more valuable than the unrecorded decision of a committee. Changes should not be permitted without the consent of the management. No master plan can be final until the job is done. The work of this division is a continuing work; the plan need rarely be changed, but the schedule is alive and not a static thing, and coordinated rescheduling may go on frequently without necessarily impairing the usefulness of the master plan.

Usually the wisdom of sending the complete plan to all parties concerned is open to discussion. The executive heads of major divisions of the business should have complete copies, but the minor executives need have only those sections in which they are directly concerned.

6. Inspection

Inspection is the checking up of results as the work is progressing and after it is finished. The master planning division should be held responsible for following schedules of performance and should report to the management any deviations from the plan of schedule. This is highly important as better planning will follow the checking up of the performance of previous plans. It leads to real cooperation.

E. Personnel for Master Planning

The men best adapted for master planning are of the creative, analytical, imaginative type—the engineer type. The training for the work is essentially that of the engineer, although it does not follow that only graduates of technical schools will satisfactorily meet the requirements. The school of life in its human, industrial, and commercial contacts will often fit a man for the work if he has the aptitude for observation and analysis. In a general way it is difficult to discuss the personnel for master planning. The final product—the master plan—must take a form to meet the individual needs and type of organization of the particular business enterprise.

F. Types of Master Planning

There are two general types of master planning organization. The first is adapted to the business making a single related line of products. In this case there will usually appear a functionalized form of organization. We may find (1) field investigators, (2) bibliographical or desk investigators, (3) statistical investigators, (4) planners, (5) schedulers.

The second form of master planning organization is usually found in a business dealing with diversified unrelated lines of products. In this case we find no clear differentiation of functions. Occasionally this organization is called a "merchandising department." It confines its operations to the research and planning work of a single line of products and there are as many merchandising divisions as there are definite, diverse lines of product. Usually, however, even in this type the statistical and research functions are centralized. Separate specialized staff divisions perform these functions for all parts of the business. Frequently, also the planning and operating functions are united. The master planning for the whole business is done by a committee of merchandising, sales, and production executives and the result of the committee's work constitutes the master plan for the whole business.

II. Determination of the Method of Control

CONTROLLING the manufacture of the product is probably the most important factor in putting across a master plan or budget of the business. Upon this control depends the economical manufacture of the product. It insures a constant flow of product to meet the sales schedule and the least possible waste in time and money due to the idleness of machinery and labor.

A. Gathering the Facts

Many factors of varying importance affect the type of control to be developed. Having determined in advance that control of production is desirable and necessary, the next step is to decide upon the proper type of control.

1. Type of Industry

The industry itself will determine the broad principles, for all industries fall into three groups; (1) assembling; (2) continuous; (3) a combination of both. A straight line industry will naturally need a very simple and more or less automatic control. The assembly plant, however, usually presents a more complicated situation and therefore requires an entirely different method of supervision.

2. Type of Manufacturing

After deciding to which of these groups the industry belongs, the question is whether the products should be produced (1) to order; (2) for stock (3) both.

If the number of lines are few the problem is comparatively simple and the amount and kind to be produced can be planned a long time in advance. This can also be done in certain cases of manufacturing to order, especially in industries where orders are placed far in advance and in large quantity. In most instances this is not true, and extremely careful consideration must be given to the problems of when and how much should be made.

The first classification, as in the making of rubber footwear, can be governed by an order control, either by breaking down the original order into its different elements or by grouping orders for similar parts having the same delivery dates. The second, manufacturing for stock, can be considered along with the third—which is a combination of both manufacturing for orders and manufacturing for stock. This condition, which necessitates a part or product control, is highly emphasized in the manufacture of watches and speedometers with their many parts of intricate design, their sub or minor assemblies, major assemblies, and the complicated final assembly.

3. Types of Product

The type of the product has a direct bearing on the control methods. A concern manufacturing a crude, cheap article and one manufacturing scientific instruments have entirely different problems. It has been proved in numerous cases that rapid production and quality production do go together. However, in cases where workmen are extremely scarce and highly skilled, where the necessity for quality is a dominating factor and where cost is a minor consideration, it is highly advisable that the management proceed slowly and cautiously in developing a system of control.

4. Equipment, Processes and Material

Other important items are the kinds of machines and equipment. Automatic and specialized machinery present different problems from those of bench work or simple progressive assembly. The processes and machinery may be more or less standardized. As a general rule they can be highly standardized. With materials the situation is different. Certain materials are by nature hard to deal with; wood, for example, is much more difficult to standardize than steel. The methods of handling materials, however, may be highly standardized in many cases.

5. Size of Plant

An extremely important factor is the size of the plant. A small factory may be controlled by means that are in principle entirely inadequate for a large concern in the same line of business. The size of the business is an excellent measure of the type of control for labor, tools, planning, and production.

6. Layout

The layout of the plant is important. A modern plant, with large floor areas and all buildings having the same floor levels, presents a different situation from that of an old crowded set of structures with varying floor levels. The layout usually affects the physical movement of work as much as any other single factor.

7. Departmentalization

The extent of the departmentalization is vital. In cases where the products are manufactured in interrelated departments a tight and complicated control must be established. The problem is more simple if the departments are not so interrelated; that is, if one department or a group of departments make the product from the raw material through to shipment.

8. Delivery Dates

Delivery dates are all-important in seasonal businesses. The consumer or distributor will not accept the product after a certain date. In order to continue in business the manufacturer must have a comprehensive method of determining assembly and delivery dates in advance and of seeing that they are lived up to. Even in non-seasonal businesses establishing and honoring delivery dates is highly desirable. More friction between producer, seller and consumer has been aroused by failure to live up to promises than by any other cause.

B. Determining the Type of Control

The group of facts which have just been discussed can readily be determined for any business; it is a matter of inspection. Certain of these items are permanent; others can be modified. After the facts are all in mind and stabilized the decision as to types of control can be made.

1. Centralized or Decentralized Control

There seems to be a great deal of discussion as to whether centralized or decentralized control is best. Two schools of thought have developed around this point, but it is becoming rapidly apparent that no one type is best for all cases.

The term centralized as applied to production control implies that each function or group of functions is under the control of one person and is performed in one place. In a sense, anything short of the complete centralization indicated would be termed decentralization. In actual practice, however, the important thing is the degree of centralization. In decentralized control the major plans are worked out in