

manufacturing the future

By Joseph J. Houldin

Just as the 19th and 20th century companies and industries grew to be national in scope and stood on the shoulders of a diverse base of existing companies that were seeded in the 18th century, Greater Philadelphia's 21st century manufacturing sector will grow, once again, from the existing large and diverse base of manufacturers on the ground today. The future belongs to the entrepreneurs from every size company with an overall environment that enables them to do what they do – make things.

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There is an increasing reference in the general public and business media to a macro trend in our early 21st century national manufacturing economy. It is described as entering the Second Industrial Revolution. With terms like re-shoring, on-shoring, and back-shoring, it suggests that a major reinvention of how and where what is made – what is manufactured – is well underway.

Manufacturing activity continues to be viewed by economically emerging countries as the doorway to broad-based national prosperity. As such it is cultivated in many different ways by government policy in countries throughout the world. Of course the world stage in 2013 is very different from the one in 1850 but is still very important to understand where and how developed countries and regions will continue to play. The foundational threshold for a seat at this new larger table is and will continue to be some mix of price, quality, and service advantage where the plusses of one help offset the minuses of another. Also, we have come to understand or remember that innovation, or an increase in the rate of positive change from the norm, is the secret sauce that produces sustainable competitive advantage.

Hit hard by the most recent recession, the nation's manufacturing base has been weathering ongoing global shifts in manufacturing production, intense international price competition, major demographic shifts, and frenetic world markets. Greater Philadelphia's manufacturing sector, once heralded as the "Workshop of the World," has also weathered these elements and has done so (in large part because of its diversity) better than many other regions. With a manufacturing renaissance of sorts underway, Greater Philadelphia is poised yet again to become a premier region in the business of making things. The Delaware Valley Industrial Resource Center (DVIRC) has witnessed these changes over the past 25 years and will continue to provide high value-added services focused on helping companies with profitable growth. In addition to helping companies with operational efficiencies, we now offer a robust suite of services for strategy and new market development focused on growing business value.

What follows makes the case briefly for why the Philadelphia region will once again be one of the global players in this "second" industrial revolution.

THE WORKSHOP OF THE WORLD

From the Greater Philadelphia area perspective, what is happening can just as easily be described as its *Third* Industrial Revolution. The Philadelphia area was the center of manufacturing for the 13 original colonies and at the center of the "first" industrial revolution. It was in the forefront of the period when things were made in a low volume, highly customized, craft-based production model; it was in the forefront of the shift to a more mechanized, high volume and low customization model; and it is now at the forefront of the current revolution to a high value-added mass customization model.

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GREATER PHILADELPHIA IN THE 21ST CENTURY

From its craft beginnings in colonial times, through its ascent as a major steel producer and maker of ships and planes and locomotives and just about everything else at the turn of the 20th century, to its unparalleled production at the Philadelphia Naval Shipyard during World War II and post-war rise as a center of chemical and pharmaceutical research and production – Greater Philadelphia's manufacturing history is long and storied. Today, through innovation and partnerships, the region's manufacturing sector has not only survived but is poised to thrive, and emerge as a premier region "in the business of making things."

While some of the large manufacturers in our region are re-shoring – K’NEX toys for example – a vast majority of the 6,000 manufacturers in Greater Philadelphia are thriving because they have perfected their craft, adopted lean manufacturing practices, and identified targeted niche markets worldwide.

21st century manufacturing sector will grow, once again, from the existing large and diverse base of manufacturers on the ground today. The future belongs to the entrepreneurs from every size company with an overall environment that enables them to do what they do – make things.

The Philadelphia region has that environment and those entrepreneurs. Three such examples follow.

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K’NEX is a third generation, family owned toy maker from suburban Philadelphia that moved part of its manufacturing process overseas in the 1990s. Over the past four years, the company has grown by about 40 percent. Thanks in part to license agreements with Nintendo, Sesame Street, NASCAR, and others, its toys are now distributed in 40 countries, up from just 12 three years ago. Its management recently began re-shoring, hiring workers and spending millions on equipment locally. The decision to do so came at a time when American parents were concerned about toys being manufactured in China. Quality matters. K’NEX is now exporting toys to China where the “Made in America” brand is desirable because it is synonymous with good quality.

Stockwell Elastomerics, a 4th generation and 93-year-old company, has made the shift from higher volume, commodity and price sensitive type production to lower volume, specialized production based on their ability to solve customer problems (engineering) and provide unmatched service through the fast-turn delivery of custom gaskets, seals and cushioning components for the high-tech electronics and specialty electronics markets.

