

Technological integration and fragmented labour market structures: the decline and restructuring of the US steel integrated sector

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Introduction: the competitive failure of the US steel industry

The US steel industry was once recognised as a world leader in terms of technology, output, and market share. Over the past several decades, however, it has suffered competitive decline leading some to describe the US as a newly deindustrialising economy. Since 1950, there has been a general reduction in the rate of growth in demand for steel due to the saturation of mature domestic markets, the development of new, lighter steels and of substitutes for traditional steel products, and indirect imports of steel embodied in such products as cars, electric and non-electric machinery and appliances.

Shifts in the structure of domestic steel supply indicate that the US steel industry has not been suffering a general decline. Composed of two main sectors, mini-mills and integrated firms, the industry has historically been dominated by the integrated sector, which accounted for more than 95% of domestic market share into the 1950s; the decline is located in this sector. Between 1950 and 1988, the integrated sector lost 29% of its share of domestic production to the American mini-mills. During the same period, import penetration increased from 1 to 20% of domestic steel consumption (American Iron and Steel Institute, various years, from here on referred to as AISI). This dual squeeze on the integrated sector's market share has resulted in declining rates of capacity utilisation and excess capacity in the primary stages of steel-making production despite capacity reductions. Excess capacity has translated into dramatic cost inefficiencies, leading to poor financial performance and consequent difficulties in attracting new capital for investment.

The decline of the US steel industry has been widely examined. Its roots have been attributed to comparative cost disadvantages [Crandall, 1981; Bradbury, 1987; Barnett and Crandall, 1986; *Competitive Status of the Steel Industry* (National Research Council), 1985], partially an effect of sluggish technological innovation; political pressures which impede structural adjustment to changing product market

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conditions (Ballance and Sinclair, 1983; Zysman and Tyson, 1983; Borrus, 1983); a natural stage of industrial development (Acs, 1984); and internal problems attributable to managerial structures and strategies which interfere with recognition and response to changing product market conditions (Schorsch, 1987; Abernathy and Hayes, 1981; Hirschhorn, 1986; Adams, 1986), as well as labour market structures and strategies which impose rigidities to organisational response and cost effectiveness in a competitive environment (Hoerr, 1988).

Policy prescriptions have focused on modernisation of process technology and plant layout (Zysman and Tyson, 1983; Borrus, 1983; Bradbury, 1987; Goldberg, 1986); industrial policy designed to facilitate technological and structural adjustment (Zysman and Tyson, 1983; Borrus, 1983; Ballance and Sinclair, 1983; *Competitive Status of the Steel Industry* National Research Council, 1985); policy aimed at fostering competition, decentralisation and flexible production (Adams, 1986; Crandall, 1981; Goldberg, 1986); development of market-orientated and entrepreneurial management (Schorsch, 1987; Abernathy and Hayes, 1981; Hirschhorn, 1986; Goldberg, 1986); and the willingness of the workforce to co-operate with strategies developed by the management (Kochan, Katz and McKersie, 1986; Hoerr, 1988; Goldberg, 1986). In the literature, there has been no thorough consideration of the organisation of work around technology and its impact on organisational performance.

While these explanations shed light on the problem and its symptoms, they fail to find a root cause for the integrated sector's inability to meet competition effectively. Since the 1980s, many of the industry's recognised weaknesses have been addressed. Cost disadvantages have been reduced through modernisation of technology, labour concessions, reduction in capacity and plant closure. After years of industry performance difficulties, political pressures have encouraged adjustment and flexibility rather than rigidity in structures and strategies of industrial organisation. Managerial structures and the organisation of work around technology have been reformed. Despite this, since 1981, financial losses have been more serious than during any other period in the industry's history.

This paper argues that the integrated sector's performance difficulties can be traced to incompatibilities between production process technologies and internal labour market structures which remain unresolved because of internal conflicts and divergent interests among corporate management, plant management, supervisors, international union representatives, local union representatives and workers. Within a single plant, steel-making technology involves the close integration of continuous flow processes from the melting of iron ore and other raw materials in a blast furnace to the production of final steel products in the finishing mills. In stark contrast, internal labour market structures are rigid and highly fragmented. Horizontally, job structures mirror production process technology; they are segmented according to location in the production process and narrowly defined in terms of the task composition of specific jobs. Vertically, labour, supervisory and managerial jobs are organised into extensive job progressions, supervisory and managerial hierarchies.

Historically, adversarial and often antagonistic relationships between workforce and management in this context have resulted in institutional arrangements designed to protect each side from discretionary behaviour on the part of the other including restrictive work rules and job classifications. Extensive supervision,

narrow job definitions, rigid job structures and a low trust¹ or no trust relationship between workforce and management have given rise to low discretion attitudes on the parts of both labour and management. They have created and perpetuated class distinctions between lower, middle and upper level management, between plant labour and management, and between labour across divisions, departments and seniority units within a plant. The result is a system in which relationships and structures are frozen because each side fears abuse at the hand of the other.

With the evolution of steel-making technologies, job and industrial relations system structures have not been adjusted. Oligopolistic product market control from 1901 until the 1960s permitted US steel producers to retain their market despite growing incapacities between labour markets and technology. Market control assured sufficient demand to cover costs of mass production technologies, permitted sale of products of sub-optimal quality, and allowed oligopoly pricing practices to cover costs and inefficiencies, thereby lifting or reducing pressures imposed by external product market constraints. Despite its internal problems, the US steel oligopoly remained profitable until 1959 when its markets were penetrated by competition from imports and domestic mini-mills.

Increasing product market competition has required producers to be responsive to changes in demand. Along with higher product quality, more competitive prices and reliable delivery, organisational responsiveness requires technological adjustment. New technologies demand broader skills and greater flexibility in the organisation of work; and they assign to the labour force an increasing degree of responsibility for the process of production as well as for product quality and cost. This has put pressure on firms to restructure jobs and improve co-operation among labour and management at the level of the plant. It is here that the integrated producers have met with greatest difficulties.

Product market success through the 1960s reassured agents of the appropriateness of chosen methods and objectives and permitted institutionalisation of the rigid structures and adversarial relationships which evolved in that context. Recent deterioration in performance, however, has activated certain constraints (product market and stock market pressures) which operate on decision-making agents, typically at the corporate management and international union levels of the organisation. In response, these agents have devised strategies and made choices which affect agents at lower levels (the plant and local union levels), contributing to division and conflict at those lower levels. Plant-level resistance to initiatives imposed from above has been substantial. This can be partially explained by institutional arrangements for resolving external pressures which render plant-level agents vulnerable to higher-level decisions and force them into defensive positions. It is also a result of the integrated sector's historical legacy of adversarial and antagonistic relationships between labour and management, reinforced by recent short-run survival strategies and violation of negotiated contracts.

Corporate management is responsible for corporate viability and can resolve external product market and stock market pressures through choices affecting the

¹ Trust in this context is used in the 'thin' sense of credibility of commitments or confidence among actors that promises made will be ratified in performance rather than the 'thick' notion of trust associated with friendship or kinship ties. See Fox (1974) and Gambetta (1988) for a further discussion.

fates of particular plants within the corporation or through diversification of corporate assets via abandonment or entry into different industries. Vulnerability of corporate management is relatively low, arising primarily from measures of corporate performance, and there are few limits on methods for resolving external pressures. Plant management is responsible for plant viability and is constrained by strategies and decisions made by corporate management and the labour union (if the plant is organised) as well as the relative success of other plants. Plant management has fewer options in attempting to resolve external constraints and pressures, having only specific plant-level decisions available to them. Any adjustment in job structures and the organisation of work must be negotiated through collective bargaining with the local and internal union. Plant-level power and authority are located at this level, subject to higher-level corporate decisions. Thus plant management has some degree of protection in the event a plant is scaled-down.

