

WASHBURN'S LEGACY

How WPI-Company Connections Shaped Worcester's Industrial Expansion

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Interactive Qualifying Project
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ABSTRACT

This IQP examined the relationship between WPI, its alumni, and the industrial development of the city of Worcester. Through local sources and first-hand interviews, the history of a handful of companies that were heavily influenced by WPI graduates was examined. The development of Coghlin Electric, Riley Stoker, Heald Machine, Rockwood Sprinkler, Jamesbury, and others illustrate the strong and lasting relationship between the school and the city's industry. WPI significantly aided in the development of a uniquely diverse industrial city in central Massachusetts.

PREFACE

Industrial history has a well-documented literature for many of America's large cities. Industry propelled New York, Chicago, and Boston to their prominent standing in the national psyche. This is the story of a mid-sized city that developed against all odds within the shadow of Boston. With a sudden influx of technologies in the years before and after the Civil War, Worcester, Massachusetts, became a prime location for industry.

Without many advantageous natural assets, such as a seaport, Worcester developed as a direct result of three manmade conditions. Forty miles from any major port, the Blackstone Canal established a practical north-south axis of transportation during its twenty-year lifespan from 1828 to 1848. With the demise of the canal came the railroads, allowing even greater transportation of goods and people in and out of the landlocked town. Many small streams within Worcester's boundaries did not provide adequate hydropower. However, the invention of steam power allowed a limited water supply to be sufficient for industrial development. The most decisive factor in Worcester's growth, however, was the resolve and vision of the city's original settlers. They lobbied for internal transportation improvements, and some went so far as building factories equipped with power to encourage economic development.

With a focus on local history, and employing a historical methodology, this Interactive Qualifying Project documents Worcester Polytechnic Institute's significant role in the industrial development of the Heart of the Commonwealth. This intersection of society and technology resulted in transforming Worcester into an industrial power largely fueled by WPI.

Washburn's Legacy would not have been possible without the aid of many individuals. I thank Robyn Christensen and the Worcester Historical Museum staff, Joy Hennig and the Worcester Public Library staff, and Margaret Anderson and the WPI Archives Staff for assisting

in the research of the companies examined in this paper. Howard Freeman, Susan Mailman, James Heald II, and Professor Francis Hoy provided tremendous insights about the connections between WPI and local industry along with supporting facts. I am especially grateful to Professors James Hanlan and Kent Ljungquist for their guidance, support, and editorial wisdom throughout the project.

A CITY AND ITS INDUSTRY

It had been a half a century since the Pilgrims landed at Plymouth Rock, when Reverend John Eliot and Captain Daniel Gookin entered the Nipmuc village of Pakachoag in September, 1674.¹ They negotiated a deal with the Natives to purchase eight square miles of land for two coats, four yards of cloth, and a small sum of money, the total monetary value being around \$12.² Settlers first came to the village of Quinsigamond in the spring of 1675, but King Philip's War broke out within months, sending them fleeing back to the coast.³

By the spring of 1679, men met in Cambridge to encourage the resettlement of Quinsigamond. They resolved that the village should be resettled within the following year and should follow six provisions. One of the six stated that the plantation would be "for the better accommodation of trades-people." Four more years passed before the land was divided into 480 lots, twelve of which were reserved for mills and "useful trades."⁴ It was at this point that the name of the village changed from Quinsigamond to Worcester.⁵

During the second settlement, Captain John Wing came from Boston and built a saw and grist mill on the Mill Brook near the former Worcester Boys Club on the north side of Lincoln Square. Historians believe this to be the first mill in Worcester. Within fifteen years, Native hostility again forced most of the residents back to the coast.⁶

Finally, in 1713, Jonas Rice, who had been one of the inhabitants of the second settlement, returned and built a log cabin on Sagatabscot Hill, where Worcester Academy now

¹ Kenneth J. Moynihan, *A History of Worcester, 1674-1848* (Charleston: The History Press, 2007), 13.

² Mildred McClary Tymeson, *Worcester Centennial, 1848-1948: Historical Sketches of the Settlement, the Town, and the City. Worcester of 1948* (Worcester: Worcester Centennial, Inc., 1948), 1.

³ Moynihan, 21-30.

⁴ Charles G. Washburn, *Industrial Worcester* (Worcester: The Davis Press, 1917), 9.

⁵ Tymeson, *Worcester Centennial*, 3.

⁶ Washburn, 10.

stands. This marked the first permanent European settlement in Worcester. The town organized in 1722 and became Worcester County's Shire Town in 1731. The population of the new town paled in comparison to its neighbors, but Worcester took the new calling to heart.⁷

Over the next century, Worcester remained much of the same. A smaller town of a couple thousand residents, most Worcesterites were engaged in agricultural or small industrial and commercial firms. In the early nineteenth century, merchants in Providence, Rhode Island, began to discuss a canal that would begin in Worcester and empty into the Narragansett Bay, bypassing Boston. After many hurdles, the construction of the Blackstone Canal began in 1824 and was completed in 1828.⁸

Local historian Kenneth Moynihan wrote that "Worcester's established leaders were eager to encourage manufacturing in their midst."⁹ This was crucial to the town's success in the middle of Massachusetts. With the advent of the railroad, Worcester's trade shifted away from the canal. In 1831, the state of Massachusetts incorporated the Boston and Worcester Railroad. By the close of 1834, the railroad approached Worcester from the east. After bypassing Lake Quinsigamond to the south, the road entered Worcester and opened to the public on July 6, 1835.¹⁰ Worcester became a center of transportation over the following 25 years, linking it to all the major cities of New England. Population grew from 2,962 people in 1820 before the Blackstone Canal to 17,049 by 1850, a 475% increase.¹¹ As the populace grew and diversified, a culture unique to Worcester was created. Neighborhoods developed character and many cultural institutions were born, including the Lyceum and Mechanics Association. Worcester was also a

⁷ Tymeson, *Worcester Centennial*, 4.

⁸ Moynihan, 125.

⁹ Moynihan, 132.

¹⁰ Moynihan, 132-133.

¹¹ Moynihan, 136.

center of revolutionary ideas about reform. Temperance, abolition, women's rights, education, and patient care reform all saw early beginnings in the growing town.¹²

As the town grew following its establishment as a transportation hub, industry followed. Albert Southwick wrote that Worcester was a town and city of “tinkerer[s] and inventor[s].”¹³ Ichabod Washburn was the foremost industrialist during the antebellum period. He came from Kingston, Massachusetts, and apprenticed in the blacksmithing trade. In Worcester, he began manufacturing woolen machinery and lead pipe. Within a few years, he obtained a partner and they employed thirty men. Washburn discovered a way to efficiently draw wire and engaged Stephen Salisbury II, son of one of Worcester's first merchants, to construct a water-powered mill on Salisbury's property. Ichabod Washburn's wire company would become, and remain, the industrial keystone of Worcester for the next half century.¹⁴

On February 29, 1848, the state of Massachusetts granted Worcester a city charter. A mayor, board of aldermen, and city council were all elected early in the spring.¹⁵ During the first half century as a city, Worcester grew nearly 600% in population to well over 100,000 inhabitants.¹⁶ Population growth inspired immense industrial growth. It was during these five decades that hundreds of innovative and diverse businesses sprung up all over the city. Unlike other industrial cities, Worcester was not known for one specific product. Firearms, skates, valentines, corsets, sprinklers, boots, bonnets, and envelopes are just a sampling of the diversity in which Worcester's industrialists were involved.¹⁷ This diversity protected the city from many

¹² For a descriptive history of early cultural institutions in Worcester, see Moynihan, 137-153.

¹³ Albert B. Southwick, *More Once-Told Tales of Worcester County* (Worcester: Databooks, 1994), 15.

¹⁴ Moynihan, 136.

¹⁵ Tymeson, *Worcester Centennial*, 18.

¹⁶ Albert B. Southwick, *150 Years of Worcester: 1848-1998* (Worcester: Chandler House Press, 1998), 38.

¹⁷ Donald Tulloch, *Worcester, City of Prosperity* (Worcester: The Commonwealth Press, 1914), 57-59.

economic woes as it grew in the late nineteenth and early twentieth century. A constant supply of young mechanics was also needed.

LITERATURE REVIEW

Worcester, being the second largest city by population in New England, has an extensive number of published histories on various aspects of the city and its development. Charles Nutt's four-volume work, published in 1919, takes a comprehensive view of Worcester from its early foundations to the date of publication. Numerous other works published throughout the city's history offer varying degrees of detail on general history. Two definitive works, published within a few years of each other, account for the majority of general industrial history within the city of Worcester. These two volumes, by Charles G. Washburn and Donald Tulloch, are discussed further below. Additionally, many of the larger industrial firms in Worcester, including Norton Company, Morgan Construction Company, and others have published histories that principally focus on that one company's story. These works may be found within the bibliography.

INDUSTRIAL WORCESTER

“The introduction of steam-power, the opening of the Blackstone Canal and the railroads, have made it possible for a large manufacturing city to grow where otherwise no considerable progress could have been made...”¹⁸

- Charles G. Washburn

When Hamilton Hurd wrote a history of Worcester County in 1889, Charles G. Washburn, grandnephew to Ichabod, contributed a section on the “Manufacturing and Mechanical Industries of Worcester.” Nearly three decades later, Washburn expanded on his work in an in-depth history aptly entitled *Industrial Worcester*.

The first two chapters of the volume focus on very early industry in Worcester. The first mills and mining operations are briefly covered as well as early general business and manufacturing. Washburn claims that Worcester's industrial success was not natural, but

¹⁸ Washburn, 31.

synthetic. Stream privileges along Mill Brook and other waterways within the city were vitally important as steam power became more prevalent. Steam power, accompanied by transportation improvements beginning in the 1820s, allowed Worcester to begin its economic growth early in the nineteenth century.¹⁹ However, Washburn goes on and suggests the factory buildings that were constructed and outfitted with steam capabilities and supplementary amenities set Worcester apart from other New England towns. These mills decreased industrialists' initial risk because they did not have to pay for building construction.²⁰

The majority of *Industrial Worcester* thoroughly discusses the history of the different trades of Worcester. A chapter is devoted to textiles, while others focus on wire, shoes, and even sprinklers. These portions of the work act as an excellent source for information about the trades in question as well as facts about individual firms. Washburn also discusses the educational institutions of the city, including Worcester Tech, as WPI was then sometimes called. After giving a brief overview of the foundations of the school, he relates that “at one time or another...four hundred and sixty-one graduates of the Institute have been at work in the industrial field in Worcester.”²¹ A list of many of these graduates and the firms that employed them follows. The companies listed are:

Baker Box Co.	Washburn & Moen Mfg. Co.
Morgan Construction Co.	Wheelock Engine Co.
Norton Co.	Whitney Mfg. Co.
Reed & Prince Co.	Worcester Loom Co.
Riley Stoker Co.	Worcester Pressed Steel Co.
Rockwood Sprinkler Co.	Worcester Stamped Metal Co.
United States Envelope Co.	Wyman-Gordon Co.

¹⁹ Washburn, 31.

²⁰ Washburn, 292.

²¹ Washburn, 308.

Washburn's work provides the significant background information on what made Worcester industry thrive as well as focusing on individual trades and firms. He, however, was a member of the industrial elite and may have written with a bias toward his family's trade (i.e. wire) and toward Worcester industry in general. The early publication date of this work also provides some limitations. Any post-Great War industrial history is absent from the work.

WORCESTER, CITY OF PROSPERITY

“Worcester is a unique city. There isn't anything just like it in the Western Hemisphere.”²²
- Donald Tulloch

In anticipation of the sixteenth annual convention of the National Metal Trades Association, Donald Tulloch penned his work *Worcester, City of Prosperity* in 1914 for metal tradesman visiting the convention. The association held the convention at the newly completed Bancroft Hotel in Worcester between April 20 and 22. Tulloch made it his duty to woo every single businessman that descended upon the Heart of the Commonwealth.

After a brief history of the City of Worcester, Tulloch begins his exposition on the many trades of Worcester in no certain order. For two pages, he lists “some kinds of machinery and specialties made in Worcester,” from lathes to horse clipping machines to piano hardware.²³ Due to the wide diversity in the industrial output of the city, it was partially insulated from the economic woes of the nineteenth and early twentieth centuries.²⁴ When one trade collapsed, there were hundreds of stable and emerging trades.

According to Tulloch, Worcester Academy sent “more of its students to the Worcester Polytechnic Institute than any other single school or college.”²⁵ In turn, many WPI graduates became involved in Worcester businesses. Tulloch states that, at the time of publication, 72

²² Tulloch, 15.

²³ Tulloch, 57-59.

²⁴ Tulloch, 41.

²⁵ Tulloch, 181.

graduates were “either owners, part owners, or occupying executive positions in connection with shops of the National Metal Trades Association.”²⁶ For the purpose of this report, the graduates in leadership roles in Worcester industries have been excerpted and are as follows:

Armour's Pattern Shop	James W. Armour, William W. Armour
Baldwin Chain & Manufacturing Co.	William F. Cole
Eastern Bridge & Structural Co.	George S. Holden, George F. Martin, Edward H. Moore
Economic Machinery Co.	H. M. Carleton
Harrington & Richardson Arms Co.	Ephraim Currier
Heald Machine Co.	Waldo J. Guild, James N. Heald, C. W. Phillips, George G. Whitney
Hobbs Manufacturing Co.	Eugene A. Copeland
Leland-Gifford Co.	William T. Donath, Albert J. Gifford, Subbo Nikiloff, H. P. Sawtell, C. W. Taft
Morgan Construction Co.	Victor E. Edwards, Paul B. Morgan, Theodore H. Nye
Norton Co.	Edwin G. Chaffin, Charles E. Gillett, Aldus C. Higgins, Norman F. Holter, R. Sanford Riley
Norton Grinding Co.	Albert G. Belden, Howard P. Chace, Paul R. Crooker, Fred W. Eastman, Harry N. Harding, Roger B. Hubbell, W. C. Searle, Clayton O. Smith, John C. Spence
Reed-Prentice Co.	Waldo L. Sherman
Stewart Boiler Works	Stanley P. Stewart
The Wire Goods Co.	Charles G. Washburn
Woodward & Powell Planer Co.	Edward M. Woodward Jr.
Worcester Pressed Steel Co.	John W. Higgins
Worcester Trade School	Elmer H. Fish
Wyman & Gordon Co.	Lyman F. Gordon, George S. McFarland

Early benefactors and instructors such as Ichabod Washburn, George Alden, and Milton Higgins are also discussed throughout the work.

Tulloch adopts an overly promotional tone similar to that of a representative of a local chamber of commerce. He writes to emphasize the best attributes of the city: its transportation system, its factories, and most of all its diversity. Due to the relatively early publication date of this work, there is a large portion of Worcester industrial history that is not covered. These two considerations must be taken into account when citing Tulloch’s work.

²⁶ Tulloch, 157-161.

PROCEDURE

This project consisted of a variety of research procedures including literature review, library research focusing heavily on primary sources, and oral history interviews with individuals with information to contribute about Tech's relationship with local industry.

LITERATURE REVIEW

Much of the background research on the history of Worcester, WPI, and some large Worcester firms has been published over the past 150 years. This material was used to convey the uniqueness of the Heart of the Commonwealth and set a stage for the case studies. Major titles cited include Washburn's *Industrial Worcester* (1917), Tulloch's *Worcester: City of Prosperity* (1914), and Tymeson's *Two Towers: The Story of Worcester Tech, 1865-1965* (1965).

SIGNIFICANT REPOSITORIES

The research performed on specific Worcester firms was conducted primarily at the Worcester Historical Museum Research Library, the Worcester Public Library Local History & Genealogy Collection, and the Worcester Polytechnic Institute Archives & Special Collections.

The Worcester Historical Museum Library, located at 30 Elm Street, in Worcester contains over 7,000 published titles, 400,000 photographic images, and 4,000 linear feet of non-published material, including personal papers, business and industrial records, and a newspaper-clipping file. The library is open Wednesday thru Saturday from 10:00 a.m. to 4:00 p.m. for a fee of \$5 per day or at no cost to members of the museum. Researchers are asked to email the librarian, Robyn Christensen, at robynchristensen@worcesterhistory.net two to three days prior

to a visit so that material may be available at the time of visit. Only a pencil and pad of paper are allowed within the library. All other belongings must be left in a locker in the lobby.²⁷

The Worcester Public Library Local History & Genealogy Collection is located on the third floor of the main library branch at 3 Salem Square in Worcester. The collection contains thousands of published volumes on local history; city directories, maps, and newspapers; and a large newspaper clipping file containing articles from the *Worcester Telegram*, the *Worcester Evening Gazette*, and the *Worcester Telegram & Gazette* from 1960 to present. The files are organized by topic and are fully accessible to the public. Joy Hennig is the librarian and can be reached at jhennig@worcpublin.org. The main library branch is open from 9:00 a.m. to 9:00 p.m. on Tuesdays and Wednesdays, and 9:00 a.m. to 5:30 p.m. Thursday thru Saturday.²⁸

The Worcester Polytechnic Institute Archives & Special Collections is located on the ground floor of the George C. Gordon Library located at 100 Institute Road in Worcester. The archives contain a vast amount of material, both published and unpublished, relating to the University, notable alumni, and some Worcester firms. The papers of Woodbury and Company and the Morgan Construction Company are accessible to visitors as well as manuscripts written by faculty and alumni of WPI. Yearbooks and alumni registers were the primary resource used for this project. The Archives is open 10:00 a.m. to 4:00 p.m. Tuesday thru Friday. Appointments made through the archivist, Margaret Anderson, at archives@wpi.edu are encouraged to ensure access to material.²⁹

²⁷ Worcester Historical Museum, "Research at Worcester Historical Museum," *Research*, <http://www.worcesterhistory.org/whm/research.cfm> (accessed 09 Sep 2012).

²⁸ Worcester Historical Museum, "Genealogy Resources," *Local History & Genealogy*, <http://www.worcpublib.org/resources/genealogy.htm> (accessed 09 Sep 2012).

²⁹ Worcester Polytechnic Institute, "Archives & Special Collections," *George C. Gordon Library*, <http://www.wpi.edu/academics/library/collections.html> (accessed 09 Sep 2012).

ORAL HISTORY INTERVIEWS

In addition to the research conducted at the aforementioned institutions, oral history interviews were conducted with individuals knowledgeable about WPI's relationship with Worcester industry to provide a new or unique facet to the insider's view of the history. After contacting the individuals, a general outline of what topics to be covered during the interview was created. A series of open-ended questions that functioned as conversation starters were drafted for use during the interview when needed. Some topics discussed included personalities and nuances of the company and its employees, strategic visions, labor relations, turning points within the company, technological changes, and even company failures. The interviews, when possible, were recorded and transcribed. These recordings will be archived at the WPI Archives for use by future researchers.

SCHEDULE

The background research and proposal for this project was conducted during the first term of the 2012-13 academic year. The following term consisted of original primary-resource research conducted at the significant repositories. During the spring semester, interviews were conducted and initial composition began. The final term of the project was primarily writing and final editing.

AN EDUCATION FOR INDUSTRY

Antebellum Worcester had begun to take on an industrial nature. Ichabod Washburn's wire manufactory was, without question, the city's preeminent firm. Washburn located in Worcester in 1820 and began manufacturing woolen machinery with various partners. By 1831, he had begun to work on innovations for drawing wire. Stephen Salisbury II constructed a factory in 1834 for Washburn's wire works along what is now Grove Street. The Mill Brook, which ran alongside the site, was dammed to provide waterpower. In the process, Salisbury Pond was created. Ichabod's brother Charles joined him in the wire business in 1835, and the company remained a family-based firm for many years into the late-nineteenth century.³⁰

As his industry grew, Ichabod Washburn found the need for educated mechanics. In 1841, a meeting was held to discuss the formation of a mechanics association with Washburn as chairman. The Worcester Mechanics Association formed shortly after the initial meeting with the mission for "the moral, intellectual and social improvement of its members, the perfection of the mechanic arts and the pecuniary assistance of the needy."³¹ Washburn heartily supported the group. After five years of discussion about building a hall for the Association, Washburn offered to give \$10,000 towards the effort. Ground was broken in 1855. The building was completed two years later at a cost of \$162,000, nearly 100 percent over budget. The Association plunged into bankruptcy and lost their newly completed hall to the bank. Washburn, like many other wealthy Worcesterites, agreed to take on a portion of the \$104,000 debt.³² Without a doubt, he established an invested stake in the success of the Mechanics Association. The success of the

³⁰ Washburn, 143-145.

³¹ Washburn, 301.

³² Albert B. Southwick, *Once-Told Tales of Worcester County* (Worcester: Databooks, 1994), 63-66.

group would lead to a supply of educated mechanics that he needed at his wire plant and upon which other city industries could also draw.

Shortly after the Mechanics Association organized, Washburn began to dream of a school that the Association could work with to teach the science behind mechanics. He discussed his idea with Rev. Dr. Seth Sweetser. Local industrialists would fund the school. The combination of science from the school and practical knowledge from the Mechanics Association would create intelligent young mechanics to work for the school's founders. The Panic of 1857, however, dashed Washburn's dreams of an industrial school.³³

Eight years after the panic, an aging tin manufacturer from Templeton, Massachusetts entrusted his former partner, David Whitcomb, with \$100,000 to use as an endowment for an industrial school in Worcester to educate young mechanics on the science behind their trade. John Boynton, the donor, required that the people of Worcester provide the land and buildings for the school. One month after General Lee surrendered his Army of Northern Virginia at Appomattox Court House, the Worcester County Free Institute of Industrial Science was incorporated.³⁴ The Washburn & Moen Manufacturing Co., as it had evolved into, had grown to be the largest wire producer in the world. Ichabod Washburn was taken aback by Boynton's proposal. He had planned to create a school in his likeness but life had intervened. He had now lost the opportunity. After much thought, Washburn agreed to support the new school. He would build and outfit a machine shop to educate students in the practice of mechanics.³⁵

Construction ensued and the Institute was dedicated on a rainy day in November, 1868. In describing the school, speakers shied from speaking of the nature of the education. The

³³ Washburn, 306.

³⁴ Washburn, 305.

³⁵ Mildred McClary Tymeson, *Two Towers: The Story of Worcester Tech, 1865-1965* (Barre, MA: Barre Publishers, 1965), 15-16.

