

customer than the manufacturer who relies solely upon dealers in his marketing program.

Some Management Problems

The balance of this discussion will be devoted to a brief resume of certain of the more important problems with which the manufacturer is confronted in his endeavor to execute the several functions of service to the best advantage of the customer and of himself. In their enumeration, these problems will be placed in their proper classification under the five major functions of service which I have already touched upon.

Manufacture and Distribution of Parts

In regard to the function of manufacturing and distributing of parts, a problem of great importance and no little complexity, particularly to the large manufacturer producing a fairly wide variety of models, it may be said that the development of scientific methods for anticipating parts requirements is of first importance. A proper analysis of parts mortality, aside from obvious benefits to the purchasing and production departments, paves the way for prompt service to the owner, thereby assuring to him a minimum of idle machine time, a factor of tremendous importance.

In addition, such analysis permits of the maintenance of well balanced inventories in the field, assuring to the branch office or dealer a reasonable profit on sales, and to the fleet owner the carrying of a minimum investment in spare parts stock. A third, and by no means negligible, advantage lies in the evidence, thus presented to the manufacturer of the frequency of parts failure, which facilitates product improvement.

Another important factor in parts manufacture is found in the necessity of obtaining the highest possible degree of interchangeability. Selectivity, as opposed to interchangeability, inevitably results in added maintenance cost to the owner, and extra expense to branch or dealer, because of increased parts inventories and of extra labor involved in repair operations.

A third parts problem, confronting all the larger motor vehicle manufacturers, consists in the necessity of safeguarding the owner against the added maintenance burden imposed by his purchase of non-genuine parts. Competition by non-genuine parts manufacturers, most of whom can compete only by the production of parts of inferior quality,

is best coped with by the maintenance of price schedules as low as adherence to standard quality will permit, and by a well organized and efficient machinery of distribution, assuring prompt service to the owner.

Mechanical Repair Work

It may be stated briefly that the function of mechanical repair work has as its primary object rendering to the owner quick work, well done, and at a cost as low as adherence to highest quality will permit, thus insuring a minimum of idle vehicle hours and of maintenance expense.

The necessity for work well done and for low cost is obvious. The importance of quick work is well illustrated, for example, by the effect of undue delay upon the individual truck owner whose sole income is derived from his truck; if the owner's income from his vehicle is \$30.00 a day and a complete day is necessary to effect certain repairs, it is obvious that the tie-up of his truck will seriously affect his earning capacity. Similarly, in the case of the fleet owner whose motor equipment is utilized for the hauling of his own products, unnecessary idle vehicle time naturally results in the necessity for increasing his motor equipment investment.

In carrying out this objective the automotive industry is confronted with the highly involved problem of *repair operation standardization*, a problem which is now receiving the study which for many years was chiefly reserved for production. The two problems have much in common; and the following quotations concerning production problems are applicable to the service problem.

Two fundamental principles of cheap production lie hidden away amongst inefficient shop processes, bewildering disorder of shop conditions, and lax, inaccurate, and utterly misleading shop methods.

1. The determination of a "standard time" for each job and its tabulation, introduction and enforcement.
2. The absolute elimination from the workman's routine of every duty but that of running his machine continuously and efficiently. (Carpenter.)

No record can, as a rule, be kept of men doing miscellaneous work unless it is properly planned ahead of time with that object in view. If it is intelligently planned, an improvement will result which will far more than pay for the expense of planning and record keeping. (Gantt.)

The main trouble with the majority of departments operating chiefly by manual labor is the lack of correctly determined standards of every move. (Parkhurst.)

In discussing the complex problem of ship repairs, W. B. Ferguson enumerated as difficulties attending cost estimating:

1. Extent and nature of repairs unknown in detail until the work is under way; that is, before estimate is made;
2. Accessibility of the work, whether in the shop or in the field; work may be overhead, or in closed-in or cramped places;
3. Complexity and difficulty of the work compared to some assumed standard condition;
4. Continuity or contiguity of the units which comprise the operation, the amount of shifting of tools or position of the workman which is required.

Motor vehicle repairs involve very similar circumstances and conditions.

The problem of standardization is now receiving the attention, by progressive manufacturers, which it so well deserves, and its successful solution is attended by many worth-while results. Such standardization permits a more efficient control of job delivery promises, of quality, of waste, and of cost to the owner. It results in better material control and in ability to requisition parts, tools and materials in advance of workmen's needs. It eliminates excessive lost motion. Its ultimate development permits the payment of higher wages because of lower costs, and assists in attaining steadier and more assured volume of repair business.

In regard to material control, for example, referring to the supplying of parts and materials to the shop for installation during repair work, it should be possible through proper standardization to pre-requisition better than 85 per cent of all items necessary, the result naturally being that of reducing mechanic idle time spent at the requisition or delivery windows. Such pre-requisitioning will ordinarily effect a saving of upwards of thirty minutes per mechanic per day, which labor time would otherwise be charged out to customers.

With reference to waste, the setting up of proper standards results in reducing to a minimum the needless renewal of parts; proper salvage standards clearly indicating whether old parts should be utilized or scrapped. Loss due to spoilage and breakage is similarly reduced to a minimum.

Such standardization allows the repair shop to deal with its customers on a more businesslike basis, making it possible to guarantee not only quality but specified delivery time and definite cost as well.

There are four methods of dealing with customers with regard to cost: the ordinary method of charging in accordance with actual time and material consumed; the approximate estimate; the maximum estimate; and the so-called flat rate or fixed price. The latter two methods are obviously preferable in that they involve giving the owner a definite quotation in advance of any expenditure on his part.

Another problem confronting the repair shop results from the constant and violent fluctuation of business to which shops, large and small, are subjected. These fluctuations make more difficult the attainment of the ultimate goal of every large repair shop, a complete production basis. This burden, particularly difficult for the smaller shop, is made easier by the provision of "fill-in" work wherever possible, such as used car repairs, and by such control and scheduling of incoming work as can properly be exercised.

The increasingly important stress which is being placed, more particularly by owners of commercial vehicles, upon continuous service and upon the necessity for reduction of vehicle inventory by increase of vehicle hours on the job, is being met in a number of ways, night service and unit replacement being two important methods. Organized night service, a difficult problem, but one which can be solved successfully nevertheless, carries an advantage to the repair shop as well as to the customer in that it permits a more continuous use of building equipment, involving, where any considerable volume can be maintained, a worth while reduction in overhead expense.

Unit replacement, where the actual repair of the unit involved consumes considerably more time than is taken by a mere exchange of a rebuilt unit for the worn unit, is bound to lessen considerably the total time of the vehicle spent in the shop. Referring again to the example of the individual truck owner, it is obvious that if the repair of a certain unit on his vehicle can be accomplished by the simple process of installing a completely rebuilt unit (billing him only for the repairs of the unit he turns in) he has been materially benefited by the increased productive time thereby secured for his truck.

Such procedures as night service and unit replacement serve to illustrate the fact that the manufacturer of commercial automotive equipment must