



How Does the Engineering Occupation in Wichita Compare to Other MSAs?

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Approximately 8.9 percent of the nation's nonfarm wage and salary employment was in the manufacturing sector in 2010; whereas, the percentage of manufacturing employment in the Wichita metro area was 18.5 percent. Consequently, one would suspect that the high concentration of manufacturing in the Wichita metro area might also indicate a larger representation of engineers, compared to other metropolitan areas. In an effort to determine the validity of that assumption, the Center for Economic Development and Business Research gathered and analyzed engineering and population data for 363 metropolitan statistical areas. This article provides a summary of findings from that process.

According to the Census Bureau, in 2010 there were more than 1.75 million engineers in the United States.¹ The U.S. Bureau of Labor Statistics estimates that 35.2 percent were in the manufacturing industry, while 31.1 percent were in the professional, scientific, and technical services sector.² The rest were distributed among the other major industries.

Also, according to the U.S. Census Bureau, the Wichita MSA had 6,955 engineers, which ranked it 47th highest compared to 362 other metropolitan statistical areas. The Los Angeles-Long Beach-Santa Ana, CA metro area had the largest number, with 80,184 engineers, and the Danville, VA metro area ranked last out of the 363 areas, with 77 engineers.

When comparing the number of engineers to the total of all occupations employed in the civilian labor force, age 16 years and older, Wichita ranked 17th highest, with 2.3 percent of Wichita's employed civilian labor force in the engineering occupation. The Huntsville, AL metro area ranked first with 5.5 percent of its employed civilian labor force comprised of engineers. For comparison, the national percentage was 1.2 percent.

When comparing the number of engineers to total population, Wichita ranked 16th highest, with 1.1 percent of Wichita's population comprised of engineers. The Huntsville, AL metro area ranked first with 2.6 percent of its total population comprised of engineers. This was significantly higher than the national average of 0.6 percent.

For this study, CEDBR compared the percentage of engineers in the total employed civilian labor force for each MSA to the percentage for the United States. This produces a statistic known as a location quotient, which is a measure of the concentration of a resource or activity in an area, compared to the concentration in a larger area or base.

¹ U.S. Census Bureau, 2010 American Community Survey, Three-Year Estimates.

² U.S. Bureau of Labor Statistics, May 2010 Occupational Employment and Wage Estimates, National Sector NAICS Industry-Specific Estimates, http://www.bls.gov/oes/oes_dl.htm. See the Appendix for national engineering occupations by Standard Occupational Classification codes.

In other words,

$$LQ = \frac{e/clf}{E/CLF}$$

Where LQ = Location Quotient
 e = No. of Engineers in an MSA
 clf = Total Employed in the MSA Civilian Labor Force
 E = No. of Engineers in the U.S.
 CLF = Total Employed in the U.S. Civilian Labor Force

Below is a table that shows the location quotient for the MSAs closest in population size to the Wichita MSA, as well as the two MSAs with the highest and lowest concentration of engineers.

- If a location quotient is less than 1.0, the concentration of engineers is less than the national average.
- If it is equal to 1.0, the proportion of engineers is similar to the nation.
- If it is between 1.0 and 1.2, the MSA economy is concentrated in one or more industries requiring engineers.
- If the location quotient is greater than 1.2, the economy is specialized in one or more industries requiring engineers.

With a location quotient of 1.9, the Wichita MSA is an area specializing in an industry that requires engineers. We know that to be the manufacturing industry.

Table 1. Location Quotients for Selected Metro Areas Comparing Number of Engineers to Total Employed in the Civilian Labor Force

MSAs	Total Population*	Location Quotient
Huntsville, AL Metro Area (Highest concentration)	411,241	4.5
<i>Wichita, KS Metro Area</i>	617,575	1.9
Greenville-Mauldin-Easley, SC Metro Area	631,852	1.8
Boise City-Nampa, ID Metro Area	610,912	1.4
Colorado Springs, CO Metro Area	634,008	1.4
Syracuse, NY Metro Area	660,842	1.2
Poughkeepsie-Newburgh-Middletown, NY Metro Area	668,788	1.1
Charleston-North Charleston-Summerville, SC Metro Area	655,600	1.0
Toledo, OH Metro Area	652,257	1.0
Youngstown-Warren-Boardman, OH-PA Metro Area	567,970	0.7
Lakeland-Winter Haven, FL Metro Area	598,757	0.6
Cape Coral-Fort Myers, FL Metro Area	614,477	0.4
Danville, VA Metro Area (Lowest concentration)	106,845	0.1

*Total population is shown only for comparison purposes with the population of the Wichita MSA.

