

Transportation Equipment Manufacturing

CLUSTER SUMMARY

The *Transportation Equipment Manufacturing* industry cluster produces equipment for transporting people and goods. Major industries in this cluster have production processes similar to those in other machinery manufacturing establishments: bending, forming, welding, machining, and assembling metal or plastic parts into components and finished products. However, the assembly of components and subassemblies and further assembly into finished vehicles are more common in this cluster than in the Machinery Manufacturing industry cluster.

The five-county region has a relatively small presence in this industry cluster, but is well positioned to take advantage of development opportunities based on the capabilities and expertise of its Machinery and Fabricated Metal Products Manufacturing clusters. In addition, the Rockford metro area has a strong and well-established presence in two important subsectors of the Transportation Equipment Manufacturing cluster: motor vehicle production and aerospace components.

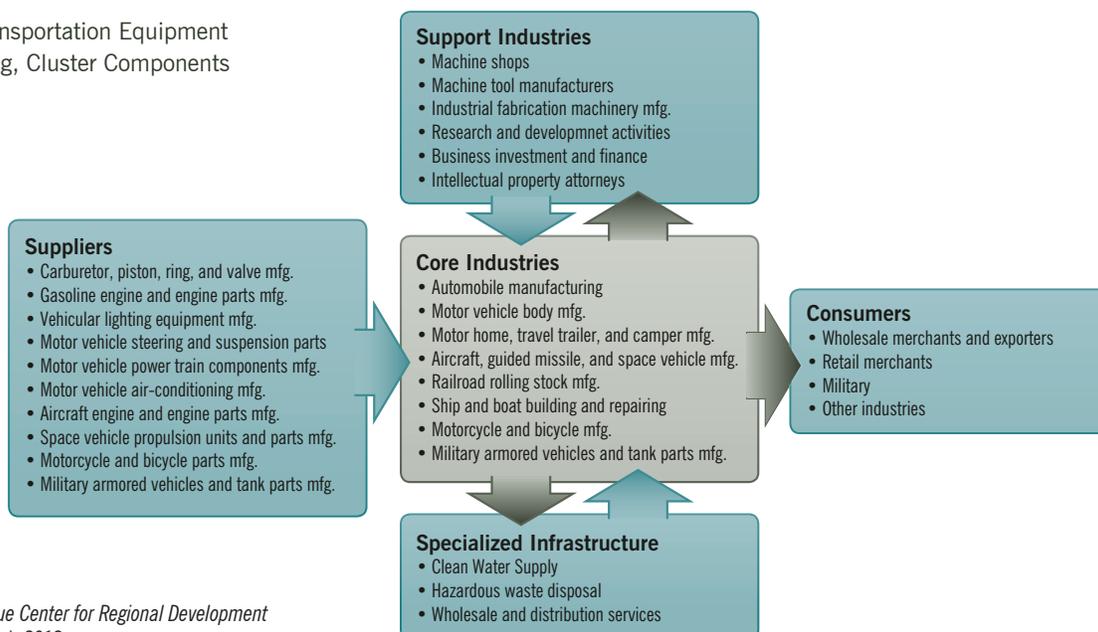
The Rockford metro area's motor vehicle industry has developed around the Chrysler Belvidere Assembly Facility plus Tier I and Tier II suppliers which produce parts and services for the plant and other auto makers. The Rockford area also has five Tier I suppliers to the aerospace industry, including UTC Aerospace Systems and Woodward. In addition, some parts and components produced by this industry are used by farm and construction equipment manufacturers with a strong presence in the five-county region, as well as the Quad Cities and Peoria metro areas.

Based on this concentration of automotive and aerospace related firms and employment, the five-county region is well-positioned to take advantage of the growth opportunities in these industries.

CLUSTER DEFINITION

An industry cluster is a group of similar industries which are closely connected by supply chains and/or similar labor pools located within the same region. The core strength of the Transportation Equipment Manufacturing industry cluster comes from the production of tools, structural components, and parts which are either sold as finished products or are incorporated into other manufactured goods. These core industries drive employment and inputs in other industries supplying them (e.g., the final assembly of vehicles for sale or delivery to market), as well as those which provide support through business finance, research and development, or industrial process services (Figure 1).

