

The Mon Valley Discovering the Genesis of the Modern American Steel Industry

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HABS/HAER, through the sponsorship of the Steel Industry Heritage Task Force (now the Steel Industry Heritage Corporation), has operated a field office in Homestead, PA since April 1989. Its primary responsibility has been to aid the task force's effort to fulfill congressionally mandated legislation regarding the establishment of a heritage preservation area in the Monongahela Valley. The character of this aid has ranged from identifying extant historically significant industrial process equipment; to helping the task force select individual industrial sites for consideration as possible heritage centers; to the preparation of in-depth documentation about each of the selected sites in the study area.¹

The Homestead Field Office has prepared extensive documentation—histories, measured drawings, and photographs—of several of the region's steel mills, including those in Homestead, Braddock, Duquesne, and McKeesport. Among our most important findings is that the Monongahela Valley or Pittsburgh District—stretch-



Carrie Blast Furnaces No. 6 and 7, and Hot Blast Stoves, Swissvale, PA. Photo by Martin Stupich, 1989, HAER.

ing westward to Aliquippa and southward to Monessen from Pittsburgh—was the birthplace of the modern American steel industry. The acknowledged leader in this development was Andrew Carnegie. Although bessemer steelmaking facilities had been added to several of the nation's iron mills in the late 1860s and early 1870s—most notably the Cambria Iron Works in Johnstown, PA—the major breakthrough in the relation-

ship between steel mill design principles and the use of modern technologies did not occur until the greenfield construction of Carnegie's Edgar Thomson Works at Braddock in 1875. Designed and built under the supervision of Alexander Holley, the buildings and equipment making up the new complex promoted a continuous flow of materials through the mill. Shortly after the mill began operations, it became the largest producer of steel rails in the nation. As a result, its layout design became



W. A. Young and Sons Foundry and Machine Shop, Rices Landing, PA. Photo by Jet Lowe, 1991, HAER.

the prototype for the construction of integrated steel mills in the industry. Today the Edgar Thomson Works remains one of the few operating steel mills in the region.²

The influence of the Carnegie Steel Company in the creation of the modern American steel industry extended far beyond the construction of the Edgar Thomson Works. The company confirmed its leadership role in the industry by establishing "American practice" in the operation of blast furnaces and rolling mills. The standard for American blast furnace production was established between 1872-1900 by the gradual development of "hard driving" techniques at four local Carnegie facilities (Lucy Furnace Plant, Edgar Thomson Works, Duquesne Works, and the Carrie Furnace Plant). Predicated upon the introduction of larger blast furnaces, more powerful blowing engines, regenerative hot blast stoves, and an automatic raw materials storage, handling, and delivery system, 'hard driving' resulted in dramatic improvements in pig iron production, which rose from not more than 50 tons per day at a single furnace in 1872 to the world daily production record of 790 tons set by Carrie Furnace No. 3 in 1900. Three equally significant blast furnace plants from the period are extant—Edgar Thomson, Duquesne, and Carrie. Each one retains, if not its original equipment, the design principles which were developed between 1872-1900.³

The company established "American practice" in rolling mill operation by consistently employing the most productive equipment available.⁴ Between 1890-1900, it installed an expensive new direct process for rolling rails, inherited from its purchase of the Duquesne Works, at