Supervisors are responsible for co-ordinating internal work and production processes within a narrow segment of operations; they are in effect policemen of the system. Under pressure from plant management, the union, demands of production, and the internal organisation of work, these individuals are not empowered with any real freedom in resolving external pressures. While product market success may provide limited protection by reducing pressures for internal adjustment, supervisors have no vehicle for representation, no real political power, and no explicit or implicit employment security. In responding to external pressures, they are often forced into defensive or self-protective positions. Supervisors are among the most vulnerable agents in the system.

The international union has overall responsibility for the viability of the union as an institution and is interested in maximising union membership. It is constrained by the performance and future of industries employing its membership as well as the possibility that companies will whipsaw the union. In response to these pressures, the international union can choose among constituent locals and can diversify membership across industries; it is thus not wholly committed to any particular industry or local. Union power and decision-making authority are centralised at this level, subject to membership approval; and as a result, vulnerability of international union officials is low. Local unions are responsible for the interests of plant membership. They are under external pressure from the international union and plant management directives as well as from the relative success of other plants, but have no real power in resolving these constraints aside from defensive strategies including strikes, work slow-downs, sabotage of equipment and output and resistance to and/or attempts to undermine threatening new approaches. Local union officials have limited protection due to the centralisation of plant-level union power and decision-making authority, subject to membership approval. However, this security depends upon the viability of the plant and its organised labour force. Workers are responsible for their specific jobs. They face external pressures from decisions of union officials as well as supervisors, yet generally have no mechanism for resolving conflicts arising from these sources aside from the defensive strategies identified above. Organised workers are afforded union representation and protection of employment, wages and the terms of employment, reducing their vulnerability to plant-level constraints. However, if the plant is closed or capacity reduced, workers are affected.

Vulnerability of plant-level agents to higher-level decisions and the fact that plant supervisors, the local union, and workers are often forced into defensive positions contributes to the conflicts and 'short-term-ism' at the level of the plant which paralyse action at precisely the point where it must take place if the interests of everyone involved are to be served. As discussed below for two successful cases of restructuring, however, when external constraints are relaxed and forms of representation and protection for plant-level agents exist, there is scope for developing more positive involvement in plant-level decisions as opposed to strictly defensive reaction choices. Agents' functions, pressures, protections, and, for the cases of less successful restructuring, their opinions are summarised in Table 1.

Divergent interests among agents contribute to conflicts when external pressures and constraints press in. Corporate and plant management interests diverge because corporate management is concerned with corporate viability and is thus not wholly committed to the plant. International and local union interests diverge because the international union is interested in the viability of the union as an institution, and can diversify its membership or make choices among various locals. Local labour is concerned about the viability and interests of workers within a particular plant and is vulnerable to choices made by international union representatives which may not have the same interests. Labour and management interests diverge over the distribution of income and authority within the plant; supervisory personnel and management interests diverge over the distribution of income because supervisory costs are part of operating costs. Labour and supervisory interests diverge over the distribution of authority and legitimacy of respective functions.

Since 1959, external pressures and constraints have intensified internal conflicts arising from divergent interests. These conflicts have threatened the viability of plants as external forces (i.e. product market competition) have imposed high taxes on internal struggles. Interest areas and divergent interests are summarised in Table 2.

While some firms have been able to reduce or lift external pressures, the US integrated steel sector as a whole has yet been unable to fully resolve conflicts arising from external constraints and now represents an example of a failing productive system in a newly competitive environment. The roots of market failure are embedded in historical experience and inherited structures and strategies in the areas of technology, industrial organisation and industrial relations, which are incompatible with competitive market performance.

Historical legacy of the integrated sector

The 'integrated' steel sector gets its name from the fact that processes within a single plant are closely connected (or 'integrated') from the earliest to the final stages of production. The process of converting iron ore into steel has not substantially changed since the late 19th century. Iron is melted in furnaces, refined into steel and rolled into finished products. What has changed is the degree of mechanisation, integration and finally computerisation of the process. The flow of iron and steel through the production process is now governed by the process technology; the resolution of predictable complications can be programmed into the system. However, unexpected problems which arise on the line must be handled by workers.

Table 1. *Functions, pressures, protections and options of agents*

	Function/ responsibility	Pressures/ constraints	Representation/ protection	Choices for response to external pressures
Corporate management	Overall responsibility for corporate viability and for viability of all plants under corporate umbrella	Stock market: possibility of takeover Product markets	Political power: centralisation of corporate-level power and decision-making authority resides in these individuals, subject to stockholder approval	Corporate diversification (choice between industries) Choice between plants
Plant management	Responsibility for viability of plant through plant-level production and product decisions (quality, cost, service)	Corporate management Union Relative success of other plants	Limited political power: centralisation of plant-level power and decision-making authority resides in these individuals, subject to corporate choices	Few: specific plant level decisions only Adjustment in job structures organisation of work is subject to collective bargaining process
Supervisors	Responsibility for co-ordinating internal work and production processes within narrow segment of operations (policemen)	Plant management Union Demands of production and internal organisation of work	No representation No employment security ^a	Limited or no scope for input into decision-making process for resolving external pressures Defensive strategies only

International union	Overall responsibility for the viability of the union as an institution and for all constituent membership	Future of industries employing membership Possibility of whip-sawing of membership	Political power: centralisation of union power and decision-making authority resides in these individuals, subject to membership approval	Diversification of membership (choice between industries) Choice between locals
Local union	Responsibility for interests of plant membership	International union Plant management Relative success of other plants	Limited political power: centralisation of local union power and decision-making authority resides in these individuals, subject to membership approval	Limited or no scope for input into decision-making process for resolving external pressures Defensive strategies including strike, undermining LMPT, etc.
Workers	Responsibility for specific job requirements	Local union Supervisors	Union representation and protection of employment, wages and terms of employment, to degree possible ^b	Limited or no input Defensive strategies including strike, slowdown, sabotage of process or product, etc.

^aProduct market viability may provide limited protection by reducing pressures for internal adjustment.

^bIn non-union settings, product market viability may provide limited protection by reducing pressures for adjustment in internal structures. However, the system is vulnerable to economic fluctuation.

Table 2. *Interests of agents: corporate and plant level management and supervisors international and local union and labour*

Agents	Interest areas			
	Industry viability	Corporate viability	Plant viability	Distribution of income/costs
Corporate management		X		Low costs (including labour, management and supervisory costs) in interest of profits
Plant-level management			X	Low costs (including labour and supervisory costs) in interest of profits
Supervisors			X	High income; employment security
International union	X			High membership, regardless of source; high wages for members
Local union			X	High plant-level membership; high wages for membership
Workers			X	High wages; employment security

Given a continuous flow process, there is little time to spare between a problem on the line and its ultimate resolution if costly down-time is to be prevented. As the production process has become increasingly mechanised and the process flow more closely integrated, the significance of timing of decisions made and actions taken at the level of the shopfloor has gained increasing importance.

In spite of the increasingly integrated nature of steel-making technology and the apparent benefits of an integrated or fluid organisation of complementary labour resources around technology, the organisation of work in the US steel industry has been based on a fine division of labour. With the introduction of mass production technologies in steel during the late 19th century and the concurrent popularity of scientific management methods of work organisation which sought 'efficiency' through the division of labour into its narrowest component parts and the separation of execution from conception, job structures were fragmented and narrowly defined in terms of task composition and responsibility. The organisation of tasks into jobs, jobs into job ladders (or seniority units), job ladders into departments, and departments into divisions was framed by technology and, from the turn of the century, shaped by the principles of scientific management. Given the gradual evolution of steel-making technologies, and the market power of the integrated steel producers, there was little pressure for radical adjustment in the structuring of jobs and industrial relationships. As a result, job structures were modified but not substantially changed from the early 1900s (Stone, 1974; Hoerr, 1988; Management interviews, 1989).

