Southwestern Pennsylvania Industry Cluster Snapshot

MANUFACTURING

Three Rivers Workforce Investment Board
August 2003

ABOUT THIS BRIEF

Southwestern Pennsylvania Industry Cluster Snapshot: Manufacturing is part of a series of publications intended to inform discussions about workforce development efforts in the region[1]. It is a product of the Community Audit project, a collaborative effort by the Three Rivers Workforce Investment Board (TRWIB) and its partners[2] to improve the quality of local workforce information. The target audience includes local elected officials, cluster coordinators and members, education and training providers, employers, job seekers and other stakeholders. Other cluster briefs deal with information technology, healthcare, financial services and hospitality and tourism. The briefs serve as companion pieces to a more comprehensive report entitled "A Regional Audit of Workforce Supply and Demand." To obtain additional copies of this brief, contact the TRWIB at 412-552-7090. The complete series is also available online at www.trwib.org/reports.htm.

The Community Audit project is supported by a demonstration grant from the U.S. Department of Labor.

[1] In this series, the Southwestern Pennsylvania region is defined by four contiguous workforce areas: Southwest Corner (Washington, Greene and Beaver counties); Three Rivers (Allegheny County, including the City of Pittsburgh); Tri-County (Indiana, Armstrong and Butler counties); and Westmoreland-Fayette (Fayette and Westmoreland counties).

[2] Partners include Workforce Connections (a project of the Pennsylvania Economy League), the Pittsburgh Technology Council, the Steel Valley Authority, the Westmoreland-Fayette Workforce Investment Board, the Tri-County Workforce Investment Board, and the Southwest Corner Workforce Investment Board.

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WHAT ARE INDUSTRY CLUSTERS?

According to the National Governors Association, most experts define an industry cluster as a "geographically bounded concentration of similar, related or complementary businesses, with active channels for business transactions, communications and dialogue, that share specialized infrastructure, labor markets and services, and that are faced with common opportunities and threats."[3]

Businesses typically benefit from clustering through better access to suppliers, skilled labor pools, and transfers of knowledge. Collectively, cluster companies can enhance a region's economy by increasing productivity and fostering entrepreneurship.

The Five "Priority" Clusters

In 2001, the Three Rivers Workforce Investment Board, Workforce Connections (a project of the Pennsylvania Economy League) and other major players in regional workforce development selected five industry clusters on which to concentrate their collective efforts. The five clusters, chosen because of their importance to the regional economy, are:

- financial services;
- healthcare;
- hospitality and tourism;
- information technology; and
- manufacturing.

Collective efforts to date have included convening four industry-focused workforce summits, hiring “cluster coordinators” to work with employers to develop and implement targeted strategies to address critical labor shortages, and undertaking action-oriented research.

[3] *A Governor's Guide to Cluster-Based Economic Development*, National Governors Association (2002).

SUMMARY OF MAJOR FINDINGS

- Manufacturing has the second highest employment of the five priority clusters, with 9.6% of SWPA's total employment.

- The manufacturing cluster's average annual wage in SWPA exceeds the average annual wage in Pennsylvania and the U.S., but wage growth trails both. The region's employment growth, meanwhile, exceeds the rates for Pennsylvania and the U.S.

- In terms of employment, the leading industry is "blast furnaces and steel mills," with 19,762 jobs, followed by "paints and allied products" with 5,794 jobs. "Other industrial machinery" has the most business establishments (374), followed by "commercial lithographic printing" (300).

- First-line supervisor/manager of production and operation workers is the occupation with the most employment in the cluster, with 5,770 jobs in the region. Machinists (4,390) and team assemblers (3,860) are second and third.

- Most of the top occupations by employment require some level of work experience and on-the-job training. Only one of the top occupations pays more than $40,000 year.

- Career clusters within the industry cluster include health, safety, and environmental assurance; logistics and inventory control; maintenance, installation, and repair; manufacturing production process development; production; and quality assurance.

- Key skills separate occupations along a career mobility track. For example machinists have higher levels of skills in critical thinking, science, and active learning than do machine setters, operators, and tenders. In addition, the former occupation requires more on-the-job-training, typically between 12 and 48 months.

