PACKAGING THE PAST

Industrial Archeology and Industrial Ecology

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As Robert Heilbroner has remarked, the decay of industrial capitalism in Great Britain gave birth to the study of its monuments and tombstones. This movement, a child of curiosity and fascination, gained perceptible headway about twenty years ago; it has become established in the U.S. over the past decade, particularly in deindustrialized areas of the Northeast. Though practitioners include enthusiasts and buffs of every species, adherents are also found within such scholarly disciplines as the history of technology and—less conspicuously—social history, as well as within the museum and design professions. The background of its partisans and the distribution of their affiliations shape the direction and potential of "industrial archeology."

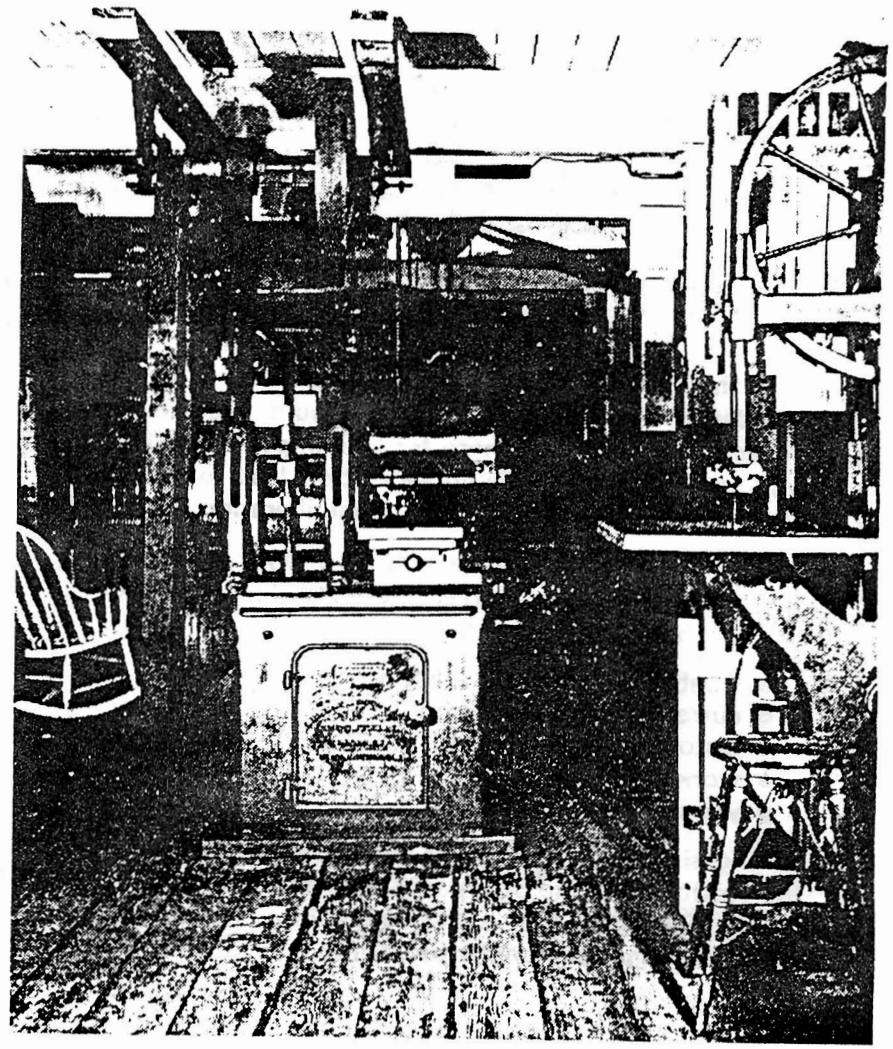
The term itself signifies an ecumenical interest in surviving examples of methods of transportation, communication, construction, power generation and production that have been superseded or have fallen into comparative desuetude. Common areas of investigation include canals, railroads, and public utilities; the use of wind, water, and steam for prime movers; structures displaying novel or representative uses of wood, stone, brick, iron, or steel; and the extension of the factory system into various branches of manufacture. In addition, occasional studies fix on such features of the contemporary environment as electric power generation, reinforced concrete construction,

and transportation by means of the internal combustion engine.

