



PLASTIC PRODUCTS MANUFACTURING
RESHORE READINESS REPORT
2014



INDUSTRY OVERVIEW

This industry includes companies that manufacture a range of plastic products, including housewares, durable consumer goods, building materials, packaging material, motor vehicle parts, resilient floor coverings, appliance parts, and bottle caps and lids.

Tangential industries include the manufacture of resin adhesives, custom compound resin, plastic film, sheets and bags, and tires.

Most experts predict that, as the economy recovers, consumer spending will drive demand in the industry's major markets — automotive, electrical equipment, construction and furniture.

The industry is expected to grow to \$92.8 billion over the next five years. At 30.1% of total industry revenue, automotive manufacturers are the industry's largest market segment, followed by hardware and home improvement wholesalers, electrical and electronic manufacturers, plumbing fixture wholesalers, and furniture wholesalers.

Key Industry Data

PROJECTED **2014** DOMESTIC INDUSTRY REVENUE

\$87.7 BILLION

PROJECTED **2019** DOMESTIC INDUSTRY REVENUE

\$92.8 BILLION

TOTAL VALUE OF IMPORTS, **2014**

\$19.2 BILLION

TOTAL VALUE OF IMPORTS FROM CHINA, **2014**

\$10.1 BILLION

INDUSTRY AVERAGE NET PROFIT MARGIN

\$4.50%

IMPORTS AS A PERCENT OF TOTAL 2014 DOMESTIC DEMAND (PROJECTED)

20.47%

Due to federal regulations requiring cars to have an average fuel economy of 54.5 miles per gallon by 2025, experts predict an increase in demand for plastic console and engine components over the coming years as automotive manufacturers replace heavier metal parts with lightweight plastic parts. Demand will also increase as new car sales are expected to grow throughout 2019.

The industry's second largest market — hardware and home improvement wholesalers — account for an estimated 23.7% of industry sales revenue, while plastic plumbing fixture wholesalers, who primarily supply contractors, account for an estimated 13.4% of sales revenue. These markets depend heavily on the construction industry by supplying plastic bolts, nuts, rivets and other plastic construction supplies. The construction industry is expected to grow at an average annual rate of 7.5% through 2019, particularly construction with respect to corporate renovations, as many companies will start to remodel buildings with energy-efficient materials.

Electrical and electronics manufacturers and furniture manufacturers account for an estimated 18.4% and 10.1% of industry sales revenue, respectively. These markets are driven by new product introductions like Blu-ray disc players, the increased adoption of mobile phones and the increase in popularity of lighter, more durable plastic furniture.

KEY INDUSTRY PLAYERS

National, International and Pennsylvania-based manufacturers and industry leaders include companies such as:



