IN CONTEXT

May 2001 | THE INDIANA ECONOMY | Vol. 2, Issue 5

IN the Spotlight:

Highs and Lows of High-Tech Occupations

High-technology employment is often used to indicate a state's success in the new economy. In the June 2000 issue of *IN Context*, we calculated high-technology employment in Indiana using three different classifications of industries considered to be high-tech. This article will calculate employment using occupation types rather than industries.

The U.S. Bureau of Labor Statistics (BLS) obtains occupational data at the state and national level through the Occupational Employment Statistics survey (OES). There does not appear to be an official classification of high-technology occupations — the classification used here is based on BLS reports on high-technology employment published in the *Monthly Labor Review*. In these reports, BLS focused on those occupations most often associated with research and development activities. This study takes a slightly broader view, including most

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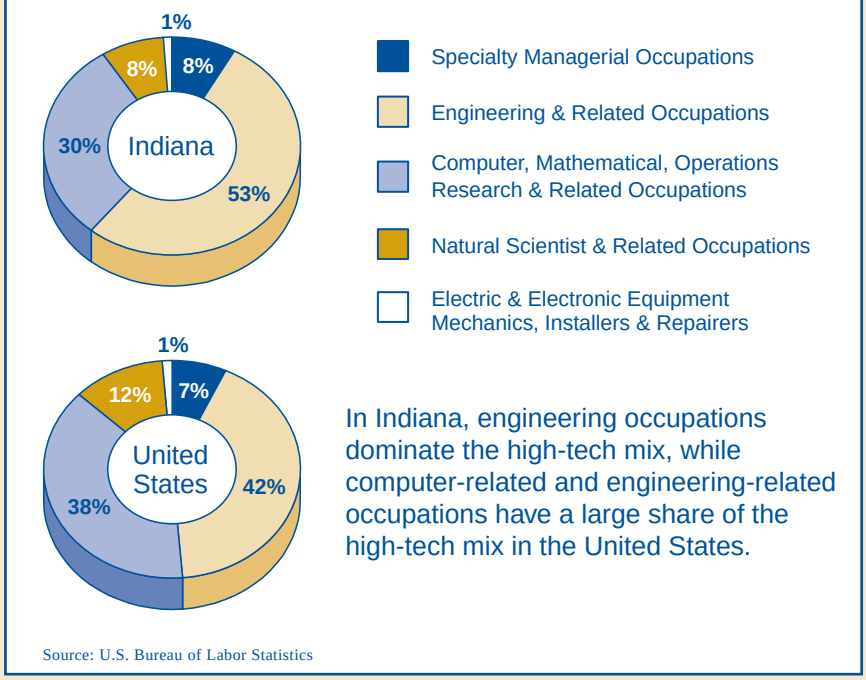
Figure 1: High-Tech Employment in Indiana and the Nation, by Major Occupational Groupings



In Indiana, engineering occupations dominate the high-tech mix, while computer-related and engineering-related occupations have a large share of the high-tech mix in the United States.

Source: U.S. Bureau of Labor Statistics

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Indiana Unemployment Rate for February 2001: 3.5%

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engineers, scientists, computer specialists and single categories for specialty management and support. High-technology employment and average salary for 1998 are presented by major occupational groupings in Table 1. The individual occupations identified as high-tech for this article are listed in the sidebar below.

Engineering and related occupations employ the most high-technology workers in both Indiana and the United States, constituting 53% and 42%, respectively, of all high-technology workers. The pie charts in Figure 1 illustrate the structural similarities and differences between the distributions of high-technology employment in Indiana versus the nation. The highest-paid group of technology workers are employed in specialty managerial occupations as engineering, mathematical or natural-science managers. These managers earn, on average, $64,060 annually in Indiana and $71,840 nationally. Computer and related occupations is the second-largest grouping and pays the third-largest salaries in both Indiana and the nation.

In terms of total impact on the high-technology economy, engineering occupations stand out, given their number and relatively high wages. Assuming that each person employed as an engineer in Indiana makes the average salary of $48,960, this group adds more than $2.3 billion in income to the Indiana economy each year. Meanwhile, high-technology managers

Who's High-Tech?

The following occupations are defined as high-tech for the purposes of this article.

- Engineering, Mathematical, and Natural Sciences Managers
- Metallurgists and Metallurgical, Ceramic, and Materials Engineers
- Chemical Engineers
- Agricultural Engineers
- Electrical and Electronic Engineers
- Computer Engineers
- Industrial Engineers, Except Safety
- Mechanical Engineers
- Marine Engineers
- All Other Engineers
- Electrical and Electronic Engineering Technicians and Technologists
- Industrial Engineering Technicians and Technologists
- Mechanical Engineering Technicians and Technologists
- All Other Engineering and Related Technicians and Technologists
- Physicists and Astronomers
- Chemists, Except Biochemists
- Atmospheric and Space Scientists
- Geologists, Geophysicists, and Oceanographers
- All Other Physical Scientists
- Foresters and Conservation Scientists
- Agricultural and Food Scientists
- Biological Scientists
- Medical Scientists
- All Other Life Scientists
- Biological, Agricultural, and Food Technicians and Technologists, Except Health
- Chemical Technicians and Technologists, Except Health
- Nuclear Technicians and Technologists
- Petroleum Technicians and Technologists
- All Other Physical and Life Science Technicians and Technologists
- Systems Analysts, Electronic Data Processing
- Data Base Administrators
- Computer Support Specialists
- Computer Programmers
- Computer Programmer Aides
- Programmers, Numerical Tool and Process Control
- All Other Computer Scientists
- Operations and Systems Researchers and Analysts, Except Computer
- Mathematical Scientists
- All Other Mathematical Scientists
- Mathematical Technicians
- Data Processing Equipment Repairers

with their higher salaries contribute only $459 million. Similarly, in the United States, engineering occupations generate $110 billion in earnings, while high-technology managers generate $25 billion annually. The impact of engineering occupations is also greater in both Indiana and the nation than computer-related occupations, which contribute annual earnings of $1.2 billion in Indiana and $96 billion nationally.