Industrial archeology, then, concerns itself with illustrations of a particular stage in the human struggle with nature and with the accumulation of the knowledge gained through that struggle—with, in short, the forging of links between rational inquiry and commodity production. The process is most commonly set forth in terms of the development of engineering. During the second quarter of the nineteenth century engineers served as the midwives of the American "transportation revolution": civil engineers, who laid out canals and railroads joining eastern seaports with the inland waterways of newly-settled areas, and mechanical engineers, who developed high-pressure steamboats and locomotives suitable to the rugged terrain. One of the major achievements of the Wisconsin labor history school was its analysis of the social conflict generated during the extension of regional markets which characterized this period.

Industrial expansion in the late nineteenth and early twentieth centuries has been associated with trusts, mergers, and financial legerdemain in which the realization of value was divorced from the actual production of physical objects. However, production and industry were also transformed. Daniel Nelson has documented the eclipse of empirical shop practice by laboratory analysis of materials and the design of machinery that could be tended by less refractory labor; and David Montgomery has suggested that elaboration of managerial controls deprived some workers of autonomy which prior mechanization had not entirely extinguished. From the Federalist era through the Progressive era, an increasing urban population was supplied erratically and rather anonymously with water, sewage treatment, light, and power under mixed private and public auspices. Philadelphia's Centre Square (1799-1801) and Fairmount water works (1812-1815) provided the first drops in the bucket. Though skewed by the effects of social stratification on residential conditions, these municipal engineering projects seem to have elevated the nineteenth century standard of living; the liabilities of dependence on central electric generating stations were unanticipated.

All these activities contributed to the Promethean aura of bourgeois hegemony: canal boats sailing uphill by means of ascending flights of locks; mill owners subordinating the landscape around water power sites to their requirements; a city on a hill illuminated through practical application of physical laws. The early essays in engineering foreshadowed the symbiosis of institutionalized research and capital accumulation through which Western civilization has achieved its current status as the prime exemplar of the satisfaction of material needs through the manipulation of nature—a one-dimensional society that



Wilkinson mill machine shop.

strives thereby to encompass its own negations.

The practice of industrial archeology can lead to a fuller understanding of the conditions of life and work under industrial capitalism in past time; but the questions which are commonly asked concerning examples of nineteenth century engineering fail to transcend the utilitarian or antiquarian: How did they work? When were they built, and by whom? This orientation is a preliminary necessity to some extent. The subject itself is relatively novel, and traditional disciplines like history have accommodated themselves imperfectly to the increasing use of non-literary source materials or to matters which did not pertain directly to the behavior of elites. Monographs dealing with such integral components of Victorian civilization as steam power or structural ironwork often require specialized knowledge and detailed research to delineate innovations and evolutionary design changes. Treatises of this sort understandably tend to concentrate on the nuts and bolts of the subject, but as a genre they are often indispensable, if occasionally soporific, elements in reconstructing the social history of a period.

Examining specimens of obsolete or obsolescent technologies can be particularly useful when focusing on standard practice rather than invention. The survival rate among pioneering ventures tends to be low, and the commonplace events of industrial routine are not often made a matter of record. However, these artifacts are of more than academic interest. The manner in which nineteenth-century structures are incorporated into their present surroundings and the public interpretation of industrial environments at museums or historic sites are political questions. Current activities in these domains are colored to some extent by the perspectives of the two major organizations that have claimed jurisdiction over industrial and engineering sites: the Historic American Engineering Record and the Society for Industrial Archeology. Each organization is in its own way parochial, and yet the work they do is by no means devoid of significance.

The Historic American Engineering Record (HAER) is a satellite of the Heritage Conservation and Recreation Service, U.S. Department of the Interior; it may therefore be nominally classified as part of the state bureaucracy's cultural apparatus. Created in 1969 by a tripartite agreement among the American Society of Civil Engineers, the Library of Congress and the National Park Service of the Interior Department, the organization's original purpose involved documentation of significant structures and machinery, plus consciousness-raising about the role of engineering in American history. HAER enters into agreements or understandings with state agencies and local organizations to conduct regional inventories. Each site is located, mapped, and photographed; its history is cursorily researched; its current status is described. The results are entered on standardized cards and incorporated into a cross-indexed national file which is accessible to the public. Some inventories are published, as are more detailed drawings, photographs and descriptions of particularly noteworthy sites—a procedure similar to the recording of residential architecture and civic edifices which has been carried out by the Historic American Buildings Survey (HABS) since 1933. Though overall control of the program lies with a central staff in Washington, the content of individual inventories and surveys is determined by the project field directors who are usually affiliated with the co-sponsoring institutions. The perspective of the publications produced to date under such arrangements has varied considerably, as has their educational value. Some inventories, for example, have ignored or omitted production technology.

