Illinois Community College Baccalaureate: Occupational Brief
Advanced Manufacturing/
Bachelor of Applied Science in Industrial Production Management/Bachelor of Applied Science in Engineering Technology

In 24 states, community colleges offer bachelor's programs that provide local access and open economic and professional doors for students, but Illinois state law does not currently permit community colleges to do so. These occupational briefs provide information regarding career areas where these degrees may be needed in Illinois.[1]

Advanced Manufacturing Overview: Manufacturing is a key contributor to the Illinois economy, representing 14 percent of the state's economy as measured by gross domestic product (GDP), and 9.5 percent of total state employment. Manufacturing is undergoing a resurgence in the state, experiencing a "significant rebound" following the Great Recession, growing by over 4 percent from 2009 – 2019.[i] "More recently, although total employment in Illinois dropped by 13.5 percent between February and April 2020 due to the pandemic-induced recession, the manufacturing industry has been more resilient, falling by just 8.3 percent over the same time period."[ii] Since 2020, manufacturing has resumed its growth in employment, showing a 4 percent growth from 2020 to 2023.[iii]

Illinois is investing in its manufacturing employment base, especially in advanced manufacturing. One example of this is the Scaling Transformative Advanced Manufacturing Pathways (STAMP) initiative, a partnership between the Illinois Manufacturer's Association (IMA) and the Education Systems Center at Northern Illinois University (NIU), supported with funding from the Illinois Department of Commerce and Economic Opportunity (DCEO).[iv] This initiative is working to create improved career pathways for preparing students to enter advanced manufacturing careers.

"The governor's state budget proposal included a 7 percent increase in operating funds or $19.4 million more for community colleges than the previous year, the highest proposed increase in two decades. The funding will allow Illinois' community colleges to create new cutting-edge programs in several areas including advanced manufacturing for vehicle electrification to address the workforce needs in this rapidly growing industry."[v] In light of these developments, and in recognition of the important role of advanced manufacturing in the Illinois economy, the Illinois Community College Trustees Association (ICCTA) Community College Baccalaureate (CCB) Advisory Committee requested that we examine the potential for CCB development for advanced manufacturing occupations, and this brief presents the results of our research to date.

What do we mean by "advanced manufacturing?" Advanced manufacturing involves the use of "innovative technologies to create existing products and the creation of new products. Advanced manufacturing can include production activities that depend on information, automation, computation, software, sensing, and networking."[vi] Some examples of the technologies used in advanced manufacturing include additive manufacturing, advanced/composite materials, robotics/automation, laser machining/welding, nanotechnology, and network/IT integration.[vii]

Defining Occupations and Programs of Study for Advanced Manufacturing: Since advanced manufacturing refers to a set of functions and technologies, rather than a specific occupation or group

[1] This Occupational Brief was authored by Timothy Harmon, President, Workforce Enterprise Services (WES), and Dr. Debra Bragg, Bragg & Associates, Inc., with grant funding awarded to the Illinois Community College Trustees Association (ICCTA) led by Jim Reed, Jr. J.D., Executive Director of ICCTA. We appreciate the generous funding and support that we have received from the Joyce Foundation and ICCTA to carry out this research.

of occupations, it is necessary to define which occupations and related programs of study should be included in our analysis of the potential for CCB degree development. To do this, we examined Lightcast employment projections and job postings information for numerous occupations, focusing on industrial production management and engineering technology. We used the following criteria to help select the occupations that would have the greatest potential for CCB development:

- Does the occupation have substantial employment in Illinois, and reasonable projected job vacancies?
- Is there substantial current demand for employment for the occupation, as reflected in Lightcast online job openings data?
- Is there adequate demand for baccalaureate-prepared employees for the occupation, as reflected in Lightcast online job openings data?
- What are the potential earnings for the occupation?

Applying these criteria to the available data resulted in two occupations/occupational groups being selected for more detailed analysis, including the federal Standard Occupational Classification (SOC) number and definition for each occupation:

Industrial Production Managers (SOC 11-3051).[2] These workers oversee the operations of manufacturing and related plants. They coordinate, plan, and direct activities involved in creating a range of goods, such as cars, computer equipment, and paper products. Industrial production managers, also called plant managers, may oversee an entire manufacturing plant or a specific area of production. Some industrial production managers are responsible for carrying out quality control programs to make sure the finished product meets standards for quality.[viii]

Engineering Technologists and Technicians. This group includes the following occupations:

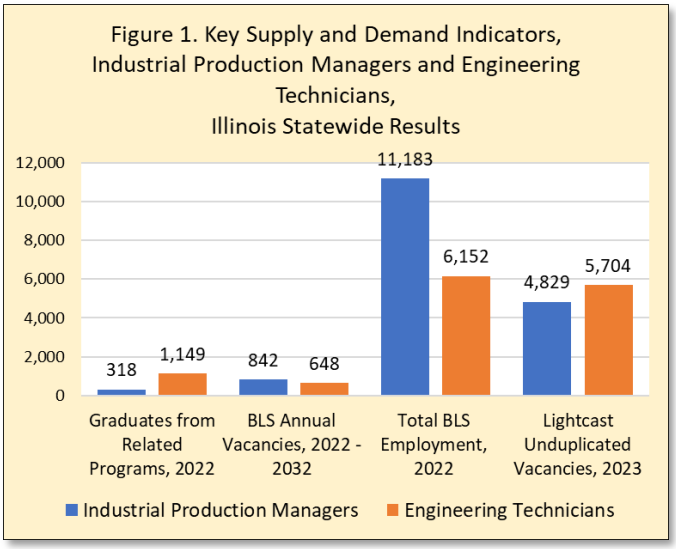
- Electrical and Electronics Engineering Technologists and Technicians (SOC 17-3023) help electrical and electronics engineers plan and develop communications equipment, computers, medical monitoring devices, or other equipment that is powered by other electricity or electric current. They often work in product evaluation and testing, using measuring and diagnostic devices to test, adjust, and repair equipment. They are also involved in assembling equipment for automation.[ix]
- Electro-Mechanical and Mechatronics Technologists and Technicians (SOC 17-3024) combine knowledge of mechanical technology with knowledge of electrical and electronic circuitry. They operate, test, and maintain unmanned, automated, robotic, or electromechanical equipment.[x]
- Mechanical Engineering Technologists and Technicians (SOC 17-3027) help mechanical engineers design, develop, test, and manufacture tools, engines, machines, and other devices. They may make sketches and rough layouts, record and analyze data, and report their findings.[xi]
- Engineering Technologists and Technicians, Except Drafters, All Other (SOC 17-3029) Manufacturing engineering technologists and technicians work to raise production quality and