In the context of the larger economy, high-technology employment constitutes just 3% of all employment in Indiana and 4% of all U.S. employment. Table 2 compares high-technology occupations to all occupations in Indiana and the nation in terms of both employment and wages. Indiana's share of national high-tech employment is lower than its share of total employment, and high-technology wages in Indiana are 7% lower than the U.S. average. Similarly, Indiana's average wage for all occupations is 94% of the national average. *All wage averages used in this article have been weighted to take into account the size of each occupation.*

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Table 1: Major High-Technology Occupational Groupings

	INDIANA			UNITED STATES		
	Employment	Percent Total High-Tech Employment	Annual Average Salary (Weighted)	Employment	Percent Total High-Tech Employment	Annual Average Salary (Weighted)
Specialty Managerial Occupations	7,170	8%	$64,060	345,790	7%	$71,840
Engineering and Related Occupations	46,800	53%	$48,960	2,115,500	42%	$52,320
Natural Scientist and Related Occupations	7,080	8%	$40,821	591,190	12%	$44,157
Computer, Mathematical, Operations Research and Related Occupations	26,700	30%	$44,070	1,939,610	38%	$49,444
Electric and Electronic Equipment Mechanics, Installers and Repairers	950	1%	$29,440	61,680	1%	$31,520

Source: U.S. Bureau of Labor Statistics

Table 2: High-Tech Occupations as a Percent of All Occupations: Employment and Salary

	Indiana	United States	Indiana as a Percent of U.S.
EMPLOYMENT			
All High-Tech Occupations	88,700	5,053,770	1.76%
All Occupations including High-Tech	2,872,360	124,704,600	2.30%
High-Tech Occupations as a Percent of all Occupations	3%	4%	
AVERAGE ANNUAL SALARY (WEIGHTED)			
All High-Tech Occupations	$47,850	$51,343	93%
All Occupations including High-Tech	$27,682	$29,743	94%
High-Tech Average Wages as a Percent of Total Average Wage	173%	173%	

Source: U.S. Bureau of Labor Statistics

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In terms of single occupations, Indiana's largest high-tech employment group is "all other" engineers, followed closely by systems analysts (see Table 3). Computer programmers are the top employment group in the United States, also followed by systems analysts (see Table 4). In both Indiana and the nation, the top 10 occupations constitute approximately 75% of employment in all the high-tech occupations. Of these occupations, three in Indiana are also among the top 10 highest-paid technology occupations — engineering, mathematical and natural-sciences managers; all other engineers; and electrical and electronic engineers. In the nation as a whole, computer engineers also fall into both the top 10 largest occupations and the top 10 highest-paid occupations.

The next step to understanding high-technology employment is to look at both industry and occupations simultaneously. The Indiana Department of Workforce Development (DWD) has developed staffing patterns that show, for example, every industry employing engineers, or, looking at it from the opposite perspective, how many engineers are employed by a single industry, such as fabricated metals or transportation. This information can be found on DWD's new workforce statistics Web site at www.state.in.us/dwd/inews/lmi.asp.

Table 3: Indiana's Top 10 High-Tech Occupations

Occupation	Employment	Rank	Wage	Rank
All Other Engineers	8,950	1	$59,050	3
Systems Analysts, Electronic Data Processing	8,460	2	$50,830	15
Mechanical Engineers	7,310	3	$51,890	12
Engineering, Mathematical, and Natural Sciences Managers	7,170	4	$64,060	1
Computer Programmers	7,090	5	$44,910	21
Electrical and Electronic Engineering Technicians and Technologists	6,300	6	$36,530	29
Computer Support Specialists	6,150	7	$36,200	30
All Other Engineering and Related Technicians and Technologists	5,830	8	$38,880	27
Electrical and Electronic Engineers	5,280	9	$52,470	10
Industrial Engineers, Except Safety	4,080	10	$53,940	6

Source: U.S. Bureau of Labor Statistics

Table 4: The Nation's Top 10 High-Tech Occupations

Occupation	Employment	Rank	Wage	Rank
Computer Programmers	573,850	1	$53,400	16
Systems Analysts, Electronic Data Processing	552,530	2	$54,110	13
Computer Support Specialists	455,950	3	$40,590	33
All Other Engineers	420,620	4	$59,160	7
Engineering, Mathematical, and Natural Sciences Managers	345,790	5	$71,840	1
Electrical and Electronic Engineers	328,410	6	$59,670	6
Computer Engineers	300,830	7	$59,850	5
Electrical and Electronic Engineering Technicians and Technologists	299,020	8	$38,110	35
All Other Engineering and Related Technicians and Technologists	253,980	9	$39,840	34
Mechanical Engineers	216,100	10	$54,550	11

Source: U.S. Bureau of Labor Statistics