Rather than assigning to a worker or a work team responsibility for operating a blast furnace, for example, a hierarchy of jobs was constructed, from labourer to

furnace keeper; workers at each level of the job ladder were responsible for a narrowly defined segment of the total process and there was little overlap of tasks or responsibility between layers within the job ladder. Movement up the ladder involved progressively more responsibility and specific skill, and typically involved a reduction in the manual content of the job. Because movement from the lowest to the highest levels of a seniority unit usually required between 15 and 20 years of continuous service, top-level positions were held by experienced steelworkers whose careers had been devoted to work in their particular seniority unit. Maintenance jobs involved a greater variety of tasks than process work and had a relatively higher discretionary content because of the unpredictable nature of maintenance responsibilities. However, maintenance jobs were narrowly defined in terms of skill or craft affiliation between which there was little if any overlap.

The intrinsic incompatibility between a highly integrated production process and fragmented organisation of work gave rise to all kinds of anomalies. Thus, extensive and rigid supervisory structures and a new class of managers were created to co-ordinate work and technology and to assure the continuity of the flow of steel through the various departments and divisions. Within each department, managerial hierarchies mirrored the organisation of work and technology, typically measuring 10 layers or more from the shopfloor to the plant manager. This system created a low discretion mentality among both shopfloor labour and supervisory personnel because the close supervision of both limited their apparent ability to exercise discretion in the context of their work (Fox, 1974). The system institutionalised adversarial relationships by segmenting labour from management as well as by dividing the labour force among itself according to division, department and seniority unit within the plant. As a result, relations between labour and management were highly adversarial; and often, relations between labour in various departments were strained due to ethnic or racial labour market segregation and wage inequities. Historically poor working conditions, low wages and a predominantly immigrant labour force added fuel to worker militancy.

The industry was organised in the 1930s and following recognition, the United Steelworkers of America (USWA) accommodated itself to existing job and managerial structures and standardised jobs and pay across the industry; under this system, worker rights were tied to specific jobs. Job classifications became the basis for wage payments and jobs were ranked hierarchically into job ladders within each department. Mobility was vertical and determined by seniority. A formal grievance process was created to handle disputes relating to this system.

The system was favoured by both labour and management. For labour, it provided protection from managerial discretion in job assignment and apparent equalisation in compensation structures across facilities. For management, it equalised base pay rates across plants, removing labour costs (wages and working conditions) from competition. As a result, with the establishment of a job classification system in the US steel integrated sector, existing internal labour market structures were institutionalised and rigidified after 1947 (Arthur, 1987; Hoerr, 1988; Steiber, 1959). The job classification system standardised labour market structures and removed specific issues of job definition, task assignment and compensation structure from the collective bargaining process, effectively limiting the scope of collective bargaining and

injecting stability and certainty into the system. From 1947 through to the mid-1980s, this highly structured system of job and wage classifications was expanded. According to one estimate, by 1957 there were 18,000 job descriptions, 30 wage categories for production workers and three categories for craft/maintenance workers (Arthur, 1987). According to another estimate, at USS alone, there were 25,000 job descriptions and 32 job classifications for production and maintenance workers (Hoerr, 1988).

In spite of the centralisation of industrial relations in steel, the immediate post-World War II period was volatile. Steel labour wanted some share of the prosperity of the post-war period as well as restoration of wages which had been frozen during the war. As a result, the USWA went on strike prior to contract settlement at three-year intervals in 1946, 1949, 1952, 1955, 1956 and 1959. This contributed to surges of imports which followed the strike pattern. In 1945, imports rose 17%; in 1948, they rose 363% and in 1951, they rose 115% (AISI). The industry was shut down for 116 days in 1959, a year which in retrospect has been identified as the beginning of steel industry product market competition (Tiffany, 1988; Barnett and Crandall, 1986, p. 36; Crandall, 1981, p. 191; Goldberg, 1986, p. 168; Acs, 1984, p. 104).

During the 1960s, wages and benefits were significantly increased in an effort to prevent another devastating strike; by 1970, labour costs accounted for 41% of total costs (AISI). Apparent industry prosperity due to relatively strong demand during the 1960s concealed many of the integrated sector's problems. By the late 1970s, however, product market pressures intensified and integrated producers responded with attempts to reduce costs through labour concessions and closure of facilities; this resulted in plant-level conflict and growing distrust between labour and management. Further, since the labour cost implications of concessionary agreements made at the national level between the steel companies and the international USWA had to be worked out at the local level, there was even local level suspicion of a 'sell-out' by the international USWA, contributing to problems and divisions within the union itself (Bensman and Lynch, 1987; Union interviews, 1989-91).

In the late 1970s, plant closure and capacity reduction reduced both employment and labour costs in the steel industry. During this period, companies began to subcontract traditional USWA work to outside contractors in an effort to further reduce costs by avoiding trailing costs (i.e. insurance, pensions and fringe benefits) associated with the employment of a USWA steel-worker. The presence of subcontractors in close proximity to internal labour forces has been a source of conflict. Subcontractors threaten direct employment and suggest management's disregard for the interests of US steelworkers; as a result, their presence creates insecurity which reveals itself in shopfloor resistance to efforts at restructuring. Subcontracting represents an explicit violation of negotiated contracts and, moreover, indicates a corporate lack of commitment to its local labour forces. Consequently, plant-level hostility between labour and management has intensified, and both sides have become unwilling to co-operate without explicit contractual protection.

Voluntary retirement and labour concessions in the early 1980s further reduced labour costs. Wage employment, which had peaked in 1953 at 544,325, declined gradually through 1979 at an average annual rate of 1.4%. During the 1980s, the decline in employment accelerated, averaging 7.1% per year. By 1988, the steel

industry employed only 125,289 wage employees. Employment costs had declined from a peak of 41% of total costs in 1970 to 26% of total costs in 1986, rising slightly to 28% in 1988 (AISI). Industry performance continued to deteriorate, reinforcing the notion that job structures (the job classification system) and industrial relationships were a significant part of the problem and suggesting modification of the job classification system.

Adjustment in the job classification system, however, had to be negotiated through the institutions in which vested interests in the maintenance of existing structures and relationships were entrenched. Given industry decline, and growing concern for employment security on the parts of both local management and labour, internal labour market structures were highly resistant to change. Labour resisted adjustment because of the threat to existing employment and fear of labour intensification disguised as augmented responsibility and control. Job classifications represented employment and compensation security, helped protect labour from managerial discretion in job assignment and helped to maintain employment in the context of industry decline (Hoerr, 1988). Shopfloor management resisted adjustment because of the impact of such change on existing supervisory relationships and structures. By charging labour with increased responsibility and control over the production process, new job structures threatened to eliminate many of the existing supervisory functions. Given the particular vulnerability of supervisory personnel to job elimination because they lack representation and employment security, their resistance has been significant, intensifying shopfloor conflict and resistance to new approaches.

Nevertheless, by the early 1980s, after prolonged difficulties and failure to revitalise the industry, US integrated steel firms began to restructure their industrial relations systems, organisational and managerial structures, and jobs. Unfortunately, many of the industry's efforts have been perceived as short-run survival strategies with exploitive objectives, and have served to aggravate historically antagonistic and low-trust industrial relationships. At the same time, because traditional managerial hierarchies and power relationships are threatened by job restructuring, middle and lower management has often interfered with restructuring, undermining its effectiveness.

Unsuccessful restructuring efforts in the integrated sector (1980–present)

From 1980 through to the present, the integrated sector has made efforts at restructuring. These efforts and their effects, presented below, are revealed through information obtained during extensive interviews with representatives from both labour and management from plants of Bethlehem Steel, Inland Steel, USX, LTV and National Intergroup.

