to be run that day would get the times the paper would go through the different processes, and when it should be fed to the stuff-chest. These markings are on dials which are set arbitrarily so that they should get started off with zero; and it is set down on the dial how long each particular beater is to run, so that if a beater starts out with zero and runs for two hours, it would be done at zero and two. If it were to be done in two and a half hours, it would read zero and two and a half, and if it were set at two and a half, it would read for two hours, four and a half. Then we have on the routing sheet when the order should be started. This is not the clock time, at which these various beaters are to be filled and timed, but by a process of subtraction from the actual clock time we can give the men the actual time, and they only have to follow the times on their beaters.

There is one thing that strikes me very forcibly in this matter of beating and making paper. As Mr. Green said, the equipment we are using to-day for beating paper is practically the same as we were using fifty years ago, or even longer. It is a very crude process to look at. I believe, after these investigations have gone as far as it is practical to carry them, and such investigations may extend over a period of a great many years, that some method will be devised that will be an improvement over the present method of beating paper. I say this simply as one who looks on from the outside, and not as one who is actually

using the machines. It seems to me, that, when we arrive at an analysis of the various problems connected with the beating of paper, and we have found the value of the different properties in the fibres themselves and their relation to each other, there will be a great many improvements which will take the place of the present methods of beating paper.

There is another matter which both Mr. Green and Mr. Wolf take up in their papers, and that is this idea of the human element in connection with the scientific management of industries. I take issue a little with Mr. Wolf, I think, though I am not quite sure. It would appear from Mr. Wolf's remarks that he was relying more on the individual judgment and initiative of the working man than a great many of us in this room. It looks so, if Mr. Wolf meant that from the very outset the workman should be considered as far as possible in what was being done.

It seems to me that we are not aiding the working man much by giving him at the outset too many different subjects to think about. We ought to give him all the information we can on the subject he is to work with, give him to understand that he is to follow these instructions, and then turn loose his ingenuity and see if he cannot improve on the methods being used. It is as if a man who intended to study chemistry, started out with the idea that he was going to use his own initiative instead of studying the accumulated information on the subject, and began to reason the whole thing out for himself. It is useless to begin the thing that way. It seems to me that it is putting the men on the road to development, and giving them a much better chance to show their initiative, to tell them what to do rather than to make them guess at it. It is my idea that Mr. Wolf has standards in his mill and that every one lives up to them.

To my mind, a big factor is the factor of the human relationship. It is one thing we are emphasizing more and more at the plant of the Eastern Manufacturing Company, and it is the one thing that is indispensable to help on the entire cause. It makes the men feel the responsibility more. We have meetings with the men every Saturday night. We are endeavoring, moreover, to make every employee feel that he or she is getting absolutely a square deal. In the plant we are encouraging them to make suggestions as to how the people in the plant should be treated, and any suggestions of this sort are carefully considered. We have organized a "Service Department" which is essentially an employees' department. The Service Department is their department, and through that department we can move on with the management with the assurance of fair treatment on questions that come up in connection with the work of the employees.

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