



# Pattern Industry Insight

## Chemical Manufacturing

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Department of Economic Development



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# Pattern Industry Insights: Chemical Manufacturing

One of the largest and diverse pattern industries in Missouri is Chemical Manufacturing. Companies in this sector employ nearly 17,000 and are clustered in St. Louis, Northeast and Northwest Missouri. Chemical manufacturers not only provide a bounty of jobs to Missourians but also pay a high industry average wage of \$62,000.

But what is a pattern industry and why is it important? Furthermore, what do chemical producers really make?

## Pattern Industries

A pattern industry is a regionally-concentrated industry that exports the majority of the good or services it makes. Pattern industries can be clusters if a large number of companies create an employment concentration or a spot strength if only a few, very large firms dominate the pattern. All things being equal, a cluster is preferred as it naturally diversifies economic risks and rewards when many companies have a broad mix of specialized products and markets. Clusters can better weather bad times as opposed to one large company that may leave and take the industry with it.

The export-orientation of pattern industries is crucial for long-term economic prosperity as those businesses sell products to customers outside a region thereby bringing new dollars into an economy. This new income is spent and creates additional area jobs. Seldom can a region's population maintain a robust economy by only selling things to itself; it has to export to bring in new wealth.

## Chemical Manufacturing

Chemical manufacturers do export! Chemicals represent Missouri's second largest foreign export, \$1.9 billion in 2009, and a major domestic export to other states, \$15.3 billion at last count (2007).

The industry is also diverse with over 375 establishments developing chemicals for agriculture, pharmaceutical, industrial, and cleaning applications, among others.

As mentioned earlier, chemical manufacturers pay well. Skilled operators that run mixing, blending, extruding, and forming machines represent the largest employment and make an average of \$30,000 to \$36,000. Companies also employ a large number of inspectors (\$36,000), chemists (\$65,000) and chemical technicians or equipment operators (\$43,000). Chemical manufacturers need skilled workers and represent a great industry to grow Missouri incomes.

This pattern industry insight report provides the details to better understand the companies and markets of this lesser known, but vital sector in Missouri's economy.

Chemical Mfg. Concentration  
Regions in Gold



## Basic Chemical Manufacturing

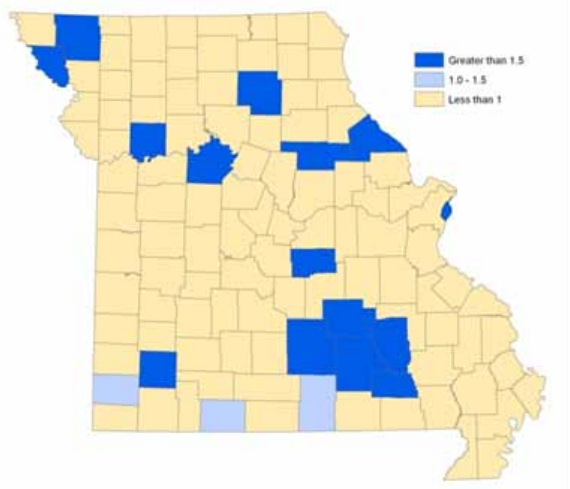
The basic chemicals segment covers the manufacturing of petrochemicals, gases, dyes, and pigments. Petrochemicals are produced from petroleum and natural gas and contain carbon and hydrogen. Dyes, plastics, and several other products are typically derived from organic chemicals. These products are mostly utilized in the production of other chemicals. Inorganic chemical manufacturing utilizes salts, metals, and other minerals to produce solid and liquid chemicals as well as industrial gases such as oxygen, nitrogen, and helium. Inorganic chemicals are utilized in many cases as catalysts in chemical reactions.

Basic chemical manufacturing employs approximately 152,000 people across the United States according to the US Bureau of Labor Statistics. This makes up around 18% of the total workforce involved in chemical and pharmaceutical manufacturing. In Missouri, this sector employs nearly 3,100 people throughout 52 businesses. The average annual wage for these jobs in 2009 was \$66,041.

Missouri produced more than \$768 million in total exports from this category in 2009. The largest sub-category export within basic chemicals was "organo-sulfuric compounds" making up \$189 million of the total.

## Regional Dependence

The statewide distribution in basic chemical manufacturing jobs based on the location quotient shows several areas throughout Missouri with a heavy concentration of jobs in the county. Those include the south central area that includes West Plains, the St. Louis City area, and Louisiana. There are also several other spots scattered throughout the middle of the state with a location quotient above 1.5. This shows these areas to have higher concentrations of chemical manufacturing jobs than the national average.

