

BRIGHT FUTURE AHEAD FOR MANUFACTURING

Regional Industry Analysis 2016



The past decade was challenging for manufacturers, as unfavorable domestic and international forces consistently menaced the industry.

By the close of 2015, our manufacturing economy, which accounted for 12.8% and 14.1% of national and statewide private sector jobs, respectively, and a full 16.5% of regional non-governmental employment just 10 years earlier, had changed significantly. The nation had lost nearly 2 million manufacturing jobs, while Pennsylvania lost 117,000. Regionally, close to 12,000 manufacturing jobs vanished.

That, however, is the story of the industry’s past, not necessarily a bellwether of its future. In fact, despite manufacturing’s most recent 10-year story, the industry’s brightest days are still ahead.

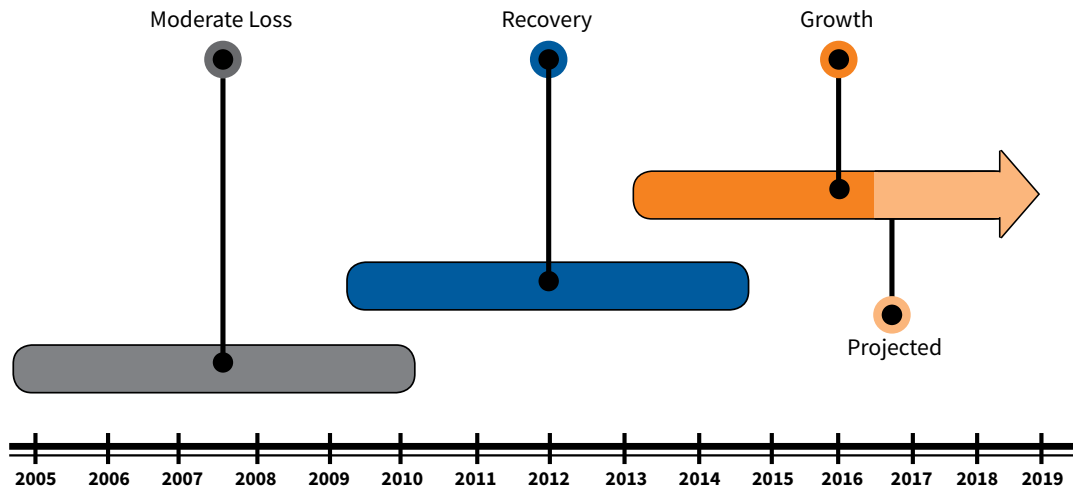
An Era of Challenge — 2005 to 2010

Manufacturing’s last decade is best described as two distinct 5-year periods – one of loss and one of modest recovery.

From 2005 through 2010, the nation, state, and northeastern Pennsylvania region lost manufacturing jobs at comparable rates – 19.05%, 17.85% and 18.38%, respectively. Most economists agree that the real estate and consumer debt bubbles, restrictive commercial lending practices, intense overseas competition, foreign currency manipulation, unfair international trade laws and the insatiable Chinese appetite for steel and other manufacturing inputs all precipitated the setback in domestic manufacturing.

Given the relative consistency in manufacturing job loss percentages across all three spectrums, it is tempting to assume that the causes behind them were similar. That, however, is not necessarily the case.

Both nationally and across Pennsylvania, the five industry sectors that lost the highest percentage of jobs throughout the 2005-2010 period accounted for only a small percentage of total manufacturing employment – 12.5% within the United States and 7.4% across the Commonwealth. This suggests that while those sectors are valued contributors to the overall manufacturing landscape, they are not sectors within which the United States or Commonwealth enjoyed true competitive advantage in terms of technology, innovation, productivity or workforce. Else, they would have experienced higher concentrations of employment. Rather, those sectors represented products with high labor content, relatively low levels of process technology and a competitive environment based primarily upon price.