Industrial relations system

In 1980, collective bargaining was decentralised by the dismantling of industry-wide bargaining, the objective being to permit agreements to vary across companies and facilities depending upon the viability of the company or plant. Centralised industry-wide agreements had been designed to co-ordinate labour contracts and hence relative labour costs (exclusive of incentive payments) across companies and facilities in

an environment in which intra-firm competition on any basis was potentially detrimental to traditional oligopoly practices. With the advent of competition, which drastically cut into profit margins, the standardisation of labour costs at the industry level put disproportionate pressure on distressed facilities. Thus, contracts were negotiated on a company-by-company or plant-by-plant basis in order to more closely adjust labour costs to the ability to pay of individual plants. Local-level labour and management consequently assumed responsibility for negotiating collective bargaining agreements tailored to the needs and customs of their specific locations. As might be expected, faced with the threat of redundancy, labour forces in the older and/or less efficient plants were willing to concede more than were workers in relatively more healthy facilities.

During the early days of crisis (late 1970s/early 1980s), the effects of decentralised concessionary bargaining were usually detrimental to both labour and management at the plant level. Company-by-company and then plant-by-plant concessions were negotiated and wages and benefits were reduced in exchange for job security and profit-sharing programmes. However, plants were often closed following concessions and local management was given little notice before a site was scheduled for closure. Both labour and management suffered the physical and emotional strain of such events (Personal interviews, 1989–91). This served to create bitterness between local and corporate management, between local labour and management and between labour in different plants. A serious outcome of this was the reinforcing of traditional adversarial attitudes between labour and management.

In a period of excess capacity, decentralised bargaining also imposed serious market consequences on individual firms whose labour forces took industrial action. In 1985, there was a strike at Wheeling-Pitt, followed closely by corporate filing for bankruptcy. There were two more company-wide work stoppages in 1986: steelworkers at USS were locked-out for 184 days and Armco steelworkers walked out for five days in 1986. The deterioration of industrial relationships was given an additional twist in 1986 when LTV filed for bankruptcy and thereby attempted to avoid pension liabilities. Shortly afterwards, the company's management was awarded 'performance bonuses' while the workforce was forced to make concessions (Union interviews, 1989). This served to intensify hostilities and distrust between labour and management and, at the time of this study, LTV was continuing to ship steel and operate under bankruptcy in the absence of a labour contract.

One consequence of the breakdown of centralised bargaining has been strategic variation in the dates at which individual company contracts are negotiated and signed. USS, for example, signed a four-year contract in 1987 while other companies negotiated three-year contracts in 1987, 1988 and 1989. This staggering of contract dates permits companies to observe the agreements of others before finalising their own. Most companies now negotiate company-wide contracts with plant-specific clauses. Initially, from the perspective of plant locals, local bargaining was a positive development because it gave local labour more input into the process of negotiating the terms and conditions of employment at their own plant. By 1991, however, it has become apparent that contracts will be re-opened if one firm is believed to achieve a more advantageous settlement than another. This management initiated pattern, the effect of which threatens to standardise contracts across facilities and companies at

lower and lower levels of settlement, is seen by USWA officials at a local level as disadvantageous to organised labour (Union interviews, 1991). The ease with which contracts can be re-opened makes apparent the union's vulnerability as well as the limited protection afforded by agreement.

Managerial structures

Firms have also been adjusting managerial and organisational structures. Entrenched steel industry management has been an impediment to acceptance of the reality of competitive market conditions as well as to efforts at restructuring. The 1980s, which has been the decade of restructuring of the integrated sector, has also been the decade in which there has been a change in top corporate and plant management personnel in virtually every major integrated steel company. For example, new CEOs were named at National in 1980, Bethlehem in 1986, USX in 1989 and LTV in 1991. In many companies there have also been significant changes in plant management; a new plant manager was named at USX's Gary Works in 1985, at Bethlehem's Burns Harbour Plant in 1987 and at National's Midwest Division in 1980. New management appears to be more progressive, more technically orientated, and more interested in establishing co-operative relationships between labour and management (Management interviews, 1989-91). However, the unions claim that new management has been employed to smooth over antagonistic relationships which impede managerial restructuring efforts and remain unconvinced that new management is sincerely interested in implementing changes which will benefit labour and plants over the long term (Union interviews, 1989-91).

Along with efforts to decentralise plant-level operations, US steel companies have been centralising corporate functions. Corporate functions and strategies are the domain of corporate offices while production operations and job restructuring are largely accomplished on a plant-by-plant basis. Since the 1980s, supervisory structures, which had not significantly changed since the early 20th century, have been or are in the process of being significantly altered. Plants remain organised into levels of supervision which include the plant, division, department and seniority unit levels. However, the organisation of personnel into each of these levels has been modified in an effort to reduce costs and improve responsiveness of the various channels of decision-making authority within and between each level of supervision within the plant. Layers of managerial personnel have been collapsed, typically into one position at each level of the organisation. At USX, managerial progressions have been flattened from 10 to four layers; at Bethlehem, they have been reduced from seven to four layers; and at National, from eight to six layers (Management interviews, 1989-90). Because heaviest supervision has traditionally existed at the level of the shopfloor (the seniority unit), it is this level which has been most radically affected by recent efforts at restructuring supervisory structures. The ultimate objective of restructuring is to dissolve approximately four levels of supervision into one, the 'Front Line Manager'. Traditional and restructured managerial hierarchy is illustrated in Table 3.

As shopfloor managers have little or no protection in issues of job jurisdiction and security, one effect of restructuring has been the precipitation of intense conflict among supervisory personnel who fear for their jobs. This fear often translates into

Table 3. *Managerial hierarchy before and after restructuring*

Pre-1980	1989
(PLANT) Plant Superintendent Assistant Plant Superintendent	(PLANT) Plant Manager
(DIVISION) Superintendent (for each division) Assistant Superintendent	(DIVISION) Division Manager (for each division)
(DEPARTMENT) Superintendent (for each department) Assistant Superintendent	(DEPARTMENT) Department Manager (for each department)
(SENIORITY UNIT) General Foreman Relief Foreman Vicing Foreman Shopfloor Foreman	(SENIORITY UNIT) Front Line Manager (for each seniority unit)

Source: Integrated Sector Management Interviews, 1989.

the resistance of shopfloor managers to efforts associated with restructuring, serving to impede the process of change and incite further conflict at the level of the seniority unit, the level at which much of the restructuring must be implemented.

Job restructuring

Job restructuring has been accomplished on a plant-by-plant basis. This results in some variation in job structures across facilities because job structures are designed to satisfy the demands of specific plant conditions and the attitudes of local management and labour forces regarding the appropriate organisation of work. While this represents a departure from traditional standardised industry job structures, the complete organisation of steel labour forces by the USWA, and communication between local union leadership across plants, translates into only slight variations across facilities. The decentralisation of local functions, by placing responsibility for local decision making at that level, theoretically provides great opportunity for local labour and management; and familiarity of local labour and management provides some basis for the development of trust and co-operative relationships. However, the centralisation of both USWA and corporate leadership often undermines trust relations at the local level because local labour and plant management both fear that local agreements may be invalidated by either higher-level management or international USWA directives. International union officials are concerned with the viability of the union as an institution, regardless of the composition of its membership; as a result, local interests may be subordinated to international union interests and decisions to diversify membership. Corporate management is concerned with

the viability of the corporation, regardless of industry affiliation or the composition of constituent plants; plants are thus vulnerable to corporate decisions to diversify, divest of facilities or close plants. Local and plant vulnerability to higher-level decisions and strategies exerts pressure on plant-level agents, making the future uncertain and discouraging plant initiatives which may have short-run costs in the interest of long-run benefits.

In spite of these barriers, jobs are being gradually restructured in the US steel industry. Local restructuring is being accomplished through arduous negotiation proceedings designed to protect both parties from discretionary behaviour on the part of the other. However, the process is impeded by traditional short time horizons, characteristic of American management, and consequently, the 'tentative' nature of the process and uncertainty on the parts of both labour and management with regard to how far the restructuring should be allowed to progress.

