

THE STEEL FOUNDRY

CHAPTER I

INTRODUCTORY

The function of the steel foundry is to produce by casting in sand or other moulds, steel shapes that cannot be rolled or forged; or that would require special equipment for rolling and forging, that is not justified by the number of the particular article wanted. Thus many steel articles that would be made by drop forging or press forging in dies, if wanted by the hundred or thousand, are made of cast steel when not enough are to be purchased to pay for the expensive dies required. The foundry, therefore, supplies the country with steel shapes often more costly than rolled or forged shapes; and herein lies one of the most vexatious features of the business.

In general, steel foundries may be roughly divided into three classes, according to the market in which they sell their castings. These are, first the Tonnage Foundry, that is the foundry supplying great numbers of castings from relatively few patterns, generally of shapes that can be made only of cast metal, and frequently bidding for long term orders on a flat rate per pound of steel. Such are the foundries furnishing draw bars and knuckles, bolsters, etc., for railroad cars, frames, driving wheel centers and other castings for locomotives, and other work of that general nature. The problem of these foundries in working to make a profit is similar to that of the rolling mills, and may be summarized as that of turning out a heavy enough tonnage of comparatively simple work at a small profit per pound, to return a dividend on the investment. The effort in these shops is concentrated on producing the greatest possible number of castings per day, and everything must be arranged to keep a constant flow of work passing through every department—delays are fatal. In many ways the problems in these shops are the easiest of solution to be met in the business, since the constant production of one class of castings lends itself naturally to the introduction of labor-saving devices suited to the particular sort of work being handled, and from the familiarity attained by constant repetition the men throughout the

shop learn naturally the quickest ways of performing each detail of the operations. Raw materials, tools, equipment of every sort can be standardized, processes adopted or rejected according to how well they fit in with the primary object of keeping the output moving steadily through the shop, and the operation of the plant made almost automatic. The desired quality of the product is known, and improvements consist almost entirely in devising means of producing a superior article without interfering with the routine (and hence raising cost), in order that the salesmen may have an additional argument in favor of their goods and not be forced to shade prices to the last inch to get orders.

The second class is the Jobbing Foundry, a familiar name and a most expressive one, as shops of this class handle all the odd jobs that come along. Here are brought the miscellaneous machinery castings, automobile and truck castings, shapes that would be made by forging or rolling if wanted in quantity, and job lots of all sorts. The jobbing foundryman has a very different problem on his hands from that of the tonnage man, and his position is often an unenviable one. Frequently, one might almost say invariably, the number of castings to be furnished from each pattern is so small that a very few spoiled castings spell loss instead of profit on the order. The tonnage manufacturer has the opportunity to experiment with his patterns, change sections here and there, add fillets and brackets where needed, and generally get posted up by preliminary experiments on each pattern, and then start in and turn out finished work almost without thinking about details. The jobbing expert, on the other hand, must constantly foresee the difficulties to be encountered by the light that is in him, and must know almost by instinct the precautions to be taken in moulding and pouring to get a solid casting, the amount of metal that will be required for sink heads, gates, etc., and thus be able to fix a price that will yield him a profit. This price generally has to be so fixed as to cover the inevitable lost castings, which no human foresight or experience can entirely prevent; and the jobbing foundryman above all must have an unerring eye for the casting that from some peculiarity of design cannot be cast at all without a large number of "wasters," and must persuade the customer to alter the fatal features of the design, or turn the order down altogether. These are the cats and dogs of the business, and many are the wiles of the casting buyer in foisting them upon the unwary at prices that mean loss.

Another woe of the jobbing foundryman is the small casting that

really should be a forging, on which he expends money for patterns, or for wasters made in experimenting on a small order, counting on subsequent orders produced without trouble to reimburse him—only to find that the machine of which his castings form a part is a success and is to be manufactured in quantity, justifying expense for dies to forge the parts and leaving the foundryman a sadder and a wiser man. The jobbing man's one really happy time is when business is so good that everyone is rushed to the limit, and orders are placed chiefly on quick delivery; then the overflow from the tonnage foundries comes to his shop and he waxes fat on standard work that can be easily and cheaply produced, and is paid his high prices because the work is wanted at once.