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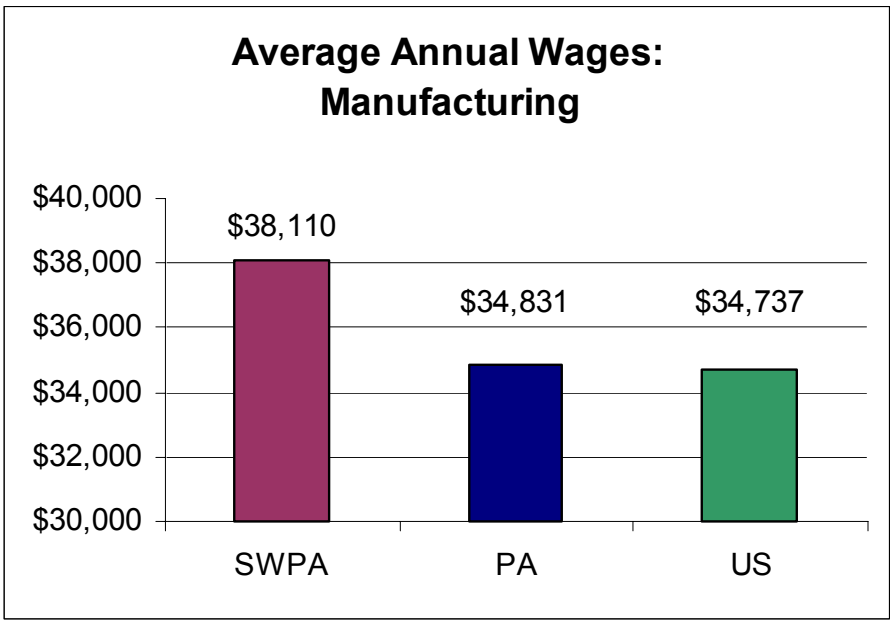
CLUSTER TRENDS

This section details the employment, wages and labor market trends for the manufacturing cluster in Southwestern Pennsylvania ("SWPA"), the state, and the nation. Data come from multiple sources so there may be discrepancies.

Employment

The manufacturing cluster employed a total of 139,390 workers in 2000, the second highest level among the five priority clusters.[4]

Wages



Center for Workforce Information and Analysis, PA Department of Labor & Industry (2000)

The average annual wage within the manufacturing cluster was quite a bit higher in the SWPA region ($38,110) in 2000 than it was in the state ($34,831) or nation ($34,737) and higher than it was for all of the other priority clusters with the exception of information technology.