Production jobs. Production job structures have been particularly resistant to change. Much of the adjustment in jobs has occurred in the form of combining existing jobs into one through job elimination and the reallocation of tasks. In some departments, where the timely performance of maintenance functions is critical, operator's jobs have been expanded to include minor maintenance responsibilities. One example is the position of 'Equipment Tender' at USX, which combines maintenance and operator responsibilities. When equipment is running, the Equipment Tender operates it; when it stops, the Equipment Tender is responsible for its maintenance and/or repair. Adjustments such as these are resisted by both shopfloor labour and the union. They often represent labour intensification, pose safety problems in the case of insufficient training for maintenance, and create friction within the labour force.

Another example is the combination of existing jobs into new positions, compensated at higher rates of pay (higher job classifications). Examples of job combinations at USS's Gary Works include the creation of the 'Furnaceman', 'Assistant Continuous Caster', 'Furnace Operator Assistant' and 'Material Handler' positions. These job combinations are designed to reduce labour costs by reducing the number of workers employed in these departments as well as to increase the functional flexibility of the new job structures.

Maintenance jobs. Maintenance job structures have undergone substantial alteration, primarily designed to increase the ability and authority of maintenance workers to perform a wider variety of tasks. With intensified economic and competitive pressures and the nature of new, increasingly sophisticated integrated process technologies in steel, the issue of maintenance has become critically important. Firms have been forced to develop methods for improving the quality and timeliness of maintenance functions; and there has been significant pressure for the establishment of multi-skilled craftsmen. During the first half of the 20th century, the control of craft workers over the production process was effectively broken through the division of production and maintenance functions and the strict separation of craft jurisdictions into 'pure crafts'.

Since the 1960s, with the intensification of economic and technological pressures, firms have pursued efforts at restructuring maintenance jobs. US steel companies have attempted the introduction of expanded craft, multi-craft or super-craft positions as well as new positions which assign to craft workers responsibility for the performance of multiple craft duties. Super-crafts combine mechanical maintenance functions into one job classification and electrical into another. In so doing, they reduce the total number of jobs available to craft workers, blur lines of distinction between separate crafts, require additional training of craft workers and expand the task content and responsibilities associated with maintenance jobs.

Such job restructuring has been resisted by both plant-level management and labour forces. Plant-level management has resisted such change because by expanding tasks and responsibilities of the labour force, it undermines the role of many layers of supervisory personnel. Further, it requires training programmes which are no longer feasible or cost efficient to provide in-house. Reduced labour force size has made it inefficient to maintain in-house apprenticeship programmes and many have been dismantled since the late 1970s. Plant-level labour forces place considerable value on craft identities and they hold tightly to the employment protection and financial benefits afforded by seniority units. The average age of an integrated steel worker is 45 and many resist change in job classifications because of disinterest in learning new skills and assuming additional responsibilities given the uncertain future of the industry and consequently their jobs (Personal interviews, 1989-91).

Organisational survival to an increasing degree depends upon the effectiveness of restructuring, encouraging local support for these efforts. The availability of multi-skilled outside craftsmen and willingness of companies to contract-out work, coupled with the general fear for employment among US steel labour forces, have encouraged maintenance workers to accept (particularly after 1986) contracts which call for some degree of craft expansion. Pressures for change in maintenance job structures have also been in part an effect of the shortage of skilled crafts generated by the industry 'crisis' and the exit of dissatisfied skilled craftsmen who could earn sufficient wages in alternative employment which is more secure and less adversarial. This labour shortage has made it necessary for firms to create necessary maintenance labour resources from existing maintenance labour forces; and this has been used as justification for the contracting-out of certain maintenance work.

During the late 1970s, after the problem with contracting-out had received widespread recognition, many companies created general maintenance crews, responsible for the maintenance of all departments and for providing downturn supplementation. An important objective of these crews was to reclaim work from contractors. Efforts such as this have resulted in the proliferation of more broadly defined maintenance jobs. Because these workers perform general maintenance duties using general and transferable knowledge and skills, the establishment of general maintenance crews or 'bull gangs' to perpetuate and even advance the process of task expansion of maintenance jobs. By 1986, with the industry's increased interest in subcontracting traditional steel work to multi-skilled outside contractors, steelworkers feared for their jobs and overt resistance to job re-structuring declined. Restructuring was negotiated with the USWA, whose agreements have provided for full employment of maintenance personnel. In 1986, most collective bargaining agreements called for

the establishment of 'multi-skilled' craftsmen, steelworkers trained to perform multiple maintenance jobs.

Effective restructuring of maintenance positions has called for provision of requisite training, guarantees of protection against subcontracting and adjustment in job classifications to provide additional compensation for expanded craft responsibilities. The willingness of both labour and management to co-operate with new job structures and industrial relationships created through multi-craft arrangements influences their effectiveness; and the labour-management environment has been an important indicator of the relative success or failure of such efforts.

Inland Steel Company was among the first to combine mechanical crafts (millwright, pipefitter and welder) into one job classification, the 'Mill Mechanic'. Given resistance from existing crafts, it first introduced the combined job classification in its new facilities, where there was no pre-existing aversion to the Mill Mechanic job classification. After the job classification proved effective in new Inland facilities, it was bargained into each division of Inland's Indiana Harbour Works. In the 1986 collective bargaining agreement, routine welding was added to all Mill Mechanic jobs. After this had been achieved, responsibility for 'inspecting and planning' was added to the job. Inland shares the adversarial industrial relations history of the rest of the industry. However, it differs from the rest in that most steel-making operations are located at one site, the Indiana Harbour Works. This removes pressures associated with plant vulnerability to higher-level corporate decisions and objectives. Relative centralisation of facilities unites corporate and plant interests, reducing potential conflict among management at the plant and corporate levels. In addition, Inland's labour force is not divided into different plants; local interests are not subject to choices made in favour of other company locals, eliminating the possibility of conflict across company locals. This facilitates centralised bargaining within the company and the achievement of company-wide agreements on job restructuring.

In 1986, National Steel Company was also successful in combining traditional mechanical jobs (pipefitter, welder, rigger and millwright) into one, 'Technician' job. National Steel has been recognised within the industry for its generally good, co-operative labour management relations system (a fact which will be developed later). This has been cited as an important determinant of success in adjusting job structures (Hess, 1990; Personal interviews, 1989-91).

At US Steel Corporation's Lorain Works, in 1986, welding was required of 'Mechanical Craftsmen' (boilermakers, millwrights, pipefitters and electricians), whose jobs did not previously include this task. Due to reductions in employment and the dismantling of apprenticeship programmes, training was not provided in-house but at local colleges and vocational training centers. Thus, as an incentive to learn welding, workers were paid \$1000 to begin the training programme and another \$1000 upon completion of the programme (Hess, 1990). In addition, new job classifications were rated at a higher pay level to compensate workers for additional tasks and responsibilities.

At USS's Gary Works, expanded craft positions have also been created, including the 'Millwright-Expanded' and 'Motor Inspector-Expanded' positions and the 'Ironworker', 'Systems Repairman' and 'Mechanical' and 'Hydraulic Repairman'

job titles. These jobs effectively combine the functions of existing maintenance jobs into one, more broadly defined position. The objective of such efforts is to broaden job content, responsibility and skills associated with these positions and to reduce reliance on specific crafts in which labour shortages exist.

Movement to an expanded craft position requires greater skill and responsibility as well as the expansion in task content of jobs. In 89% of cases, an increase in employment training and experience is required for movement to the expanded position. In 67% of cases, mental skill requirements are higher as are responsibility for materials and responsibility for tools and equipment. In 56% of cases, responsibility for the safety of others increases with advancement to the expanded position. Increased manual skill requirements occur in only 33% of cases; physical effort requirements increases in only 11% of cases. Thus, in the majority of cases, expanded craft positions require greater investments in employment training and experience as well as higher mental skills than the original position. They also impose greater responsibility for materials, tools and equipment, and the safety of others. In only a minority of cases are physical or manual requirements increased or hazards imposed by the expanded position. All of this is evidence of the tendency for restructuring efforts to broaden responsibilities, training and mental capacity. Table 4 summarises requirements of expanded and original positions.

