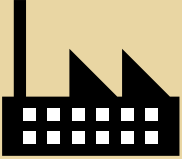


Machinery Manufacturing

Machinery Manufacturing



DeKalb County Indicators

Employment (2015) = **591**
 Employment Trend (2009–2015) = **+25.7%**
 Location Quotient (2015) = **2.9**
 Average Annual Earnings per Job (2015) = **\$53,450**

DeKalb County Region Indicators

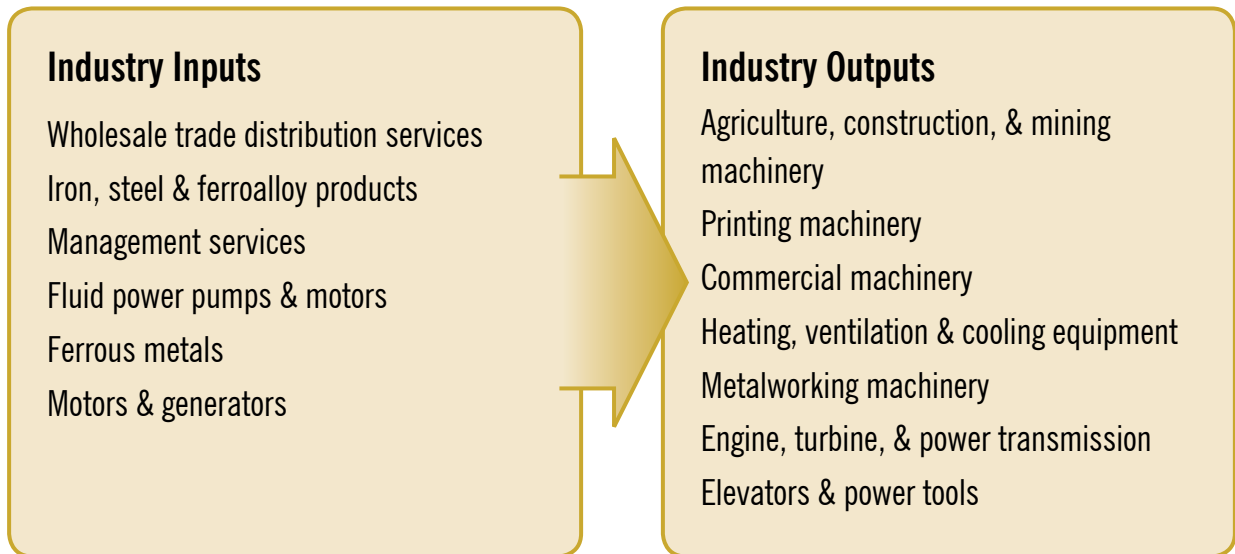
Employment (2015) = **16,241**
 Employment Trend (2009–2015) = **+4.0%**
 Location Quotient (2015) = **3.9**
 Average Annual Earnings per Job (2015) = **\$64,185**

CLUSTER SUMMARY

The machinery manufacturing cluster consists of businesses that manufacture machinery used in a wide variety of industries (Figure 1). It includes, for example, the manufacturers of agricultural, construction and mining equipment, printing machinery, commercial and service machinery, HVAC equipment, metalworking machinery, engines and turbines, and power tools. Principal inputs to the machinery manufacturing cluster include suppliers of stock metals, manufactured components, management services, and various wholesale distributors.

According to data generated by the IMPLAN economic impact model, 11.5% of production costs are in wholesale trade and distribution, either to purchase materials or to ship finished products. Iron, steel, and other ferroalloys used as raw materials represent an additional 11.4% of production costs. Machinery manufacturing also includes purchases of products from other manufacturing industries, including fluid pumps, motors, generators, ball bearings, semiconductors, lubricating oil, and so on. Many sub-sectors are interdependent, such as engine manufacturers who producing components for construction machinery.

Figure 1: Machinery Manufacturing Cluster Input and Output Examples



Source: Adapted from 2015 IMPLAN data and U.S. Bureau of Labor Statistics, *Industries at a Glance*, 2017.

REGIONAL OVERVIEW

The machinery manufacturing cluster in DeKalb County and the surrounding region had 485 establishments in 2015 and employed 16,241 people at an average annual earnings per job of \$64,185 (Figure 2). The cluster also has a higher than average concentration of economic activity in the county and the region, especially the areas in and around Rockford and Aurora, when compared to the nation’s economic activity in this cluster overall.