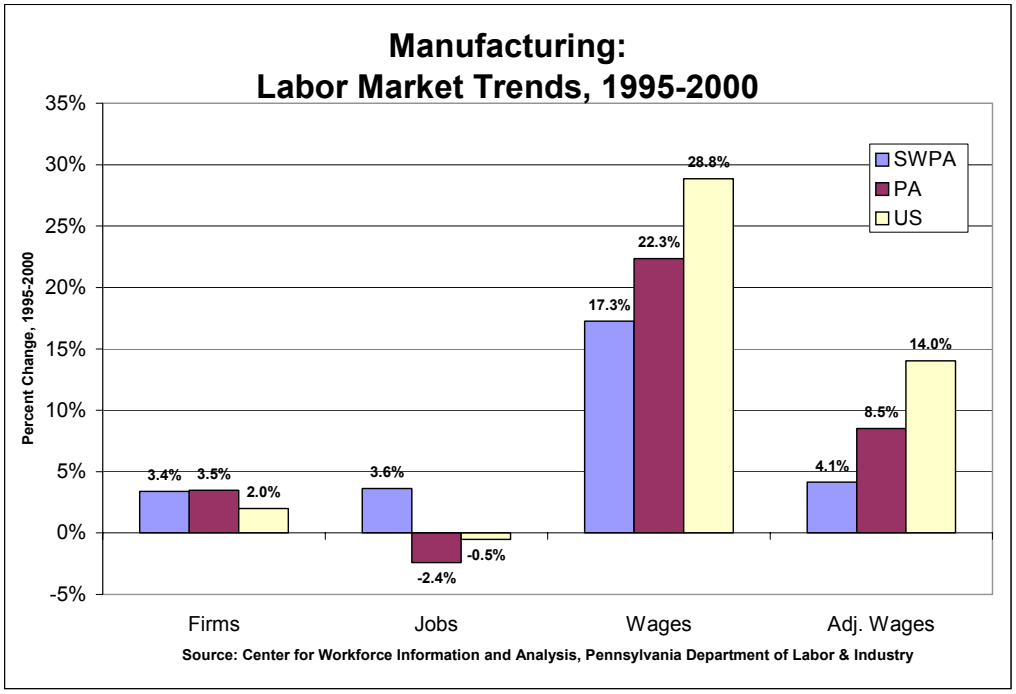
Job Growth

The rate of job growth in the region's manufacturing cluster was 3.6% from 1995-2000, low on an absolute scale but high relative to the nation's rate of -0.5% for the same period.[5]

[4] Center for Workforce Information and Analysis, PA Department of Labor & Industry
[5] Ibid.

CLUSTER TRENDS (CONT.)

Labor Market Trends



The rate of growth in new business locations ("firms") in the region (3.4%) was similar to the rate for the state (3.5%) and greater than the rate for the nation (2.0%). The rate of job growth (3.6%) was high relative to the state and national rates (-2.4% and -0.5%, respectively). Wages and adjusted wages[6] grew more slowly than they did statewide or nationwide.

Location Quotient[7]

The region's concentration of employment in the manufacturing cluster was below average compared to Pennsylvania and the U.S., with location quotients of 0.75 and 0.89, respectively, in 2000.[8]

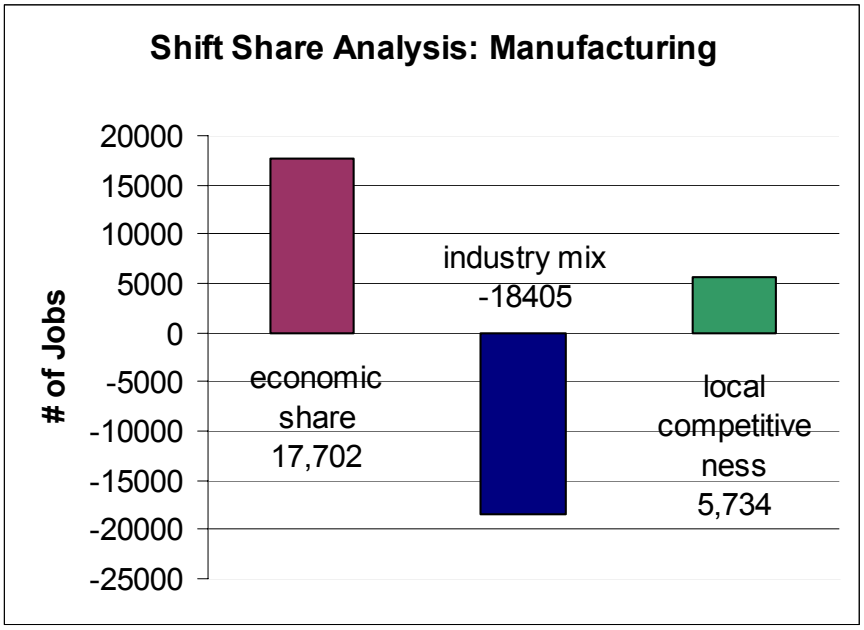
[6] i.e., adjusted for inflation

[7] A location quotient indicates the extent to which a single industry's concentration of employment in one region compares to the concentration in another region. A value greater than one signifies an above-average concentration of employment in the first region relative to the second; a value of less than one signifies a below-average concentration of employment in the first region relative to the second.

[8] Center for Workforce Information and Analysis, PA Department of Labor & Industry

CLUSTER TRENDS (CONT.)