National and International

Armstrong World Industries, Inc.
PolyOne Corporation
SABIC Innovative Plastics

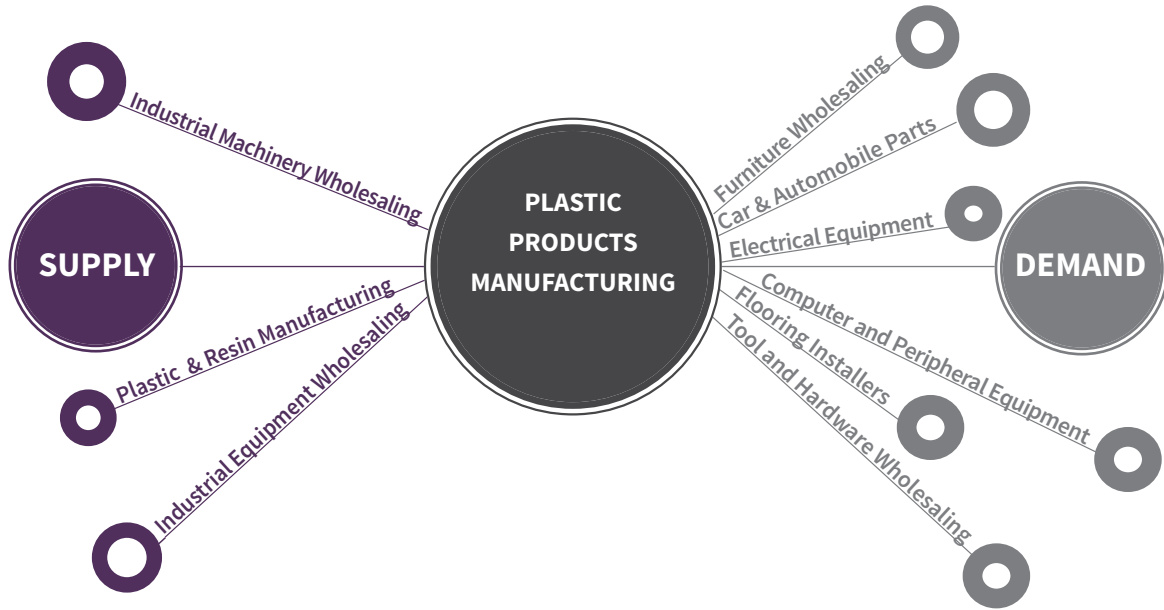


Pennsylvania-Based

Adams Manufacturing Company
Armstrong World Industries, Inc.
Clarion Bathware
Dart Container Corporation
MOLDAMATIC, LLC
Mondo USA
Regupol America
The Tapco Group
Whirley-DrinkWorks!
York Imperial Plastics, Inc.

PRIMARY SUPPLY CHAIN PARTNERS

Plastic product manufacturers rely upon robust supply chain partners as illustrated in the graphic below. Industry demand for plastic products is primarily determined by the level of automotive manufacturing, which uses plastic console components and plastic engine components. Residential and commercial construction activity affects demand for resilient floor coverings, plastic plumbing fixtures and other plastic products used in construction. Furniture purchases are also influenced by the housing and construction markets.



MAJOR DEMAND MARKETS

Demand within the plastic products industry is driven primarily by a few major sectors that provide the industry with the bulk of its business, the largest of which is the automotive market, followed by hardware and home improvement wholesaling, electrical and electronic manufacturing and furniture manufacturing.



AUTOMOTIVE

\$26.4 BILLION



HARDWARE AND HOME IMPROVEMENT

\$20.8 BILLION



ELECTRICAL AND ELECTRONIC

\$16.1 BILLION



FURNITURE

\$8.9 BILLION

INDUSTRY RESHORING FACTORS

Several recent industry trends are fueling reshoring decisions among manufacturers and industry supply chain companies.

Robotics, Automation and Reduced Emphasis on Direct Labor

Because the production of plastic items has traditionally been labor-intensive, much of the initial wave of offshore production and outsourcing decisions was fueled by real or perceived labor cost savings often associated with foreign production at that time. While direct labor continues to be an important element of total production costs, employee wages as a percentage of sales have diminished over time, from 18.7% in 2005 to slightly under 16.3% in 2014. This trend is expected to continue throughout the next 5 years as companies continue to implement Lean Enterprise manufacturing techniques and integrate robotics and increased automation into their production processes. Such advances have already led domestic manufacturers to realize increases in average revenue per employee metrics. In 2005, for example, domestic industry

revenue per employee stood at \$218,550. In 2014, that metric is expected to exceed \$269,600.

As production becomes less labor intensive, any remaining Chinese or other foreign producer labor cost advantage becomes even less significant, and is more easily outweighed by other overseas production costs, such as the cost of poor quality, transportation costs and the opportunity costs associated with longer product lead times.

Cheaper Domestic Prices of Natural Gas

Domestic manufacturers and industrial users have a unique cost advantage due to the wealth of natural gas reserves in Pennsylvania and other parts of the U.S., made possible by more efficient hydraulic fracturing techniques. Plastics manufacturers have a competitive advantage by sourcing raw materials from U.S. soil as petrochemical manufacturers pass on cost savings, due to the abundance of ethane, which is a primary feedstock for plastics and a by-product of natural gas. For many years to come, U.S. manufacturers will enjoy the cost advantage of cheaper natural gas and industrial electricity, estimated to be half that of the major export nations — China, Japan, Germany, France, and Italy.

Increasing wages in China, coupled with increasing productivity of U.S. workers and decreasing energy costs, are making manufacturing in the U.S. more attractive.