Figure 2: Summary Characteristics of the Machinery Manufacturing Cluster, DeKalb County and Reference Region

Indicator	DeKalb County	Reference Region
Number of Firms (2015)	20	485
Firm Change (2009-2015)	0.0%	-3.6%
Firm Location Quotient (2015)	2.9	3.9
Employment (2015)	591	16,241
Employment Change (2009-2015)	25.7%	4.0%
Employment Location Quotient (2015)	2.0	3.5
Average Annual Earnings per Job (2015)	\$53,450	\$64,185

Source: U.S. Bureau of Labor Statistics, *Quarterly Census of Employment and Wages*, 2015.

This cluster has grown substantially in DeKalb County. Employment increased by 25.7% and the employment location quotient went from 1.7 to 2.0 between 2009 and 2015, even as employment in the broader manufacturing sector declined. Sub-sectors in the machinery cluster represented in DeKalb County include metalworking, miscellaneous, agriculture/construction/mining, and others (Figure 3).

Location Quotients (LQs) are used to evaluate local business development opportunities. LQs are the ratio of the employment percentage represented by a given industry in the county to the percentage that industry represents in the nation. A ratio greater than 1.0 = higher local concentration and a likelihood of exports from the county; a ratio less than 1.0 may suggest goods or services are imported into the region.

Figure 3: Machinery Manufacturing Sub-Sectors Based on Employment Concentration in DeKalb County

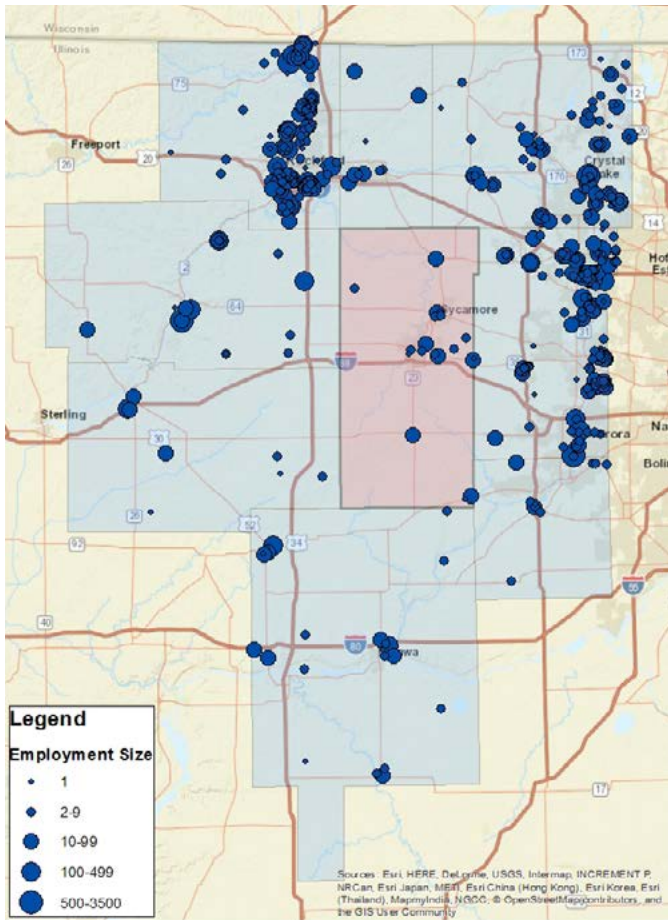
Sub-sector Description	Establishment LQ	Employment LQ
Machinery Manufacturing Industry Cluster	2.9	2.0
Agriculture, Construction, and Mining Machinery	3.1	Disclosure
Industrial & Printing Machinery	2.2	Disclosure
Commercial & Service Industry Machinery	1.6	Disclosure
HVAC & Commercial Refrigeration Machinery	1.9	Disclosure
Metalworking Machinery	3.0	1.3
Miscellaneous Machinery (i.e., air compressors, elevators, power tools)	4.4	5.3

Source: U.S. Bureau of Labor Statistics, *Quarterly Census of Employment and Wages*, 2015.

Data for employment in some manufacturing sub-sectors was unavailable because of disclosure issues, but the two largest sub-sectors with published employment data in DeKalb County are metalworking machinery and miscellaneous machinery. Of the 591 machinery manufacturing jobs in DeKalb County, 380 jobs (64.2%) are in miscellaneous machinery (i.e., air compressors, elevators, power tools) and 64 jobs (11.0%) are in metalworking machinery.