Institute would be a combination of a scientific and a trade school. All schools of this nature had failed in the past.³⁶ For the time, this was a risky experiment to say the least. Washburn had suffered a paralyzing stroke earlier in the year and was not able to attend the dedication. Charles Hill Morgan, whom Washburn hired in 1864 to be superintendent of his wire mill, was put in charge of supervising the construction of Washburn's machine shop and the installation of the machinery. Morgan also sought out a director for the shops. Milton Prince Higgins was chosen for the position and would work at the mill and teach mechanical drawing for the Mechanics Association until the machine shop was completed. Morgan and Higgins spent much time with Washburn during his waning days and grew to truly understand his dreams for the school.³⁷ On 30 December 1868, Ichabod Washburn rode by the completed Washburn Shops in his carriage. That evening, he turned to his brother and said, "It's all right," and passed away. A descendant of Charles Hill Morgan wrote that Washburn "had seen his dream a reality and had found younger hands to carry it out."³⁸

Unknowingly, Washburn had already recruited two future Worcester industrialists before he passed away. Charles Hill Morgan and his descendants went on to found and play an instrumental role in numerous Worcester companies, including Morgan Construction, Morgan Spring, and Heald Machine. Milton Prince Higgins and his family founded companies such as Norton, Worcester Pressed Steel, and Riley Stoker. George Ira Alden and other early professors at the Institute would follow their predecessors into Worcester industry. Similarly, students of the Worcester County Free Institute of Industrial Science, later Worcester Polytechnic Institute,

³⁶ Washburn, 308.

³⁷ Morgan Construction Company, *Morgan Milestones: From Worcester to the World* (Worcester: Morgan Construction Co., 1988), 4.

³⁸ Morgan Construction Company, 5.

followed the lead of their teachers into a growing industrial world. Nearly 500 graduates of Tech had gone to work in Worcester industry by 1917.³⁹

Coinciding with the changing landscape of the northeast following the Civil War, Worcester began to industrialize at an ever-increasing rate following the founding of WPI. The diversity and abundance of industrial firms was unmatched. Worcester would not have had this opportunity if it were not for the early industrialists who sought an educated workforce. They not only accomplished their goal but also created an ever-increasing network of supporters for their legacy. A walk through the campus started by Boynton and Washburn reads as a directory of the graduates and industrial giants of Worcester. The relationship between Worcester Polytechnic Institute and its students is forged in the educational years and remains for a lifetime.

A comprehensive study of all Worcester firms founded or influenced by WPI graduates is a mammoth task. This paper looks at a sampling of those firms that accentuate the evolving and lasting relationship between students and their alma mater.

³⁹ Washburn, 308.

COGHLIN ELECTRIC COMPANY

Ten years before Joseph Swan and Thomas Edison successfully created a practical incandescent electric light, a boy was born to James Joseph Coghlin and Catherine A. Taft in Milford, Massachusetts. The couple had a child, James, two years earlier, but he did not live to see the birth of his younger brother, John Patrick, in 1869. James J. Coghlin had emigrated from Ireland during the late 1850s, and settled with his parents and siblings in Milford. He, like many in the town, was a boot maker. In 1866, he married Catherine A. Taft who was born in England to Irish parents. She came with her parents, grandparents, and older sister to Framingham when a young girl. James and Catherine had ten children who lived to maturity and John Patrick was the eldest.⁴⁰

J. P., as he is commonly referred to, had a strong desire to succeed and make money. He was fixated with new inventions, especially anything electrical.⁴¹ After graduating from Southborough High School in 1888, J. P. attended Worcester Academy for a year to take preparatory classes before entering Worcester Polytechnic Institute.⁴² The ambitious young Coghlin took advantage of the WPI shop system under the supervision of Milton Prince Higgins. Since its founding by Ichabod Washburn, the Washburn Shops at the institute allowed students to gain first hand practical knowledge about manufacturing while simultaneously turning a profit.⁴³ J. P. spent his time building electric motors and generators for about \$50 apiece. He then would sell them for \$200, earning a profit to help pay for his education. One of his creations was celebrated for yielding the greatest output per pound of any contemporary motor.

⁴⁰ LaVerne Dickinson, *The Coghlin Story, 1885-1985* (Worcester, MA: The Heffernan Press, 1985), 1 and various Massachusetts Vital Records and United States Federal Censuses.

⁴¹ Dickinson, 1-2.

⁴² Charles Nutt, "John P. Coghlin," in *History of Worcester and its People* (New York: Lewis Historical Publishing Company, 1919), 4:868.

⁴³ Profit making at the shops was discontinued in 1896. The educational activity was continued until 1955.

Coghlin wrote his thesis on “Intermediate Speed Regulators” and the advantages of utilizing them in mills. He graduated in 1893, the class famous for adopting a goat as a mascot, with a Bachelor of Science degree in Mechanical Engineering.⁴⁴

After graduation, J. P. formed a partnership with Frank E. Gilbert and Ervin W. Howard, both WPI alumni themselves, to manufacture electric motors and generators under the name Columbia Electric Co.⁴⁵ The firm became well known for its “Columbia Dynamo” due to its efficiency, economy, and reliability. They installed large generation plants to light buildings in central Massachusetts and soon became the largest electrical concern in the area. The business, though, was not as profitable as J. P. desired. He sold his share of the company to Gilbert in 1897 and formed the Central Electric Co. to focus on supplying electrical equipment and installing electric plants.⁴⁶

Later that same year, Coghlin purchased Page Electric Co. from its founder Charles Henry Page. Page had moved to Worcester from western New York a quarter century earlier. After a variety of jobs, he founded one of the first electrical construction concerns in the city in 1885. Page had various partners over the years and conducted business under several names. By the time J. P. bought the company, it was known as Page Electric Co.⁴⁷ He merged Central Electric and Page Electric into one concern and incorporated the business as Page Electric Co. on June 18, 1897. The company was largely owned by J. P. who was also its president, treasurer, and secretary. His younger brother, Peter A., graduated from WPI that year and became the

⁴⁴ Dickinson, 6-7. The goat was eventually adopted as WPI’s mascot. Gompei Kuwada of the class of ’93 had acted as the goat keeper in 1891. His name became synonymous with the goat itself.

⁴⁵ “Coghlin Rites On Wednesday,” *Worcester Evening Gazette*, 29 Apr 2009.

⁴⁶ Dickinson, 10.

⁴⁷ Charles Nutt, “Charles Henry Page,” in *History of Worcester and its People* (New York: Lewis Historical Publishing Company, 1919), 4:727.

superintendent of the business.⁴⁸ During the first year of business, Page employed around a dozen men and did a total of \$10,000 in business.⁴⁹ All aspects of the company operated out of a small store at 24 Pearl Street. Lillian Quinn, the store's bookkeeper, thought it was "the darkest and coldest office in the world."⁵⁰ They remained there for the next decade.

At first, there were many small jobs for the company. J. P. would take any job he could whether it was electrical work or pouring concrete. Page Electric first electrified several mills along the Blackstone River. In 1900, the company received its first large contract. Henry Perky had recently invented Shredded Wheat biscuits and was manufacturing them in Worcester. The demand for the new cereal forced the National Food Co. to make plans to build a new plant at Niagara Falls, New York. One of J. P.'s professors at WPI, George Ira Alden, was a strong proponent of the product and a significant investor in the company. When it came time to let the \$200,000 electrical contract for the new plant, he suggested Page Electric. J. P. acted as the electrical engineer and personally supervised all electrical and equipment installation in New York.⁵¹

The following year, the Worcester & Southbridge Street Railway contracted Page Electric for electrical and mechanical engineering services, amounting to \$500,000, to build the first high-tension electric railway in New England.⁵² J. P. hired Clarence W. Kinney, a member of the WPI Class of 1899, as an assistant after making preliminary investigations of the route. Engines, boilers, high-voltage insulators, and a massive power plant to power 200 miles of roadway all had to be designed with little precedent. The contract for installing the overhead

⁴⁸ Ellery Bicknell Crane, "John P. Coghlin," in *Historic Homes and Institutions and Genealogical and Personal Memoirs of Worcester County Massachusetts* (New York: The Lewis Publishing Company, 1907), 26.

⁴⁹ Nutt, "Coghlin," 4:868.

⁵⁰ Dickinson, 11-12.

⁵¹ Dickinson, 14-17. For more on the Nation Food plant, see Crane, "John P. Coghlin," 27.

⁵² Crane, "John P. Coghlin," 26-27.

lines was also let to Page Electric, which posed an interesting situation in which J. P. had to supervise himself. From his experiences on the job, J. P. wrote a thesis on the real-world education offered throughout the project dealing with stockholders, contractors, and highly challenging designs. On this basis, he received his degree in Electrical Engineering from WPI in 1905.⁵³

As the company began to gain a reputation, it was selected for numerous jobs all over the northeast. The city of Worcester is dotted with hundreds of buildings that were electrified by J. P. Coghlin, including buildings at Norton Co., Morgan Construction Co., and Heald Machine Co., all companies founded by fellow WPI alumni. He even worked on buildings at the school itself.⁵⁴ In 1902, the company expanded to include a jobbing department with many salesmen who traveled all over New England, much like the peddlers of the past. It was the only firm of its type outside of Boston or Providence.⁵⁵

J. P. had a knack for adding and dropping businesses at the right time. He was not afraid to venture into a new field, but was quick to drop any aspect of the business when it became less profitable. Following his love for new inventions, J. P. became attracted to the automobile. When electric cars were the rage, he expanded the business to include them.⁵⁶ He was a founding member and president of the Worcester Automobile Club. Under his presidency, the club organized six successive “Dead Horse Hill Climbs” from 1905 until 1911. Starting at the foot of Dead Horse Hill on Stafford Street in Worcester, automobiles of the age raced up the hill

⁵³ Dickinson, 18-25.

⁵⁴ Evelyn Herwitz, “Worcester’s Ted and Jim Coghlin Guide Family Enterprises Into Second Century,” *Business Digest*, April 1985, 3-9.

⁵⁵ Nutt, “John P. Coghlin,” 4:868.

⁵⁶ Dickinson, 1.

towards the Leicester town line. The course was a mile long, but climbed nearly 850 feet. J. P. was presented a golden watch fob by the Club for all of the work he had done for them.⁵⁷

The tenth anniversary of Page Electric Co. was a milestone year. After spending a decade in the “hole in the wall” store at 24 Pearl Street, the company removed to larger quarters at 234 Main Street. Coghlin had built a reputation for his name over the past ten years, so J. P. decided to change the name of Page Electric Co. to Coghlin Electric Co. A telephone switchboard was added to meet increased business and a new electrical fixture department was created.⁵⁸ The company moved again in 1911 to 259 Main Street. Electrical appliances were added to the store’s growing list of departments in 1913, followed by a furniture department two years later.⁵⁹

John P. Coghlin had earned himself an astounding reputation by the time he attended the New England Electric Contractors’ Convention in Springfield in 1915. He had become the authority on electrical contracting, often speaking and writing on the topic. At the fall conference, he delivered a paper entitled “How to Estimate Cost and Keep Accounts.”⁶⁰ J. P. had found, throughout his career, that bids often varied tremendously due to lack of proper cost accounting. He believed labor costs were one of the biggest areas for improvement. Contractors typically spent much time on material costs, but only a few minutes estimating the amount of work hours for a job. If workers turned in detailed time slips for every job, it would aid in determining labor costs for future jobs. Meticulous inventories also helped to save money.⁶¹

⁵⁷ Dickinson, 28-30.

⁵⁸ Dickinson, 13.

⁵⁹ Dickinson, 31.

⁶⁰ Nutt, “John P. Coghlin,” 4:868.

⁶¹ Dickinson, 32-35.

The response was phenomenal. J. P. required two stenographers for some time just to answer letters about the paper.⁶²

The following year, Peter A. Coghlin left the company, after nearly 20 years with his brother, and opened the Economy Electric Co. on Foster Street. The firm was to focus on electrical engineering construction and supplies.⁶³ All of J. P.'s brothers and a couple of his sisters worked at Coghlin Electric at one time or another. He wanted to help them along in whatever way he could. Peter was not the only one to leave and establish a competing business in Worcester. Charles and Edward formed the Coghlin & Wilson Electric Co. Charles eventually went to California, and Edward to Boston. J. P.'s youngest brother, James, worked for him for some time and then removed to Boston, remaining in the electrical business.⁶⁴ The Coghlin's, with the guidance of J. P., had become a family of electrical contractors.

As J. P.'s brothers left to blaze their own paths, Coghlin Electric was not without other Coghlin's for long. His eldest son, John William, graduated from WPI in 1919 with a degree in Mechanical Engineering. John was born and raised in Worcester. He graduated from South High and then enrolled at his father's alma mater. John was a "happy-go-lucky" boy who was loved by all at "Tech." He joined his father after his commencement. While John was receiving his diploma at WPI, his younger brother, Edwin Bernard or simply "Ted," was graduating from South High. Four years later, he received his Mechanical Engineering Degree from what was becoming the school of the Coghlin's. Ted was involved in a long list of activities while in college.⁶⁵ Three days after graduation, he joined the Coghlin Electric team.⁶⁶ By 1924, John

⁶² Nutt, "John P. Coghlin," 4:868.

⁶³ "Alumni Notes," *The Journal of the Worcester Polytechnic Institute* 20, no. 1 (Nov 1916): 67.

⁶⁴ Dickinson, 39.

⁶⁵ Dickinson, 40.

⁶⁶ "Edwin B. Coghlin Sr., 79, Civic Leader, Businessman," *Worcester Evening Gazette*, 21 Dec 1981.

was assistant treasurer and manager of the contracting department while Ted was secretary and assistant manager.⁶⁷

New blood was not the only thing new at Coghlin as the '20s dawned. The demand for electrification of private homes began to skyrocket. James Duffy Sr., who joined Coghlin as an electrician in 1920, remembered that, "back in those days, you got a bunch of chains, a bunch of sockets and made homemade fixtures when you wired a house." The small private jobs always kept a few electricians busy. In 1925, the company began carrying General Electric appliances at their Main Street store and offered them for wholesale all across New England.⁶⁸ Another move was necessitated in 1926 when a new theater was proposed at the corner of Main and Central that would cause the removal of the store at 259 Main Street.⁶⁹ Relief of getting away from the rats that plagued the store outweighed the sentimental sadness. James Duffy Sr. recalled that the rats used to eat rubber-covered wire in the basement where the janitor used a .22 to "pick off the rats." Lillian Quinn remembered one afternoon "a rat became real ambitious and jumped from the balcony to the floor of the office."⁷⁰

The new store at 280 Main Street was rat-free and much larger. It only contained the retail store, however. All contracting and wholesale business took place in a building at 30 Exchange Street. The retail store was outfitted with electrical fixtures and appliances displayed in their proper settings, created with furniture.⁷¹ Splitting of the two branches of the company geographically eventually led to the legal split in 1927. Coghlin's Inc. was formed on May 13, 1927. The new business would specifically deal with electrical contracting and the retail aspects

⁶⁷ "Main Street Block Is Sold," Clipping from Worcester Historical Museum, 05 Jan 1924.

⁶⁸ Dickinson, 37-38.

⁶⁹ "Coghlin Electric Co. To Move Next Month," Clipping from Worcester Historical Museum, 05 Sep 1926. This is now the site of The Palladium theater.

⁷⁰ Dickinson, 36.

⁷¹ Dickinson, 37.

of the business. Coghlin Electric Co. continued as the wholesale electrical supply business. J. P. was president-treasurer of both.⁷²

Three years after opening the new retail store on Main Street, it fell prey to the Eden Street Fire of November, 1929. By the following April, they had extensively remodeled and opened the “Treasure Chest Shop” outfitted with many gifts and furnishings from all over the world. The store had a room dedicated solely to lampshades of every size and texture. It was the second of its kind known to exist. There was even a department for “sensible and serviceable bridge prizes.” In celebration of the grand opening on April 7, 1930, there was a special pottery display with pieces ranging from \$15 to \$500. The “Treasure Chest” was designed to “present an opportunity for the women and men of the city to browse about enjoying its countless objects.”⁷³ On September 8, 1930, Coghlin’s Inc. opened a new refrigerator store next to the “Treasure Chest.” They carried General Electric units for apartments, houses, and commercial uses. To celebrate, the store offered lectures on home economics.⁷⁴

The Depression did come to Worcester, however. By 1932, a quarter of the city’s workforce was unemployed. At its worst point, Coghlin’s employment dropped to 10 from about 70 in the mid-1920s. George Moore was the only worker at the retail store. The company dipped into the red for a brief time, and J. P. considered closing. He had Ted work as a bill collector. J. P. offered stock to employees when he could not pay them. A large contract from State Mutual Life Assurance Company helped the company get through the worst years and, by 1934, the Coghlin companies were back in the black.⁷⁵

⁷² Dickinson, 41.

⁷³ “Coghlin Store To Open Monday,” *Worcester Telegram*, 06 Apr 1930.

⁷⁴ “New Refrigerator Store Is Opened,” *Worcester Evening Gazette*, 08 Sep 1930.

⁷⁵ Dickinson, 43-44. A 1926 article is cited on page 37 that reported an average of 70 employees working for the company.

Growth of electrical refrigeration and air conditioning led the company to even more growth over the next couple of years. In 1936, Coughlin's retail store purchased a five-story building at 244 Main Street and planned to move in early in 1937. Gift merchandise of every variety was displayed on the ground floor while the second floor was outfitted with all major appliances and soundproof rooms in which radios could be tested. Upper floors contained furnishings and endless lighting fixtures and lampshades.⁷⁶

John Patrick Coughlin rose on April 28, 1940 and readied for church. He and his family arrived at St. Peter's Church in time for the 11 o'clock mass. During the service, J. P. collapsed. The Reverend administered his final rights and, by the time an ambulance arrived, J. P.'s 70 years had come to an end. The young boy born to immigrant parents who dreamt of building dynamos and making money while doing it, had accomplished his goals beyond what he could have ever imagined. The company that he started in 1897 with an annual volume of \$10,000 grew to \$1,000,000 in annual volume by his death.⁷⁷ Working his way through "Tech," J. P. set himself up for a long and prestigious career in the new electrical contracting field. In his field, he established himself as the premier contractor in New England. His reputation assured future success of the businesses that bore his name and his enthusiasm for new inventions and progress always kept them relevant. In addition to two successful companies, J. P. left a much greater legacy to his family and employees. Hard work, ingenuity, and aggressive actions in business guaranteed success. He was the definition of a tinker and mechanic in the city of tinkerers and mechanics. His dedication to that city ensured that he would not be forgotten.

When J. P. passed, he did not leave a master plan for the companies, but he had decided who would run them. John W. would become president of Coughlin Electric Co. and treasurer of

⁷⁶ Dickinson, 44-47.

⁷⁷ "John P. Coughlin, Business And Civic Leader, Dies," *Worcester Telegram*, 29 Apr 1940.

Coghlin's Inc. Ted would hold the opposite roles: president of Coghlin's Inc. and treasurer of Coghlin Electric Co.⁷⁸ The brothers were completely different people, but they worked fabulously together. During their decades as presidents of the Coghlin companies, they shared an office with desks that faced each other.⁷⁹

The Coghlin companies were poised for great success as the 1940s dawned. Having thoroughly recovered from the Depression, John and Ted bought back the stock that had been issued to employees in the years of red ink. When the United States entered World War II, what the future had in store was questionable. Gasoline was to be rationed, copper wire fell under the government's supervision, and many employees would be taken away to fight in Europe. The War required great changes at the Coghlin companies, but the changes came with great success.⁸⁰

Worcester companies were asked to increase their output as part of the war effort and Coghlin stepped in to facilitate their growth. The contracting division grew to employ over 125 workers. Planning and cooperation, though, became more important with rationing. Coghlin electricians were assigned "C" gasoline stickers that signified they were essential to the war effort. This allowed them to get gasoline in order to pick up supplies and deliver them to job sites. One employee had his "C" sticker rescinded for cruising Main Street for girls. Ted would often check in at job sites and, when he did, he would load up his Hudson Teraplane with supplies and a handful of his children. Nothing was left to waste.⁸¹

As men picked up arms and left Worcester – 42 employees served in total – women took their places at the retail store. For the first time in many years, Worcester families had disposable income, some of which made its way to the Coghlin coffers. The company also took

⁷⁸ "Coghlin's Marks Century," *Worcester Telegram*, 27 Mar 1985.

⁷⁹ Dickinson, 41.

⁸⁰ Dickinson, 55.

⁸¹ Dickinson, 55.

time to give back. Ted led a war bond drive as chairman of the Worcester Merchants War Campaigns Committee. The War had given much to Coghlin, and they returned the favor.⁸²

The economic boom that followed World War II maintained the growth started a few years earlier. Coghlin worked with Roger Heald of Heald Machine Co. to improve morale at the company with an all-new lighting system. Morgan Construction Co. also contracted Coghlin to improve the electrical systems at their rolling mill factories. While John was on vacation in 1946, Ted decided to purchase a new building for Coghlin Electric at 155 Summer Street as the wholesale company had outgrown its home at 30 Exchange. Ted, however, immediately questioned his decision and how John would take the news. A couple of days before John returned, the second floor of the Exchange Street building collapsed. The repairs would be exceedingly costly. Ted's anxiety was eased with the sudden change of circumstances. John, upon return, applauded Ted on his purchase. Coghlin Electric moved its operations to Summer Street shortly after.⁸³

Along with construction and wholesale expansion, the retail store picked up its pace after the War. Appliances from toasters to crock pots became a mainstay in the 1940s American kitchen. If anyone in Worcester was looking for a gift, Coghlin's was the place to go. They carried everything from Tiffany glass shades to Lenox china and jewelry.⁸⁴ The store kept growing and changing into the '50s, when the company received a "slap in the face" from a long time partner. In 1954, Coghlin was given 60 days' notice that they would no longer be able to carry GE appliances. After nearly a 30-year relationship with the company, Coghlin had to dispose of their stock within two months.⁸⁵ The revocation was a major blow to Coghlin.

⁸² Dickinson, 55-56.

⁸³ Dickinson, 57-58.

⁸⁴ Dickinson, 59.

⁸⁵ Roger Donaway, "The Coghlin's Look Forward to 2nd Century," *Worcester Telegram*, 03 Dec 1985.