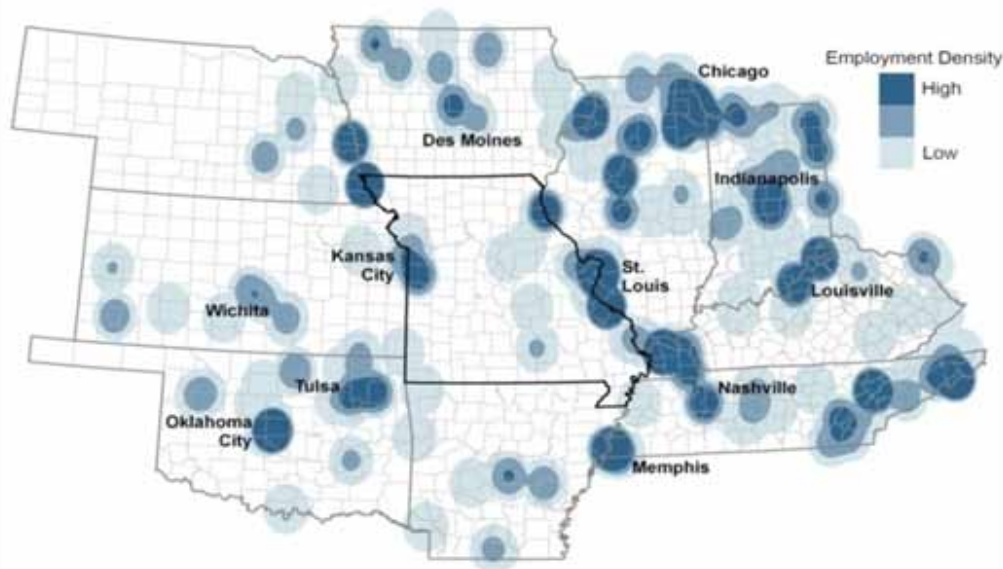


## Top 5 Missouri Basic Chemical Manufacturing Employers

- 1. Sigma-Aldrich**  
**St. Louis, MO**  
Produce chemical and bio chemical products used in research, diagnosis, and high tech manufacturing.
- 2. Royal Oak Enterprises**  
**West Plains, MO**  
Manufactures and exports charcoal, lighter fluid, inorganic chemicals, synthetic waxes, natural waxes, other biochemicals and inorganic compounds.
- 3. Solutia, Inc**  
**St. Louis, MO**  
Specialize in efficiency enhancing chemicals in automotive, solar, architectural, and energy markets
- 4. ICL Performance Products LP**  
**St. Louis, MO**  
Manufacture and market phosphates, phosphoric acid, and phosphorus chemicals used in baking, beverage, asphalt, cleaners, and others.
- 5. Hercules, Inc**  
**Louisiana, MO**  
Manufacture nitrogen solutions fertilizer, industrial organic chemicals, paint driers, paint extenders, anti slipping agents, paint, and primers.

## Regional Employment Density

In comparison to a ten-state region, Missouri has two major areas of basic chemical manufacturing employment density within its borders, St. Louis and Kansas City. There are other areas of the state which have high employment densities right across the state line that may employ Missouri residents. These areas include the La Grange, St. Genevieve, and Rockport vicinities.



## Export Trends

In 2009, two products generated nearly 50% of the basic chemical export revenue in Missouri. Organosulfur (commonly used in tire production, agrochemicals, antibiotics, and food preservatives) has topped the list for the last three years but declined 83% in the first quarter of 2010. The second biggest export is the heterocyclic compound, which is often used as a precursor to agrochemicals and pharmaceuticals, and is used to denature antifreeze and ethanol. The heterocyclic compound with a pyridine ring structure has shown the fastest growth over the past three years and currently tops the list for 2010 at over \$55 million so far this year.

## Where do Missouri's Basic Chemicals Go?

Missouri's basic chemicals are widely utilized in the manufacturing of other chemicals throughout the Midwest. Below is a list of Midwestern states (including Missouri) who received basic chemicals from Missouri based companies.

Missouri's basic chemicals also extend beyond the United States to locations all over the world. In 2009, the top 5 recipients of Missouri basic chemicals were **Germany (\$92.8MM)**, **Brazil (\$73.5MM)**, **Belgium (\$53.2MM)**, **India (\$22.3MM)**, and **China (\$20.2MM)**.

State	\$Millions	State	\$Millions
Missouri	\$3,050	Kentucky	\$22
Illinois	\$508	Indiana	\$20
Iowa	\$85	Nebraska	\$19
Kansas	\$55	Tennessee	\$19
Arkansas	\$23	Oklahoma	\$4

## Agricultural Chemical Manufacturing

The agricultural chemical manufacturing sector accounted for \$109 million in Missouri exports in 2009. Herbicides, antisprouting products, and plant-growth regulators made up over half of the groups' exports with \$58 million in 2009. Insecticides were next at \$20 million followed by fungicides at \$16 million.