Advanced Manufacturing Techniques

The U.S. remains the largest producer of advanced technology products. Domestic manufacturers continue to invest in new technology and new product development in order to maintain and increase their competitiveness. The U.S. supports manufacturing by making strong investments in manufacturing research and the development of advanced manufacturing products, processes, systems, and enterprises. America Makes, the National Additive Manufacturing Innovation Institute, is a resource that U.S. companies can use to collaborate on innovations, overcome challenges quickly and accelerate time to market. Advanced manufacturing resources like America Makes strengthen the global competitiveness of existing U.S. manufacturers.

Need for Collaborative Innovation and R&D

Downstream plastic markets are actively searching for new products that can replace heavy, more expensive metal, especially in the automotive industry where manufacturers seek lightweight plastic parts as an alternative to heavier and higher priced metal parts as a way to improve fuel economy. Studies find that for every 10,000 miles traveled, nearly 200 gallons of fuel is saved when heavier metal components are replaced with plastic. The heavier weight and higher price of metals, as compared to that of plastics, presents a great opportunity for plastics manufacturers to derive higher revenue from metal-dominated markets.

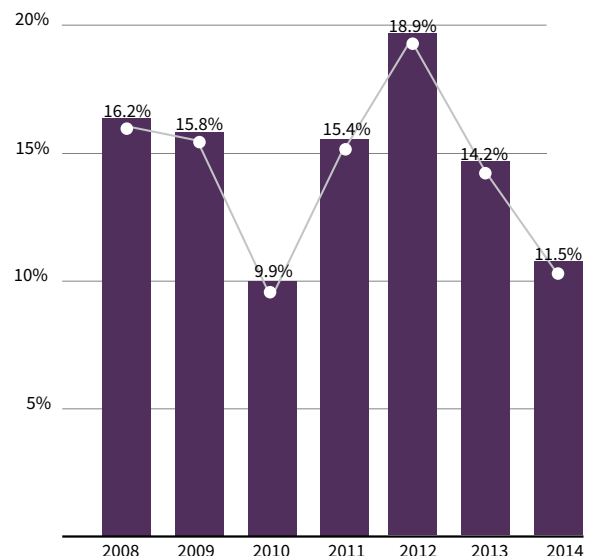
In order to capitalize on this opportunity, plastic manufacturers need to engage in robust and ongoing process and product innovation and work collaboratively with their customers to meet their needs. By colocating design and engineering with manufacturing, companies encourage innovation and new product development, resulting in product differentiation and new market opportunities. In addition, U.S. manufacturers are better positioned to leverage additive manufacturing resources like America Makes, additive manufacturing labs, federal labs, research universities, technical schools and other innovation systems to foster their own advances in plastics materials, product design and new product development.

Rising Chinese Labor Rates

The supply of China's low-cost labor is expected to dwindle over the next few years, as the competition for labor and minimum pay rate increases in China considerably narrow China's direct cost advantage. According to the Boston Consulting Group, pay and benefits for the average Chinese factory worker rose by 10 percent a year from 2000 through 2005 and by 19 percent a year from 2005 through 2010.

Additionally, the Chinese government has set a target for annual increases in the minimum wage of 13 percent from 2010 through 2015. Rising wages, higher U.S. productivity and other factors have significantly eroded the cost advantage of many low-cost manufacturing countries. According to the Boston Consulting Group, China's manufacturing cost advantage over the U.S. has shrunk to less than 5 percent.

ANNUAL CHINA MANUFACTURING WAGE INFLATION RATES 2008-2014



PENNSYLVANIA SPECIFIC RESHORING BENEFITS

In addition to the industry-wide reshoring factors mentioned, Pennsylvania offers several reshoring benefits to plastic product manufacturers and their supply chain partners.

Unique Material & Operating Cost Advantages Through Marcellus Shale

Pennsylvania is situated atop the 2nd largest energy field in the world, with Marcellus Shale gas existing beneath approximately two-thirds of the Commonwealth's land mass. Marcellus Shale is just one of eight gas formations in Pennsylvania. Pennsylvania's safe, efficient and environmentally-sound natural gas production has already had significant beneficial impacts to the plastics industry within the Commonwealth.

Remcon Plastics, for example, recognized a 30% reduction in purchasing costs by migrating to Marcellus Shale-derived plastics and the utilization of lower-cost Marcellus Shale gas within its operations. Pennsylvania's Marcellus Shale play provides plastic manufacturers – from resins to finished products – with assurance that they will enjoy unique, location-based cost advantages for ethane, hydrocarbon ethylene, compressed and liquefied natural gas and clean gas for use as a utility fuel for decades into the future.

