

THE ORIGINS OF JOB STRUCTURES IN THE STEEL INDUSTRY *

INTRODUCTION

Recently economists have taken a new look at the labor market, in an attempt to understand the concentration of unemployment and underemployment amongst specific groups. In doing so, they have rejected the neoclassical model of a free and open market allocating labor according to comparative marginal costs and distributing income according to respective marginal productivity. A new set of categories, such as "dual labor markets" and "internal labor markets" and a new set of concepts, such as "hierarchy" and "stratification" have been introduced to better explain the functioning of the labor market.

Yet by and large studies of labor market stratification have taken its essential precondition, the hierarchical division of labor within the enterprise, as a technical fact, while focussing on the struggle among groups of workers for positions within it as the only relevant social issue. Clearly this is a holdover from the neoclassical approach to production, which views all that takes place within the firm as economically efficient adaptations to market conditions. This paper suggests that the division of labor on which labor market stratification is based must itself be seen as a central social issue related to the struggle between capital and labor over the process of production and its material fruits.

This paper attempts to trace the development of labor market structures in one major industry, the steel industry. ** The bulk of the paper concentrates on the period between 1890 and 1920, for during that time the essentials of today's labor system took form. The intention is to show that by understanding how various structures came to be, we can better understand what perpetuates them and what might change them.

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** This paper deals with certain selected aspects of the industry's labor relations. It is by no means intended to be a general survey. Specifically omitted is discussion of the role played by racial and ethnic divisions and the role played by company repression in dispersing discontent.

Part I of the paper describes the labor system of the steel industry in the 19th century, in which skilled workers controlled the production process and made steel by using the employers' capital. This system came into conflict with the employers' need to expand production without giving the workers a substantial share of the proceeds. They therefore moved to break the workers' power over production and all the institutions that had been a part of it -- the skilled workers' union, the contract system, the sliding scale for wages, and the apprenticeship-helper system. They were successful, and the prize they won was the power to introduce labor-saving technology and control the production process. They become the sole beneficiaries of innovation.

Part II shows how, under the impact of the new technology, the skilled craftsmen and the heavy laborers were both transformed into semi-skilled machine operators.

Part III presents the efforts of the employers to create a new labor system that would institutionalize their control over production. It deals with the development of three specific institutions that were central to this process: wage incentive schemes, promotion hierarchies, and welfare programs. The employers' reasons for setting up each of these institutions is unraveled, to demonstrate that, far from being inevitable, the institutions were chosen from several alternatives in order to maximize the power of employers over workers. These institutions are the foundation for today's "internal labor market."

Part IV describes the redivision of labor which employers engineered to perpetuate their power. The essence of the redivision was to take knowledge about production away from the skilled workers and to transfer it to the side of management. They accomplished this by devising new ways to train skilled workers, by re-educating their foremen, and by recruiting new types of managers. This redivision of labor created a status and pay hierarchy based on "mental skills," and is the basis of today's education fetishism.

Part V brings the analysis up to the present by describing the only major change in the labor system of the past fifty years, the organization of the United Steelworkers of America. It shows how little the presence of the union affected the institutions employers had earlier set up.

The following major themes, which are elaborated and generalized to other industries in the concluding Part VI, run through the entire paper:

- 1) Technology, by itself, did not create today's labor system. Technology merely defined the realm of possibilities.
- 2) The development of hierarchy in the labor force was not a response to the increased complexity of jobs, but rather a device to counter the increased simplicity and homogeneity of jobs.
- 3) The issues of how work shall be organized, how jobs shall be

defined, and how workers shall be paid are points of conflict and class struggle between workers and employers. The structures that emerge can only be understood in those terms. Any explanation based on impersonal market forces or natural economic laws misses the actual historical development.

- 4) The division of labor of today that separates mental work from physical work is an artificial and unnecessary division that only serves to maintain the power of employers over their workers.
- 5) The labor market structures that were developed in the early part of this century under the banner of "scientific management" have lasted, in refined forms, until today. No labor movement or reform group has yet developed successful means for overthrowing them and establishing a more rational system for getting work done.

1. The Breakdown of the Traditional Labor System

In 1908 John Fitch, an American journalist who had interviewed hundreds of steel workers and steel officials, described the labor system in the steel industry of his day.

In every department of mill work, there is a more or less rigid line of promotion. Every man is in a training for the next position above ... The course would vary in the different styles of mills, as the positions vary in number and character, but the operating principle is everywhere the same. In the open-hearth department the line of promotion runs through common labor, metal wheelers, stock handlers, cinder-pit man, second helper and first helper, to melter foreman. In this way, the companies develop and train their own men. They seldom hire a stranger for a position as roller or heater. Thus the working force is pyramided and is held together by the ambition of the men lower down; and even a serious break in the ranks adjusts itself all but automatically.

Anyone familiar with industry today will recognize this arrangement immediately. It is precisely the type of internal labor market, with orderly promotion hierarchies and limited ports of entry, which economists have recently begun to analyze. When Fitch was writing, it was a new development in American industry. Only 20 years earlier, the steel industry had had a system for organizing production which appears very strange to us today.

Although steel had been produced in this country since colonial times, it was not until after the Civil War that the steel industry reached substantial size. In 1860, there were only 13 establishments producing steel, which employed a total of 748 men to produce less than 12,000 net tons of steel a year.² After the Civil War, the industry began to expand rapidly,

so that by 1890, there were 110 Bessemer converters and 167 open hearth converters ³ producing 4.8 million net tons of steel per year. ⁴ This expansion is generally attributed to the protective tariff for steel imports, the increased use of steel for railroads, and to changes in the technology of steel production.

The pivotal period for the U.S. steel industry were the years 1890-1910. During that period, steel replaced iron as the building block of industrial society, and the United States surpassed Great Britain as the world's prime steel producer. Also during the 1890's, Andrew Carnegie completed his vertically integrated empire, the Carnegie Corporation, and captured 25 percent of the nation's steel market. His activities led to a wave of corporate mergers which finally culminated in the creation, in 1901 of the world's first billion dollar corporation, the U.S. Steel Corporation. U.S. Steel was built by the financier J.P. Morgan on the back of the Carnegie Corporation. At its inception, it controlled 80 percent of the United States output of steel.

The following table summarizes the development of the steel industry in the 19th century:

	<u>Pig Iron Production</u> (million tons)	<u>Steel Production</u> ⁵ (million net tons)
1860	0.9	n.a.
1870	1.9	n.a.
1880	4.3	1.4
1890	10.3	4.8
1900	15.4	11.4

In the 19th century, the steel industry, like the iron industry from which it grew, had a labor system in which the workers contracted with the steel companies to produce steel. In this labor system, there were two types of workers -- "skilled" and "unskilled." Skilled workers did work that required training, experience, dexterity, and judgment; and unskilled workers performed the heavy manual labor -- lifting, pushing, carrying, hoisting, and wheeling raw materials from one operation to the next. The skilled workers were highly skilled industrial craftsmen who enjoyed high prestige in their communities. Steel was made by teams of skilled workers with unskilled helpers, who used the companies' equipment and raw materials

The unskilled workers resembled what we call "workers" today. Some were hired directly by the steel companies, as they are today. The others were hired by the skilled workers, under what was known as the "contract system." Under the contract system, the skilled workers would hire helpers out of their own paychecks. Helpers earned between one-sixth to one-half of what the skilled workers earned.

The contract system was never fully developed in the steel industry. Often the steel companies paid part of the helpers' wage or provided

helpers themselves for certain skilled workers, so that a hybrid system was prevalent. For example, in one iron works in Pittsburgh in 1878, puddlers were paid \$5.00 per ton, of which one-third went to pay their helper. The helper also received 5 percent of his pay from the company. In the same works, a heater was paid 65¢ per ton and received one helper, paid by the company, with the option of hiring a second helper whom he would pay himself. The number of unskilled workers who were hired and/or paid by the skilled workers was declining in the late 19th century. ⁶

The skilled steel workers saw production as a cooperative endeavor, where labor and capital were equal partners. The partnership was reflected in the method of wage payment. Skilled workers were paid a certain sum for each ton of steel they produced. This sum, called the tonnage rate, was governed by the "sliding scale," which made the tonnage rate fluctuate with the market price of iron and steel, above a specified minimum rate below which wages could not fall. The sliding scale was introduced in the iron works of Pittsburgh as early as 1865, and in the 25 years that followed, it spread throughout the industry. The original agreement that established the system read as follows:

Memorandum of Agreement made this 13th day of February, 1865, between a committee of boilers and a committee from the iron manufacturers appointed to fix a scale of prices to be paid for boiling pig iron, based on the manufacturers' card of prices. ⁷

The sliding scale was actually an arrangement for sharing the profits between two partners in production, the skilled workers and the steel masters. It was based on the principle that the workers should share in the risks and the fruits of production, benefitting when prices were high and sacrificing when prices were low. John Jarrett, the president of the iron and steel workers union, referring to another aspect of this partnership, described the system as a

kind of co-operation offered by the company, in which were certain conditions, the principal of which was that the men agreed to allow the company to retain the first four weeks wages in hand, and also twenty-five percent of all wages earned thereafter, the same to be paid to men at the end of the year, if the profits of the business would justify such payment. ⁸

Andrew Carnegie, the largest steel employer of them all, concurred in this view of the sliding scale by saying, "It is the solution of the capital and labor problem because it really makes them partners -- alike in prosperity and adversity." ⁹

Another effect of the sliding scale was that by pegging tonnage rates directly to market prices, the role of the employer in wage determination was eliminated. Consider, for example, the following account, summarized

by David Montgomery from the records of the Amalgamated Association of Iron Steel and Tin Workers:

When the Columbus Rolling Mill Company contracted to reheat and roll some railroad tracks in January, 1874, for example, the union elected a committee of four to consult with the plant superintendent about the price the workmen were to receive for the work. They agreed on a scale of \$1.13 per ton, which the committee brought back to the lodge for its approval.

There followed an intriguing process. The members soon accepted the company offer, then turned to the major task of dividing the \$1.13 among themselves. Each member stated his own price. When they were added up, the total was 3 3/4 cents higher than the company offer. By a careful revision of the figures, each runback buggyman was cut 2 cents, and the gang buggyman given an extra 1/4 of a cent to settle the bill. By the final reckoning, 19 1/4 cents went to the roller, 13 cents to the rougher up, 10 cents to the rougher down, 9 cents to the catcher, 8 1/4 cents to each of the four hookers, 5 cents each to the runout hooker and the two runback buggymen, and 13 3/4 cents to the gang buggyman, half of whose earnings were to be turned over to his non-union helper. 10

The employers had relatively little control over the skilled workers' incomes. Nor could they use the wage as an incentive to insure them a desired level of output. Employers could only contract for a job. The price was determined by the market, and the division of labor and the pace of work was decided by the workers themselves. Thus, the sliding scale and the contract system defined the relationship between capital and labor in the nineteenth century.

The skilled steel workers had a union, the Amalgamated Association of Iron, Steel and Tin Workers, which was the strongest union of its day. Formed in 1876 by a merger of the Heaters Union, the Roll Hands Union and the Sons of Vulcan, by 1891, the Amalgamated represented 25 percent of all steel workers. Through their union, they were able to formalize their control over production. For example, at Carnegie's Homestead mill, a contract was won in 1889 that gave the skilled workers authority over every aspect of steel production there. A company historian described it this way:

Every department and sub-department had its workmen's "committee," with a "chairman" and full corps of officers... During the ensuing three years hardly a day passed that a "committee" did not come forward with some demand or grievance. If a man with a desirable job died or left the works, his position could not be filled without the consent and approval of an Amalgamated committee... The method of apportioning the work, of regulating the turns, of altering the machinery, in short, every detail of working

the great plant was subject to the interference of some busybody representing the Amalgamated Association. Some of this meddling was specified under the agreement that had been signed by the Carnegies, but much of it was not; it was only in line with the general policy of the union ... The heats of a turn were designated, as were the weights of the various charges constituting a heat. The product per worker was limited; the proportion of scrap that might be used in running a furnace was fixed; the quality of pig-iron was stated; the puddlers' use of brick and fire clay was forbidden, with exceptions; the labor of assistants was defined; the teaching of other workmen was prohibited, nor might one man lend his tools to another except as provided for. ¹¹

John Fitch confirmed this account of worker control at Homestead when he interviewed Homestead workers and managers in 1908. Fitch reported that:

A prominent official of the Carnegie Steel Company told me that before the strike of 1892, when the union was firmly entrenched in Homestead, the men ran the mill and the foreman had little authority. There were innumerable vexations. Incompetent men had to be retained in the employ of the company, and changes for the improvement of the mill could not be made without the consent of the mill committees. I had opportunity to talk with a considerable number of men employed at Homestead before 1892, among them several prominent leaders of the strike. From these conversations I gathered little that would contradict the statement of the official, and much that would corroborate it. ¹²

The cooperative relationship between the skilled steel workers and the steel employers became strained in the 1880s. The market for steel products began to expand rapidly. Domestically, the railroads began to generate high levels of demand for steel, and internationally, the U.S. steel industry began to compete successfully with the British and the German steel industry for the world market. (In 1890, for the first time, U.S. steel exports surpassed those of Great Britain.) The effect of this massive increase in demand was to intensify competition in the U.S. industry. What had been a stable market structure was disrupted by the new markets opening up.

Firms competed for the new markets by trying to increase their output and cut their costs. To do that they had to increase the productivity of their workers -- but the labor system did not allow them to do that. For example, from 1880 on, the market price for iron and steel products was falling drastically, so that the price for bar iron was below the minimum specified in the union's sliding scale, even though the negotiated minimum rates were also declining. As Peter Doeringer says in his essay on the subject, "the negotiated minimum piece rates ... became the de facto standard rates for the organized sector of the industry during most of the period from 1880 to the end of the century." ¹³ This meant that employers

were paying a higher percentage of their income out in wages than they would have were the sliding feature of the sliding scale operative, or had they had the power to reduce wages unilaterally in the face of declining prices.

At the same time that their labor costs as a percentage of revenue were rising, the labor system also prevented employers from increasing their productivity through reorganizing or mechanizing their operations. The workers controlled the plants and decided how the work was to be done. Employers had no way to speed up the workers, nor could they introduce new machinery that eliminated or redefined jobs.