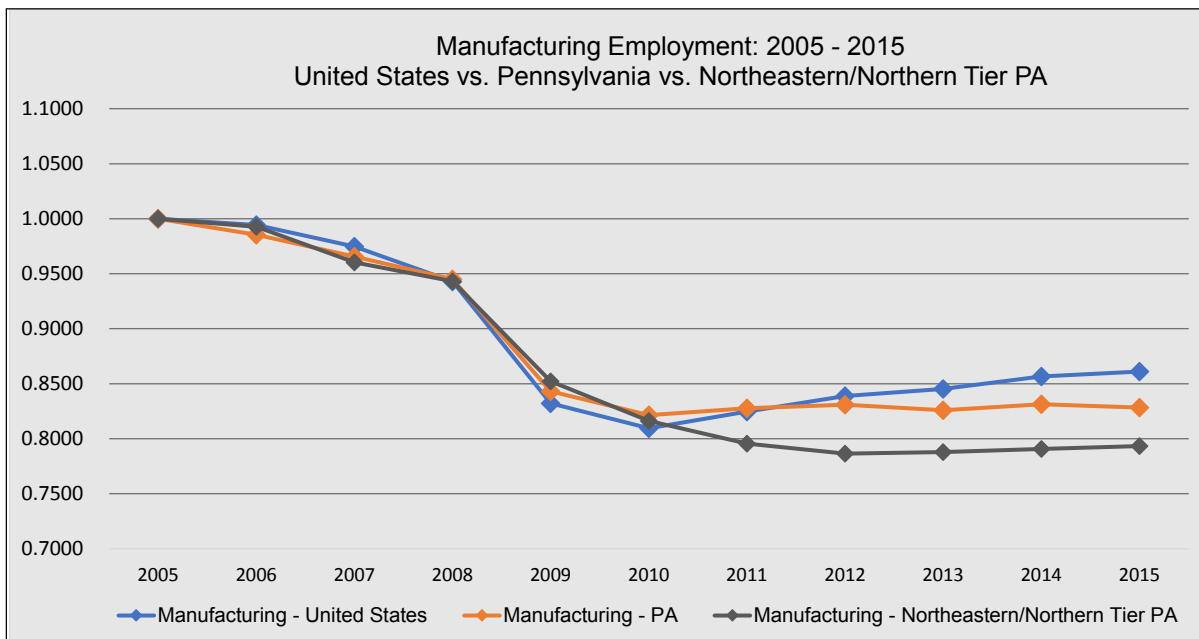


Conversely, the five sectors that lost the lowest percentage of jobs tended to be high-technology and high-skill sectors that accounted for 37.6% of total 2005 industrial employment nationally and 38.3% within Pennsylvania. Employment concentration in these sectors suggests the presence of some domestic advantages unique to each sector or shared among them, such as an abundance of the process inputs required, applied technology expertise or prominence of the worker skills required. The fact that these sectors retained 89.8% of their nationwide workforce and over 90% of their Pennsylvania-based employees during this tumultuous five-year period indicates that those competitive advantages were preserved.

Regional performance, however, was a bit more interesting. Consistent with national and statewide trends, sectors that maintained more than 90% of their 2005-level workforce accounted for an impressive 46.3% of total manufacturing employment. Sectors that lost jobs at a much higher rate than the nation, however, include Computer & Electronic Products, Machinery Manufacturing and Electrical Equipment & Component Manufacturing. While these constituted only 11.1% of total 2005 regional manufacturing employment, they lost 40.9% of their combined workforce during the five-year span. More importantly, they represent high-tech, innovation-based sectors. The question then becomes why the region lost advanced manufacturing jobs within key technology sectors at twice the national and statewide rate.

There are many plausible answers to that question. Those with the most merit include the region's lack of a technology-focused research university, weak linkages between those sectors and existing university-based innovation resources, the absence of, at that time, incubation and entrepreneurship centers to support computer and electronics advances, and low numbers of graduates from proximate computer, electronic and advanced manufacturing training programs.

