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Factory Costs*

BY L. T. KONOPAK

While it is true that certain principles underlie all factory cost systems for the same industry, it is equally true that no one system will fit all the factories in that industry. The forms used and the manner of accumulating the detail must be governed by the physical operations and the production methods employed, which differ in practically every factory even though the same product is manufactured. The cost system described in the following pages was designed for a factory manufacturing transmissions, and the only claim made for it is that it fits the conditions of the particular factory for which it was designed, but not the industry as a whole. It was designed for a factory making its first step toward efficiency, and an attempt was made to avoid complications, which would discourage further efforts.

The forms provided for reporting the various transactions of the factory were designed to facilitate handling the clerical work in a routine manner with the least consumption of time.

It is imperative that the men employed in the factory be impressed with the importance of the system, for the cost records are based entirely upon reports issuing from the factory employees. When a new cost system is installed various difficulties are encountered and its introduction is sometimes opposed by the employees, for the system may mean a curtailment of privileges, closer supervision and more effective work—all of which are advantageous to the plant. Possibly some minor points of the system as first installed will require revision in the light of new developments, but there is no doubt in regard to its successful operation if supported by the management.

By keeping the physical operations of the factory in mind this report will be easily comprehended, for the cost system merely records them in dollars and cents. The ease with which costs are accumulated depends entirely upon the manner in which the factory is operated. The records must follow the same routine as the production, and if the production is thoughtfully and systematically

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planned the records will naturally follow in the same order—and, of more importance, the production costs are then at a minimum.

The accounting of the company is divided into two distinct classes, segregating all expenditures for production, constituting factory costs, in one group of accounts and the expenditures for general administrative and selling expenses in another group of accounts. The factory cost includes all items incident to the manufacture of the product and may be further subdivided into direct and indirect costs. The direct cost of an article includes the cost of all material that goes into it and the labor cost of the men performing the work. The indirect costs include all items which can not be charged in entirety directly to the article being manufactured, such as supervision, power, depreciation and all other items of expense necessary for the factory's operation. Indirect cost is generally called overhead and will be pro-rated over the cost of the various articles made in the factory in proportion to the direct labor consumed in their production.

The operation of the system will be started with a complete inventory of all raw material, material in process of manufacture, finished parts and assemblies. The inventory of the work in process will be posted to the cost sheets for the respective part numbers, and the raw material, finished parts and assemblies will be posted to the stock record cards.

When material is received in the factory it is reported on a receiving slip from which the quantity and unit cost are entered on the stock record. Material returned to the shipper is reported on a return purchase slip and the quantity is deducted from the balance on hand as shown by the stock record.

When the manufacture of each quantity of a part is started, an identification tag is fastened to that particular group or lot showing the lot number, part number and the quantity started. The bottom of the tag contains a requisition, on which the material used is recorded, which is then detached from the tag and sent to the cost department, where it is priced, charged to the cost sheet and credited to the stock record.

The cost of all work performed in the factory is accumulated on cost sheets, which are carried for each part or assembly of parts or for orders to cover various expenses and work other than regular production. The part number is always recorded by the employees of the factory when reporting work performed or ma-

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material used in the manufacture of a part or assembly of parts. When working on a part, the lot number shown on the identification tag is also reported. If work, for which orders are provided, is performed the employee designates the order number on his time report in the place of the part number.

The parts made in the factory will be entered on the stock records from the cost sheets and those used in assemblies completed during a month will be determined from specifications of parts required and reports from the factory of the quantity of assemblies completed. It will not be necessary for the factory to make requisitions for parts used in assemblies.

However, as parts are found defective when fitting them in the assemblies and as only the parts required according to the specifications are charged to the costs, it will be necessary to return to the stock room all material found defective, and the stock-keeper will report it to the office on a defective material report from which the stock records will be credited. When entering the receipt of such material on his reports, the stock-keeper will segregate it according to the disposition he will make of it. That is, he will group the material to be scrapped on one report, the material to be repaired on another and the material to be returned to the shipper on another.

Each employee will record the time he spends on each job on which he works during the day, whether he is paid on a day rate or piece rate. The daily time tickets are to be approved by the foremen and sent to the cost department, where the rates and extensions are entered and they are then posted to the cost sheets and payroll.

The inspector will make out the piece-work ticket in duplicate, giving the carbon copy to the employee as a receipt for the work. The original is sent to the cost department where it is priced, extended, entered on the employee's daily time report, posted to the cost sheet and filed according to part and lot number.