In the past, employers had introduced new machinery, but not labor-saving machinery. The many innovations introduced between 1860 and 1890, of which the most notable was the Bessemer converter, increased the size and capacity of the furnaces and mills, but they generally did not replace men with machines. Sir Lowthian Bell, a British innovator, who toured the U.S. steel industry in 1890, reported that:

Usually a large make of any commodity is accomplished by a saving of labor, but it may be questioned whether in the case of the modern blast furnace this holds good. To a limited, but a very limited, extent some economy might be effected, but if an account were taken of the weight of material moved in connection with one of our Cleveland furnaces, and the number of men by whom it is handled, much cannot, at all events with us, be hoped for. ¹⁴

However, in the late 1880s and 1890s, the steel companies needed more than just bigger machines and better methods of metallurgy. Bottlenecks were developing in production, so that they needed to mechanize their entire operations. For example, the problem with pig iron production -- the first stage of steel-making -- was that with increased demand, the larger blast furnaces could produce pig iron faster than the men could load them, so that the use of manual labor became a serious hindrance to expanding output. As one technical authority wrote in 1897:

The evolution of the blast furnace, especially the American blast furnace, during the last third of a century has indeed been radical, making the question of getting the material to the furnace and the product away from it promptly, cheaply and regularly -- the problem once satisfactorily solved by the cart or sled, and wheelbarrow and manual labor -- one of great difficulty and importance. ¹⁵

The steel masters needed to replace men with machines, which meant changing the methods of production. To do that, they needed to control production, unilaterally. The social relations of cooperation and partnership had to go if capitalist steel production was to progress. The steel companies understood this well, and decided to break the union. In 1892,

Henry Clay Frick, chairman of the Carnegie Steel Company, wrote to Andrew Carnegie that "The mills have never been able to turn out the product they should owing to being held back by the Amalgamated men." ¹⁶

The strongest lodge of the Amalgamated Association was at Carnegie's Homestead mill; it is no wonder that the battle between capital and labor shaped up there. In 1892, just before the contract with the Amalgamated was to expire, Carnegie transferred managing authority of the mill to Frick. Frick was already notorious for his brutal treatment of strikers in the Connellsville coke regions, and he wasted no time making his intentions known at Homestead. He ordered a fence built, three miles long and topped with barbed wire, around the entire Homestead Works; he had platforms for sentinels constructed and holes for rifles put in along the fence; and he had barracks built inside it to house strikebreakers. Thus fortified, Frick ordered 300 guards from the Pinkerton National Detective Agency, closed down the Works, laid off the entire work force, and announced they would henceforth operate non-union. The famous Homestead strike began as a lock-out, with the explicit aim of breaking the union. Dozens of men were killed in the four months that followed, as the Homestead workers fought Pinkertons, scabs, the Sheriff and the State Militia. In the end, the intervention of the state and federal governments on the side of the Carnegie Corporation beat the strikers. The Works were re-opened with strike-breakers, and Frick wrote to Carnegie, "Our victory is now complete and most gratifying. Do not think we will ever have any serious labor trouble again." ¹⁷

The Homestead strike was the turning point for the Amalgamated Associations throughout the country. Other employers, newly invigorated by Frick's performance, took a hard line against the union, and the morale of the members, their strongest local broken, was too low to fight back. Within two years of the Homestead defeat, the Amalgamated had lost 10,000 members. Lodge after lodge was lost in the following years, so that membership, having peaked at 25,000 in 1892, was down to 10,000 by 1898, and most of that was in the iron industry. ¹⁸ The union never recovered from these losses. The locals that remained were one by one destroyed by the U.S. Steel Corporation, so that by 1910 the steel industry was entirely non-union.

With the power of the Amalgamated broken, steel employers were left to mechanize as much as they needed. The decade that followed the Homestead defeat brought unprecedented developments in every stage of steel-making. The rate of innovation in steel has never been equaled. Electric trolleys, the pig casting machine, the Jones mixer, and mechanical ladle cars transformed the blast furnace. Electric traveling cranes in the Bessemer converter, and the Wellman charger in the open hearth did away with almost all the manual aspects of steel production proper. And electric cars and rising-and-falling tables made the rolling mills a continuous operation. ¹⁹ These developments led the British Iron and Steel Institute to conclude after its visit in 1903 that:

the (U.S.) steel industry had made considerable advances in the ten years ending with 1890. It is, however, mainly since that year that the steel manufacture has made its greatest strides in every direction, and it is wholly since that date that costs have been so far reduced as to enable the United States to compete with Great Britain and Germany in the leading markets of the world. ²⁰

Several visitors to the steel mills around the turn of the century described the new steel-making processes introduced in the wake of the Homestead conflict. One British economist, Frank Poppelwell, was particularly amazed by the degree to which new innovations were labor-saving. He concluded:

Perhaps the greatest difference between English and American conditions in steel-works practice is the very conspicuous absence of labourers in the American mills. The large and growing employment of every kind of both propelling and directing machinery -- electric trolleys, rising and falling tables, live rollers, side-racks, shears, machine stamps, endless chain tables for charging on the cars, overhead travelling cranes -- is responsible for this state of things. It is no exaggeration to say that in a mill rolling three thousand tons of rails a day, not a dozen men are to be seen on the mill floor. ²¹

A group of British iron-masters from the British Iron and Steel Institute also toured America in 1903, and they, too, were impressed to find in the blast furnaces that

the bulk of the heavy drudgery has been obviated by the use of machinery. There is no pig-lifting, no hand shovelling of stock, no hauling of charging barrows. All the tedious clay work around the hearth, the incessant changing of tuyeres, is done away with. ²²

They found that in the rolling mills

the appliances introduced have effected the best results in doing away with manual labor. A tongs or hook is not seen near any of the rail mills visited, and the whole operation is conducted from a platform, where levers connected with the various live rollers and lifting tables are collected together. ²³

And as far as the open hearth operations were concerned, perhaps the most vivid description was left by J.H. Bridge, an American journalist who wrote a series of articles about the steel industry for Everybody's Magazine:

It is at Homestead that wonders are performed as amazing as those of the Arabian Nights. Here machines endowed with the strength of a hundred giants move obedient to a touch, opening furnace doors and lifting

out of the glowing flames enormous slabs of white-hot steel, much as a child would pick up a match-box from the table. Two of these machines, appropriately named by the men "Leviathan and Behemoth," seem gifted with intelligence. Each is attended by a little trolley car that runs busily to and fro, its movements controlled by the more sluggish monster. This little attendant may be at one end of the long shed and the Leviathan at the other; but no sooner does it seem to see its giant master open a furnace door and put in his great hand for a fresh lump of hot steel, than it runs back like a terrier to its owner and arrives just as the huge fist is withdrawn with a glowing slab. This the Leviathan gently places on its attendant's back; and, to the admiration of all beholders, the little thing trots gayly off with it to the end of the building. Even then the wonder is not ended; for the little fellow gives a shake to his back, and the glittering mass, twice as big as a Saratoga trunk, slides onto a platform of rollers which carry it to the mill. And no human hand is seen in the operation. ²⁴

In this way, the steel masters succeeded in eliminating the bottlenecks in production by replacing men with machines at every opportunity. This mechanization would not have been possible without the employers' victory over the workers at Homestead. Thus we can see how the prize in the class struggle was control over the production process and the distribution of the benefits of technology. As David Brody summarizes it:

In the two decades after 1890, the furnace worker's productivity tripled in exchange for an income rise of one-half; the steel workers output doubled in exchange for an income rise of one-fifth ... At bottom, the remarkable cost reduction of American steel manufacture rested on those figures.

The accomplishment was possible only with a labor force powerless to oppose the decisions of the steel men. ²⁵

The victory of the employers in 1892 allowed them to destroy the old labor system in the industry. They could then begin to create a new system, one that would reflect and help to perpetuate their ascendancy. Specifically, this meant that they had three separate tasks: to adapt the jobs to the new technology; to motivate workers to perform the new jobs efficiently; and to establish lasting control over the entire production process. The next three sections of this paper will deal with each one of these in turn.

II. Effects of the New Technology on Job Structure

Unlike earlier innovations in steel-making, the mechanization of the 1890s transformed the tasks involved in steel production. The traditional skills of heating, roughing, catching and rolling were built into the new machines. Machines also moved the raw materials and products through the plants. Thus the new process required neither the heavy laborers nor the

highly skilled craftsmen of the past. Rather, they required workers to operate the machines, to feed them and tend them, to start them and stop them. A new class of workers was created to perform these tasks, a class of machine operators known by the label "semi-skilled."

The new machine operators were described by the British Iron and Steel Institute after their visit in 1903 as men who

have to be attentive to guiding operations, and quick in manipulating levers and similarly easy work ... the various operations are so much simplified that an experienced man is not required to conduct any part of the process.²⁶

Similarly, the U.S. Department of Labor noted the rise of this new type of steel worker in their report of 1910:

The semi-skilled among the production force consist for the most part of workmen who have been taught to perform relatively complex functions, such as the operation of cranes and other mechanical or metallurgical knowledge ... This class has been developed largely within recent years along with the growth in the use of machinery and electrical power in the industry. The whole tendency of the industry is to greatly increase the proportion of the production force formed by this semi-skilled class of workmen. They are displacing both the skilled and the unskilled workmen.²⁷

The semi-skilled workers were created by the downgrading of the skilled workers and the upgrading of the unskilled. These shifts proceeded throughout the 1890s and early 1900s, as more and more plants were mechanized. Although there are no hard data on these shifts in job categories, they are reflected in the change in relative wage rates. Between 1890 and 1910, the hourly wages of the unskilled steelworkers rose by about 20 percent, while the daily earnings of the skilled workers fell by as much as 70 percent. Also after 1892, the wage differential between the various

*Usually time series data on percentage employed in the different categories are used to demonstrate the changing mix of skill requirements in the industry. For my purpose, however, such data are more misleading than helpful. In part, this is because there is no way to know how the Census Department or the individual steel companies are defining "skilled," "semi-skilled" and "unskilled," so that comparisons between them are impossible. Also, the meaning of the categories changes over time. In 1890, "unskilled" work in the steel mills meant purely heavy manual labor. By 1910, "unskilled" work included simple machine operating jobs, as well as laborers. Similarly, "skilled" work in 1890 meant all workers who had a particular craft. By 1910, "skilled" workers were either maintenance men (mechanics, machinists, etc.) or workers holding supervisory-type functions, directing and coordinating the various men and machines. (Footnote continued on next page.)

types of skilled workers narrowed substantially. ** Thus, the British iron masters reported in 1903

The tendency in the American steel industry is to reduce by every possible means the number of highly skilled men employed and more and more to establish the general wage on the basis of common unskilled labour. This is not a new thing, but it becomes every year more accentuated as a result of the use of automatic appliances which unskilled labor is usually competent to control. 28

One consequence of the diminished importance of the skilled workers once their power was broken was the dramatic decline in their earnings. The following table of wage rates for selected positions at the Homestead plant mill between 1892 and 1908 illustrates the fate of skilled workers throughout the industry. Bear in mind that during this interval, their productivity was multiplying and wages throughout the nation were rising. Also, their workday was increased from 8 hours to 12 hours, so that the decline in daily earnings understates their reduction in real wages.

(Footnote continued from previous page).

The other reason that time series data are not germane is that even when data is available for particular job titles at different periods of time, there is no way to know that the job itself remained unchanged. The following passage from Fitch (op. cit., p.43) gives us one example of how job titles were changing during this period:

There were three men regularly employed at an open-hearth furnace -- "first helper," "second helper" and "cinder-pit man." The first helper was formerly called a "melter," but now, with a different organization, a melter has charge of several furnaces. In an open-hearth plant there are usually a superintendent and an assistant superintendent in control, a foreman or boss melter in active charge of from three to five furnaces.

Thus I have concluded that contemporary accounts are more valuable than statistical data to describe the changing content and categories of work in steel mills. Only in this way is it possible to go behind the statistical data and show the concrete content often masked in the abstract categories.

** Doeringer, op. cit. Doeringer attributes this shift purely to commodity market forces. He argues that shifts in demand for different kinds of steel products narrowed the wage differentials between steel workers. He mentions the decline of the Amalgamated after Homestead and the skilled workers' subsequent inability to hold their own against the employers, but does not relate this to the change in wage differentials.

Table 1. Wages in Plate Mills, Homestead, 1889-1908 ²⁹

<u>Position</u>	<u>Decline in Tonnage Rates</u>			<u>Decline in Daily Rates</u>		
	<u>1889-92</u>	<u>1908</u>	<u>% decl.</u>	<u>1892</u>	<u>1907</u>	<u>% decl.</u>
Roller	\$14.00	\$4.75	66.07	\$11.84	\$8.44	28.72
Heater	11.00	3.99	63.73	8.16	7.21	11.64
Heater's Helpers	7.50	2.09	72.13	5.80	4.09	29.48
Hooker	8.50	2.40	71.76	n.a.	n.a.	n.a.
Shearman	13.00	n.a.	n.a.	9.49	5.58	41.20

These reductions were part of the steel companies' policy of reducing the wage differentials between the classes of workers to make them more consistent with differentials in skill requirements for the different jobs. An official of one Pittsburgh steel company put it this way:

It is perfectly true that the tonnage rates, and in some instances the actual daily earnings of skilled laborers, have been largely decreased. The reason for this is, mainly, the tremendous increase in production, due to improved equipment, representing very large capital investment, enabling the men at lower rates to make equal or even higher daily earnings.