Shift Share Analysis[9]



Center for Workforce Information and Analysis, PA Department of Labor & Industry (1995-2000)

According to shift-share analysis for the region's manufacturing cluster, the region's employment growth from 1995 to 2000 can be attributed to the expansion of the national economy ("economic share") and, to a lesser degree, to the fact that manufacturing employers in SWPA are, in general, more competitive than comparable industries across the nation ("local competitiveness"). The negative measure for the "industry mix" component indicates that manufacturing industries across the U.S. generally experienced slower-than-average growth in comparison with other industries.

[9] Shift Share Analysis breaks regional job growth or decline down by three factors: "economic share" (the increase or decrease in employment that can be attributed to growth or decline in the national or state economy); "industry mix" (the increase or decrease in employment that can be attributed to faster-than-average or slower-than-average growth in the industry cluster, compared with the average for all industries in the state or nation); and "local competitiveness" (the increase or decrease in employment that can be attributed to advantageous or disadvantageous conditions in the local area that make the industries in the cluster either more competitive or less competitive than their counterparts nationally or statewide.

DETAILED CLUSTER PROFILE

This section provides a more up-to-date and more detailed picture of the cluster by looking at standard industrial classification ("SIC") codes. (Note: the data come from a private third party – Dun and Bradstreet – so they may not correlate with other data that appear in this report.)

Industry Employment in the SWPA Manufacturing Cluster (March 2003)

SIC Number	SIC Name	Employment	Businesses	Average Employment per Business
3312	Blast furnaces and steel mills	19,762	96	230
2851	Paints and allied products	5,794	30	215
2711	Newspapers	5,548	124	55
2821	Plastics materials and resins	5,468	26	219
3599	Industrial machinery, other	4,621	374	13
3089	Plastics products, other	4,106	104	46
3743	Railroad equipment	3,802	20	190
2752	Commercial printing, lithographic	3,302	300	11
3842	Surgical appliances and supplies	3,030	39	80
2759	Commercial printing, other	2,996	259	12
3353	Aluminum sheet, plate, and foil	2,620	11	291
3544	Special dies, tools, jigs, and fixtures	2,402	70	35
	Total/Average[10] for all 4-Digit Industries	174,194	6,105	30

Source: MarketPlace (Dun and Bradstreet)

Almost 175,000 manufacturing jobs existed in the nine-county region in March 2003. Blast furnaces and steel mills employed the largest number (19,762), nearly four times as many as paints and allied products, the next largest industry from an employment standpoint.

The cluster's average employment per firm is 30, but five industries dominate with more than 190 employees each: blast furnaces and steel mills; paints and allied products; plastics materials and resins; railroad equipment; and aluminum sheet, plate and foil.

[10] These aggregate figures reflect the entire cluster (all 4-digit industries), not just the top twelve 4-digit industries listed in the table.

STAFFING PATTERNS

This section looks at occupations for which there is high demand from employers in the industry and provides information about the number of jobs available, the average salary, the type of work schedule offered, the stability of the job, and the education level required.

Dynamite Dozen: Top 12 Manufacturing Production-Related Occupations by Employment, Pittsburgh Metropolitan Statistical Area[11] (2001)

Occupation	2001 Employ-ment	Mean Annual Wage	Likelihood of Part-Time Employ-ment	Suscepti-bility to Unemploy-ment	Education and Training
1. First-Line Supervisors, Managers of Production and Operation Workers	5,770	$45,900	Very Low	Very Low	Work Experience in a related occupation
2. Machinists	4,390	$31,560	Very Low	Low	Long-term on-the-job training
3. Team Assemblers	3,860	$23,800	Very Low	High	Moderate-term on-the-job training
4. Inspectors, Testers, Sorters, Samplers, and Weighters	3,690	$31,800	Very Low	High	Moderate-term on-the-job training
5. Welders, Cutters, Solderers, and Brazers	2,900	$30,270	Very Low	High	Post-secondary Vocational Award
6. Packaging and Filling Machine Operators and Tenders	2,900	$23,060	Low	Very High	Short-term on-the-job training
7. Helpers, Production Workers	2,850	$24,620	Low	Very High	Short-term on-the-job training
8. Cutting, Punching, and Press Machine Setters, Operators, and Tenders	2,700	$27,040	Very Low	High	Moderate-term on-the-job training
9. Electrical and Electronic Equipment Assemblers	2,180	$24,980	Very Low	High	Moderate –term on-the-job training
10. Computer-Controlled Machine Tool Operators	1,650	$27,130	Very Low	Very Low	Long-term on-the-job training
11. Water and Liquid Waste Treatment Plant and System Operators	1,410	$38,850	Very Low	Very Low	Long-term on-the-job training
12. Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders	1,370	$28,270	Very Low	High	Moderate-term on-the-job training