The table below shows the number of metro areas falling within each location quotient category.

Table 2. Number of Metro Areas Per Location Quotient Category

Location Quotient Category*	Number of Metro Areas (Of the 188 Examined)
<1.0	224
=1.0	25
>1.0 and <=1.2	48
>1.2	66
Total	363

*Location quotient categories were rounded to one decimal place to determine the number of metros in each range.

The table below shows the top 12 metro areas with the greatest percentage of engineers in their employed civilian labor force. The Wichita MSA does not appear in the table because it is ranked 17th highest, with 2.3 percent of its civilian labor force comprised of engineers, for a total of 6,955.

Table 3. Metro Areas With the Highest Percentage of Engineers in the Total Employed Civilian Labor Force

MSA	% of Engineers in Total Employed Civilian Labor Force	Total Engineers*	Total Employed Civilian Labor Force
Huntsville, AL Metro Area	5.5%	10,697	193,386
San Jose-Sunnyvale-Santa Clara, CA Metro Area	5.0%	43,600	874,021
Columbus, IN Metro Area	4.6%	1,732	37,288
Palm Bay-Melbourne-Titusville, FL Metro Area	3.3%	7,690	233,798
Boulder, CO Metro Area	3.2%	4,936	155,150
Ann Arbor, MI Metro Area	3.0%	4,979	165,997
Bremerton-Silverdale, WA Metro Area	2.9%	3,089	107,771
Detroit-Warren-Livonia, MI Metro Area	2.9%	52,747	1,843,153
Kennewick-Pasco-Richland, WA Metro Area	2.8%	3,111	111,893
Manchester-Nashua, NH Metro Area	2.8%	5,942	214,367
Kokomo, IN Metro Area	2.7%	1,084	40,442
Warner Robins, GA Metro Area	2.6%	1,554	60,719

*The total engineers category does not include engineering technicians. Because they are aggregated with other technicians, determining the specific number of engineering technicians was not possible.

The top 10 metro areas with the largest number of female engineers in the employed civilian labor force are shown below. The sum of female engineers in these 10 metro areas represents 34.8 percent of the total female engineers in the nation. Only 7.8 percent of Wichita's engineers are female. Of the 363 metro areas 108 have a lower percentage than Wichita.

Table 4. Number of Engineers by Gender for the Metro Areas with the Largest Number of Female Engineers

MSA	Number of Female Engineers* in Total Employed Civilian Labor Force	Number of Male Engineers* in Total Employed Civilian Labor Force
Los Angeles-Long Beach-Santa Ana, CA Metro Area	11,271	68,913
Houston-Sugar Land-Baytown, TX Metro Area	9,954	51,485
New York-Northern New Jersey-Long Island, NY-NJ-PA Metro Area	8,090	58,131
Detroit-Warren-Livonia, MI Metro Area	7,491	45,256
Washington-Arlington-Alexandria, DC-VA-MD-WV Metro Area	7,115	40,713
San Jose-Sunnyvale-Santa Clara, CA Metro Area	6,712	36,888
San Francisco-Oakland-Fremont, CA Metro Area	6,619	35,918
Dallas-Fort Worth-Arlington, TX Metro Area	6,282	37,218
Chicago-Joliet-Naperville, IL-IN-WI Metro Area	6,156	44,692
Seattle-Tacoma-Bellevue, WA Metro Area	5,782	34,746
*The number of engineers does not include engineering technicians. Because they are aggregated with other technicians, determining the specific number of engineering technicians was not possible.		

The two engineering occupations that are most prevalent in Wichita are aerospace engineers and industrial engineers. The average annual salary for aerospace engineers is \$90,560, and the average annual salary for industrial engineers is \$74,260.³ Consequently, the engineering occupation in Wichita contributes significantly to the local economy.

According to the U.S. Bureau of Labor Statistics 2010-11 Edition of the Occupational Outlook Handbook, the overall outlook for engineering job opportunities from 2008 through 2018 was expected to be good, with job growth of between 7 and 13 percent. An 11 percent increase in overall U.S. engineering employment is expected over the decade mentioned above, for an average annual growth rate of 1.1 percent.⁴ This is a decline from actual past growth rates. From 1999 through 2008, the number of engineers in the United States grew by an average annual rate of 3.7 percent.

³ U.S. Bureau of Labor Statistics, May 2010 Metropolitan and Nonmetropolitan Area Occupational Employment and Wage Estimates, http://www.bls.gov/oes/current/oes_48620.htm#17-0000.