He then added, somewhat more straightforwardly:

At the same time the daily earnings of some of the most highly paid men have been systematically brought down to a level consistent with the pay of other workers, having in mind skill and training required and a good many other factors. ³⁰

The other side of the picture was the upgrading effect that the new technology had on the unskilled workers. Their wages were increased considerably during that same period. In part this was accomplished by a raise in the hourly rate for unskilled labor, from 14 cents per hour in 1892 to 17.5 cents in 1910, and in part it was the result of the steel companies putting more men on tonnage rates, enabling them to make higher daily earnings. ³¹

Many unskilled workers were put in charge of expensive machinery and made responsible for operating them at full capacity. (It turned out to be very easy to train unskilled workers for these jobs, as will be shown in Part III, Section 2). Fewer and fewer men were hired just to push wheelbarrows and load ingots, so that, as an official of the Pennsylvania Steel Company said, "While machinery may decrease the number of men, it demands a higher grade of workmen." ³²

Thus, the effects of the new technology was to level the work force and create a new class of workers. The following table shows this process as a whole. The data is based on a survey of 28 steel plants, conducted

by the U.S. Commissioner of Labor in 1913. The table reports earnings only of production workers, omitting the earnings of foremen, clerks, timekeepers, weighters, and chemists.

Table II. Percent Employees Earning Each Classified Amount ³³

<u>Hourly Earnings</u>	<u>1900</u>	<u>1905</u>	<u>1910</u>
Under 18 cents	65.0	64.3	41.8
18 and 25 cents	17.4	20.6	32.8
25 cents and over	17.6	15.1	25.4
70 cents and over	1.9	0.9	1.2

As can be seen from the table, the percentage of workers earning in the middle two categories went from 35% to 58% in the ten-year period.

The existence of the growing group of semi-skilled workers created certain problems for the employers, which will be explored in Part III.

III. Solving the Labor Problem

In Part I we saw how the market conditions in the industry led employers to destroy the skilled steel workers' union in order to mechanize their operations. Employers therefore became the unilateral controllers of steel production. However, by doing that they created for themselves the problem of labor discipline. When the skilled workers had been partners in production, the problem of worker motivation did not arise. Skilled workers felt that they were working for themselves because they controlled the process of production. They set their own pace and work load without input from the bosses. In the 1890s, however, when the steel masters showed them who was boss, workers lost their stake in production, so that the problem of motivation arose. How hard workers worked became an issue of class struggle.

In Part II we saw how the effect of the new technology introduced in the 1890s was to narrow the skills differentials between the two grades of workers, producing a work force predominantly "semi-skilled." This homogenization of the work force produced another new "problem" for the employers. That is, without the old skilled/unskilled dichotomy and the exclusiveness of the craft unions, the possibility that workers might as a class unite to oppose them was greater than ever. Frederick Winslow Taylor, the renowned management theorist who began his career as a foreman in a steel plant, warned employers of this danger in 1905:

When employers herd their men together in classes, pay all of each class the same wages, and offer none of them inducements to work harder or do better than the average, the only remedy

for the men comes in combination; and frequently the only possible answer to encroachments on the part of their employers is a strike. ³⁴

Ultimately, however, both the problem of worker motivation and the problem of preventing unified opposition were the same problem. They both revolved around the question of controlling worker behavior. To do that, employers realized they had to control their perceptions of their self-interest. They had to give them the illusion that they had a stake in production, even though they no longer had any real stake in it. This problem was known as "the labor problem."

To solve the labor problem, employers developed strategies to break down the basis for a unity of interest amongst workers, and to convince them that, as individuals, their interests were identical with those of their company.

Out of these efforts, they developed new methods of wage payments and new advancement policies, which relied on stimulating individual ambition. They were designed to create psychological divisions among the workers, to make them perceive their interests as different from, indeed in conflict with, those of their co-workers. Employers also began to use paternalistic welfare policies in order to win the loyalty of their employees. The effect of all these new policies was to establish an internal labor market in the major steel companies, which has lasted, in its essentials, until today. This section will describe the new labor system that was created and the reasons why employers created it.

1. Development of Wage Incentive Schemes

With the defeat of the Amalgamated Association, the entire complex traditional system of wage payments collapsed. The sliding scale of wages for paying skilled workers and the contract system for paying their helpers rapidly declined. Employers considered them a vestige of worker power and rooted them out of shop after shop. As the British Iron and Steel Institute noted in 1902:

Many owners of the works in the United States have set their faces so completely against the contract system that in the opinion of the most experienced authorities, the contractor, as hitherto established, is likely, before long, to entirely disappear. ³⁵

Thus, the employers had the opportunity to establish unilaterally a new system of wage payment. Initially, they began to pay the new semi-skilled workers. Soon, however, they switched to the system of piece work, paying a fixed sum for each unit the worker produced. The British visitors found, in 1902, "in most of the works and shops visited that piece work is very general in all operations that call for a considerable amount of skill, and, indeed, wherever the work is above the level of unskilled

labor." 36

The most obvious function of piece work was, of course, to increase output by making each worker drive himself to work harder. Employers also contended that the system was in the workers' best interests because it allowed each one to raise his own wages.

However, the employers soon found that straight piece work gave the workers too much control over their wages. That is, when it succeeded in stimulating workers to increase their output, their wages soared above the going rate. Employers would then cut the piece rates to keep the wages in line. Once they did that, however, they had reduced the piece rate system to simple speed-up -- a way of getting more work for the same pay. Workers responded to the rate cuts by collectively slowing down their output, so that the system defeated itself, leaving employers back where they had started. An article in Iron Age, entitled "Wage Payment Systems: How to Secure the Maximum Efficiency of Labor," gives an interesting account of this process:

It is in the administration of the piece work system that manufacturers, sooner or later, make their great mistake and over-reach themselves, with the result that the system becomes a mockery and the evil conditions of the old day work system reappears. Regardless of the continually increasing cost of living, the manufacturers decide among themselves, for example, that \$1.50 for 10 hours is enough for a woman and that \$2.50 a day is enough for the ordinary working man and a family. The piece work prices are then adjusted so that the normal day's output will just bring about these wages ... Immediately throughout the entire shop the news of the cuts is whispered about ... with the result that there is a general slowing down of all producers. 37

Thus employers began to experiment with modifications of the piece rate. They developed several new methods of payment at this time, known as "premium" or "bonus" plans. These differed from piece work only in that they gave the workers smaller increments in pay for each additional piece.

The Halsey Premium Plan, developed in 1891, served as a model for most of the others. It called for establishing a base time period for a job, and setting one rate for workers who completed the job in that period. If a worker could finish the job faster, then he received a bonus in addition to the standard rate. The bonus was figured so that only a part of the money saved by the worker's extra productivity went to him, the rest going to the company. Different plans varied according to how they set the base time period and the base wage, and how they divided the more efficient workers' savings between the worker and the company. Iron Age recommended one particular variation, called the Half and Half Premium Plan, in which the rule was "to pay the more efficient workman only one-half what he saves in speeding up." The article described one example where under the

plan,

for every extra \$1 the man earned by his extra effort, the manufacturers would gain \$7. Not a bad investment this premium system. It betters the workingman's condition materially, and, best of all, improves his frame of mind. ³⁸

Frederick Winslow Taylor's Differential Piece Rate is basically another variation of the Halsey Premium Plan. Under Taylor's system, the employer established two separate rates, a low day rate for the "average workman" and a high piece rate for the "first class workman," with the stipulation that only the fast and efficient workmen were entitled to the higher rate. He suggests setting the high rate to give the worker about 60 percent increase in earnings, and for this, the employer would demand of him a 300-400 percent increase in output. Like the Halsey Plan, it was simply the piece rate system modified to give the worker diminishing returns for his extra effort.

In order for any of the output incentive plans to work, management had to be able to measure each worker's output separately. All of the premium plans stressed the importance of treating each worker individually, but only Taylor gave them a method for doing so. His great contribution was systematic time study -- giving employers a yardstick against which to measure an individual's productivity. The emphasis on individual productivity measures reinforced the fragmenting effect of the plans. As Taylor said about his experience implementing the system at the Bethlehem Steel Works:

Whenever it was practicable, each man's work was measured by itself ... Only on a few occasions and then upon special permission (...) were more than two men allowed to work on gang work, dividing their earnings between them. Gang work almost invariably results in a falling off of earnings and consequent dissatisfaction. ³⁹

Output incentives were designed to increase individual worker output. Employers understood that to do that, they had to play upon individual worker's ambitions, which meant breaking down workers' collective identity. They gave each worker inducement to work harder, and also divided the workers into different groups, according to their output. They also increased the social distance between the more "efficient" and the less "efficient" workers.

Thus, output incentives served as a lever to prevent workers from taking collective action. As one manufacturer explained in 1928, he had originally adopted output incentives:

To break up the flat rate for the various classes of workers. That is the surest preventative of strikes and discontent. When all are paid one rate, it is the simplest and almost inevitable

thing for all to unite in the support of a common demand. When each worker is paid according to his record there is not the same community of interest. The good worker who is adequately paid does not consider himself aggrieved so willingly nor will he so freely jeopardize his standing by joining with the so-called "Marginal Worker." There are not likely to be union strikes where there is no union of interest. ⁴⁰

Taylor, too, boasted in 1895 that

There has never been a strike by men working under this system, although it has been applied at the Midvale Steel Works for the past ten years; and the steel business has proved during this period the most fruitful field for labor organization ... I attribute a great part of this success in avoiding strikes to the high wages which the best men were able to earn with the differential rates, and to the pleasant feeling fostered by this system. ⁴¹

An editorial in Iron Age, 1905, entitled "Union Restriction of Output," reveals much about employers' views of the incentive plans. It said:

The premium plan, which has done for the machine shop, and on a smaller scale for the foundry, what the introduction of non-union men did at the Gamble mine -- increasing wages and reducing the cost per ton -- has been resisted by the molders' union, as it has been steadily opposed by the machinists' union. As ground for this opposition it is urged that the premium plan is only a modification of what the unions regard as the vicious piece price system, and that the union must prevent a greedy scramble for high wages by workmen who take no account of the pace they are setting for the less capable... ⁴²

This article tells us how conscious both the employers and the unions were about effects of the premium plan on the social relations inside the plant. Employers saw it as the equivalent to bringing in scabs to a union shop in its power to break up unity between the workers and advocated it for that reason. The unions opposed it, not because they misunderstood, but because they saw it in precisely the same way.

Quite explicitly, then, the aim of the premium plans was to break up any community of interest that might lead workers to slow their pace (what employers call "restriction of output") or unite in other ways to oppose management. They were a weapon in the psychological war that employers were waging against their workers, and were, at least for a while, quite successful. A survey of plant managers made in 1928 by the National Industrial Conference Board found that:

There was little dissent from the opinion that the (premium plan) is effective in promoting industrial harmony. The responsibility

for low earnings is placed squarely on the shoulders of the worker, leaving no room for complaint of favoritism or neglect on the part of management. ⁴³

Between 1900 and World War I, piecework and premium plans became more and more prevalent in the steel industry. Although there are no figures on the percentage of workers on incentive plans, as compared with percentage on day work, there is evidence that piece work and the premium system became the preferred method of wage payment and was used whenever possible. The number of articles in Iron Age advising employers to use output incentives increase every year during this period, and they give more and more examples of companies which have employed it successfully. By 1912, there were articles about the system almost every month in Iron Age, with titles like "A Sliding Scale Premium System" (March 14), "The Sphere of the Premium Plan" (April 25), "Success with Bonus Wage Systems" (July 4), "Productivity Betterment by Time Studies" (April 4), and "Adopting Piece Work and Premium Systems" (December 5).

Bethlehem Steel Company was one of the first major companies to adopt premium plans. Charles Schwab, president of the company, attributed his uncanny success in buying out bankrupt shipbuilding companies and turning them into profitable ventures to the introduction of premium plans. In one particularly dramatic case, he bought the bankrupt Fore River Shipbuilding Company in Quincy, Massachusetts and claimed, with the bonus plan, to have revived the company so as to make a million dollars' profit from it in the first year ! ⁴⁴

Steel workers opposed the new methods of payment, and the residual unions in the industry raised objections at every opportunity. In one instance, at Bethlehem Steel's South Bethlehem Works, opposition to the bonus system exploded into a major strike in February, 1910. Approximately 5,000 of the 7,000 workers there went out on strike spontaneously. The strike lasted several weeks, during which time one man was killed and many were injured. Strike demands were drawn up separately by each department or group of workers, and every single one called for uniform rates of pay to be paid by the hour, and time-and-a-half for overtime. Several added to that an explicit demand for the elimination of piecework and a return to the "day-work" system. A U.S. Senate investigation into the strike found that the "Time-Bonus" System in use was one of its major causes." ⁴⁵

However, worker opposition proved ineffective in preventing the use of output incentive schemes. Since 1892, the employers had held the upper hand in the industry, and they used it to perpetuate their power. The wage incentive schemes were aimed at doing just that.

2. New Promotion Policies and the Development of Job Ladders

As we saw in Part II of this paper, the new technology diminished the skill requirements for virtually all the jobs involved in making steel, so

that even the most difficult jobs could be learned quickly. The gulf separating the skilled workers from the unskilled workers became virtually meaningless. Charles Schwab himself said in 1902 that he could "take a green hand -- say a fairly intelligent agricultural labourer -- and make a steel melter of him in six to eight weeks."⁴⁶ When we realize that the job of melter was the most highly skilled job in the open hearth department, we can see how narrow the skill range in the industry really was. The employers knew this, and put their knowledge to good use during strikes. For example, during a strike at the Hyde Park Mill in 1901

it was resolved that the works should be continued with green hands, aided by one or two skilled men who remained loyal. The five mills thus manned were started on the 3rd of August, and up to the date of my visit, near the end of October, they had not lost a single turn.⁴⁷

Around the turn of the century, employers began to recognize the dangers inherent in the homogenization of the work force. They formulated this problem as worker discontent caused by "dead-end jobs." Meyer Bloomfield, an industrial manager who in 1918 wrote a textbook in factory management, summarized their discussion on this subject:

A good deal of literature has been published within the last dozen years in which scathing criticism is made of what has come to be known as "blind alley" or "dead-end" jobs. By these phrases is meant work of a character which leads to nothing in the way of further interest, opportunity, acquisition of skill, experience, or anything else which makes an appeal to normal human intelligence and ambition. The work itself is not under attack as much as the lack of incentive and appeal in the scheme of management.⁴⁸

Bloomfield says right off, then, that the problem of "dead-end" jobs need not be solved by changing the jobs themselves. The better solution is to change the arrangement of the jobs. To do this, he says,

a liberal system of promotion and transfer has therefore become one of the most familiar features of a modern personnel plan, and some of the most interesting achievements of management may be traced to the workings of such a system.⁴⁹

Thus, the response of employers to the newly homogenized jobs was to create strictly demarcated job ladders, linking each job to one above and one below it in status and pay to make a chain along which workers could progress. The reason for this response was their view that

what makes men restless is the inability to move, or to get ahead. This fundamental law of human nature is forgotten frequently, and its neglect gives rise to situations that are never understood by the employer who looks upon a working force as something

rigid. 50

The establishment of a job ladder had two advantages, from the employers' point of view. First, it gave workers a sense of vertical mobility as they made their way up the ladder, and was an incentive to workers to work harder. Like the premium plan, the promise of advancement was used as a carrot to lure the men to produce more and more. As Charles Hook, the Vice President of the American Rolling Mill Company, a major subsidiary of U.S. Steel, told the Third International Management Congress

a few general policies govern the selection of all(our employees) One of the most important of these is the policy of promotion within the organization. This is done wherever possible and has several advantages; the most important of which is the stimulating effect upon the ambitions of workers throughout the organization. 51

The other advantage of the job ladder arrangement was that it gave the employers more leverage with which to maintain discipline. The system pitted each worker against all the others in rivalry for advancement and undercut any feeling of unity which might develop among them. Instead of acting in concert with other workers, workers had to learn to curry favor with their foremen and supervisors, to play by their rules, in order to get ahead. As one steel worker described the effect this had on workers during the 1919 organizing campaign, "Now, they won't join no union; they're all after every other feller's job." 52 This competition also meant that workers on different ladder rungs had different vested interests, and that those higher up had something to lose by offending their bosses or disrupting production.