Figure 1: Transportation Equipment Manufacturing, Cluster Components

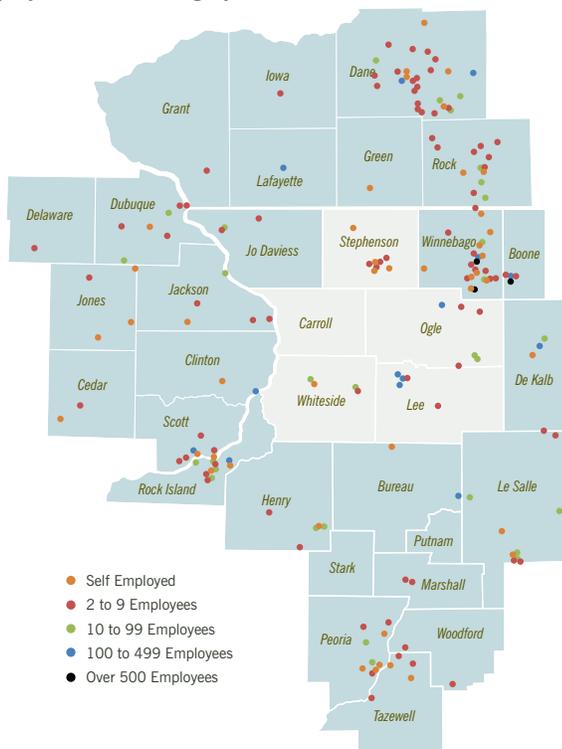


Source: *The Purdue Center for Regional Development (cluster definitions), 2012.*

REGIONAL OVERVIEW

The Transportation Equipment Manufacturing cluster in the Reference Region, a group of 32 counties in northwest Illinois, northeast Iowa, and southwest Wisconsin including the five-county region, had 105 establishments in 2010 and employed 9,452. A majority of businesses in this cluster are small in employment (70.0% of firms have fewer than 10 employees), but the five largest employers account for 64.0% of total employment in the cluster (Figure 2).

Figure 2: Transportation Equipment Manufacturing: Firms by Employment Size Category



Source: DecisionData.net, 2011.

The Transportation Equipment Manufacturing cluster has had a consistently high concentration of employment in the Region with location quotients (LQ) of 2.9 in 2001, 3.9 in 2007, and 3.6 in 2010. Only three industry subsectors had a strong presence in the Region based on concentration of employment (Figure 3).

Figure 3: Transportation Equipment Manufacturing: Subsectors Based on Employment Concentration

Indicator	Location Quotient (2010)
Truck trailer manufacturing	4.9
All other transportation equipment manufacturing	3.4
Motor vehicle parts manufacturing	1.3

Note: This does not reflect the Nippon-Sharyo railcar production facility in Rochelle that opened in 2012.

Source: IMPLAN, 2010.

However, the automotive and aerospace industries have a strong presence in the nearby metro areas, especially Rockford. In addition, the recent location of the Nippon-Sharyo railcar manufacturing facility in Rochelle is not reflected in any recent statistics. The development of the railroad equipment manufacturing supply chain is an additional opportunity for the Region, since some parts and components used in the automotive and aerospace industries are similar.

Location Quotients (LQ) are used to evaluate local development opportunities and find businesses which are especially suited for the Region. A LQ is the ratio of the employment percentage represented by a given industry in the county to the percentage which the industry represents in the state or a representative area of interest. A ratio greater than 1.0 indicates a higher local concentration and a likelihood of exports from the county; a ratio less than 1.0 may suggest that goods or services are imported into the Region.

In 2010, the Region had nine establishments and employed 611 people in direct cluster jobs. This cluster has a higher than average concentration of economic activity, as defined by firm LQ, in both the Reference Region and the five-county region, when compared to the nation's economic activity in this cluster overall (Figure 4). Only five firms have 100 or more employees (Figure 5). However, the surrounding metropolitan areas have major national and global companies as well.

Several major agricultural and construction machinery and equipment manufacturers are located in the Quad Cities (Deere) and Peoria (Caterpillar) metro areas. These industries use many similar parts and components (e.g., engine and power transmission components or instrumentation used in cars, trucks, railroad equipment, and aircraft).