Diverse Energy Sources & Low Energy Costs

Pennsylvania is among national leaders in low-cost energy for manufacturers. In addition to leveraging the world's 2nd largest Marcellus Shale reserves to reduce the cost of natural gas, the Commonwealth's energy portfolio consists of coal, clean-coal technology, nuclear power, hydropower and other renewable energy sources to fuel manufacturing growth. In the last six years, Pennsylvania's abundant resources have reduced natural gas prices by 50% and electricity costs by 40% for industrial users.

Vibrant Network of Plastic Technology Centers & Centers of Excellence

Pennsylvania is host to several world-class research centers, technical colleges, testing facilities and R&D resources with a focus on plastics.

The Plastics Innovation & Resource Center (PIRC) at the Pennsylvania College of Technology, for example, is one of the top plastics technology centers in the nation for R&D, testing, prototyping and education relating to injection molding, extrusion, blow molding, rotational molding and thermoforming. The Plastics Technology Center (Erie, PA), Penn State Material Research Institute (State College, PA) and the University of Pittsburgh Applied Research Facility (Pittsburgh, PA) represent a small sampling of the vast resources that Pennsylvania-based plastics manufacturers can draw upon to accelerate and improve their new product development, material selection, material testing, custom compounding and process technology systems. These resources, and many others across Pennsylvania, stand at the ready to provide quality workforce education and training programs to Pennsylvania's growing plastics manufacturing industry.

Access to Innovative Additive Manufacturing Labs

Additive manufacturing has the potential to revolutionize the plastics industry – particularly within the automotive and plastic profile shape segments. Pennsylvania manufacturers have access to world-class additive manufacturing labs, research facilities, prototyping services

and training programs enabling them to stay ahead of the additive manufacturing curve and lead the way, profiting from this new technology. The University of Pennsylvania’s PennDesign Fabrication Lab, Penn State University’s CIMP-3D Applied Research Lab and the University of Pittsburgh’s research being performed under a National Additive Manufacturing Innovation Institute (America Makes) Award are examples of just some of the additive manufacturing resources that plastics manufacturers can rely upon to help them evaluate and adopt additive manufacturing techniques and technology. Across the Commonwealth, additive manufacturing training curriculum, simulation labs, research capabilities and industry-to-university collaborations are growing in support of one of the Commonwealth’s largest manufacturing industries – plastics.

Robust Existing Plastics Industry

Among the 50 states, Pennsylvania ranks 5th in terms of the number of plastic product manufacturers. In total, the Commonwealth’s plastic and related products industry provides employment for more than 35,000 full-time workers – or over 6.5% of all manufacturing industry employees. Due to Pennsylvania’s focus on the plastics industry and unparalleled network of trade schools, technical colleges and universities, over 44% of Pennsylvania’s current plastics industry workers possess an Associate’s Degree or greater. Over 15% hold a Bachelor’s Degree, Master’s Degree or higher level of designation.

Extensive Network of Supply Chain Partners & Prospective Customers

Pennsylvania supports its plastics industry with an extensive network of potential suppliers and prospective buyers. The Commonwealth is home to 59 plastic material and resin manufacturers, more than 1,100 industrial machinery and equipment wholesalers and 30 auto parts manufacturers.

Pennsylvania has a robust supply chain network for this industry as shown below.

PA PLASTIC MANUFACTURING SUPPLY CHAIN

Supply Chain Sector	# of Establishments in PA
Auto Parts Manufacturing (NAICS 33639)	30
Automobile Interior Manufacturing (NAICS 33636)	8
Car & Automobile Manufacturing (NAICS 33611)	2
Computer and Peripheral Equipment Manufacturing (NAICS 33411)	45
Electrical Equipment Manufacturing (NAICS 33531)	111
Flooring Installers (NAICS 23833)	501
Furniture Wholesaling (NAICS 42321)	187
Industrial Machinery & Equipment Wholesalers (NAICS 42383)	1,179
Plastics Material and Resin Manufacturing (NAICS 325211)	59
Tool & Hardware Wholesaling (NAICS 42371)	229



Access to Nationwide & World Markets

Having a presence in Pennsylvania gives plastic manufacturers the competitive advantages of quick customer response, in-field installation and assistance, 24-hour part replacement capability and other customer-focused advantages that overseas or out-of-state suppliers cannot easily duplicate. A presence in Pennsylvania also places manufacturers within a reasonable commute to 40% of the U.S. population, 6 of the 10 largest domestic markets and 60% of Canada's population. Despite its proximity to such markets, Pennsylvanians enjoy a lower cost of living than all 7 other northeastern states.