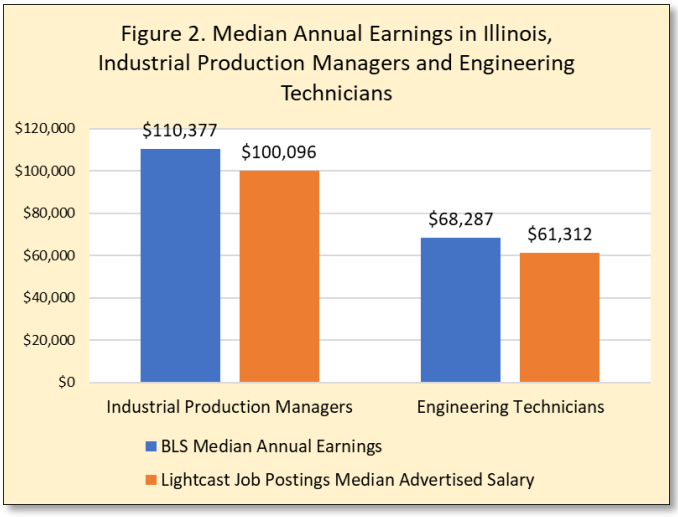
[2] Demand data, which includes data on current and projected employment, as well as earnings, are organized around occupational codes such as the Standard Occupational Classification (SOC) codes.

profitability. By planning, testing, and custom making industrial products, they help engineers improve manufacturing processes and output. They may assess prototypes, analyze machinery performance, or try new production methods.[xii]

We did not include front-line supervisors of manufacturing production, since this occupation, while in high demand, does not generally require completion of a baccalaureate degree, according to the Lightcast job openings data. Similarly, additional engineering technologists and technicians in the Engineering Technologist and Technician category (SOC 17-302 group) not listed above were not included in the brief, either because they did not have substantial numbers of employees in Illinois, or they did not have substantial demand for baccalaureate-prepared employees, as measured by the Lightcast online job openings data. Table 6 provides a breakdown of each SOC Title in this 5-digit category, along with the criteria that it met for inclusion in the analysis.

Since these two occupational categories have distinct duties, qualifications, and preparatory pathways, the data in the brief will be presented separately for each group. The following is a brief description of the occupations for each of the two categories. The related programs of study for each group will be discussed under the Supply Trends part of the brief below.





Overall Supply and Demand Outlook: What is the overall employment outlook for these occupations, how does annual employment demand compare to the number of graduates each year in related programs, and what do these occupations pay? To examine this, we looked at three sources of information: Bureau of Labor Statistics (BLS) occupational projections and wage data, Lightcast current online job openings and advertised salary data, and Lightcast IPEDS completion data for Illinois colleges and universities.

For Industrial Production Managers, statewide employment of 11,183 is projected to grow by 1.6 percent between 2022 and 2032. The number of job vacancies projected by the BLS (which include net growth and replacements of those permanently leaving the occupation) is 842 per year over the next ten years. Lightcast unduplicated online job vacancies for the year ending in September 2023 (which includes turnover as well as net

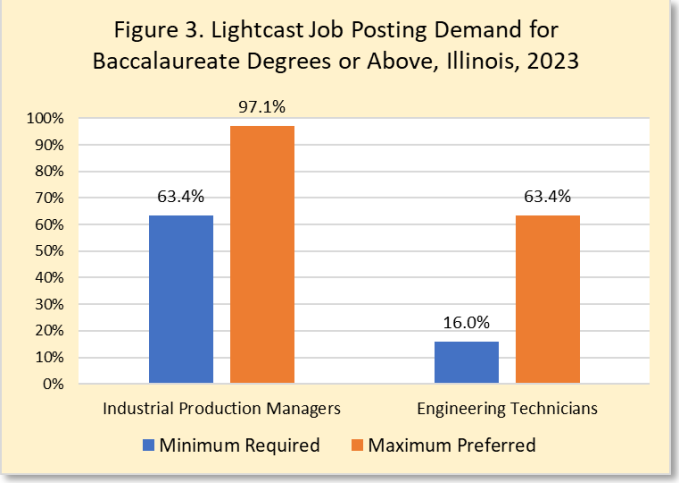
change in jobs) is 4,829. The two related programs (see Supply Trends below for discussion of programs included) produced a total of 318 graduates of all credential types during 2022 (Figure 1).[xiii]

Industrial Production Managers in Illinois have BLS median annual earnings of $110,377, and a Lightcast advertised salary of $100,096 (Figure 2).