History repeated itself, though, and the following year State Mutual Life Assurance Company announced its plans to construct new headquarters on Lincoln Street. The electrical contract, at \$1.5 million, was the largest electrical contract ever awarded in central New England. At first, Coghlin was not even considered for the job. It had not been invited to bid on recent jobs at Norton Co. and Wyman-Gordon due to its lack of size and the fact that it was not a union shop. State Mutual did not forget their previous relationship with Coghlin and, since Coghlin's had unionized in 1954, they were invited to submit a bid. Coghlin's bid was competitive and they were awarded the contract. The job had as many as 100 electricians working at any given time. More man-hours were tallied on the State Mutual job than any other in Coghlin's history.⁸⁶

The State Mutual job was groundbreaking in many respects. In addition to its sheer size, a new Coghlin was on the job. Edwin Bernard "Ted" Coghlin Jr. graduated from WPI in 1956. He was the fifth Coghlin to graduate from the school in 63 years.⁸⁷ Ted Jr. had always planned on following in his father's footsteps at WPI and into the family business. He worked at Coghlin's since a teenager doing a variety of jobs. The day after he graduated, he started work on the State Mutual project. Ted Jr. remembered visiting the site as a young boy when Myron Converse ran a turkey farm there. He could see the city's landscape changing, and it was with bittersweet feelings that he began building his practical knowledge of electrical construction.⁸⁸ The job was finished on time and on budget. Coghlin's reputation kept growing. When Norton Co. expanded its operations onto the old fairgrounds, Coghlin was chosen to engineer and install the electrical system. Ted Jr. took the lead on this job.⁸⁹

⁸⁶ Dickinson, 62.

⁸⁷ Ruth Trask, "Ted Coghlin '56: Looking Ahead to The Second Century," *WPI Journal* 89, no. 4 (May 1986), 12-13.

⁸⁸ Dickinson, 63.

⁸⁹ Trask.

The company was prospering and a new generation was becoming involved. Ted Sr. and John had more time now to dedicate to civic organizations. John was very active in operations at WPI. He was a member of the Board of Trustees and served as secretary for a time. He also led the Alumni Association and the Alumni Fund Board. In 1963, WPI awarded John Coghlin an honorary doctor of engineering degree. Ten years later, the Alumni Association awarded him the Herbert F. Taylor Award for outstanding service to the association and the school. John was also involved with Hahnemann Hospital, the Mechanics Savings Bank, and the Airport Commission. The list of John's activities goes on and on.⁹⁰ Ted Sr., likewise, took an energetic role in community affairs. He was active at WPI like his father and brother. He also took a leading role with the Worcester Boys' Club, the Community Services of Greater Worcester, and led the Community Chest fundraising drives in 1951 and 1952.⁹¹ He later served as director of the Worcester Area Chamber of Commerce.⁹² In 1963, Ted Sr. was awarded the Isaiah Thomas Award by the Worcester Advertising Club for his dedication to community betterment. He was the fourteenth to receive the award following others such as Harry Stoddard, Philip Morgan, George Fuller, Harold Daniels, and Milton Higgins. During the award ceremony, the keynote speaker and man who introduced Ted Sr. was the president of his alma mater, General Harry Storke.⁹³ Upon receiving the award, Ted Sr. remarked that, "Worcester has given to me a full life of family, church, education, business and community service."⁹⁴ In less than a century, the Coghlin family had entwined itself in the history and fate of WPI and the city of Worcester.

A third generation was slowly beginning to take control of Coghlin. Ted Jr. was with the company nearly a decade when his younger brother James W. "Jim" Coghlin graduated from

⁹⁰ "John W. Coghlin, 79, Head of Coghlin, Inc.," *Worcester Evening Gazette*, 03 Apr 1977.

⁹¹ "E.B. Coghlin To Receive Thomas Award," *Worcester Telegram*, 24 Feb 1963.

⁹² "Edwin B. Coghlin Sr., 79, Civic Leader, Businessman," *Worcester Evening Gazette*, 21 Dec 1981.

⁹³ "Coghlin 14th To Receive Noted Award," Clipping from Worcester Historical Museum, 18 Apr 1963.

⁹⁴ "Coghlin Speech Excerpts," *Worcester Telegram*, 18 Apr 1963.

Nichols College with a Bachelor of Business Administration degree in Marketing. Jim, like his brother, had started with Coghlin early on.⁹⁵ One day, he was cleaning out a used oven for resale. Taking a seat on a milk crate as he worked, he did not know there was a rag with oven cleaner on it underneath him. After being treated for second degree burns on his hindquarters, his father, Ted Sr. told him, “Well, son, that’s what you get for sitting down on the job.”⁹⁶ Hard work was one of the many lessons Ted Jr. and Jim learned from their father and uncle.

Over the next decade, Ted Sr. and John groomed the next generation to take the lead. The two were so committed to a full day’s work that they did not even believe in coffee breaks, yet some Coghlin employees created a secret coffee room under the stairs. They also pitched in whenever they could doing even the most menial jobs. Both would periodically check in on customers to make sure everything was going as planned.⁹⁷ While Ted Jr. and Jim learned from their predecessors, they each brought new ideas to the businesses. Jim was the first Coghlin to receive a business degree. He brought a new mentality to the companies that helped them grow in the latter half of the twentieth century.

After twelve years with the company, Ted Jr. had quite extensive experience under his belt. He, along with other relatively new employees, decided to bid on the Raytheon facility in Andover in 1968 without his father’s consultation. They were the lowest bidder, but the project was like nothing Coghlin had done before. It was the one of the largest all-electrical manufacturing plants in the country and included highly specialized electrical needs. The group of young men inched out a small profit but proved they could manage the construction

⁹⁵ Dickinson, 72.

⁹⁶ Dickinson, Prologue.

⁹⁷ Dickinson, 68.

department.⁹⁸ As WPI was growing, it often contracted Coghlin for jobs such as Goddard Hall, Harrington Auditorium, and the re-wiring of Boynton Hall.⁹⁹

The early '70s saw much activity in the company slow down. Worcester's heavy industry, that Coghlin had always served, began to decline. General electrical construction followed suit due to the economic recession. Towards the end of the decade, high-tech industries began to emerge as Coghlin's major customer. They worked on many projects for Digital Equipment Corporation and others dealing with factory automation. Estimating at the company also went high-tech with computer estimating towards the beginning of the 1980s.¹⁰⁰ The wholesale business also suffered. Coghlin revived the division with tele- and mail marketing that reached all over the east coast. In 1981, RM Electronics was purchased by Coghlin to expand their offerings and computerize their inventory. Clients could now opt into inventory management programs that allowed them to reduce overhead. Coghlin would carry the parts they regularly required and could be shipped at a moment's notice.¹⁰¹

Change kept coming at Coghlin. John Coghlin passed away in 1977 followed by his brother Ted Sr. in 1981. They left a mark on the city that much mirrored their father's. They were dedicated to their family, employees, and neighbors. When Ted Sr. passed, long time city manager Francis McGrath said that his community service was the "hallmark of his life." Edmund Cranch, WPI's president, remarked that, "he was always ready to assist his college in any way he could."¹⁰² J. P., from his resting spot in Saint John's Cemetery, would have been proud of his successors.

⁹⁸ Trask.

⁹⁹ Dickinson, 78.

¹⁰⁰ Dickinson, 83-85.

¹⁰¹ Herwitz.

¹⁰² "Edwin B. Coghlin Sr..."

Ted Jr. took on the roles of his father: president of Coghlin's Inc. and treasurer of Coghlin Electric Co. Jim followed his uncle as president of Coghlin Electric and treasurer of Coghlin's Inc. Their first major mark on the businesses came shortly after the passing of their father. The retail store on Main Street had undergone many changes in the last decade. Small appliances were discontinued in the mid-70s with large appliances following in 1980. The company's service department closed its doors in 1981. The question remained on what to do with the remaining furniture business.¹⁰³ After studying the issue for six months, Ted and Jim decided to renovate the entire building and refocus on interior design. A whole building renovation was completed between 1983 and 1984. Dona Morris was hired to manage the store and guide it to cater to high-end interior designers.¹⁰⁴ By 1985, the store had increased sales 450% from three years before.¹⁰⁵

One hundred years had passed since Charles Page started a pioneering electrical construction firm in Worcester. He would not recognize his company after all the changes that had taken place. The Coghlin companies now employed 175 people across three divisions. Electrical contracting and wholesale distribution made up 90% of the business. The furniture company made up the rest.¹⁰⁶ In celebration of the centennial, Coghlin held an employee appreciation night and a concert. They also commissioned a written history by LaVerne Dickinson and organized a reenactment of the Dead Horse Hill Climb that J. P. started in 1905.¹⁰⁷ The race attracted pre-1915 car owners from as far away as Wyoming.¹⁰⁸ Roger Donaway at the *Worcester Telegram* found it interesting that even though Coghlin and Norton

¹⁰³ Roger Donaway, "The Coghlin's Look Forward to 2nd Century," *Worcester Telegram*, 03 Dec 1985.

¹⁰⁴ Mel Singer, "Coghlin's Third Generation Is Generating Some Changes," *Worcester Evening Gazette*, 09 Dec 1983.

¹⁰⁵ Donaway.

¹⁰⁶ Herwitz

¹⁰⁷ "Coghlin's Marks Century."

¹⁰⁸ "Tomorrow's Blast From the Past Will Be Steam on Dead Horse Hill," *Worcester Evening Gazette*, 22 Jun 1985.

Co. shared anniversaries, “the Coghlin firms remain[ed] very personal businesses, owned and operated by Coghlin’s.”¹⁰⁹

The Coghlin’s moved on into their second century unaware of all the changes that were to follow. The companies underwent significant organizational changes in 1986. Coghlin Electric Company changed its name to Coghlin Electric/Electronics to reflect its changing stock. Coghlin’s Inc. became Coghlin Electrical Contractors and focused solely on construction. A new business was formed under the name Coghlin’s Inc. to run the furniture store and any other side ventures in the future.¹¹⁰ In an effort to refocus the business on electrical contracting and electronics, and without an interested buyer, the company decided to close the furniture store on Main Street on May 22, 1987. The majority of the employees at the store were transferred to other Coghlin companies.¹¹¹ After 80 years in retail, the Coghlin’s had moved on. The building at 244 Main Street was sold in the fall for \$1.1 million, and the Coghlin companies began renting space on Briden Street.¹¹²

With a deep recession setting in during the early 1990s, many small businesses struggled to stay afloat. Coghlin Electric/Electronics, on the other hand, was doing quite well. Switching over to inventory management programs in the ‘80s had paid off. As other companies faltered, Coghlin grew 10% between 1989 and 1991.¹¹³ The company was in such a prime position that they purchased Greene-Shaw Co. of Connecticut in the spring of 1992. Greene- Shaw

¹⁰⁹ Donaway.

¹¹⁰ “Corporations Division,” *Secretary of the Commonwealth of Massachusetts*, <http://www.sec.state.ma.us/cor/> (accessed 07 Mar 2013).

¹¹¹ Kathryn A. Lee, “Coghlin’s Inc. mulls building’s future,” *Worcester Evening Gazette*, 12 Jun 1987.

¹¹² Ted Bunker, “Coghlin’s Building Is Sold for \$1.1M,” *Worcester Telegram*, 10 Dec 1987.

¹¹³ John J. Monahan, “Comlick, Coghlin survive small-business blues,” *Worcester Business Review*, 07 Feb 1992, E11.

specialized in electronics components for high-tech applications. The Coghlin companies projected annual sales of \$45 million with the addition of Greene-Shaw.¹¹⁴

In 1994, Worcester announced plans to redevelop 21 acres along Summer Street into a “Medical City.” One of the many businesses affected was Coghlin. The building Ted Sr. purchased without his brother’s consent in 1946 was now taken through eminent domain. Ted Jr. wished to remain in Worcester, but there was simply no place to move that did not have significant environmental concerns. On July 4, 1994, Coghlin Electrical Contractors and Greene-Shaw Co. moved with 125 employees to leased space in Westborough. Coghlin Electric/Electronics as well as Coghlin Network Services and Columbia Technical Services, which had organized as in 1989 and 1991 respectively, remained at Briden Street with their combined 125 employees. Columbia Technical Services was the fastest growing of the companies, adding 60 new jobs in less than two years. The business functioned as a subcontracting manufacturer specializing in assembly and installation of electronics.¹¹⁵ The Coghlin were doing what they did best: adapting to changing circumstances.

By the end of the decade, circumstances and the Coghlin companies had changed greatly. WESCO International Inc. of Pittsburgh offered to buy Coghlin Electric/Electronics in 1999 for an undisclosed price. The offer was accepted. Jim was serving as president at the time and agreed to stay on as a consultant. His son, Jim Jr., would serve as general manager.¹¹⁶ The company originally founded in 1885 and purchased by J. P. Coghlin in 1897 had been sold after

¹¹⁴ “Coghlin buys electronics distribution firm,” *Worcester Telegram & Gazette*, 16 Apr 1992, C2.

¹¹⁵ Lisa Eckelbecker, “Worcester loses Coghlin Electric,” *Worcester Telegram & Gazette*, 25 May 1994, E1.

¹¹⁶ Peter P. Donker, “Coghlin Electric is sold,” *Worcester Telegram & Gazette*, 25 Jun 1999, E1.

102 years of Coghlin ownership. The company became known as CEE WESCO and eventually CCA WESCO, remaining active in Westborough as a distributor of electrical products.¹¹⁷

The Coghlin family had now narrowed down their companies to three. Ted Jr. served as president of Coghlin Electrical Contractors and Coghlin Network Services. Jim presided over Columbia Technical Services. The three companies employed around 300 people.¹¹⁸ When the Westborough lease expired in 1999, Coghlin Electrical Contractors returned to Worcester at the Briden Street facility and for a short time, all Coghlin family members were under the same roof.

Growing up, Susan (Coghlin) Mailman never thought she would play a role in the family business. Her father, Ted Jr., was always dragging her and her siblings to company and community events that she grew to partially resent. She was an independent young girl who wanted to pave her own path in the world. After graduating from high school, she moved out of her parents' house and began working at a bank after attending classes at "several local colleges."¹¹⁹ In 1985, Jim Duffy Jr., who was general manager of the contracting division, invited Sue to join the Coghlin team doing data entry. Over the intervening years, she worked in every area of the company from payroll to project management. She came to understand what the Coghlin name meant to the city of Worcester. Other old-time employers had left, but Coghlin remained. Sue decided she had a role to play in the family business and Ted Jr. was happy to oblige.¹²⁰

As Sue was preparing to succeed Ted Jr. at the head of Coghlin Electrical Contractors and Coghlin Network Services, Jim was in no rush to turn over control of Columbia Technical Services. Two of his sons had begun working for the company in the early '90s. Jim Jr. had

¹¹⁷ WESCO, "WESCO-CCA," *WESCO Companies*, <http://www.wesco.com/company/cca-ne.htm> (accessed 07 March 2013).

¹¹⁸ Donker, "Coghlin Electric is Sold."

¹¹⁹ Margaret LeRoux, "The Boy Scout and the Rebel," *Worcester Telegram & Gazette*, 25 Apr 2007.

¹²⁰ Susan Mailman, interview by author, 27 Feb 2013.

graduated from Hobart and William Smith Colleges while his brother Chris graduated from Northeastern University. Chris had started, much like his father, doing odd jobs around the business as a teenager. After graduating, he began at Coghlin Electrical Contractors and eventually transferred to the newly formed Columbia Technical Services.¹²¹ Being at different points in their lives and seeing a potential for imbalance within the Coghlin companies, Ted and Jim decided to permanently split the enterprises in 1999. Coghlin Construction Services was organized as a holding company for Coghlin Electrical Contractors and Coghlin Network Services, which transferred to Ted Jr. Coghlin's Inc. became the holding company for Columbia Technical Services, which was transferred to Jim Sr. Sue Mailman recalled that the split was a very good move. It allowed both companies to thrive separately.¹²²

Sue began to run the Coghlin Construction Services companies in the Washburn Building at 100 Prescott Street in 2000. After receiving her Master of Business Administration degree in 2003 from Northeastern University, she took over as president and owner.¹²³ Under her reign, the construction companies have prospered, employing about 230 people in 2012. Large projects such as the Worcester County Courthouse, the CitySquare project, and WPI's Gateway Park project have all involved Coghlin Construction Services.¹²⁴

Across the street at 17 Briden Street, Coghlin's Inc. has also grown and prospered. In 2001, the company purchased Design Components Inc. and renamed it DCI Automation. The company joined Columbia Technical Services as a subsidiary that conducts contract engineering for companies all around the country.¹²⁵ Chris Coghlin took over as president of Coghlin's Inc.

¹²¹ "2009 40 Under Forty: Chris Coghlin," *Worcester Business Journal*, 31 Aug 2009.

¹²² Mailman.

¹²³ LeRoux.

¹²⁴ Coghlin Companies, "Coghlin Family Honored at the 169th Annual Meeting of the Worcester County Mechanics Association," *Coghlin Companies Blog*, <http://www.coghlincompanies.com/blog/2012/10/coghlin-family-honored-at-the-169th-annual-meeting-of-the-worcester-county-mechanics-association/> (accessed 07 March 2013).

¹²⁵ "Purchase enlarges Coghlin," *Worcester Telegram & Gazette*, 21 Jun 2001, B8.

in 2006 as Jim Sr. took on an advisory role as chairman. Under Chris' leadership, Coghlin's Inc. has started two new subsidiaries: Cogmedix and Coghlin Precision, focusing on medical engineering and electronics. The wide variety of offerings at Coghlin's has ensured great success. As the recession of the late 2000s hit many businesses hard, Coghlin's grew tremendously due to a strong online presence that expanded their markets. The companies now employ approximately 330.¹²⁶ Since the split in 1999, the two Coghlin enterprises have, indeed, flourished.

While the Coghlin companies changed tremendously since the passing of John and Ted Sr., some things remained the same. Ted Jr. and Jim Sr. have given back to Worcester just as their father, uncle, and grandfather had. Ted has served WPI admirably on the Alumni Fund Board, the Poly Club, and the Alumni Association. Following in his uncle's footsteps, he was awarded the Herbert F. Taylor Award in 1981 for outstanding alumni service to the college.¹²⁷ Ted, though, is best known for his work with the Boy Scouts Mohegan Council and the Worcester Technical High School.¹²⁸ Jim has dedicated great effort to cancer charities and other local groups. Both have been honored with the Isaiah Thomas Award as their father was in 1963; Ted in 2004 and Jim in 2008.¹²⁹ Sue Mailman and Jim's sons are no exception to the family's commitment to giving back. David Fosberg, who previously served as president of the Worcester Business Development Corp., attributed it to their genes: "I think it's part of their DNA. Frankly, they're everywhere. I can't think of an important cause or organization that at one stage or another hasn't had very active and important support from the Coghlin family."¹³⁰ The entire Coghlin family was the honored recipient of the 2012 Master Mechanic Award given

¹²⁶ Emily Miucci, "Columbia's Recipe: Web, Different Markets, Talent," *Worcester Business Journal*, 15 Oct 2012.

¹²⁷ Trask.

¹²⁸ Taryn Plumb, "Four Generations Of Solid Service," *Worcester business Journal*, 10 Jun 2012.

¹²⁹ Lisa Eckelbecker, "Coghlin earns top T&G Visions honor," *Worcester Telegram & Gazette*, 08 Feb 2009.

¹³⁰ Plumb.

at the 169th annual meeting of the Worcester County Mechanics Association for generations of “leadership in the community, business practices, and philanthropy.”¹³¹

One hundred and twenty years after John Patrick Coghlin sat in the Washburn Shops building dynamos, his family carries on his name and his legacy employing over 500 people in Worcester. Eight members of his family have graduated from “Tech” since his attendance; many of them guiding his company through generations of change. They have succeeded due to his lessons, primarily his willingness to change.¹³² Sue Mailman attributes much of his success, however, to the practical “horse sense,” that is taught to graduates of Worcester Polytechnic Institute. The school and the Coghlin companies remain involved on many fronts in the Worcester community. Mailman summed her feelings with one thought: “Worcester; WPI; Coghlin; it’s all synonymous with this community.”¹³³

¹³¹ Coghlin Companies.

¹³² Trask.

¹³³ Mailman.

RILEY STOKER CORPORATION

Katherine, daughter of Milton Prince Higgins who was the first superintendent of the Washburn Shops at WPI, received a letter from Robert Sanford Riley around 1900 when he was stationed in Hong Kong as chief engineer of naval auxiliary vessels during the Boxer Rebellion. He wrote her, “the stoker’s job is really lousy. There’s got to be an easier way to stoke the fires.” He had witnessed men on ships endlessly shoveling coal into fires and removing the ash. Mechanical stokers had been around as long as the steam engine itself, but none was practical. Riley had no idea that practically the rest of his life would center on the device.¹³⁴

R. Sanford Riley was born twenty-six years earlier in Hamilton, Ontario to English parents. His father, Robert Thomas Riley, was a banker in Winnipeg, Manitoba, to whence the family moved early in Sanford’s life. There, in Winnipeg, he attended the Collegiate Institute. After graduating, he made the nearly 2,000-mile trip to Worcester, Massachusetts where he had enrolled at Worcester Polytechnic Institute. Four years later, in 1896, he graduated with honors in mechanical engineering.¹³⁵ He had grown close with Mr. Higgins in the “Shops” and graduated with his son, John Woodman Higgins.

Higgins had become a prominent name in Worcester industry in the three decades since Milton removed to the city after graduating from Dartmouth College in 1868. Charles Hill Morgan, under the direction of Ichabod Washburn, asked Higgins to come to Worcester and supervise the mechanical shops at the new Worcester County Free Institute of Industrial Science. He held the position until 1896. While Higgins was superintendent, the shops grew tremendously. The manufacture of hydraulic elevators became so successful that the trustees of

¹³⁴ Susan Avery, “Building the Businesses That Endure, Part II,” Clipping from Worcester Public Library, Feb 1985.

¹³⁵ Charles Nutt, “Robert Sanford Riley,” in *History of Worcester and its People* (New York: Lewis Historical Publishing Company, 1919), 3:109.

the school sold that operation to Higgins to continue as a private venture. In 1885, Higgins and Professor George Alden began the Norton Emery Wheel Company, eventually becoming the world's largest manufacturer of abrasives.¹³⁶ Higgins and his colleagues were carrying on the tradition of Ichabod Washburn brilliantly.