The 'Team Leader'. The 'Team Leader' (mechanical maintenance, electrical maintenance, production and service) is an entirely new position that has been created as the highest position in most departments. A Team Leader is 'responsible to lead the overall task execution by the work team, perform administrative functions and participate in hands on performance of his team's work.' (USX Job Description of the position, 'Team Leader', supplied by USWA LU 1014, 1989). This position effectively assigns supervisory responsibility and authority in all areas except discipline to a production or maintenance worker. Compensation for this position is set at three job classifications above the highest classified job in the seniority unit over which the Team Leader exercises leadership. Job progressions have been reconstructed to incorporate the new positions. At present, Team Leaders have been employed in most departments at USX's Gary Works (approximately 80%), from the sintering plant and blast furnace to the rolling mills. At the same time, managerial hierarchy has been flattened from ten to four layers and the workforce has been drastically reduced since the early 1980s. At South Works alone, employment fell 95% from 15,000 to 800 people during the early 1980s (Integrated Sector Management interviews, Gary Works, 1989; Integrated Sector Union interviews, Local Union 1014, 1989-91). Table 5 identifies job ladders, job classifications and Team Leaders at USW's Gary Works.

Team Leaders have the advantages and contractual protection associated with union membership while at the same time assuming the authority and responsibility associated with shopfloor management. This represents a radical departure from traditional job structures in the steel industry which attempted to remove that authority from the workforce. Team Leaders are responsible for both supervising and performing any seniority unit work depicted by a dotted box in the respective job ladder; thus, this type of work organisation attempts to relax the traditional

Table 4. *Requirements for advancement to expanded craft positions from existing positions*

Original position	JC	Expanded position	JC	Factor classes which are increased	Factor classes which are decreased
Welder	14	Ironworker	19	2,3,5,6,8,12	
Rigger	14			2,3,4,5,6,9,11	
Boilermaker	15			2,3,5,6,8,11	
Instrument Repairman	16	Systems Repairman	20	2,3,5,7,8,12	
Electronics Repairman	18			5,7	
Machinist	16	Mechanical and Hydraulic	19	2,7,8,10,11,12	5
Millwright-Expanded	16	Repairman		2,3,6,8	
Motor Inspector	14	Motor Inspector-Expanded	16	2,3,4,6	
Millwright	14	Millwright-Expanded	16	2,4,5,6,9	
Factor			Expanded positions with increase (%)	Expanded positions with decrease (%)	
2. Employment training and experience			89		
3. Mental skill			67		
4. Manual skill			33		
5. Responsibility for materials			67	11	
6. Responsibility for tools and equipment			67		
7. Responsibility for operations			22		
8. Responsibility for the safety of others			56		
9. Mental effort			22		
10. Physical effort			11		
11. Surroundings			33		
12. Hazards			33		

Source: Integrated Sector Union Interviews, USX Gary Works (1989-1991); Job Classification Manual, USWA (1963).

JC: Job classification number.

hierarchical structure of seniority progressions by creating a 'team' structure out of a previously rigid seniority unit structure.

However, Team Leader positions create friction on the shopfloor. By giving supervisory responsibility to the labour force, Team Leaders threaten existing shopfloor supervisory structures, thereby causing friction between shopfloor labour and supervisors. Team Leader positions also cause friction within the labour force. USWA agreements forbid one worker from testifying against another. Thus, the Team Leader is put in an uncomfortable position when required to testify against a worker involved in a shopfloor grievance. Further, the augmentation in 'status' associated with movement from an operator or maintenance position to that of Team Leader as

Table 5. *Job structures in a typical integrated facility (1989–1990)*

Division	Department	Seniority unit	Job levels ^a	Job classifications ^b	Team leader ^c
Coke and chemicals	Chemical operations	Distillation	2	10–11	
		Gas cleaning	6	6–24	TL
	Laboratory	Laboratory	4	8–18	TL
	Coal handling/precarb	Coal handling	6	2–15	TL
		Precarb	4	NA	TL
	Coke production	Heating	2	8–18	
	Maintenance	Position-rated jobs	3–5	5–12	
		Maintenance (trade and craft)	4	NA	TL
Iron-producing	Iron producing	Docks (two ladders) ^d	3	NA	TL
		Maintenance (position-rated jobs)	5	NA	
	Blast furnace and sintering	No. 3 Sinter plant	3–4	NA	
		No. 3 blast furnace	5	3–16	
	Maintenance	Furnaces and auxiliary	4–5	2–17	TL
		Furnaces, ore docks and No. 3 sinter plant	4	NA	TL
			4	NA	TL
Steel-producing	No. 1 BOP and Caster	No. 1 BOP and caster	3–6	2–29	TL
		No. 1 BOP/caster maintenance	4	15–24	TL

160"/210" plate mill	No. 2 QBOP	No. 2 QBOP	3-5	2-26	TL
		No. 2 QBOP			
		maintenance	3-5	15-24	TL
		operations/			
		maintenance	5-8	8-29	TL
	46" slab mill	46" conditioning			
		yard	9	2-18	TL
		46" slab mill			
		pits	4	NA	
	46" maintenance	46" maintenance	1-4	NA	TL
		(five ladders)			
	Maintenance	Off line			
		maintenance			
		bull gang	4	16-21	TL
Shops and Services, East	Steel services	Steel services	2-6	2-13	TL
		(two ladders)			
	Heat treat	No. 11	5	2-12	
	Heating, rolling and yard	No. 6	5	2-27	
	Roll shop	No. 128	3	2-12	
	Shears and shipping				
	and flame cut	No. 8	4	2-11	
	Maintenance	No. 12A	2-3	NA	
		(4 ladders)			
	Central shops	Machine	4-5	NA	TL
		Machine shop	3-4	3-12	
	Field services	Field services	3	2-10	
		Field services	4-5	15-22	TL
	Electrical services	Electric shop	2-3	NA	TL
		(six ladders)			

Continued on next page

Table 5. (Continued)

Division	Department	Seniority unit	Job levels ^a	Job classifications ^b	Team leader ^c
Energy and environmental	Mason	Carpenter/painter (two ladders)	2-3	NA	TL
		Mason	2-3	3-10	
	Garage	Craft	3	NA	TL
		Garage craft	3	NA	TL
		Janitor	1	NA	
	Locomotive Maintenance	Locomotive maintenance (two ladders)	1-3	NA	TL
	Fuel and electronics	Fuel and electronics	4-8	2-25	TL
	Electrical	Electrical	3-4	2-23	TL
	Steam production	Steam production/MOM	3-7	2-15	TL
Plant security	Plant security	Plant security	3	8-16	TL

^aIndicates the number of levels of progression from the lowest to the highest positions on a seniority unit job ladder.

^bIndicate the lowest through the highest job classification (pay level) in the seniority unit.

^cIndicates that job ladders are headed by Team Leader positions.

^dIndicate the number of job ladders in a particular seniority unit.

Supervision: there are now only four levels of supervision from the shopfloor to the plant manager: these include front line managers, area or department managers, division managers and a plant manager. This has been reduced from 10 layers, which included foremen, vicing general foremen, general foremen, assistant superintendents, superintendents, division superintendents, an assistant plant superintendent and a plant superintendent.

Source: Integrated Sector Union and Management Interviews, Gary Works (1989-1991); Job Descriptions and Ladders supplied by Gary Works, Local Union 1014 (1989).

NA: not applicable.

well as the apparent contradiction in the Team Leader's roles of supervisor and worker cause friction among workers in the seniority unit.