As early as 1900, Iron Age was advising employers to fill production work vacancies from inside the firm. They advocated a policy of hiring only at the lowest job levels and filling higher jobs by promotion -- what contemporary economists refer to as limiting the ports of entry. In one article, titled "Developing Employees," a columnist sharply criticizes a specific employer who

has very often failed to find the proper qualifications among his employees to promote any one of them to certain higher positions which had become vacant from various causes ... At such times he usually hired outsiders to fill the positions and thus engendered dissatisfaction among his helpers. 53

In the following years, the journal suggested that employers issue special employer certificates to their more faithful and efficient employees, which would serve as tickets to advancement when openings became available. By 1905, they concluded that

The plan is working so well that already employers' certificates are held in higher favor by the industrious well-disposed work-

men than a union card could ever be by such a man. 54

Clearly, the employers' certificates were a gimmick to further the workers sense of opportunity by holding out the promise of promotions even before there were jobs available. Thus, workers were made to compete with each other for the certificates, as well as for the better jobs. The certificates in themselves did not guarantee anything, they merely improved one's chances -- so the "certified" loyal ones still had to compete.

The principle of internal promotion was expounded by Judge Gary, the President of the U.S. Steel Corporation, in his dealings with the subsidiaries. For example, in a speech to the presidents of the subsidiary companies in 1922, Gary said:

We should give careful thought to the question as to who could be selected to satisfactorily fill any unoccupied place; and like suggestions should be made to the heads of all departments. Positions should be filled by promotions from the ranks, and if in any locations there are none competent, this fact should be given attention and men trained accordingly. It is only necessary to make and urge the point. You will know what to do, if indeed any of you has not already well deliberated and acted upon it. 55

Observers of the steel industry in the early years of this century saw the effects of these new policies on the structure of jobs. The British economist, Poppelwell, visited the American steel industry in 1902 and concluded that:

the most characteristic feature of American industrial life and the most far-reaching in its effects is what may be shortly termed the mobility of labour ... Under a competitive system, a large degree of mobility, not only in the various grades of labour themselves, but also between the different grades, allows the best man to come rapidly to the top, and promotion is very much quicker in America than here. 56

As we saw in Part I of this paper, John Fitch, the American journalist who made a study of the steel industry in 1908, also found a rigid line of promotion within each department, and a work force that was "pyramided and (...) held together by the ambition of the men lower down." 57

On an aggregate level, the vertical mobility inside the steel industry can be traced through the rise of the various immigrant groups, all of whom entered the industry as common laborers. David Brody, in his book Steel Workers in America, gives the following data about one large Pittsburgh mill for the year 1910: 58

Number of Immigrants Holding Jobs

<u>Years Service</u>	<u>Unskilled Jobs</u>	<u>Semi-skilled Jobs</u>	<u>Skilled Jobs</u>
Under 2 years	314	56	0
2 - 5 years	544	243	17
5 - 10 years	475	441	79
over 10 years	439	398	184

John Fitch also noted that one could chart mobility through the rise of the various groups of immigrants. In the open hearth department, for example, he noted that the newly arrived Slav is

put to work in the cinder pit; from here he is promoted to be second helper and then first helper. Practically all of the cinder-pit men now are Slavs, and a majority of the second helper are Slavs, and it would seem to be only a question of time when the first helpers and even the melter foremen will be men of these races promoted from the lower positions. 59

In this way, the steel companies opened up lines of promotion in the early years of the century by creating job ladders. Employers claimed that each rung of the ladder provided the necessary training for the job above it. But the skilled jobs in the steel industry had been virtually eliminated and production jobs were becoming more homogeneous in their content. If, as Charles Schwab said, one could learn to be a melter in six weeks, then certainly the training required for most jobs was so minimal that no job ladder and only the minimum of job tenure were needed to acquire the necessary skills.

At the time, technological development made it possible to do away with distinctions between skilled and unskilled workers. Instead of following this trend, they introduced divisions to avoid the consequences of a uniform and homogeneous work force. Therefore, the minutely graded job ladders that developed were a solution to the "labor problem," rather than a necessary input for production itself.

3. The Welfare Policies

The history of this period also sheds light on another important aspect of the steel industry's labor policies -- the welfare programs. U.S. Steel's policy on welfare was formulated during the first few years of the corporation's life, and specific programs were established throughout the early years. These programs included a stock subscription plan for workers and a profit-sharing plan for executives; old-age pensions and accident insurance; a safety and sanitation campaign; and efforts to provide community housing, education and recreation facilities. Indeed, they included most of the functions performed today by the so-called "welfare state." The welfare policies were the most visible and best publicized part of the industry's labor policies. They were set up to serve the interests of the employers as a class, rather than as individual manufacturers.

The stock subscription plan, the first of the welfare measures, went into effect in 1903. It involved the sale of stock at reduced rates to corporation employees, paid for by monthly paycheck deductions. The plan provided the subscribers with a bonus, in addition to the regular dividends, of \$5 for each of the first five years that the subscribers remained in the employ of the corporation and retained the stock, provided he showed "a proper interest in its welfare and progress." Also, the deserving subscribers received an extra bonus after owning the stock five years.

The idea of the stock subscription plan was to give employees a share in the growth of the corporation. As such, it was a form of profit-sharing. However, the bonuses and the extra bonuses made the plan something more. They gave employees an incentive to stay with the corporation for five years, and to show "a proper interest" in its welfare. Although it did not specify what showing a "proper interest" involved, certainly joining a union or sabotaging production were not included. The plan was clearly designed to control workers' behavior. One of the workers interviewed by John Fitch saw it simply as "... a scheme to keep out unionism and prevent the men from protesting against bad conditions." 60

The stock subscription plan set the tone for all of the later insurance measures. They all contained clauses and sub-paragraphs stipulating how workers had to behave to be eligible for benefits. For example, the pension fund established in 1911, which was made up solely of corporation contributions, offered retirement benefits at age 60 for employees of 20 years seniority, except "in case of misconduct on the part of the beneficiaries or for other cause sufficient in the judgment of the Board of Trustees." 61 Similarly, a Voluntary Accident Relief Plan was inaugurated in 1910 to pay workers benefits in case of temporary disability, permanent disability, or death resulting from on-the-job injuries. The plan (which was soon superseded by state workmen's compensation laws) was the first of its kind in the United States, and for all of its liberality, was also a device to ward off lawsuits in accident cases caused by company negligence. The plan said explicitly that "No relief will be paid to any employee or his family if suit is brought against the company," and "all employees of the company who accept and receive any of this relief will be required to sign a release to the company." 62

Other aspects of the welfare program contained more subtle behavior modification devices, aimed at changing behavior indirectly, through changing the attitudes of employees. For example, the steel industry was notorious for its hazardous working conditions and the high accident rate that resulted. The corporation, as part of its welfare program, began a safety propaganda campaign in 1908. They hung safety posters around the plants, distributed safety handbills to all the workers, circulated safety bulletins, and showed safety films -- all of which were designed to convince the workers that " 'workers are solely or partially responsible (for accidents) in ninety percent of the cases.' " 63 U.S. Steel maintained, and preached, this position despite conclusive statistical evidence published at the time which showed that plant and equipment design were the cause of most work accidents in the steel industry. 64 In other words, the point of the

elaborate and highly praised safety campaign was to convince the workers that accidents were their own fault, and so to ward off any blame for the companies' unsafe production practices.

Another part of the corporation's welfare program was to encourage workmen to build houses by giving them low-income loans for that purpose. Although the program benefitted workers, the motives for the program were, at best, mixed. An editorial in Iron Age in 1905 praised the corporation's housing program because:

Workmen will build homes of their own, which is most desirable as bearing upon permanency of employment and its influence against labor agitation, for the home-owning workman is less apt to be lead astray by the professional agitator than the man whose industrial life is a transient one.⁶⁵

The corporation's welfare efforts in the communities of its employees were extensive and impressive. The corporation by 1924 built 28,000 dwellings, which it rented to its employees, and built entire towns around some of its subsidiaries. Gary, Indiana, for example, was built from scratch by the corporation, and was acclaimed at the time as a model of town planning techniques and modern social services. In these company towns, the corporation built water purification facilities and sewage systems. They employed nurses to visit the families of their employees, instructing them in methods of hygiene, and they employed dentists to visit the children's schools and give them "toothbrush drills." They built emergency hospitals to serve their towns, charging special low rates to families of workers. They helped build the public schools and often supplemented teachers' salaries in order to attract good teachers. They built libraries and club houses for the workers, at which they offered night courses in English, civics, arithmetic, and technical subjects. Every plant had its own glee club, band or orchestra, with instruments provided by the company. Unoccupied company land was turned over to the workers for gardens, where with seed provided by the company, about a million dollars worth of vegetables were produced each year. And for its employees' recreation, the corporation had built, by January 1, 1924, 175 playgrounds, 125 athletic fields, 112 tennis courts, 19 swimming pools, and 21 band stands.⁶⁶ Such was the welfare program of the Steel Corporation. The question that remains is, why?

Most writers about the industry treat the welfare work either as a sincere expression of good intentions on the part of the steel management, or as a public relations ploy. Friends of the corporation, such as Arundel Cotter, a personal acquaintance of Judge Gary, argue that the welfare work proved that labor and capital could progress together in harmony, providing better lives for the workmen and higher profits for the corporation at the same time. He sums up his review of the welfare work by saying, "the organization of the U.S. Steel Corporation was the greatest step that has ever been made toward the highest form of socialism."⁶⁷ Critics of the corporation like John Garraty and Robert Weibe, both historians of the period,

argue that the welfare work was designed to convince the public that the corporation was a "good trust," in order to avoid the furor of the trust-busting sentiment of the times, but that in fact they benefitted very few workers.

A look at the origins of the welfare programs gives a more rounded view of the role they served. The welfare programs were designed by George Perkins, one of J.P. Morgan's top men. Perkins had originally attracted Morgan's attention when, as a Vice President of New York Life Insurance Company, he had developed an extraordinary innovation in labor relations, the NYLIC club. The purpose of the scheme was to reduce employee turnover. Perkins set up the club for all employees who promised never to work for another business. Membership in the NYLIC club gave one monthly bonuses and a life-time pension after twenty years of service. According to Perkins' biographer:

"The idea of this plan," Perkins told the agents, "is to say to the solicitor ... that if he will give up ... any thought of going into any business, or into any other company, no matter what the inducements might be, and will accept ... the New York Life Insurance Company for his Company, then we will do something for him that is ... better than any other Company can do." ⁶⁸

The plan was enormously successful at reducing turnover, and it made Perkins' career. He went to work for Morgan, and he was put in charge of labor relations for all of Morgan's concerns. He designed welfare policies for Morgan's railroads, the International Harvester Corporation and U.S. Steel, all with the same goal -- to bind workers to the company for a long time. ⁶⁹ Again, Perkins' biographer reports that the stock subscription plan at U.S. Steel

had certain special features intended to make the employees identify their personal interests with that of U.S. Steel. These features reflected clearly Perkins' experience in the life insurance business, and especially with the NYLIC organization. Just as he had worked to retain his agents on a permanent basis, Perkins was eager to avoid a labor turnover at every level. ⁷⁰

The welfare policies caused a bitter dispute within the corporation's Executive Board when they were first proposed. U.S. Steel's original Executive Board was made up of two groups -- the Wall Street bankers who had organized the merger, and the presidents of the large steel companies who had been merged. On November 22, 1902, less than a year after the corporation was formed, the financiers on the Board, Judge Elbert Gary and George Perkins, presented the stock-subscription plan. The old-time steel men on the Board immediately opposed the plan. Their labor policy, so effective in the 1890s, was straightforward, out-and-out repression. Charles Schwab, president of the corporation, characterized their attitude by saying, "When a workman raises his head, beat it down." Thus a fight developed between the bankers and the steel men over the labor policy of

the new corporation -- a fight which was ultimately settled by J.P. Morgan, who threw his support to the bankers.⁷¹ Schwab resigned as president of the corporation soon thereafter, and Gary was made chairman of the Board of Directors. With the victory of the financiers, the welfare programs were begun.

The welfare programs, then, were part of a broader strategy on the part of the finance capitalists to break down the interfirm mobility of workers. The reason for this was not simply that labor turnover was expensive -- for indeed turnover was not particularly expensive in those days when there was little on-the-job training and none of the negotiated fringe benefits which make turnover costly today. The reason for reducing turnover was, as Perkins and other managers of the day noted, that changing jobs had an unsettling effect upon the workers. It tended to make them identify with other workers, and to see themselves as a class. All of the major strikes of the 19th century had shown that steel workers were quick to go out in sympathy with striking workers in other companies and other industries. The welfare programs were supposed to combat this tendency, by giving workers both a psychological and an economic motive for remaining loyal to their employer.