These explanations, however, pale in comparison to the fact that the region was, throughout that period, home to low-cost production-only facilities owned by larger corporations within those sectors. Those facilities rarely had the authority or autonomy to develop new products, enter new markets or, in some cases, even modernize internal processes to become more efficient. Rather, they were restricted to serving as low-cost production outposts. Workforce training and development budgets, set at the corporate level, were also insufficient to advance worker skills as emerging technologies and best practices demanded. Eventually, alternative facilities, both domestically and abroad, became more cost-competitive, resulting in corporate divestiture of their northeastern Pennsylvania operations.



Manufacturing On The Upswing — 2011 to 2015

After five consecutive years of job loss, 2011 began an era of manufacturing stability and renewal.

The nation added 733,000 manufacturing jobs between 2011 and 2015 as sectors such as Beverage Manufacturing, Fabricated Metals, Machinery Manufacturing and Transportation Equipment Manufacturing grew by double-digits. Many factors that contributed to the manufacturing recession in the early 2000's had since subsided and the industry successfully adapted to others. Manufacturing was becoming popular again, and Made In America, Buy American and similar movements took hold.

Unfortunately, Pennsylvania, and the northeastern Pennsylvania region in particular, have not yet fully enjoyed the post-2010 manufacturing recovery. While national industrial employment expanded by 6.38% during the past five years, Pennsylvania's grew by just short of 1%. Across northeastern Pennsylvania, manufacturing employment fell by 2.8% during the span, although industry employment expanded by 1% during the shorter period of 2013 through 2015.

Several Pennsylvania-specific conditions help explain the Commonwealth's underperformance. Before reviewing those matters, it should be noted that from 2011 to 2015, Pennsylvania's Food Manufacturing, Beverage Manufacturing and Wood Product Manufacturing sectors enjoyed job growth rates that surpassed those of the nation, largely due to proximity to end-user markets and unique woodland resources. Conversely, Pennsylvania's Printing and Apparel sectors contracted sharply due to rapid changes in sector technologies, overall high labor content, low barriers to competitor entry and product commoditization. The Pennsylvania-specific items detailed below impacted most other manufacturing sectors uniformly.

Federal discussions of sequestration, which threatened to greatly reduce Department of Defense (DoD) spending, stymied Pennsylvania's manufacturing rebound. In 2011, when such deliberations began, Pennsylvania was a dominant DoD supplier state – ranking sixth (6th) in the nation in terms contract value. With sequestration looming, the Commonwealth's plastics, metals, machinery and electronics manufacturers, many of which were

active within the DoD supply chain, placed growth plans on hold. Ultimately, their worries became reality when the American Taxpayer Relief Act of 2012 became law, reducing DoD expenditures by 6.4% in 2013 and 5.5% in 2014.

Insufficient qualified labor also obstructed Pennsylvania's manufacturing growth. In 2012, 74% of Pennsylvania's manufacturers reported that a workforce skills gap was hindering expansion. During that year, more than 7,600 manufacturing jobs went unfilled due to the lack of qualified candidates. The Commonwealth's prior five-year history of manufacturing job losses somewhat contributed to the workforce shortage, as news of manufacturing layoffs discouraged aspiring workers from enrolling in advanced manufacturing training programs. The industry also has to accept some responsibility for the shortage, as manufacturers were slow to embrace apprenticeships, internships and job shadowing platforms that encourage students and young workers to explore careers within their firms. Certain accountability also rests with educators, school administrative personnel and education policy-makers, as educational institutions became less connected with manufacturers and began stressing the importance of four-year degrees, often to the downplay of Associate Degrees, industry-recognized certifications and specialized industry training courses.

