

Production Planning¹

A Case Description

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THIS paper is primarily one asking for information rather than giving it. Perhaps this is not a common procedure; but since discussions of papers are sometimes their most valuable product, it is hoped that some useful effect of this sort may result here.

The questions to be raised relate to the production methods of the Jones and Lamson Machine Company of Springfield, Vermont, with which the writer is connected. These methods were outlined in a paper entitled "Design, Manufacture and Production Control of a Standard Machine" read before the American Society of Mechanical Engineers on December 4, 1924. In brief, this paper described: (1) the re-design of a line of turret lathes to make them as far as possible of the same component parts; (2) mounting the beds on temporary truck wheels for progression by manpower in a line assembly scheme; (3) the departmentalization of the shop by product rather than by function, bringing the progress of the work into a straight-line flow from rough stock to line assembly, and including an open stock room without stock keeper or records; (4) the devising of a "program" scheme of production control; and (5) the installing of a system of standard operative times which forms the basis of individual and departmental efficiency records.

The purposes of this scheme were: (1) to lower production costs by standardizing the product and applying some of the advantages of continuous production with line assembly to a low output; (2) to reduce the overhead expenses of routing, scheduling, stock chasing, transportation, supervision and stores keeping; and (3) to give flexibility to the production program of the various machines in the company's line to meet varied demands of the market. All of these purposes appear to have been met in a fair degree, though there has been such a variety of other changes made meanwhile

¹Paper presented before a meeting of the Taylor Society, Philadelphia, Pa., May 1, 1931.

that it has not been easy to segregate and value the effect of these particular ones.

Figure 1 gives a view down the hand-operated assembly line of the shop as it was originally laid out.

It is of the scheme of production control that I desire particularly to speak. There are, of course, several production schemes, of which building and assembling in lots, and ordering on maximum and minimum perpetual inventory records, are the most usual for small output, while "continuous production" is the common plan for output high enough to permit of its use. Our "program" scheme was devised and installed with the hope of getting some of the benefits of continuous production in a shop of small output. Let me describe the plan briefly.

The year is divided into standard production periods, of which we had at first four of three months each. These were later changed to six of two months each. Each piece of a standard machine is scheduled for a particular starting date in the shop, which date then recurs at two-months intervals. The shop production is governed by standing orders, good until changed, calling for so many of each general class of machine per week or per month. The particular sizes are not specified in the standing orders. By means to be described the order clerk translates this information into the proper size of lot for each given part. When the starting date is reached for a given part, the order clerk counts the number of parts in the stock bin. His orders show that for the current rate of production there should be a standard number of parts in the bin at that particular time. If there are more than the standard number, the standard lot is diminished by the amount of the excess; if there are less than the standard number, the lot is increased to meet the deficiency. The standard quantity was originally set to give a half lot in reserve when the new lot arrived in the stock room. The purpose of this half lot was to provide for spoilage, and to give a reservoir on which to draw for immediate

large share of a certain type of manufacturing overhead. There are practically no records to keep except for costing; there are almost no inter-departmental communications, either verbal or written; there is a minimum of transportation of materials, and a stream of parts is provided in such a way that, on the whole, assembly proceeds without undue delays.

Of the various criticisms which have been directed against the scheme the one which we have been inclined to take the most seriously is that it ties up too much money in inventory between the receiving platform and the assembly line. The half lot in reserve, and the standing production orders (frequently modified, it is true) probably require more value on hand than does the lot method; and the size of lots cannot be so accurately set at the most economical production figure as with the maximum and minimum stock-bin method.

Consideration of the advantages of the lot method has, in fact, led us to elaborate somewhat our original simple method of determining the lot size. We are now using a plan depending on the forms illustrated in Figures 2, 3 and 4.

At the beginning of each two-months period the man in charge of production refers to current orders from the financial control of the company, giving the rate of output in machines desired per week. He then obtains from the management the estimate of the sales department as to actual orders, inquiries, etc., and thus makes out a schedule of the desired number of each of the various styles and sizes to make up the required orders. This schedule when made up appears as in Figure 2. This shows a rate of output of three and two-thirds Fay lathes per week or a total of thirty-three for the nine-weeks period. For the turret lathes a schedule of nine is called for, or one a week only. These figures reflect "hard times," Russian orders, a small stock of finished turret lathes and other current phenomena.

Every component part of all the machines in our line has its own card as shown in Figure 3. This is filed in the shop-order department under the starting date. When the starting date is reached the card is pulled out. The assembly numbers at the top correspond with the same numbers on the schedule in Figure 2. In the space marked "analysis of assemblies" is a list of the sub-assemblies in which the part is used. The "total per machine"

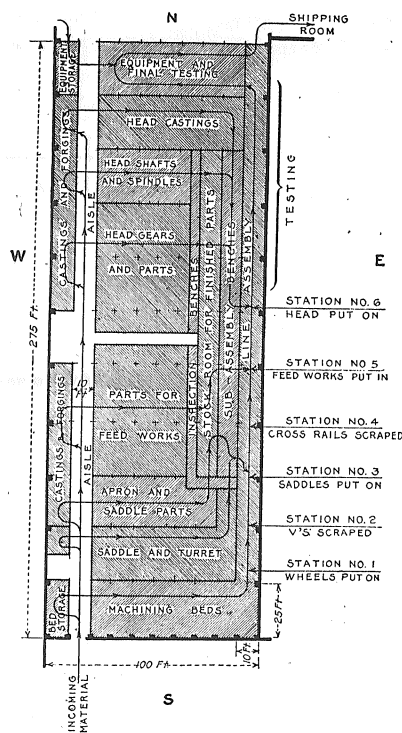


Figure 1: View Down Hand-Operated Assembly Line

increases in the assembling rate when orders increased suddenly, as sometimes happens.

Meanwhile the rough stock has been controlled on the same principle, by the ordering of enough new castings, forgings or what-not to provide a predetermined total of raw material for the standard, shop order in the two-months period, and still maintain a half-lot reserve. For details of this plan the reader is referred to the original A.S.M.E. paper.

After eight years' experience, we can say that this production scheme has met almost all our expectations, particularly in doing away with a