For Engineering Technologists and Technicians, statewide employment of 6,152 is projected to grow by 5.3 percent between 2022 and 2032. The number of job vacancies projected by the BLS, (which include net growth and replacements of those permanently leaving the occupation) is 648 per year over the next ten years. Lightcast unduplicated online job vacancies for the year ending in September 2023 (which includes turnover as well as net change in jobs) is 5,704. The nine related programs produced a total of 1,149 graduates of all credential types during 2022 (Figure 1).[xiv] See Supply Trends below for discussion of programs included.

Engineering Technologists and Technicians in Illinois have median annual earnings of $68,287 and a Lightcast advertised salary of $61,312 (Figure 2).

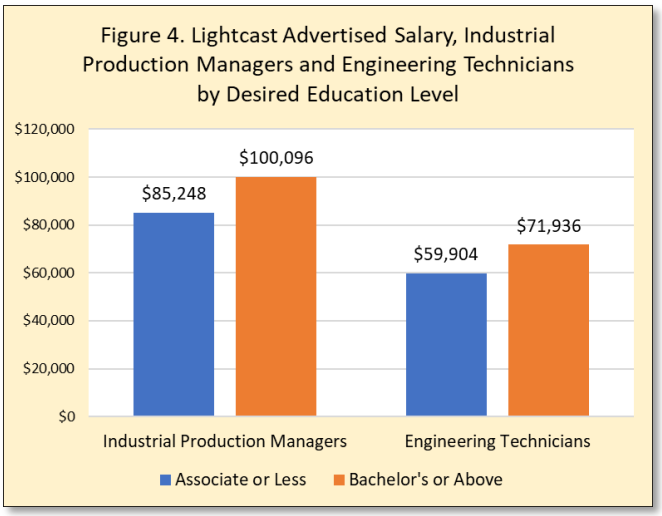
Demand for Baccalaureate Graduates: For each of these occupational groups, is there substantial demand for baccalaureate-prepared job seekers? To examine this, we looked at Lightcast current online job openings data, which includes employer preferences for educational attainment.



For Industrial Production Managers, employers are seeking to hire employees with baccalaureate degrees or higher for most job openings in this occupation, with 63.4 percent of all 2022 Lightcast job openings including a minimum educational requirement of a bachelor's degree or higher. For those job openings where the employer specified a maximum educational preference (i.e., two or more education levels were mentioned), 97.1 percent of requested a baccalaureate degree or higher (Figure 3).[xv]

For Engineering Technologists and Technicians, employers are seeking to hire employees with baccalaureate degrees or higher for many of the job openings in this occupation. While only 16 percent of all 2022 Lightcast job openings included a minimum educational requirement of a bachelor's degree or higher, this percentage should be considered a floor, since it includes those job openings for which employers did not mention any educational preference. Many of these employers may in fact prefer to hire those with a particular degree. In fact, 63.4 percent of employers with a maximum educational preference (i.e., two or more education levels were mentioned) preferred a bachelor's degree or higher (Figure 3).[xvi]

Another way to assess whether employers are demanding baccalaureate-prepared employees for these job openings is to see if higher education requirements are associated with a higher advertised salary. Since Lightcast aggregates advertised salary information from job postings, we can make this comparison. Figure 4 shows there is a distinct wage premium for each of these occupations, as measured by advertised salaries for openings in Illinois.[xvii]



Defining Programs of Study for Advanced Manufacturing: How do the demand projections compare to the current capacity for completers of all credential types? To examine this, we first needed to determine what programs of study, or Classification of Instructional Program (CIP) codes[3], are the programs most likely to prepare graduates for entry into either of the occupational groups we are investigating. Once these programs have been identified, we used Integrated Postsecondary Education Data System (IPEDS) data from Lightcast to determine the most recent graduate counts by type of credential, along with the history of these numbers of graduates by institution in the last few years (2016 – 2022).

It is important to recognize that there is often not a precise way to determine which programs of study are supplying which occupations. Employees follow many diverse pathways between school and work, and many incumbent employees in these occupations may have entered outside of formal training in any of these programs, just as graduates from these programs may enter occupations that are not closely related to their studies. Nevertheless, arriving at a fair assessment of supply and demand for any occupation requires making decisions about what programs of study are most closely related, since these are the programs likely to form the basis for any future CCB development. In an actual program development context, colleges would of course seek the advice of employers, faculty, and students, and consult with other institutions offering similar programs before making any decisions about which specific CCB programs would best respond to the workforce needs in their region.

For Industrial Production Managers, the most closely related programs of study are Engineering/ Industrial Management (CIP Code 15.1501), and Operations Management and Supervision (CIP Code 52.0205).

[3] Supply data, which includes data on the counts and characteristics of graduates of postsecondary institutions, are organized around program codes, using the Classification of Instructional Program (CIP) system.

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For the Engineering Technologists and Technicians group, there are numerous programs of study that might prepare graduates for entry into one or more of the four occupations included in this group. According to data received from the Illinois Community College Board, there were 25 distinct CIP codes in use across Illinois community colleges that were in some way related to preparing students to enter manufacturing occupations.[xviii] However, not all of these programs prepare students to enter one of the Engineering Technician roles included in the group being investigated here. For example, there are several programs focused on preparing students to become Industrial Engineering Technologists and Technicians (SOC code 17-3026), which is an occupational category that we did not include since only a few percent of employers indicated a need for baccalaureate-prepared employees in their Lightcast online job postings. As a result, this occupation did not meet our criteria for inclusion. Therefore, the programs of study closely related to this occupation are also not included in our counts of graduate supply.

