

about labor costs. But assuming that we are not so fortunate as to be able to realize any very large increase in efficiency, it has been shown that the men see the reasonableness of paying for their greater leisure by some reduction in total earnings. This figure of 25 per cent is the maximum that would be required even under conditions of labor shortage.<sup>1</sup>

The figure for a 35 per cent increase in men, instead of 50 per cent, is also a conservative one. In many plants exactly 50 per cent more men are employed on three shifts than on two, and most of them are close to the 50 per cent figure. But the 35 per cent standard has been attained by such large plants as those of the International Harvester Company and Inland Steel Company, and a much better showing was made by the American Rolling Mill Company. It might be noted that the limitation to 35 per cent increase can be obtained, if, where 10 men are now employed on a shift, it is possible to get along with 9. That is, 27 men employed on three shifts is just 35 per cent more than 20 men employed on two shifts. It seems only reasonable to assume that with so large a reduction in the number of hours, it would be possible to cut out one man out of ten.

The figure for increased output of 10 per cent seems not very far away as an average. It is of course too high for a blast furnace. I know of no reason to expect greater output at all from a blast furnace on three shifts, unless it was before very badly handled. Fortunately in the case of a blast furnace the labor cost is small. In the case of the open-hearth furnace a 10 per cent increase in output would be an ambitious program. Many steel men would say that any increase in output at all would be impossible. Others think that wide-awake labor can hasten the charging and guarantee that the melting takes place at maximum speed. Fortunately about an open-hearth furnace there are ample opportunities for improving the quality of the steel, prolonging the life of the furnace, and saving in materials, which may more than make up for the difficulty of increasing output. As regards rolling mills, the human equation enters in to a considerable extent, so that increase in output may be looked for. The amount depends on the type of mill and the opportunities for doing more rapid work. It would also depend some on the efficiency of

<sup>1</sup>The evidence is not altogether satisfactory as regards the Pittsburg district. The three-shift plants located near Pittsburg are small compared with the district's two-shift plants and some of the managements have gone more than half way in the matter of wage adjustment.

the arrangements for supplying the metal to be rolled, and for shearing and taking away the finished product. On many mills, however, actual figures show that the increase in output may run up well toward 20 per cent, or even higher.

Such calculations as we have been considering make the goal of eliminating increase of labor cost under the three-shift system seem not altogether out of the range of attainment,—and, indeed, individual companies have in some cases just about reached the standards suggested—though average accomplishment is still considerably lower. But the striking feature of the whole question of cost is the fact that whether plants do well or badly the increase in cost involved in going on the three-shift system cannot, at the utmost be very serious. Suppose that there were no increase in efficiency at all, that a plant increases its force of shift men precisely 50 per cent, that the output is no greater in any department than under two shifts, and that the hourly wage rates are raised 25 per cent. Table IX shows the maximum possible increase in labor cost so far as the making of pig iron is concerned.

In a good blast-furnace plant, the labor cost at present wage levels and efficiency should not be far from \$1 a ton, to be safe we will say \$1.25 a ton.<sup>2</sup> Assuming that the change from 12 hours to 8 would affect 2/3 of the men, the pay of these men under the two-shift system would amount to 2/3 of \$1.25 or 83 cents per ton. An advance of 25 per cent in the hourly wages of these men would increase the labor cost per ton of pig iron by 21 cents. Considering the fact that pig iron sells for around \$40 a ton,<sup>3</sup> that the ore that goes into a ton when delivered at Pittsburg costs about \$16, the trifling risk involved in increasing the labor cost a maximum of about 21 cents is apparent.

Likewise in open-hearth work the labor cost might be \$1.30 a ton, to be safe we will say \$1.50 a ton. The maximum increase in labor cost here, assuming no increase in efficiency, would be 25 cents. Thus the total increase in labor cost for the steel ingot would be not more than 46 cents, still a small figure for something that sells for about as many dollars.

<sup>2</sup>We are speaking here of blast furnaces which are a part of large steel plants. In the case of isolated furnaces, or those not having modern ore handling, charging, or pig casting machinery, the cost might well be considerably higher than the figures here given.

<sup>3</sup>At the time of writing. Earlier the price was considerably higher. Since the presentation of this paper it has dropped to considerably below \$40. Wages also have tended downward.

In the rolling mill, the labor cost will run higher, especially where material is rolled several times, and into light shapes, such as rods, plates, etc. This might, indeed, be an advantage rather than a disadvantage, for in proportion as the product is put through many

processes, the opportunities for getting higher labor efficiency and increasing output multiply. So that in various rolling mills visited the three-shift system meant no increase in labor cost.