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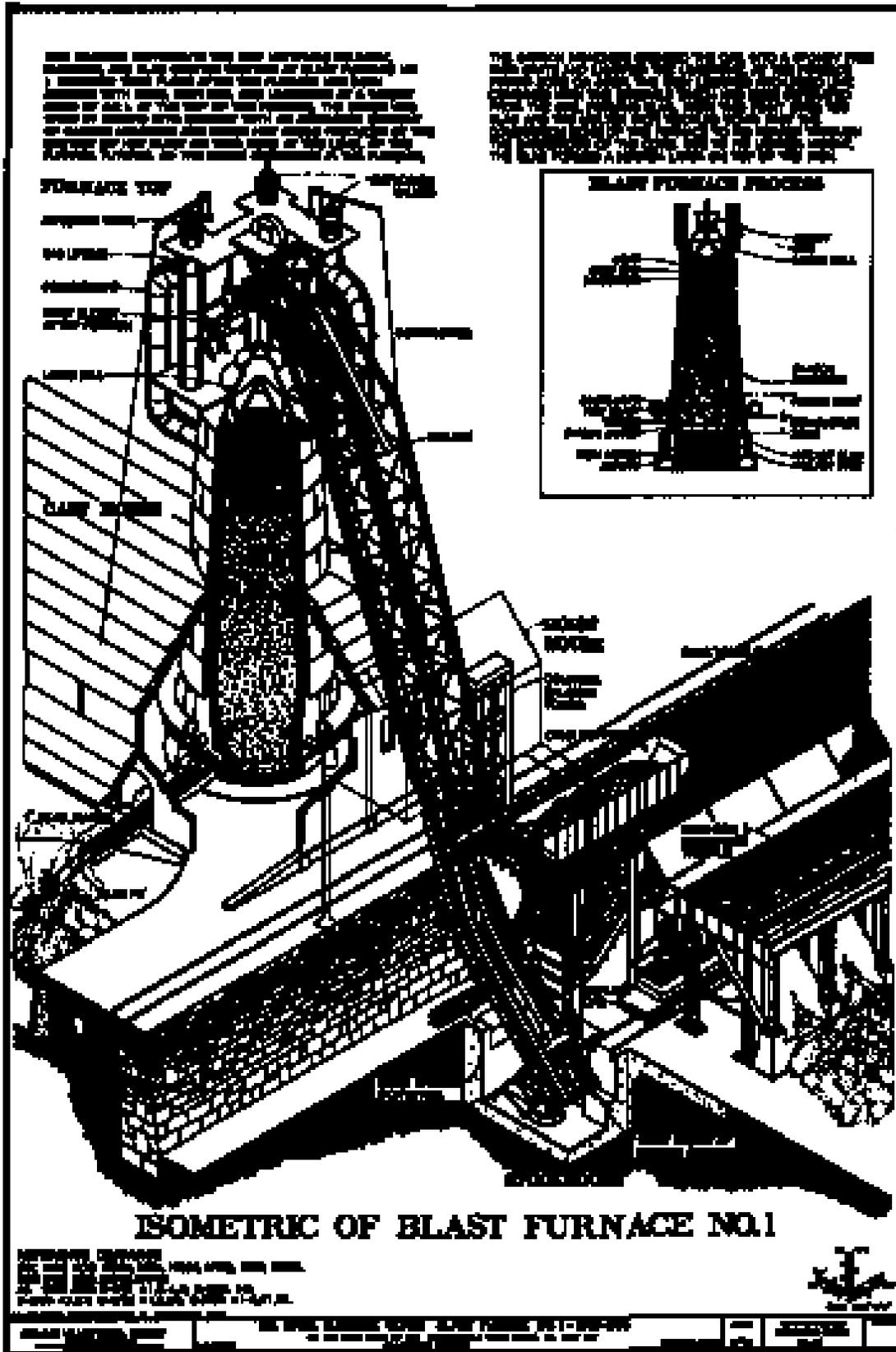
the Homestead and Edgar Thomson Works.⁵ Several state-of-the-art structural and plate mills as well as a modern armor forging plant were also installed at the

Homestead Works during the period.⁶ The 48" steam-driven universal plate mill, installed at Homestead in the late 1890s, is the only extant rolling mill from the era. Recently dismantled by the task force, it is being stored