CIP Code	Description
15.0000	Engineering Technologies/Technicians, General
15.0303	Electrical, Electronic, and Communications Engineering Technology/Technician
15.0401	Biomedical Technology/Technician
15.0404	Instrumentation Technology/Technician
15.0613	Manufacturing Engineering Technology/Technician
15.0702	Quality Control Technology/Technician
15.0803	Automotive Engineering Technology/Technician
15.0805	Mechanical/Mechanical Engineering Technology/Technician
15.9999	Engineering/Engineering-Related Technologies/Technicians, Other

Based on a review of existing IPEDS data, along with the ICCB manufacturing program data, and the SOC/CIP crosswalk information accessible via Lightcast, we have selected nine CIP codes that seem to be most closely related to the four occupations included in our Engineering Technologists and Technicians group (inset). In addition, we looked at whether these programs were included in any of the CCB degree programs developed by other states. Two of the most frequently occurring programs in the national inventory are in our group (15.0303 and 15.0613). All but two programs appear in the inventory with at least one program somewhere.

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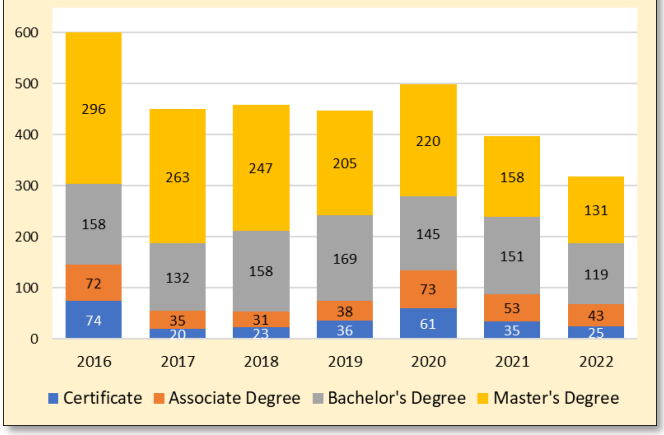
Supply Trends in Industrial Production Management and Engineering Technician Programs:

For Industrial Production Managers, the number of graduates from Illinois colleges and universities have decreased for all credential types in these two programs of study, from a high of 600 in 2016 to a low of 318 in 2022 (Figure 5).[xix] The largest declines have been in certificates and master's degrees. Bachelor's degrees now represent about 37 percent of all graduates. The 318 total conferrals in 2022 (latest year available) is well short of the number of graduates needed to fulfill even the most conservative estimate of demand for these positions (Figure 1).

Figure 5. Illinois Graduates, Industrial Production Management Programs by Type of Credential, 2016-2022



For the Engineering Technologists and Technicians group, graduations from Illinois colleges and universities increased from 2016 to 2018, then declined somewhat from 2018 to 2020, dropped during the pandemic, and partially recovered in 2022 (Figure 6).[xx] The relative proportion of credential types for the nine Engineering Technologist and Technician programs has remained relatively constant over this time period. Of the total graduates, about 37 percent received a certificate, 25 percent got an associates degree, and 29 percent attained a bachelor's degree. The 1,149 total conferrals in 2022 are more than the 648 BLS projected annual vacancies, but well short of the 5,704 Lightcast online job openings in the year ending in September 2023 (Figure 1).

Figure 6. Illinois Graduates, Nine Engineering Technician Programs by Type of Credential, 2016-2022

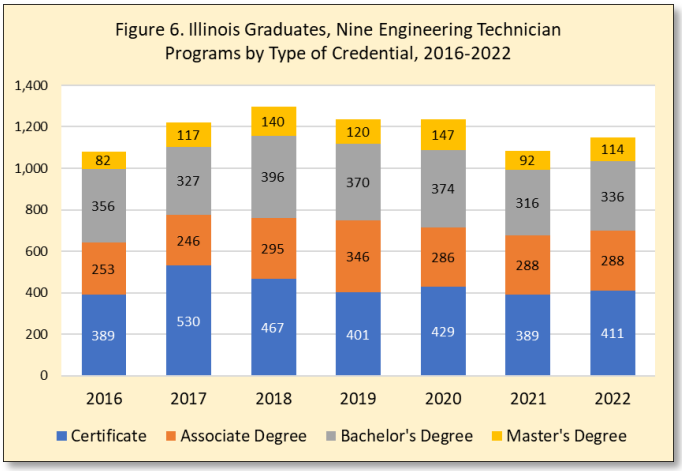
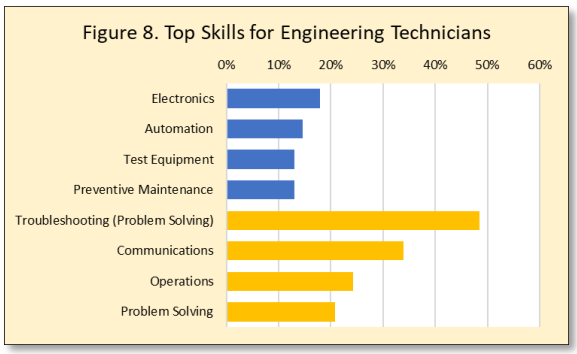


Table 1 provides the 2016 to 2022 graduation counts by CIP code for each of the two program categories included in this analysis.

Top Skills for Industrial Production Management and Engineering Technicians: What skills are sought by Illinois employers for each of these occupational groups? Lightcast online job postings data enables us to measure the frequency with which employers include specific skills in their job openings, and these data can provide insight into the types of skills most in demand.