As stated before, all parts being manufactured in the factory are identified by a lot number designated on a tag attached to one of the parts and as the work progresses the clock number of each employee performing any operation on the part, the number of the operation performed and the quantity completed and passed by the inspector are entered on the tag. The advantages of this tag are to aid the inspector in determining the correct count, to

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avoid errors of paying more than once for performing the same operation on the same part and to insure a report of the material used for the cost records.

If the employee does not complete, before quitting time, the lot passed to him, only the quantity actually completed will be entered on the tag at that time and the balance will be entered when completed. If it is desired to break a lot and send some through ahead of the remainder, the quantity on the original tag should be changed to agree with the quantity left behind, and a new tag, bearing the same lot number as the original, should be attached to the parts sent through ahead, and the quantity, operator's number and operations should be recorded thereon for the parts in that group.

The costs are accumulated on sheets segregating the material, the labor for each operation and the overhead. A separate cost sheet will be used for each part number and the number of lots for the same part grouped on one sheet will be determined by the cost department. By recording the lot numbers for the material used and the labor for every operation, it is an easy matter for the clerk posting these sheets to determine any discrepancies in count. When a cost sheet is closed, the costs are totalled and reduced to a unit cost which is transferred to a comparative cost record. In time this record will be valuable to indicate fluctuations in costs, but the final analysis must be made from comparison of the original cost sheets.

All material used for assemblies will be credited to the stock record and charged to the assembly cost sheets from specifications of parts required and will not be reported on a requisition from the factory. The assembly labor is posted from the time tickets and, upon the closing of the cost sheets, the overhead is added to ascertain the cost of the completed articles. They are then entered on stock cards from which they are credited when sold.

There is a considerable difference in the overhead per hour or dollar of labor for the various departments in the factory, which becomes evident by comparing the equipment used by a man at a bench with a few tools and an electric light with the man at a machine costing several thousand dollars which requires expensive repairs, power, oils, etc. Therefore, all the individual expenses of a department will be charged directly to it and the remaining items of overhead will be pro-rated to the various departments in pro-

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portion to the benefits which they receive therefrom. Separate overhead rates will be determined for each department by dividing the total departmental expenses by the number of its productive labor hours.

DESCRIPTION OF FORMS

Receiving slip. A separate receiving slip, made in duplicate, is used to report all material received on each purchase order number. Both copies are delivered to the office, where the duplicate remains for the office files. The unit prices are entered on the original, which is then delivered to the cost department and the quantities and unit costs are posted therefrom to the stock record card, indicating the receiving slip number in the reference column. The original is then filed according to number in the cost department.

Stock record. A separate stock record card is used for each part to perpetuate the inventory, and the quantity of each part on hand and its cost when the inventory is taken will be posted to the respective cards. The material received for stock is added to the balance on the stock record cards from receiving slips, from defective material reports of material to be stocked or returned to shipper and from closed cost sheets. All raw material used is reported by the requisitions detached from the identification tags and the quantity so used is entered on the stock record and deducted from the balance on hand. Finished parts used in assemblies are deducted monthly in total for quantities as shown on assembly cost sheets. Parts used for customers' repairs—charged or gratis—are deducted as reported.

Identification tag. Each lot of a part manufactured is to be tagged and identified by the lot number on the tag. If it becomes necessary to divide a particular lot of parts and send some through ahead of the others, an additional tag bearing the same lot number will be used. The requisition attached at the bottom of the tag should be properly filled in, stating the quantity of material used, the part number of the completed part and the number of pieces started. This requisition is delivered to the cost department and the quantity of material used as designated thereon should be credited to the stock record card. The unit and total costs are then entered on the requisition and posted to the cost sheet for the part number designated. The requisition is then filed according

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to lot number until the end of the month when an adding machine list is made and the total cost shown thereon is charged to work in process and credited to the stock room.

The inspectors or employees should record the operation number, quantity completed and passed by the inspector and the operator's number in the spaces provided on the identification tag. When the part is finally completed the tag is sent to the cost department as notification.

Defective material report. All material which is defective, due to poor workmanship or other causes, should be returned to the stock room. The stock-keeper should make daily reports to the office of all such material received, stating what disposition will be made of it. Such material as castings, etc., if returned to the foundry before any work has been performed upon them in the factory will not be reported on a defective material report; but if an operation has been performed on the material and it is then found defective the stock-keeper should report the receipt of such material. Separate reports should be used to report the material to be scrapped, repaired for stock and returned to the shipper, respectively. The cost department will enter the costs on these reports and credit the various cost sheets to which the material has been charged. At the end of the month they will be summarized to show the total cost of parts scrapped, repaired for stock and returned to shipper.

