Production Management[1]

A Treatment of Two of Its Major Phases—Equipment and Materials Control

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THE material of this paper is drawn largely from the cotton manufacturing end of the textile industry where matters of equipment and materials control make up the main manufacturing problems of the industry. The other problems of production management are provided for to a large extent in the nature of the processes involved in cotton manufacture. Predetermined standards of production and cost are not possible of fulfilment, however, without a high degree of machine efficiency and an effective system of handling materials and supply parts.

Equipment Control

Equipment control, or plant maintenance, can be divided into five main subdivisions.

1. Machinery
2. Belting
3. Electrical equipment
4. Buildings (village)
5. Fire protection

1. *Machinery Inspection and Maintenance.* The purpose of this is to prevent, as far as is possible, interruptions in operation and loss of production due to machinery and equipment in bad order or broken down. To accomplish this purpose it is necessary to (1) inspect machinery and equipment at such intervals as to insure the detection of wrong adjustments, wear or impending breakdown; (2) make such repairs or replacements as inspection shows to be necessary; (3) keep systematic records of equipment inspection and repair, and (4) keep tickler records to warn of the necessity of re-inspection.

One of the most important points to consider is the qualifications of the inspector or inspectors. It is essential that the inspector have experience which would enable him to qualify as a first class machinist, with some knowledge of motors and electrical starting equipment. His schedule of inspection takes him into all departments of the mill and brings him into contact with overseers, second hands, section hands, loom fixers, etc. For this reason he must be in a position to command respect because of his ability. He should also have the faculty of being able to win the co-operation of his fellow workers.

Inspection is carried on by the regular inspector and is confined entirely to machine maintenance. It does not cover inspection of operating conditions and machine settings, such as that carried on by order of the department overseer. For example, it is not the purpose of maintenance inspection to check up on card or loom settings, but a check on the wear of gears and bearings is well within the limits of this inspection. In other words, it is a machine inspection and not an operating inspection.

Reports on boilers, steam engines, pumps, motors, mill roof, windows, heating system, shafting, hangers, counter pulleys, elevators, sprinkler pipes, etc., take care of scheduled inspections on other than actual process machinery.

The schedule of inspection is provided for by a series of forms on which the items which are to be inspected in connection with every machine are listed. To simplify the reports the questions are so worded that, in a majority of cases, the inspector has only to check "Yes" or "No" in a column in order to indicate the condition of the machine items. If further inspection is required than the check in the "Yes" or "No" column indicates, a check is put opposite the proper item in a "Remarks" column. Here also the inspector lists any unlisted defect or alteration that needs attention.

A few of the questions pertaining to resistance motors are given in illustration.

	Yes	No	Remarks
Motor tight on base			
Brushes tight			
Brushes burned			
Resistance spools burned			
Sleeve worn			
Dust guard tight			
Brush shafting lever worn			
Cable connections to resistance spools tight			
Terminals tight			
Toggle for brush shafting lever worn			
Rollers for shafting lever worn			

The arrangement of the inspection forms in the tickler file requires very careful consideration, because it brings up the question of the frequency of inspections and the element of time involved in the inspection itself. Some items, such as looms, may require three or four days for inspection; other machinery of necessity has to be inspected during week-ends. Some equipment should be inspected weekly; whereas every six months is often enough for other items.

After the time element is determined, a tickler file consisting of sections for the twelve months, with daily tabs for the active month, is arranged. At the beginning of the year, the days of each month are listed and the form number for each report is listed opposite the predetermined date. At the end of the month someone in the office takes the list for the next month and places the proper form numbers behind each date in the tickler file. The first thing every morning the inspector goes to the plant maintenance tickler file and takes out the inspection forms for that day only. The following morning, he gives one copy of the previous day's report to the overseer in whose room the inspection was made, and the other to the office. The inspector's duties cease when the reports with their findings are turned in to the office. The office copies of reports are held until the overseer turns in his copy with the notation that the work recommended by the inspection is completed. The two copies are then filed together. It should be the duty of the manager or his assistant to check up occasionally on items reported by the overseer as "corrected."

There will be times when, in the opinion of the overseer and the mill manager, it is not desirable or economical to carry out the inspector's recommendations. When this occurs, the reason for such a decision is stated on the file copy. It should be noted that failure of the overseer to agree to a given recommendation by the inspector does not necessarily constitute a criticism of either the overseer or the inspector. The inspector's duty clearly is to report conditions as he finds them; whether his judgments are followed must be left to his superior's discretion.

Obviously there are some machine parts which require internal inspection and which the inspector has no time to take apart himself. It might be helpful to mention a few examples.

A mill, for example, has five pickers. One of these is taken down and thoroughly cleaned every week. Consequently, the inspector is able to make his internal inspection for wear on each picker every fifth week. The inspection of valves on steam pumps, triplex pumps and air compressors obviously cannot be made unless the machines are taken apart. If it is decided that these shall be overhauled every three months, the plant maintenance man makes his report at these periods. The forms for these machines which are carried in the tickler file and come up regularly every three months act also as a reminder to the master mechanic that it is time to do such overhauling.

2. *Belt Inspection and Maintenance.* The purposes of a system of belt inspection are, briefly: to keep the cost of belting at the lowest possible point by proper cleaning, dressing and inspection; to maintain machinery in operation at all times; to maintain the speeds of all machines at the standard set for each machine; and to maintain an adequate set of records, so that an accurate check may be had on the wearing qualities or the economy of any particular belt.

The duties of the belt man are to care for all belts in the mill, including motor, counter, to machine and purely machine belts, with the exception of cone belts on roving frames. In order to do this, he has a regular schedule for cleaning, dressing and inspecting. In general, all belts should be cleaned once a month. This, however, is not a fixed interval but is decided on the basis of local conditions. For instance, the speed records, of which more will be said later, showed us the necessity of cleaning card belts daily. Once a month, after cleaning a belt, dressing is applied if the belt man finds it necessary. Castor oil, neats foot oil, cod oil, tallow or a belt preservative recommended by the belt manufacturer, are all permissible. Nothing containing rosin or mineral oil is used because both are detrimental to belts. All belts are inspected on schedule for slackness or slippage. The

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