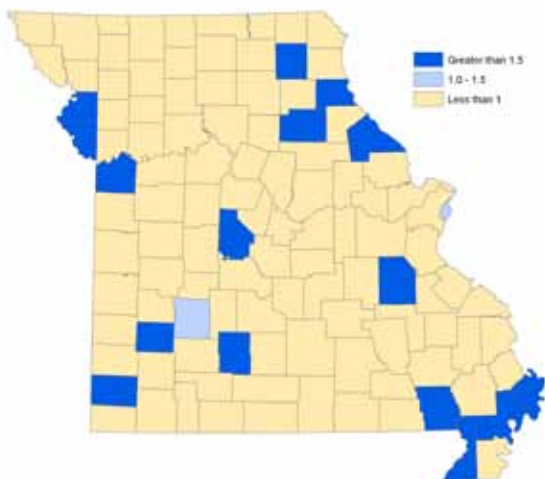
Agricultural chemical manufacturing employs approximately 36,000 people in the United States according to the US Bureau of Labor Statistics. This makes up approximately 4% of the total workforce involved in chemical and pharmaceutical manufacturing. In Missouri, this sector employs about 1900 people throughout 47 businesses. The average wage for these jobs in 2009 was \$65,866.

Missouri produced a total of \$109MM in agriculture chemical manufacturing exports in 2009. Herbicide exports was the top sub-category within ag chemicals making up \$58MM in 2009 exports.

Missouri is also home to Fortune 500 Company Monsanto. Headquartered in St. Louis, Monsanto owns Roundup and several other nationally distributed agricultural chemicals. Monsanto's primary business is in agriculture seed development.

## Regional Dependence

The statewide distribution of agricultural chemical manufacturing is spread throughout the state. MFA is a unique organization, located throughout the state in several locations to serve multiple agricultural areas, boosting the location quotient in the given areas. The Kansas City area surpasses the 1.5 location quotient, while St. Louis scores between 1 and 1.5. Southeast Missouri also has a large pocket where several counties score above 1.5 for their location quotient.

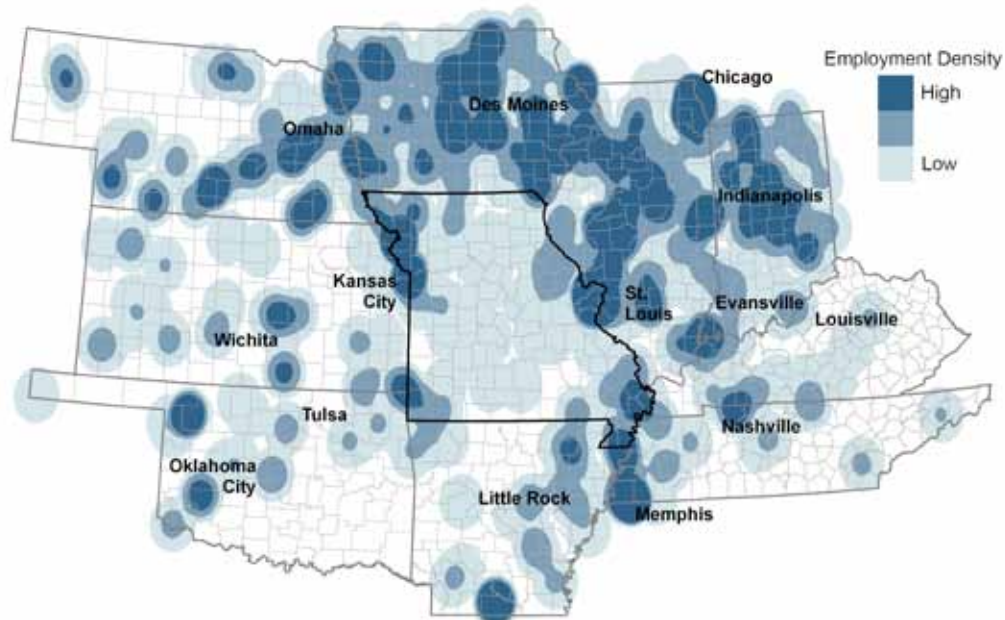


## Top 5 Missouri Agricultural Chemical Manufacturing Employers

- 1. Bayer Crop Science  
Kansas City, MO**  
Manufacture several herbicides, insecticides, and fungicides heavily utilized by farmers worldwide.
- 2. Purina Mills LLC  
St. Louis, MO**  
Acquired by Land 'O Lakes in 2001. Formulate and manufacture specialty feed for 26 species of livestock and pets.
- 3. Albaugh, Inc  
St. Joseph, MO**  
Produce and distribute herbicides, insecticides, fungicides, and plant growth regulators.
- 4. MFA Enterprises  
Statewide, non coop**  
Manufacture livestock feed and supply and market plant food and crop protection products.
- 5. HPI Products, Inc  
St. Joseph, MO**  
Manufacture and package both liquid and dry products including law and garden supplies, herbicides, pesticides, soaps, cleaners, disinfectants, granular products, agrochemicals, and other chemical products.