The machinery manufacturing cluster is represented by several mid-size and larger employers (Figure 4). Machinery manufacturers are densely concentrated in Kane and Winnebago counties. In DeKalb County, most of the machinery companies are concentrated in the cities of DeKalb and Sycamore, although there are mid-sized companies in outlying communities.

Figure 4. Machinery Manufacturing Cluster: Firms by Employment Size, DeKalb County and the Reference Region



Source: Decisiondata.net, 2017.

The largest machinery manufacturers in DeKalb County are Sonoco and Albus, both of which manufacture custom packaging. Henderson Engineering of Sandwich manufactures air compressors for the removal of moisture from manufacturing systems. Most are exported to a variety of international markets. Other machinery manufacturers with more than 500 employees in the region include Genwoods Holdco LLC, an Oregon-based fabricator of farm machinery, and Carrier Commercial Refrigeration Inc. in Rockton. Carrier Commercial Refrigeration manufactures refrigerated display shelves for supermarkets and convenience stores.

Several mid-sized machinery manufacturers are in DeKalb County (Figure 5). Fortune Metal Midwest LLC in Sandwich builds machinery for recycling scrap metal. H. A. Phillips & Company in DeKalb produces a range of products for industrial refrigeration. Cortland-based Dun-Rite Tool & Machine Company provides custom machining for a variety of companies working with metal and the company specializes in large-scale turning operations.

Figure 5: Major Employers in the Machinery Manufacturing Cluster, DeKalb County

Business Name	Employees	City	Industry Description
Sonoco	250	DeKalb	Blister Packaging Machinery, Thermoforming Heat Sealers, and Design Services
Albus Packaging	125	DeKalb	Heat Sealing Machines, Light-Gage Thermoforming, and Contract Packaging
Henderson Engineering	52	Sandwich	Compressed Air, Natural Gas Dryers, Dew Point Analyzers and Filters
Fortune Metal Midwest, LLC	50	Sandwich	Other Industrial Machinery Manufacturing
H A Phillips & Company	30	DeKalb	Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing
Dun-Rite Tool & Machine Company	30	Cortland	Construction Machinery Manufacturing

Source: The DeKalb County Economic Development Corporation, Illinois Manufacturers Directory, 2018, and Dun & Bradstreet Inc., 2017.

INDUSTRY TRENDS¹

American machinery manufacturers have faced growing international competition over the past 40 years. While more sophisticated machinery has been developed by advanced manufacturers in Japan and Germany, lower-cost machinery produced in China and Mexico has squeezed U.S. machinery makers from both ends. With manufacturers offering similar products globally, competition has increased for exporting companies in DeKalb and the surrounding region.

¹ Summarized from industry reports by Hoovers¹ Inc., a Dun & Bradstreet Company.

Increasing adoption of computerized and internet-enabled devices is spreading to machinery makers and is leading to the emergence of autonomous smart machines. Smart machines could incorporate performance data for adapting to new production environments over time, reducing labor needs. Greater use of computer components will require different engineering skills in the design of new machinery, but it also offers opportunities for new markets.

With rapid technological advancements come changing customer demands, both from households and institutions. To meet changing demands, manufacturers are equipping their factories with machinery with flexible configurations. For example, metalworking companies have a growing preference for cutting machinery with different types of cutting heads.

Several opportunities exist within the sector. Environmental regulations and fluctuating energy prices have increased the demand for fuel-efficient machinery, offering new avenues for manufacturers that can produce more efficient machinery through such means as using lightweight metals. Demand for fuel-efficient machinery is especially beneficial for HVAC manufacturers as institutions are driven to replace older heating and cooling infrastructure.

Although automation is often seen as a threat to manufacturing employment growth, the machinery manufacturing cluster benefits from the trend in the form of increased demand. Investment in the construction sector is transitioning from labor to equipment as machinery can now automate some building processes, offering new opportunities in the construction machinery manufacturing sector.

To meet new product design challenges, advances in CAD software has enabled virtual prototyping, where new product models may be tested digitally before a model is built. Further, the emergence of additive manufacturing or 3D printing is rapidly changing how machinery manufacturers operate. 3D printing is less capital-intensive than traditional machinery production because it requires less machinery and tools. Further, waste is reduced because each product is made with only the amount of plastic required. Additive manufacturing is currently being used mainly for rapid prototyping, i.e., developing many smaller-scale models of a potential product to identify the optimal product design. However, 3D printing may advance to the point where it replaces current mass-production processes.