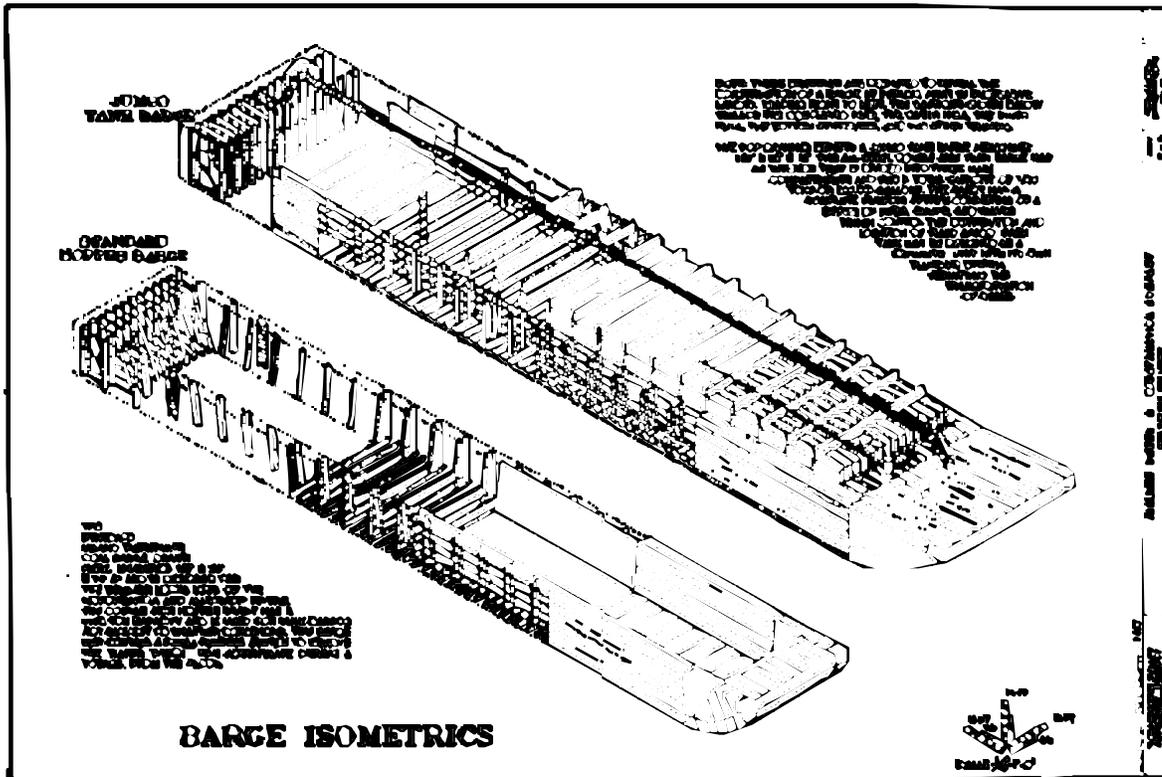
in preparation for reassembly at a future steel heritage center.

The company's success in mass production and marketing had important consequences for the development of labor-management relations and the overall character of the heavy ferrous metals production industry. The installation of automatic steelmaking equipment and scientific product testing methods completely undermined the skills which made the Amalgamated Iron and Steel Workers of America viable. Although union rollers staunchly defended their lodges at Homestead in the 1880s, their defeat during the great Homestead lock-out and strike of 1892 effectively vanquished craft unionism from the industry.⁷

Carnegie's financial success led the region's two largest wrought-iron producers, the National Tube Works Company in McKeesport and the Jones and Laughlin Company in Pittsburgh, into the exclusive production of steel goods.⁸ By 1900 the steel mills in Allegheny County alone produced nearly 40% of the entire nation's steel ingot output.⁹ After Carnegie Steel became the largest component of the United States Steel Corporation in 1901, it participated in the greatest single industrial expansion in American corporate history with the addition of four blast furnaces



Duquesne Blast Furnace No. 1, Duquesne, PA. Delineated by Christopher Marston, 1990, HAER.



Barge Isometrics, Hillman Barge & Construction Company, Brownsville, PA. Delineated by Jack Conviser, 1992, HAER.

(Carrie Nos. 6 and 7 and Duquesne Nos. 5 and 6), an open hearth steelmaking plant at Homestead and Duquesne, and several rolling mills at Duquesne and other local mills by 1910.¹⁰ In addition, several fully integrated steel mills were built by other companies in the district between 1890-1907.¹¹

A key element in the success of the region's leading steelmakers was their proximity to and control over the relatively narrow Connellsville and Klondike coal fields, known to contain the best metallurgical coking coal in the nation. This area not only served local needs but also those of other burgeoning steel districts in the Northeast and Midwest.¹²

Because of the many coal and coke facilities in the area, several important transportation companies were established to deliver their products. The Homestead Field Office has recently documented two of these, the Monongahela Railway and the Hillman Barge and Construction Company, both located in Brownsville, a part of the Klondike region.