Lastly, the Commonwealth's budgetary policies constricted manufacturing advancement from 2011 through 2015. While competitor states were investing in innovative manufacturing support programs, Pennsylvania's budget significantly cut key programs proven to stimulate and accelerate industrial growth. The Commonwealth's only technical assistance program focused solely on the manufacturing sector was eliminated, despite U.S. Department of Commerce verification of its effectiveness. Initiatives designed to improve manufacturer access to university-based innovation resources and fast-track the development and commercialization of new products were tabled. Incentives to support manufacturing attraction, expansion and job creation were reduced, and cuts to state-funded universities led them to discontinue many industry-focused initiatives.

Due to these and other factors, many of Pennsylvania’s key manufacturing sectors added jobs at a pace below each sector’s comparable national rate for the period of 2011 through 2015.

Although regional manufacturers continued to lose jobs throughout the 2011-2015 period, much of that loss occurred in 2011 and 2012. Since then, northeastern Pennsylvania manufacturers added jobs every year. This three-year turnaround actually outpaced Pennsylvania’s overall manufacturing job creation rate during that timeframe.

Regional Sector Performance Varies

In keeping with the statewide trend, the region’s Food Manufacturing and Beverage Manufacturing sectors added jobs between 2011 and 2015. Their employment gains, however, were largely offset by losses in the Printing and Apparel sectors. Those losses were also consistent with statewide performance.

Losses in the Chemical Manufacturing, Plastic Product, Nonmetallic Minerals, Machinery Manufacturing and Computer & Electronics sectors prevailed within the region due to geography disadvantage and the lack of supply-chain clusters.

Resurgence in the residential and commercial real estate markets accounts for much of the national growth within the Plastics Product and Nonmetallic Minerals sectors. Such growth, therefore, was mostly confined to regions that experienced the greatest boon in those markets, as buyers utilized local suppliers and larger manufacturers ramped-up production in facilities close to major markets. Northeastern Pennsylvania companies, due to geography alone, did not consistently benefit from that trend.

With respect to Machinery Manufacturing, while the northeastern Pennsylvania region has some supply chain participants within that sector, more significant industry clusters – dynamic groupings of multi-tiered suppliers, supporting research facilities, institutes with specialized training programs and so forth – exist elsewhere across the Commonwealth. They are particularly prevalent in southwestern, northwestern and south central Pennsylvania.

While regional manufacturers made valiant efforts to grow their business on pace with the national trend, the lack of a bona fide localized industry cluster was working against them. At the same time, end-user market conditions were hampering their growth, as

the mining, natural gas exploration and petroleum industries slowed during the period, resulting in reduced demand for pumps and specialized equipment.

The former notwithstanding, the absence of qualified workers impacted all regional manufacturing sectors more than any other factor.

Regionally, the loss of manufacturing jobs between 2005 and 2010 had the effect of hollowing-out the industrial skills pipeline. During that period, many of the region’s technical schools, community colleges and training institutes experienced significant reductions in advanced manufacturing program enrollments. In the years that followed, the natural gas industry’s demand for workers competed with manufacturing. Between worker retirement, voluntary employee departure and the inability to backfill vacant positions with capable workers despite their strong desire to do so, many regional manufacturers had no choice but to maximize the output of their existing workforce and, essentially, accomplish more with fewer workers. This approach, however, was not their preference.



Today's Profile: Manufacturing Still a Powerhouse

While the industry's 10-year history had its challenges, manufacturing remains a driving force behind our economy.

Pennsylvania is still a manufacturing powerhouse. The Commonwealth's manufacturing output ranks eighth (8th) in the nation. Pennsylvania's level of manufacturing exports increased nearly 40% over the past five years and now ranks tenth (10th) nationwide. Manufacturing employee productivity continues to increase, with each worker now adding over \$131,000 to the Gross State Product (GSP) annually.

Manufacturing remains a premier wealth creator for all Pennsylvania's communities. At the end of 2015, manufacturing provided 565,164 full-time jobs, accounting for 11.27% of statewide non-government employment. Only the retail and healthcare industries provide more jobs. With an average wage 15.8% higher than the overall Pennsylvania wage, Commonwealth manufacturers infused \$33.1 billion into the economy in the form of annual payrolls last year alone. That's 13.15% of total wages earned by all working Pennsylvanians last year.