After graduating from WPI, Sanford Riley left Worcester and began working as a locomotive engineer for a short time. He worked at Cramp's Shipyard in Philadelphia and the New York Shipbuilding Company as a marine engineer before entering the U.S. Navy around the turn of the century. As chief engineer of all U.S. vessels in China, he earned notoriety as a ship engineer and acquired a great deal of experience.¹³⁷ Riley returned to the U.S. and married Milton Higgins' daughter, Katherine Elizabeth, in 1904. They moved to Providence, Rhode Island, the following year and he began work at the American Ship Windlass Company where E. E. Taylor had recently patented the first underfeed multiple-retort stoker. The stoker could handle a greater capacity and automatically dispose of ash, but it was not successful. Riley improved upon Taylor's stoker after joining the company and quickly made it a success. He became president in 1907, as the company was still on unstable financial ground. The stoker's growth stabilized the company. When Sanford approached the company directors to develop a stoker with moving grates to break up coal more efficiently, they chose not to pursue it. He sold his interest in the company and resigned.¹³⁸

In the family home in Providence, Riley began to experiment with new ideas for automatic stokers. His brother, Harold J. Riley, had graduated from WPI in 1909 and helped in the first drawings of what would become the Riley Stoker. The Sanford Riley Stoker Company

¹³⁶ Charles Nutt, "Milton Prince Higgins," in *History of Worcester and its People* (New York: Lewis Historical Publishing Company, 1919), 3:38-39.

¹³⁷ Nutt, "Robert Sanford Riley," 3:109.

¹³⁸ Avery.

Ltd. was formed under Massachusetts law in 1911. Riley's father-in-law, Milton Higgins, served as president while his father was vice president. Aldus Higgins, his brother-in-law, and George Jeppson, a Norton Co. founder, served as treasurer and secretary, respectively. Riley was to be general manager. The company lost nearly \$18,000 in the first year of business, but when the first multiple-retort underfeed stoker manufactured by the company was installed in the old Narragansett Electric Co. plant in the spring of 1912, it worked fabulously. The company headquarters moved into the Worcester Five Cents Savings Bank building on Main Street in Worcester.¹³⁹

To increase the company coffers, the Riley Stoker Corporation incorporated on June 24, 1913, with \$100,000 in both preferred and common stock. Sanford Riley became the first president of the corporation; Aldus Higgins and George Jeppson remained as directors. Fred Harold Daniels joined the company at the beginning of 1913 after two years with B. F. Sturtevant Co. of Hyde Park.¹⁴⁰ His father, Fred Harris Daniels, had graduated from WPI in 1873. The senior Daniels became the protégé of Charles H. Morgan at the Washburn and Moen Manufacturing Company.¹⁴¹ He remained with the company through its many mergers and acquisitions until his death in 1913. F. Harris Daniels was also one of the original partners of Norton Company with George Jeppson, Milton Higgins, George Alden, and others.¹⁴² The junior Daniels came on as sales manager when the company was made up of him, Riley, and two other employees.¹⁴³

Patents for the Riley Stoker were issued in 1914 and 1915 as the company expanded into England. The stoker was licensed to Erith's Engineering of London. The company's first

¹³⁹ Avery.

¹⁴⁰ Avery.

¹⁴¹ The duo's relationship became strained, and even hostile in later years. See *Morgan Milestones*.

¹⁴² "Busy Career of Fred H. Daniels Ended By Death," *Worcester Evening Gazette*, 01 Sep 1913.

¹⁴³ "F. Harold Daniels, Civic Leader, Dies," *Worcester Telegram*, 16 Jun 1967.

acquisition came in 1917 with the purchase of Murphy Iron Works in Detroit.¹⁴⁴ By 1919, the Riley Stoker was in power plants all over the United States and the world. Murphy Iron Works alone employed over 500.¹⁴⁵ Land was purchased on Neponset Street that year from the M. K. Smith window company. New offices for Riley Stoker opened in 1920.¹⁴⁶

Riley Stoker celebrated its fifteenth anniversary in 1926. The company had grown from an unprofitable beginning with only three employees to an “enterprise involving \$2,000,000 of capital.” Their stokers could be found in every corner of the world that had large power plants. In addition to Murphy Iron Works, Riley had absorbed the Underfeed Stoker Co. of Detroit, the United Machine & Manufacturing Co. of Canton, Ohio, and the A. W. Cash Co. of Decatur, Illinois. International subsidiaries were operated out of both Toronto and London. On April 26 of that year, Sanford Riley was asked to be president of the American Society of Mechanical Engineers. He modestly declined. Less than two weeks later, he died of heart failure at his house on West Street.¹⁴⁷

In his short life, Robert Sanford Riley had established himself as “one of the greatest combustion engineers of the world.”¹⁴⁸ In addition to the centerpiece of his career, Riley was active in Norton Co. and numerous other companies and organizations in Worcester.¹⁴⁹ A memorial in a local newspaper remarked that, “he had about him that tinge of romance and adventure which seems to others to be a part of the personality of a man, who with indomitable spirit, iron determination, surmounts difficulties and carves his own fortune.”¹⁵⁰ Upon the day of his funeral, flags were lowered to half-staff throughout the city; he was a “member of the city’s

¹⁴⁴ Avery.

¹⁴⁵ Nutt, “Robert Sanford Riley,” 3:109.

¹⁴⁶ Avery.

¹⁴⁷ “R. Sanford Riley, Manufacturer and Engineer is Dead,” Clipping from Worcester Historical Museum, 07 May 1926.

¹⁴⁸ “R. Sanford Riley, Manufacturer and Engineer...”

¹⁴⁹ “R. Sanford Riley, Manufacturer and Engineer...”

¹⁵⁰ “R. Sanford Riley,” Clipping from Worcester Historical Museum, 07 May 1926.

official family.” Doctor Ira Hollis who had retired as president of WPI in 1925 was joined by sitting president Ralph Earle, Harry Stoddard, Harold Daniels, Paul Morgan, and other notable Worcester businessmen as pallbearers.¹⁵¹ One of Worcester’s industrial giants had fallen too soon.

At the time of his death, Riley and his wife were involved in the planning for the first residence hall on WPI’s campus. He was to begin his service on the institute’s board of trustees within a month. The trustees, in honor of Riley, named the residence hall Sanford Riley Hall. It was completed in September, 1927.¹⁵² When his wife, Katherine, died two decades later, she left the Higgins-Riley home at the corner of West and Salisbury Street to WPI after being in the family for nearly eighty years. She and her siblings had all been born and raised at 228 West Street.¹⁵³ The house was eventually razed and Goddard Hall was constructed in its place.

All of the Riley children were too young and inexperienced to take over the helm of their father’s company when he died. F. Harold Daniels, who was general manager and vice president upon Riley’s death, took over as president of Riley Stoker Corp.¹⁵⁴ Chapin Riley, who was 17 at the time of his father’s passing, recalled that Daniels guided the company through the Depression with great skill. Daniels purchased the complete stock of Badhausen Corp. of Cornwells Heights, Pennsylvania, in 1931. Badenhausen was a manufacturer of boilers and other steam generating equipment. With the acquisition, Riley Stoker began carrying a full line of boilers and had a half dozen locations in the northeast, midwest, and Canada. Daniels was confronted

¹⁵¹ “Simple Funeral Exercises Held,” Clipping from Worcester Historical Museum, 10 May 1926.

¹⁵² “The WPI Campus,” *The Tech Bible*, <http://www.wpi.edu/academics/library/history/techbible/campus.html> (accessed 01 Mar 2013).

¹⁵³ “Many Public Services Aided By Mrs. R. S. Riley’s Will,” *Worcester Evening Gazette*, 04 May 1948.

¹⁵⁴ “Fred H. Daniels Named President,” Clipping from Worcester Historical Museum, 17 May 1926.

with the idea of moving Riley's headquarters from Worcester. His wife, however, loved the city and would not hear of it.¹⁵⁵

For over twenty years, Harold Daniels served the company until Louis E. Griffith succeeded him. He became chairman of the board until his retirement in 1960 when the last connection between Riley and Norton Co. was severed. In 1935, he joined the WPI Board of Trustees and served until 1967 when he passed away. The school awarded Daniels an honorary doctorate in engineering in 1941. Daniels Hall was erected in 1963 honoring his late father, a member of the third graduating class.¹⁵⁶ While Daniels was president of Riley Stoker and trustee of WPI, three Riley boilers were installed in the campus' steam generating powerhouse and were used until they were replaced in 2006.¹⁵⁷ Harold Daniels, while not a WPI alumni, served the college with dignity for much of his professional life. His work with many other community organizations gained him recognition as a recipient of the prestigious Isaiah Thomas Award.¹⁵⁸

Daniels had expanded Riley Stoker greatly, so when Louis Griffith became president, the company was poised for phenomenal growth. By the early 1950s, the company operated major plants in Pennsylvania and Michigan out of the Worcester office with associations in Illinois as well as Canada, France, Italy, and Australia. Riley Stoker joined with John Brown & Co. Ltd. of Sheffield, England, in 1952 to sell Riley steam generating and fuel burning equipment in England. Brown & Co. ran the largest shipyard in Europe, where the Queen Mary and Queen Elizabeth were constructed.¹⁵⁹ Annual sales at Riley set records year after year. The largest steam generating plant ever designed and built by Riley was installed in Los Angeles in 1954. The \$2.9 million contract was for an 18-story tall, 123-ton boiler that could use oil, natural gas,

¹⁵⁵ Avery.

¹⁵⁶ "F. Harold Daniels..."

¹⁵⁷ Bronislaus B. Kush, "New \$8M plant heating WPI," *Worcester Telegram & Gazette*, 09 Feb 2006, B1.

¹⁵⁸ "F. Harold Daniels..."

¹⁵⁹ "Riley Stoker To Have Producer In England," *Worcester Evening Gazette*, 26 Nov 1952.

or pulverized coal.¹⁶⁰ The adaptability of fuels for this project was becoming more common. New sources of energy were being explored and Riley joined the search as New England had the highest energy cost rates in the country. Riley was one of eight companies from across the United States that formed the Rocky Mountain Nuclear Study Group to study the “economic and engineering possibilities of a nuclear power reactor” in 1954.¹⁶¹ “Lou” Griffith had led Riley Stoker through a decade of industry changes. When Harold Daniels retired as chairman, Lou took his place. Lou’s son, Robert K. Griffith, became president.¹⁶²

Within months of changing leadership, Riley Stoker purchased the entire stock of Union Iron Works in Erie, Pennsylvania. The company, which became a subsidiary, employed a few hundred individuals in the manufacture of boilers and other power generating equipment.¹⁶³ The following year, Baldwin-Lima-Hamilton Corp. of Philadelphia showed interest in purchasing Riley and all of its assets, valued at \$22 million. Riley, with its subsidiaries, employed about 3,000 people at the time. Baldwin started as a locomotive manufacturer, but expanded into many industries since its founding in 1911.¹⁶⁴ While the deal never came to fruition, it was the first serious action towards altering the company’s ownership.

After reaching a new annual sales high of \$59 million in 1966, a three-year period of decline began likely due to declining use of coal. By 1969, sales were down to \$45 million.¹⁶⁵ Many stockholders became unhappy with the management’s reaction to the downturn and staged a proxy fight to force action in the spring of 1968. Arthur R. Sawers of Chesley & Co. of Chicago led the fight, which eventually failed by a large margin.¹⁶⁶ That was only the first

¹⁶⁰ “Riley Stoker Erects Big Plant for L.A.,” *Worcester Evening Gazette*, 12 May 1954.

¹⁶¹ “Riley Stoker Joins Nuclear Study Group,” *Worcester Evening Gazette*, 20 Oct 1954.

¹⁶² “Daniels Resigns At Riley Stoker,” *Worcester Evening Gazette*, 18 Mar 1960.

¹⁶³ “Riley Stoker Corp. Buys Erie Factory,” *Worcester Evening Gazette*, 31 Oct 1960.

¹⁶⁴ “Negotiations Begin In Riley Stoker Deal,” *Worcester Evening Gazette*, 12 Oct 1961.

¹⁶⁵ “Riley Stoker Hit Revenue High,” *Worcester Evening Gazette*, 15 Jan 1971.

¹⁶⁶ “Management Wins Riley Stoker Fight,” *Worcester Evening Gazette*, 27 Apr 1968.

challenge. Later that year, a merger with Zurn Industries, Inc. of Erie, Pennsylvania, was discussed but failed. The following spring, Pennsylvania Engineering Corp. (Pecor) set out to buy a controlling interest in Riley. They acquired over 75,000 shares valued at \$2.2 million dollars until a restraining order stopped further purchases. Pecor had gained 25-26% control, not the 50% they desired. Two weeks later a manufacturer of industrial monitoring devices from Skokie, Illinois, purchased over 20% of the company from the Fred Harris Daniels Foundation. The company was Scam Instrument Corp. that was founded in 1953 by Howard Warren.¹⁶⁷ Warren, a native of Colorado, graduated from WPI in 1942 with a degree in Mechanical Engineering. He served in the Marine Corps during World War II before starting Scam.¹⁶⁸ After the purchase, Warren and two other Scam directors were named to the Riley board of directors, replacing Lou Griffith and Chapin Riley who had been with the company for years.¹⁶⁹ The loss of Chapin Riley dissolved the last connection with Sanford Riley.

Within a month, Scam acquired a controlling stake in the company. Management, however, was “friendly” to the takeover.¹⁷⁰ In the fall of the same year, Bob Griffith resigned as president and was replaced by Richard Flynn who was one of the Scam directors appointed to Riley’s board earlier in the year. Flynn was a native of Worcester and graduate of Holy Cross.¹⁷¹ In 1970, Pecor sold their 41% stake in Riley to Scam for \$6 million, giving Scam a total of 92% control.¹⁷² The Scam takeover was completed in October 1971 when the two companies merged. Riley Stoker Corp. became a wholly owned subsidiary of Scam Instrument Corp., which changed its name to the Riley Company.¹⁷³ The three years from 1968 to 1971 altered Riley Stoker Corp.

¹⁶⁷ “3 Named to Riley Board After Big Stock Purchase,” *Worcester Telegram*, 26 Apr 1969.

¹⁶⁸ “Howard C. Warren,” *Chicago Tribune*, 16 Feb 2010.

¹⁶⁹ “3 Named to Riley Board...”

¹⁷⁰ “Control of Riley Stoker Corp. Acquired by Scam Instrument,” *Worcester Evening Gazette*, 23 May 1969.

¹⁷¹ “President Resigns At Riley Stoker,” *Worcester Evening Gazette*, 15 Oct 1969.

¹⁷² “Riley Stoker Corp. Gets Contract for \$20 Million,” *Worcester Evening Gazette*, 28 Aug 1970.

¹⁷³ “Riley-SCAM Merger Plan Is Approved,” *Worcester Telegram*, 12 Oct 1971.

in the greatest possible way. The changes, however, prepared the company for a great rebound in the 1970s.

Even before the Scam merger was complete, Riley began looking to build a new research and development lab to meet the changing demands in the boiler market. Due to uncertainty about the future at Neponset Street, the company purchased 50 acres of land from the Worcester Airport Commission.¹⁷⁴ The plans at the airport, however, were abandoned for a plot of land closer to headquarters. Former U.S. Steel Corp. land between I-290 and McKeon Road on the Middle River was purchased in 1972.¹⁷⁵ Construction began on an 11,400 square foot research lab to study more efficient fuel burning technologies. In addition to efficiency tests, the facility would be used to find methods for reducing emissions and practically produce gaseous fuel from coal. The site opened in February, 1974 with 42 employees on site. The test furnace, one of the largest in the world, could heat 3,000 average American homes.¹⁷⁶ Richard Sadowski, a WPI graduate, was named manager of the Fuel Burning Engineering department at the lab.¹⁷⁷ The massive expansion displayed the new owner's dedication to Worcester and changing markets.

Two months before the lab was completed, Richard Flynn resigned as president of both Riley Stoker and its parent, Riley Co. He had brought the company back from the brink in his four-year presidency. Riley was now "post[ing] substantial profits."¹⁷⁸ Under his presidency, Riley-Beaird of Shreveport, Louisiana was acquired. Employing about 1,500, the new subsidiary manufactured steel drums and other boiler components for the petrochemical industry.¹⁷⁹

¹⁷⁴ "Decision for a New Building Still in Offing-Riley Stoker," *Worcester Telegram*, 19 Aug 1971 and "Airport Board Approves Sale of Land to Riley Stoker," *Worcester Telegram*, 24 Aug 1971.

¹⁷⁵ "Riley Stoker Plans New Lab," *Worcester Evening Gazette*, 30 Dec 1972.

¹⁷⁶ Robert E. Lindberg Jr., "Riley Stoker Builds New Lab for Research in Energy Use," *Worcester Telegram*, 17 Feb 1974.

¹⁷⁷ "Riley Stoker Corp. Names Sadowski As a Manager," *Worcester Evening Gazette*, 12 Mar 1974.

¹⁷⁸ "Riley Co. President Resigns," *Worcester Evening Gazette*, 21 Dec 1973.

¹⁷⁹ "Riley Stoker Builds A 'Stronger' Base," *Worcester Business Review*, 11 Jan 1974.

Howard Warren, the owner of Riley Co., was named acting president of Riley Stoker and served until James Farrell was appointed in October, 1974.¹⁸⁰

As fuel use in the United States continued to shift, Riley Stoker purchased the exclusive rights to Morgan Construction Company's cylindrical gas producer. The Morgan gas producer, designed by Charles Hill Morgan in 1880, was the first of its type in the United States. Morgan Construction sold the unit through 1941, but no longer had a demand and dropped the product. Riley adapted the producer to gasify coal and marketed it as the Riley-Morgan Producer beginning in 1978.¹⁸¹ The shift back to coal in the U.S. increased stoker sales for Riley. Coal, though, required greater pollution control.¹⁸² Riley collaborated with Babcock Contractors Inc. of Pittsburg to develop an industrial boiler that would run on low-grade fuel while meeting air quality standards. By injecting limestone into the furnace, sulfur dioxide would be captured. This new development reduced the need for air scrubbers.¹⁸³ The Fluidized-bed Combustion Boiler came to market at the beginning of 1980.¹⁸⁴

The 1970s saw phenomenal growth at Riley. Record earnings were posted in 1979.¹⁸⁵ Nineteen utility boilers were sold in the decade, some of them at \$50 million apiece.¹⁸⁶ U.S. Filer Corp., a "diversified concern with interests in engineering services for energy-related industries and in manufacturing of pollution control equipment," offered to buy Riley Co. in 1979 for \$113 million.¹⁸⁷ The offer was accepted, and the two firms merged. Riley Stoker became a subsidiary of U.S. Filter.¹⁸⁸ Ashland Oil Co. soon purchased Riley's new parent firm

¹⁸⁰ "J.J. Farrell Is Names Riley Stoker President," *Worcester Telegram*, 13 Oct 1974.

¹⁸¹ "Riley Stoker Corp. Adds Coal Gasification Unit," *Worcester Evening Gazette*, 09 Jan 1976.

¹⁸² "Shifting Coal Aids Riley

¹⁸³ "Local Firm Has Role In Boiler Production," *Worcester Evening Gazette*, 09 Feb 1979.

¹⁸⁴ Polly Pruneau, "Riley Stoker Sees a Warm Future," *Worcester Telegram*, 12 Jan 1980.

¹⁸⁵ Pruneau.

¹⁸⁶ Avery.

¹⁸⁷ "U.S. Filter offers to Buy Riley Stoker Parent Firm," *Worcester Evening Gazette*, 24 Jul 1979.

¹⁸⁸ Pruneau.

in 1981.¹⁸⁹ James Farrell was tapped to become vice president of U.S. Filter's Engineering and Power Group in late 1980. Kenneth Heritage, who had been with Riley since 1964, was chosen to succeed Farrell as president of Riley Stoker.¹⁹⁰ Heritage would need to lead the company through some of its most trying years.

The energy crisis of 1979 was followed by a deep recession. Boiler orders ceased with no prospect of picking back up anytime soon. More change occurred at Riley Stoker in the first years of the 1980s, then had in the previous forty years. Stokers and coal became relevant again. Everyone was looking for new forms of energy. By 1983, Riley was one of four domestic boiler manufacturers, but still struggled to compete against government-subsidized countries in Asia. The plant in Oklahoma was shut down while massive layoffs occurred at the Pennsylvania plant. A manufacturing force of 1,000 in the mid-1970s dropped to 200. Employees were laid off in Worcester as well. Riley looked for any new opportunities. It was awarded nearly a half dozen research contracts, including one for combustion research by the EPA. A refuse-burning boiler was designed with installations in Florida and another in Millbury at the RESCO plant.¹⁹¹ While things were turning around, the company was not through the rough times. Employment had dropped to 380 by 1984 when another 5% of the workforce in Worcester was to be laid off due to lack of investment in plant expansions.¹⁹² Changes in product and employment had made Riley profitable again. Income was estimated to be \$6.2 million for 1984, but came in at \$10.1 million. Ashland Oil presented Riley with their Grand Tiger Trophy for "best all-around financial performance."¹⁹³

¹⁸⁹ Lee M. Hammel, "Riley Stoker Debuts New Boiler," *Worcester Telegram*, 10 Jan 1981 and Gary V. Murray, "Industrial Contracts Boon to Riley," *Worcester Telegram*, 09 Jan 1982.

¹⁹⁰ "Riley Stoker Appoints Heritage as President," *Worcester Telegram*, 31 Dec 1980.

¹⁹¹ Dave Mawson, "Diversification Breathes New Life Into Riley Stoker," *Worcester Telegram*, 08 Nov 1983.

¹⁹² "Riley Stoker Lays Off 5% of Workforce," *Worcester Telegram*, 17 Mar 1984.

¹⁹³ Avery.

An additional 50 employees were laid off in mid-1985, but the company began to only see improvement after that final belt-tightening.¹⁹⁴ The boiler market had bottomed out in 1979, and Riley was now focusing on cogeneration and resource recovery plants. “Trash burning” had been used in Japan for decades, and Riley secured an agreement with Takuma Ltd. to license its technology in the United States. Two contracts in late 1985 for refuse boilers in Missouri and Michigan netted \$15 million for Riley. The boilers, anywhere from 70 to 200 feet tall, eliminated the need for landfills that endangered groundwater and took up a great deal of real estate. Additionally, energy generated from refuse boilers, at four to eight cents per kilowatt-hour, was much cheaper than other forms.¹⁹⁵ The diversification of the company, led by President Heritage, had made Riley a successful company once again. Continued research and development in pollution controls made Riley a “one-stop supplier in the steam-energy-refuse burning business.”¹⁹⁶

While some of Riley’s competitors exported their manufacturing facilities to Canada to take advantage of lower labor costs, Riley remained committed to Worcester and the United States.¹⁹⁷ After nearly 70 years at 5 Neponset Street, Riley’s headquarters moved to a new 130,000 square foot facility at 8 Neponset Street on June 19, 1987. The building project was part of the Greendale Mall development.¹⁹⁸ That fall, Riley Energy Systems Corp. was created as a subsidiary to focus on “waste-to-energy and turnkey cogeneration projects.”¹⁹⁹

After a decade, Riley was back on a strong footing. Heritage, who had led Riley in those years, stepped down as president in the spring of 1988. He cited personal reasons as well as the

¹⁹⁴ John J. Mohanah, “Riley Stoker Lays Off 50 Employees,” *Worcester Evening Gazette*, 03 Jul 1985.