## Regional Employment Density

In comparison to a ten state region, Missouri's high density employment regions in agricultural chemical manufacturing exist in four main pockets: St. Louis, Kansas City/St. Joseph corridor, the Southeast, and Joplin.



Within the agricultural chemicals category, the herbicide group (plant growth regulators) was the top export making up \$58MM or 53% of total 2009 ag chemical exports. Herbicides are also out to a fast start this year, up 24% at the end of April 2010 compared to April 2009. The fastest growing agricultural chemical export in 2009 was fungicides with 73% growth. It was off to an extremely fast start through the first four months of 2010, having jumped by 396% when compared with the same period of 2009.

## Profile of a Co-op

Missouri's farmers have created a unique operation that does significant business in regards to agricultural chemical manufacturing. Missouri Farmers' Association Inc is a Midwest based regional farm supply and marketing cooperative that serves over 45,000 farmers in Missouri and its surrounding states. There are 106 locations spread across the state, providing members with livestock feed and supplements, fertilizers, crop protection chemicals (insecticides, pesticides, etc), and other products.

This table shows the countries that received Missouri's top agricultural chemical export (herbicides) from Missouri based manufacturers in 2009.

Country	Exports (millions)	Country	Exports (millions)
Belgium	\$9.68	Canada	\$4.25
Brazil	\$8.73	Mexico	\$3.99
United Kingdom	\$6.75	Columbia	\$2.80
China	\$5.25	Korea, Republic	\$2.28
India	\$4.52	Australia	\$1.41

# Pharmaceutical & Medicine Manufacturing

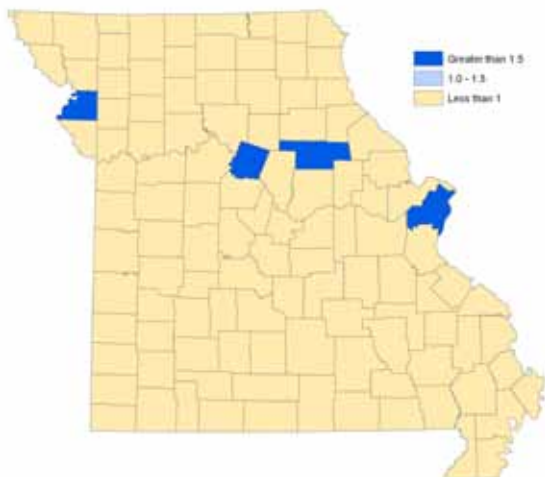
The next category is pharmaceutical and medicine manufacturing. The US pharmaceutical manufacturing industry is unique amongst its peers, as it spends a disproportionately high amount of its revenue on research and development. The industry may perform testing on millions of compounds annually, but less than 1% of those may ever become new prescription medicines. The industry has produced thousands of products used for vaccinations, illness recover, disease prevention, and nutrition supplementation.

According to the US Bureau of Labor Statistics, there were 289,800 jobs in pharmaceutical and medicine manufacturing in 2008 at over 2500 places of employment. This makes up about 34% of the total workforce involved in chemical and pharmaceutical manufacturing. This segment also employs about 4800 in Missouri throughout 65 businesses. These jobs paid an average salary of \$73,644 in 2009.

Missouri exported approximately \$698 million in pharmaceuticals in 2009. Composite diagnostic/laboratory reagents was the biggest sub-category, making up \$179 million of the total, or nearly 26%. In 2008 Missouri overtook Nebraska as the U.S.'s top exporter of veterinary vaccines and have continued in that spot ever since. Through May 2010 Missouri had already exported \$97 million with the next highest total being Nebraska at \$48 million.

## Regional Dependence

The map below reflects the statewide distribution of pharmaceutical manufacturing jobs in Missouri. The main concentrations of pharmaceutical jobs are located in the St. Louis area and in St. Joseph, both of which are represented in the list of Missouri's top five pharmaceutical employers.