In recent years HAER has become more actively involved with historic preservation and urban planning through its conduct of adaptive re-use feasibility surveys. This convergence of interests is now a growth industry, fertilized by changes in the tax law affecting rehabilitation of structures listed in the National Register of Historic Places. The rationale of recycling is to retain a building's aesthetic qualities while frequently altering its original function in a more profitable direction. A devotion to the integrity of facades is laudable, but conversion into offices, housing, or boutiques may leave so little of the spatial arrangements in the previous incarnation intact that the preservation achieved is partial: turning blast furnaces into sculptures or recreational areas is ludicrous.

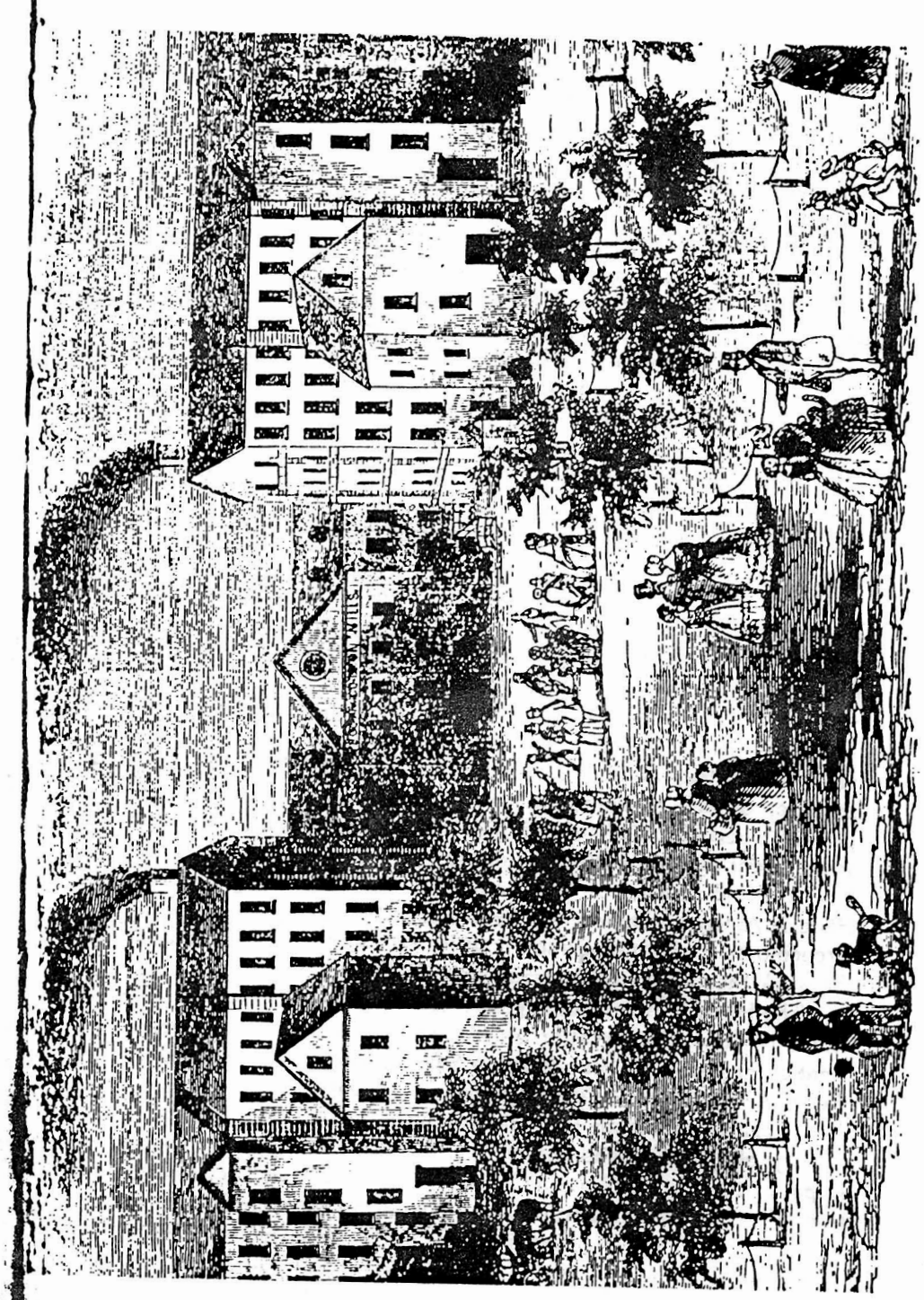
A more sinister aspect of institutionalized preservation arises from the prominence of public officials and professional developers in assessing the fate of structures which may have social as well as aesthetic significance within a particular community. The 1874 Elmira Rolling Mill in New York has an unusual series of modified Fink trusses supporting its roof, but it was also the scene of a major strike in 1888, as well as an abortive venture in cooperative production after the works had been abandoned. Its continued existence is due only to its suitability for the storage of plumbing fixtures. There is no guarantee that a social history perspective will be adequately represented within the ranks of government bureaucrats, preservationists and developers, or that such a coalition is elastic enough to accommodate input from labor or community organizations. On the other hand, there was little grass-roots lamentation when the Amoskeag millyard in Manchester and the Dutton Street boarding houses in Lowell were leveled. If sites and structures are salvaged in order to