In addition, Pennsylvania offers access to the world market through six international airports and three major ports to the Atlantic Ocean, Great Lakes and Gulf of Mexico. Pennsylvania also provides resident manufacturers with a state-supported network of 27 overseas offices that cover more than 62 world markets.

World-Class R&D and Innovation Capabilities

Pennsylvania is home to more than 270 colleges and universities, including four of the nation's top 50 universities, eight of the top 50 liberal arts colleges and three top business schools. Together, these colleges and universities provide not only a world-class workforce, but unparalleled collaborative R&D, innovation, materials testing and technology acceleration capabilities.

Pennsylvania also supports Centers of Excellence in plastics technology, metal stamping and perforation, welding, additive manufacturing, materials testing and other manufacturing specialties. These Centers assure Pennsylvania's manufacturers that they will have access to the cutting-edge technologies, workforce training opportunities and innovations they need to remain competitive and thrive.

Make It In America: The PA Made Again Initiative



PA Made Again is a statewide initiative, funded in part with federal Make It In America Challenge Grant support, that is focused on creating jobs through the growth and retention of Pennsylvania's manufacturing economy. The initiative includes key economic development organizations from across the Commonwealth that work collaboratively to build a strong pipeline of middle and highly-skilled manufacturing workers for companies reshoring to Pennsylvania. The initiative avails companies considering reshoring their production facility or supply chain inputs to a variety of assistance.

Manufacturing Extension Partnership (MEP) Centers host industry professionals who can introduce manufacturers to Total Cost of Ownership, Assess Costs Everywhere and similar reshoring tools. These tools help companies make informed reshoring decisions based upon accurate, real-time offshore and domestic production costs and other important factors. MEP centers also offer no-cost supplier identification assistance and technical assistance to companies considering reshoring.

Economic Development Administration (EDA) Partners assist manufacturers in site selection for their businesses, along with touring, deal negotiation and financing assistance. EDA partners can provide prospective Pennsylvania manufacturers with demographic information, permit and regulatory assistance, infrastructure/utility data, quality of life statistics and similar information.

Employment & Training Administration (ETA) Partners are building a strong pipeline of skilled workers through a collaborative training environment that serves the needs of existing manufacturers and new foreign-owned businesses wishing to locate in Pennsylvania. Through regional workforce organizations, ETA partners can identify the workforce that manufacturers need today, as well as train their workforce of tomorrow.

Together PA Made Again partners are collaborating to strengthen regional assets, advance regional workforce skills and create localized supplier networks – all with the goals of attracting, supporting and growing Pennsylvania's Reshore-Ready industries.

RESHORING SUCCESSES



Armstrong World Industries

In October of 2013, Armstrong World Industries announced that it would reshore production of its luxury vinyl tile (LVT) from China to Lancaster, PA.

In 2014, they began construction of a new facility to expand their manufacturing capability to include LVT for commercial and residential use in the U.S., a \$41 million investment.

The LVT market is experiencing double-digit growth in North America, largely because of product performance, appearance and ease-of-installation. By on-shoring LVT manufacturing from China, Armstrong expects to realize a more competitive cost structure with shorter lead times and improved customer service. The company expects to start shipping LVT product from the Lancaster, PA plant to customers by mid-2015.

SPECTRUM PLASTICS GROUP

Spectrum Plastics Group (SPG)

While looking for ways to grow sales, Spectrum Plastics Group (SPG), a mid-sized manufacturer headquartered in Minneapolis with multiple facilities across the U.S., recognized a trend with former clients who had once left them for foreign competitors. Many of these past customers were experiencing difficulties working with their foreign partners and wanted to bring back their molding and assembly work to the U.S.