For Industrial Production Managers, Illinois employers seek specialized skills such as auditing, quality management, production management, and continuous improvement process, and common skills such as management, communications, leadership, operations, quality assurance, and problem solving (Figure 7)[xxi].



For Engineering Technologists and Technicians, employers seek specialized skills such as electronics, automation, test equipment, preventive maintenance, and common skills such as troubleshooting (problem solving), communications, and operations (Figure 8)[xxii].

The skill requirements in Figures 7 and 8 are for all job openings, regardless of the educational levels included in the online posting. Employers seeking bachelor-degree employees are asking for similar skills, but more frequently.

Regional Overview: What is the employment demand for specific regions within Illinois for each of these occupations? To examine this question, we used Lightcast to create county-based regions for Illinois mirroring the regions[xxiii] created by the state for economic development and workforce planning purposes. Using these regions, we created summary data indicators based on the BLS employment and wage data and the Lightcast online job postings data. See Attachment 2 for a map of these regions.

Table 2 shows the extent of job demand in each of the state's official economic development regions, for each of the two occupational groups.

Among Industrial Production Managers, the Chicago metro region accounts for 68 percent of current employment, 62 percent of projected annual vacancies, and 75 percent of current Lightcast job openings. But there is also demand in other parts of the state, including Central, North Central, Northern Stateline, and Northwest regions. In fact, employment in this occupation in every region outside of the Chicago metro area is projected to grow at double-digit rates. Median earnings vary somewhat across the regions, from a low of about $100,000 to a high of about $116,000.

Among Engineering Technologists and Technicians, the Chicago metro region accounts for 68 percent of current employment, 62 percent of projected annual vacancies, and 69 percent of current Lightcast job

openings. But there is also demand in other parts of the state, including North Central, and Southwestern regions. In addition, employment in the East Central, Northwest, and Southeast regions is projected to grow at double-digit rates. Median earnings vary somewhat across the regions, from a low of about $59,000 to a high of about $75,000. See Attachment 2 for a map of these regions.

Top Schools: Table 3 shows the schools with at least fifteen graduates in either of the related program areas in 2022, along with the number of these graduates by type of credential and the cost for in-state tuition and fees for each institution. Students attending the 11 public community colleges (highlighted in green) account for 30% of the total graduates across all advanced manufacturing programs in the state. Each of these colleges offered certificates and associate degrees. Enrollment in three private universities (yellow) accounts for 17% of the total, with seven public universities making up 53% of the total. Average annual tuition varies greatly by institution type, from about $3,500 for community colleges and about $10,000 for public universities. The two private non-profit universities ranged from $17,000 to $62,000 and the private for-profit university was about $14,000.

Percentages of Female and Racially Minoritized Graduates: Table 4 shows gender and racial/ethnic percentages for the Illinois institutions shown in Table 3. The data are for the totals of all graduates from 2017 to 2022, to ensure sufficient numbers of graduates to compute percentages for each category. The highlighted cells are where the percentage exceeds the statewide percentage for that category. There are very substantial differences in the gender, racial and ethnic distribution of graduates across institutions. The percentage of graduates that are female varies from 5.0 to 44.9 percent. The percentage of Black graduates varies from 0.9 to 24.5 percent, and the percentage of Hispanic/Latinx graduates varies from 3.2 to 60.1 percent. Among the nine community colleges, two graduate females in proportions above the state average for all advanced manufacturing programs. Six of these colleges graduate Hispanic/Latinx students at proportions above the state average, one graduates Black students at an above average proportion, and three graduate multi-racial students at proportions above the state average. Among the six public universities, two graduate females in proportions above the state average, and three graduate Black students at an above average proportion. One private non-profit university graduates females at above the average state proportion for these programs. Based on these data, community colleges may be able to help the state meet its equity goals for baccalaureate attainment in this field, particularly for Hispanic/Latinx students. More work is needed, though on improving representation for women and other racialized students.

Top Employers: Table 5 shows the 14 Illinois employers that had over 40 unique job openings in either occupational group during the year ending in September of 2023, along with the number of job postings in that period. Some employers had job openings in both groups. This table includes companies from all industries that hire in these occupations, not just manufacturing companies. Many of the listed companies are staffing/recruitment firms since most manufacturers hire through these intermediaries.[xxiv]

Conclusion: Our analysis validates the state's commitment to advanced manufacturing and its potential contribution to the Illinois economy and workforce. Illinois should take steps now to ensure that it has sufficient numbers of workers to fill future openings in these occupations. This should include expanding

higher education programs to prepare bachelor's degree qualified workers for well-paying jobs in advanced manufacturing. This recommendation is supported by the following findings:

- Advanced manufacturing is key to the development of the Illinois economy, and requires an even more highly skilled workforce than traditional manufacturing.
- There is strong demand for Industrial Production Managers and Engineering Technologists and Technicians in Illinois, as measured by BLS projections data and Lightcast online job openings data.
- Industrial Production Managers are very well compensated in Illinois, with median annual earnings of $110,000. Engineering Technologists and Technicians have a median annual earnings of $68,000 per year, which is well above the median annual earnings for all Illinois jobs ($47,000).
- There is very stong demand for baccalaureate-prepared Industrial Production Managers and evidence that employers prefer baccalaureate-prepared Engineering Technologists and Technicians.
- There is evidence that employers will pay more for baccalaureate-prepared employees in each of the occupational categories.
- There are numerous community colleges, public universities and private institutions with programs of study focused on advanced manufacturing, particularly for those program categories related to the Engineering Technologists and Technicians group. However, the overall production of graduates from these programs is not adequate to meet the demand for baccalaureate-prepared workers.
- Although there are number of smaller programs focused on advanced manufacturing, few of the community college programs are large enough to form the basis for the development of a bachelor's degree program at this point.
- While the majority of projected vacancies and online job postings are in the Chicago metro region, there is demand for workers in both occupational categories in regions across the state.