Source: U.S. Bureau of Labor Statistics

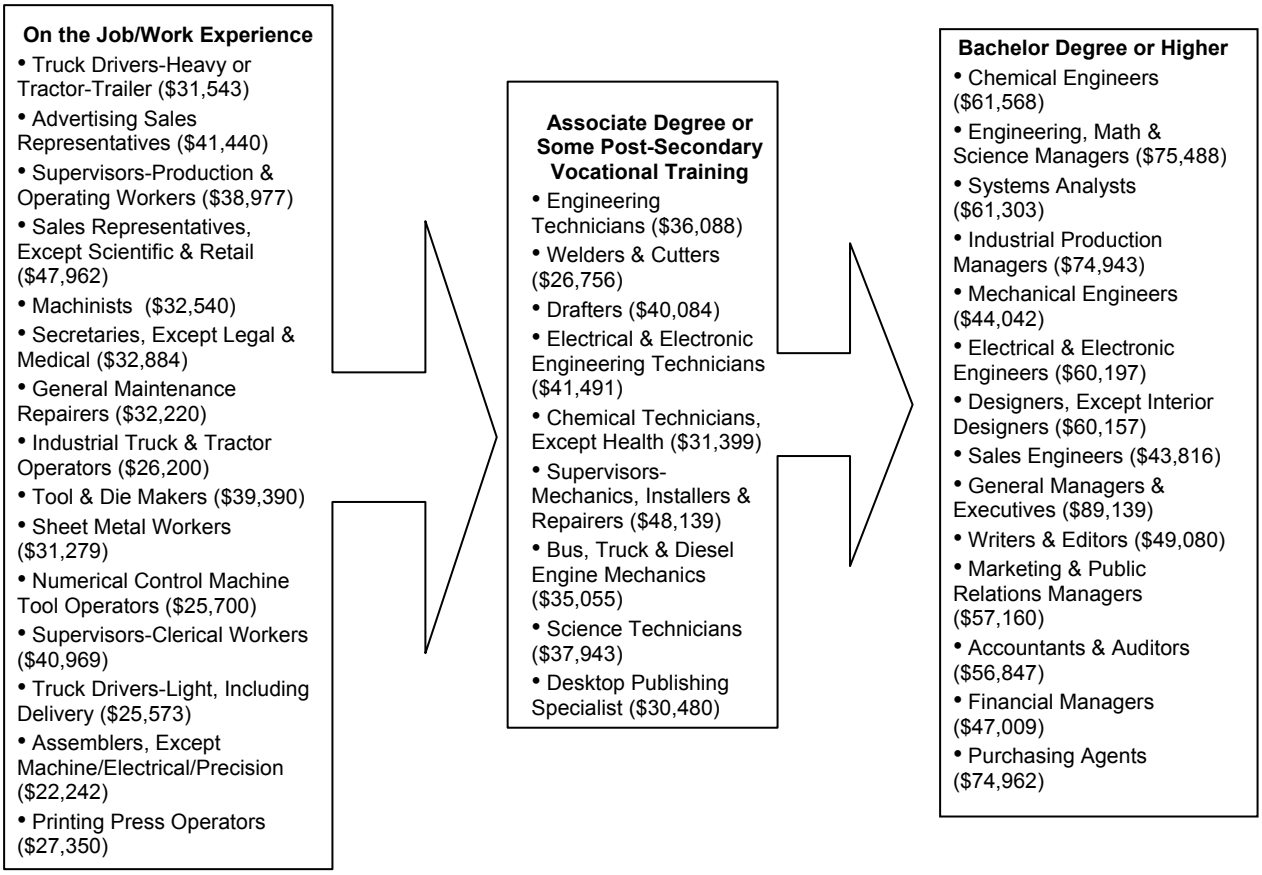
[11] The Pittsburgh MSA includes the counties of Allegheny, Beaver, Butler, Fayette, Washington, and Westmoreland.