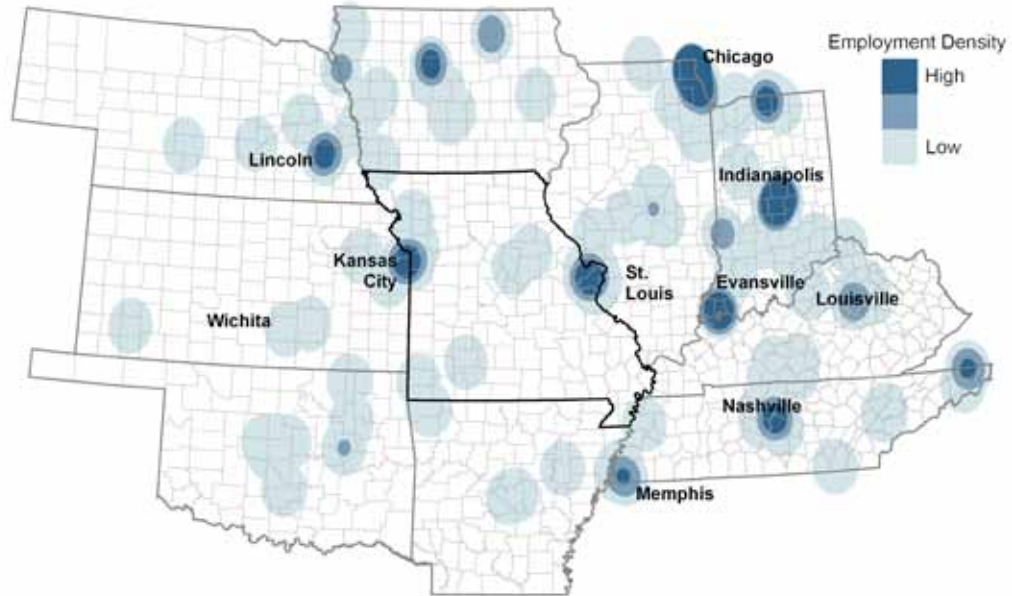
Audrain and Howard counties also have location quotients above 1.5 putting them in the highest statewide category. The rest of the state has a location quotient under 1, with no other significant concentration of pharmaceutical jobs.

## Top 5 Missouri Pharmaceutical & Medicine Chemical Manufacturing Employers

- 1. Pfizer**  
**St. Louis, MO**  
These laboratories are focused on the areas of inflammation and Biologics. Recent products this area has helped bring to market are Celebrex, Inspra, Genotropin, and Somavert.
- 2. K-V Pharmaceutical Co**  
**St. Louis, MO**  
Develop, manufacture, and market branded, generic (non-branded), and specialty ingredient products using proprietary drug delivery technologies.
- 3. Sanofi-Aventis U.S.**  
**Kansas City & St. Louis, MO**  
The Kansas City site serves as a primary manufacturing site utilizing Primary Processing Units to meet immediate demands for various products. The St. Louis site serves as a primary packaging location.
- 4. Boehringer Ingelheim**  
**Vetmedica Inc**  
**St. Joseph, MO**  
Research and develop vaccines, medication, and pest control products for cattle, swine, equine, and pet industries.
- 5. Meridian Medical Tech Inc**  
**St. Louis, MO**  
Manufacture and market prefilled syringes and self injectors for first responders and military personnel.

## Regional Employment Density

In comparison to a ten state region, Missouri has two major areas of pharmaceutical manufacturing employment concentration. These areas are the state's top metropolitan locations of Kansas City and St. Louis, both of which are also highlighted in the location quotient map on page one. In comparison to the other top chemical manufacturing industries, pharmaceutical manufacturing companies exist in fewer locations throughout the midwest.



## Export Trends

For 2009, composite diagnostics and veterinary vaccines were the two top sub-categories combining for \$330 million of the \$698 million in pharmaceutical exports, or 47%. The composite diagnostic/laboratory reagent is a substance utilized in a chemical reaction to detect, measure, examine, or produce another substance, heavily used in at-home testing or injection kits. Veterinary vaccines are medicine, vaccines, and nutrition products primarily targeted to equine, cattle, swine, and pets. Veterinary vaccines have surged past composite diagnostics and have become Missouri's number one pharmaceutical export so far in 2010 with \$97 million in total exports through May.

## Geographical Advantage

Missouri is located directly within a region referred to as the KC Animal Health Corridor, with Kansas City serving as the corridor's focal point. Companies such as Boehringer Ingelheim Vetmedica and Teva Animal Health, both of St. Joseph, MO, prosper in this region. The chart shows the top 10 states where the majority of Missouri manufactured pharmaceuticals were shipped in 2009.

**China (\$16.5 million)** was the top recipient of Missouri's top two pharmaceutical export segments in 2009 followed, by **Japan (\$12.7 million)**, **Mexico (\$6.6 million)**, and **Canada (\$10.8 million)**.