⁴ U.S. Bureau of Labor Statistics, Occupational Outlook Handbook, 2010-11 Edition, Engineers, <http://www.bls.gov/oco/ocos027.htm>

APPENDIX

Area: National Period: May 2010	
Occupation (SOC code)	Employment(1)
Aerospace Engineers (172011)	78,450
Agricultural Engineers (172021)	2,520
Biomedical Engineers (172031)	15,280
Chemical Engineers (172041)	28,720
Civil Engineers (172051)	249,120
Computer Hardware Engineers (172061)	66,960
Electrical Engineers (172071)	148,770
Electronics Engineers, Except Computer (172072)	133,660
Environmental Engineers (172081)	49,800
Health and Safety Engineers, Except Mining Safety Engineers and Inspectors (172111)	23,390
Industrial Engineers (172112)	202,990
Marine Engineers and Naval Architects (172121)	5,720
Materials Engineers (172131)	21,830
Mechanical Engineers (172141)	234,400
Mining and Geological Engineers, Including Mining Safety Engineers (172151)	6,270
Nuclear Engineers (172161)	18,610
Petroleum Engineers (172171)	28,210
Engineers All Other (172199)	139,610
Total	1,454,310
(1) Estimates for detailed occupations do not sum to the totals because the totals include occupations not shown separately. Estimates do not include self-employed workers.	
SOC code: Standard Occupational Classification code -- see http://www.bls.gov/soc/home.htm	
Data extracted on November 11, 2011	

Area: National	
Industry: Sectors 31, 32, and 33 - Manufacturing (NAICS codes 31-33)	
Period: May 2010	
Occupation (SOC code)	Employment(1)
Aerospace Engineers (172011)	38,860
Agricultural Engineers (172021)	770
Biomedical Engineers (172031)	7,280
Chemical Engineers (172041)	14,140
Civil Engineers (172051)	2,470
Computer Hardware Engineers (172061)	25,600
Electrical Engineers (172071)	54,700
Electronics Engineers, Except Computer (172072)	42,080
Environmental Engineers (172081)	2,770
Health and Safety Engineers, Except Mining Safety Engineers and Inspectors (172111)	5,220
Industrial Engineers (172112)	140,660
Marine Engineers and Naval Architects (172121)	600
Materials Engineers (172131)	13,120
Mechanical Engineers (172141)	117,120
Mining and Geological Engineers, Including Mining Safety Engineers (172151)	150
Nuclear Engineers (172161)	830
Petroleum Engineers (172171)	2,740
Engineers All Other (172199)	42,510
Total	511,620
Footnotes:	
(1) Estimates for detailed occupations do not sum to the totals because the totals include occupations not shown separately. Estimates do not include self-employed workers.	
SOC code: Standard Occupational Classification code -- see http://www.bls.gov/soc/home.htm	
NAICS code: North American Industry Classification System code -- see http://www.bls.gov/bls/naics.htm	
Data extracted on November 11, 2011	

Area: National	
Industry: Sector 54 - Professional, Scientific, and Technical Services (NAICS code 54)	
Period: May 2010	
Occupation (SOC code)	Employment(1)
Aerospace Engineers (172011)	26,330
Agricultural Engineers (172021)	620
Biomedical Engineers (172031)	3,480
Chemical Engineers (172041)	8,940
Civil Engineers (172051)	133,090
Computer Hardware Engineers (172061)	26,040
Electrical Engineers (172071)	47,850
Electronics Engineers, Except Computer (172072)	26,970
Environmental Engineers (172081)	25,880
Health and Safety Engineers, Except Mining Safety Engineers and Inspectors (172111)	4,500
Industrial Engineers (172112)	27,770
Marine Engineers and Naval Architects (172121)	3,330
Materials Engineers (172131)	3,670
Mechanical Engineers (172141)	69,730
Mining and Geological Engineers, Including Mining Safety Engineers (172151)	2,220
Nuclear Engineers (172161)	6,160
Petroleum Engineers (172171)	4,100
Engineers All Other (172199)	31,950
Total	452,630
Footnotes:	
(1) Estimates for detailed occupations do not sum to the totals because the totals include occupations not shown separately. Estimates do not include self-employed workers.	
SOC code: Standard Occupational Classification code -- see http://www.bls.gov/soc/home.htm	
NAICS code: North American Industry Classification System code -- see http://www.bls.gov/bls/naics.htm	
Data extracted on November 11, 2011	