The steel companies regarded their welfare work as their greatest contribution to domestic tranquility. They saw welfarism as the way to head off class struggle in society as a whole. For example, during the discussion of welfare work at the 1912 convention of the Iron and Steel Institute, one of the directors of U.S. Steel, Percival Roberts, said:

We live in an age of discontent and great unrest. It is world-wide, not peculiar to this country at all. And I believe that no body of men is doing more to restore confidence today than those assembled here tonight. It is the one thing which we need today, eliminating all class distinctions, and restoring not only politically, but industrially, good fellowship; and I believe that the Iron and Steel industry is taking a leading position in that work.⁷²

The Steel Corporation advertised its welfare work widely. Beginning in 1913, they began an "Iron and Steel Institute Monthly Bulletin" which did nothing but report on the welfare work of the different steel companies. Judge Gary and George Perkins gave many speeches about the welfare work, and encouraged other corporations to follow their example. They sought publicity for the programs in the business press and the popular press. They did this because they saw the programs as more than a labor policy for U.S. Steel. They believed that if all companies followed their example it would prove to be a solution to the "labor problem" nationally. Welfarism was their answer to the class politics of the Socialist Party, which was making great headway at the time. By increasing the ties between workers and their employer, they hoped to weaken the ties between workers and

their class. *

Perhaps the best statement of the strategy of the welfare policies was given by Judge Gary, who ended a meeting with the presidents of U.S. Steel subsidiary companies in January, 1919, by saying:

Above everything else, as we have been talking this morning, satisfy your men if you can that your treatment is fair and reasonable and generous. Make the Steel Corporation a good place for them to work and live. Don't let the families go hungry or cold; give them playgrounds and parks and schools and churches, pure water to drink, and recreation, treating the whole thing as a business proposition, drawing the line so that you are just and generous and yet at the same time keeping your position and permitting others to keep theirs, retaining the control and management of your affairs, keeping the whole thing in your own hands. ⁷³

IV. The Redivision of Labor

While employers were developing new systems for managing their work forces, they also altered the definition of jobs and the division of labor between workers and management. They did this by revising the training mechanism for skilled workers, retraining the foremen, and changing their methods of recruiting managers. The result of these changes was to take knowledge about production away from the skilled workers, thus separating "physical work" from "mental work." This further consolidated the employers' unilateral control over production, for once all knowledge about production was placed on the side of management, there would be no way for workers to carry on production without them.

Frederick Winslow Taylor was one of the first theorists to discuss the importance of taking all mental skills away from the worker. In his book Principles of Scientific Management (1905), he gives a description of the division of knowledge in the recent past:

Now, in the best of the ordinary types of management, the managers recognize the fact that the 500 or 1000 workmen, included in the twenty or thirty trades, who are under them, possess this mass of traditional knowledge, a large part of which is not in the possession of the management. The management, of course, includes foremen and superintendents, who themselves have been in most cases first-class workers at their trades. And yet these foremen and superintendents know, better than anyone else, that their own knowledge and personal skill falls far short of the

* For a discussion on the class-conscious nature of the welfare work, and the leading role played by U.S. Steel, see Weinstein, The Corporate Ideal in the Liberal State and Weibe, Robert, Businessmen and Reform.

combined knowledge and dexterity of all the workmen under them.⁷⁴

Taylor insists that employers must gain control over this knowledge, and take it away from the workers. In his manual Shop Management, he says quite simply, "All possible brain work should be removed from the shop and centered in the planning or laying-out department."⁷⁵

Taylor suggested several techniques for accomplishing this. They were all based on the notion that work was a precise science, that there was "one best way" to do every work task, and that the duty of the managers was to discover the best way and force all their workmen to follow it. Taylorites used films of men working to break down each job into its component motions, and used stop watches to find out which was the "one best way" to do them. Taylor also insisted that all work should be programmed in advance, and co-ordinated out of a "planning department." He gives elaborate details for how the planning department should function -- using flow charts to program the entire production process and direction cards to communicate with foremen and workmen. These were called "routing" systems. One historian summarizes this aspect of scientific management thus:

One of the most important general principles of Taylor's system was that the man who did the work could not derive or fully understand its science. The result was a radical separation of thinking from doing. Those who understood were to plan the work and set the procedures; the workmen were simply to carry them into effect.⁷⁶

Although most steel executives did not formulate the problem as clearly as Taylor, they did try to follow his advice. Around 1910, they began to develop "dispatching systems" to centralize their knowledge about production. These systems consisted of a series of charts showing the path of each piece of material as it made its progress through the plant and how much time each operation took -- enabling the supervisors to know exactly where each item was at any point in time. The purpose of these systems was to give the supervisors complete knowledge of the production process. Between 1910 and 1915, Iron Age carried innumerable articles about steel plants that had adopted dispatching systems.

At the same time that they systematized their own knowledge about production, the steel companies took that knowledge away from steel workers. Previously, the skilled steel workers, acting in teams, possessed all of the skills and know-how necessary to make steel. They also had had authority over their own methods of work. Now employers moved to transfer that authority to the foremen and to transfer that knowledge to a new stratum of managers. This section will describe and document that process, in order to show that this redivision of labor was not a necessary outgrowth of the new technology, but rather was an adaptation of employers to meet their own needs, as capitalists, to maintain discipline and control.

1. The New Skilled Workers

As we saw in Part II, the mechanization of production largely eliminated the role of the traditional skilled worker. However, the steel industry still needed skilled workers. Machines required skilled mechanics to perform maintenance and repair work. Also, certain skills were needed for specialized production processes which had not yet been mechanized. However, these skilled workmen were very different from the skilled workmen of the 19th century, who collectively possessed all of the skills necessary to produce steel. The new skilled workers had skills of a specific nature that enabled them to perform specific tasks, but did not have a general knowledge of the process of production. This new class of skilled workers had to be created by the employers.

One would think that finding skilled men should have been no problem because of the huge numbers of skilled workers who were displaced and downgraded in the 1890s. However, by 1905, employers' associations began to complain about the shortage of skilled men. The reason for this paradox is that when the employers destroyed the unions and the old social relations, they destroyed at the same time the mechanism through which men had received their training.

Previously, the selection, training, and promotion of future skilled steel workers had been controlled by the skilled craftsmen and their unions.* The constitution of the Amalgamated Association of Iron, Steel and Tin Workers had a clause that insisted that " 'all men are to have the privilege of hiring their own helpers without dictation from the management.' " 77 The men would then train their helpers in their trade. The union also regulated the helpers' advancement. For example, in 1881, it passed a resolution saying " 'Each puddler helper must help one year and be six months a member of the Association before he be allowed the privilege of boiling a heat.' " 78 After the union was destroyed, the skilled workers were no longer able to hire and train their own helpers.

Within a few years, employers, realizing that no new men were being trained, began to worry about their future supply of skilled workers. In 1905, Iron Age reported that

The imperative necessity of renewing the apprentice system on a general and comprehensive scale has become apparent to every employer who is dependent on the skilled mechanic (craftsman) for

* In other industries, a formal apprenticeship system provided the future skilled workers, and the attempts by employers to replace that system with a helper system was the source of much conflict between workers and employers in the 19th century. The importance of the distinction was that the apprenticeship system meant control by the skilled workers, and the helper system meant control by employers. In the steel industry, the helper system was controlled by the workers, so the distinction was not important.

his working force. 79

Statistics collected by the Department of Labor in 1910 show that the skilled workers were considerably older than the other workers, their median age being roughly 37 while that of semi-skilled was 27 and that of unskilled workers was 26. * By the 1920s, the situation was critical. Associations of steel employers decried the extinction of skilled workers at their conventions and in their publications. One contemporary economist, after a study of skilled workers in iron and steel foundries in Philadelphia, concluded:

that there are proportionately too few men who are in their twenties and an exceptionally large number who are in their fifties and sixties ... The number of complaints about the lack of apprentices voiced in all the publications has increased. 80

During this period, employers began to develop a new type of skilled worker, one whose skills were highly specialized and limited in their scope. In 1912, Iron Age described the evolution of this class of workers:

That the supply of American mechanics is altogether too small is an old story. The apprentice system was permitted to die out and the relative supply of skilled men fell away rapidly. In the last ten years, a more or less organized effort has been made to increase the number and has met with considerable success. Nevertheless, the demand for this class of labor has increased so greatly that each year the proportion of trained men to the total number of mechanics which must be employed has become smaller.

The consequence has been that vast numbers of men have been trained for specialized work in machine shops, and improved machinery has made it possible to decrease the average excellence of workmen without reducing the quality of the product. 81

In order to create this new class of skilled workers, employers set up a training system that was an alternative to the union-controlled appren-

* Calculated on the basis of table in Labor Conditions, p. 480. A more detailed breakdown is:

<u>Age</u>	<u>Skilled</u>	<u>Semi-skilled</u>	<u>Unskilled</u>
Under 30	29%	54%	52%
30-40	38	30	26
Over 40	33	16	22
Over 50	11	5	7

We would, of course, expect skilled workers to be somewhat older than the others, but we would hardly expect a variation of this extent.

ticeship system of the past, known as the "short course." The "short course" involved a manager or superintendent taking a worker who had been in a department for long enough to get a feel for the process, and giving him individualized instruction in some specialized branch of the trade. By using the short course, employers could train men for specific skilled jobs in a limited period of time. The training period varied, according to the skill being taught, from a few weeks to a year. The Secretary of the Milwaukee branch of the National Metal Trades Association described the use of the short course in his district in 1924 as follows:

The handyman are usually helpers desiring to learn more of the trade -- are over 21 years of age and usually limit their training to one special line.

And the chairman of the local association of foundrymen reported that same year that

In checking up the situation in this community, the committee found that generally most of the foundries were taking on inexperienced help and developing what has come to be known as specialty molders. ⁸²

In this way, a new class of skilled workers was created during the first two decades of the 20th century. These workers were selected by the employers, trained in a short period of time, and then set to work with their job-specific skill. These workers had skills which were only good for one job. They did not have the independence of the 19th century skilled workmen, whose skills were transferable to other jobs and other plants. Nor did they have the generalized knowledge of the production process that skilled workers previously possessed. The knowledge they had was that which could serve their employer, but not that which could serve themselves.

Thus, the new skilled workers were a dependent class. The employers had created their dependency on purpose, as advice which appeared in Iron Age in 1912 reveals:

Make your own mechanics ... The mechanics that you will teach will do the work your way. They will stay with you, as they are not sure they could hold jobs outside. ⁸³

The success of these policies can be judged from the following statement, made by the president of the American Rolling Mill Company in 1927:

Work has become so specialized in these mills that even men in the regular trades, who have not had mill experience, find it difficult to follow their trade until they have served another apprenticeship, which though not a formal one in the narrow sense is nevertheless a real one. So true is this, that furnace helpers and foremen melters of open hearth furnaces, trained in mills making common grades of steel, are unable to fill similar

positions satisfactorily in "quality" mills, and, likewise, men trained for these jobs in "quality" mills have almost equal difficulty in mills where the emphasis is placed upon the making of large tonnage of common steel.⁸⁴

2. The Changing Role of the Foreman

As the employers expanded their control over the process of production, they realized they had to develop an alternative means for exercising control on the shop floor. Just as they had taken knowledge about production away from the skilled workers, they also took away their authority over their own labor and that of their helpers. Now, the task of regulating production was transferred to the foremen, who previously only had authority over the pools of unskilled workers. Foremen were now seen as management's representatives on the shop floor. To do this, employers had to redefine the job of foreman and retrain the men who held those jobs.

In order to transfer authority to the foremen, the employers had to distinguish them from the skilled workers. This distinction had to be created; it did not evolve out of the new technology. Foremen were recruited from the ranks of the skilled workers -- foremanship being the highest position to which a blue-collar worker could aspire. Once there, however, steel employers had to re-educate them as to their role in production. This re-education began with convincing them not to do manual work, which was no easy task. An editorial in Iron Age in 1905 quotes one superintendent lecturing an audience of foremen as saying:

You men have no business to have your coats off when on duty in your shops unless you are warm. You have no business to take the tools out of a workman's hands to do his work. Your business is to secure results from other men's work.

The editorial goes on to say why this is important:

A man cannot work with his hands and at the same time give intelligent supervision to a gang of men, and a foreman who does this is apt to lose the control of his men while he is weakening the confidence of his employers in his ability as a general.⁸⁵

The foreman's job was to direct and correct the work, but never to do the work himself. His authority depended upon that. Foremen, as the lowest ranking "mind" workers, had to be made distinct from the manual workers. One steel company official likened the organization of authority to that of the "army, with the necessary distinction between the commissioned officers and the ranks."⁸⁶

The companies had to give their foremen special training courses in order to make them into bosses. These courses were designed to teach the foremen how to "manage" their men. One such course, at the American Steel and Wire Company, a U.S. Steel subsidiary, spent most of its time on that

subject with only a few sessions on production techniques or economics. As described by one of the instructors, the course

includes such subjects as the inherent qualities of the workmen, both physical and mental, temperament, fatigue, emotion, state of mind, and so on, how all these various factors affect the capabilities and efficiency of the men. The management course also includes external environments which affect the man's efficiency, the wage system, employment management, pleasure in work, the human cost of labor, the relations of foremen to the workers, relations of the foremen to the company, and scientific management and subjects of that kind. ⁸⁷

This development was not unique to the steel industry. Throughout American industry, special foremen's training courses were becoming prevalent. Dr. Hollis Godfrey, president of the Drexel Institute in Philadelphia, the first private institution concerned solely with foremen's training, said that the purpose of foremen training was to

make the skilled mind worker. The skilled mind worker is a little different proposition than the skilled hand worker, and a great many people are still wandering around in the differentiation between the two ... From the foreman to the president right straight through, you have got one body of mind workers, and they do but two things: they organize knowledge and then they use the knowledge as organized. ⁸⁸

Although foremen did little work, they also did little thinking. Most of their training was designed to teach them how to maintain discipline -- techniques for handling men, developing "team work," deciding who to discharge and who to promote. They were the company's representative in the shop, and as the companies consolidated their power over the workers, the strategic importance of the foremen increased.