State	Value (000's)	State	Value (000's)
Missouri	\$6,717	Tennessee	\$519
Illinois	\$3,815	New Jersey	\$455
Kansas	\$1,843	California	\$366
Iowa	\$1,019	Pennsylvania	\$353
Arkansas	\$716	Nebraska	\$349

# Paint, Coating, and Adhesive Manufacturing

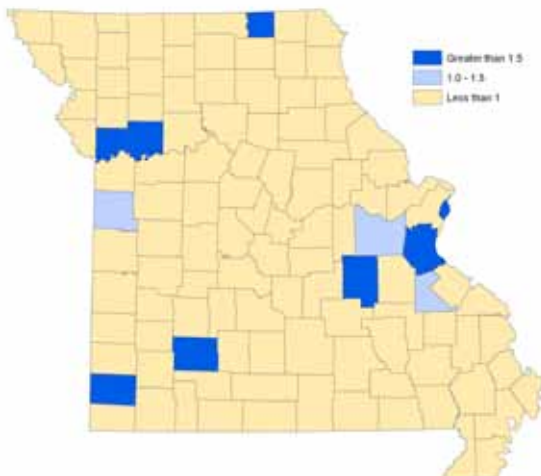
The paint, coating, and adhesive manufacturing segment covers firms that make paints, varnishes, putties, paint removers, sealers, adhesives, glues, and caulking. This segment's largest commercial clients are from the construction and furniture industries. Other customers include home improvement businesses, do-it-yourself consumers, and specialty businesses in need of specialized paint, adhesives, or other custom chemical products.

The paint, coating, and adhesive manufacturing segment employs approximately 62.8 million people throughout the United States according to the US Bureau of Labor Statistics. This makes up about 7% of the total employment involved in chemical and pharmaceutical manufacturing. In Missouri, there are approximately 1900 employed in this segment throughout nearly 60 businesses. The average wage for these jobs in 2009 was \$51,681.

Missouri produced \$57.2 million in total exports from this segment in 2009. The largest sub-category export within paint, coating, and adhesive manufacturing was "paints and varnishes" with \$17.2 million of the total.

## Regional Dependence

The map below shows the statewide distribution of paint, coating, and adhesive manufacturing jobs in Missouri. These jobs had the highest concentration in St. Louis City and Jefferson Counties in the St. Louis area, Clay and Ray Counties near Kansas City, Joplin, Springfield, and a few other isolated counties all with location quotients over 1.5. Cass, Franklin, and St. Frances Counties had moderately high job concentrations with location quotients at 1.0-1.5 while the rest of the state measured less than 1.

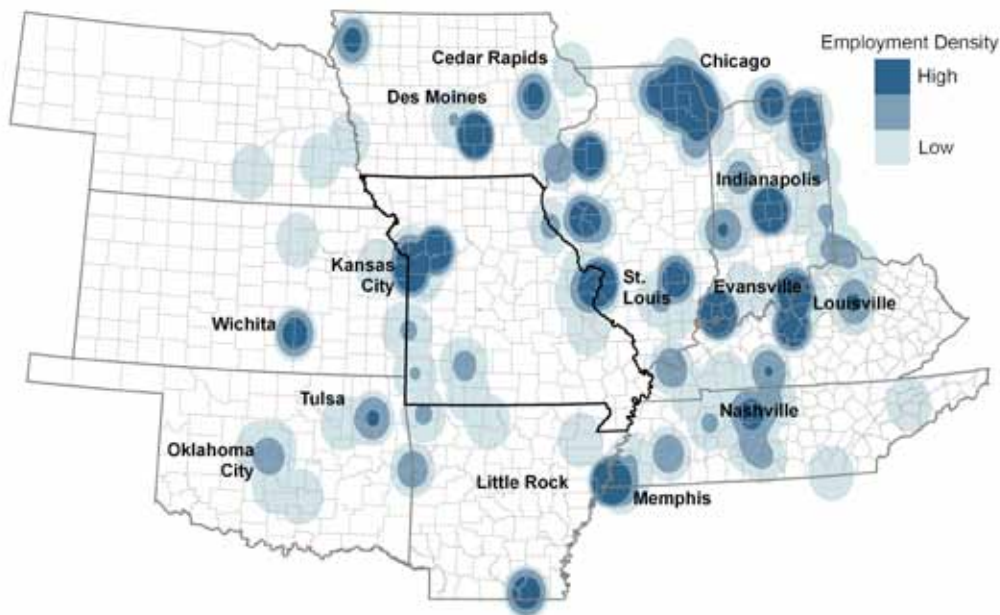


## Top 5 Missouri Paint, Coating, and Adhesive Manufacturing Employers

- 1. TNEMEC Company, Inc.**  
**Kansas City, MO**  
Manufacture over one hundred architectural and industrial coatings. Product examples are premium epoxies, polyurethanes, specialized fluoropolymer, and polyurea products.
- 2. Carboline Company**  
**St. Louis, MO**  
Carboline is a subsidiary of Fortune 300 company RPM International. They produce and sell sealants, corrosion control coatings, flooring products and specialty chemicals to industrial and consumer customers. Brands include Rus-Oleum, Temco, and Stonhard.
- 3. Silka Corporation**  
**Grandview, MO**  
Silka Automotive, a subsidiary of Silka Group, produces specialty chemicals for the auto industry. Their core competencies involve bonding, sealing, damping, and reinforcing.
- 4. Behr Process Corporation**  
**Columbia, MO**  
Behr produces interior and exterior paints, primers, and stains throughout 9 states and 4 countries. Its headquarters is in Santa Ana, CA.
- 5. The Valspar Corporation**  
**Kansas City, MO**  
The Valspar Corporation has a presence in 25 countries worldwide and manufactures a wide variety of paints, coatings, and adhesives.