Implications

Although progression to expanded, combined and new jobs is strictly voluntary, workers feel pressure to advance to these positions, particularly in the context of an industry undergoing contraction. With steady restructuring of job categories and descriptions, the expanded and combined jobs are more secure than the other jobs. Should positions be eliminated (as they have steadily been since the 1970s), the traditional narrowly defined positions will be the first to go. Higher pay provides incentives for acceptance of expanded craft jobs; however, the primary motive behind movement to these positions is concern that existing jobs will be eliminated.

At USX's Gary Works, in 1984, job and craft expansion, realignment and combination eliminated 37.3 equivalent jobs in the Coke Division; 9.4 maintenance and 5.2 production jobs in the Iron Producing Division; 53.1 production and 17.8 maintenance jobs in the Steel Producing Division; 11.5 jobs in the Energy Division; 91 positions in the Maintenance Division; and 2.1 maintenance and 30.5 production jobs in the Plate Mill. 124.9 'Equipment Tender' (ET-Mechanical, ET-Electrical, ET-Mechanical/Electrical) positions were created, displacing 69.4 operating positions. At LTV's Indiana Harbour Works, re-manning resulted in the elimination of 51 production and maintenance positions in 1987; at the Hennepin Works, 19 positions were eliminated; at Aliquippa, 13 positions were eliminated; at Cleveland, 35 positions were eliminated; at the Cleveland Works, 147 positions were eliminated; at the Pittsburgh Works, 26 positions were eliminated (Collective Bargaining Agreement, August 6, 1987, LTV and USWA). Similar reductions have occurred in every major US steel integrated facility.

While the elimination of jobs through restructuring has obvious labour cost advantages for firms, it is resisted by shopfloor management. Positions such as Team Leader effectively eliminate supervisory personnel by assigning supervisory responsibility to key labour personnel. Restructuring also reduces layers in production/maintenance hierarchies, eliminating the need for redundant layers of shopfloor management. Management/supervisory positions are not protected from elimination to the extent that production/maintenance positions are protected; and managerial personnel were among the first to disappear in corporate efforts to achieve operational flexibility. The methods for elimination of jobs engendered fear and job insecurity among people in these positions, serving to intensify adversarial elements in the system of industrial relationships and incite even greater resistance to change. This contributes to further industrial relations problems at the plant level because of the resistance of these managers to experiment with newly developed co-operative programmes.

Objections have been raised by the USWA (local level) on the basis of employment and safety considerations. Expanded crafts reduce employment by expanding and combining previously existing jobs; however, they increase the employment and security of those maintaining employment in expanded positions. They also pose safety problems. During the early 1980s, the union reported that reduction in crew sizes resulted in a 600% increase in accidents at Gary Works, many of which were

serious (Union interviews, 1989–91). Representatives of USWA locals claim that 6 to 10 weeks of training is a relatively short period of time to equip newly expanded craft workers with the necessary experience and training in order to satisfactorily perform critical duties required by these new jobs. This short time period is reflective of the traditional short-run methods employed by US management as well as the somewhat tentative nature of adjustment. While these expanded crafts are being created and workers train accordingly, cost pressures have encouraged the reduction or dismantling of traditional extensive apprenticeship programmes in most firms.

In 1989, a joint company–union career institution was established to meet the industry's needs for training to prepare the labour force for the steady advancement of steel-making technologies. At present, Inland, National, LTV and Armco are members. USX has not joined. While training is critical to the ability of firms to man new equipment and technology, adjustment in existing job structures is a prerequisite for effectiveness in re-training; a co-operative or at least non-antagonistic system of labour-management relationships is important for the success of efforts to restructure jobs and train labour. It appears that as long as the root problem of adversarial and low trust labour management relationships is not effectively addressed, the US steel industry will be unable to realise the potential benefits of efforts at re-training and job redesign.

Examples of cases successful adjustment

A central theme of this study is that successful performance under competitive product market conditions demands organisational responsiveness which in turn depends on trust between labour and management. Of the large integrated firms studied for this paper, two firms stand out as notably successful in this effort: Northwestern Steel and Wire and National Steel's Midwest Division. In both of these cases, in addition to local conditions for success, a prerequisite for adjustment was the reduction or lifting of external pressures operating on the plant. This was accomplished through a radical change in the structure of ownership or the organisation of capital, altering the explicit relationship between labour and management, extending time horizons, and freeing the labour force and local-level management to co-operate.

Northwestern Steel and Wire (NWSW) is a large electric furnace steel producer, which began operations in Sterling, Illinois, in 1879. Organised by the USWA, NWSW shares the industrial relations history of the major integrated producers. In the early 1980s, when the industry was in deep crisis, a new CEO, Robert Wilthew, was appointed. Wilthew had radical ideas about how relationships and operations should be conducted, many of which involved increased internal communication between labour and management and between levels of management, as well as a sharp reduction in managerial hierarchy. Although local labour and management were initially sceptical of the anticipated results of such strategies, over time, planning time horizons were extended, promises were ratified in performance, co-operative relationships began to develop, and the company's performance began to improve. These events provided and reinforced local conditions for success.

During this same period, owing to the widespread financial difficulties of the US steel industry, NWSW was put up for sale by the Dillon family which had owned the

company since its inception. Fear of 'corporate raiders' at a time when the company was just beginning to do well posed a danger to local efforts. This, coupled with a shortage of alternative employment opportunities in a region dependent on NSW for employment, encouraged management and employees to explore the possibility of an employee buy-out. Thus, in 1988, NSW was purchased by its workers and managers and now operates as an ESOP. Removal of the company from the stock market lifted stock market constraints and consequent vulnerability of the plant to external control. Employee ownership dramatically changed the explicit relationship between labour and management, removing class distinctions which may have existed between the groups and uniting the interests of the two through joint ownership of the company. Ownership involved input into the operations of the company, shared investment on the parts of both hourly and salaried employees, and consequently shared interests in the long-term viability of the company. This has contributed to the subsequent profitability of NSW.

National Steel's Midwest Division (NSMWD) is another large steel facility which has profited from successful restructuring of operations and the creation of a more co-operative and high trust system of industrial relationships. In the case of NSMWD, the relevant series of events took place during the early 1980s. In 1980, before National Steel was taken over by Japanese management, NSMWD was given a new plant manager and its labour force elected a new UAW local president. Both were individuals who favoured co-operative programmes as a response to the industry's difficulties at the time. A key factor in the success of these programmes, called the 'Co-operative Partnership,' is that the idea, strategy and structure for achieving a co-operative industrial relations system at NSMWD originated with the union, giving the labour force a vested interest in the success of the programmes. Further, management was agreeable, assigning responsibility and decision-making authority to the union and plant-floor labour force and providing necessary facilities, financing, and organisational support for efforts of co-operative groups.

At NSMWD, plant-level agreements are binding, reinforcing efforts at local-level co-operation. Binding plant-level agreements eliminate the fear of subversion of local efforts by higher-level decisions. NSMWD is also a rather young division. Built in 1961, it was not over-manned and has consequently not experienced the same employment losses of other, older facilities. National Steel is also the only company in the integrated sector to provide explicit employment security to its labour and local management forces, reducing the potential employment costs of co-operative programme suggestions for improving efficiency. Although a specific job may be eliminated, the worker (or manager) affected is guaranteed employment at NSMWD with no loss of pay.

NSMWD thus has a history of relatively co-operative industrial relationships, reinforced by plant-level management and union representatives who support such efforts. Product market success has limited the apparent vulnerability of plant labour and management to economic downturns and corporate directives. Together, these provide local conditions for success of co-operative arrangements. Japanese ownership has further lifted many of the external pressures operating on the firm, including stock market and certain product market constraints, reducing the potential for plant-level conflict and facilitating co-operation among agents at that level. Japanese

ownership has injected a long-term view of the future into the system. Investments have been made in the plant and the ownership has expressed its willingness to wait for the returns of these investments rather than judging performance on short-term measures of profitability.