Locally, our manufacturers continue to drive economic prosperity and support the health, vitality and advancement of our communities. Across northeastern and the northern tier of Pennsylvania, manufacturing currently employs nearly 50,000 full-time workers – or 12.8% of the region's total private sector employment. Once again, only two other industries, retail and healthcare, provide higher levels of regional occupation. Last year, regional manufacturers paid out more than \$2.22 billion in salaries, or 15.21% of total area compensation across all industries. On average, our manufacturing workers earn between 11% and 28% more than their counterparts working in other industries. In rural counties, that disparity is even greater.

Simply put, manufacturing remains a driver industry across the Commonwealth and within our communities.

Pennsylvania's Leading Industries			
By Annual Payrolls		By Employment	
Industry Sector	Annual Payrolls (Billions \$)	Industry Sector	# of Jobs
Healthcare & Social Assistance	\$44.175	Healthcare & Social Assistance	954,480
Manufacturing	\$33.102	Retail Trade	639,995
Professional, Science & Technical	\$28.872	Manufacturing	565,164
Finance & Insurance	\$21.899	Accommodation & Food Service	450,637
Wholesale Trade	\$17.326	Professional, Science & Technical	341,497

Sources: Economic Modeling Specialists, Intl. Q1 2016
Pennsylvania Center for Workforce Information & Analysis

Signs of a Bright Future

In recent years, regional efforts to upgrade the image of manufacturing, modernize manufacturing training programs, improve industry-to-university collaboration, foster manufacturing innovation and create high-performing industry clusters have been successful.

As a result, the future looks bright for regional manufacturers, their current workforce and those aspiring to prosperous careers within the industry.

According to the well-respected labor market research firm, Economic Modeling Specialists, Intl. (EMSI), regional manufacturers will hire more than 8,600 production workers over the next 10 years. When related administrative, sales, supervisory and upper-management positions are factored in, EMSI's projected level of regional job creation within manufacturing tops 10,000.

A growing pipeline of prospective workers is gearing-up to accept those well-paying jobs. NEPIRC's Manufacturing Day initiative, local manufacturing career fairs, industry in-school and CareerLink presentations, and open-to-the-public plant tours have bolstered the image of manufacturing and raised awareness of its career opportunities. Manufacturer engagement in apprenticeship, internship, job shadowing and after-school employment programs has allowed younger workers and students to more fully explore industrial careers. In response, registration in advanced manufacturing training programs is on the rise, with many certificate and Associate Degree programs at or near capacity.

Northeastern Pennsylvania community colleges, technical institutes and universities are investing millions in modernizing their industrial skills training facilities. They are becoming state-of-the-art institutes featuring the latest conventional and additive manufacturing equipment, the newest software and the most modern technology available. Courses in nanotechnology, 3D design, flexible materials, optics and robotics now complement more traditional manufacturing skill curriculum, yielding a workforce that will fill our manufacturers' immediate needs and propel them into the future.