STAFFING PATTERNS (CONT.)

Eleven of the top dozen manufacturing occupations require only work experience and/or on-the-job training. Welders, cutters, solderers and brazers require post-secondary education. Only one of the top dozen occupations makes more than $40,000 per year; four make less than $25,000. While none of the occupations are likely to be part-time, eight of the top dozen are either "highly" or "very highly" susceptible to unemployment.

Top Occupations in the SWPA Manufacturing Cluster by Education and Training

In addition to identifying occupations in demand, it is useful to look at career mobility – how workers move from one job to another. In the chart below, occupations are ranked according to current employment, projected rate of growth and annual wage, and then categorized according to education and training levels required.



Source: O*NET, U.S. Department of Labor, and Corporation for a Skilled Workforce

STAFFING PATTERNS (CONT.)

According to this model[12], "heavy truck driver" is the "top" job, requiring no post-secondary education or training and paying more than $31,543 per year. For those with an associate or bachelor degree, "engineering technician" and "chemical engineer" are good jobs, paying $36,088 and $61,568, respectively.

[12] Current employment, projected growth rates, and average annual wages were ranked, weighted equally, and aggregated.

CAREER CLUSTERS

The U.S. Department of Education's Office of Vocational and Adult Education (OVAE) has developed 16 career clusters[13] to help educators organize curricula around employment readiness. For each cluster, OVAE has identified sample career specialties/occupations and a set of common knowledge and skills. Career clusters related to the manufacturing cluster include:

Health, Safety, and Environmental Assurance
Sample career specialties/occupations: health and safety representative, safety engineer, safety technician.

Logistics and Inventory Control
Sample career specialties/occupations: dispatcher; material handler and mover; traffic, shipping, and receiving clerk.

Maintenance, Installation, and Repair
Sample career specialties/occupations: boilermaker, computer installer/repairer, industrial maintenance mechanic, laser system technician, millwright.

Manufacturing Production Process Development
Sample career specialties/occupations: electronics engineer, industrial engineer, process improvement technician, production manager, purchasing agent.

Production
Sample career specialties/occupations: assembler, book binder, hand packer and packager, instrument maker, machine operator, production associate, tool and die maker.