## Regional Employment Density

In comparison to a ten-state region, Missouri has two major areas of employment density in paint, coating, and adhesive manufacturing. The major areas include the St. Louis and Kansas City metro areas. Other areas of above average employment density include the Joplin, Springfield, and Hannibal areas.



## Export Trends

The paints and varnishes segment and rubber or polymer based adhesives are the top two sub-categories within this segment. Together they made up \$32.4 million in exports out of the segment's total of \$57.2 million, or just less than 57%. Through May 2010, this category has followed the same trend with these two sub-categories still in first and second place overall respectively in export dollars.

Canada was far and away the biggest recipient of Missouri's top two paint, coating and adhesives subcategories with over \$11 million in 2009. Mexico was next with slightly less than \$6 million in combined exports. New Zealand (9th overall) cracked the top ten list despite receiving zero exports from the rubber or polymer based adhesives segment. They received only paints and varnishes from Missouri manufacturers in 2009.

Country	\$ millions	Country	\$ millions
Canada	\$11.46	France	\$1.54
Mexico	\$5.80	Spain	\$1.20
Korea	\$2.54	China	\$1.11
Italy	\$1.89	New Zealand	\$0.93
Japan	\$1.74	United Kingdom	\$0.72

# Soap and Cleaning Compounds Manufacturing

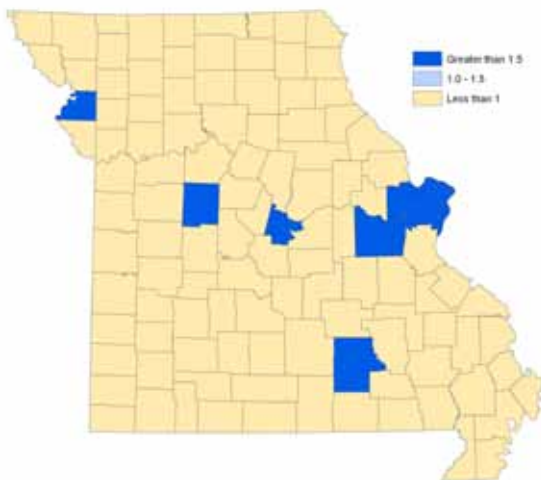
The soap and cleaning compound manufacturing segment is the one segment of the bunch directed primarily at consumers. Companies in this segment include items such as soap, detergents, household cleaning compounds, toothpaste, perfume, shaving cream, lotion, and insect repellent.

The soap and cleaning compound manufacturing segment employs approximately 108 million people throughout the United States according to the US Bureau of Labor Statistics. This makes up approximately 12.7% of the total workforce involved in chemical and pharmaceutical manufacturing. In Missouri, this sector employs around 3300 people throughout 82 businesses. The average wage for these jobs in 2009 was \$54,005.

Missouri produced \$108 million in total exports from this segment in 2009. The largest sub-category export was "retail surface washing and cleaning preparations" with \$27 million. This makes up 25% of the total 2009 soap and cleaning compound exports.

## Regional Dependence

The map below shows the statewide distribution of the soap and cleaning compound manufacturing jobs throughout Missouri. Major concentrations of these jobs occur in the St. Joseph and the St. Louis Metro areas. Other top concentrations occur in Pettis and Cole Counties in the Mid-Missouri area and in Shannon County towards the Southeast portion of the state. These eight counties highlighted in blue have a location quotient above 1.5. No other county in the state has a location quotient of less than 1.