SUPPLY CHAIN

This analysis examines three aspects of supply chain: the value of supply chain inputs; the amount of inputs being produced outside DeKalb County for the industry segments studied (represented in most cases by the gap between total input purchases and inputs purchased within the region); and stages along the supply chain that are areas of competitive advantage or that provide an opportunity to attract businesses.

Areas with large gaps along the machinery manufacturing supply chain allow the county to capture the most value from a specific stage in the production or delivery of products and services. This may inform strategy by indicating where in the value chain 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 that are underperforming also offer opportunities for business attraction and/or entrepreneurship. It is important when reviewing data relating to industry inputs to compare both the supply gap as well as the total value of inputs, as certain services or components that maintain a high percentage may be of low value to the regional economy. Similarly, certain inputs, regardless of the total value purchased outside the region, 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 sector is the local supply chain. While not all inputs (goods or services) that an industry sector needs can be produced in the local economy, it is desirable to meet as many of the sector's needs locally as possible. This analysis reveals the source and amount of purchases among the unique niches within an industry. Identifying total industry economic outputs and areas outside the region from which goods and services are being purchased helps determine which areas of the industry supply chains are strongest. It also assists in identifying the best growth opportunities for DeKalb County.

INDUSTRY CLUSTER PROFILE

The supply chain information provided shows the flows of trade from both within and outside the region that support machinery-related industries. Key sectors that may be appropriate targets for expansion appear as imports (gaps) from outside the county, but still within the industry sector (Figure 6). These gaps are then analyzed in terms of county strengths and potential areas for targeting and support and are placed into a supply chain framework to determine the stages of the supply chain with the strongest presence in DeKalb County. To fully develop the machinery manufacturing cluster, economic developers in DeKalb County might consider focusing on those sectors without a strong regional presence at present but have significant potential to develop.

Regional Inputs

The dollar value of production inputs that are purchased from businesses within the DeKalb County region.

Gross Inputs

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

Regional Supply Gap

Difference between gross and county inputs: a sizeable gap value indicates that a large amount of inputs are imported into the region, rather than produced within.

Figure 6: DeKalb County Key Supply Chain Gaps, Machinery Manufacturing (\$ Millions)

Industry Description	Local Supply Gap	Local Inputs	Gross Inputs	Percent Purchased Outside of County
Iron and steel and ferroalloy products	-\$488.8	\$5.6	\$494.4	98.9%
Management of companies and enterprises	-152.8	24.8	177.6	86.0
Other engine equipment	-152	0.1	152.1	99.9
Fluid power pumps and motors	-129.5	18.5	147.9	87.5
Ferrous metals	-115.5	7.3	122.8	94.0
Valve and fittings, other than plumbing	-112	5.7	117.8	95.1
Motors and generators	-103.9	2.0	105.9	98.1
Machined products	-71	8.1	79.1	89.7
Semiconductors and related devices	-65.4	0.2	65.6	99.7
Other motor vehicle parts	-64.8	4.4	69.2	93.7

Source: IMPLAN, 2015.

Note: Input figure are in millions of dollars.

For example, the machinery manufacturing cluster requires \$494.4 million in inputs (i.e., the products or services required to create a finished product) from iron/steel/ferroalloy products. However, only \$5.6 million of this material is produced in the region. This suggests an opportunity for an existing firm or new business to satisfy the local demand for metallic production. Ferrous metals are another raw material with a large supply gap. The machinery cluster requires \$115.5 million in ferrous metals as production inputs, of which only \$7.3 million was produced in the DeKalb County region.

Iron and Steel Mills and Ferroalloy Manufacturing

(NAICS Sector 331110)

This industry consists of businesses engaged primarily in forming raw iron or steel into forms usable in other industries. Example products of this sector include steel bars and plates, wheels, and iron ore.

WORKFORCE REQUIREMENT, SUPPLY AND DEMAND

Retaining a skilled local workforce has been an ongoing issue for manufacturing in general, including in the machinery cluster. The challenge of a skilled workforce has stemmed from the impending retirement of experienced workers in the Baby Boom generation. Even as industry employment has experienced a net decline over the past decades (a trend that is expected to continue), the succeeding generations of potential workers are comparatively small in absolute numbers and younger workers are often not disposed to pursue careers in manufacturing.

