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Graphic Production Control.

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In the management of any industrial plant, the author has become convinced, through plain experience, that apart from the personality of the management directing affairs, and the regular accounting system, there is a great necessity everywhere for the placing of facts in such a manner that the condition of affairs today can be quickly seen in their true relation to the policy of the management. We are all more or less accustomed to seeing statistics shown graphically. Their value to show what has happened is unquestioned. We are able to see at a glance for instance how our expenditure on a certain class of output compares with last year, and if we plot on the same sheet the amount of our output we are able to see how the cost has varied with the output. Such a diagram is a familiar one and needs no explanation (sample shown in fig. 1). Endless combinations are made like this, but they all tell you what is done. I wish to emphasize this point because upon it hinges the purpose of this paper.

I ask those who are departmental heads, do you not on receiving statements, whether in figures or by diagram, often feel that you have been "let down," so to speak. Let us suppose you have received a statement showing departmental expenses, or a statement of output in which an item shows lower than your expectations or the average. You see a condition that if you had known it was happening, you could have done something, but you didn't, and all you can do now is to investigate and make such changes as your judgment dictates.

After you have received an explanation, called your man down or perhaps replaced him, what guarantee have you that you will not look at an even worse condition next month? The only guarantee you have is your confidence in the man in charge. This confidence I do not for an instant depreciate, because it is your main stay with the most perfect of systems, but consider, in this age of specializing, would you not be better off and would not the individual departmental heads or foreman be better off if you were to supply him with such information on expenses or where he stands on this output, or other details that are "up to the day of looking at it," so that he can control the situation to give you what you want. The natural question becomes, can it be done? It can if you organize to do it. To organize to do it, means that you must assist that executive or foreman by training specialists to perform functions that are at present part of that foreman's duties, to do them better than the foreman can, by reason that these specialists concentrate on one particular object only.

Specializing needs no introduction, on our machines and operations we know a specialist can produce more than an all round man on work adaptable to specializing. We no more think of having the same boilermaker that puts a patch on a boiler, roll in tubes, than we would ask a tuber to put on a patch even if they do get the same rate. Therefore, I say, for the reason that specializing cuts costs, so it applies in management questions.

Without further discourse on the principles involved, I propose to give a few concrete examples of how graphical production methods permit a specialist to perform functions that assist the executive by supplying information that is "up to the day of looking at it," that show "What is causing delays," or "What will cause delays." The diagrams I have made are for obvious reasons of size and data made so as to show the principle. Colors are used on actual forms in order to create striking contrast.

Locomotive or Passenger Car Repair Schedule—Example 1 is a shop repairing locomotives. The methods apply equally to a passenger car repair shop. Our object is to assist all foremen to plan their work so that delays to output are min-

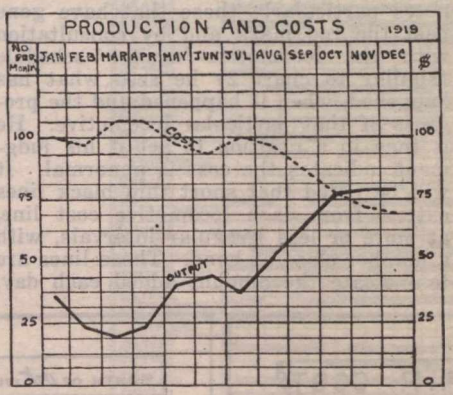

Fig. 1, What HAS happened.

imized. Analyzing the situation, we find we have about 30 departments, all of which receive some part of each locomotive or car to repair, and on all of which rests the responsibility of having it ready at a certain time, when the process of erecting demands it. Based on the road report, and a preliminary inspection our specialist, the scheduleman, in conjunction with the general foreman of the shop, determines that it will require so many days to complete. This period is determined by adding together the time required on all the various detail jobs known. From past experience we have on this work developed a series of schedules from 9 to 30 days each, one of which is applied to each locomotive or car as the case may be, as the work demands. The locomotive repair schedules are practically all based on one 18 day schedule, in that on all locomotives the operations for the first 5 days are practically the same, and for the last 7 days also, they are the same; the space in between being taken up by the department having the excessive or special work to do.

We now come to our first chart which we call a master schedule (fig. 2). The master schedule forms have detailed down the left side all the controlling detail operations or parts listed in the sequence in which they are required completed. At the top of the vertical columns we enter the locomotive or car number as each is taken in the shop, and then by the application of the particular schedule, on which each locomotive or car is to follow, we enter opposite the operation or part the date it is required completed or delivered. When this is done we take our second form called a date schedule (fig. 3), which is identical with the master schedule, except that instead of locomotives or car numbers at the top of the vertical column, we have all the days of the month, and we insert in the column for the date as entered on the master schedule the locomotive or car numbers opposite the operation.

This is done as soon as the locomotive or car is taken in the shop. By a four color code we record on both charts every day exactly what has happened, whether "on time," "shop late," "material delivery late," or "drawings late," in black, green, red or yellow, respectively. This is done as follows: Each day, at a certain time, the schedulemen make a check of all shops, after which they mark up the master and date schedules. Following this they make out from the date schedule for each departmental foreman, a list of operations due completed tomorrow, and include on it, especially marked, all items that are late. This daily order of work sheet is delivered to each foreman the night before the day it covers, so that they can plan their work to cover every item. Incidental to this a list of all late items in all shops is prepared for the general foreman and superintendent's use in order that they may use their influence to prevent further delays.

Summarizing this example, we provide each departmental foreman with a list of work which must be done tomorrow; we provide a list of late operations and material so that delays may be investigated and something can be done early in the progress. We have before us a graphic record of each locomotive or car's progress, showing each delay, as it occurs, and we have a graphic record of each day's progress, from which weak points can be seen at a glance. The result of this performance is that we get a co-operative effort, because each department, being familiar with the process, realizes that the management knows what is going on and can measure each man's effort. It makes it unnecessary for foremen to leave their shops to trace material, this being part of scheduleman's duties. Changes that occur when extra work is found necessary, causing a set back to the original date of delivery are automatically taken care of by the production department. The net result is a shorter number of days in the shop per unit, time between jobs reduced and lower costs.

Locomotive or Passenger Car Repair Costs—Example 2 may be considered a