If one had walked through the Stockwell Rubber plant 10 to 15 years ago, one would have seen rows of large presses die-cutting rubber parts, with significant floor space devoted to work-in-process and finished goods inventory. Today, most of the big presses are

gone, replaced by four smaller, programmable water jet cutters. Much of the floor space is now dedicated to small batch size adhesive lamination and custom fabrication to support the fast-turn production needs of Stockwell’s customers in the Technology Sector.

With DVIRC as a partner, the company implemented Lean Business Principles in 2007 – with the main goal of responding faster to the design needs

of customers in the Technology Sector – where the sealing gasket is one of the last components specified. Despite having one engineering and production location in Philadelphia, the company’s reach is global, exporting product to generate approximately 25 percent of its revenue from customers with facilities in Asia and Mexico. The business has increased in revenue by 50 percent since 2009, surpassing its pre-recession peak and gaining additional share in its strategic markets.



Dean Swisher (left) and Mike Sisco (right) apply custom adhesives in Stockwell’s lamination department.



Customized silicone sponge gaskets die cut at Stockwell Elastomerics.

Ehmke Manufacturing Company, Inc. is an 83-year-old Philadelphia textile end-product manufacturer selling products and services primarily to the Department of Defense (DoD) and the Defense marketplace. In its early years, Ehmke produced commercial commodity textiles such as school tote bags, workers aprons, and residential awnings. Today, the company has transformed into a premier domestic military contractor supplying technical fabric products such as aviation thermal/acoustical blankets, medical first aid kits, nylon military tactical gear, and custom military aircraft VIP interiors. Ehmke’s specialization in engineered, customized product solutions has resulted in substantial growth since the current ownership took control of the business in 2001.

Over the last five years, Ehmke CEO Bob Rosania and COO Cliff Stokes have successfully elevated the

company up the value/margin supply chain within its market segments. Ehmke recently made a significant investment in research & development resulting in a robust New Product Development (NPD) process that has enabled the company to bring over 50 new tactical gear products to the market under the brand name, *High Ground Gear*. *High Ground Gear* is integrated nylon sewn products that are specifically designed to meet the unique mission requirements of Special Forces operators and military personnel. Ehmke's investment in R&D and its business model to offer high value-added products to its customer base have provided a pathway forward for continued growth.

Through a robust Lean Manufacturing initiative implemented with the help of the DVIRC starting in 2008, Ehmke has drastically improved its productivity and eliminated wastes in its production processes. Since 2008, Ehmke has doubled in size and has surpassed its highest revenue year in 2012.



Bob Rosania, president of Ehmke Manufacturing Company

As a U.S. textile manufacturer, Ehmke has not only survived, but thrived in an industry decimated by foreign competition during a tumultuous economic environment. The foundation of that success can be found in its innovative approach to NPD and its commitment to Lean Manufacturing.

These are but three examples that illustrate some of the types of changes that are going on in firms throughout the region. Housed within the manufacturing base of some 5,000 firms lies a wealth of business, engineering, marketing, sales, and production expertise that is second to none. The number of 5,000 firms is about the same as the number in 1970. Of course there are fewer large firms or branch plants and lower total employment, and most of those firms are not where they once were – in the city; they are now in the Greater Philadelphia suburbs. That said, the evidence is that the region's manufacturers as well as the region as a whole maintain a globally competitive position.

In addition to the essential ongoing company investment in innovation, the region has recently received a public investment intended to further spur investments at the company level. DVIRC and its partner organizations – PIDC, Penn State University, and Philadelphia University among them – received grants from five different public agencies (the U.S. Departments of Commerce, Energy, and Labor, and the Small Business and Economic Development Administrations) to develop an *Advanced Manufacturing Technology and Jobs Accelerator*. This project brings together economic development organizations, universities, and area companies with expertise in product design, prototyping, and manufacturing simulations capabilities to augment an already dynamic innovation process. Located at the Philadelphia Navy Yard, it will be a magnet for manufacturers to more efficiently and effectively spur innovation.