Nevertheless, assuming that there is no increase in efficiency in the rolling mill or elsewhere, exhaustive analyses made by the government have shown that if every department of a steel plant were put on three shifts the total cost of producing steel products, including blast-furnace, open-hearth furnace, and rolling-mill work, could not on the average be increased more than about 3 per cent.<sup>1</sup>

While with good management, there can be no question but that the increase in labor costs may be kept well below the maximum figures given above, it must be evident that we are after all dealing here with a rather unimportant aspect of the making of steel. As a matter of fact the managers in the steel industry are not worried a great deal one way or the other about this 21 cents for pig iron or this slightly larger amount for open-hearth steel.<sup>2</sup> I think that probably the real reason why nearly all the three-shift manufacturers with whom I spoke were in favor of continuing on three shifts was because of those not easily measured efficiencies that spring out of the spirit of the men. I kept asking managers why they were in favor of three shifts. They had said that it cost more. I think that many of the manufacturers were influenced somewhat by humanitarian motives; but beyond this they kept saying that they also regarded the three-shift system as better from a business standpoint.

The fact is that the actual labor cost is not the decisive factor in the steel industry that it is in some places. The main expenditures are for equipment and materials. What is of importance is that the equipment be kept up, and that the processes proceed without mishap. As a Chicago steel man, whose plant went from three to two shifts about a year ago, but who was personally in favor of three shifts, said, it is now much more important than formerly to have responsible, watchful labor in the steel industry. There was a time when the men were occupied in shoveling ore that was to go into the furnace, or preparing the sand casting beds, when the men could pitch in and work hard for a time and then take it easy. Now nearly all of that intermittent manual labor is gone, the gangs have been cut down to almost nothing, and those who are left are in more responsible positions, not doing much hard manual work, but watching over vast and important processes. This more continuous duty is in a way more of a strain

<sup>1</sup>Sen. Doc. 110, 62 Congress, 1st Session. *Report on conditions of employment in the iron and steel industry*, vol. iii, pp. 175-187. The 3 per cent estimate is based on very exhaustive studies made by the Bureau of Corporations and the Bureau of Labor, relative to the cost of making merchant bars, wire rods, structural shapes, Bessemer rails, and sheared plates, these products constituting two-thirds of the country's steel products. Sheet and wrought iron were omitted from the analysis as the departments making these products were already working substantially 8 hours. Two sets of figures are given, one assuming a 25 per cent increase in hourly rates, and one a 50 per cent increase. I have taken the 25 per cent figures. This study, which is the most recent comprehensive analysis of the subject, was unfortunately made as long ago as 1912. If during the last ten years (shift-) labor costs have risen out of proportion to total costs, including ore, coke, transportation, repairs, and (in the case of the later operations) pig iron and ingots, then the figure of 3 per cent would be too low. So far as the making of pig iron is concerned, I feel fairly certain that no such disproportionate increase in labor cost has occurred. As to whether there has been a disproportionate increase in the labor cost in the case of the open-hearth furnace and rolling mills, a good deal would probably depend on how far labor efficiency has fallen off, and how far this has been made up for by the increased use of labor-saving machinery. The actual maximum figure would, of course, move up one year and down the next, and would vary greatly in different plants. Whether or not 3 per cent is the exact average for this year it might be hard to tell; but we may feel sure that the maximum would fall somewhere in that neighborhood.

I find that steel men can hardly believe that this figure could be as low as 3 per cent. While not personally responsible for the estimate, having obtained it from the report referred to, I think it cannot be very far wrong. For the figure to come out 3 per cent it is only necessary to assume that the proportion of labor cost (going to turn labor) in the steel industry is one-eighth of the total cost. (For if one-eighth of the cost be increased by 25 per cent, the total increase in cost would be one-thirty-second, or almost exactly 3 per cent.) It should be a fairly easy matter for any manufacturer of steel to determine the proportion between his total pay-roll paid to 12-hour turn men and his total costs, and he can then tell for himself whether 3 per cent is too large or small for his plant.

Judge Gary, speaking for the U. S. Steel Corporation, declared that 25½ per cent of the Corporation's employees work 12 hours. If now the total pay-roll of the Steel Corporation were just half of the total cost, including such items as royalties, freights, materials purchased, interest, depreciation, repairs and any other charges not payable to the Corporation's own labor, then the cost for shift labor employed by the Steel Corporation would not be far from one-eighth of the whole; and the cost of a 25 per cent advance made to these men could not be far from 3 per cent.

By the extent to which these assumptions vary from the true condition, the reader can tell how near or remote the 3 per cent figure may be.

<sup>2</sup>The maximum increase in cost referred to in the preceding paragraph (3 per cent) is much smaller than the normal range in steel prices during the course of a calendar year. In fact, a differential greater than this has been existing on the same date between the price asked by the Steel Corporation and those asked by the "independents."