¹⁹⁵ Kathryn A. Lee, “Riley Stoker Corp. Is Gearing Up to Cash In on Trash,” *Worcester Evening Gazette*, 16 Dec 1985.

¹⁹⁶ Joe Pinder, “Riley Stoker Brims With a New Optimism,” *Worcester Evening Gazette*, 09 Jan 1987.

¹⁹⁷ Joanna Zikos, “Business Improves, but Competition Strong for Riley Stoker,” *Worcester Telegram*, 10 Jan 1986.

¹⁹⁸ “Riley Stoker Ready to Move,” *Worcester Telegram*, 09 Jun 1987.

¹⁹⁹ “Riley Creates New Subsidiary,” *Worcester Telegram*, 11 Sep 1987.

New England climate for leaving his post.²⁰⁰ H. Kerner Smith II, a vice president of marketing at one of Riley's largest competitors, Babcock & Wilcox, was appointed to replace Heritage.²⁰¹ One of his first actions as president was to lay off twenty-six employees. According to Smith, the cuts were "done to consolidate the number of jobs and business functions and reduce overhead."²⁰² Those were the final layoffs, however. One hurdle remained for the '80s.

Riley had received a contract for two coal-fired steam generators to be designed and installed in a plant operated by Cajun Electric Power Cooperative Inc. in 1975. The plant went into operation in 1981, but the generators were found to be defective. The Cajun dispute resulted in \$13 million in damages awarded to Cajun on behalf of Riley Stoker in 1989. Other problems with Riley boilers cost the company \$38 million. When Ashland Oil Co., Riley's parent, reported 1989 profits at \$86.2 million, down from \$223.9 million the previous year, Riley was held partially responsible.²⁰³

Early in 1990, Robert Morrow, vice president of employee relations and administration at Riley, reported, "The '80s were tough, but the problems have been identified and are behind us. We see the hill again, and we're starting to climb it."²⁰⁴ A German company saw the potential that Riley Stoker had for the 1990s and acted. Deutsche Babcock Group, a former affiliate of Babcock & Wilcox, purchased 20% of Riley and its subsidiaries after Riley had initiated talks with the company. A fourteen-month observation period started on June 30, 1990. If Deutsche Babcock was pleased with the "operating results" during that fourteen month period, they would purchase the remaining 80% of Riley. If they were not pleased, Ashland Oil was required to buy

²⁰⁰ "President of Riley Stoker Resigns Effective June 30," *Worcester Telegram*, 21 Apr 1988.

²⁰¹ "President, CEO is appointed at Riley Stoker," *Worcester Evening Gazette*, 21 Jul 1988.

²⁰² "Riley trims workforce by 26," *Worcester Telegram*, 22 Nov 1988.

²⁰³ "Riley Stoker loses panel vote," *Worcester Telegram & Gazette*, 28 Feb 1989, D1 and "Ashland Oil reports loss, cites Riley subsidiary," *Worcester Telegram & Gazette*, 27 Oct 1989, C2.

²⁰⁴ "Riley readjusts gauges after some stormy years," *Worcester Telegram & Gazette*, 02 Feb 1990, E17.

back the 20% already purchased by Deutsche Babcock. The move was seen to be beneficial to all parties. Ashland would be able to refocus on the energy market, while Riley and Deutsche Babcock could further develop their production lines that focused on boilers and environmental technologies.²⁰⁵ Further talks between the three companies led to a full purchase of Riley in the fall of 1990. Riley Stoker Corp., with 572 permanent employees at Worcester and their Erie, Pennsylvania plant, was now a subsidiary of Deutsche Babcock Group.²⁰⁶

Expanded markets from the Deutsche Babcock acquisition greatly improved growth at Riley Stoker. The company began to build a backlog of orders as they bid on others such as a \$300 million contract in Taiwan in 1991.²⁰⁷ In 1993, Riley's headquarters on Neponset Street was chosen to be the center of operations of all Deutsche Babcock's North American operations. H. Kerner Smith was named president of the newly formed holding corporation, Deutsche Babcock Technologies.²⁰⁸ In addition to Smith's posts at the helm of Riley and Deutsche Babcock Technologies, he was elected a trustee of Worcester Polytechnic Institute in the fall of 1993.²⁰⁹ Smith was not a graduate of the school, but the company he led had a long relationship with WPI that involved the Rileys, Higgins, Howard Warren, and others. In 1988, nearly five dozen graduates of the school were employed at Riley Stoker.²¹⁰ Smith served on the board for

²⁰⁵ Andi Esposito, "Riley may get new owner, W. German firm to buy stock soon," *Worcester Telegram Gazette*, 05 Apr 1990, C1.

²⁰⁶ Paul P. Heldman, "German company, Riley unite," *Worcester Telegram & Gazette*, 03 Oct 1990.

²⁰⁷ Peter P. Donker, "Riley returning from the brink, Boiler company building backlog," *Worcester Telegram & Gazette*, 21 Aug 1991, C1.

²⁰⁸ Chris Pope, "riley site tapped as hub, Command post for N. America," *Worcester Telegram & Gazette*, 10 May 1993, E1.

²⁰⁹ "WPI names four new trustees, Abdow, Corcoran, Smith, Tardy elected," *Worcester Telegram & Gazette*, 17 Nov 1993, B6.

²¹⁰ Worcester Polytechnic Institute, *Alumni Directory: 1988*.

ten years as the school began a massive campus expansion as well as renovations of many buildings, including Sanford Riley Hall.²¹¹

Michael Bray took over Smith's presidential roles with Riley and Deutsche Babcock in 1994.²¹² The following year, Riley's name was changed to DB Riley Inc. to bring the company closer to its parent company.²¹³ DB Riley, though, was just entering unsteady times. The restructuring and deregulation of the U.S. power market had unfortunate impacts on Riley. Revenue began to fall in 1995 that necessitated 32 layoffs in December of that year.²¹⁴ The company looked to refocus their efforts meaning elimination of some product lines. Riley Construction Inc. and Pace Power Inc., two construction companies owned by Riley, were sold in 1996 to refocus on international and high-tech markets.²¹⁵ Riley, between December 1995 and March 1996, laid off seventy-five employees in total.²¹⁶

In July 1996, the testing facility on McKeon Road in Worcester was chosen to be the global fuel testing facility for Deutsch Babcock. At the same time, Michael Bray received a promotion and John Halloran took his place as president of DB Riley.²¹⁷ Severe internal dysfunction of Deutsche Babcock forced a massive bank-funded reorganization of the company that same year. Company shares plummeted as it reorganized as Babcock Borsig AG.²¹⁸ For the time, Riley's parent found stability.

²¹¹ Worcester Polytechnic Institute, "A Guide to Construction Projects Under Way at WPI," *News*, <http://www.wpi.edu/news/19956/renovations.html> (accessed 12 Apr 2013).

²¹² Sheryl Webbs, "Business People," *Worcester Telegram & Gazette*, 10 Jul 1994, E2.

²¹³ "Local," *Worcester Telegram & Gazette*, 25 May 1995, E1.

²¹⁴ Andi Esposito, "Riley revenue losing steam, Boilermaker plans cutbacks," *Worcester Telegram & Gazette*, 25 Jan 1996, E1.

²¹⁵ Andi Esposito, "DB Riley board OKs selling construction arm," *Worcester Telegram & Gazette*, 17 Feb 1996, B6.

²¹⁶ "Local," *Worcester Telegram & Gazette*, 26 Mar 1996, E1.

²¹⁷ "DB Riley selected global fuel testing facility," *Worcester Telegram & Gazette*, 04 Jul 1996, D2.

²¹⁸ "Shares of DB Riley parent drop amid rumors of fiscal problems," *Worcester Telegram & Gazette*, 06 Jul 1996, B6 and "Deutsche Babcock reorganization brings higher costs," *Worcester Telegram & Gazette*, 15 Oct 1996, E2.

With renewed interest in coal, once again, Riley led the way to “developing environmentally superior, cost-efficient coal-fired boiler[s].”²¹⁹ Riley received two Department of Energy grants in the ‘90s in reducing emissions and designing a state-of-the art coal power plant.²²⁰ By the mid-2000s, coal was gaining greater momentum due to its relatively low cost compared to gas. Additionally, tax credits became available for new technological developments in coal.²²¹ As Riley stayed relevant, however, their parent did not. In 2002, Babcock Borsig disbanded and sold off all of its assets. A private group of investors organized Babcock Power Inc. in Danvers, Massachusetts and purchased all of Babcock Borsig’s North American holdings, including Riley. DB Riley was renamed Riley Power Inc.²²²

Riley’s focus on research and development decreased its need for a large production plant. By the 2000s only the former Union Iron Works plant in Erie, Pennsylvania remained. After functioning for forty-nine years under Riley ownership, the Erie plant ceased operations on Christmas Eve 2009.²²³ The Worcester office at Neponset Street remains the headquarters of Riley Power. For one hundred years, Riley Stoker Corp. and its successors have remained dedicated to the city of Worcester. In 1999, it donated twenty-two acres along the Middle River to the city for a park.²²⁴ The park became part of the Blackstone River and Canal Heritage State Park to recognize the “steam-driven industrial revolution” that Riley took a large part.²²⁵ Riley has also remained active in the legacy of its founder, R. Sanford Riley, and the school he graduated from in 1896.

²¹⁹ Chris Pope, “DB Riley gets grant to build coal plant,” *Worcester Telegram & Gazette*, 18 Oct 1997, A1.

²²⁰ Chris Pope, “DB Riley...”

²²¹ Bob Kievera, “Coal-oriented, Renewed reliance on age-old resource fires Babcock fortunes,” *Worcester Telegram & Gazette*, 30 Nov 2005, E1.

²²² “Business briefs,” *Worcester Telegram & Gazette*, 09 May 2006, E1.

²²³ “Demolition under way at former Riley Stoker plant in Erie,” *Erie Times-News*, 23 Mar 2011.

²²⁴ John J. Monahan, “Twenty-two-acre parcel along river given to city,” *Worcester Telegram & Gazette*, 13 Aug 1999, B1.

²²⁵ “The gift of Riley,” *Worcester Telegram & Gazette*, 12 Apr 1989, A14.

HEALD MACHINE COMPANY

Leander Heald offered to sell his share of L. S. Heald & Son of Barre, Massachusetts in 1903 when his son, and partner, James N. Heald, desired to move the business to Worcester to better access labor, material, and transportation. James had graduated from Worcester Polytechnic Institute in 1884 and had worked in the family business since. He did not have the capital to buy out his father, so he searched for supporters in Worcester. Oliver B. Wood of the Commonwealth Press and John W. Harrington of Harrington & Richardson Arms joined Charles Hill Morgan and his sons Paul B. and Ralph L. in purchasing Leander Heald's share of the company. On the final day of the purchase option, James Heald missed the last train from Worcester to Barre. He and Ralph Morgan, a fellow graduate of WPI, mounted horses with a bag full of money and raced twenty-one miles northwest to Barre.²²⁶

James Heald's grandfather, Stephen, had begun business in Barre in 1826 as a woodworking shop powered by a small brook. The concern expanded to include agricultural equipment such as ox yokes, and plow beams. An iron foundry was built around 1840, the only one for miles. Cheese presses and corncob crackers became two of the many products made at Heald's shop. In 1846, the *Barre Gazette* reported, "Mr. Stephen Heald of this town, one of the most ingenious and enterprising mechanics to be found, has begun the manufacture of Steam Engines at his shop in this village."²²⁷ Stephen's son, Leander S., joined his father in 1864 and the firm became S. Heald & Son. That same year, Leander and his wife, Ann Nichols, had a son James N. Heald. S. Heald & Son sold iron stoves, sash trimmers, hay rakes, and "hay tedders" that tossed freshly cut hay to aid in drying.²²⁸

²²⁶ "Heald Machine Notes 150 Years' Growth," *Worcester Evening Gazette*, 09 Jan 1976.

²²⁷ Heald Machine Company, *Yesterday, Today, Tomorrow: Issued in Recognition of our 125th Anniversary, 1826-1951* (Worcester: Heald Machine Company, 1951), 2-4.

²²⁸ "Heald Machine Notes 150 Years' Growth."

After graduating from WPI in 1884, James took a great interest in the family business. When Stephen Heald passed away in 1887, James joined his father in business under the name L. S. Heald & Son. New items were introduced that focused on industry more than agriculture. Wire drawing and leather crimping equipment began leaving the shop. James began to develop an interest for grinding. He created a lathe attachment for internal and external grinding of lathe centers. He also invented the American Twist Drill Grinder that was used to sharpen the points of drills. By 1903, Leander Heald was 67 years old and slowing down. James was just getting started and wanted to move the company to Worcester. Leander sold his portion of the company to the group of Worcester investors and Heald Machine Company was incorporated August 23, 1903. Paul B. Morgan, president of Morgan Construction Co. and another graduate of Tech, was president, James Heald treasurer and general manager, and John W. Harrington clerk.²²⁹

A small 90-foot by 100-foot building on New Bond Street in Worcester was rented from Charles H. Morgan who formerly used it to manufacture motor trucks. The plant, just opposite the site of Norton Co., employed seventeen workers and carried the same stock as was carried in Barre.²³⁰ Shortly after the move, a six-inch ring and surface grinder was developed for “grinding piston rings for automobile and gas engines.”²³¹ Through this invention, he found that there was a great need in the automobile industry for a machine that could create accurate cylinder bores in engines. The planetary grinding spindle was designed to solve the problem and quickly became a standard machine used in the industry.²³² An article in the *Worcester Magazine* in 1916 remarked, “the most novel feature of this machine is its ability to grind round and straight holes without requiring the work to be rotated, whereas the ordinary type of universal and other

²²⁹ Heald Machine Company, 4-9.

²³⁰ “The Early Years,” *Heald Craftsman* 31, no. 1 (Jan 1976): 1,8, PMF Heald Machine Company, Worcester Historical Museum, Massachusetts.

²³¹ “Model Assembling Shop Added to Plant of Heald Machine Co.,” *Worcester Magazine* (April 1912): 107.

²³² “The Early Years,” 1.

internal grinders require the work to rotate while the grinding wheel travels lengthwise through it.”²³³ This feature was critical as “the work” became larger and could not be practically rotated. Next, an internal grinding machine was developed to grind straight or tapered holes and had adjustable speed and feed controls.²³⁴ In 1908, the Model 70 grinder set a new standard for accuracy. It became the company’s most well-known machine and provided stable sales for many years.²³⁵

With the increasing product line of the Heald Machine Company, it needed to expand its manufacturing plant. In 1907, a 150-foot addition was added to the rear of the building. A new boiler house and coal pocket were constructed at the same time.²³⁶ Successive additions were made in 1909, 1911, 1915, 1916, and 1917 until the plant was over well over 100,000 square foot.²³⁷ The majority of the factory was constructed with “saw-tooth” roofs that allowed natural light to enter the factory during daylight. Artificial lighting was also installed throughout. In the first thirteen years Heald Machine was in business, employment jumped from 17 to 325, nearly 2,000%.²³⁸ World War I provided a great demand for Heald machines used in the production of engines for airplanes and other vehicles. On the 125th anniversary of the company in 1951, an article stated, “practically all the cylinder heads for aviation motors used in World War I by the United States, England, France and Italy were finished on Heald machines.”²³⁹ Employment reached a high of 737.²⁴⁰ In 1917, alone, 1,362 machines were shipped. A sudden downturn, however, quickly followed the boom that accompanied the beginning of the war. The post-

²³³ “The New Plant of the Heald Machine Company,” *Worcester Magazine* (Jun 1916): 141.

²³⁴ “The New Plant of the Heald Machine Company,” 142.

²³⁵ Heald Machine Company, 10.

²³⁶ “The New Plant of the Heald Machine Company,” 142-143.

²³⁷ Washburn, 257-258 and “The Early Years,” 8.

²³⁸ “The New Plant of the Heald Machine Company,” 143.

²³⁹ “Heald Machine Co. Celebrating 125th Anniversary This Week,” *Worcester Telegram*, 09 Sep 1951.

²⁴⁰ Heald Machine Company, 11.

World War I recession led to a 25% drop in machine tool orders in 1919.²⁴¹ Business activity dropped off violently during the early-20's depression. Orders dropped, employees were laid off, and branch offices were closed and consolidated. Heald began to market their machines to small shops all over the country.²⁴²

Heald Machine Company introduced several new machines during the '20s and '30s that looked to meet the needs of a growing metalworking and automobile industry. Hydraulic-fed table machines were introduced in 1922 and greatly increased the speed at which Heald grinders operated. The Size-Matic and Gage-Matic machines provided automatic size control, stopping the grinder when a desired hole size was reached. Centerless grinders allowed for greater concentricity and squareness. The Bore-Matic increased accuracy of boring procedures.²⁴³ In 1927, Heald purchased the grinding machine division of Giddings and Lewis Machine Tool Company of Fond du Lac, Wisconsin. A large addition was added to the New Bond Street plant in 1929 that included a transformer house, entry lobby, and metallurgical lab.²⁴⁴

After nearly three decades in charge of the company, James N. Heald was elected president of Heald Machine Company in 1930. He succeeded John W. Harrington who had served for about five years, himself succeeding the twenty-some-odd year tenure of Paul B. Morgan.²⁴⁵ Heald largely ran all operations of the company from design to manufacturing to sales.²⁴⁶ He did not serve long as president of the company that bore his name. On May 6, 1931, he passed away at home, only sixty-six years old. Since moving his family business to Worcester in 1903, it grew from a 90-foot by 100-foot plant to 300-foot by 600-foot and

²⁴¹ *Heald Craftsman* 31, no. 2 (Feb 1976).

²⁴² *Heald Craftsman* 31, no. 3 (Mar 1976).

²⁴³ Heald Machine Company, 12-14.

²⁴⁴ *Heald Craftsman* 31, no. 4 (Apr-May 1976).

²⁴⁵ *Heald Craftsman* 31, no. 4 (Apr-May 1976).

²⁴⁶ Heald Machine Company, 10.

employed 800 men. He was active in many local organizations, including the Alumni Association of WPI.²⁴⁷ The company Board of Directors adopted a memorial resolution on June 17 that read in part:

Mr. Heald's earnest and unremitting effort toward the perfection of grinding processes and machinery gained for him and the Company an international reputation and established the Company as the foremost builders of [grinding] machines.

Endowed with great gifts of invention, fine courage and held strong friendships, his career has been an outstanding one and his success notable.²⁴⁸

James Heald left four sons: Roger N., Richard A., Robert S., and Stanley W. All four attended WPI. Roger and Richard were members of the class of 1920, but withdrew during WWI. Robert graduated in 1929. Stanley was in the class of 1932, but never graduated.²⁴⁹ The reason for his withdrawal from the school is undocumented, although it may have been due to his father's death. The eldest boys joined Heald Machine in 1919, followed by Robert ten years later.²⁵⁰ Stanley died in 1936 at the age of 28, a great loss of mechanical genius.²⁵¹ At Heald, Roger became treasurer in 1927 and succeeded his father as president in 1931. He would lead the company over the following eighteen years of growth and change.²⁵²

When the Great Depression finally settled into Worcester, Heald was faced with the prospect of rebuilding the company from the ground up. A "cooperative agreement" was announced with Cincinnati Milling Machine Company in 1932. That year was one of the worst in company history. Between thirty and fifty percent of the workforce was released due to decreased sales while half of the remaining employees worked every other week. Additionally,

²⁴⁷ "Established Machine Firm Bearing Name," Clipping from Worcester Historical Museum, 07 May 1931.

²⁴⁸ Heald Machine Company, 15.

²⁴⁹ WPI Media Relations, "WPI Students Receive Heald Scholarships," *News Releases* <http://www.wpi.edu/news/19956/heald.html> (accessed 23 Apr 2013).

²⁵⁰ "The Early Years," 8.

²⁵¹ Heald Machine Company, 15.

²⁵² "Roger Heald Of Tool Firm Dies at 64," *Worcester Telegram*, 26 Jun 1961.

company pay rates and premiums decreased.²⁵³ Stability, though, returned within a couple of years. Two large additions were built in 1937 and 1939, with an office building added to the front of the plant in 1940 yielding a total floor space of 350,000 square feet.²⁵⁴

The war years in the 1940s proved to be very prosperous for Heald. Even with a recently expanded plant, it purchased additional space on Prescott Street that was formerly the Sherman Envelope Company plant.²⁵⁵ As in World War I, Heald machines were used for engines in airplanes, tanks, trucks, and other “implements of modern war.”²⁵⁶ Employment reached 3,600 at one point between '41 and '45.²⁵⁷ Following the war, Roger Heald worked with Ed Duffy, of Coghlin Electric Company, in developing plans for relighting the entire Heald Machine plant. The pair aimed to “improve employee morale and productivity and to ensure a better quality product,” by installing good lighting.²⁵⁸ In the latter part of the decade, Heald introduced a line of eighteen new grinding machines. The machines mainly focused on improving accuracy, finish, and production.²⁵⁹

Richard Heald, treasurer of Heald Machine, succeeded his elder brother to the presidency of the company in 1949. Roger became chairman of the board, while Robert became vice president and secretary.²⁶⁰ In 1950, three miles of piping was installed on the roof of the Heald factory to aid in cooling of the factory floor. When the roof reached 82 degrees Fahrenheit, the system turned on. Evaporation of the water significantly cooled the factory. The system was one of a kind in Worcester, and greatly improved working conditions at Heald.²⁶¹ A \$1.5

²⁵³ *Heald Craftsman* 31, no. 5 (Jun 1976).

²⁵⁴ “The Early Years,” 8.

²⁵⁵ “Sherman Envelope Building Bought By Heald Co.,” *Worcester Telegram*, 22 Apr 1942.

