

machinery, not physical in this case, but mental.

Let us look for a moment more closely at the function of purchasing, for instance. Do purchasing agents buy the commodities needed by their concern on the basis of standard specifications in every case where this is technically feasible? In 1925 the U. S. Bureau of Standards in Washington, D. C., published a "National Directory of Commodity Specifications" listing about 27,000 standard specifications used in this country by private firms, trade associations, technical societies, public authorities, etc. Even though this list contains many duplications—a number of individual specifications have been adopted by more than one organization—it looks rather impressive at first sight. When one learns, however, that a single electric power company—a large one, it is true—has found that no less than 41,000, or 89 per cent, of the 46,000 items which it regularly purchases are suitable for standardization, a somewhat different light is thrown upon the 27,000 figure, even though our appreciation of the good work done in compiling the list is not diminished. In fact, on 28,000 items, that is, on a number larger than that listed in the National Directory, standardization work had been started some time ago by that company.

In the light of the above facts, it must be concluded that the renown of American industry in the field of industrial standardization is evidently due to the outstanding achievements of a relatively small number of organizations, rather than to the general acceptance by the average concern of standardization as a business or managerial policy.

A further question must therefore inevitably arise in one's mind; namely, what are the obstacles which may prevent standardization, so actively preached in many quarters and given so much attention in the various technical magazines and even in the daily press, from being more generally adopted in individual plants?

I have listed a number of the obstacles most commonly met.

1. There may be a complete lack of interest in the possibilities of standardization due to the fact that the business is running to the satisfaction of the management, and that there are no apparent flaws suggesting potential trouble. Under these conditions, the main aspect of a possible change may seem to be one of needless outlay of capital and non-justifiable disturbance of the existing

course of affairs, without a fair chance of increased returns. Such an attitude explains the fact that the advocate of standardization often finds a more attentive hearing in times when business is slack than when it is flourishing.

2. Pride of existing traditional practice may prevent the adoption of a new standard, either because the quality of the product made by the concern in question is deemed superior to the standard specifications or because a certain type, style or brand has captured the market to a considerable extent. In the former case, the company may also fear that the large majority of consumers will be satisfied with the standard grade and that consequently the higher grade may not command the accustomed rate of profit. For those advocating the adoption of the standard, this is usually a rather difficult question to argue about, because a concern that pays no attention to standardization will as a rule not have any system for keeping track of market conditions enabling it correctly to judge future sales possibilities.

3. It may be a question of who will be the first to fall into line with the standard: the manufacturer who wishes to continue to make the product that has become non-standard, as long as there is a demand for it, or the user who decides to buy the obsolete kind of product as long as he can get it without an increase in price.

A decision on the part of either group no longer to make, or no longer to order, non-standard product may break the deadlock to the benefit of both parties. Concerted action between the two groups is of course still better. Agreement between the two groups may be greatly facilitated by fixing a date on which the new standard shall go into force. Such date should be well ahead of the date of agreement, in order to allow for the clearance of old stock on the part of the producers, and for securing or using replacement parts for old equipment on the part of users.

4. A very common case is for everybody in the organization to focus his attention so completely on his particular function in the business (design, production, testing, etc.) as to have no time to consider possible opportunities for standardization. Even if it is realized that standardization would be beneficial to everybody's work, nobody has time to stop and think about it. Also, the problem may be so extensive and intricate that it cannot pos-

sibly be handled by the staff of one particular department which has no authority to get things done in other departments.

In this connection it may also be observed that the introduction of standardization as a function of management—like research and other progressive industrial techniques—demands a carefully and systematically prepared plan, carried out with great determination. A casual venture into the possibilities of standardization by means of well intended, but isolated efforts is almost bound to fail and to do more harm than good to the standing of the cause in the organization concerned.

5. Standardization in many cases acts as a tonic whose vitalizing influence appears not immediately but gradually. This may explain why an organization that is perfectly willing to spend \$10,000 on a new machine, provided it will save its cost in a few years, may not feel inclined to put any money into even a modest standards department set-up, simply because the savings that it could effect are not so clearly evident in advance. Probably the best thing to do in this case is to recommend that standardization be given a try-out on an object greatly in need of it, and to refer, with data and illustrations, to cases where standards departments have proved to be excellent investments.

For instance, the sum of \$10,000 a year was saved by a large machine tool manufacturer merely by eliminating odd varieties of bolts and nuts. It is evident that, although the investigation preceding this weeding-out process may have been a rather extensive one, it very probably required only a fraction of the amount saved in one year, while once the job was completed the saving continued. A company manufacturing textile machinery saved in the course of seven months three times the cost of the standardization work for the year. After having spent money on standardization for three consecutive years, another concern reported that, on the basis of the results obtained, it expected the investment to yield a dividend of 500 per cent in the fourth year.

6. There may be a feeling in the departments of an organization that each is well able to take care of its own business, and that there is, therefore, no special need for a new department, which by its very nature is expected to have a certain control over the activities of the existing ones. Thus, the departmental staffs will hold that nothing

would be gained by pooling their respective requirements and experiences. This situation calls for particular tact and mutual consideration, something which is necessary, of course, in any kind of co-operative work, but certainly to a high degree in standardization, whose nature, it has been said, is 90 per cent a matter of human relationships and only 10 per cent a matter of technical problems. Moreover, if under such conditions, the establishment of a standards department is effected, it may easily become the victim of a continuous struggle for supremacy in its control, although in reality it should not be controlled by any particular department.

7. Too often a standard is still regarded as something rigid, resisting any change whatsoever, hampering progress and stultifying the state of the art. Having no standards would then mean, according to this view, complete freedom of action and progressiveness. This fallacy may be met by emphasizing the point that standardization does not mean standing still, but moving forward together in harmony; that no standard should be regarded as the one best solution for all times, and that, just as in the case of the regulator of an engine, a sufficiently important change in basic conditions will automatically bring about a movement of the whole system from its original position of temporary stability to a new one.

8. As the last cause of resistance to be listed here, I should like to mention a few factors which are largely due, I believe, to certain phases in the early development of the human race, when man, in order not to be wiped out, had still to struggle with the most fundamental problems of existence, such as food, clothing, shelter and defense. Under these primitive conditions he had to provide rough and ready emergency solutions for his crude problems and, while solving them, he was flooded with new ones, preventing the revision and refinement of the solutions of the earlier problems.

Man thus expanded for a long time in the scope of his activities and interests, but not in their depth or their intensive working out. When, in a later period, he began to specialize in distinct trades, the situation did not change materially. Forced to go ahead or drop out, and disposing by and by of a considerable amount of practical experience accumulated by many generations, the craftsman had no time to look backward and find out whether