

cide how to manufacture. They know what machines and departments are available and what material and labor can be utilized. The route clerk lists the various operations, assigns machines or work places and alternates and makes out the tool lists. The latter's assistants upon receipt of a manufacturing order proceed with the necessary paper work.

Stores issues are made out in advance and stores apportioned to the orders, or if stores are not available the purchasing agent is notified and orders placed for the requisite material. Routine clerks then make out all other forms such as operator's job tickets, move slips, bulletin board tickets, inspection tickets, route or progress sheets, identification tags, and instruction cards where these are necessary. All this advance paper work is collected and filed away in a route file by classification and symbol, until the time when the order is to be started.

2. Scheduling

Under the development of plans the general determination of when to do the work is outlined. It is the duty of the scheduling group definitely to decide the relative order in which all operations should be worked upon, and just when each should be started and finished. They have available all the information that the master plans and the preparation function have secured and formulated. In addition to this they must secure for themselves exact facts as to the orders and needs of customers; what materials are on hand or due on specific dates; the time required for each operation, including inspection, moving, and assembly operations; balance of work ahead at all times in hours or in units; and balance of labor of requisite skill available for each operation.

The schedule supervisors, who are subordinate to the development and preparation group start with the knowledge of when each order or lot is desired and must work out a method of action through which orders will be finished when desired, at the same time keeping a proper balance of work and of labor in the plant. Machines must be used as continuously as possible and labor must not remain idle. Materials, which have already been prepared, must be ready to be moved to the machine or department. The best available operators for the individual operation, together with alternates must be provided just as is the case with machines.

3. Dispatching and Production

Having settled upon the proper sequence of operations for each job, and having indicated so far as

possible in advance when each operation should start and finish, it is the duty of the dispatchers working in close cooperation with the schedule men to see that the schedule is carried out as planned or revised as needed. If the schedulers, owing to the peculiar conditions of the plant, cannot definitely assign specific machines or labor to jobs, then it is up to the dispatchers to do so as soon as practicable.

Starting with the detailed schedule, the dispatchers must be provided with immediate and continuous records of progress, with records of machines and labor available, of quantity and quality of work produced, so that plenty of work (orders, instructions, materials, tools and so on) may be kept ahead, and revisions in the schedule made as necessary. Work cannot be economically started and carried through a shop in a haphazard manner; the methods must be worked out in advance if any sort of balance is to be maintained.

The detailed methods, of course, may be devised to fit the particular problems of the particular industry, but they all have the same object—that of putting work into a plant in an orderly fashion—and in many cases the experience and methods of one executive may be directly useful to another executive in a different line of work.

Some of the more familiar mechanisms by which this control is secured in different industries are planning or bulletins boards—which may or may not be in graphic form—graphic charts of various kinds, tickler systems, visible card indexes, and so on.

The whole function of scheduling and dispatching is a very difficult one since every factor and influence in manufacturing affects a predetermined schedule. The men in charge of this work must be of high calibre (particularly those who have to do with the scheduling) to sense in advance and avoid the pitfalls incident to high production.

Production, or the actual performance of the work, follows the dictates of the schedule as administered by the dispatchers. It is the duty of production officials to see that preparations for performance have been properly made and to direct and supervise the execution of them.

In order to function properly, the production group must have advance information regarding the work to be produced, the materials, tools, drawings, methods, wage plans, and all other necessary instructions. It is their job to check this information; they must be sure that they can carry out the plans as outlined. The material supplied must be of the proper speci-

fication and quality; the tools must be adequate and properly designed from the point of view of production as well as of engineering; drawings, together with detailed instructions as to methods and times of processing, as well as payment for work done, must be looked over and followed. Keeping the supply of labor up to requirements is primarily the duty of the preparation function, but the production men are in a position to assist in securing sufficient quantity of the right character of labor through selection and training of new employees.

The production group should supply the dispatchers with immediate and continuous records of progress with respect to all shop activities. Where desirable, this may be accomplished by providing job tickets, move slips, inspection tickets, etc., to be centrally issued and returned at each step in the work.

4. Inspection and Costs

Broadly, it is a function of inspection to see that all activities are being carried out satisfactorily. This means not only that work must be inspected for conformity to specifications, but also to see that performance in general is carried out in accordance with the instructions of the dispatchers. Thus both the quality inspectors and the production officials are concerned with the general inspection function.

The men responsible for quality inspection must work hand in hand with the schedulers and dispatchers, for it is only after the inspectors have passed upon the product that the dispatchers can continue with the processing. The inspectors must be furnished with the specifications and drawings showing the finish, tolerances and quantity, instructions as to methods, and properly calibrated inspection tools. In addition the inspector must have sufficient knowledge of the uses of the product to determine whether to scrap, repair, or pass doubtful cases. The foreman and other production officials must also be provided with all information and instructions for performance, so that general inspection can be maintained throughout the time of processing.

The cost department follows in the trail of production and collects the actual expenditures. It includes sorting and charging each expenditure against its proper account or classification. A system of production control, as indicated here, provides an easy and natural tie-up with costs. While performing the various functions outlined all the actual order or operation costs is made out as part of the preparation routine. It remains to tabulate and collect the vari-

ous costs from the job tickets and other production records that are turned in daily by the various departments.

In conclusion, the object of production control is to secure the maximum use of facilities so as to satisfy the needs of sales, production, and finance. This is to be accomplished by means of careful and scientific preparation and administration of work in process, as outlined in this paper.

However, the mere setting up of functions and mechanisms will not necessarily produce proper production control. In addition to standardization and functionalization, personnel of high calibre is absolutely necessary. Men who think, and have executive ability, must be placed in control. Functions such as development and preparation of plans, scheduling, production and inspection all require men who are distinctly able and aggressive. Again, even with the proper type of personnel in the functions, best results are obtained when these men are tied together through a logical form of organization so that they work and cooperate as one harmonious group.

IV. The Value of Production Control in Industrial Management

IT WOULD be difficult to find a manufacturer who does not believe in some kind of planning or production control or has not put into operation a control plan in his own industry. It is for the purpose of checking up the value of present methods of production control that this paper is written.

A. Turnover

Manufacturing executives of large and small industries are continually confronted with the problem of inventory turnover time. Of this all-important subject it is sufficient to say here that the length of turnover time in a manufacturing plant depends largely upon a proper system of production control.

Manufacturers are successful or otherwise according to the quality of the service supplied the public, and the measure of this service is the price and quality of the product in comparison with competing industries. Inasmuch as time is the thing that all manufacturers pay for in raw materials and finished product, it is advisable to arrange manufacturing methods so as to shorten the time of manufacture to a minimum as the consumer will buy where he receives the most for his money.