For example, because of continuing intellectual property issues, a former electronics customer asked SPG to quote mold transfers and consider building new multi cavity molds to replace those built by foreign businesses. The cost of the travel and flights required to troubleshoot the IP issues alone outweighed the costs realized on the cheaper-made products. The discussion led to the reshoring of several existing molds, allowing SPG to obtain new sales.

This connection proved to be beneficial to SPG in the long run, as the client subsequently placed many new orders. After a five-year exit to the Asian market, the customer brought SPG back as their preferred supplier.

SPG is now embracing reshoring and has earned back the business of many former clients across numerous industries, greatly increasing their sales.

WHY RESHORE?

Top 10 most commonly cited reasons for reshoring

Taken from over 40 reshoring case studies, related to the plastic product manufacturing and the plastics and rubber manufacturing sector.

1 Freight Costs

Costs to ship goods and finished products is an important concern for companies. Rising oil prices, a fall off in new shipbuilding and a projected shortage in container port capacity in 2015 are expected to boost ocean freight rates, according to the Boston Consulting Group.

2 Research and Development

R&D capabilities are key success factors for product innovation. Having access to research centers like the Plastics Innovation & Resource Center at PA College of Technology and Manufacturing Extension Partnership offices provides a competitive edge for industry players.

3 Lead Time to Markets

Long lead times cause manufacturers to carry excess inventory and can cause on-time delivery issues. As demand for domestic production increases, it makes sense for plastics manufacturers to be located near their customers.

4 U. S. Price of Natural Gas

PA has the greatest numbers of active and permitted Marcellus Shale wells in the nation. Marcellus Shale drilling activities are expected to continue within PA for years into the future, which will make energy and raw materials less expensive, giving PA manufacturers a competitive advantage.

5 Brand Issues (Made in USA)

Customers commonly associate “Made in the USA” with “Quality”, which leads to increased brand loyalty and the ability to command premium prices.

6 Wages and Currency Changes

Escalating pay and benefit increases for the average Chinese factory worker and the appreciation of China’s currency, coupled with increased U.S. productivity, make domestic manufacturing more attractive.

7 Skilled Workforce

PA has over 35,000 workers in the plastic products industry. Over 44% of them possess an Associate’s Degree and over 15% hold a Bachelor Degree or higher, giving plastics manufacturers the skilled workforce they need to operate highly automated machinery and equipment.

8 Product Quality & Rework

Recalls of Chinese products have contributed to a consumer preference for products “Made in USA.” In 2013, the Consumer Safety Commission recalled 181 products imported from China, 360% more than the number of recalls for products manufactured in the U.S.

9 Automation and Technology

This industry continuously innovates to improve its machine technology and product performance while expanding the use of recycled materials and product applications. Having access to PA’s vibrant network of Plastic Technology Centers & Centers of Excellence gives Plastics manufacturers a competitive advantage.

10 Productivity

U.S. plastics workers are increasingly more productive. The Bureau of Labor Statistics reported that output per hour for this industry increased by 2.8% between 2011 and 2012 while unit labor costs increased only .2%.

TOTAL COST OF OWNERSHIP (TCO)

MAKING AN INFORMED RESHORING DECISION

Manufacturers considering reshoring their production capabilities and/or their supply chain inputs (components, sub-assemblies, packaging, consumables, etc...) to Pennsylvania can receive **NO-COST** reshoring assistance through the PA Made Again initiative.


NEPIRC and its partners provide no-cost Total Cost of Ownership analyses for manufacturers. Total Cost of Ownership (or TCO) is a comprehensive analysis that considers all outsourced product costs – including factors that are often overlooked by most internal pricing, costing and sourcing models – so that manufacturers can make informed outsourcing, domestic purchasing or internal production decisions.

More than 60% of companies use cost modeling and purchase analysis systems that do not accurately capture the true cost of offshore production or imported supply chain inputs. In many cases, these systems understate the true costs by as much as 20%. The TCO model walks manufacturers through 29 factors that contribute to total product cost. Using real-time, user-inputted data, the TCO model allows companies to make accurate sourcing decisions.

Make the TCO analysis a key element of your company's sourcing decision-making process today.

To learn more about the Total Cost of Ownership analysis, and how your company can receive **NO-COST** assistance with the tool, contact:

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