GREATER PHILADELPHIA REGION – Manufacturing Establishments 2012

NAICS	NAICS Description	No. Firms	Pct. of Total
311	Food Manufacturing	529	8.9%
312	Beverage and Tobacco Product Manufacturing	61	1.03%
313	Textile Mills	64	1.08%
314	Textile Product Mills	123	2.08%
315	Apparel Manufacturing	139	2.35%
316	Leather and Allied Product Manufacturing	25	0.42%
321	Wood Product Manufacturing	147	2.48%
322	Paper Manufacturing	117	1.98%
323	Printing and Related Support Activities	635	10.73%
324	Petroleum and Coal Products Manufacturing	58	0.98%
325	Chemical Manufacturing	359	6.07%
326	Plastics and Rubber Products Manufacturing	246	4.16%
327	Nonmetallic Mineral Product Manufacturing	226	3.82%
331	Primary Metal Manufacturing	97	1.64%
332	Fabricated Metal Product Manufacturing	1,038	17.54%
333	Machinery Manufacturing	508	8.58%
334	Computer and Electronic Product Manufacturing	362	6.12%
335	Electrical Equipment, Appliance, and Component Manufacturing	151	2.55%
336	Transportation Equipment Manufacturing	139	2.35%
337	Furniture and Related Product Manufacturing	272	4.60%
339	Miscellaneous Manufacturing	622	10.51%
Total		5,918	100.00%

Source: IHS Global Insights 2012

The Accelerator will be a place where the partners' services are delivered to companies committed to more aggressive growth, and it will be a hot house of innovation for the area's manufacturing community. The project was funded in part by a group of federal investors who saw opportunity for economic growth within the Philadelphia region's manufacturing sector.

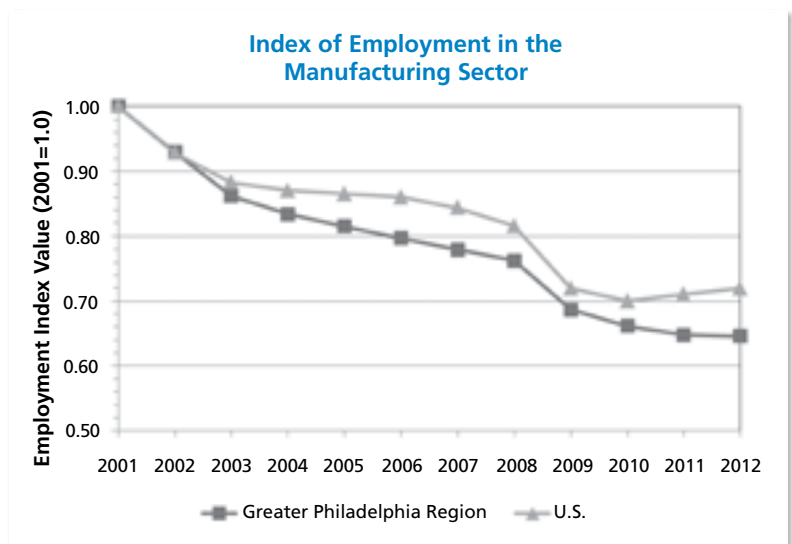
MORE THAN A HELPING HAND

DVIRC and others in the region are helping to usher in the impact and benefits of this next revolution for the Philadelphia region. As a regional economic development organization, DVIRC's place among the business development and attraction-oriented service providers is defined as a convener and as an educational and technical assistance provider focused solely on the manufacturing sector. DVIRC functions as a consultant, trainer, facilitator and yes, as an instigator of continuous improvement within a company, and we offer more than a helping hand. We won't fish for you, or just teach you how to fish. We want to be your fishing buddies.

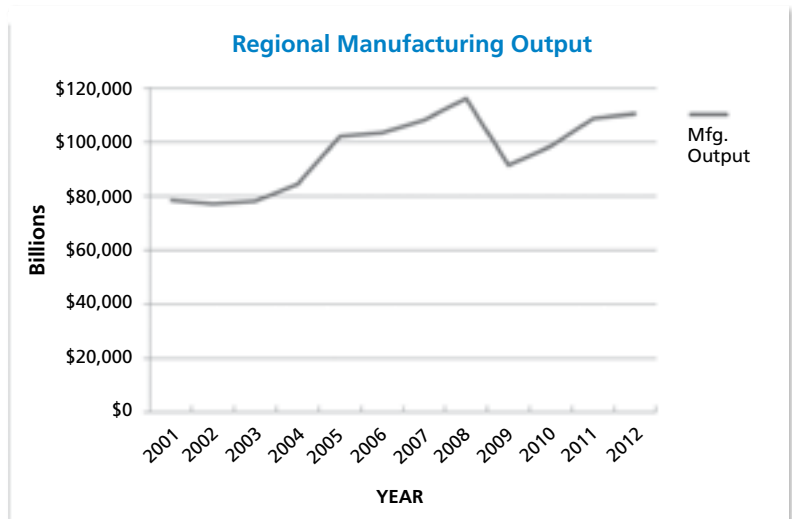
Since 1988, DVIRC has served as an economic development organization that supports its work through multi-year and performance-based contracts from the state and federal governments along with fee-for-service income. Public support enables DVIRC to pay particular attention to smaller companies that typically require a longer sales cycle and that undertake smaller projects in dollar amount and time. Public support also allows DVIRC to be more patient than most private consultants can generally afford to be – an essential characteristic that enables us to pursue our mission with passion.