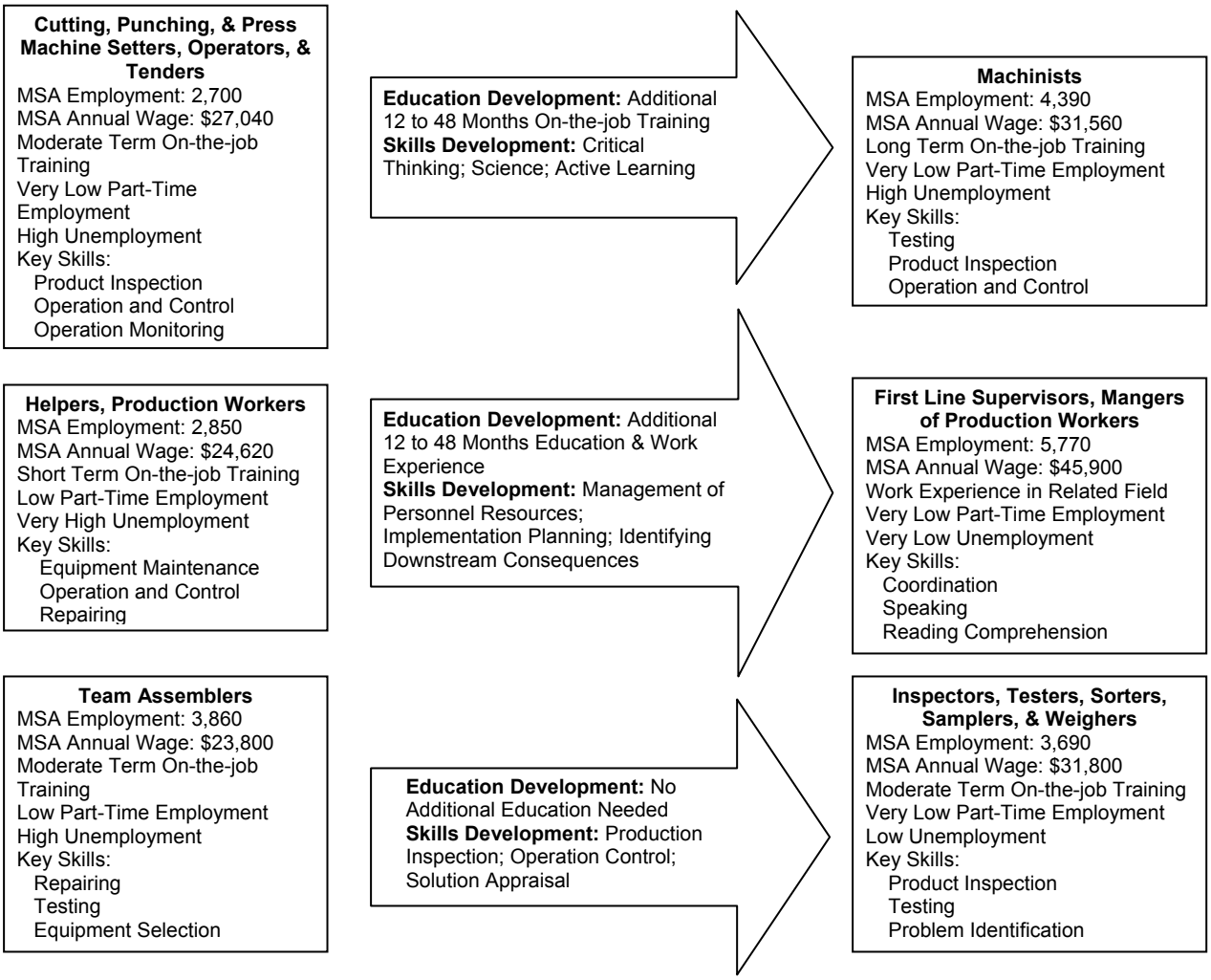
Quality Assurance
Sample career specialties/occupations: calibration technician, inspector, lab technician, quality control technician, quality engineer.

[13] For more information, visit www.careerclusters.org.

CAREER MOBILITY

The chart below illustrates how workers might progress from one occupation to another within the manufacturing cluster. Based on 2001 data from O*NET (a project of the U.S. Department of Labor), pairs of occupations were analyzed in terms of employment and wages for the Pittsburgh Metropolitan Statistical Area, the education and training requirements (as identified by the U.S. Bureau of Labor Statistics), the likelihood of part-time employment, the susceptibility to unemployment, and key skills (as defined by O*NET and the U.S. Department of Labor).

Included in the arrow between occupations are the necessary education and training development required, and the three critical skills that must either be developed or enhanced in order to make a successful transition from one job to the next.



Source: O*NET, Department of Labor

SPOTLIGHT: #1 DEMAND-OCCUPATION FOR MANUFACTURING CLUSTER

There are more than 5,700 jobs for front-line supervisors/managers of production and operating workers in the Pittsburgh Metropolitan Statistical Area. Compiling a list of the most often performed tasks for the occupations in highest demand is one approach to ensuring that the region's educational and training curricula are adequate for creating and maintaining a pool of qualified workers.

