IV. DETAILED EXPERIENCES OF FIVE PLANTS WHICH HAVE INTRODUCED THE THREE-SHIFT SYSTEM

Chart I shows the three-shift plants. Probably there are other plants on three shifts. Before this study was started there was no exhaustive list of three-shift plants, and the people in the plants themselves usually knew of only one or two other plants which had gone on three shifts. So the method of discovering the plants was largely accidental, and almost up to the end of the study new plants were being found.

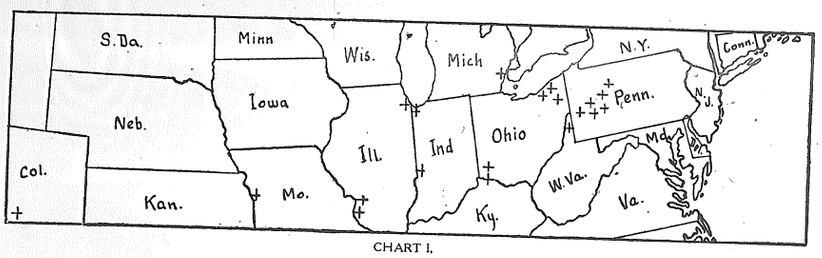

CHART I.

Taking first blast furnaces, the following plants are working blast furnaces on three shifts: The Colorado Fuel & Iron Company, at Pueblo; The Inland Steel Company[1], at Indiana Harbor, near Chicago; The International Harvester Company, at South Chicago; The Ford Motor Company's Rouge River Plant, at Detroit; The McKinney Steel Company, at Cleveland; The Upson Nut Company, Cleveland; The Adrian Furnace, Dubois, Pa.; the Punxsutawney Furnace at Punxsutawney, Pa.; and a furnace or furnaces at Josephine, Pa. This list does not include any plants for California, as I went no further west than Colorado, but it is said that the steel industry of California is on three shifts. The Iroquois Iron Works, a plant of the Steel and Tube Company of America, with several stacks located at Chicago, also operated on three shifts with success for some months preceding the steel strike. Some five of the plants listed above have steel works and rolling mills as well as blast furnaces, and these departments are also on three shifts.

The following plants, which have no blast furnaces, operate open-hearth furnaces and rolling mills on three shifts: The Kansas City Bolt and Nut Company, Kansas City, Mo.; The National Enameling & Stamping Company, Granite City, Ill.; the Andrews Steel Company, Newport, Ky.; The American Rolling Mill Company, Middletown, Ohio[2]; The Trumbull Steel Company, Warren, Ohio; The West Penn Steel Company, Brackenridge, Pa.; Follansbee Bros., Follansbee, West Virginia.

The following plants, having open-hearth furnaces, but no rolling mills, are on three shifts: The Commonwealth Steel Company, St. Louis (works in Granite City, Ill.); The Dusquesne Steel Foundry, Coraopolis, Pa.

The Allegheny Steel Company, Brackenridge, Pa., has its open hearth furnaces but not its rolling mills on three shifts (aside from sheet mills). The Hoosier Rolling Mill Company, a concern having a rolling mill at Terre Haute, operates on three shifts.

In this list of three-shift plants no account has been taken of plants which have only sheet or hoop mills on three shifts, as that is the common practice everywhere, and no account has been taken of plants which have some isolated department on three shifts as is sometimes true of a blooming mill or Bessemer converter.

All these plants taken together make up only a fraction of the steel industry, but they are more than a drop in the bucket; they are widely scattered, they are in all branches of the steel industry, and they are names that are respected. In outlining their experience with the three-shift system, we shall first consider in some detail the experiences of four or five, and then summarize in a more systematic form the combined experience of the twenty.

1. The Commonwealth Steel Company

We shall speak first of the Commonwealth Steel Company, because the company is well known, because it was the first of any of the companies mentioned to go on three shifts,[1] and because we are indebted to a scientific study made by Mr. R. A. Bull, at the time production manager of the company, and later president of the American Foundrymen's Association, for some of the most exact data that has been collected on the relative efficiency of two-shift and three-shift work.

[1]Since this paper was presented, the Inland Steel Company has ordered a change from three to two shifts. On the other hand, a number of plants which were running on two shifts at the time this paper was prepared are now operating in whole or in part on three shifts, apparently as a more or less temporary device for relieving unemployment.

[2]The American Rolling Mill Company has also blast furnaces at Columbus, but these are not on three shifts.

TABLE IV. COMPARATIVE EFFICIENCY TWO-SHIFT AND THREE-SHIFT SYSTEMS
OPEN-HEARTH WORK[1]
(Commonwealth Steel Company)

		12-Hour Shift	8-Hour Shift
General results:			
Extra pig iron charged	(pounds)	556	424
Fuel oil consumed per heat	(gallons)	1275	1138
" " " per ton of metal charged	(gallons)	55	49
Longest intervals between reversal of burners	(minutes)	28	26.7
Cracked castings	(per cent)	0.49	0.37
Chemical tests:			
Maximum phosphorus	(per cent)	0.022	0.018
" sulphur	(per cent)	0.025	0.025
Average carbon	(per cent)	correct	correct
" phosphorus	(per cent)	0.011	0.011
" sulphur	(per cent)	0.022	0.022
" manganese	(points *under*)	2	correct
" silicon	(points *over*)	1	correct.
Physical tests:			
Minimum yield point per sq. in.	(per cent *under*)	2.5	(over) 7.7
" tensil strength per sq. in.	(per cent *under*)	4.7	1.4
" elongation in 2 in.	(points *under*)	5	3
" reduction of area	(points *under*)	8.3	7.6
Average yield point per sq. in.	(per cent)	13.0	15.5
" tensil strength per sq. in.	(per cent *over*)	5.9	5.8
" elongation in 2 in.	(points *over*)	4.6	4.1
" reduction of area	(points *over*)	7.9	7.2

[1]Mr. Bull included the material upon which this chart is based in an address delivered in 1912 before the American Foundrymen's Association. It was printed in the Transactions, and reprinted in technical journals, including the Engineering Magazine for January, 1913.

[1]Since reading this paper I have been advised that the tonnage men employed on two rod mills, a billet mill, and one or more converters of the Joliet works of the Illinois Steel Company went on three shifts in 1898. There was no added cost to the company and for a time the men could not make over laborers' pay. But they stuck to their project, improvements added by the company increased the supply of metal, and eventually production rose considerably. The men are well satisfied with the arrangement, and believe that the management is also.