The Monongahela Railway was incorporated in 1900 as a connecting line for the delivery of coal and coke to the trunk lines of the Pittsburgh and Lake Erie and Pennsylvania railroads. Between 1909-24, it built shops in South Brownsville to service its steam locomotives and cabooses. They included a roundhouse, erecting and machine shop, a car shop, a coal dock, and a sand house employing hundreds of skilled and unskilled workers.

The railway enjoyed great success during the first 30 years of its existence. Even after the local beehive coking industry gave way to the steel mill based by-product coking process after 1918, there continued to be a strong industrial and domestic demand for coal. Following World War II, however, public demands for cleaner

burning fuels led to the enactment of local clean air legislation, which led to a slackening demand for the region's coal resources. The railway's problem was compounded by its conversion to diesel from steam locomotive power in the early 1950s, thereby significantly reducing its own coal needs, and by competition from river-going transportation firms.

The conversion to diesel engines, which, unlike steam locomotives, were serviced by interchangeable instead of custom-made parts, signif-

icantly reduced the skilled workforce by altering the technology associated with repair work. Likewise, the introduction of unit-trains, which eliminated the local need to make up delivery trains, eliminated most unskilled jobs. Drastically reduced labor costs, however, did not save the company from decline until recently. Financially stable today, it has just merged into the Conrail system. Only the engine turntable and the erecting and machine shops remain from its historic steam locomotive period.¹³

The Hillman Barge and Construction Company was founded by John H. Hillman Jr. The head of a leading entrepreneurial family in the Pittsburgh District, he abandoned his failing coal and coke holdings in the Klondike region and, in the American tradition of patriarchal entrepreneurship, moved a portion of his transportation company into Brownsville from Dravosburg in 1938, partly to provide work to his unemployed miners and coke workers. Originally conceived as a repair facility, the operation grew into a construction firm for barges and towboats.

The company has employed three different production systems during its existence, following progressively from batch to continuous flow methods. At present, it turns out one barge per day by integrating modern automatic cutting and welding equipment with historic hand welding methods in a circuitous process flow system. The company, which recently merged into the Trinity Group, has generally flourished, with the exception of a near decade-long experience in the 1980s when the region's steel industry went into severe decline.¹⁴

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The Homestead Field Office has also documented an important early machine shop in the region. An increasing need in the early years of this century to service coal mining equipment led to a rapid expansion of the machine tools industry. One firm that was established partly for this purpose was W. A. Young & Sons Foundry and Machine Shop in Rices Landing. The foundry and belt-driven machine shop, established in 1901, served the needs of both individual customers and large mines in the area, never having more than a handful of operators throughout most of its existence. Inactive since 1969 and presently owned by the Greene County Historical Society, it remains in pristine condition.¹⁵

Finally, the field office has also documented the historic bridge over Dunlaps Creek in Brownsville. The Dunlaps Creek Bridge was built between 1836-39 as part of a Federal effort to repair the National Road. Designed and built under the supervision of Captain Richard Delafield of the Army Corps of Engineers, the bridge was the first cast-iron bridge in the country. Today, the 80' span arch bridge carries every form of modern vehicular traffic, 153 years after its construction.¹⁶

The historic steel, transportation, and machine tools industries are only part of the rich industrial legacy of the Monongahela River Valley. Through the ongoing sponsorship of the Steel Industry Heritage Corporation, the Homestead Field Office will continue to investigate and document the many significant industrial sites in the region.

¹ The study area encompasses all or parts of six counties in southwestern Pennsylvania. They are Allegheny, Beaver, Fayette, Greene, Washington, and Westmoreland counties.

² Lynne Snyder, "Overview History of the Edgar Thomson Works," forthcoming paper prepared for the HABS/HAER Homestead Field Office. Formal photography of the Edgar Thomson Works was done by John McWilliams.