Return purchase slip. All material returned to a shipper is recorded on a return purchase slip in duplicate. The carbon copy is sent to the cost department and the quantity shown thereon is credited to the stock record card. The original is delivered to the office and an invoice against the original shipper is made therefrom.

Report of material used. Frequently material purchased for the manufacture of the company's product will be used for other purposes, such as making new tools, repairs, etc., and it should be reported to the office on the report of material used. The quantities thus reported are credited to the stock record and the report is priced, posted to the cost sheet and filed according to order number until the end of the month, when the total cost is obtained and charged to work in process, crediting the stock room.

Piece-work ticket. Piece-work tickets are to be made by the

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inspectors, reporting on a separate ticket each kind of part worked on during the day by the operator. These tickets are to be made in duplicate; the original is sent to the office and the carbon copy is given to the operator as a receipt for the work. In the office these tickets are priced, extended, checked with the employees' daily time report and posted to the cost sheet for the part number designated. They are then filed according to part number.

Time report. A daily time report is to be approved by the department foreman for each employee. It will show the disposition of his time for the entire day, whether piece-work or day work, and the part number or order number, etc., on which he worked. In the office these tickets are extended, entered in the payroll book and posted to the cost sheets. They are then filed according to the employees' clock numbers and accumulated for each pay period.

Cost sheet. A separate cost sheet is used to record the cost of manufacturing each part, assembly or work performed on orders. These sheets are filed in a binder according to part number or order number. When the requisitions are posted the lot numbers are also entered in the space provided on the sheet as a check against incorrect labor postings. The posting of time tickets is segregated to show the total labor cost of performing each operation on the part. When the cost sheet for a particular part is closed, overhead is added and the totals are summarized and transferred to the comparative cost record. The quantity completed is posted to the stock record cards for finished parts or assemblies. The cost sheet is then withdrawn from the current file and the total of all closed orders is charged to the stock room and credited to work in process. The charges accumulated on orders will be closed each month by charging the respective expense or asset accounts and crediting work in process.

At the end of each month the cost sheets are proved by trial balance with the controlling account carried in the general ledger.

Comparative cost record. A separate comparative cost record is kept for each part number and the costs accumulated on a cost sheet are transferred, when the cost sheet is closed, to the comparative cost card.

Assembly cost sheets. The cost of assemblies completed is computed on an assembly cost sheet on which the parts required

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are listed in detail. The stock records are credited with the parts used, and the unit and total costs are entered on the assembly cost sheet. The assembly labor and overhead are then added. The total quantity assembled is entered on the stock record and the total cost of assemblies for each month is charged to finished product and credited to work in process. These sheets are then posted to the comparative cost cards and filed according to part number for further comparison.

MONTHLY JOURNAL ENTRIES

The following journal entries, necessary to prepare the general books for the compilation of the monthly financial and profit and loss statements, are to be made by the cost department and given to the general bookkeeper:

Dr—Work in process

Cr—Raw material stores

Total cost of raw material used, taken from requisitions detached from identification tags.

Dr—Raw material stores

Dr—Material spoiled and scrapped

Cr—Work in process

Total cost of material found defective in process of manufacture as shown by summary of defective material reports.

Dr—Work in process

Cr—Raw material stores

Total cost of material used as shown by reports of material used.

Dr—Work in process

Cr—Overhead distributed

Total overhead as shown by manufacturing expense accounts in general ledger.

Dr—Finished parts

Cr—Work in process

Total cost of parts and assemblies completed as shown by cost sheets.

Dr—Various accounts, as designated on special orders

Cr—Work in process

Total cost of special orders closed.

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Dr—Work in process

Cr—Finished parts

Parts used for assemblies as shown by assembly cost sheets.

Dr—Finished product

Cr—Work in process

Total cost of assemblies completed, from assembly cost sheets.

Dr—Cost of sales—repair parts

Cr—Finished parts

Total cost of parts used for repair orders charged to customers.

Dr—Gratis repairs

Cr—Finished parts

Total cost of parts used for repair orders gratis to customers.

Dr—Cost of sales

Cr—Finished product

Total cost of transmissions sold.