

THE THREE-SHIFT SYSTEM IN THE STEEL INDUSTRY¹

BY

HORACE B. DRURY²

ABSTRACT

At this time when many mills are laying off large numbers of men the question is being raised as to why any job need be 12 hours long. England has given up the 12-hour day in her steel industry, and so has France, Germany, Sweden, Italy, Belgium, Spain. There is no other large American industry which, like a steel plant, works the majority of its men 12 hours a day.

The writer has recently visited practically all of the some 20 American steel plants which are now running on three shifts. He has found that the men have been willing to make substantial concessions in daily wages in order to get the shorter hours. A 25 per cent increase in hourly rates is ample to compensate the men for a 4-hours' loss of pay. To give all the men now on 12-hour work a 25 per cent increase in wages and cut down their day from 12 to 8 hours, would cost a manufacturer of pig iron at the most about 21 cents a ton. Pig iron sells for \$40. If all the departments in a steel plant were to be changed from two to three shifts, the increase in total cost for the finished rail, bar, or plate could not, on the average, be more than about 3 per cent.

But the increase in cost need not be nearly so great as these figures. By taking care, some manufacturers going on 8 hours have been able to reduce their force of men 10 per cent—some more. Others have found that the quality of their open-hearth steel has improved and that the expense for fuel and wear and tear on furnaces has been substantially reduced. Others have found that their rolling-mill output has gone up well toward 20 per cent, or even more.

The steel industry is not one in which output can easily be increased, and during the initial stages of three-shift operation most companies have had to stand some increase in labor cost but, taking it all in all, the manufacturers now operating on the shorter day are practically a unit in saying that it means more satisfactory operations, and is better business. Many detailed problems have had to be worked out; but cer-

tainly the experience of these 20 plants has shown that there is no outstanding obstacle to putting the steel industry on a three-shift day.

Today conditions are more favorable for introducing the three-shift system than they were at the time when most of the plants now employing it made the change. With labor as abundant as at present, the expense of wage adjustments would unquestionably be less, and the increase in efficiency substantially greater, than was true in the case of the companies whose experience is discussed in this report.

If the present favorable opportunity is not seized, it is apt to mean greater expense when the steel industry does decide to go to three shifts, as it is almost certain to do before the lapse of very many years.

IN order to appreciate properly the problem involved in putting the steel industry of the United States on a three-shift basis it is first necessary that we have some knowledge of the extent and character of the existing two-shift operation.

It should not be necessary to speak before an audience of engineers of the importance to the country of the steel industry or of the manner in which practically all the other manufacturing industries rest upon it. This is the age of steel. Nearly all machinery and a very large part of the country's physical equipment along all lines is in this day constructed out of iron or steel. Not only is the steel industry in this special sense the foundation for all our productive activity, but it is in itself one of the country's greatest industries. Particularly, in the largeness of its physical equipment, steel stands out as a sort of super-indus-

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²Recently with the Industrial Relations Division of the United States Shipping Board; formerly of the Economics Department, Ohio State University; Author of *Scientific Management* (Longmans).

try; and likewise of overshadowing interest is the investment factor. Yet the industry is also a large one from the standpoint of employees, who must number altogether somewhere around five or six hundred thousand.¹

I. EXTENT OF THE TWELVE-HOUR DAY²

The actual percentage of steel industry employees who under the two-shift system have been employed 12 hours a day has been variously estimated at from 26½ to 52 per cent. The truth of the matter would seem to be that, so far as concerns those continuous operation processes which make up the heart of the steel industry, such as the blast furnace, the open-hearth furnace, and most types of rolling mills, together with the various auxiliary departments necessary to keep these processes going, and make a complete plant, the bulk of the employees work 12 hours. The proportion of 12-hour jobs in these places is not a full 100 per cent; for the reason that in many of the departments there is a certain amount of work, usually of a common labor or mechanical type, which can be concentrated in the daylight hours and is commonly performed on a 10-hour basis. But all the shift men, all the men whose presence is essential to the carrying on of the processes, from the chemist and bosses down to the lowest helper—the technical graduate, the American-born roller, and the unskilled foreigner—all these, with very few exceptions work 12 hours. Most likely the percentage of 12-hour workers for the whole plant—which we are assuming is entirely, or almost entirely, devoted to the more fundamental steel processes—will be considerably over 50 per cent,—in some cases two-thirds.

But while fully one-half of the men in these plants or departments of plants which constitute the seat of the steel industry work 12 hours, the percentage of 12-hour men taking the American steel industry as a whole would be considerably less than 50 per cent, for the reason that all around these blast furnaces, steel works, and rolling mills there is a fringe of work which is classified as a part of the steel industry but is not continuous process work, or for some other reason does not run on two shifts. In the case of the United States Steel Corporation, for instance, some 70,000 of the 260,000 men whom the company normally employs are not in manufacturing plants at all but are employed in coal mines, ore mines, or on railroads, ships, etc. Most of these men would not, in

all probability, work 12 hours. Likewise within steel manufacturing plants themselves, there are here and there departments which work on the more refined processes which follow the basic ones mentioned above, such as foundry departments, forge shops, machine shops, and fabricating departments of various sorts, which often work shorter hours. In a sense we do not include this type of work in our minds when we speak of the steel industry, yet in all the statistics of the industry they would be so classified, and they help materially to reduce the percentage of 12-hour men. Finally there are a few branches of the iron and steel industry proper which have for many years been on three shifts. This is true of puddling furnaces³ for the making of wrought iron—not at present a very important branch of the industry—and of sheet and tin mills, hoop mills,⁴ and perhaps some other special types of work where there is an excessive amount of manual labor. Sometimes also a plant will have its Bessemer converters or its coke works on a shorter day. Sometimes rolling mills are not run as a continuous process operation.

But we are now enumerating the exceptional cases. All in all there are probably enough men engaged in the raw materials end, or in the finished product end, of the steel industry in positions where the work is less than 12 hours to bring down the percentage of 12-

¹The Steel Corporation, which in normal times employs about 260,000 men, produces approximately 40 per cent of the country's steel products (in 1918, 40 per cent of the pig iron, 44 per cent of the ingots, and 42 per cent of the rolled products). A first approximation to the number of men in the steel industry would therefore give about 650,000. This would not include steel foundries or many other lines of industry dealing with steel products. I have, however, hesitated to put the figure as high as 650,000 because the Steel Corporation, to a greater extent than the "independents," has employees in transportation, coal mining, and other work removed from steel plants. An enumeration of the men actually in steel plants, as they would be counted in the census, would doubtless give a figure well below 500,000. Probably 600,000 is a fair approximation for the number of men in the industry, as commercially organized in normal times.

²The 12-hour day as used in this paper means a day which averages 12 hours. Sometimes men work 11 hours one week and 13 on the night shift the next; or even 10 or 10½ hours one week and 14 or 13½ the next. As indicated later in the text the shorter day-shift is often preferred by the men.

³We are not speaking here so much of puddling mills proper, which still work two shifts as a general rule; but rather of bushelling, which, differing from puddling in the narrower sense in that it uses scrap instead of pig iron, has largely displaced the former process, and appropriated the common name. Some puddling furnaces (in the old sense of the word) and most bushelling furnaces are on three shifts.

⁴According to several persons interested in the steel industry, including the officers of one hoop mill visited. It is possible, however, that a wider survey of hoop mills might lead to a different conclusion.