Historically, for the first half of our organizational existence we focused our services on the production and operations levels in a company, helping hundreds of area firms learn about and apply the principles of Lean Manufacturing to improve quality, on-time delivery, and overall productivity. Over 2,000 individuals have been through our Lean Manufacturing programs, creating a knowledgeable army of continuous improvement soldiers. Helping companies adopt lean techniques and innovative growth strategies is at the heart of what we do, through our own internal expertise and by bringing additional service providers to the table to help our clients grow their business value – the most significant measure of business competitiveness.

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Source: IHS Global Insights 2012



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The key to the region's manufacturing future is directly tied to our region's ability to provide companies with the overall business environment needed to succeed. A significant business environment component is providing the talent – business, engineering, technical, financial – businesses need to grow their companies. Now and over the next decade, as older workers retire, there are and will be plentiful opportunities for individuals to forge a career in manufacturing. Engineers, machinists, mechanics, technicians, skilled production specialists – these are positions that represent opportunities to engage in the making of things that will support the high quality of life and standard of living we want for our region.

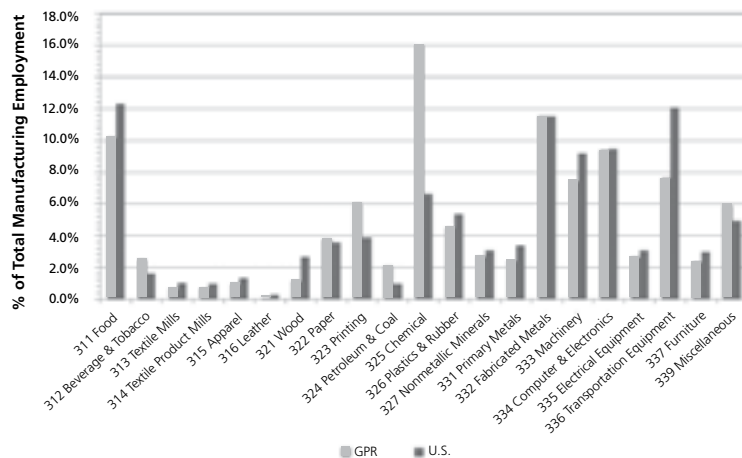
Now that our national and regional economies are inching out of the recession, we expect to see even more job opportunities in the manufacturing sector, with companies throughout the region vying for manufacturing talent as they continue to grow.

MANUFACTURING ESTABLISHMENTS BY EMPLOYMENT SIZE 2010

Employment Size	Establishments	Pct of Total
1-9	2,982	54.3%
10-19	892	16.2%
20-49	915	16.7%
50-99	353	6.4%
100-249	266	4.8%
250-499	40	0.7%
500-999	35	0.6%
1000+	11	0.2%
Total	5,494	100.0%

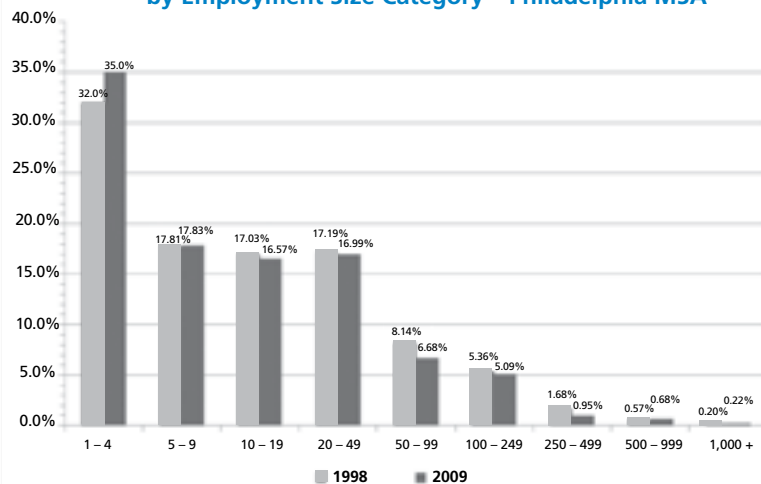
Source: Bureau of the Census, 2012. 2010 County Business Patterns