3. New Types of Managers

Just as the authority that the skilled workers had previously possessed was transferred to the foremen, their overall knowledge about production was transferred to the managers. By adopting new methods for training skilled workers, steel employers took the generalized knowledge about the production process as a whole away from the skilled workers. In their place, employers began hiring a new class of white-collar employees, recruited from the public and private schools and their own special programs. These workers became the bottom rung of the management hierarchy.

Before 1900, most managers in the steel industry were men who had begun at the bottom and worked their way all the way up. Andrew Carnegie had insisted on using this method to select his junior executives. As he once said, boastingly, "Mr. Morgan buys his partners, I grow my own." ⁸⁹

Carnegie developed a whole partnership system for the management of his empire based on the principle of limitless upward mobility for every one of his employees. * He felt that by "growing his own," he not only found those men who had proven their abilities and loyalty to the firm, but also inspired the others to work that much harder. Thus he wrote to Frick in 1896

Every year should be marked by the promotion of one more of our young men. I am perfectly willing to give my interest for this purpose, when the undivided stock is disposed of. There is Miller at Dusquesne, and Brown, both of whom might get a sixth of one percent. It is a very good plan to have all your heads of departments interested, and I should like to vote for the admission of Mr. Corey; and if there is a sixth left, perhaps Mr. Keer of the Edgar Thomson Blast Furnaces deserves it. We cannot have too many of the right sort interested in profits. ⁹⁰

This attitude was well known throughout the Carnegie empire, with the result, as Carnegie's biographer puts it, that "just as Napoleon drove his soldiers on with the slogan that every foot soldier carried a marshall's baton in his knapsack, so Carnegie taught his men to believe that every worker carried a partnership in his lunch pail." ⁹¹

Around the turn of the century, employers began to choose college graduates for their management positions. As one prominent steel official told a member of the British Iron and Steel Institute in 1903:

We want young men who have not had time to wear themselves into a groove, young college men preferably ... When a college graduate, who shows that he has the right stuff in him, reaches the age of 25 or 30 years, he is ready for a position of trust. When men get older they become more valuable as specialists, but for managers and executives we select young men with brains and education. ⁹²

This was not mere philosophy; the British visitors found on their tour that of the 21 blast furnaces they visited, "18 were managed by college graduates, the majority of whom were young men." ⁹³

Employers used publically-funded technical colleges to train their new managers. Technical colleges were new, established with the support of the

* Although Carnegie was generous in his disbursement of stock shares and seats on the Executive Committee, he had no intention of giving up corporate control. All of his junior partners had to sign the "iron clad agreement," stipulating that in the event of death or dismissal, their shares would be returned to the Carnegie Steel Company, Limited, for which they would be paid the shares' book value. In this way, Carnegie could reward his "young geniuses" with partnerships and still keep them from challenging his control.

business community and over the protest of the labor movement. As Paul Douglas wrote in 1921:

Employers early welcomed and supported the trade school, both because they believed that it would provide a means of trade-training, and because they believed that it would remove the preparation for the trades from the potential or actual control of unions. ⁹⁴

Some steel employers also set up their own schools to train managers in the arts of steel-making. For example, the Carnegie Company opened a technical school in Pittsburgh, in 1905. The purpose of the school was "providing instruction in those studies essential to a technical education" to applicants who were high school graduates. ⁹⁵

Technical training alone, however, was not sufficient to produce competent managers for steel factories. The young men also needed to know about steel-making. To meet this need, the steel companies developed a new on-the-job training program to supplement the formal learning of their young college graduates. This program consisted of short rotations in each mill department under the supervision of a foreman or superintendent, which gave the men experience in every aspect of mill work before they were put in managerial positions. This program was called an "apprenticeship," and although it trained managers instead of workers, it was an apprenticeship by the original meaning of the word. It gave the apprentices knowledge of each stage of the production process and how it fit together. A circular describing the Apprenticeship System begun in 1901 at the Baldwin Locomotive Works, which trained both managers and lower-level personnel, stated:

In view of the fact that in recent years manufacturing has tended so largely toward specialization that young men apprenticed to mechanical trades have been able in most cases only to learn single processes, and, as a result, the general mechanic has threatened to become practically extinct, to the detriment of manufacturing interests generally, the Baldwin Locomotive Works have established a system of apprenticeship on a basis adapted to existing social and business conditions. ⁹⁶

The visitors from the British Iron and Steel Institute described the prevalence of the new apprenticeship system in their report of 1903:

In a number of the leading American (steel) works, the principals attach importance to binding, as apprentices or otherwise, lads and young men who have had the advantage of a first-class education ... Indeed, in some cases, as at the works of the Midvale Steel Company, at Philadelphia, my attention was specially called to the unusually large number of college graduates that were employed on the premises in various positions. ⁹⁷

By the 1920's, such methods were nearly universal throughout the industry. Charles Hook, the vice president of the American Rolling Mill Company, a U.S. Steel subsidiary, described his method for selecting and training managers in a speech of 1927 to the International Management Congress:

The condition as outlined respecting the selection of the "skilled" employee is quite different from the condition governing the selection of the man with technical education ...

Each year a few second- and third-year (college) men work during the summer vacation, and get a first-hand knowledge of mill conditions. This helps them reach a decision. If, after working with us for a summer, they return the next year, the chances are they will remain permanently ... Some of our most important positions -- positions of responsibility requiring men with exceptional technical knowledge -- are filled by men selected in this manner. 98

The prospective managers, in short, were increasingly recruited from the schools and colleges, not from the shops.

In these apprenticeship programs, a distinction was often made between different types of apprentices, distinguished by their years of schooling. Each type was to be trained for positions at different levels of responsibility. For example, at the Baldwin Works, there were three classes of apprentices, such that:

The first class will include boys seventeen years of age, which have had a good common school (grammar school) education ... The second class indenture is similar to that of the first class, except that the apprentice must have had an advance grammar school (high school) training, including the mathematical courses usual in such schools ... The third class indenture is in the form of an agreement made with persons twenty-one years of age or over, who are graduates of colleges, technical schools, or scientific institutions ... 99

Similarly, the application for indenture at the steel works of William Sellers and Company, in Philadelphia, read:

Applications for Indenture as First Class Apprentices will be considered from boys who have had a good common school education ... Applications for Indenture as Second Class Apprentices will be considered from boys who have had an advanced Grammar or High School training ... Applicants for a special course of instruction covering a period of two years, will be considered from young men over twenty-one years of age who are graduates of colleges, technical schools or scientific institutions. 100

Thus, formal education was beginning to become the criterion for separating different levels of the management hierarchy, as well as separating workers from managers.

During this period, employers redivided the tasks of labor. The knowledge expropriated from the skilled workers was passed on to a new class of college-trained managers. This laid the basis for perpetuating class divisions in the society through the educational system. Recently several scholars have shown how the stratification of the educational system functions to reproduce society's class divisions.¹⁰¹ It is worth noting that the educational tracking system could not work to maintain the class structure were it not for the educational requirements that were set up at the point of production. These educational requirements came out of the need of employers to consolidate their control over production.

Within management, the discipline function was divided from the task of directing and coordinating the work. This is the basis for today's distinction between "staff" and "line" supervision. We might hypothesize that this division, too, had its origin in the desire of steel employers to maintain control over their low level managerial staff.

The effect of this redivision of labor on the worker was to make his job meaningless and repetitious. He was left with no official right to direct his own actions or his own thinking. In this way, skilled workers lost their status as partners, and became true workers, selling their labor and taking orders for all of their working hours.

V. To the Present

Having assumed its modern corporate form by about 1910, the United States steel industry slipped into a period of relatively untroubled calm. The rapid pace of technological change and managerial innovation of the previous twenty years slackened, and the steel employers sat back to let monopoly capitalism flower. Demand for steel was expanding steadily, both domestically and internationally. Judge Gary managed to stabilize steel prices and developed an informal price-fixing system that prevented steel companies from under-bidding each other during recession periods. The First World War was a tremendous boon for the steel companies, bringing big windfalls to the stockholders. And, generally speaking, the steel industry suffered no significant "labor troubles." The only exception was the 1919 strike, in which 350,000 steelworkers were out for four months, until the steel companies managed to crush them totally.

This calm produced a self-satisfied lethargy among the major steel companies -- a lethargy from which the industry had not yet recovered. There were few major technological developments or capital investment programs until the 1960s. New steelmaking technology introduced in other countries was slow to be adopted here. Most notable for its lethargy was the U.S. Steel Corporation, which developed a widely-quoted philosophy of "no inventions, no innovations." Although it remained the world's largest producer of steel, U.S. Steel's share of steel capacity in the United States fell from 65% in 1901 to 38% in 1936. The earnings on its stocks,

which averaged 12% between 1901 and 1911, fell to 2.8% between 1926 and 1936.¹⁰² By then, the U.S. Steel Corporation had won a reputation among the business community for antiquated management, obsolete plants, archaic pricing policy, and an antediluvian attitude toward organized labor, expressed in black lists and company spies.¹⁰³ As Fortune magazine concluded in its series on U.S. Steel in 1936, "The Steel Corporation has been seriously ill."

The labor system set up by the steel employers early in the century also has not changed. The essentials of the system -- wage incentives, job ladders, welfare schemes, and a division of labor that kept skills highly job-specific -- have lasted to the present.

The only major change in the industry's labor relations has been the union organizing drive of the 1930s, culminating in the establishment of the United Steelworkers of America. The union brought steelworkers job security and raised wages. For the first time, it gave workers a voice in the determination of working hours, working conditions, and fringe benefits. However, the presence of the union did not change the basic mechanisms of control that employers had established. This section deals with the impact of the union on the employers' control of production, and shows that although the union was able to alter the manner in which employers exercised control, it never challenged the heart of this control as institutionalized in the labor system.

Unionization of the steel industry was one of the most dramatic accomplishments of the CIO in the 1930s. By the Depression decade, U.S. Steel's long history of anti-unionism and the open shop had lead most people to believe that the corporation, and the industry as a whole, was impenetrable. As one historian of the union campaign, Robert Brooks, described it:

For forty years, steel had assumed the leadership of the anti-union movement. As steel had gone, the nation had followed. If steel could be captured for unionism, resistance elsewhere might be broken.¹⁰⁴

The steel industry was of prime strategic importance to the CIO for several reasons. First, the industry employed hundreds of thousands of people, all of whom were potential dues-paying trade unionists. Second, the industry was central to the nation's economy, and its unionization would give the labor movement a great deal of political, as well as economic leverage. And third, the open shop policy of the industry was a direct hindrance to the unionization of other industries. Fortune magazine reported in 1936 that:

The Corporation is believed to impose its labor policy on the steel industry as a whole and on the companies from which it purchases supplies, thus constantly widening the spread of unorganized industry. Machine works, electrical supply houses, tool makers, manufacturers of steel equipment, could, labor leaders claim, be organized without great difficulty and without

great opposition from their operators if it were not that U.S. Steel orders would cease immediately with recognition of the union.¹⁰⁵

Unionization of steel was of special interest to the United Mine Workers' president, John L. Lewis, who saw steel company-owned mines as a threat to unionism in the coal industry in general.

The story of how the steel industry was finally organized has been told many times.¹⁰⁶ The essentials are as follows: The National Industrial Recovery Act of 1933 contained a clause that said that workers had the legal right to organize. In response, and to ward off any real unionism, the steel companies began to set up company unions, called "employee representation committees," which were mechanisms for airing the workers' grievances without any power to correct them. However, the steel companies' intention to co-opt union sentiment with these schemes backfired. Many of the company union leaders, elected by the steel workers, were seriously interested in change and soon realized that the employee representation committees were shams. They began to meet with each other secretly, developing plans to bring real unionism into the industry.

At the same time, John L. Lewis broke with the craft unionism of the American Federation of Labor and set up the Congress of Industrial Organization to organize the mass production industries on an industry-wide basis. As part of this effort, he founded the Steel Workers Organizing Committee (SWOC) and placed Phillip Murray, one of his officials from the United Mine Workers, at its head. Together, SWOC and the renegade company unions organized the steel industry, winning their first contract with U.S. Steel in March, 1937. The smaller steel companies held out against the union longer, and put up a bloody fight which culminated in the Memorial Day Massacre in 1938. But in the end, they too capitulated. By 1941, SWOC had won union recognition and signed contracts with all of the major steel producers in the United States.

1. Impact of Unionization on the Wage Structure

By the 1930s, the rational wage structure of the steel industry degenerated into hopeless chaos. The basis for many of the job and pay distinctions had been eroded by minor changes in technology and job duties. By the 1930s, wage rates for the same job varied greatly from plant to plant and within individual plants. Furthermore, methods of payment differed greatly within job categories, between jobs, and between plants. Some workers were on straight piece rates, some on piece rates plus bonuses, some on time wages, some on time wages plus incentive bonuses, etc. According to Carroll Daughterly, an economist who studied the impact of the NRA on the industry:

A final point concerning the nature of wage rates in the industry requires emphatic underlining: The wage rate structure is extraordinarily complex and varied, much more so in fact than those

found in most other manufacturing industries. ¹⁰⁷

The different rates and methods of payment were a source of unending dissatisfaction among the steelworkers. Jack Steiber, former member of the Research Department of the United Steelworkers of America, reports that:

The union found a ready-made issue in the problem of wage rate inequities and took advantage of the situation to gain members during its organizing drive in the 1930s. According to the union "the hideous wage structure" of the industry was one of the main reasons for organizing. ¹⁰⁸

Once the union was organized, the issue became even more pressing. Workers began filing grievances about wage inequities and insisting on some form of corrective action. R. Conrad Cooper, Vice President for Industrial Relations of U.S. Steel said at the time, "The issue of alleged inequities blossomed into an area of major controversy comprising two-thirds of all grievances, slow-downs, work stoppages, strikes and collateral controversies." ¹⁰⁹ Because wage rate grievances were the overwhelming majority of all grievances once contracts were signed, the union had to come up with a plan for correcting the inequities.