present a visual sense of the past to posterity then nominations to the National Register should reflect the range of living and working conditions created during the earlier stages of industrial capitalism. There can be a role for local initiative as well as cost-benefit analysis.

By contrast with HAER's pedigree the Society for Industrial Archeology (SIA) is a mixed breed. The first voluntary national organization of its kind, it was formalized in 1972 by an assortment of museum professionals and academics with interests in material culture and the history of technology. Though its core membership is linked to the Smithsonian Institution's National Museum of History and Technology and the National Trust for Historic Preservation, as well as private development companies, the SIA itself is not formally integrated into the business of preserving and interpreting the residue of industrialization. Membership in the national organization totals about 1100, and a number of active regional chapters have been spawned. The society publishes a journal and a newsletter with varying punctuality. At the annual conference members present papers or talks, and tour local historic sites and operating facilities. This sort of agenda suggests that while it has been able to mobilize participants within a rather narrow range of occupations, the SIA has not yet succeeded in resolving the contradictions caused by the diverse inclinations of its membership, a mixture of aspiring scholars and voyeurs. Because its structure and goals are less monolithic than those of HAER, it does have some potential for transcending analysis of objects in isolation. However, corporate memberships have recently been proposed as a remedy for financial difficulties. The effect of this strategy on the type of projects that the society might undertake in the future is unpredictable.

Combining a knowledge of industrial technology and the development of professional engineering with an understanding of the historical fabric that encompassed each may be accomplished by individuals both within and outside of the SIA. The utility of HAER and the SIA lies in their provision of mechanisms for the conduct of specialized investigations or the presentation of anecdotes which may be of value to citizens and to other historians. Physical survival of mills, as well as the mansions of their owners, has the salutary effect of directing attention to the patterns of land use in a stratified society, though working-class housing has yet to acquire a vocal constituency.

One area in which industrial archeology can make a contribution to both social history and the interpretation of industrial development in museum exhibits lies in the study of work. E.P. Thompson has discussed the temporal effects of industrial discipline on established labor traditions and the dismay which "Saint Monday" occasioned



among employers and evangelicals. Changes wrought in the material environment of production have received less concentrated attention. A perspective of reconstitution should merge an account of workers' tasks with description of a particular workplace and its equipment in order to build up a comprehensive picture of daily routines within a particular trade. Such an orientation is distinct from both the institutional history of organized labor and quantitative analysis of social mobility: it might be called "industrial ecology."

Structures and equipment related to factory production seem to offer the greatest promise for investigations of this kind. Labor played a larger role during construction of the great civil engineering works than in their subsequent operation. A fractured aqueduct marking the abandoned route of the Erie Canal stands as a mute witness to the skill of stonemasons and the tenacity of navvies wallowing in a swamp, but it is less eloquent as an aid to reconstructing the division of labor and pace of work by which it was built. A bowstring or lenticular truss bridge reveals something of what designers knew (or suspected) about the distribution of stresses or the properties of iron, but once erected its role in the process of commodity production is inert. The drama or tragedy surrounding major construction projects cannot be denied: consider, for example, the construction of the Roeblings' Brooklyn Bridge (1869-1883), which resulted in the death of Roebling senior, permanent injury to his son, and numerous other casualties. Even so, the structures that resulted from such projects, as they now appear to industrial archeologists, do not bear directly on work practices and conditions. The same may be said of railway routes, coastal defense works, or the navigational aids that have occupied engineers since Smeaton applied his talent to Eddystone Light: once completed they employed little or no labor directly. This is not the case with Victorian harbor facilities, public utilities, railway yards, and urban trolley systems. The role of English dockers and gas workers in the "New Unionism" of 1889, of switchmen and yardmen in the 1877 strike against the eastern trunk lines, and of carmen in the 1895 Brooklyn trolley strike underscores the presence of labor; but most of these work environments were not as complex or opaque as factory production. Consequently, the preservation of material culture is less of an aid to historical reconstitution.