INDUSTRY CLUSTER PROFILE

Figure 4: Transportation Equipment Manufacturing: Economic Activity Summary

Indicator	Five-County Region	Reference Region (32 Counties)
Number of Firms (2010)	9	105
<i>Percent Change in Number of Firms (2007-2010)</i>	-25.0	-7.1
<i>Firm Location Quotient (LQ)</i>	1.3	1.1
Employment (2010)	611	9,452
<i>Percent Change in Employment (2007-2010)</i>	-1.3	-46.9
<i>Employment Location Quotient (LQ)</i>	0.9	0.8

Sources: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) and the Purdue Center for Regional Development (cluster definitions), 2012; Minnesota IMPLAN Group, 2007, 2010.

Figure 5: Transportation Equipment Manufacturing: Largest Employers, Five-County Region

Company Name	# of Employees	Industry Description	City
Nippon-Sharyo	300	Passenger Railcar Manufacturing	Rochelle
Borgwarner Inc.	250	Carburetor, Piston, Piston Ring, and Valve Manufacturing	Dixon
Johnson Controls, Inc.	200	Motor Vehicle Seating and Interior Trim Manufacturing	Dixon
Austin-Westran LLC	215	Truck Trailer Manufacturing	Byron
Donaldson Company, Inc.	180	Other Motor Vehicle Parts Manufacturing	Dixon

Source: Dun & Bradstreet, Inc., 2012.

INDUSTRY TRENDS¹

Aerospace Components

Tighter OEM Control:

To make production more efficient, Boeing and other large aircraft OEMs are exercising greater control over their contractors by specifying quality control inspection programs for suppliers, requiring that suppliers buy metals like aluminum and titanium from designated providers and reducing the number of suppliers.

Air Cargo Expansion:

Air cargo traffic is growing faster than passenger traffic, causing more passenger airplanes to be converted into freight-carrying aircraft. Both major commercial aircraft manufacturers, Boeing and Airbus, are aggressively seeking to expand their roles in the freighter conversion market, pushing out the once dominant third-party freight conversion companies. The global freighter fleet is expected to increase 150 percent by 2025, according to Airbus.

Direct Pricing:

Although many contracts are awarded after competitive bidding, especially for Department of Defense business, some large Original Equipment Manufacturers (OEM) are awarding more contracts based on direct pricing. These contracts are offered to a manufacturer at a specific, nonnegotiable price. The effect is to reduce the number of contractors that OEMs deal with, simplifying the production process.

Offset Manufacturing Agreements:

With increasing competition from European aircraft manufacturers like Airbus, U.S. commercial aerospace manufacturers are beginning to see offsets as necessary to compete internationally. Offsets are manufacturing or sales agreements between U.S. aerospace companies and foreign governments which typically involve establishing an overseas production facility. Aircraft part manufacturers either have to link themselves to these offset expansions or slowly lose business to overseas production. China is a main location for offsets with the U.S. aerospace industry.

Composite Materials:

More aircraft components are now made from a composite of plastics, fibers, and glue rather than from metal. The aircraft parts industry has concerns that using composites, which offer several important advantages to manufacturers, will be restricted by safety concerns.

¹ Source: Hoovers, Inc., 2013. (www.hoovers.com)

Automotive Components

Globalization:

To compete globally, auto parts companies are merging and forming partnerships and joint ventures with worldwide auto companies. Partnerships are often created for the mutual exchange of ideas. Large suppliers have expanded operations overseas, wherever U.S. or foreign OEMs assemble cars. To keep or add business, smaller suppliers have followed suit, either by manufacturing abroad or expanding their international distribution system.

More Older Vehicles Operating:

The demand for auto parts is increasing due to Americans owning more vehicles and keeping them longer. The average light vehicle on the road is nearly eight years old and requires more maintenance and repairs than newer ones, according to the National Automobile Dealers Association (NADA).

Aftermarket Sales Grow Slowly:

Sales of aftermarket replacement parts and products are expected to increase slowly. Used car sales are increasing as the U.S. economy remains tepid and motorists either want to spend less on a vehicle or have difficulty securing new car financing. While better engineering is producing cars which last longer without major overhauls, consumers are shifting to spending more on maintenance to improve fuel efficiency, since they keep their older cars for longer periods.

R & D Shifts to Suppliers:

As big car companies concentrate on styling, marketing, and engines, part suppliers are advancing technology in many car components. Just as anti-lock brakes are now standard on many cars, parts companies believe that the computer-controlled, electronically operated systems they're developing will be popular for transmissions, suspensions, safety systems, and steering.