³ Joel Sabadasz, "The Development of Modern Blast Furnace Practice: The Monongahela Valley Furnaces of the Carnegie Steel Company, 1872-1913," (Homestead, 1990), unpublished paper prepared for and in the possession of the HABS/HAER Homestead Field Office. Measured drawings of the Duquesne Blast Furnace Plant were produced by Christopher Marston, Matthew Severence, and Joanna Winarska. Formal photography of the Duquesne, Edgar Thomson, and Carrie Furnace Plants was done by Jet Lowe, John McWilliams and Martin Stupich.

⁴ Henry Huse Campbell. *The Manufacture and Properties of Iron and Steel* (New York, 1907): 470.

⁵ Joel Sabadasz, "Overview History of the Duquesne Works," (Homestead, 1991), unpublished paper prepared for and in the possession of the HABS/HAER Homestead Field Office. Formal photography of the Duquesne Works was done by Martin Stupich.

⁶ Mark M. Brown, "Technology and the Homestead Steel Works: 1879-1945," *Canal History and Technology Proceedings*, Vol. 11 (March 14, 1992). The author prepared the research and much of the writing for this essay at the Homestead Field Office while an employee of HABS/HAER. Measured drawings of Press Shop No. 1 at the Homestead Works were produced by Craig Strong, Christopher Marston, Camilla Schlyter, and Patrick Williams. Formal photography was done by Jet Lowe and Martin Stupich.

⁷ David Brody, *Steelworkers in America: The Non-Union Era* (New York, 1969): 56-58.

⁸ Michael E. Workman, "Overview History of the National Tube Works Company," forthcoming paper prepared for the HABS/HAER Homestead Field Office. Formal photography of the National Tube Works was done by Martin Stupich.

⁹ Ralph J. Watkins, editor. *Industrial DataBook for the Pittsburgh District* (Pittsburgh, 1936): 32.

¹⁰ Mark M. Brown, "Technology and the Homestead Works;" Joel Sabadasz, "Overview History of the Duquesne Works;" "The Steel Corporation's New Construction for 1907." *The Iron Age*, Vol. 78 (December 13, 1906): 1616.

¹¹ Kenneth Warren, *The American Steel Industry, 1850-1970: A Geographical Interpretation* (Oxford, 1973): 134-36.

¹² Bruce Bomberger, William Sisson, and Diane Reed, "Draft National Register Nomination for Iron and Steel Resources of Pennsylvania, 1716-1945."

¹³ David Jardini, "Overview History of the Monongahela Railway Company." Unpublished paper prepared for and in the possession of the HABS/HAER Homestead Field Office. Measured drawings of the Monongahela Railway's South Brownsville Shops were produced under the general direction of Christopher Marston by Mark Pierson, John Eberly, Dana Peak, and Eva Mollnitz. Formal photography was done by Jet Lowe.

¹⁴ Kathleen Hopkins, "Overview History of the Hillman Barge and Construction Company," (Homestead, 1992), unpublished paper prepared for and in the possession of the HABS/HAER Homestead Field Office. Measured drawings of the Hillman Barge and Construction Company were produced under the general direction of Christopher Marston by Alan Loud, Jack Conviser, Brian Chevchek, and Kirsi Heininen. Formal photography was done by Jet Lowe.

¹⁵ Frances Robb, Mark Brown, and Christopher Marston, "Overview History of the W. A. Young and Sons Foundry and Machine Shop," (Homestead, 1992), unpublished paper prepared for and in the possession of the HABS/HAER Homestead Field Office. Measured drawings of the foundry and machine shop were produced by Christopher Marston, Evelyn Green, Roderick Fluker, and Paula Palombo. Formal photography was done by Jet Lowe.

¹⁶ Frances Robb, "The History of the Dunlaps Creek Bridge" (Homestead, 1992), unpublished paper prepared for and in the possession of the HABS/HAER Homestead Field Office. Measured drawings of the Dunlaps Creek Bridge were produced by Christopher Marston, Dana Peak, and Brian Chevchek. Formal photography was done by Jet Lowe.

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