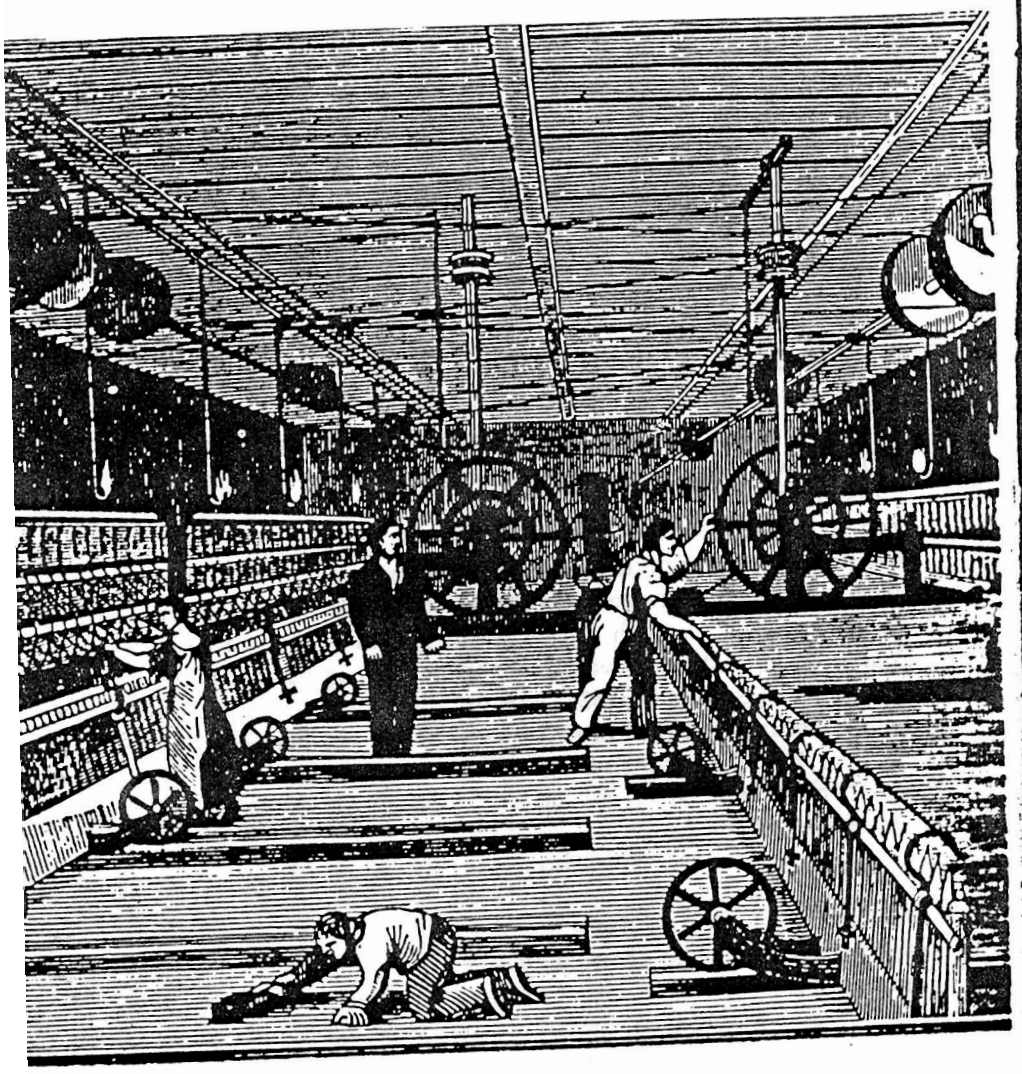
Three points should be emphasized with respect to the dark Satanic Mills described by William Blake and their functional equivalents in other industries. First, throughout the classic period of the trans-atlantic Industrial Revolution the majority of productive workers remained engaged in agriculture and handicrafts. The lurid glow from the coke-fired iron smelting furnaces at Coalbrookdale was

only a preliminary spark in the eighteenth-century England of Henry Fielding. With the exception of the condensing pumping engines that embroiled Boulton and Watt with the parsimonious Cornish Adventurers, mining operations remain unmechanized, though it eventually became possible to dispense with the phosphorescence given off by putrefying fish as a source of subterranean illumination. In the stirring image at the conclusion of Zola's *Germinal* (1885) the miners chipping their way upward toward a revolutionary springtime still had only hand tools at their disposal.