Railroad Equipment

Sales to Shippers, Leasing Companies:

More rolling stock is now leased or owned by shippers than sold directly to railroads. Some leasing companies are managed by the rolling stock manufacturers, and one major leasing company, TTX, is owned by a cooperative of railroads. The share of railroad ownership in freight rolling stock has steadily declined and now stands at about 40 percent, according to the Association of American Railroads.

Corporate Restructuring:

The last decade brought corporate restructurings in railroad equipment manufacturing. General Motors sold EMD to a consortium of private investors (which later sold it to Caterpillar), GE Transportation is a result of GE's corporate merging of several divisions, and Trinity sold its European operations. Companies which divest or restructure seek to gain internal efficiencies. Diversification and realignment can help companies reduce the risk inherent in the cyclical rolling stock industry.

Low-Floor Light Rail:

Light rail manufacturers are increasingly designing passenger cars with floors that are just over one foot high. Low-floor cars allow regional light rail systems to implement easy-to-access boarding stations. This new design often eliminates the need for steps and helps light rail systems meet federal standards for persons with disabilities.

MARKET OPPORTUNITIES²

Aerospace Components

Avionics:

Electronic sensing, communications, and control systems are becoming more important to the aircraft business, especially the military. Boeing is developing communications systems to allow commercial fliers to access the Internet in flight. The FAA has also begun development of a national NextGen air traffic control system which relies on satellites rather than a ground-based system. Avionics systems can be more profitable than regular aircraft parts, but are more difficult and expensive to develop.

Automotive Parts and Components

Telematics:

Integration of automotive telematics, technology which provides in-car access to communication networks, is expected to increase in the near future. Employing computers and wireless communication networks, automotive telematics applications range from vehicle tracking and navigation systems to mobile television and email access. Growing interest in Internet-enabled automotive features could provide growth opportunities for parts and accessory manufacturers.

Green Technologies:

Growing concern over climate change and energy dependency in the U.S. has accelerated the development of environmentally friendly and alternative energy technologies. Demand for hybrid, electric, and alternative fuel-powered cars is growing, along with consumer expectations about the use of renewable, non-toxic materials. Some parts suppliers have created environmental initiatives to guide their product development and manufacturing practices.

Growing Market in China:

With growing vehicle and parts sales and the WTO agreement opening the market, China has become a growing target market for motor vehicle parts and products, according to the Motor and Equipment Manufacturers Association (MEMA). Between 2000 and 2010, U.S. exports of auto parts to China increased almost 400.0%.

² Source: Hoovers, Inc., 2013. (www.hoovers.com)

RAILROAD EQUIPMENT

Acquiring Component and Parts Manufacturers:

In recent years, locomotive and railcar companies have acquired or bought stakes in components and parts makers, which can increase access to key parts such as airbrakes, wheelbases, and couplers. Bringing component manufacturers into the company can help to control costs. These acquisitions also help shorten the supply chain and may lead to fewer bottlenecks in the production of rolling stock.

Internal Leasing:

Railcar manufacturers are finding value in leasing the cars they make. Railcar leases are typically for one to 20 years in length. Internal leasing creates the interesting dilemma of a company's backlog resulting from its own orders.

New Export Markets:

Exports to countries such as India, Kazakhstan, South Korea, and Ukraine have risen significantly over the past few years. Although Canada and Mexico continue to represent the bulk of rolling stock exports, nations with growing infrastructure needs have greatly increased demand for U.S. locomotives, railcars, and passenger cars.

Ethanol Demand Drives Increase in Tank Car Production:

Freight car manufacturers are seeing a significant increase in demand for 30,000-gallon tank cars. Government incentives for ethanol production have led some manufacturers to switch from grain car to tank car production to meet demand. Some industry insiders believe the demand for ethanol carloads could increase by 30.0% or more.

SUPPLY CHAIN

The supply chain analysis provides insight into the value of supply chain inputs, the amount of inputs produced in a region for the industry clusters studied (represented in most cases by an absorption rate), and the stages along the supply chain which stand out as areas of competitive advantage. Areas of high absorption are areas in the Transportation Equipment Manufacturing supply chain which allow the Region to capture the most value from a specific stage in the production or delivery of products and services within the supply chain. This tool supports an economic development strategy by indicating where an investment will have the highest impact on the regional economy and may indicate opportunities for business retention or expansion.

