

setting standards unless methods have first been studied and perfected. He has no intention, however, of cutting the bonus on this operation. He realizes that if he did the men would have no faith in any of the standards set up and that the loss to the company would be greater than the expense of this faulty calculation.

It was interesting to observe the rest period described in this paper. The young man, Arthur, puts his two fingers in his mouth and blows a long whistle at about ten o'clock. Immediately the men start circulating about, munching their sandwiches, chewing gum or chatting with each other. At the end of ten minutes Arthur strikes a bell, such as the one teacher used to have to call classes, and everybody goes back to work without any confusion or commotion.

Mr. Dowd tells me that the cost of this installation was approximately six hundred dollars. The man who has been trained in scientific management and is imbued with the Taylor philosophy is not dependent on elaborate systems and can get large results at a low cost.

**B**EFORE going any farther, let us take a picture of ourselves and see what we are.

Our company was organized in 1922, and has been in the same location since that date. The building is a one-story, brick building containing about 7,500 square feet of space. Five thousand of these are in the main part where our machines are located, and an additional 2,500 square feet are used as a stockroom. The office is located in one corner of the main room.

We manufacture folding paper boxes, on standard equipment made for the purpose. It is the same kind of equipment as that used in the majority of the folding-box plants in this country. This equipment consists of both job and cylinder printing presses, platen and cylinder cutters and creasers, hand and automatic gluing machines, and a paper-cutting machine, together with miscellaneous equipment of various kinds. With this equipment we are able to manufacture a very large range of sizes of boxes.

The material used is known as folding-box board. It is a particular form of so-called cardboard, ranging in thickness from fifteen to forty one-thousandths of an inch. As a rule, the board is

purchased in the size required for the job at hand, although some stock is carried on hand, and has to be cut before it is run.

Generally speaking, the process of making a folding box is as follows: The stock is first printed on one of our printing presses, in one or more colors, as may be necessary; then cut and creased on one of the cutting and creasing machines. We usually make several boxes on the same sheet and between each box a small amount of stock is left. It is necessary to remove this waste by hand. One hundred sheets of stock are handled at one time. These boxes are then stacked on platforms and fed into the automatic gluing machine, where they are glued, folded, counted and tied in packages of fifty boxes. They are now finished, ready to be bundled and shipped.

There are about ten men employed in the plant, two of whom represent the management side. One of these two has charge of the plant. He directs the men in the way the work should be done, and the other tells them when and where the operations are to be performed. None of these ten men has ever worked in any other box shop. They are all young. None is over thirty-five and the youngest is twenty-three years old. Some of these men have been with the company since its beginning. None of the men employed at the present time has been with us less than three years.

Our total investment in equipment and machinery amounts to about \$30,000. Our sales are between \$75,000 and \$100,000 per year, and in the course of a year we consume between five and six hundred tons of stock.

In such a small plant as ours, it is necessary that the clerical force be kept as low as possible, and we are very fortunate in having a young man with us who is able to serve in many ways. All of the clerical work pertaining to the planning, production and recording of results is done by this young man, who has been referred to as one of the men on the management side who directs the men "when and where the operations are to be performed."

In large organizations there may be one or more persons assigned to each function of planning, but in this small organization this one man performs the following duties:

1. Order Clerk (Records orders.)
2. Route Clerk (Prepares route sheets.)

3. Ticket Clerk (Duplicates time tickets.)
  4. Balance-of-Stores Clerk (Keeps stores records.)
  5. Order-of-Work Clerk (Schedules orders for production.)
  6. Bulletin-Board Clerk (Changes operators' time tickets.)
  7. Receiving Clerk
  8. Shipping Clerk
  9. Payroll Clerk (Summarizes daily, weekly and monthly the individual operator's time tickets.)
  10. Cost Clerk (Makes up cost sheet for each job.)
- It is due largely to his ability that our shop runs so smoothly.

When an order is received, a copy of it is made in a book provided for the purpose, and a number assigned to it. No attempt has been made to work out a classification of our product. The various styles of boxes with the almost unlimited number of sizes makes it difficult to see the advantage. A job envelope is used to hold what information is necessary, such as a sample, copy, proof, and whatever else pertains to the particular job. A route sheet is made out from the construction sheet. This contains complete information as to the operations to be done, in their proper order, quantities of each size, bill of material, and such shipping instructions as are necessary, since our product is shipped as soon as it is finished. Time tickets, stores issues and shipping labels are made from the route sheet. A master of each is set up, and the required number run off on a Speed-O-Graph duplicator. The time tickets are made in duplicate, one white, the other yellow, for each operation. They carry the name of the operation, the machine symbol, and the quantity to be made. These tickets are then placed on the planning board under the machine in operation, either in numerical order, or in accordance with some order-of-work schedule. The stores issues, after the quantity has been deducted from the available column of the stores-record card, are placed in the job envelope until such time as the stock is ready to be used. At this time, a man, working on a time ticket charged to this particular order, moves this stock to the machine. He indicates on the stores issue the amount of stock taken, the balance on the bin tag, and signs the record. The material is then priced, extended, deducted from the "on-hand" column of the stores record card, and filed by order number. The labels are held until the order is

ready to bundle, at which time it is given to the bundler, who places a label on each bundle as he finishes it.

With this picture in mind, it is not very difficult to recognize some of the problems with which we have to contend. Our sales are irregular. By that, I mean that this week we may be running several jobs of three colors, with very few jobs that are not printed. It is necessary to run the printing presses overtime to keep the flow of work to the subsequent machines uniform. Next week we may be running jobs, the majority of which are blank, so that our printing equipment is idle.

Since we manufacture no stock items, we must actually have an order for boxes before we can start to manufacture. Except for small orders, the stock has to be ordered from the mill. The mill carries no stock, so that it is necessary for them to have sufficient orders for the particular grade and thickness before they can manufacture our order. This often makes it impossible to know definitely when our stock will be delivered. One or two weeks is the average time for delivery. This does not help to smooth out our production.

Unbalanced equipment is a necessary evil with the small plant. Take the automatic gluing machine as an example. This machine has a capacity sufficient to glue the output of a plant three times the size of ours. It requires three men to operate it. It runs one-third of the time. We must have men available for this machine, and we must have work for them when the machine is idle. We have to use them for other work, such as janitors, bundlers, etc. We try not to use operators of other machines for this class of operation. Each man has been trained in more than one job, so that we are able to shift practically all of our men from one operation to another.

Set-up time is very uncertain; sometimes it takes as long as, or longer than, the actual running time, but just as often it takes a short time compared with the running time. Each feeder is required, as a rule, to set up his own machine. It is a regular thing for a man to stay on one machine for several weeks, performing alternately the work of set-up man and feeder.

When a man is put on a machine, he is given such instructions as he needs. If the job happens to be a printing job, he is given the ink to be used, the electrotypes, the stock on which the job is to