In short, there are cases in which struggling facilities have been able to adjust technology, industrial organisation, and industrial relationships and develop more co-operative arrangements, reducing internal conflict and improving possibilities for long-term success. However, a prerequisite in each of these cases has been the reduction or lifting of external pressures through a radically different form of capital organisation or ownership structure than is characteristic of the traditional integrated steel sector firms.

In comparing successful with less successful cases of restructuring, there are significant differences in the existence of, as well as the perceptions of, plant-level labour and management with respect to employment security, participation, co-operation and trust.¹ In the successful cases, explicit employment security or agents' confidence in the security of their jobs, reduces vulnerability of plant-level agents to redundancy and facilitates their co-operation with new approaches. In the less successful cases, there is no explicit employment security and recent layoffs have intensified employment insecurity. In the successful cases, the labour force is willing to co-operate with management owing to vested interests in the success of participative approaches because of employee ownership or the fact that the idea of co-operation was initiated by the union. In the less successful cases, co-operation was suggested by management as a response to a locational crisis; and fear of plant closure or employment reduction was used as the motivating factor. In the successful cases, formal participation programmes have been established; in the less successful cases, no such programmes have been effectively implemented. In the successful cases, plant management and union representatives each believe that the other can be trusted to respect and fulfil the terms of agreement made while in the less successful cases, the union believes that management cannot and should not be trusted.

These findings provide evidence that a prerequisite for effective restructuring is the relaxation of external pressures (described above in Table 1) coupled with reduction in plant-level vulnerability to change. Table 6 summarises conditions in the plants and the perceptions of plant-level union and management representatives as to whether trust has been established between labour and management.

Conclusions

The economic environment for most industries since the 1960s has been increasingly competitive. As a result, firms have been forced to become more responsive to changes in demand for their products as well as to meet more rigorous product market standards in areas including product quality, price, service and delivery. Recent advances in technology in many heavy industries, particularly in steel, have tended toward increased automation, integration of processes and computerisation. These have assigned greater responsibility to line workers for the flow of production,

¹ These comparisons are more fully developed in my PhD thesis where I contrast the integrated sector with the generally more successful mini-mill sector of the US steel industry. See Smith (1991).

Table 6. *Plant-level conditions and union and management perceptions*

	Successful restructuring		Less successful restructuring			
	NWSW	NSMWD	Inland	USX	BETH	LTV
Conditions						
Job security						
Implicit?	Yes	Yes	No	No	No	No
Explicit?	No	Yes	No	No	No	No
Cooperation						
Why is labour willing to co-operate?	ESOP	Employment security	Industry and/or locational crisis Fear of plant closure or reduction in employment			
How was co-operation suggested?	ESOP	Union idea	Management	idea imposed from above		
Participation						
Formal?	Yes	Yes	No	No	No	No
Informal?	Yes	Yes	No	No	No	No
Perceptions:						
Trust						
Is there trust in plant?						
Management	Yes	Yes	—	Improv- ing	Improv- ing	—
Union	Improving	Yes	No	No	No	No

Source: Integrated Sector Union and Management Interviews, (1989–1991).

as well as for the product quality and decision making at the point of production and have required a restructuring of work and industrial relationships (Kochan, Katz and McKersie, 1986).

Recent adjustments in steel job structures have been targetted at a more co-operative and flexible organisation of work and a relaxation of the traditional hierarchically structured division of labour. However, recent adjustments cannot be explained by purely technical requirements. Technological innovation offers feasible alternatives but does not explain the timing or motivation behind adjustment in job structures. These are influenced by pressures exerted by shifting product market conditions as well as by the dynamic of systems of industrial relationships. In the US steel integrated sector, adjustment has been largely motivated by crisis conditions and fear. New job structures are reminiscent of internal labour markets under craft labour market conditions of the competitive 19th-century steel industry. These were dominated by strategically located craft workers who exercised considerable control over the production process. The Team Leader, for example, is similar to the 'leading hand'; and the combination of production/maintenance functions represents a reversal of the objectives of scientific management which have guided job and industrial relations systems since the early 20th century.

The new system offers advantages to those workers and shopfloor managers whose positions are not eliminated. For workers, it theoretically provides benefits including greater skill, responsibility, decision-making authority, control over the process of production, and improved working conditions. However, in reality, efforts have resulted in opposite effects because co-operation is resisted by shopfloor management and supervisors fearful of losing control, whose response has in many cases been to hold onto as much control as possible. Consequently, while new job and industrial relations structures provide institutional mechanisms that push control to the shop floor, control has actually be pulled upward by shopfloor managers and supervisors. Fearful of the effects of such change, they attempt to maintain control to the extent that they are able. The result is an intensification of adversity on the shopfloor and growing perceptions by labour that co-operative efforts are a 'sham'—a cover for managerial objectives of further exploiting the labour force. Thus, while new job structures offer great possibilities for labour, realisation of the benefits of their implementation is undermined by historical experience and the traditional system of industrial relationships and distrust in steel, reinforced daily by adversity and contract violation at the plant level.

Despite apparent efforts to decentralise, decision-making authority is structurally centralised at the level of the corporation and the international union. This contributes to the vulnerability of agents at the level of the plant: plant-level management, supervisors, local union representatives and workers. Supervisors are particularly vulnerable as they have no vehicle for representation or protection of the terms and conditions of employment. Many of the integrated sector's problems are related to the fact that recent top-level managerial strategies have precipitated conflict at the level of the plant, perpetuating an environment of distrust which has permeated virtually every level of productive operations and management. Because of the vulnerability of both plant-level management and labour to decisions made by upper-level management, and the fact that much of the change must be implemented at the shopfloor level, plant-level conflict has paralysed action at the point where it must take place.

Any external pressure precipitates some degree of conflict at the level of the plant, resulting in resistance to efforts at adjustment. The more intense the conflict, the greater the resistance to change. The greater the degree of divergence in attitudes of labour and management regarding plant-level conditions, the greater the conflict, more short term the strategies and lower the likelihood that adjustment will take place. Conversely, the greater the convergence in attitudes of plant-level labour and management, the lower the conflict, more long term the strategies can be and the greater the likelihood that adjustment will take place. If external pressures can be lifted or reduced, conflict and plant-level difficulties can be resolved and time horizons extended, permitting the implementation of strategies and the construction of institutional arrangements necessary for long-term productive system success. This success, if it persists over an extended period of time, then provides the vehicle for eventual institutionalisation of new strategies and structures.

Methods for lifting or reducing external pressures include:

1. Removal of stock market pressures and the threat of takeover through removal of the company from the stock market

2. Removal or reduction in market pressures through efforts to achieve some degree of market power via industry concentration (i.e., oligopoly or monopoly)
3. Removal or reduction in market pressures through efforts to achieve product differentiation
4. Removal of plant vulnerability to corporate choices among plants through creation of a single plant firm; if a company is a single plant firm, corporate and plant interests are united
5. Removal of plant vulnerability to corporate choices among plants through provision of some degree of real plant-level autonomy and consequently plant-level authority to make binding agreements
6. Removal of some degree of divergence in the interests of plant-level labour and management through such arrangements as employee ownership
7. Reduction in resistance from supervisory personnel through employment protection which reduces their vulnerability to process changes or changes in the distribution of responsibility and authority over shopfloor operations
8. Reduction in worker resistance to change through employment security which reduces labour's vulnerability to process change or adjustment in the organisation of work on the shopfloor.

In the US steel integrated sector, some firms have been successful in lessening or removing external pressures by one or more of the methods identified above. In this way, they have effectively reduced internal conflict and facilitated efforts to restructure jobs and systems of industrial relationships, improving their chances for performance success. However, the majority of firms continue to face unresolved internal struggles which impede restructuring. A consequence of this internal conflict is difficulty in responding to market demand and high taxes on firm performance which ultimately threaten long-term organisational viability, reinforcing the downward spiral of external pressures, unresolved internal conflicts, and consequent performance difficulties.

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