The largest employee age group in the machinery manufacturing sector in DeKalb County is pre-retirees, ages 45-64 (50.6%, Figure 7). This age group includes Generation X and those born toward the end of the baby boom generation and represent experienced workers that will need to be replaced in the future. Seven percent of machinery employees are currently of retirement age, and 36.4% are of prime working age from 25-44 years old. Lower annual wages for machinery employees under age 25 are likely due to limited work experience.

Figure 7: Machinery Manufacturing Cluster Employment and Wages by Age Group, DeKalb County

Age Group	Percent of Total Employment	Average Annual Earnings*
Under 25 Years	5.6%	\$31,217
25 to 44 Years	36.4	45,801
45 to 64 Years	50.6	60,694
65 Years and Older	7.0	52,408

Source: U.S. Census Bureau, Quarterly Workforce Indicators, 2015.

* Note: Although the words “wages” and “earnings” are often used interchangeably, the differences between the two can be significant. Wages refers to compensation paid by an employer on an hourly, weekly or monthly basis. Earnings can include wages paid by an employer but also other sources such as interest, dividends, and contractor or business income.

Production occupations account for 52.6% of the employment in the cluster (Figure 8). The next largest employment category is architecture and engineering occupations, which typically have higher wages. Ensuring that appropriately skilled production workers are available at competitive compensation rates will be critical to maintaining the manufacturing sector in the region.

Figure 8: National Machinery Manufacturing Cluster Staffing Patterns

Occupation Type	Percent of Cluster Employment	County Median Wage All Industries	Region Median Wage
Production occupations	52.6%	\$33,079	\$34,430
Architecture and engineering occupations	10.1	66,903	72,646
Office and administrative support occupations	10.1	31,712	32,235
Management occupations	6.6	81,756	81,279
Business and financial operations occupations	4.5	51,504	55,661
Installation, maintenance, and repair occupations	4.5	43,979	46,192
Sales and related occupations	3.6	23,246	23,692
Transportation and material moving occupations	3.5	30,549	29,674
Computer and mathematical occupations	2.0	56,701	67,658
All other occupations	2.5	46,629	45,451

Source: U.S. Bureau of Labor Statistics and Illinois Department of Employment Security, Occupational Employment Statistics, 2016.

A challenge for employers is the looming demand for replacement workers as older workers retire. The Illinois Department of Employment Security projects that 960 openings for production workers will become available per year between 2012 and 2022, with a majority coming from replacements (Figure 9).

INDUSTRY CLUSTER PROFILE

Figure 9: Occupational Employment, Projected Demand by Selected Worker Classifications, Workforce Investment Board Region 5*

Occupation Type	Employment		Employment Change, 2012-2022		Average Annual Job Openings		
	2012	2022	Number	Percent	Growth	Replacements	Total
Total, All Occupations	282,136	333,489	51,353	18.2%	5,215	6,645	11,860
Office & Administrative Support	38,831	44,430	5,599	14.4	585	876	1,461
Sales & Related	29,095	34,025	4,930	16.9	494	896	1,390
Production	27,431	31,295	3,864	14.1	417	543	960
Transportation & Material Moving	21,834	26,920	5,086	23.3	509	535	1,044
Management	18,935	21,456	2,521	13.3	271	380	651
Business & Financial Operations	10,482	12,916	2,434	23.2	244	203	447
Installation, Maintenance & Repair	9,150	10,794	1,644	18.0	164	206	370
Computer & Mathematical	5,015	6,450	1,435	28.6	144	83	227
Architecture & Engineering	3,983	4,644	661	16.6	66	93	159

Source: Illinois Department of Employment Security, 2012-2022 Employment Projections.

*Workforce Investment Area 5 includes the counties of DeKalb, Kane, and Kendall. Items do not sum to totals because not all occupations are shown.

Because of the competition with surrounding metro areas for workers with specific skills or experience, compensation levels are a concern for local businesses. For example, the projected demand for production workers in the counties of Boone, Winnebago, and McHenry is estimated to be 1,059 openings per year between 2012 and 2022². The estimated average annual wage for production workers is \$33,079 in DeKalb County compared to \$34,430 in the region, which includes other areas with a high concentration of machinery firms, such as the Rockford MSA and Elgin. This could put local employers at a competitive disadvantage relative to areas offering comparable jobs at higher wages. Given the intense competition for skilled workers, companies will need to monitor compensation trends in order to recruit and retain qualified employees.