Several Illinois community colleges may be able to help respond to the unmet need for baccalaureate-prepared employees, if further emphasis is given to the development of these programs, and if state policy could be changed to allow this, as it has been in 24 other states. In addition, improved partnerships between community colleges and public universities should be encouraged to develop better pathways for students to enter advanced manufacturing occupations.

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Attachment 1 Tables

Table 1. IPEDS Graduates for Illinois Advanced Manufacturing Programs of Study[xxv]								
CIP Code	Description	2016	2017	2018	2019	2020	2021	2022
Industrial Production Management Programs:								
15.1501	Engineering/Industrial Management	229	264	267	229	235	171	147
52.0205	Operations Management and Supervision	371	186	192	219	264	226	171
	Totals	600	450	459	448	499	397	318
Engineering Technologist and Technician Programs:								
15.0000	Engineering Technologies/Technicians, General	159	174	204	219	201	155	155
15.0303	Electrical, Electronic, and Communications Engineering Technology/Technician	289	250	265	235	209	200	258
15.0401	Biomedical Technology/Technician	106	160	69	122	100	85	139
15.0404	Instrumentation Technology/Technician	13	24	38	38	45	50	47
15.0613	Manufacturing Engineering Technology/Technician	269	264	301	270	300	300	266
15.0702	Quality Control Technology/Technician	0	14	14	9	8	12	9
15.0803	Automotive Engineering Technology/Technician	101	83	113	103	112	92	89
15.0805	Mechanical/Mechanical Engineering Technology/Technician	105	77	104	113	92	72	69
15.9999	Engineering/Engineering-Related Technologies/Technicians, Other	38	174	190	128	169	119	117
	Totals	1,080	1,220	1,298	1,237	1,236	1,085	1,149

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Table 2. Regional Demand for Industrial Production Managers and Engineering Technicians, Illinois, 2022 - 2032[xxvi]

Illinois Economic Development Regions	Base year number of persons employed (2022)	Projected year number of persons employed total (2032)	Median annual earnings	Projected annual vacancies	Most recent period Lightcast job postings count (2022)
Industrial Production Managers					
Central Illinois Region 1	526	578	$100,568	44	208
East Central Illinois Region 2	215	258	$103,023	20	130
North Central Illinois Region 3	597	699	$102,397	56	188
Northeast Illinois Region 4	7,618	7,259	$115,970	520	3627
Northern Illinois Stateline Region 5	540	532	$102,454	38	219
Northwest Illinois Region 6	592	689	$107,339	53	158
Southeastern Illinois Region 7	237	291	$99,633	24	56
Southern Illinois Region 8	166	202	$101,252	17	22
Southwestern Illinois Region 9	297	340	$117,866	26	107
West Central Illinois Region 10	134	160	$99,418	13	34
Statewide Estimate	11,183	11,366	$110,377	842	4,749
Engineering Technicians					
Central Illinois Region 1	180	197	$62,654	20	223
East Central Illinois Region 2	163	190	$61,905	19	142
North Central Illinois Region 3	275	298	$65,756	31	470
Northeast Illinois Region 4	4,159	4,143	$68,941	402	3911
Northern Illinois Stateline Region 5	227	223	$61,678	23	341
Northwest Illinois Region 6	137	196	$58,581	22	280
Southeastern Illinois Region 7	144	171	$58,920	19	54
Southern Illinois Region 8	130	141	$60,193	15	50
Southwestern Illinois Region 9	402	418	$74,813	42	149
West Central Illinois Region 10	65	69	$60,774	7	31
Statewide Estimate	6,152	6,476	$68,287	648	5,704

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Table 3. Top Schools in Illinois for Industrial Management and Engineering Technology Graduates in 2022[xxvii]							
School	Certificates	Associate Degree	Bachelor's Degree	Master's Degree	All Completions	**Annual Avg. Tuition Full- Time Undergrads.	State Region
Industrial Management Programs (CIP 52.0205)							
Northern Illinois University	*	*	76	*	76	$9,792	4
Joliet Junior College	8	29	*	*	37	$3,480	4
McHenry County College	15	9	*	*	24	$3,345	4
University of Illinois Urbana-Champaign	*	*	17	*	17	$14,542	2
Totals for all Illinois Institutions	25	43	119	131	318		
Engineering Technology Programs (various, see Attachment 3)							
Joliet Junior College	153	23	*	*	176	$3,480	4
DeVry University-Illinois	1	50	106	*	157	$14,392	4
Southern Illinois University-Carbondale	*	*	98	31	129	$9,638	8
Northwestern University	*	*	*	73	73	$62,391	4
Eastern Illinois University	54	*	9	*	63	$9,417	7
Northern Illinois University	*	*	58	*	58	$9,792	4
William Rainey Harper College	11	26	*	*	37	$3,204	4
Illinois State University	3	*	33	*	36	$10,907	3
Kankakee Community College	29	5	*	*	34	$4,380	4
Lake Land College	28	5	*	*	33	$3,000	7
College of Lake County	20	9	*	*	29	$3,584	4
Western Illinois University	*	*	19	10	29	$9,130	10
College of DuPage	11	14	*	*	25	$3,300	4
McHenry County College	7	17	*	*	24	$3,345	4
Rock Valley College	5	15	*	*	20	$3,600	5
Morrison Institute of Technology	*	19	*	*	19	$17,500	6
Triton College	7	12	*	*	19	$4,290	4
Totals for all Illinois Institutions	411	288	336	114	1,149		
*Not Offered. **In-district value for community colleges, in-state value for universities.							