Second, mechanization and centralization of manufacture were not necessarily simultaneous. Grist mills and sawmills of the type developed by Oliver Evans served to render local primary products into more easily transportable forms. In Lynn critical stages in the manufacture of shoes, such as cutting soles and uppers, were concentrated in central shops under entrepreneurial control by the 1830s. though the first sewing machines were not introduced until 1852.

Third, technical progress occurred at an uneven rate. As E.J. Hobsbawm and Raphael Samuel have emphasized, the mechanization of one process often entailed a more frantic pace in archaic sectors to keep up with the new prodigy. Perhaps the discrepancies were more striking in Britain. Specialists in Anglo-American industrial development have theorized that relative factor prices prolonged labor-intensive methods in such regions as the Midlands hardware district. Change within industries was also sporadic. Though a continuous rail mill was in operation by 1888, jobs in other types of rolling mills remained arduous, as illustrated by such early twentieth-century survivals as the 1910 22-inch band mill at Simonds Steel in Lockport, New York and a hand-caught rod mill at Washburn Wire in East Providence, Rhode Island.

Examples in the erratic chronology of uneven development are legion, but without the human dimension the chronicle is distorted. How might physical artifacts help recover the experiences of those men and women who chanced to confront the maneuvers of these mechanisms and the crudities of these environments? Some of the factories are still standing: their interior dimensions and spatial arrangements emphasize the contrasts among the dwellings, churches and workshops of artisans, and those buildings whose structure was conditioned by the requirements of mechanized production. Some of the machinery still exists, and more may be discovered through organized hunts or individual exploration: scrutiny in the field or museum can revive the operations of throstle spinning frames, back-geared engine lathes, or Lincoln millers, and the tasks of their attendants. This detritus reminds us of the skills that are continuously am-



MULE SPINNING.

putated and forgotten in the course of industrial development.

The fossilized vertebrae of dinosaurs or the remnants of antique technologies are necessary for accurate reconstitution, but not sufficient. They reveal something of the structure of the organism, less of the way in which it functioned. Archival payroll and production records, articles in the engineering press, and memoirs can flesh out some details about job skills, earnings and methods of payment, turnover rates, the pace of work, and conditions inside the mills and factories (temperature, humidity, noise, and toxicity). The British Committee on the Machinery of the United States, which toured the Northeast during 1854, attributed excessive absenteeism at the Springfield Armory to the discomfort of working in summer temperatures. The Pittsburgh rolling mills had ceased work at the time of their visit due to the heat.

Gaps inevitably occur in attempted restorations; they can be bridged only by inference and imagination. However, critical studies of obsolete equipment and the internal social relations of nineteenth-century factories can aid in a more precise periodization of industrial capitalism by historians and the recreation of that era in museum exhibits.

In his recent study of early industrialization in the Rockdale, Pennsylvania mill district Anthony Wallace, an anthropologist by trade, presents a marvelous torrent of information on the role of the family in the mobilization of venture capital and the consolidation of a form of bourgeois hegemony based on the double-edged instrument of evangelical Protestantism. (His own interpretation is not presented in these terms.) However, in the general area of working-class life and customs his research is shallow. On the subject of work Wallace's descriptions of specific transactions between various types of equipment and what a *Harper's* journalist termed "the human portion of the machine" are discursive. Work processes that have become remote from the experience or imagination of many readers might have been rendered more vivid by synthesizing direct observation of such machinery as survives from the period with relevant labor and production records. Wallace did examine some decrepit mill sites in the Chester Creek Valley; but the survival of Victorian production technology *in situ* is extremely rare. The manner of its presentation in museums of industry therefore becomes more significant. A massive display of individual machines within a modern building requires a Herculean effort of imagination to reconstitute the work environment from which they have been abstracted. If the role of the operative in the operation of the machine is not clearly set forth through graphic or audio-visual displays or narration the exhibit fails as social history.

Even within the more restricted compass of technological history, acquainting a novice with the mechanism of a consolidation locomotive in repose requires considerable information of which the cooperation between engineer and fireman when climbing a grade is but one part.

Restoration of a nineteenth-century factory in prose or fact is no panacea for alienation and narcissism, but it is useful in revealing conditions under which previous generations passed a substantial portion of their lives. Within this educational sphere the specialized practice of industrial archeology can unearth valuable material, providing a sort of Rosetta Stone to decipher the language peculiar to industrial tombs. □