That the dissatisfaction with the wage structure did not take the form of an attack on wage differentials per se, attests to the success of the companies' strategy that lay behind the whole incentive scheme. What workers defined as "inequity" was different payment for the same or similar work. The divisive nature of the incentive plan lead workers to compare their earnings to that of other workers and to perceive their problem as one of inequity among themselves, rather than comparing their earnings to the actual value of what they produced, and perceiving their problem as one of inequity between themselves and their employers.

The United Steelworkers of America insisted on doing away with the obvious inequity of different pay for similar work but did not challenge the basis for the differentials that remained. In the early years, they advised their committeemen to rate jobs in terms of physical effort, personal skill, hazards, strain, disagreeableness, education and instruction required, and to weigh these factors in terms of their relative importance in order to devise an "equitable" scale for evaluating individual jobs. As far as actual rate-setting for incentives and bonuses is concerned, they recommended that they be worked out jointly by management and the union. Only occasionally did they question the idea of incentives, piece rates and bonuses altogether. In an early manual to committeemen, called "Production Problems," written around 1940, they said at the end of a discussion on piece rate adjustment:

It is not out of place to state here that any such debatable value to management as piece rates and bonus systems possess are often not worth the ill will and poor practices which these methods radiate. Yet it is important that both workers and

executives should know how well they perform their work. This promotes continuing economy of course, but more important, it is usually needed for the complete satisfaction of personal aspiration and individual development. For these purposes, however, production standards are adequate and piece rates are not needed. ¹¹⁰

During World War II, the issue of wage rate inequities in the steel industry came before the War Labor Board. The union asked for the elimination of wage rate inequities by the application of the principle "equal pay for similar work" throughout the industry. This demand was denied by the Board because, as one economist interpreted the ruling:

The Board refused to change its rule that existing wage differentials should be maintained so as not to unstabilize existing pay brackets. ¹¹¹

The Board ruling of 1944 did, however, say that:

The company and the union shall negotiate the elimination of existing intra-plant wage rate inequities and reduction of the number of job classification in accordance with the following steps: (1) describe simply and concisely the content of each job (2) place the jobs in their proper relationship (3) reduce the number of job classifications to the smallest practical number by grouping those jobs having substantially equivalent content. ¹¹²

The Board also stipulated that the wage inequity adjustment should not cost any one company more than the equivalent of a raise of 5¢/ hour for all its employees, and that no employee's wage should be reduced as a result of the re-evaluation.

As a result of the Board's ruling, the union and the steel companies sat down together in 1945 to reclassify and re-evaluate the entire industry's job and wage structure. This Herculean task took two years to complete, and resulted in a job classification manual for the entire industry, a procedure for classifying new jobs, and a standard hourly wage scale on which all rates would be based. Here we see the formalization of one aspect of the internal labor market -- the job hierarchy. The steel manual became the example of job re-evaluation programs in other industries, and remains in effect in all major steel companies today.

The job classification program reduced the number of job classifications by about half, and those jobs it rated according to the following factor: ¹¹³

Pre-employment training	1.0
Employment training and experience	4.0
Mental skill	3.5
Manual skill	2.0

Responsibility for materials	10.0
Responsibility for tools & equipment	4.0
Responsibility for operations	6.5
Responsibility for safety of others	2.0
Mental effort	2.5
Physical effort	2.5
Surroundings	3.0
Hazards	2.0

One of the interesting aspects of this weighting scheme is the relatively insignificant role given to skill factors -- indicating once again the lack of important skill differentials between the jobs in steel-making.

One of the most important results of the program, besides the drastic reduction in the number of job classifications in the industry, was the strict hierarchical order of the job classifications that remained. For example, the following passage describes the effect of the program at U.S. Steel:

(Prior to the program), U.S. Steel alone had had between 45,000 and 50,000 job titles. These were reduced (by the manual) by half, and what was more important, all of these were filed into thirty separate wage-rate classifications. Between each of these was a 3.5-cent-an-hour increment. ¹¹⁴

A basic hourly rate was set for each wage rate classification, with even gradations between them. It was applied to all hourly-rated jobs in the industry, and set the minimum wage guaranteed for incentive jobs. Subsequently, the steel companies based the size of the incentive payments on the basic hourly rate as well. The union whole-heartedly supported the entire classification program, which rationalized the basis of the job hierarchies within the industry.

However, no such agreement was ever reached regarding the extra money workers would receive for extra output under incentive plans. In 1947, after the classification manual and the basic hourly rate were agreed upon, the union and the company tried to negotiate a basis for equitably setting incentive rates, based on the determination of a "fair day's work" standard. The parties spent three years trying to reach agreement before admitting failure.

The question of wage incentives has remained a source of conflict between the company and the union. For example, George McManus, in his book The Inside Story of Steel Wages and Prices, gives the following account of the 1959 contract negotiations in the industry, when, in addition to some wage demands and demands for tougher sanctions against wildcat strikes, the steel companies

demand clear acceptance of management's right to develop incentives and establish sound practices. It sought clarification of

scheduling rights (referring to the speed of work) ...

Before the question of job reforms arose, an opinion survey showed steelworkers strongly opposed to a strike. Many authorities believe the most minimal terms would have been accepted by the union at this stage ... The job reform program (proposed by the company) solidified the union. After the list of reforms was published, another opinion survey showed the workers ready to go down the line in resistance to management's blunder. ¹¹⁵

The resulting strike lasted 120 days -- one of the longest strikes in any major American industry.

The issue of incentives took a curious turn during the post-war years. More and more, the nonincentive workers resented the higher earnings of their incentive co-workers, and incentive workers with relatively low earnings demanded rate changes. The union's response was to demand that all workers be put on the incentive plan. As Elmer Maloy, Director of the United Steelworkers' wage division, explained in 1953,

The fact that about half of our members are on incentive plans of one sort or another makes the elimination of all incentives quite a problem. We seem to be stuck with it.

Incentives should cover the greatest possible number of employees including maintenance, craft and service employees, if we are to cut down the present dissension. ¹¹⁶

In short, steelworkers preferred wage incentives to the straight hourly rates simply as a matter of better remuneration. The extension of incentive pay had ironically become a way of equalizing pay among different groups of workers. The result, as pointed out by Robert McKensie was:

Under pressure from the union, the steel industry has been forced to extend incentives to coke ovens, blast furnaces, and maintenance operations, not for industrial engineering reasons, but in order to minimize the earnings gap between incentive and non-incentive groups. ¹¹⁷

The companies, following out the looking-glass logic of the situation, opposed this extension of incentives. From the standpoint of "industrial engineering," they served no purpose because they could not be counted on to increase worker output. As Steiber says,

company industrial engineers were not planning to install incentives in departments like coke ovens and blast furnaces where they were considered unwarranted. Most industrial engineers were of the opinion that workers could exert no positive influence on production in these units and any incentive installed would represent an outright gift. ¹¹⁸

However, union pressure on this point was increasing throughout the 1950s. By 1956, U.S. Steel was the first steel company to agree to the principle of 100 percent incentive coverage. Since then, other companies have also included more and more workers under incentive plans. Thus, the steelworkers have managed, to a limited extent, to turn incentive pay to their own advantage.

In conclusion, the impact of the union was to re-rationalize the wage structure, which it did through the job reclassification program. The result of the program was to build the notion of job hierarchy permanently into the wage structure. The subsequent movements toward equality of pay through extending wage incentives has been a retreat from the principles of the manual, but not a very significant one. The wage incentives are no longer the divisive element in the method of wage payment in the industry -- the divisive element is the structure of the hourly rate itself. As Jack Steiber summarizes the impact of the new plan on the industry wage structure:

It was not until the introduction of a common job evaluation system, with complete participation and strong support from the union, that the pattern of uniformity was extended to classifications and rates at all levels of the wage structure. The maintenance of relative occupational differentials among base rates during the post-war period, when market forces and inflationary pressures were operating to narrow differentials, must also be ascribed to union and company influence. ¹¹⁹

2. Effect of Unionization on Promotion Policies

One of the major accomplishments of the union was the limitation of favoritism as a basis for promotions and lay-offs. The union restricted management's ability to use advancement prospects to motivate and manipulate workers, and instead, insisted that length of service -- i.e., seniority -- be used as a basis for upgrading and downgrading. The very first union contract signed between SWOC and the five largest subsidiaries of U.S. Steel, March 17, 1937, stipulated that:

In all cases of promotion ... the following factors shall be considered ... (a) length of continuous service (b) knowledge, training, ability, skill and efficiency (c) physical fitness (d) family status, number of dependents, etc. (e) place of residence. ¹²⁰

Since then, the principle of seniority has been modified and refined in every subsequent agreement. Complex seniority systems have been developed, combining plant-wide seniority with departmental seniority in a variety of ways, which spell out neatly defined paths of promotion within each plant in the steel industry. For example, in the 1968 contract between the United Steelworkers and the Jones and Laughlin Steel Corporation, 35 pages out of the 155-page agreement are devoted to the issue of senior-

ity. The seniority clause begins with the simple idea that:

promotional opportunities and job security in event of promotions, decrease of forces and recalls after layoffs should increase in proportion to length of continuous service. ¹²¹

However, it takes 35 pages of detailed contract language to spell out the exact lines of promotion to which seniority shall apply, the rules regulating intra-departmental and intra-plant mobility, the conditions under which seniority shall be modified by other factors, etc. This agreement is typical of all contracts in the steel industry today.

The addition of seniority as a basis for promotion altered the form but not the content of the system that had been established earlier. Although seniority limited favoritism in the granting of promotions, it did not question the hierarchical existence of job ladders which made that promotion system possible. In fact, just as the re-classification program rationalized the steps in the job ladder, seniority rationalized the worker's progress up it. The minutely graded job ladders developed around seventy years ago have survived to the present intact.

The British iron and steel industry's Productivity Team, which visited the United Steel works in 1951, made this observation about promotion in the industry:

The training of American operatives over 18 years of age follows a pattern very similar to that in the British steelworks. It is almost entirely on-the-job training, starting with labouring work with opportunities to learn and perform jobs higher up the ladder of promotion. In a very few instances, there are specific training programmes for certain adult jobs, e.g., crane driving, but usually it is a question of learning by doing jobs under the supervision of existing operatives. In choosing men for promotion, seniority counts most, though ability and physical fitness are taken into consideration. Job security depends on length of continuous services. ¹²²

Likewise, the International Labour Organization's study of "Vocational Training Promotion in the Iron and Steel Industry" had this to say about promotion policies in the United States:

New workers for production shops usually enter one of the production departments as unskilled workers -- either labourers or learners. They may subsequently rise by promotion to posts demanding higher qualifications. Training for production trades is given almost entirely "on-the job," and workers are promoted from one operation to another as they acquire experience and skill.

As an example of the above, a worker starting as a labourer may advance to cinder snapper, keeper's helper, keeper, blower's helper and finally blast furnace blower. In the open hearth department, a man will start with general cleaning work and

advance to door operator, cinder pit man, third, second and first helper and eventually melter. In the finishing mill, the line of promotion might be as follows: pit man, roll hand, manipulator, rougher, and finish roller. To reach these skilled jobs takes a minimum of four or five years, but usually a much longer time is required. ¹²³ (Emphasis added.)

This report reveals that promotion today, as before, bears little relationship to ability to perform the work, because men are able to perform the skilled jobs long before they are actually moved into them. Thus, the promotion hierarchy is as artificial today as when it was first created.

Therefore, the establishment of seniority as a criterion for promotion has not affected the promotion system. In fact, seniority has helped to rationalize the system by taking it away from the discretion of the foreman, and basing it on principles of fairness. An alternative might have been for the union to press for a system of job rotation, or some other non-hierarchical way of allocating work, using seniority only for purposes of lay-offs.

The existence of job ladders has produced continual conflict among steel workers, as it was originally intended to do. Steelworkers quite rightly regard the seniority list as the determinant of their prospect for advancement in their life-time. The system, as it was developed, discriminates against some groups of workers, notably blacks and women. And yet, any attempt to change the seniority system meets with the most determined resistance, and brings on bitter conflicts between different groups of workers. The job ladder arrangement has been effective in dividing workers and allowing other kinds of divisions to be institutionalized. *

Clark Kerr, an industrial relations specialist, pointed out the relationship between the job ladders and labor "peace" in the postwar steel industry:

The iron and steel industry ... is not particularly famous as a center of strike activity ... It might rank somewhat higher (in its propensity to strike) were it not for the high degree of job differentiation which marks the industry and which both separates one worker from another and creates a ladder for each worker to climb. ¹²⁴

*In every case involving Title VII of the Civil Rights Act of 1964 (Equal Employment Opportunity section), the issue of revising seniority lists creates the most dissension. For example, a recent New York Times story (1/22/73) describes the racial tension at Bethlehem Steel's Sparrows Point Works resulting from a ruling that the discriminating seniority system had to be changed.

3. Impact of Unionization on Welfare Policies

The impressive welfare programs inside U.S. Steel Corporation that were set up after the turn of the century all came to an end during the 1930s. Some of the functions which the welfare programs provided were taken over by the state, as part of the New Deal social welfare programs. Other of the functions became issues for negotiation with the union, rather than being determined and run unilaterally by the company. Thus workmen's compensation, unemployment insurance, social security, and medicare are now provided by the state. Health insurance and pensions are now provided for steel workers by the union-management contract. Health and safety conditions inside the plant are regulated by contract language, union-management safety committees, and, since 1971, by the federal government's Occupational Safety and Health Administration. The other welfare measures that involved company contributions to the community are now generally defunct. According to the 1951 British Productivity Team Report, "American training schemes and welfare activities are no better than the average progressive British firm." ¹²⁵

The transference of the welfare programs from company control to union and governmental control has ridden them of their most manipulative features. No longer can a worker be denied a pension for "failing to show a proper interest in the welfare of the corporation." However, many of the union fringe benefits, most notably the pensions, are still based on length of service, and as such, still operate to cut down worker mobility between jobs.

In the past decade, the strategy of the union and the labor movement in general has been to press for the federal government to take over all of the social insurance programs -- such as the current legislative fights for federal insurance of private pension plans, increases in social security benefits, and national health insurance. If they are successful, this would have the effect of freeing up the labor market somewhat, by making it less costly for workers to change jobs in the middle of their working lives.

