

and control which should in all cases be the first step.

When I joined the Holt Caterpillar Tractor Manufacturing Company immediately after the war, a sales commercial, manufacturing and engineering organization was to be perfected and procedures to be established. We had a pretty difficult time at first. We started scheduling of materials and parts and started production and final test, and we tried for uniform production several times. The first time we ran five days on an exact schedule of output. The second time we were able to run for a year and on the third attempt we made schedule every calendar day for 685 consecutive days. For nearly two years we were able to run without a single break in the production record simply because we had planned and had finally brought the personnel to realize that it could be done. Once the uniformity was well started every single person in the factory from the gateman down the line would have cried salt tears if we had failed.

There is one other thing that must be considered in weighing the conveyor against the lot system of manufacture. You should appreciate that when you have a progressive system of manufacture you must stop operation as soon as your yard is full of products, and it gets full mighty quick. Reducing hours and slowing down the conveyor can be carried only so far. As I have said before, a certain load is necessary to make it possible to operate under this system. You are presented with an entirely new personnel problem, as the experience of the Detroit automobile plants testifies. When the dealers' shops and the freight trains on the sidings are filled the plant must stop. You must consider this as you go into progressive manufacture.

We should encourage our small manufacturers to study their products and operations with a view to classifying and simplifying them wherever possible and using appropriate manufacturing methods. If they could do this all along the line, even down to the pattern shop where one piece is made and never repeated, I think we should have accomplished something really worth while.

In 1915 I embodied these ideas in a paper presented before a meeting at Lake Placid. That particular paper was the result of studies to find out the effect on lot sizes of time per unit and the number of units to be produced. They are the important factors of a planning program.

Thomas R. Hough.⁷ I was much impressed with Mr. Bryant's paper because of its application to certain of my problems. A few years ago our company was making 125 golf clubs a day. I went with this organization from the parent company to install a wage incentive system, but shortly after the superintendent died and I have had his job ever since. I am confronted with much the same sort of problem that Mr. Hathaway described—the problem of turning out a large volume of production while putting in a wage incentive plan and at the same time keeping up the supervision of the maintenance department.

It happens that our golf club and golf ball divisions are standing up strong under the recent depression. About a year ago we were making around 3,000 dozen golf balls a week. I was just asked to arrange with slight increase in equipment for a production of 7,000 dozen per week. To do this it was necessary to operate the molding machines fourteen hours a day, and in the midst of this one of the high-pressure boilers broke down. It was necessary to tear down the brick work and rebuild it on a Sunday in order to be back in production on Monday morning. We have managed with as little capital expenditure as possible by applying all the elements of scientific management that are possible and with a limited personnel. All capital expenditures except those resulting in apparent economies have been avoided. A considerable saving in expense has resulted from the introduction of the better methods.

For example, we have been paying about six cents apiece for the boring on certain types of club heads. A recently made installation is going to enable us to turn out 200 of these clubs an hour, obviously at a very material reduction in cost. The same thing has happened with the club gripping operations. Formerly only skilled operators were used in this department, but as a result of breaking down the operations, mechanization and unskilled operators are now reducing costs. About ten devices have already been installed and more are in preparation. The use of these devices, developed as a result of time studies, has made possible a production increase of 150 per cent and has resulted in better grips.

These improvements and good planning have

⁷General Superintendent, Wilson Western Sporting Goods Company, Chicago, Ill.

licked the problems and we are on the road to getting the production desired.

John Younger. I should like to make another comment. When you are stepping up production rapidly I think there should be some understanding about maintaining rates. I was with a shop that moved up from seven to forty products per day but before they did it a statement was issued to the effect that there would be no cut in piece rates while the process and method remained the same. The notice also said the men would be given the benefit of increased production that resulted from their suggestions for change in method. If the management was responsible for an improved method it reserved the right to cut rates.

Morris L. Cooke.¹⁰ I have just one point I should like to make and that is that it seemed to me that the paper placed undue emphasis on the leadership of the top man. One of the most discouraging things about scientific management is the quickness with which the genius gets tired. I have in mind a plant in which a reasonably good job of scientific management was done, but the thing has been at a standstill for years. Personally, I think we are never going to get the kind of industry we dream of until we carry the idea of leadership all the way to the bottom. When the top men ripen and take up golf and fishing there must be another lot of men coming along who will be filled with the same type of enthusiasm.

The capacity for growth must be given more and more consideration. When I first entered industry the ideal was to get someone who was going to be satisfied with the job he had and never ask for any more wages or anything further to do. If industry is going to realize its possibilities the great top man must be the one who seeks as his comrades at every level in his organization men who are going to pull the people under them and push the people above. That is one of my pet notions.

The point made in the paper about machinery manufacturers' contributions to improvements in processes reminded me of an experience of mine. I have been interested in the accounting problems of hospitals. In a certain hospital with which I am connected the system which had been put in

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by an old-line firm of accountants had completely broken down. A member of this firm was called in to tell us what was the matter. He discovered that our procedures were very similar to those of a hotel and as a result tried to approximate a hotel accounting system. The National Cash Register Company, which is putting out a tabulating machine particularly adapted to hotel accounting, was consulted. It seemed advisable for us to purchase one of these machines, but before the National Cash Register Company would sell us the machine they sent men into our hospital to watch every one of our operations for two weeks. They finally quoted us a price for a machine that was for the most part standard, but had an attachment added here and one subtracted there to especially adapt it to our needs. And then they refused to sell the machine to us until they were sure it would be possible for one or more of their men to stay in our plant for a month or so to coach the people who were going to use the machine. This seems to me like a splendid way to build up a business and keep the customer satisfied.

In connection with this question of rate cutting you will be interested to know that Mr. Kendall is about to appoint an industrial code committee of which I am to be the chairman. During the war some of the members of this Society developed a code for the Ordnance Department. This was later issued by the Quartermaster's Department also. The A. S. M. E. has drawn up a boiler code which is so good that twenty-six states require that all boilers be built in accordance with it. Mr. Kendall has the idea that we can develop a code for industry in general which will put people on notice against illicit practices, such as rate cutting and other practices.

I think the committee is about to be announced and that it will have something to report by the December meeting of the Society. The plan is first to make a tentative draft, based to a certain extent on the code worked out during the war. I think, for example, that it will be possible in fifty words to make a large part of time study as it is now practiced in this country illicit. It will deal with this practice of changing rates which has been mentioned. When the drafting committee has finished its work I assume there will be a standards committee to keep the thing up to date. I hope the Taylor Society is going to be able to