²⁵⁶ “Heald Machine Co. Celebrating 125th Anniversary This Week,” *Worcester Telegram*, 09 Sep 1951.

²⁵⁷ “Heald Co. to Note 50 Years in City,” *Worcester Telegram*, 11 Oct 1953.

²⁵⁸ Dickinson, 57.

²⁵⁹ “Heald Co. Develops 18 New Grinding Machines,” *Worcester Telegram*, 16 Nov 1947.

²⁶⁰ “Heald Machine Co. Celebrating 125th Anniversary This Week.”

²⁶¹ “Heald Factory Using New Cooling System,” *Worcester Evening Gazette*, 29 Aug 1950.

million, 50,000 square foot expansion was planned the following year to meet increased demand. The addition, completed in 1952, allowed 200 additional workers to be hired.²⁶²

Heald celebrated its 125th anniversary in 1951 and its 50th anniversary in Worcester in 1953. The company James N. Heald brought to Worcester in 1903 with 17 workers had grown to employ 2,000, with peak employment at 3,600 during WWII. James' three surviving sons ran the company. Two grandsons, James N. II and Philip B., also worked at Heald Machine.²⁶³ James I and all of his sons had attended WPI, two of which graduated from the school. In 1941, the Heald Machine Company sponsored drafting rooms in the new mechanical engineering building on WPI's campus that was named after Milton Prince Higgins.²⁶⁴ Additionally, the Heald Brothers Scholarship was created on behalf of a generous donation from the Heald family. The scholarship annually provides full tuition for a junior and senior mechanical engineering student.²⁶⁵

Unexpectedly, in 1955, Heald Machine Company was sold to Cincinnati Milling Machine Company. There were no indications of the transaction before Roger Heald made the announcement. He said that the sale was to provide "the best way of assuring the growth of the business and the well-being of Heald people."²⁶⁶ Cincinnati Milling Machine Company was founded in the 1880s and grew to become the world's largest machine tool manufacturer with international subsidiaries in England and the Netherlands. Heald had worked closely with the company since the '30s. As part of the deal, Richard Heal stepped down as president of Heald, and Carl F. Roby, a Cincinnati vice president and director, succeeded him. Heald was to remain

²⁶² "Heald's Plans \$1,500,000 Addition," *Worcester Telegram*, 25 Apr 1951.

²⁶³ "Heald Co. to Note 50 Years in City."

²⁶⁴ "Who Made Higgins Laboratories Possible?" *Building on Tradition*

<https://www.wpi.edu/academics/library/history/higginslabs/sect7.html> (accessed 23 Apr 2013).

²⁶⁵ "WPI Students Receive Heald Scholarships."

²⁶⁶ "Heald Machine Now Subsidiary; Cincinnati Concern Buys City Industry," *Worcester Telegram*, 27 Aug 1955.

a separate subsidiary and continue under the Heald Machine name. At the time of the sale, Heald was the fourth largest employer in Worcester after Norton, American Steel & Wire, and Wyman-Gordon.²⁶⁷ After four generations of ownership and management, the Heald company had transferred out of the family.

Following the sale, Heald continued to improve on its machines and develop new ones. In 1956, a two-story tall, 100,000-pound machine was created to automatically finish the main transmission case of a Buick Dynaflo at a rate of one per minute. The Dynaflo was an automatic transmission manufactured by Buick.²⁶⁸ The following year, Heald developed a machine for missile, aircraft, electronic, and instrument producers.²⁶⁹ Termed the “building block” finishing machine, it won Heald an award from the Mill & Factory magazine in May 1957.²⁷⁰ When lighter European cars gained a foothold in America in the late-‘50s, Heald looked to expand into that market.²⁷¹ In 1960, a universal tool machine was developed for “jet-age travel.” The machine, made for United Airlines, could work on pieces up to 52-inches around and 48-inches tall. It was the largest single unit ever produced by Heald up to that point.²⁷²

Carl Roby retired from Heald in 1960. Lawrence H. Cousineau, of Cincinnati, was elected to succeed him. Cousineau started with Heald in 1946 and climbed the corporate ladder to become assistant treasurer, financial division head, vice president of sales, and finally director in 1955. He moved to Cincinnati in 1958 when he became a vice president of Cincinnati Milling Machine.²⁷³ Cousineau remained in Ohio, though, and only served three years as

²⁶⁷ “Heald Machine Now Subsidiary.”

²⁶⁸ Joseph H. Gauthier, “Heald Co. Develops Two-Story Machine,” *Worcester Evening Gazette*, 12 Jul 1956.

²⁶⁹ “Heald Machine Co. Has 2 New products,” *Worcester Evening Gazette*, 30 Apr 1957.

²⁷⁰ “Heald Co. Product Wins Trade Award,” *Worcester Evening Gazette*, 08 May 1957.

²⁷¹ “Heald Co. Is Bidding On Small Car Tools,” *Worcester Evening Gazette*, 10 Jul 1958.

²⁷² “Heald’s 1st ‘Jet-Age’ Machine Is Shipped,” *Worcester Evening Gazette*, 04 Mar 1960.

²⁷³ “Cincinnati Man Is Elected Heald President,” *Worcester Evening Gazette*, 29 Apr 1960.

president of Heald. Hartwell G. Howe followed him as president in 1963. Howe was also a long time Heald employee, starting with the company in 1939.²⁷⁴ He, too, only remained president for a short time. Alfred T. Blackburn was elected in his place in 1964.²⁷⁵ After four additional years, Thomas L. Nenninger was elected president when Blackburn was promoted to chairman of Heald. Nenninger was originally with Cincinnati Milling Machine, but transferred to Heald in 1965.²⁷⁶

During the many administrative changes in the 1960s, the sons of James N. Heald I saw their leave from the company. Roger Heald died in 1961, and Richard retired as chairman in 1964 after forty-five years with the company. Richard lived until 1980 and remained active in Worcester society.²⁷⁷ The only Heald that remained with the company was James N. Heald II, the son of Richard. Heald II graduated from Yale School of Engineering and Harvard Graduate School of Business Administration. He was named a vice president at Heald in 1965 and also managed the grinding division, among others. In 1967, he was named a director at the company. In the same announcement, Philip E. Meany, a WPI graduate, was made a vice president.²⁷⁸

Growth and innovation continued throughout the 1960s. A new grinder was developed in 1963 that was heralded as the most significant advancement in grinding in over a half century. Controlled-force grinding functioned at a constant force, opposed to a constant rate. In this fashion, the finish was regulated by pressure and was much better for repeatability and grinding wheel life.²⁷⁹ The new invention was one of ten winners of the 1964 Master Design Award

²⁷⁴ "Officers at Heald Machine," *Worcester Evening Gazette*, 15 Jan 1963.

²⁷⁵ "New President at Heald," *Worcester Evening Gazette*, 11 Mar 1964.

²⁷⁶ "Nenninger Names President of Heald," *Worcester Telegram*, 08 May 1968.

²⁷⁷ "Roger Heald..." and "Richard A. Heald..."

²⁷⁸ "Heald Machine Names Officers," *Worcester Evening Gazette*, 29 Oct 1965 and "James Heald II Named Director At Heald Co.," *Worcester Telegram*, 06 Mar 1967.

²⁷⁹ "Heald Sees revolution In New Grinder," *Worcester Telegram*, 25 Sep 1963.

sponsored by *Product Engineering*, a McGraw-Hill publication.²⁸⁰ Doctor Robert S. Hahn, the research department manager at Heald, was awarded the American Society of Tool and Manufacturing Engineers 1967 research Medal for his work in the development of controlled-force grinding.²⁸¹ In 1965, the first clean room in use in the machine tool industry was installed at Heald. New tolerances were becoming so low that even air particulate was not acceptable. Air was filtered to two microns. The clean room was part of a five-year, \$2.5 million capital improvement program at Heald.²⁸² Research and development proved phenomenally successful for Heald in the 1960s and would help during the rough times to follow.

The early 1970s was one of the worst times in the machine tool industry since the Great Depression. Employment at Heald was cut twenty-five percent to 1,100 in the beginning of 1971.²⁸³ High productivity and new products led to a slight rebound in 1972, with 110 workers being added.²⁸⁴ Advancements in numerically controlled machines helped with the rebound. In the fourteen years since introducing numeric control, Heald had grown to offer twenty-one machines operated by it.²⁸⁵ The company was named Employer of the Year by the Governor's Commission on Employment of the Handicapped in 1975. The commission found that Heald provided the "same benefits to disabled employees that are available to able-bodied workers." A cafeteria, hospital room, library, and training program were all offered to Heald employees.²⁸⁶

²⁸⁰ "Heald Wins design Prize For Grinder," *Worcester Telegram*, 27 Apr 1964.

²⁸¹ "Heald Machine Official To Be Given Award," *Worcester Evening Gazette*, 19 Apr 1967.

²⁸² "Clean Room' for Machine Tools," *New York Times*, 03 Aug 1965.

²⁸³ Roscoe C. Blunt Jr., "Heald Sales Down; Volume Nursed By New Designs," *Worcester Evening Gazette*, 15 Jan 1971 and Lee Merkel Jr., "Heald Reports 'Poor Year,'" *Worcester Telegram*, 15 Jan 1972.

²⁸⁴ "Heald Shares Industrial Rise," *Worcester Evening Gazette*, 12 Jan 1973.

²⁸⁵ "Controlled Machine Centers Help in Production at Heald," *Worcester Business Review*, 11 Jan 1974.

²⁸⁶ Sylvia Glickman, "Cincinnati Milacron Named 'Employer of Year,'" *Worcester Telegram*, 04 Jan 1975.

By the close of the decade, Heald had several good years on the books. New machines that kept pace with the changing market were cited as the remedy.²⁸⁷

Expansion followed in the 1980 and 1981 with new machines and plant additions. A 100-foot by 240-foot addition at a cost of \$1.3 million would be the site of additional assembly and testing. The addition allowed for larger cranes and machinery. By '81, employment was up to 1,340.²⁸⁸ Thomas Nenninger stepped down as president of Heald that year and was replaced with Alfred J. Purcell Jr. Purcell joined Heald in 1957 and most recently was vice president of manufacturing.²⁸⁹ He would lead Heald Machine into the most difficult decade it had ever experienced.

Beginning in 1982, the following ten years saw a continual decline with only one short period of reprieve. One hundred positions were eliminated during the first half of 1982. During the summer, all 1,100 remaining Heald employees were furloughed for two non-consecutive weeks without pay in addition to the traditional two-week summer shutdown.²⁹⁰ In 1983, all non-managerial positions at Heald received an eight percent pay cut, while managers' pay was cut ten percent.²⁹¹ Continued layoffs and losses by attrition reduced the Heald workforce from 1,200 in 1982 to 800 in 1985.²⁹² Even though Heald's parent that now went by Cincinnati Milacron invested greatly in an \$83 million restructuring effort, the dramatic decline in the machine tool industry could not stop further cuts. By 1988, employment was down to 675, just

²⁸⁷ "Heald-Milacron reports Rise," *Worcester Evening Gazette*, 10 Jan 1975 and "Heald Meeting an Increased Demand," *Worcester Telegram*, 13 Jan 1979.

²⁸⁸ "Heald Plans for Expansion," *Worcester Telegram*, 10 Jan 1981 and "Cincinnati Milacron Opens Heald Division Plant Here," *Worcester Evening Gazette*, 08 May 1981.

²⁸⁹ "Marlboro Man Elected New President of Heald," *Worcester Telegram*, 13 Jan 1981.

²⁹⁰ "Heald Machine Company Furloughs 1,100 Employees," *Worcester Evening Gazette*, 13 Oct 1982.

²⁹¹ "8% Pay Cuts Are Ordered At Heald," *Worcester Telegram*, 28 Jun 1983

²⁹² David P. Kowal, "Heald Plans More Job Cuts; Machine Tool Business Sags," *Worcester Telegram*, 14 Nov 1985.

more than half of what it was six years earlier.²⁹³ The Milacron restructuring, nevertheless, provided temporary relief of its Worcester subsidiary.

Heald was named a “focus factory” in 1988 for the production of all computer-controlled grinding machines. Many products manufactured at the company for years were transferred, while other products were moved in.²⁹⁴ Milacron also invested \$3.5 million in plant improvements. Business began to rebound in late-’88 and early-’89. Heald had survived the worst years of the ‘80s. Between 1982 and 1988, one quarter of machine tool companies in America had folded, eliminating over 44,000 jobs. New management took over when Alfred Purcell retired as president in ’88. Richard Crossman, a Heald employee since 1967, was appointed. Developments in artificial intelligence and centerless grinding gave a general feeling of optimism at Heald.²⁹⁵ The feeling was not to last.

A rapid succession of layoffs and furloughs began in December 1989. Twenty-nine positions were eliminated at that time.²⁹⁶ Crossman resigned two months later, and was replaced with a Milacron vice president, Alan Shaffer.²⁹⁷ Shaffer oversaw an additional ninety-four cuts to reduce costs and increase competitiveness in the spring of 1990.²⁹⁸ He appointed Douglas Henderson president at the end of the summer. Henderson was previously president of a Connecticut company.²⁹⁹ Fifty more employees were laid off before Cincinnati Milacron announced their plans to “shed” Heald. The plant and three of four product lines were put up for

²⁹³ Dave Maney, “Strategy to benefit Heald,” *Worcester Evening Gazette*, 23 Feb 1988.

²⁹⁴ Maney, “Strategy to benefit Heald.”

²⁹⁵ Walter H. Crockett Jr., “Heald, machine tool industry on way back from hard times,” *Worcester Telegram & Gazette*, 01 Feb 1989 and Peter P. Donker, “Heald finds its way back,” *Worcester Telegram & Gazette*, 23 Apr 1989.

²⁹⁶ “Heald lays off 29 full-time workers,” *Worcester Telegram & Gazette*, 02 Dec 1989.

²⁹⁷ Peter P. Donker, “Crossman resigns as chief of Heald,” *Worcester Telegram & Gazette*, 09 Feb 1990.

²⁹⁸ Andi Esposito, “Heald lays off 94 employees; Restructuring plan affects all levels at machine tool maker,” *Worcester Telegram & Gazette*, 06 Apr 1990.

²⁹⁹ “Henderson appointed head of Heald Corp.,” *Worcester Telegram & Gazette*, 28 Aug 1990.

sale in 1991. If no buyer was found, the plant would close at the end of the following year.³⁰⁰ Foreign competition and a decline in the American automotive industry spurred the decision. Henderson expected the company to be purchased by an overseas conglomerate, but a potential buyer was found closer to home.³⁰¹ Olofsson Corp. of Lansing, Michigan began talks to purchase Heald in 1991 and planned to announce the final agreement at the beginning of '92. Company officials were confident that the sale would go through.³⁰² The agreement did not come. In March 1992, Henderson returned to Cincinnati and Arthur Brekenridge was named interim head of Heald. Since the potential sale was announced, layoffs continued. Employment now hovered around 250. It had been 550 only five months before. One employee described the 500,000 square foot plant as a ghost town.³⁰³ Finally, in April, an announcement came. Olofsson could not secure financing for the purchase. Heald Machine Company would close within months.³⁰⁴ Employment peaked in WWII at 3,600 and had dropped to 1,900 by the time of the acquisition by Cincinnati Milling Machine Company in 1955. Heald entered the 1980s with 1,300 workers and all but 160 were let go before the final decision was announced.

With the slow decline, the company and the Heald family remained involved in Worcester and WPI affairs. In 1983, the company worked with the school in developing a robot-controlled system for milling machine parts.³⁰⁵ Forty-six WPI alumni were employed at Heald in 1988.³⁰⁶ James N. "Jim" Heald II, son of Richard and grandson of James N. Heald I, was

³⁰⁰ Peter P. Donker, "Heald lays off 50 workers; Officials: Unpaid furloughs, more layoffs are possible," *Worcester Telegram & Gazette*, 21 Jun 1991 and Kathleen Pierce, "Heald up for sale, or could be closed; 550 workers told of possible deadline," *Worcester Telegram & Gazette*, 20 Sep 1991.

³⁰¹ Peter P. Donker, "Heald is casualty of market; Imports tough competition," *Worcester Telegram & Gazette*, 06 Oct 1991.

³⁰² Peter P. Donker, "Mich. Firm eyes Heald," *Worcester Telegram & Gazette*, 07 Jan 1992.

³⁰³ Peter P. Donker, "Heald set to lay off 70 workers; More cuts are planned while sale talks continue," *Worcester Telegram & Gazette*, 27 Mar 1992.

³⁰⁴ Peter P. Donker, "No buyer; Heald Co. will close," *Worcester Telegram & Gazette*, 21 Apr 1992.

³⁰⁵ Christopher H. Schmitt, "WPI, Heald Unveil a Robot System," *Worcester Evening Gazette*, 07 Dec 1983.

³⁰⁶ Worcester Polytechnic Institute, *Alumni Directory: 1988*.

elected a trustee of WPI in 1967. He was befuddled why his father or uncle had not been asked, but he agreed to serve. In his words, he joined the “tall dogs” of Worcester that served on the board. They included, among others, Milton Higgins and Robert Stoddard.³⁰⁷ Even though Jim had not attended WPI, he quickly became very involved in the operations of the board. During his thirty-one years on the board, he oversaw the construction of the Ellsworth and Fuller apartments, as well as Founders Hall and Fuller Laboratories. After his retirement from Heal Machine Company, he was able to dedicate a great deal of his time to the renovations of Boynton Hall and Higgins Laboratories, where his father and uncles had sponsored drafting rooms. The closing of West Street and construction of the Campus Center would not have been possible without his direction. In honor of his dedication to WPI, he was awarded the 1999 WPI Award.³⁰⁸ The Healds focused on their Worcester business for nearly a century, but always found the time to give back to the community and the school that made their successes possible.

³⁰⁷ James N. Heald II, telephone interview with author, 29 Jan 2013.

³⁰⁸ “James N. Heald II,” *Past Award Recipients* <http://www.wpi.edu/Images/CMS/Alumni/jheald.pdf> (accessed 25 Apr 2013).

JAMESBURY CORPORATION

The Freeman family of Winthrop, Massachusetts was hit hard by the Depression. Eli Freeman's Boston clothing manufactory was one of the victims of the crash. Eli's youngest son, Howard, helped the family by cleaning floors for thirty-five cents. After graduating first in his class from Winthrop High School, Howard Freeman received scholarships to MIT, RPI, and WPI. He wanted to go to RPI because it was the farthest away. His mother, Celia, wanted him close to home at MIT. They compromised on WPI in Worcester.³⁰⁹ He arrived at Union Station in the late summer of 1936 and, throwing his one bag over his shoulder, walked to his new home for the next four years; the ten-cent trolley fare was too expensive. Thirty-three years later, after being elected to the WPI Board of Trustees, Howard returned to his home on Montclair Drive the same way.³¹⁰

Howard Freeman's first memories of Worcester Polytechnic Institute and the city were joining the football team and going to Wintraub's Jewish Deli for a corned beef sandwich.³¹¹ He worked his way through school washing dishes at a boarding house on the corner of Highland Street and Schussler Road near campus. In 1940, he graduated with a degree in Mechanical Engineering. The dean of engineering, Francis Roys, called him into his office and told him that a company named Rockwood Sprinkler was interviewing for a new position. Roys told Freeman: "They are looking for someone as crazy as you are."³¹² Howard interviewed at Rockwood and was hired at the head of its new Research & Development department. The pay was modest, but there was room for growth.³¹³

³⁰⁹ Howard G. Freeman, interview by Worcester Historical Museum, transcript in clipping file, 1997-1998.

³¹⁰ Mary A. C. Fallon, "Tinkerer/Freeman-the Drive Behind Jamesbury," *Worcester Telegram*, 30 Mar 1982.

³¹¹ Freeman, interview by Worcester Historical Museum.

³¹² Howard G. Freeman, interview by author, 19 Jan 2013.

³¹³ Freeman, interview by author.

George Ichabod Rockwood founded Rockwood Sprinkler Co. in 1906. He was the grandnephew of Ichabod Washburn and cousin of Charles G. Washburn, the author of *Industrial Worcester*. Rockwood grew up in the Boston area and attended Phillips Academy in Andover. He started at Worcester Polytechnic Institute at age 17 and graduated three and a half years later in 1888. The first four years of his employment was at Wheelock Engine Company where he climbed from “draughtsman” to inside superintendent of the works.³¹⁴ Wheelock was founded and run by Edward K. Hill and Edward F. Tolman, who were both members of WPI’s first class of graduates in 1871.³¹⁵ While at Wheelock, George Rockwood wed Ellen T. Cheever, the niece of the second wife of Ichabod Washburn.³¹⁶ Rockwood left Wheelock in 1893 and worked as an independent mill engineer in Worcester for over a decade. His work in the city’s many mills got him thinking of ways to improve the automatic sprinkler.³¹⁷

The automatic sprinkler was first used in the 1880s, but many saw it as a nuisance due to its malfunctioning and causing water damage when there was, in fact, no fire. Rookwood took John P. Ashley, a local plumber, as a partner to perfect the device. They developed a sprinkler with a unique solder link that would only open if there were a fire. The two incorporated the Worcester Fire Extinguisher Co., later renamed Rockwood Sprinkler Co., in 1906, and operated out of the barn behind Rockwood’s house, the former Washburn Mansion. The sprinkler became enormously successful within only a couple years. The company moved to 38 Harlow Street in 1910. After the Triangle Shirtwaist Factory fire in 1911, every industrialist installed automatic sprinklers in their factories. Between then and 1918, business volume doubled each year.

³¹⁴ Charles Nutt, “George Ichabod Rockwood,” in *History of Worcester and its People* (New York: Lewis Historical Publishing Company, 1919), 3:122.

³¹⁵ Washburn, 223, 308.

³¹⁶ “Death Follows Lengthy Illness,” *Worcester Evening Gazette*, 06 Apr 1933.

³¹⁷ Nutt, “George Ichabod Washburn,” 3: 122.