4. Impact of Unionization on Division of Labor

Unionization of the steel industry has also failed to change the redivision of labor through which employers took knowledge about the production process away from the workers. The SWOC did concern itself with the issue of training skilled workers, and it demanded a say in the establishment and operation of training programs. However, in its concern, it did not question the content of the training courses. In a handbook to committeemen of local unions entitled "Industrial Training" (c.1940), the SWOC says:

Where unions have been established and collective bargaining relationships exist, there is an opportunity for unions to have a voice in the operation of training programs. They should insist through their representatives on the creation of joint committees to supervise the training programs. With union representation on such committees, they would be able to:

- a. See that union members are not discriminated against when opportunities present themselves for advancement.
- b. See that employees are given an opportunity for training with a view to advancement, both in acquiring skills and higher wages commensurate with such before new and less-experienced and well-trained employees are hired.
- c. Safeguard the seniority rights of the normal working force as well as those new employees who are engaged because of the defense economy. 126

In contrast, the American Federation of Labor, in 1940, adopted a position on training that insisted on the use of apprenticeship instead of skill specific training. It read:

Control over training on the job and related supplementary instruction in the school must be provided for through union agreement. This committee should be responsible for the training program. Training on the job includes apprentice training as well as training for specific operations. Apprentice training looking to all-round craftsmen requires study and experience over years. There are no short cuts even in an emergency, but apprentice training systematically carried on over the years is necessary to assure industries an adequate supply of workers for this machine age. 127

The difference between the SWOC and the AFL position on training no doubt stems from the fact that the AFL was composed of craft unions, who were ever conscious of the monopoly-power of their craft skills, while the SWOC was composed of steelworkers whose craft skills had been taken from them long ago. The steelworkers probably did not consider the possibility that their skills could be other than job-specific. Such was the success of the earlier redivision of labor.

The other side of the coin, as we saw earlier, was the transferring of generalized knowledge to the managers, and the use of educational requirements to distinguish managers from workers. The British Productivity Team found in their 1951 visit that this practice was still in force, and still included a version of the "management apprenticeship programs" that were established in the early 1900s.

Recruitment of university graduates for staff positions is a regular practice. One firm visited has been operating for about thirty years what are called "loop" courses for graduates. Broadly speaking, these training courses, which provide knowledge of the production processes and the activities of the firm, are divided into three parts:

- a) Basic knowledge for all trainees (in some works, this includes three months of manual work;
- b) Specialized training to equip the individual to enter a particular field of employment;

c) Actual training on the job. 128

A study by the International Labour Organization in 1954 also found that in the United States

More often than not, future supervisors are taken on by the companies as soon as they leave college and they start their careers with a spell of six months or a year as workmen in one of the departments in the plant. 129

The International Labour Organization in another study found that the steel companies were still concerned with the problem of establishing status relations between supervisors and workers, and solved it by giving "supplementary training which is essential once supervisors have been appointed in order to raise and define their status in relation to their subordinates and to ensure that their activities and those of the management are fully coordinated." 130

The presence of the union did, however, make some difference regarding the authority of the foremen in the steel industry. The establishment of formal grievance procedures and seniority as a basis for promotion undercut the power that foremen had held on the shop floor. Often foremen reacted by ignoring the contracts altogether. According to the ILO:

A number of American iron and steel plants encountered this difficulty at the time when the United Steelworkers of America were negotiating their first collective agreements with the major companies. Many of them had to re-educate their foremen so as to help them adapt themselves to the new conditions in which they henceforth had to operate. During transitional periods of this kind, complications were inevitable. For example, at the Minniqua plant of the Colorado Fuel and Iron Corporation, a number of problems arose in the early days of the collective agreement because of the ignorance of many foremen concerning the rights and privileges granted to the workers under the agreement. Other difficulties arose from the old mentality which held that the management was always right. These difficulties, according to Rudolph Smith, were largely overcome by means of periodical meetings of foremen and supervisors on the operation of the collective agreement and particularly on the clauses dealing with seniority, promotion, hours of work etc. 131

Unionization forced steel management to re-educate their foremen once again.

VI. Conclusions

This paper has traced the origin of the central institutions of the "internal labor market" in the steel industry -- hierarchical job ladders,

limited ports of entry, inducements to stay on the job, job-specificity of skills and a sharp division between the physical and the mental work of production.

The bulk of the paper has focused on the period between 1890 and 1920 -- the period of transition in the industry from a labor system controlled by the skilled workers to a labor system controlled by the steel employers. In that transition, the breaking of the skilled workers' union, which was the institutional expression of their control over the production process, was only the first step.

Once the union was destroyed, labor discipline became a problem for the employers. This was the two-fold problem of motivating workers to work for the employers' gain and preventing workers from uniting to take back control of production. In solving this problem, employers were creating a new labor system to replace the one they had destroyed.

All of the methods used to solve this problem were aimed at altering workers' ways of thinking and feeling -- which they did by making workers' individual "objective" self-interests congruent with that of the employers and in conflict with workers' collective self-interest. The use of wage incentives and the new promotion policies had a double effect on this issue. First, they comprised a reward system, in which workers who played by the rules could receive concrete gains in terms of income and status. Second, they constituted a permanent job ladder so that over time this new reward system could become an accepted fact by new workers coming into the industry. New workers would not see the job ladders as a reward and incentive system at all, but rather as the natural way to organize work and one which offered them personal advancement. In fact, however, when the system was set up, it was neither obvious nor rational. The job ladders were created just when the skill requirements for jobs in the industry were diminishing as a result of the new technology, and jobs were becoming more and more equal as to the learning time and responsibility involved.

The steel companies' welfare policies were also directed at the attitudes and perceptions of the workers. The policies were designed to show the workers that it was to their advantage to stay with the company. This policy, too, had both short-term and long-term advantages for the steel employers. In the short run, it was designed to stabilize the work force by lowering the turnover rate, thus cultivating a work force who were rooted in the community and who had much to lose by getting fired or causing trouble. In the long run, the policies were supposed to prevent workers from identifying with each other across industry lines, thus preventing the widening of strike movements into mass strikes. *

*The prevention of mass strikes continued to be a concern of employers well into this century. The provisions in the Taft-Hartley Law of 1947 that outlaw sympathy strikes and secondary boycotts are some of the most repressive aspects of that law.

Employers also sought to institutionalize and perpetuate their newly-won control over production by redividing the tasks of production so as to take knowledge and authority away from the skilled workers and creating a management cadre able to direct production. This strategy was designed to separate workers from management permanently, by basing that separation on the distinction between physical and mental work, and by using the educational system to reinforce it. This deterred workers from seeing their potential to control the production process.

In brief, then, this paper has argued that labor market institutions are both produced by and are weapons in the class struggle. Technology plays only a minor role in this process. Technological innovations by themselves do not generate particular labor market institutions - they only redefine the realm of possibilities. The dynamic element is the class struggle itself, the shifting power relations between workers and employers, out of which the institutions of work and the form of the labor market is determined.

Although this paper has concentrated on the steel industry, the conclusions it reaches are applicable to many other major industries in the United States. The development of the new labor system in the steel industry was repeated throughout the economy in different industries. As in the steel industry, the core of these new labor systems were the creation of artificial job hierarchies and the transfer of skills away from workers to the managers.

Technological innovations in every major industry around the turn of the century had the effect of squeezing the skills levels of the work force, turning most workers into semi-skilled machine operators. Paul Douglas, writing in 1921, found that the skill requirements were practically negligible in most of the machine building and machine using industries, especially the steel, shoe, clothing, meat-packing, baking, canning, hardware, and tobacco industries. He says, for example,

The wartime experience of the Emergency Fleet Corporation in training workmen for the shipyard trades furnishes interesting proof of how little time is required to master the main principles of a modern trade. Training courses were established in seventy-one yards under the direction of the Fleet Corporation. The men who were thus taught trades were drawn principally from unskilled work and from manufacturing ... the average training period for all men in the seventy-one yards was only nineteen days ! ¹³²

At the same time that jobs were becoming more homogeneous, elaborate job hierarchies were being set up to stratify them. Management journals were filled with advice on doing away with "dead-end" jobs, filling positions by advancement from below, hiring only unskilled workers for the lowest positions, and separating men into different pay classes. This advice was directed at the problem of maintaining "worker satisfaction" and preventing them from "restricting output" -- i.e., fragmenting discontent and making workers work harder. Thus, the creation of the intern-

al labor market throughout American industry was the employers' answer to the problem of discipline inherent in their need to exert unilateral control over production. Were it not for that, a system of job rotation, or one in which the workers themselves allocated work would have been just as rational and effective a way of organizing production.

At the same time, employers began a process which they called the "transfer of skill."¹³³ This meant giving managers the skills and knowledge that workers had previously possessed. They began to use technical colleges and set up their own programs to train managers in production techniques. This development was aided by the methodology of scientific management, as Paul Douglas pointed out:

The amount of skill which the average worker must possess is still further decreased by the system of scientific management. The various constituent parts of the system, motion study, the standardization of tools and equipment, the setting of the standard task, routing, and functional foremanship, all divest the individual operative of much of the skill and judgment formerly required, and concentrate it in the office and supervisory force.¹³⁴

Likewise, Samuel Haber, an historian studying the progressive period, says

The discovery of a science of work meant a transfer of skill from the worker to management and with it some transfer of power.¹³⁵

Like the creation of job hierarchies, this transfer of skill was not a response to the necessities of production, but was, rather, a strategy to rob the workers of their power.

For the skills which were still needed on the shop floor, employers instituted changes in the methods for training workers that reduced their skills to narrow, job-specific ones. The basic social inefficiency of this policy should be obvious. In an era of rapidly changing products and production techniques, jobs and industries are constantly changing, causing major dislocations in the work force. Therefore, the rational job training policy would be to give people as broad a range of skills and understanding of modern technology as possible, so that they could be flexible enough to weather the shifts in technology and the economy through their capacity to change jobs. Instead, the system of job-specificity creates one aspect of what economists label "structural unemployment" by molding workers to single skill-specific occupations. This policy wastes both individual lives and socially-useful labor power.

To varying degrees, the labor movement was aware of these developments while they were occurring. Many unions in the American Federation of Labor developed an early opposition to piece rates, and especially to bonus systems of Halsey, Taylor and others. In 1903, the International Association of Machinists expressed their opposition to "work by the piece, premium, merit (or) task," and prohibited its members from accepting such work. In 1906, the Brotherhood of Locomotive Engineers successfully refused to accept the

bonus system on the Sante Fe Railroad. In 1907, the Molders Union, the Boot and Shoe Workers, and the Garment Workers all resisted the bonus and premium systems. In general, unions opposed both the piece work and the bonus systems, although an opinion poll of union policies conducted in 1908-09 showed that "unions almost without exception prefer the straight piece system to premium or bonus systems." ¹³⁶ In 1911, the Executive Council of the American Federation of Labor passed a resolution condemning "the premium or bonus system (because it would) drive the workmen beyond the point necessary to their safety." ¹³⁷

The growing opposition to scientific management in the labor movement went beyond a critique of the speed-up aspects of the bonus system. Samuel Gompers, founder and president of the AFL, was aware that Taylor's system meant the elimination of the role of the skilled craftsmen upon which the entire AFL was based. After reading Taylor's book Shop Management, he wrote to AFL Vice-President Duncan in 1911 that "I have no doubt that it would mean (the destruction of unionism) for it would reduce the number of skilled workers to the barest minimum and impose low wages upon those of the skilled who would be thrown into the army of the unskilled." ¹³⁸ The Machinists' Union was one of the more vocal in its fear of this aspect of scientific management. According to Milton Nadworny, in his book Scientific Management and the Unions, the IAM's "Official Circular No.2."

revealed the craftman's fear of a system which not only instituted a revolutionary approach to work, but which threatened to reduce his importance in the shop. The machinist, it contended, was no longer required to use his skilled judgment -- the planning department provided full instructions; no longer was his "honor" relied upon -- the stop watch determined the time of his job. To complete the scheme, the possibility of organized retaliation against the system was prevented because only individual bargaining was permitted. ¹³⁹

The Industrial Workers of the World had an even deeper understanding of the new labor system that was emerging and the dangers it posed to the working class as a whole. In the Manifesto of 1905, announcing the IWW founding convention, they warned that

Laborers are no longer classified by difference in trade skill, but the employer assigns them according to the machine to which they are attached. These divisions, far from representing differences in skill or interests among the laborers, are imposed by the employers that workers may be pitted against one another and spurred to greater exertion in the shop, and that all resistance to capitalist tyranny may be weakened by artificial distinctions. ¹⁴⁰

Thus, the IWW understood the full implications of the developments of hierarchy at the point of production. However, they failed, as has every other labor organization in this century, to develop a successful strategy for countering it on the shop floor.

In historical perspective we can see that the institutions of the labor market were not the inevitable result of modern technology or complex social organization. They came about as part of the process of capitalists taking over production.

Under the old labor market system, the capitalists reaped profits from the production process but did not direct production themselves. The transition that this paper has described is the process by which capitalists inserted themselves into a central position of control over production. As Karl Marx, in writing about this transition, put it, "In the course of this development, the formal subjection is replaced by the real subjection of labour to capital." 141

The institutions of labor, then, are the institutions of capitalist control. They could only be established by breaking the traditional power of the industrial craftsmen. Any attempt to change these institutions must begin by breaking the power the capitalists now hold over production. For those whose objective is not merely to study but to change, breaking that power is the task of today. When that is done, we will face the further task of building new labor institutions, institutions of worker control.

NOTES

1. Fitch, John, The Steel Workers, pp. 141-142.
 2. Hogan, Economics of Iron and Steel, Vol. 1, p. 11.
 3. Ibid., pp. 218-224.
 4. Ibid., p. 185.
 5. Ibid., pp. 91-94.
 6. Ibid., p. 85.
 7. Ibid., p. 86.
 8. Quoted in Hogan, op. cit., footnote, p. 460.
 9. Carnegie, Andrew, Autobiography, p. 238.
 10. Montgomery, David, "Trade Union Practice and the Origins of Syndicalist Theory in the United States," pp. 3-4.
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