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Table 4. Race and Gender of Graduates in Illinois Institutions for Industrial Management and Engineering Technology, 2016 - 2022[xxviii]

	Total Graduates	% Female	Graduates with Known Race/ Ethnicity	% Black	% American Indian/ Alaskan Native	% Hispanic/ Latinx	% Asian	% Hawaiian, Other Pacific Islander	% White	% Multi Racial	% Race/ Ethnicity Unknown[4]	% International Students
Community Colleges												
Joliet Junior College	695	41.9%	671	6.3%	0.6%	20.7%	1.0%	0.0%	68.0%	3.4%	3.5%	0.0%
McHenry County College	241	20.3%	222	1.4%	0.0%	21.6%	1.8%	0.0%	69.8%	5.4%	7.9%	0.0%
Harper College	224	6.3%	216	0.9%	0.5%	29.6%	3.2%	0.0%	64.4%	1.4%	2.7%	0.9%
Lake Land College	222	5.0%	207	14.0%	1.9%	5.3%	0.0%	0.0%	77.3%	1.4%	6.8%	0.0%
Rock Valley College	198	7.1%	197	8.1%	0.0%	12.2%	2.0%	0.0%	73.1%	4.6%	0.5%	0.0%
College of DuPage	190	7.4%	189	3.7%	0.0%	29.1%	5.8%	0.0%	58.7%	2.6%	0.0%	0.5%
Triton College	143	14.0%	138	6.5%	0.7%	60.1%	0.7%	0.0%	31.9%	0.0%	3.5%	0.0%
Kankakee Community College	132	7.6%	131	3.8%	0.0%	14.5%	3.1%	0.0%	77.9%	0.8%	0.8%	0.0%
College of Lake County	131	5.3%	122	1.6%	0.0%	31.1%	9.8%	0.0%	54.9%	2.5%	6.9%	0.0%
Public Universities												
Northern Illinois University	1,038	14.2%	989	10.0%	0.0%	18.4%	10.0%	0.1%	60.0%	1.5%	0.2%	4.5%
Southern Illinois University Carbondale	768	7.9%	718	6.4%	0.3%	15.7%	2.6%	0.0%	73.1%	1.8%	0.3%	6.0%
Eastern Illinois University	317	33.1%	31	19.4%	0.0%	3.2%	12.9%	0.0%	64.5%	0.0%	0.9%	89.3%
Western Illinois University	224	10.7%	155	24.5%	0.6%	7.7%	0.0%	0.0%	65.2%	1.9%	1.8%	29.0%
Illinois State University	181	8.3%	178	7.9%	0.0%	11.2%	1.1%	0.0%	74.7%	5.1%	0.0%	1.7%
University of Illinois Urbana/ Champaign	101	37.6%	88	4.5%	0.0%	14.8%	28.4%	0.0%	45.5%	6.8%	0.0%	12.9%
Private Non-Profit												
Northwestern University	385	44.9%	130	6.9%	0.8%	7.7%	19.2%	0.0%	65.4%	0.0%	3.1%	62.9%
Private For-Profit												
Morrison Institute of Technology	165	6.1%	162	2.5%	0.0%	11.7%	0.0%	0.6%	85.2%	0.0%	1.8%	0.0%
DeVry University, Inc.*	155	9.7%	133	13.5%	0.0%	12.0%	9.0%	1.5%	63.9%	0.0%	12.9%	1.3%
Totals for all Illinois Institutions for these programs	7,428	17.0%	6,409	8.2%	0.4%	18.6%	4.9%	0.1%	65.8%	2.0%	2.7%	10.6%

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[4] Percent of total graduates. The unknown value and the value for international students have been excluded from the base for calculation of the race/ethnicity categories. DeVry University values are not considered reliable due to over 10 percent of unknown race/ethnicity.

Table 5. Top Illinois Employers for Industrial Production Manager and Engineering Technician Job Openings, Illinois 2023[xxix]			
Company	Unique Postings Industrial Production Managers	Unique Postings Engineering Technicians Group	Total Unique Postings
Exelon (multiple locations, Chicago HQ)		262	262
Plastipak (Champaign, Alsip, Plymouth MI HQ)	74	135	209
Randstad (multiple Chicago metro locations) *	41	95	136
Actalent (Chicago, Bloomington, Schaumburg) *		108	108
Commonwealth Edison (multiple locations in Chicago metro and northern Illinois)		97	97
The Judge Group (Chicago and Schaumburg) *	95		95
Aerotek (multiple locations in Chicago metro and Rockford) *		63	63
Caterpillar (Peoria, Aurora, Chicago, East Peoria, Mossville, and others)		60	60
ManpowerGroup (multiple locations, Milwaukee WI HQ) *		57	57
Constellation Energy (multiple locations)		56	56
Michael Page (Chicago) *	53		53
Stoughton Trailers (Stoughton, WI)	43		43
Abbott Laboratories (Abbott Park, Lake Forest, and Des Plaines)	42		42
G&W Electric Co (Bolingbrook)	42		42
*Staffing/recruitment agents			