Distribution of Manufacturing Sector Employment in 2012



Source: IHS Global Insights 2012

Distribution of Manufacturing Sector Establishments by Employment Size Category – Philadelphia MSA



Source: Bureau of the Census, 2012

Following are a few of the demographics for the regional manufacturing community.

- Mfg. bottomed out at 3.28 percent of the number of firms in all sectors in 2011 and has risen over the past two years.
- Employment: Loss of an average of about 3.8 percent per year over the 12-year period (2002-2012).
- Increase in Gross Output of approximately 3.15 percent per year from 2001 to 2012, currently totaling about \$110.6 billion.
- Output per worker from 2001 to 2012 had an annual growth rate of 7.3 percent per year, compared to 3.9 percent for all sectors.
- 54 percent of establishments have less than 10 employees and about 93.5 percent have less than 100 employees.

Though Greater Philadelphia manufacturing, like the rest of the nation, has suffered through decades of geographic shifts in production – first to the South, then to Mexico, and then to Asia, it has continued to increase both productivity and gross regional output. Fortunately, the region's manufacturing base is diverse and not tied to any large OEM or specific sector.

Barring a dip at the beginning of the recession in 2009, output continued to rise even as employment decreased. And while the diversity of manufacturing establishments is well spread, the region's employment in the chemicals more than doubles the national average due to the region's overall strength in pharmaceuticals.

Our region, like the nation, is a region of small firms, with over 90 percent having fewer than 100 employees and just over 86 percent having less than 50.

WORKSHOP REDUX – A MANUFACTURING REGION

Our region is again becoming a premier manufacturing region because we and the firms we work with are cultivating the characteristics that support growth and an increase in individual business value. Profitable growth, innovation in every aspect of the business, greater international market shares, increased productivity, a commitment to lifelong learning, and steady job growth – these are the features of the firms that are making Greater Philadelphia a premier manufacturing region.

After nearly four decades of unprecedented challenges, manufacturers in the region are poised for growth, reinventing themselves to compete in markets at home and around the world. New products, new processes, new technologies, new markets, and new business models – all are ways in which our clients are competing to sound the message that our manufacturing base is alive and well and formidable.

If you don't think Greater Philadelphia is a manufacturing region, take another look. What you'll see are companies representing the best American manufacturing has to offer – strong leaders in innovative enter-

prises with design genius and engineering know-how. Business men and women who want to define the next generation of advanced manufacturing, and who are ready to put Greater Philadelphia on the world map as a premier region in the business of making things. These are our clients: innovative companies selling all over the world, combining world class front-end engineering, design, and production with back-end installation and customer service. They are innovative leaders that are unleashing the creativity and imagina-

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tion of the people they employ. They make things. And they make things happen.

If you don't think Greater Philadelphia is a manufacturing region, take another look: there are thousands of companies with lasers, robots, materials breakthroughs, additive manufacturing prowess, nanotechnology, computer-controlled production systems, and engineering wizardry – perpetual innovation.

Whether it is precision parts, complicated assemblies and sub-assemblies, or customized design-build challenges – our companies can make and address them, and they can make them of the finest quality, delivered and serviced on time.

We have great respect for the men and women running and working in these companies – their future and the future of their companies are tied to those of the citizens of our region. Greater Philadelphia is emerging once again as a premier manufacturing region – as one of the great workshops of the world.

Our mission remains the same: to grow the business value of companies through consulting services, talent development efforts, and comprehensive resources. More than ever, we know that growing individual business value improves the standard of living and quality of life for those who live and work in this great manufacturing region. 🌐



Pennsylvania is Open for Business

- Historic Tax and Regulatory reforms projected to save businesses more than \$1 billion annually
- The largest network of international trade and investment consultants in the U.S.
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- Keystone Opportunity Zones and tax-free zones available



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