Operations expanded to Chicago, Los Angeles, and Montreal.³¹⁸ When his cousin penned *Industrial Worcester* in 1919, he reported that there were nine graduates of Worcester Polytechnic Institute at Rockwood Sprinkler.³¹⁹

In 1930, George Rockwood sold his company to the Gamewell Co. of Newton Upper Falls, Massachusetts and stepped down as president.³²⁰ He however, stayed active in civic affairs. He taught as a professor of steam engineering at WPI from 1906 to 1908 and was elected a trustee at the institution in 1915. Rockwood also led the Alumni Association when Alumni Field and Alumni Gym were under construction.³²¹ He also was active in other local organizations and the American Society of Mechanical Engineers.³²²

When Howard Freeman joined Rockwood Sprinkler as head of the new research and development department, he was assigned to H. Clayton Kendall, a 1908 graduate of WPI and vice president at Rockwood.. When Freeman asked Kendall what he should work on, Kendall told him, “you’re the head of research and development, figure it out for yourself.” Freeman was exultant. He chose to work on developing an effective spray nozzle. There was none on the market, so he had to start from scratch. Professor Karl Meissner of the WPI Physics Department helped in the Rockwood lab as a guest worker.³²³ Meissner, who was expelled from the University of Frankfurt in 1937 because he was married to a Jewish woman, came to WPI in the fall of 1938.³²⁴ At Rockwood, he worked on the relationship between water drop size and

³¹⁸ H. C. Kendall, “Reducing Fire Wastes and Fire Risks,” *Worcester Magazine*, Clipping from Worcester Historical Museum and “A Humble Beginning,” *Rockwood Rambler* 8, no. 2 (Feb 1954), box 1, folder 7, Rockwood Sprinkler Collection, Worcester Historical Museum, Massachusetts.

³¹⁹ Washburn, 284.

³²⁰ “A Humble Beginning.”

³²¹ Herbert Foster Taylor, *Seventy Years of the Worcester Polytechnic Institute* (Worcester: Davis Press, 1937), 399.

³²² “George I. Rockwood Funeral Is Tomorrow,” *Worcester Telegram*, 31 Oct 1959.

³²³ Freeman, interview by author.

³²⁴ University of Frankfurt, “Karl Meissner,” *Physics* <http://www.physik.uni-frankfurt.de/paf/paf112.html> (accessed 20 Apr 2013).

infrared absorption. He and Freeman discovered that a spray of water would not conduct electricity, a discovery that proved to be crucial in the coming years.³²⁵

A letter arrived at Rockwood Sprinkler in the spring of 1942 from the U.S. Navy. They were hosting a conference in Washington, D.C. for everyone in the fire protection field. Howard was called into the Rockwood's main office by the company's president, William J. Carroll. Carroll told Howard that he had to go. At just twenty-three years old, he was nervous, so a senior staff member accompanied him. In D.C., the Navy informed the attendants that they were losing more ships to oil fires than anything else. Previously, ships had been fueled by coal, and the firefighting equipment on board could not extinguish oil fires. Howard returned to Worcester and began working on a solution. He recalled, "it was wartime....people really cooperated." Within a couple of months, he traveled to the Navy Yards at Norfolk, Virginia to test the water fog nozzle he had conceived. The results were "spectacularly successful" and Commander Harold Burke, the head of Naval safety, ordered one hundred full sets when they arrived back in Washington.³²⁶

Towards the end of summer, Howard received a call from Commander Burke. He asked Howard if it was possible to get a dozen of each size of nozzle by the next morning. Burke told him that it was very important, but could not say more. The following morning Howard packed a dozen of each nozzle set and drove to Quonset Point Naval Air Base with his wife, Esther, and his older brother. Burke signed a receipt for the nozzles and the two parted. A few weeks later, Howard received another call from Burke. He told him that the nozzles were flown to the USS *Wakefield* that was on fire off the coast of Nova Scotia. Freeman's water fog nozzles saved the

³²⁵ Freeman, interview by author.

³²⁶ Freeman, interview by author.

ship. He remembered that after that, “the Navy went wild” and the aircraft carrier became extremely successful.³²⁷

WPI professors Victor Siegfried and Hobart Newell worked with Howard and Rockwood Sprinkler to determine the effect the water fog nozzle had on high voltage transformers. Siegfried conducted his electrical experiments on the lawn in front of Atwater Kent Laboratories on Tech’s campus. Professor Morton Masius also helped in infrared investigations. It was not until years later that Howard found out all of the work was part of the Manhattan Project.³²⁸

Commander Burke called again in 1943: “Howard, I want you on a morning flight at LaGuardia, there’s a reservation for you. You have to make it!” In Washington, Freeman was briefed on kamikaze attacks and the problems dealing with gasoline fires. His water fog nozzle was no match for the new problem that was claiming many ships, particularly aircraft carriers. The Navy believed that the fires could be extinguished with a fog of foam, but they could only produce a straight stream that was dangerous to use on gas. Howard had never worked with foam, so he was taken to the Naval Research Lab in Arlington, Virginia to learn everything he could about protein-based foam created from soybeans and fish scales.³²⁹ He called Esther and told her he was on a secret mission and would be home as soon as he could. The solution that he pictured in his mind was based on pure creativity. An old airplane body was covered with hundreds of gallons of gasoline and ignited at the Rockwood Sprinkler testing ground. The fog foam nozzle extinguished the fire in seconds. “Some inventions are progressions – some are wow!” Howard remembered of the test.³³⁰

³²⁷ Freeman, interview by author.

³²⁸ “An Inventor’s Tale: The Story of Howard Gilbert Freeman,” http://www.wpi.edu/Images/CMS/News/Howard_Freeman_2.pdf (accessed 20 Apr 2013) and Freeman, interview by author.

³²⁹ Freeman, interview by author.

³³⁰ Freeman, interview by Worcester Historical Museum.

The water fog and fog foam nozzles saved thousands of lives throughout World War II and had an immeasurable impact on the outcome. The fog foam nozzle became the standard for crash-rescue operations at airports around the world. Freeman also solved the problem with powder bags for long-range guns falsely igniting on assembly lines. In the fourteen years Freeman was with Rockwood Sprinkler, he patented twenty-two inventions in total.³³¹ The research and development department had grown to a dozen engineers during his time at the helm. Howard, nevertheless, wanted to work on inventions that were used for good, not just disasters. He also had a strong desire to run his own company.³³²

Throughout his years at Rockwood, Freeman worked with ball valves. They were difficult to use, often leaked, and only functioned in one direction. The “jamseat” valves produced by Rockwood Sprinkler accounted for less than ten percent of company sales in 1953. Freeman had thought about ways to improve upon the ball valve, and even approached Rockwood management about doing so. They were not interested, but he saw them as the way of the future. In the fall of 1953, Howard spoke with his friend, Saul Reck, about starting a business that would manufacture ball valves. Reck obtained \$60,000 in commitments if Freeman were to start such a business. Howard Freeman offered his letter of resignation from Rockwood Sprinkler and left on January 25, 1954. Four days later, Jamesbury Corporation drafted articles of incorporation.³³³

Twenty-five Worcester investors purchased \$85,000 in stock by February 2.³³⁴ Howard began designing a new ball valve “like a housewife that is a perfect cook without owning a

³³¹ Freeman, interview by Worcester Historical Museum.

³³² “An Inventor’s Tale.”

³³³ Jamesbury Corporation v. United States, 518 F.2d 1384 (1975) <http://federal-circuits.vlex.com/vid/jamesbury-corporation-the-united-states-38401543> (accessed 20 Apr 2013).

³³⁴ “An Inventor’s Tale.”

cookbook,” using ideas and natural abilities.³³⁵ By the end of February, 1954 he had completed his initial plans and a lab was set up at 15 Union Street to test the valve design.³³⁶ The first prototypes proved unsuccessful at the end of March. Oscar Vaudreuil, a machine shop owner in Worcester, offered suggestions on the design of the valve seat.³³⁷ Their design included a flexible Teflon valve seat that created a leak-proof seal in both directions. Freeman’s ball valve was the first bidirectional ball valve invented.³³⁸ It was tested under different temperatures, pressures, hydraulic and pneumatic conditions, and over an extended period. The valve seat adjusted to the conditions and the valve did not leak.³³⁹ The engineer and mechanic, like Rockwood and Ashley, had innovated an existing product into a product that would change the world.

Jamesbury’s early success was due to meticulous planning by a triumvirate made up by Freeman, Saul Reck, and Freeman’s older brother, Julian. Howard and Julian had completed a “lengthy conversation about the technical details of incorporation” when Julian finally asked, “By the way, what are we going to manufacture?” Julian focused on the company’s marketing plan while Saul created the financial plan.³⁴⁰ Reck’s estimated costs and sales for the first two years of business were within five percent of the actual figures.³⁴¹ Julian’s marketing plan set out to avoid business with utilities, the government, and the petroleum industry. Those particular industries took too long to change. Jamesbury valves would only be sold to distributors and not directly to companies. Distributors, however, had to agree to certain rules before carrying the

³³⁵ Timothy G. Holden, “New Valve Design Built on Solid Base,” *Christian Science Monitor*, 11 Jun 1958.

³³⁶ William T. Clew, “Ball-Valve Maker Sees Bright Future,” *Worcester Evening Gazette*, 30 Jan 1962.

³³⁷ Jamesbury Corporation v. United States.

³³⁸ Greg Johnson, “The Great Teflon War,” *Valve Magazine* 25, no. 1 (Winter 2013): 42-43.

³³⁹ Holden, “New Valve Design...”

³⁴⁰ “An Inventor’s Tale.”

³⁴¹ Holden, “New Valve Design...”

Jamesbury line.³⁴² Small descriptions were placed in trade journals, and over 1,000 inquiries were received.³⁴³ On naming the company, Howard Freeman chose to name it after his home at 8 Jamesbury Drive that functioned as the first office. He did not want people following him, but instead, he “wanted to identify goals and have people go with me to those goals.”³⁴⁴

After setting up a manufacturing testing plant at 383 Shrewsbury Street, Jamesbury Corp. moved to 62 Millbrook Street in 1955. The plant on Millbrook was the first commercial manufacturing plant to produce Jamesbury valves. The first full year of business, 1955, posted sales of \$35,400 with only six employees.³⁴⁵ Two years later, employment had jumped to forty-two. That year, Jamesbury added plastic valves to its expanding product line. In addition to valves of bronze, steel, stainless steel, and aluminum, a line of remote controlled devices to operate valves was developed by the engineering department. Operated by air and electricity, the controls allowed valves to be open and closed from anywhere. The growth of the first two years of manufacturing forced the company to build larger quarters at 45 New Street, right next to the Rockwood Sprinkler plant.³⁴⁶ Sales were \$821,400 in 1957 and \$1,345,700 in 1958.³⁴⁷ The New Street plant was expanded twice, but Jamesbury kept growing.³⁴⁸ A two-part article that appeared in the *Christian Science Monitor* in 1958 noted that Jamesbury was able to increase sales by \$1.5 million for every \$100,000 invested in plant expansion and equipment procurement. By that point, the valves had proven themselves on the market. Sales engineers were trained to visit companies and find solutions for their problems using the Jamesbury valve. Jamesbury products soon became a standard product on the market. “This satisfaction of the

³⁴² Freeman, interview by author.

³⁴³ Jamesbury Corporation v. United States.

³⁴⁴ Fallon.

³⁴⁵ Clew.

³⁴⁶ “City Company Now Producing Plastic Valves,” *Worcester Evening Gazette*, 07 Nov 1957.

³⁴⁷ Clew.

³⁴⁸ “Julian Freeman, 58; Jamesbury Founder,” *Worcester Evening Gazette*, 14 Apr 1975.

buyer, producer, and owner shows up at the end of each year on the financial statements and is called good business.”³⁴⁹

In 1957, Raymond G. DesRochers, a graduate of WPI in 1935, called Howard Freeman at Jamesbury. He worked at the Portsmouth Navy Yard and was working on the USS *Thresher*, a nuclear-powered attack submarine. DesRochers asked if he could pay Freeman a visit in Worcester. After asking if he had security clearance, DesRochers told Freeman that there were no valves on the market that could be used in the *Thresher*. All other valves failed under the high pressures and hydraulic shocks experienced deep beneath the surface. DesRochers returned to Portsmouth and called Freeman, who visited the Navy yard shortly after. The Navy offered Jamesbury a *carte blanche* on a research and development contract. Freeman turned down the offer, but suggested the Navy send an order to all valve companies. They did and Jamesbury was the only one to submit a bid.³⁵⁰

Jamesbury valves made the *Thresher* very successful, but the company began to receive many orders. “Getting lots of orders isn’t fun,” Freeman said. “It puts you into terrible squeezes.” While it was Jamesbury’s initial intent not to get involved with the government, the Cold War softened the policy. Freeman began to work with General Dynamics Electric Boat to solve issues posed by attack submarines. He personally designed the “flood-and-drain” system used to balance the submarine after launching a missile. Electric Boat, though, with the blessing of the U.S. Navy began to manufacture Jamesbury valves themselves. The submarine builder’s lawyer informed Jamesbury that it was no longer needed in April 1958. However, he wanted

³⁴⁹ Timothy G. Holden, “Floating Ball Aids Valve Seal,” *Christian Science Monitor*, 12 Jun 1958.

³⁵⁰ Jamesbury Corporation v. United States and Freeman, interview by author.

Jamesbury to be paid and encouraged it to file a patent infringement lawsuit.³⁵¹ And that is exactly what it did.

The patent for Freeman's ball valve was applied for in 1954 and issued in 1960. Three years later, Jamesbury filed suit against the federal government for patent infringement. Electric Boat was contracted by the United States, and therefore the government, and not Electric Boat, was liable for any lawsuits.³⁵² In 1965, Jamesbury also filed suit against Worcester Valve Co. and Lunkenheimer Corp. of Cincinnati, Ohio for patent infringement.³⁵³ The following year, E.W. Bliss Co., who had purchased Rockwood Sprinkler Co. in 1959, filed a suit claiming that Freeman had developed the idea for the ball valve while he was still employed by Rockwood.³⁵⁴ That same year, the employees of Bliss-Rockwood, as the old Rockwood Sprinkler was renamed in 1965, went on strike over pension, insurance, and wage concerns. The 237 members of Local 5667 of United Steel Workers of America were out of work from June 30, 1959 until the company's parent, E.W. Bliss, chose to close the Worcester plant at the end of August.³⁵⁵ E.W. Bliss' suit against Jamesbury, though, continued.

The U.S. Court of Claims found in favor of Jamesbury in the initial infringement case filed against the government in 1967. The judge stated that the *Thresher* submarine fleet, as well as others, would not have been able to go to sea if it were not for the Jamesbury valve.³⁵⁶ Damages could not be awarded until the other suits were settled. Nevertheless, Freeman said, "it is perhaps, even more gratifying to know that a small company can still protect its rights when

³⁵¹ Jamesbury Corporation v. United States and Freeman, interview by author.

³⁵² "U.S. Suit Filed By Jamesbury: Infringements of Patent Are Claimed," *Worcester Evening Gazette*, 23 Sep 1963.

³⁵³ "Infringement Suits Filed by Jamesbury," *Worcester Evening Gazette*, 24 May 1965.

³⁵⁴ "We've Changed Our Name," *Worcester Business Review*, 08 Jan 1965.

³⁵⁵ "We've Changed Our Name," "Bliss Strike Talks Resume Tomorrow," *Worcester Evening Gazette*, 23 Aug 1966; and "Bliss-Rockwood to Close," *Worcester Evening Gazette*, 26 Aug 1966.

³⁵⁶ Freeman, interview by author.

involved with the Government and giant corporations.”³⁵⁷ The Bliss suit over the ownership of the patent was settled in Jamesbury’s favor in 1971.³⁵⁸ Thirteen years after the decision was handed down on the first suit in 1967, Jamesbury was awarded \$10.23 million in damages. The government and company agreed on an \$8 million settlement in June, 1980. The award was the single largest awarded for patent infringement while the inventor was alive.³⁵⁹

Jamesbury’s involvement in government programs did not cease with the Navy episode. Seven valves were used on the Mercury capsule to carry Alan Shepard into space in 1961. When the automatic reentry system failed, Shepard reached up and turned a Jamesbury valve a quarter-turn to safely reenter the atmosphere.³⁶⁰ Freeman, unaware that the valves were used in the capsule, received a thank you note from NASA. Without Jamesbury, space and deep sea exploration would not be possible.

Growth continued at a rapid pace at Jamesbury. On June 1, 1961, ground was broken on an 87,000 square-foot plant at 640 Lincoln Street. The new plant was double the size of the New Street factory. With plans for the future, the building was designed for additions. Jamesbury moved into the new facility in December. In the seven years since its founding, Jamesbury had moved to larger quarters five times.³⁶¹ The fall of 1961 marked the first foreign venture of the still-young company. Joining with Serck, Ltd. of England, Jamesbury Serck was formed to manufacture and import products from Worcester.³⁶² The company had originally asked Freeman for a price on the entire company, but he declined.³⁶³

³⁵⁷ “Jamesbury Wins Suit Against U.S.,” *Worcester Evening Gazette*, 13 Apr 1967.

³⁵⁸ Johnson.

³⁵⁹ “Jamesbury Gets \$10 Million in Patent Suit,” *Worcester Telegram*, 12 Feb 1980 and “Jamesbury Settles Suit Over Patent,” *Worcester Evening Gazette*, 14 Jun 1980.

³⁶⁰ “An Inventor’s Tale.”

³⁶¹ “Ground Will Be Broken June 1 for New Jamesbury Building,” *Worcester Evening Gazette*, 12 May 1961.

³⁶² “Jamesbury Corp. Forms Subsidiary In Great Britain,” *Worcester Telegram*, 28 Sep 1961.

³⁶³ Freeman, interview by author.

By 1962, Saul Reck had left Jamesbury to go into the bowling business.³⁶⁴ He later founded Goddard Industries and the Goddard Valve Corporation.³⁶⁵ Julian Freeman remained with the company until his passing in 1975.³⁶⁶ Other long-term players were already involved in Jamesbury. In the late '40s, Howard Freeman met a man named Arthur F. Snyder. Snyder had served in the Navy during the war and was one of the sailors rescued by Freeman's water fog nozzle on the *Wakefield*. Art and Howard became very close friends and Art joined the Jamesbury board of directors from the very beginning and served for nearly thirty years. He established himself as one of the first investment bankers in Boston. He and Freeman both enjoyed sailing and once crossed the Atlantic on a boat based on a nineteenth century design.³⁶⁷

Annual sales continued to grow. In 1965, the Lincoln Street "Brookside Plant" was doubled in size.³⁶⁸ The joint venture, Jamesbury Serck was dissolved in 1966 due to a weak English economy and to free up capital to use in Worcester. By that time, 550 were employed in Worcester with an additional 14 at a Weston, Ontario plant.³⁶⁹ A Canadian subsidiary, Jamesbury Canada, Ltd., was started in 1968 to manufacture and distribute Jamesbury products in Canada.³⁷⁰

Jamesbury observed fifteen years in business in 1969. Annual sales had grown from \$35,400 to \$16 million with employment also skyrocketing.³⁷¹ Total sales eclipsed \$100 million at the end of 1968 and Freeman expected the company to surpass \$200 million in half the

³⁶⁴ Clew.

³⁶⁵ Fallon.

³⁶⁶ "Julian Freeman..."

³⁶⁷ J. M. Lawrence, "Arthur F. F. Snyder, 92; banker succeeded at risk-taking," *The Boston Globe*, 19 Jan 2011 and Freeman, interview by author.

³⁶⁸ "City Firm Gets OK for Addition on Lincoln St.," *Worcester Telegram*, 23 Mar 1965.

³⁶⁹ "Orders Up 50 Per Cent At Jamesbury Corp.," *Worcester Telegram*, 19 Oct 1966 and "Jamesbury Corp. Logs 40 Pct. Earnings Rise," *Worcester Evening Gazette*, 25 Jan 1967.

³⁷⁰ "Jamesbury Corp. Forms New Canadian Subsidiary," *Worcester Telegram*, 16 Oct 1968.

³⁷¹ "An Inventor's Tale."

time.³⁷² The company also purchased land on Clark Street to build a new plant that year. Construction began with expected completion for July, 1970, but things did not go as planned.³⁷³ Two boys from Great Brook Valley were killed in a construction accident and all development stopped. Jamesbury decided to build closer to their Lincoln Street plant.³⁷⁴ The “Lakeside Plant” at the end of Bowditch Drive in Shrewsbury was completed in 1970 and doubled in size in 1974.³⁷⁵ Within two years, a third plant was necessary to keep up with growth. Nine hundred employees worked at the Worcester and Shrewsbury plants while there were one hundred at other locations. In a little over a year, from July, 1975 to November, 1976, seventy new employees were hired. A \$3 million order for a nuclear power plant in ’76 was the largest order the company had ever received. Jamesbury had expanded its international affairs into Mexico, Germany, and Japan as well as its Canadian company. John Freeman, Howard’s son, was elected a director of the company in 1976. The widow and daughter of Julian Freeman, who had died the previous year, opposed the nomination, fearing being pushed out of the company.³⁷⁶

An opportunity to purchase the Hobbs Manufacturing Company plant at 666 Lincoln Street, directly adjacent to headquarters at 640 Lincoln, presented itself in 1977 as Jamesbury was looking to build a new factory. Hobbs was acquired by Crompton and Knowles in the early ‘70s and production at the Worcester plant ceased and was transferred to Connecticut. The plant and six acres of land was sold to Jamesbury. In addition to expanding manufacturing into the Hobbs plant, Jamesbury planned to build a research and engineering building between the two Lincoln Street plants.³⁷⁷ The new construction was complete in 1978.³⁷⁸

³⁷² “Jamesbury’s Sales Reach \$100 Million,” *Worcester Telegram*, 10 Jan 1969.

³⁷³ “Jamesbury to Build New Clark St. Plant,” *Worcester Evening Gazette*, 30 Sep 1969.

³⁷⁴ “Jamesbury Land Sale is Favored,” *Worcester Telegram*, 31 Oct 1973.

³⁷⁵ “Julian Freeman...”

³⁷⁶ “Jamesbury is Planning New Plant,” *Worcester Evening Gazette*, 10 Nov 1976.

³⁷⁷ “Jamesbury May Buy Plant,” *Worcester Evening Gazette*, 03 Mar 1977.

³⁷⁸ “Jamesbury to Build Shrewsbury Plant,” *Worcester Evening Gazette*, 23 Aug 1979.