ECONOMIC IMPACT

For every 100 jobs created in the machinery manufacturing cluster in DeKalb County, an additional 79 jobs are supported or created in other industry sectors. This also results in the generation of another \$17.1 million in value-added, as well as an additional \$9.1 million in employee compensation (Figure 10).

For every 100 jobs created in the machinery manufacturing cluster in Reference Region, an additional 97 jobs are supported or created in other industry sectors. This also results in the generation of another \$22.1 million in value-added, as well as an additional \$11.9 million in employee compensation.

Figure 10. Economic Impact Summary of 100 New Jobs Created in the Machinery Manufacturing Cluster, DeKalb County and Reference Region

Indicator	Direct Effect	Indirect Effect	Induced Effect	Total Effect	Multiplier
Employment (DeKalb County only)	100	36	42	179	1.79
Value-Added (DeKalb County only)	\$11,932,873	\$2,616,907	\$2,586,912	\$17,136,692	1.44
Employee Compensation (DeKalb County only)	\$6,656,294	\$1,345,010	\$1,179,735	\$9,181,039	1.38
Employment (Reference Region)	100	45	52	197	1.97
Value-Added (Reference Region)	\$14,317,199	\$3,996,176	\$3,771,186	\$22,084,560	1.54
Employee Compensation (Reference Region)	\$8,030,364	\$2,131,059	\$1,732,066	\$11,893,489	1.48

Source: IMPLAN, 2015.

² Source: Illinois Department of Employment Security, 2012-2022 Employment Projections.

INDUSTRY CLUSTER PROFILE

The industries most affected by job creation in the machinery manufacturing cluster in DeKalb County include wholesale trade, restaurants, employment services, truck transportation, hospitals and real estate (Figure 11). These job impacts are the result of business-to-business purchases by companies within the cluster, as well as by the household spending of their employees.

Figure 11. Employment Impacts of 100 New Jobs Created in the Machinery Manufacturing Cluster on Other Industries, DeKalb County

Industry Impacted in DeKalb County	Jobs
Total, All Affected Industries	79
Wholesale trade	9
Limited-service restaurants	4
Full-service restaurants	3
Employment services	3
Truck transportation	3
Hospitals	2
Real estate	2
All other industries	52

Source: IMPLAN, 2015.

Similar impacts can be measured in the Reference Region where the industries most affected by job creation in the machinery manufacturing cluster also include business support services, services to buildings and general merchandise retailers though the number of jobs created or supported differs somewhat (Figure 12). Developing the machinery manufacturing cluster could have spillover benefits affecting many sectors in DeKalb County.

Figure 12. Employment Impacts of 100 New Jobs Created in the Machinery Manufacturing Cluster on Other Industries, Reference Region

Industry Impacted in Reference Region	Job
Total, All Affected Industries	97
Wholesale trade	6
Limited-service restaurants	4
Full-service restaurants	3
Employment services	3
Real estate	3
Truck transportation	2
Hospitals	2
All other industries	65

Source: IMPLAN, 2015.

KEY TAKEAWAYS

- » The machinery manufacturing cluster in DeKalb County has a concentration of firms that is 2.9 times the national average and an employment concentration 2.0 times the national average. The surrounding region also ranks above the national average. Employment in the machinery cluster has increased considerably in DeKalb and surrounding counties since 2009.
- » DeKalb County has an especially high concentration of employment in manufacturers of miscellaneous machinery, such as air compressors.
- » The County's machinery manufacturing cluster is specialized in agricultural and metalworking machinery and has the potential for further development based on their supply chain relationships to other industries in the region or the surrounding metro areas.
- » Opportunities likely exist for manufacturers of fluid pumps and motors to work with agriculture/construction/mining machinery manufacturers to develop new locally-sourced products. However, more work will be necessary to identify and develop those opportunities.
- » The emergence of autonomous, computerized "smart machines" is an opportunity for machinery manufacturers nationally, but especially in DeKalb County with potential technology transfer from the engineering department at NIU. Here again, additional research is needed to determine the viability of such opportunities.
- » Despite static or declining overall employment in the broad manufacturing industry, the expected wave of retiring baby boomers will create most of the demand for new workers. Since other industries will experience the same challenges, competition for skilled workers will be brisk given the smaller number of younger workers pursuing a career in manufacturing.
- » The machinery manufacturing cluster in DeKalb County supports 591 jobs and contributes \$70.5 million to the county's economy. In the Reference Region, the cluster supports 16,241 jobs and contributes for \$2.5 billion to the regional economy.



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