Conversely, stages along the supply chain which are underperforming also offer opportunities for business attraction and/or entrepreneurship. When reviewing data relating to industry inputs, comparing both the absorption rate and the total value of inputs is important because certain services or components which maintain a high absorption rate may be of low value to the regional economy. Similarly, certain inputs, regardless of value or absorption, may be of high strategic importance to the Region in efforts to build a stronger industry cluster.

Supply Chain

An essential component for an industry cluster is the local supply chain. While not all inputs (goods or services) that an industry cluster needs can be produced in the local economy, it is desirable to meet as many of the cluster's needs locally as possible. This analysis reveals the source and amount of purchases among the unique niches within an industry. By identifying the total industry economic outputs and areas where goods and services are purchased from outside the regional economy, one may be in a better position to determine which areas of the industry supply chains are strongest, as well as those which present the best opportunities for growth within the five-county region.

The supply chain information in this report presents the flows of trade which support the Transportation Equipment Manufacturing-related cluster both within the five-county region and from outside the Region. Key sectors which may be appropriate targets for expansion appear as imports (gaps) from outside the Region, but still within the industry cluster. These gaps are then analyzed in terms of regional strengths and potential areas for targeting and support and are placed within a supply chain model to determine the stages of the supply chain with the weakest and strongest regional presence. In order to fully develop the Transportation Equipment Manufacturing cluster, the five-county region can make the most progress by focusing on those sectors without a strong regional presence currently, but which have significant development potential (Figure 6).

Regional Supply Gap

Difference between Gross and Regional Inputs: a large gap value indicates that a large amount of inputs are imported into the region, rather than produced within the five-county region.

Regional Inputs

The dollar value of gross inputs which are produced within the Region.

Gross Inputs

Total dollar amount of inputs used by the industry within each sector.

INDUSTRY CLUSTER PROFILE

Figure 6: Transportation Equipment Manufacturing: Largest Supply Chain Gaps

Industry	Regional Supply Gap	Regional Inputs	Gross Inputs	% Purchased from Outside the Region
Motor vehicle parts	-\$5,217,569	\$49,134	\$5,266,704	99.1%
Aluminum products from purchased aluminum	-\$1,365,102	\$1,057	\$1,366,159	99.9
Valves and fittings other than plumbing	-\$1,070,403	\$11,096	\$1,081,499	99.0
Fluid power process machinery	-\$1,060,583	\$16,625	\$1,077,208	98.5
Machine shops	-\$911,441	\$1,939	\$913,380	99.8
Paints and coatings	-\$811,493	\$2	\$811,496	100.0
Motor and generators	-\$779,389	\$569	\$779,958	99.9
Semiconductor and related devices	-\$649,054	\$2	\$649,056	100.0
Relay and industrial controls	-\$641,560	\$987	\$642,547	99.8
Plastics packaging materials and unlaminated films and sheets	-\$626,284	\$1,394	\$627,678	99.8

Source: IMPLAN, 2010.

For example, the regional Transportation Equipment Manufacturing cluster requires nearly \$5.3 million in inputs (i.e., the products or services required to create a finished product) from the “motor vehicle parts” industry. However, only \$49,000 of the required inputs from this industry is produced within the Region, with the balance purchased elsewhere. This finding indicates opportunities for an existing firm or new business to satisfy the regional demand for these products.

The supply chain gap for “machine shops” also presents a unique opportunity for existing business development. In general, machine shops produce a wide variety of parts or components based on customer requirements. Since most specialize in low-volume, fast-turnaround orders, they are quite versatile and are only limited by their production equipment and the skills and capabilities of their workers. Therefore, a regional initiative aimed at expanding the capabilities of machine shops could help meet the supply chain needs of several key manufacturing sectors.

Motor vehicle parts (NAICS Sector 333618)

Firms in this industry manufacture and/or rebuild motor vehicle gasoline engines and engine parts, whether or not for vehicular use. Subsectors include the following:

- » Carburetor, Piston, Piston Ring, and Valve Manufacturing
- » Natural gas engines
- » Gasoline Engine and Engine Parts Manufacturing

WORKFORCE REQUIREMENTS, SUPPLY AND DEMAND

The local skilled workforce for the Transportation Equipment Manufacturing cluster has been an ongoing issue, as it has for all industries. The shortage of skilled workers is largely the result of a wave of retirements from the Baby Boomer generation of workers. Even as industry employment has experienced net declines over the past decades (a trend that is projected to continue) the succeeding generation of potential workers is comparatively small because of recent demographic trends and the propensity of younger workers to pursue careers outside of manufacturing. Because of its relatively small presence in the five-county region, data specific to the Transportation Equipment Manufacturing industry is not available. However, in the manufacturing sector overall, nearly half of workers in 2010 were 45 year of age or older (Figure 7).