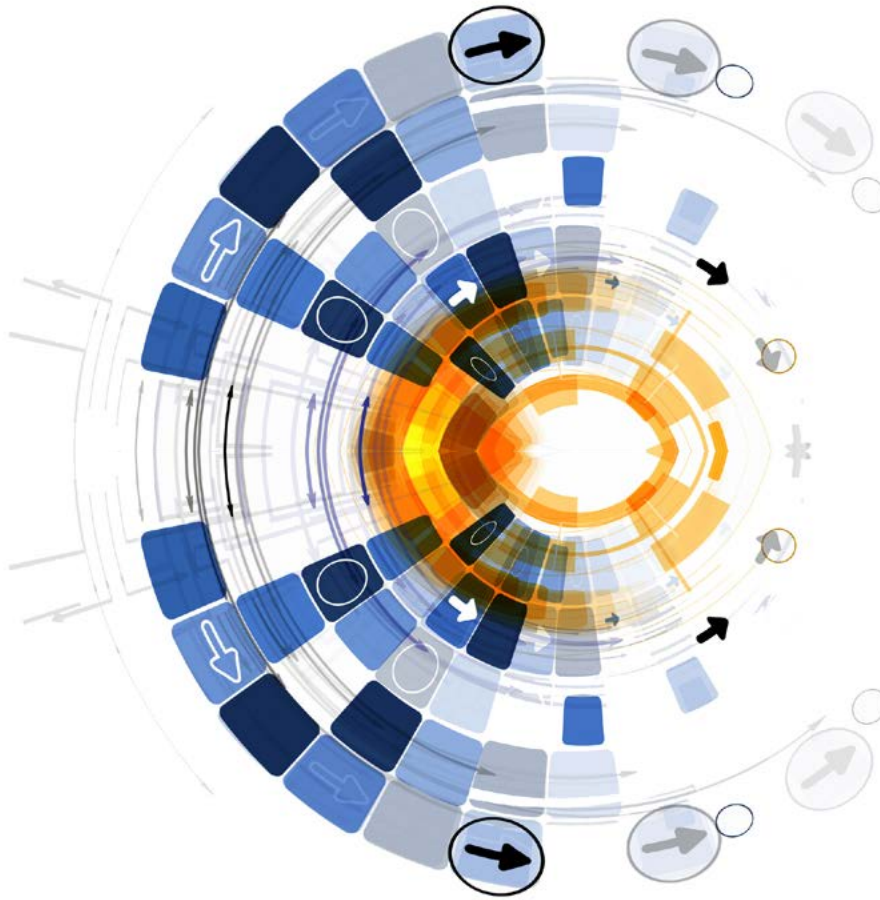
Our regional universities are collaborating with industry in all new ways, often partnering with

organizations such as NEPIRC and the Ben Franklin Technology Partners to accelerate manufacturer adoption of new technologies, expedite the commercialization of new products, or resolve product or process challenges. Faculty and student teams are working alongside manufacturing professionals on research and application projects that keep our companies on the cutting-edge and give them true competitive advantage. Additional resources within the Commonwealth budget, already proposed by many legislators, can further amplify the benefits of these collaborations.

Innovation and entrepreneurship centers throughout the region give manufacturers unprecedented access to equipment, talent, technology and fresh perspectives. Manufacturers can openly collaborate with start-up businesses to explore synergies and pursue mutually-beneficial ventures. Smaller manufacturers without a dedicated research and development (R&D) department now have a full array of university and entrepreneurial resources that they can leverage to identify and pursue proprietary opportunities.

Manufacturer attitudes and perspectives have changed for the better as a result of prior-year challenges. Same-sector companies, once viewed as competitors, are now networking, collaborating on joint projects and sharing best practices. They've formed meaningful industry partnerships and joined forces for shared employee training and recruitment activities. Across sectors, companies have formed localized supply chains and learn from each other's experiences in CEO Networks, Business Growth Networks and Innovation Consortia.

Our regional manufacturer community, the driver upon which our overall economy relies, is well-positioned to thrive in the years ahead. Our region has the workforce pipeline, advanced training programs, university-based resources, innovation infrastructure and collaborative spirit needed to ensure manufacturer growth well into the future. Because of that, our manufacturers, their employees and our community have good reason to be optimistic.



Biography

Eric Joseph Esoda is the President/CEO of NEPIRC – the Northeastern Pennsylvania Industrial Resource Center – a not-for-profit corporation that provides consultative services specifically to our region’s small and mid-market manufacturers. Mr. Esoda is also President of the Pennsylvania Industrial Resource Center Network, a member of the American Small Manufacturer’s Coalition Board of Directors and former Manufacturing Champion of the Year Nominee by the U.S. Department of Commerce.

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