

Production Control¹

"The Taylor System in Holt Management"

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The conclusions arrived at by Taylor in his paper on Shop Management in 1903, together with the methods he described, were based upon the thesis that every organized effort of human endeavor can be analyzed into its fundamental elements, and that these elements can be forecast and arranged in an orderly sequence that represents the best combination to attain the desired result. The analysis and arrangement of the elements of production brought about the two great divisions of productive effort that are characteristic of modern industrial management and production control—planning and performance.

In this paper the author presents an outline of the subject of production control in manufacturing, taking up for consideration respectively actual output with given equipment; preplanning; the establishment of manufacturing programs; determination of lot sizes; establishment of the production schedule; operation analysis; stores systems; dispatching of work; inspection; maintenance; and forms.

THE most efficient type of production management is based upon an application of the principles first laid down by Taylor in his classic paper Shop Management in 1903, and amplified and explained in his later writings and addresses. Taylor's great discovery in management

¹Paper presented at the Prague International Management Congress, Prague, Czechoslovakia, July 21, 1924; also at a joint session of the Management and Machine Shop Practice Divisions of the A.S.M.E. and the Taylor Society, New York, December 4, 1924. In presenting this paper on behalf of Mr. Babcock at the Prague International Management Congress, Mr. Robert T. Kent said in part:

"The company which I have the honor to represent here today has, by the application of the principles described in Col. Babcock's paper, achieved a record which we believe is unequalled in American industry. On July 1 of this year it had maintained for 645 consecutive working days, (on December 19, 789 days) an exactly scheduled production, based on a schedule that was laid down at least five months previous to the date on which the product was delivered to the shipping department. That is, the Company has had to determine, five months in advance, the exact quantity of work that had to be completed on any given day, the

quantity varying from week to week and from month to month. For a period of over two years it has not failed, for a single day, to deliver the exact quantity of product called for by the production schedule. This has involved the scheduling and keeping on schedule of over 8,000,000 machine operations.

Each of these items requires detailed and extensive investigation before the best combination for the desired final result can be found. Some of these investigations may involve heavy expense and exact

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technical knowledge, and may consume a considerable amount of time. Obviously, it would be impossible for the workers on their own initiative to conduct these, even if they had the inclination to do so.

Taylor's conclusions and methods were based upon the thesis that every organized effort of human endeavor can be analyzed into its fundamental elements, and that these elements can be forecast and arranged in an orderly sequence that represents the best combination to attain the desired result. This analysis and arrangement of the elements of production brought about the two great divisions of productive effort that are characteristic of modern industrial management and production control—planning and performance.

The function of planning includes all of those elements that are beyond the control of the workmen, and some of those that formerly were regarded as within their sphere. It includes a decision as to the material that will be used in the processes of the factory, the exact equipment that shall be used, the method of handling this equipment, the sequence of individual operations on each part of the product, and in the highest development of managerial science, the time that shall be taken for each operation. It also includes provision for instructing the workmen in the methods of handling the equipment so as to insure that the performance of the workman will accord with the forecast of the planning department. Upon the degree to which an industrial establishment has developed and made use of these elements of planning, depends the efficiency of production.

Classification of Manufacturing Effort

Manufacturing can be classified into the following divisions, ranging in order of efficiency from the lowest to the highest:

- a. One order for one piece, never to be reproduced
- b. One order for several pieces, never to be reproduced
- c. Repeat orders at irregular intervals for one or few pieces
- d. Repeat orders at irregular intervals for many pieces
- e. Repeat orders at uniform intervals for one or a few pieces
- f. Repeat orders at uniform intervals for many pieces
- g. Continuous or standing orders for the same piece.

Any industry may have in combination one or more of these classes of effort and in any analysis of the industry this should be recognized. The industry should be classified into the above classes and a control plan devised in such a manner as will secure the best results for each class. A general control plan will then be devised so as to relate the classes.

Irrespective of the class or combination of classes into which the work of a manufacturing plant falls, the efficiency of its operation will depend upon two things: (1) The efficiency in selection and use of the mechanical equipment of production; (2) The definite preplanning of every operation and event which takes place in the progress of the work through the factory. These may be considered in some detail.

The Mechanical Equipment

It is obvious that the best equipment that is available for a given purpose is the most desirable. High manufacturing efficiency does not depend upon this, however. Rather it depends on the best possible use of the equipment that is available.

If manufacturing efficiency be defined by the ratio

$$\text{Efficiency} = \frac{\text{Actual Output with Given Equipment}}{\text{Max. Possible Output with Given Equipment}}$$

it will be evident that the efficiency of the plant does not depend upon the efficiency of the equipment *per se*, but upon the efficiency with which that equipment is operated.

Efficient operation depends on the following factors:

- a. Maintenance of equipment in perfect operating condition, so that there will be no failures during working hours to delay production
- b. Adequate power at the machine, so that it may be utilized to its full capacity
- c. Proper adjustment of machines and auxiliary equipment and, in the case of machine tools, properly formed cutting tools
- d. Determination of the best methods of operating the equipment, and insistence that these methods be followed
- e. An adequate supply of material upon which the equipment may work, so that there will be no idle time or delays due to lack of work for any machine.
- f. Uniformity in the quality of raw material, permitting uniform operation at a predetermined rate. For example, excessive hardness in castings will compel slower operation of machine tools, and so decrease the predetermined production.