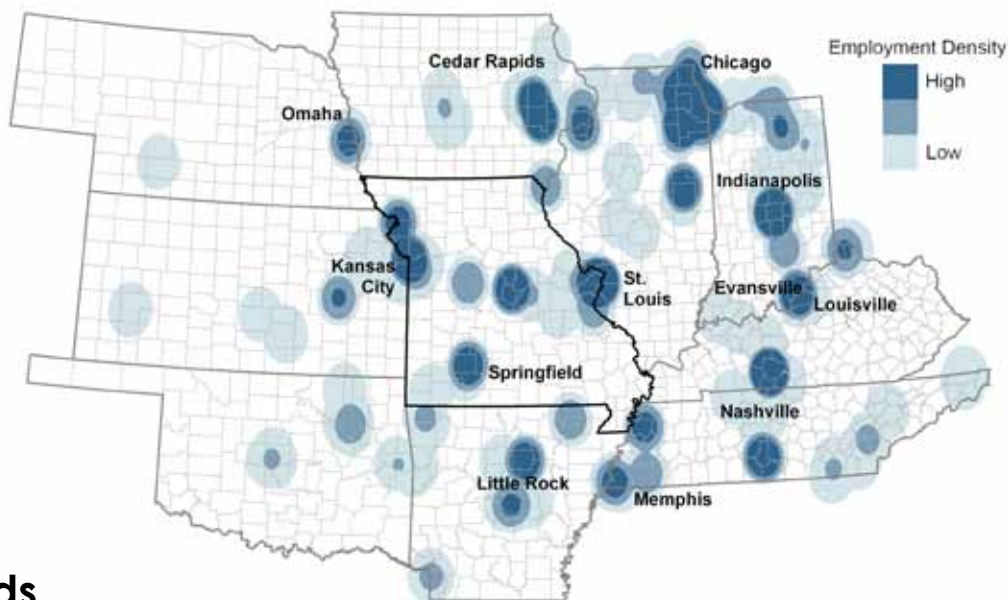


## Top 5 Missouri Soap and Cleaning Compound Manufacturing Employers

- 1. Vi-Jon, Inc.  
St. Louis, MO**  
Vi-Jon is one of the nation's oldest private label health and beauty care companies, with products sold in all 50 states. They've been headquartered in St. Louis since 1912.
- 2. Unilever Supply Chain  
Jefferson City & Sikeston, MO**  
Manufacture beauty and soap brands brands such as Dove, Degree, and Axe, but also food products such as Lipton, Ben & Jerry's, Skippy, and Slim-Fast.
- 3. Procter & Gamble  
St. Louis, Cape Girardeau, Kansas City, Jackson, MO**  
P&G is a global company that owns several huge brands involved with health, beauty, and cleaning products. Brands include Braun, Pantene, Safeguard, Gillette, Hugo, Head & Shoulders, Zest, and Ivory.
- 4. Spectrum Brands  
Overland, St. Louis, and Bridgton, MO**  
Spectrum is a global consumer products company that owns several large brands including Cutter, Rayovac, Repel, and Remington.
- 5. The Dial Corporation  
St. Louis, MO**  
The Dial Corporation is an industry leader in beauty and personal cleaning products.

## Regional Employment Density

In comparison to a ten-state region, Missouri has four major areas of soap and cleaning compound manufacturing employment density. These areas include the St. Louis metro, the Kansas City to St. Joseph corridor, Springfield, and the Jefferson City area.



## Export Trends

In 2009 two products generated 40% of all soap and cleaning compound manufacturing exports, combining for over \$42 million. These were similar in nature, with the top export sub-category being classified as washing and cleaning preparations put up for retail sale and the next top export being washing and cleaning preparations not put up for retail sale. These both describe typical detergents, degreasing substances, surface cleaners, and anionic substances.

Out of the top 5 export subcategories, only the fourth place subcategory in 2009 (hair shampoo) is ahead of last year's pace thus far in 2010, up nearly 6%. Despite being down so far in 2010, the top 5 of 2009 remain in the same ranked order thus far through 2010.

## A Top Employing Segment

The soap and cleaning compound manufacturing segment of the chemical manufacturing industry was the 2nd highest employing chemical manufacturing segment in Missouri. Here is a rundown of the top five by Missouri employment.

Rank	Segment	MO Employees
1	Pharmaceutical Chemical Manufacturing	4460
2	Soap and Cleaning Compounds Manufacturing	3737
3	Basic Chemical Manufacturing	3153
4	Agriculture Chemical Manufacturing	1500
5	Paint, Coating, and Adhesive Manufacturing	1115

## Sources

Reference USA

US Census Bureau- 2007 Commodity Flow Survey

US Bureau of Labor Statics-Quarterly Census of Employment and Wages

Wisertrade

## Top Chemical Manufacturing Companies

Certain chemical manufacturing companies were chosen based on their status as “top employers” in Missouri and are listed in order of approximate employment. Information on individual companies was obtained from Reference USA and individual company websites.

## Export Data

Export values associated with Harmonized codes were converted to NAICS based codes using a bridge between the two coding systems. The code conversion enabled a more detailed reporting of commodities while still using the broader based four digit NAICS system.

## Acknowledgements

MERIC’s Economic Analysis Team researched the information for this report. The report was written by John Kozel and Alan Spell, data collection and analysis also included Tony Brite and Tom Reichart. Graphic Design was done by Maggie Lear and Colin Duewell.