The Jamesbury product line expanded in the late '70s with wafer-sphere butterfly valves that were designed using the same theory behind the original ball valve design. The valves were used extensively in pollution abatement and heavy industry.³⁷⁹ Six 48-inch butterfly valves were used to absorb the shock waves when the space shuttle launched.³⁸⁰ Stabiflow globe valves were licensed to Jamesbury by the Foxboro Company in 1978. Production of the new valve took place at the "Hillside Plant" that was recently acquired from Hobbs.³⁸¹

New products and continued growth made 1979 a record setting year; it was the twenty-fifth anniversary of the founding of the company. The company had grown from one man in 1954 to 1,250 employees in '79. It was the third largest employer in Worcester. Only Norton and Wyman-Gordon engaged more workers. Annual sales neared \$80 million, while income decreased due to a strike at a partially owned steel foundry and the costs of international start-ups. In Worcester, management planned to build a fifth local plant in the Worcester-Shrewsbury area. With the additional factory that was built next to the "Lakeside Plant" on Bowditch Drive, total floor space in Worcester was 500,000 square feet, larger than eight football fields.³⁸² Sales reached an all-time high in 1981 at \$111.7 million, but dropped afterward with the recession of the early '80s.

The recession led to the first layoffs in company history. Between January and November, 1982, 250 employees were let go. The workweek was cut to four days throughout the summer and for nearly two weeks in late July and early August, the entire company shut

³⁷⁹ "Jamesbury parlayed better value to \$40 million yearly sales," *Industry*, Clipping from Worcester Public Library, Jun 1976.

³⁸⁰ "An Inventor's Tale" and Debra Bruno, "Jamesbury: A Success Story," *Clipping from Worcester Public Library*, Dec 1984.

³⁸¹ "Jamesbury Set to Buy rights To Make Control Valve Line," *Worcester Evening Gazette*, 12 Jan 1978.

³⁸² "Jamesbury to Build Shrewsbury Plant," *Worcester Evening Gazette*, 23 Aug 1979 and "Success Story," *Worcester Telegram*, 27 Aug 1979.

down.³⁸³ The laid off workers would continue to receive benefits for two years or until they were rehired at the request of Freeman.³⁸⁴ Howard Freeman had always taken great pride in the way Jamesbury employees were treated and the fact that it was still a union-free shop. From the very beginning, every worker received a turkey for Thanksgiving and a \$35 check for Christmas. As the company grew, it adopted a policy of “production sharing” that issued extra pay whether the company made money or not. Discussing his mentality on employee relations and public image, Freeman stated, “When someone comes to Worcester for some reason or another and gets into the cab, we want the cab driver to say ‘It’s a great company.’ And they did. We developed a reputation in the community that was outstanding.” Freeman knew many of Jamesbury’s employees by first name and spent a lot of time on the floor.³⁸⁵ William Rawstrom, a vice president at Jamesbury and fellow WPI alumnus, believed “you learn a lot about people by the way they treat taxi drivers, waitresses, and elevator operators.” From these observations, he settled that “Howard had a great deal of respect for the dignity and needs of all individuals.”³⁸⁶

Howard Freeman’s son, John, had become a vice president of information systems at Jamesbury in the early ‘80s, but he did not want to take over the business.³⁸⁷ Howard began to search for a stable and respectful buyer for the company he had founded nearly three decades earlier. When he came to Combustion Engineering of Stamford, Connecticut, he “made a careful study of [its] morality, how they treat people.”³⁸⁸ Jamesbury Corporation was sold for \$100 million to Combustion Engineering in 1984.³⁸⁹ The sale had been kept all but secret to prevent

³⁸³ “Jamesbury Plans Layoff Of 175 Employees Nov. 8,” *Worcester Evening Gazette*, 02 Oct 1982.

³⁸⁴ “Jamesbury Posts Lower Sales, Earnings,” *Worcester Evening Gazette*, 10 Nov 1982.

³⁸⁵ Freeman, interview by author.

³⁸⁶ Debra Bruno, “Trying to Change Uncle Sam,” Clipping from the Worcester Public Library, Dec 1984.

³⁸⁷ Fallon and Freeman, interview by author.

³⁸⁸ Bruno, “Trying to Change Uncle Sam.”

³⁸⁹ “Jamesbury Sold For \$100 Million To Company In Connecticut,” *Worcester Telegram*, 13 Mar 1984.

any speculation.³⁹⁰ In the fall of that year, Howard stepped down as president of Jamesbury. Daniel DeSantis, who had been with the company since 1965, was chosen by his peers to succeed Freeman. Freeman remained as chairman of the board of directors, but had much more time to dedicate to other community organizations.³⁹¹

The president of Worcester Polytechnic Institute, General Harry P. Storke, called Howard in 1969 and asked if he could stop by to talk with him. When Storke arrived, he asked Freeman to become a trustee of his alma mater. Howard was shocked. WPI had always been a conservative school and he considered himself a liberal. He informed Storke of his reservations. Storke replied, “Yeah, we know, but we still want you to join.” Freeman was an early proponent of the WPI Plan and helped ensure its successful implementation. He spent the next twenty-five years of his life serving on the board, six of which he was chairman.³⁹²

His relationship with WPI, though, was much more than his service on the board of trustees. Early on in Jamesbury’s history, William “Bill” Rawstrom and Joaquim “Joe” Ribeiro came to work at the company. When Ribeiro graduated in 1958, Professor Kenneth Merriam called Howard and asked him for a favor. Merriam told Freeman that if Ribeiro did not get a job, he would have to return to his native Portugal. Merriam assured him that, while his English was mediocre, Joe was a bright young man. Howard told Merriam to send Ribeiro over – he had a job.³⁹³ Bill and Joe both became vice presidents at Jamesbury over the years and eventually took an important role in giving back to WPI.

Jamesbury also found it advantageous to give shares of the company to WPI. It provided financial benefits and helped to prevent any one person from obtaining a great deal of stock in

³⁹⁰ Freeman, interview by author.

³⁹¹ “DeSantis Is Named President and CEO at Jamesbury Corp.,” *Worcester Evening Gazette*, 22 Oct 1984.

³⁹² Freeman, interview by author.

³⁹³ Freeman, interview by author.

the company. When Jamesbury was sold, WPI was the owner of 20,000 shares and received \$600,000 for them. The proceeds were used to fund the Howard G. Freeman Scholarship and the construction of Freeman Plaza on campus.³⁹⁴ During his years as chairman, he led the Campaign for Excellence fundraising drive that raised a record breaking \$63.7 million aided by a seven-figure donation that he and Esther made. It was the largest donation made by a living donor to that point. The university's endowment nearly doubled from \$55 to \$100 million during his tenure. WPI has recognized Howard's dedication to the school with the 1972 Goddard Alumni Award for Professional Achievement, the 1990 Alumni Association Distinguished Service Award, and the 2005 Taylor Award for Distinguished Service to WPI.³⁹⁵

The contribution to WPI Howard Freeman is most proud of, however, is his impact on the Stoddard influence on the school. When Abbie Hoffman spoke at Clark University in the 1970s, Robert "Bob" Stoddard, the president of Wyman-Gordon, was furious. During a WPI board meeting, Bob shook his finger at president George Hazzard and said, "I forbid you to have that man on the campus!" Hazzard, taken aback, looked to Howard for input. Howard turned to Bob and told him that he thought he was wrong. If WPI were to forbid Hoffman from speaking on campus, they would be the laughing stock of the community. That moment signaled the end of the strong Stoddard influence on the institution.³⁹⁶ Howard was not afraid to stand up for what he thought was right when he was on the board of trustees.

Freeman also played an active role in other local and national groups. He served as a trustee of the Worcester Art Museum where he and Esther volunteered. Howard also is a member of the American Antiquarian Society and the Greater Worcester Community

³⁹⁴ Freeman, interview by author.

³⁹⁵ "An Inventor's Tale" and "Howard G. Freeman '40," *Past Award Recipients* <http://www.wpi.edu/alumni/pastawards.html> (accessed 20 Apr 2013).

³⁹⁶ Freeman, interview by author.

Foundation.³⁹⁷ In the late '60s he was a member of Business Executives Against the War in Vietnam. After selling Jamesbury, he joined the Business Executives for National Security that looked to cut military spending while maintaining national defense.³⁹⁸ Howard has never been afraid to speak his mind.

By the end of 1984, Jamesbury had rehired nearly all of the 250 workers laid off in '82.³⁹⁹ A weak valve industry caused by foreign competition and other factors led to more layoffs in 1986, though. After peaking at 1,400 in 1981, the workforce had dropped to 1,000 with 875 in Worcester and Shrewsbury.⁴⁰⁰ In 1988, Jamesbury purchased Hammel Dahl of Warwick, Rhode Island. The firm produced control valves that broadened Jamesbury's offerings.⁴⁰¹ Only a couple months later, Combustion Engineering sold Jamesbury to Rauma-Repola Oy, a Finnish industrial company. Talks had begun a year before and were finalized in the late summer of 1988. Rauma-Repola was a leading producer of valves in Finland and employed roughly 18,000 people in 22 countries. One of its subsidiaries, Neles Oy, which was acquired in 1980, had a valve plant in Glens Falls, New York.⁴⁰² The union of Jamesbury, Hammel Dahl, and Neles made the concern "one of the strongest valve companies in the world," according to Daniel DeSantis. Jamesbury took over management of U.S. activities under all three names. Additionally, sales and profitability hit a new high after the sale.⁴⁰³

As the 1990s dawned, the machine trades began to decline in America. Employment in the industry dropped a third in central Massachusetts between 1979 and 1987. At Jamesbury,

³⁹⁷ "An Inventor's Tale."

³⁹⁸ Bruno, "Trying to Change Uncle Sam."

³⁹⁹ Bruno, "Trying to Change Uncle Sam."

⁴⁰⁰ "Jamesbury Corp. lays off 74," *Worcester Evening Gazette*, 29 Apr 1986 and "Jamesbury Corp. to lay off 56 and transfer another 19," *Worcester Evening Gazette*, 20 Jun 1986.

⁴⁰¹ "Jamesbury Buys All of Hammel Dahl," *Worcester Telegram*, 24 Jun 1988.

⁴⁰² "Talks underway for Jamesbury Sale," *Worcester Evening Gazette*, 10 Aug 1988 and "Jamesbury bought by Finnish company," *Worcester Evening Gazette*, 30 Sep 1988.

⁴⁰³ Kathleen Pierce, "Jamesbury has busy year; looks to an exciting future," *Worcester Telegram & Gazette*, 01 Feb 1989.

however, the problem was acute. Out of the 175 people hired by the company in 1988, 75 were for the machine shop.⁴⁰⁴ A joint training program was initiated between Jamesbury and the Worcester Vocational Technical High School (WVTHS) to train workers to meet Jamesbury's demands. The inaugural class included fourteen individuals with no machine skills whatsoever. For ten weeks, while being paid, the fourteen spent half a day in a classroom at Jamesbury and the other half in the WVTHS machine shop. At the end of the training program, Jamesbury would have fourteen new skilled workers.⁴⁰⁵ While being a \$75,000 investment on the valve company's part, it was an investment "that [it] had to make" according to manufacturing vice president, Thomas Sturiale.⁴⁰⁶ Jamesbury's continued commitment to Worcester treated the company favorably: sales, profits, and employment kept increasing.⁴⁰⁷

Jamesbury became Neles-Jamesbury in 1990 to reflect the two main lines of valves in North America. In April, Thomas Sturiale and Robert R. Pape were named executive vice presidents. The promotions were to test both men to succeed DeSantis as president and ensure future leadership of the company.⁴⁰⁸ Nearly two years later, Sturiale was elected president, with DeSantis becoming chairman. Howard Freeman had stepped down as chairman years before. Robert Pape became a member of the Group Management Team and chairman of Neles-Jamesbury, Ltd. of Canada.⁴⁰⁹

Increasing environmental oversight presented both obstacles and opportunities for Neles-Jamesbury in the early '90s. The company was one of two Worcester companies targeted by the

⁴⁰⁴ Peter P. Donker, "Industry in a vise; Dwindling numbers in machine trades," *Worcester Telegram & Gazette*, 26 Feb 1989, E1.

⁴⁰⁵ Kathleen Pierce, "Companies train for 'smarter jobs'; 'Smarter jobs' calls for action by area companies," *Worcester Telegram & Gazette*, 07 May 1989, E1-E4.

⁴⁰⁶ "14 are hired after graduation from shop training program," *Worcester Telegram & Gazette*, 11 Jun 1989, E3.

⁴⁰⁷ Delores Courtemanche, "Neles Jamesbury rolls on following recent mergers: Finnish owner reports record profits and orders," *Worcester Business Review*, 02 Feb 1990, E6.

⁴⁰⁸ "Neles-Jamesbury names 2 VPs," *Worcester Telegram & Gazette*, 13 Apr 1990, C5.

⁴⁰⁹ "Sturiale elected President," *Worcester Telegram & Gazette*, 04 Jan 1992, 18.

Massachusetts Department of Environmental Protection as “priority cleanup sites.” Along with Goddard Valve Corp., founded by Saul Reck, the sites were targeted because of “low concentrations of petroleum compounds and industrial chemicals in [the] groundwater.”⁴¹⁰ The two sites caused the closure of four wells in 1988 and forced the town of Shrewsbury to install a new water treatment system.⁴¹¹ Shrewsbury, in turn, filed suit against Neles-Jamesbury, Goddard Valve, and six other companies claiming negligent behavior. The sources of the pollutants in Shrewsbury’s water were never located, though.⁴¹² When the eight companies offered \$3.6 million in damages, while not admitting liability, the suit was dropped.⁴¹³ Neles-Jamesbury also faced \$413,000 in fines from the U. S. Environmental Protection Agency in 1993 for failing to report releases of toxic chemicals. The fines were part of a nationwide enforcement of the relatively new annual toxic chemical release reporting law. It was one of two companies cited in New England. Tom Sturiale reported that all toxic wastes were released to processors and not the environment.⁴¹⁴ The fines were settled in 1998 with Neles-Jamesbury agreeing to install \$260,000 in new anti-pollution equipment and pay \$82,670 in fines.⁴¹⁵ Jamesbury’s valves, however, were a great assistance to environmental control. Butterfly valves aided in the reduction of heat discharge in a Louisiana petrochemical plant the Emission-Guard Ball Valve won the 1990 Chemical Processing magazine award for preventing dangerous liquids and gases from leaking into the air.⁴¹⁶

⁴¹⁰ John J. Monahan, “2 sites in city targeted by DEP,” *Worcester Telegram & Gazette*, 07 Jun 1990, A1.

⁴¹¹ Monahan, “2 sites...”

⁴¹² Gary V. Murray, “Shrewsbury sues firms over alleged pollution,” *Worcester Telegram & Gazette*, 11 Dec 1990, A1.

⁴¹³ John J. Monahan, “Neles-Jamesbury Settles EPA Case,” *Worcester Telegram & Gazette*, 17 Jun 1998.

⁴¹⁴ Andi Esposito, “2 Companies face EPA fines,” *Worcester Telegram & Gazette*, 04 Jun 1993.

⁴¹⁵ Monahan, “Neles-Jamesbury Settles EPA Case.”

⁴¹⁶ “Jamesbury parlayed better value...” and “Valves are on the ball,” *Worcester Telegram & Gazette*, 25 Jan 1991, C1.

Remaining competitive became a large concern for Neles-Jamesbury at the same time environmental concerns propped up. In the fall of 1992, plans were announced to open a manufacturing plant in Chihuahua, Mexico due to the availability of cheaper labor. The plant would produce a line of threaded-end ball valves that were previously made in Shrewsbury. Sixty Massachusetts positions were eliminated through attrition. Around the same time, the former Hammel Dahl plant in Warwick, Rhode Island was closed with 65 to 70 jobs being transferred to Worcester, while 25 were eliminated by attrition and layoffs.⁴¹⁷ Fifty positions, including forty in Worcester, were cut in 1993 due to a “limping economy.” The cuts were the first significant layoffs since 1986.⁴¹⁸ The “Hillside Plant” was closed in 1998 with globe-valve manufacturing being transferred to one of the company’s other plants in Worcester.⁴¹⁹ One hundred and fifty additional positions were exported to Chihuahua, Mexico in 1999 with the Neles Automation Field Controls Division that operated out of Shrewsbury up until that point. The move was expected to save the company \$5 million a year. Massachusetts operations consolidated to the two plants on Bowditch Drive in Shrewsbury at the same time.⁴²⁰ In 2001, the three buildings along Lincoln Street were sold for \$5.8 million. Jamesbury’s home since 1961 would be rehabilitated and leased by GFI Partners of Boston.⁴²¹

As Neles-Jamesbury reorganized its operations in North America, corporate reorganization followed. The company was renamed Neles Controls in 1997 to reflect the growing focus on control valves and digital flow control technology. A Jamesbury Division was created to manage the manufacture of Jamesbury valves. John Quinlivan succeeded Tom Sturiale in 1998 as president of North American operations, including Neles and Jamesbury. By

⁴¹⁷ Peter P. Donker, “Valve-maker looks south,” *Worcester Telegram & Gazette*, 22 Sep 1992, E1.

⁴¹⁸ Chris Pope, “Neles-Jamesbury lays off 50 people,” *Worcester Telegram & Gazette*, 26 Jun 1993.

⁴¹⁹ “Neles to sell City Plant,” *Worcester Telegram & Gazette*, 06 Aug 1998.

⁴²⁰ Andi Esposito, “Neles valve plant moving to Mexico,” *Worcester Telegram & Gazette*, 08 Oct 1999.

⁴²¹ Jim Bodor, “Jamesbury sells three buildings on Lincoln Street,” *Worcester Telegram & Gazette*, 23 Jun 2001.

1999, Neles Control's parent, Rauma-Repola Oy, had become Rauma Corp. after nearly a decade of mergers and reorganizations.⁴²² Rauma merged with Valmet Corp. that year to become Metso Corp. The combined entities would employ approximately 23,000 globally with projected annual revenue of \$3.9 billion. North American operations were reorganized as Neles Automation and controlled from the former Jamesbury plants in Shrewsbury. Additional operational freedom from the merger led to a rebirth of Jamesbury. Since the merger, products have been marketed under the name Jamesbury Inc.⁴²³ Neles Automation became Metso Automation in 2001 and continues as such to this day.⁴²⁴

The relationship between Jamesbury and Worcester remains strong. In 2005, the Chihuahua plant was closed after over a decade of production and operations moved back to Shrewsbury in newly leased space on Bowditch Drive. Changes in tariffs and access to raw materials led to the move.⁴²⁵ Jamesbury has developed into one of the most profitable divisions of Metso and management is optimistic about growth over the coming years.⁴²⁶

When Howard and Esther Freeman discuss what they are most grateful for, they place the treatment of employees at Jamesbury near the top of the list. "We are grateful that people were happy," he reminisced.⁴²⁷ In an interview with the Worcester Historical Museum, Freeman remarked that his education at WPI "was so fundamental for everything I did."⁴²⁸ He has spent his entire life giving back to the school that provided him so many opportunities. His commitment to Worcester and the school live on at Jamesbury. When President Jon C. Strauss

⁴²² Metso, "Automation," *Our History* http://www.metso.com/corporation/about_eng.nsf/WebWID/WTB-090520-2256F-172F6?OpenDocument&mid=C1DE2635B938227EC22575BC001384D5 (accessed 23 Apr 2013).

⁴²³ Peter P. Donker, "Change brings new possibilities to Neles Jamesbury," *Worcester Telegram and Gazette*, 30 Jun 1999.

⁴²⁴ Metso.

⁴²⁵ "Valve Plant returning to area," *Worcester Telegram & Gazette*, 24 Feb 2005.

⁴²⁶ Freeman, interview by author.

⁴²⁷ Freeman, interview by author.

⁴²⁸ Freeman, interview by Worcester Historical Museum.

spoke of Howard at the 1990 Presidential Founders Dinner he said, “Freeman is that rare combination of insightful engineer, talented inventor and resourceful businessman that has been at the heart of so many success stories in American industry. But Freeman has also made his mark as a devoted member of the community and a humane and enlightened manager of people. He truly represents WPI at its best.”⁴²⁹

⁴²⁹ “WPI exceeds goal in funds campaign; Howard Freeman honored for effort,” *Worcester Telegram & Gazette*, 13 Nov 1990, A4.

CONCLUSION

During the centennial of Worcester Polytechnic Institute, Mildred McClary Tymeson wrote, “the students who made [WPI] were the same men who made Worcester.”⁴³⁰ They built an industrial power where, otherwise, it would not have developed. The school itself was founded in hopes of providing an educated workforce for the city’s expanding industrial nature. As the school grew, the alumni entered Worcester and built a unique industrial base that thrived throughout many changing conditions. The alumni that built Worcester’s industry were blessed and gave back to the city and their alma mater generously.

When Ichabod Washburn’s wire manufactory became successful, he moved to found a Mechanics Association to educate the men of Worcester in the mechanical arts. A score of years later, he agreed to support the establishment of a scientific school if he were allowed to build and equip shops that would educate the school’s students on the practical aspects of industry. The Worcester County Free Institute of Industrial Science accepted its first class of students in the fall of 1868. When the men graduated in 1871, they entered the local workforce. They eventually, accompanied by their former professors, created a diverse array of companies. In 1886, the city of Worcester reported, “no other city in the United States has so great a variety as Worcester of manufactories of an important character, in proportion to its population, and these are owned and managed here.”⁴³¹ The diverse nature is due, in part, to the practical “horse” sense obtained at the Washburn Shops.

Coghlin Electric, Riley Stoker, Heald Machine, Rockwood Sprinkler, and Jamesbury are five companies that were founded by WPI alumni and illustrate a sampling of the diverse industries of Worcester. Additionally, their pasts offer diverse stories of corporate development.

⁴³⁰ Tymeson, *Two Towers*, 69.

⁴³¹ City of Worcester, 1886 quoted in Tymeson, *Two Towers*, 70.

The founders and leaders of these companies were given an education on Boynton Hill and gave back to WPI when they became successful. The grandson of Harry G. Stoddard who led Wyman-Gordon for many years and was active at WPI, Warner Fletcher, said, “their motivation was that they had been blessed; the community was good to them, so they saw the need to give back.”⁴³² Fletcher’s uncle, Robert W. Stoddard, also played a significant role at Worcester Tech.

As Worcester grew, so did Worcester Polytechnic Institute’s impact. A mutual sense of commitment between the school, its alumni, the city, and its industry developed. The interactions between the companies studied in this project are proof of that commitment. Proof is also found in the Gateway Park redevelopment and the many local groups and charities supported by WPI alumni. Worcester Polytechnic Institute is a lens through which the history of industry in Worcester can be viewed.

⁴³² Margaret LeRoux, “A giving place,” *Worcester Telegram & Gazette*, 27 Aug 2008.

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