Our third class is composed of the foundries making a specialty of some alloy steel of particular excellence for certain purposes, or of some class of difficult castings especially suited to a particular steel-making process, and hard to make by any other. Almost as a matter of course the output of these foundries is a small one, and the profit per pound large. If the output were large, the tonnage foundries would gobble the work, especially when the specialty is in the shape of the casting rather than in the kind of steel; a large output in sight for a few difficult shapes of course justifying the installation of the special method of making steel needed, and the production of the work in quantity at a small profit per pound.

The Specialty Foundry, therefore, may partake of the characteristics of the jobbing foundry or of the tonnage foundry, according to the nature of the specialty—steel, or shape of casting. The foregoing remarks upon the two classes apply with equal force to this third class, and in the case of special steels the remarks upon the difficulties of jobbing work apply with even greater force, since to the difficulties of producing constantly varying shapes of work are added those of handling a steel frequently troublesome, for one reason or another, to produce even in simple shapes. Many an unwary foundryman has learned to his sorrow the difficulty of getting a share of the business of the manufacturer of special steels, who sells his product at a high figure because he must do so to make a profit, and is protected from competition by the smallness of his tonnage and the knowledge of the fine points of his process gained from years of experience. In the present condition of the foundry business, when there are perhaps more makers of castings than the demand justifies, so that price (and hence quality), are hammered down to the last possible inch, the payment of high prices for the output of a particular foundry

means that that foundry has mastered a specialty that cannot be made on a "tonnage" basis, and competitors feeling around for business to fill up their shops in slack times should be very sure of their ground before going after a share of the specialty man's business, lest they get caught in the unforeseen difficulties of the specialty, and suffer considerable loss before they quite know how it happened.

Naturally, no hard and fast lines can be drawn between the three classes of foundry work into which the field is divided, and a particular shop may do business more or less along two or three of the general lines. Many a jobbing foundry has its specialties, which help to pay the profits of the business; many specialty foundries do a jobbing business to increase production and cut down overhead expenses; and either one may have standard lines that can be and are handled by methods similar to those of the tonnage shop. The management of a projected foundry, or of a foundry which is not paying the profits it should and is being reorganized, will do well to scrutinize their market closely and ascertain definitely the class in which they belong, in order to determine the direction in which their efforts should be directed to develop the business to the best advantage. For instance, the producers of a special steel, of which they have long enjoyed a monopoly, may find competition springing up and cutting seriously into their volume of sales. Investigation will probably show that they are in the habit of accepting orders only for such work as can be easily turned out; that methods of handling raw material and keeping product moving through the shop are archaic; and possibly that cheaper methods at various points of the process can be adopted to the betterment as well as cheapening of the product. The shop has been a pure specialty maker, and has neglected much of the jobbing work that it might have handled at a profit, and has not adopted the more modern methods that enable tonnage work to be produced cheaply. By improved handling methods, much of the output can be made at considerably reduced costs, and by accepting a wider range of orders for miscellaneous work which can be obtained at high figures, output will be increased and the cost of steel correspondingly decreased.

New companies should be particularly cautious in entering the field without sure knowledge of the conditions to be faced. The tonnage shop, of course, is seldom started up except by large interests backed by ample capital, and often closely allied with consuming industries, so that the organizers have an assured tonnage in sight

and are perfectly cognizant of the nature of their problem. Not so the small companies organized to carry on a jobbing or specialty business, often attracted by the supposedly fat profits of established companies, and incautiously entering the field with only sufficient capital to build a plant and carry on operations for a few months. The profits counted upon to carry on the business are in too many cases not forthcoming, due to losses arising from inexperience in fixing prices and handling odd castings in a jobbing business, from the unexpected difficulties encountered in the manufacture of special steels in complicated shapes, or what not. The troubles of many of the small foundries in the first few years of their life, which so often result in the closing down of the shop, arise in most cases from bad judgment on the part of the promoters in going into the business with only a half knowledge of the conditions to be faced. Without technical knowledge of steel making, and often without experience in the foundry business, they make mistakes in the selection of a steel-making method, of a plant location, of a type of furnace, or some such matter, that are too often fatal to the success of the shop.