Figure 7: Transportation Equipment Manufacturing: Employment by Age Group, Five-County Region, 2010

Age Group	Employment (Percent of Total)
Under 25 Years	13.9%
25-44 Years	38.0
45-64 Years	43.5
65 Years & Older	5.1

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2010.

Over three-fourths of the employment, as well as 70.0% of the wages, in the Transportation Equipment Manufacturing cluster is concentrated in Production; Installation, Maintenance, and Repair; or Transportation and Material Moving occupations (Figure 8).

INDUSTRY CLUSTER PROFILE

Figure 8: Transportation Equipment Manufacturing: Staffing Patterns, Five-County Region

Occupational Classification	Share of Employment	Share of Wages	Average Annual Wage
Production	64.5%	58.3%	\$39,514
Transportation and Material Moving	5.8	4.9	36,920
Office and Administrative Support	5.8	4.9	36,863
Installation, Maintenance, and Repair	5.8	7.0	52,463
Architecture and Engineering	4.9	7.9	69,787
Management	3.5	8.5	106,642
Business and Financial Operations	2.8	2.9	46,434
Construction and Extraction	1.4	1.8	54,421
Sales and Related Occupations	1.1	1.6	63,264

Sources: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) and the Purdue Center for Regional Development (cluster definitions), 2012.

The challenge for employers is the looming demand for replacement workers as older workers retire. The Illinois Department of Employment Security estimates that nearly 200 openings for

production workers will become available per year between 2008 and 2018, most resulting from the demand for replacement workers (Figure 9).

Figure 9: Occupational Employment, Projected Demand by Worker Classification Workforce Investment Board Region #4, 2008-2018*

Occupational Classification	Employment		Employment Change 2008-2018		Average Annual Job Openings		
	2008	2018	Number	Percent	Growth	Replacement	Total
Production	9,653	8,806	-847	-8.8	5	191	196
Transportation and Material Moving	6,297	6,479	182	2.9	25	153	178
Office and Administrative Support	11,256	11,371	115	1.0	46	242	288
Installation, Maintenance, and Repair	2,798	2,930	132	4.7	15	55	70
Architecture and Engineering	1,116	1,073	-43	-3.9	3	25	28
Management	7,959	7,693	-266	-3.3	13	123	136
Business and Financial Operations	3,110	3,385	275	8.8	28	64	92
Construction and Extraction	4,047	4,188	141	3.5	16	68	84
Sales and Related Occupations	7,815	8,049	234	3.0	27	241	268

*Workforce Investment Board (WIB) Region #4 consists of Carroll, JoDaviess, Ogle, Stephenson, and Whiteside counties.

Source: Illinois Department of Employment Security, 2012.

KEY TAKEAWAYS

- » The Transportation Equipment Manufacturing cluster has a small presence in the five-county region, but the automotive and aerospace industries in the Rockford area are major employers.
- » A small number of companies in the five-county region produce parts or provide services to these sectors, but there may be potential to develop new or expanded businesses based on existing supply chain relationships with companies in the Rockford area.
- » A recent study of the development potential of the aerospace industry found that while business operation costs in Rockford were competitive with their peers in other parts of the U.S., site acquisition and property tax costs were the metro area's primary weaknesses³. These results may offer the five-county region a competitive advantage to attract these companies when combined with the expertise available in the Rockford area.
- » The recent opening of the Nippon-Sharyo railcar production facility in Rochelle offers the opportunity for new or existing companies to supply parts and components, not only to this company, but to the railroad equipment industry in general.
- » Small niche manufacturers can be supported as part of a strategy to support small business and entrepreneurship in the Region. Machine shops are of special interest because they typically do not have a standard product, but rather specialize in a range of fabrication processes or services based on customer needs.
- » The expected wave of retiring Baby Boomers represents most of the demand for new workers, despite static, or even declining, overall employment in the industry. Since other manufacturing sectors will experience the same challenges, competition for skilled workers will be brisk given the relatively limited number of potential younger workers.

³ "Rockford Regional Strategic Diversification Plan: Aerospace and Defense Industry Analysis", Angelou Economics, 2012.

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