The tasks most often performed by front-line supervisors/managers of production and operating workers include:

- Directs and coordinates the activities of employees engaged in production or processing of goods.
- Plans and establishes work schedules, assignments, and production sequences, to meet production goals.
- Calculates labor and equipment requirements and production specifications, using standard formulas.
- Determines standards, production and rates based on company policy, equipment and labor availability, and workload.
- Reviews operations and accounting records or reports to determine the feasibility of production estimates and to evaluate current production.
- Confers with management or subordinates to resolve worker problems, complaints, or grievances.
- Confers with other supervisors to coordinate operations and activities within departments or between departments.
- Reads and analyzes charts, work orders, or production schedules to determine production requirements.
- Maintains operations data, such as time, production, and cost records and prepares management reports.
- Recommends or implements measures to motivate employees and improve production methods, equipment performance, product quality, or efficiency.
- Requisitions materials, supplies, equipment parts, or repair services.
- Interprets specifications, blueprints, job orders, and company policies and procedures for workers.

Source: O*NET, U.S. Department of Labor

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EMPLOYER SURVEY RESULTS

The following observations were taken from a survey of 450 manufacturers and in-depth interviews with 27 firms[14]:

- The occupations in greatest demand include: unskilled and semi-skilled production laborers; assemblers and fabricators; welders, solderers and brazing workers; sales representatives; engineers (except electrical and mechanical); and installation, repair and maintenance workers. The demand for machinists and electrical and mechanical engineers is lower but still significant.

- While a high-school degree is usually the required education for production workers, vocational degrees are important for workers in skilled occupations.

- Core skills include: reading and comprehension at the tenth grade level; mathematics at the 9th grade level; ability to read blueprints; knowledge of shop and safety procedures; and computer literacy.

- The single greatest challenge for employers in the region is the availability of labor. Shortages are due to many factors including: a small pool of workers; geographical separation of companies from prospective employees; aging of the existing workforce; and failure of manufacturing employers to effectively engage non-traditional labor pools such as minorities and women.

- Regional strengths for the cluster include: the presence of world-class universities; a regional pool of talent in engineering, computer science and chemistry; the availability of excellent legal and banking services; the presence of a workforce that is productive, creative, and dedicated; a good quality of life in the region; and a first-rate airport.

- Regional weaknesses for the cluster include: poor regional mass transportation system; difficulties with airfreight and high costs, forcing employers to send goods via truck to save money; lack of utilities and poor tractor-trailer access in peripheral counties; old industrial sites with environmental problems; scarcity of skilled workers; lack of a good workforce development and training system; relative lack of world-class suppliers; prevalence of unionization and the high cost of labor; poor regional image which makes it difficult to attract talent; and high business and tax costs.

[14] *Challenges for Growing the Manufacturing Cluster in Southwest Pennsylvania*, Center for Competitive Workforce Development, Prepared for the Pittsburgh Technology Council, December 2001.

EMPLOYER SURVEY RESULTS (CONT.)

The following observations are drawn from a biannual survey of manufacturing employers and 606 employer interviews[15].

- In Fall 2002, there were nearly 1,300 manufacturing job openings in the Pittsburgh and Southwestern Pennsylvania region. Most job openings were for full-time, permanent positions, mostly in production occupations.
- Despite the overall decline in the number of manufacturing job openings since Spring 2002, the demand for skilled production workers remained steady.
- Employers reported problems with labor shortages. Nine out of 10 skilled production jobs in the region were rated as "somewhat or very difficult" to fill. For professional and managerial jobs, the rate was 63%; for unskilled production jobs, the rate was 54%.

[15] *Job Vacancy Report*, Center for Competitive Workforce Development, Duquesne University, February 2003.

NEXT STEPS

This brief provides a range of cluster-specific information to orient stakeholders and to foster discussion about opportunities and challenges facing the region. It is intended to be used in conjunction with other products developed within the scope of the Community Audit project – such as the educational index – to identify cluster-specific concerns related to the regional labor market.

Possible next steps include the following:

- Consider focusing efforts more strategically on high performance sub-clusters of the industry cluster rather than the cluster as a whole, recognizing that this approach could be much more challenging from a coordination standpoint.
- Work with education and training providers and other workforce professionals to integrate career clusters, career mobility concepts, and work task information into programs and curriculum.
- Develop and/or validate skill standards within the cluster so that education and training providers as well as job seekers better understand the occupations and job duties associated with them from employers' perspectives.

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