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Table 6. Engineering Technologists and Technician SOC Titles and Inclusion Criteria					
SOC Code	**SOC Title**	**Advanced Manufacturing**	**Employment in Illinois**	**Job Vacancies**	**Demand for BA Degrees**
17-3021	Aerospace Engineering and Operations Technologists and Technicians	Yes	Yes	No	NA
17-3022	Civil Engineering Technologists and Technicians	No	NA	NA	NA
17-3023	Electrical and Electronic Engineering Technologists and Technicians	Yes	Yes	Yes	Yes
17-3024	Electro-Mechanical and Mechatronics Technologists and Technicians	Yes	Yes	Yes	Yes
17-3025	Environmental Engineering Technologists and Technicians	Yes	Yes	No	NA
17-3026	Industrial Engineering Technologists and Technicians	Yes	Yes	Yes	No
17-3027	Mechanical Engineering Technologists and Technicians	Yes	Yes	Yes	Yes
17-3028	Calibration Technologists and Technicians	Yes	Yes	No	NA
17-3029	Engineering Technologists and Technicians, Except Drafters, All Other	Yes	Yes	Yes	Yes

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Attachment 2

Illinois Economic Development Regions

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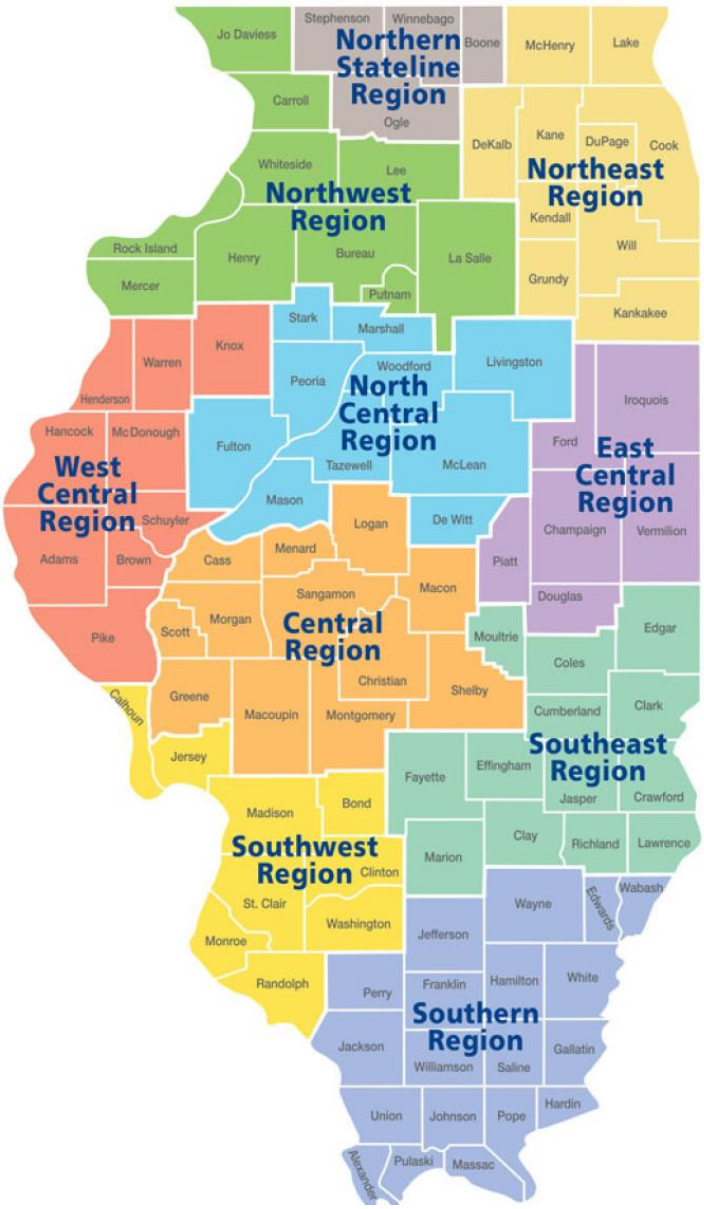

Endnotes

[i] *The Economic Impact of Manufacturing on Illinois*, Illinois Manufacturer's Association, August 2022. Found at: https://ima-net.org/wp-content/uploads/2022/08/IMAEconomicImpactOfManufacturingOnIllinois2022.pdf (visited *November 28, 2023*).
[ii] Ibid.
[iii] Industry Table, Manufacturing in Illinois, 2020 – 2023, Lightcast Q4 2023 Data Set, January 2024.
[iv] *Scaling Transformative Advanced Manufacturing Pathways*, Education Systems Center at NIU. Found at: https://edsystemsniu.org/scaling-transformative-advanced-manufacturing-pathways/ (visited *November 29, 2023*).
[v] *Governor Pritzker's Fiscal Year 2024 Budget Makes Historic Investments in Higher Education*, Press Release, February 15, 2023, at: https://www.illinois.gov/news/press-release.26066.html#:~:text=The%20governor's%20budget%20proposal%20includes,%2418%20million%20in%20workforce%20training. (visited December 1, 2023).
[vi] Manufacturing.gov, a national advanced manufacturing portal, glossary page (visited *November 28, 2023*).
[vii] *What is Advanced Manufacturing? (A Complete Guide)*, The Welding Institute, FAQ. Found at: https://www.twi-global.com/technical-knowledge/faqs/faq-what-is-advanced-manufacturing (visited *November 28, 2023*).
[viii] Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Industrial Production Managers, at https://www.bls.gov/ooh/management/industrial-production-managers.htm (visited *November 28, 2023*).
[ix] Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Electrical and Electronics Engineering Technicians, at https://www.bls.gov/ooh/architecture-and-engineering/electrical-and-electronics-engineering-technicians.htm#tab-2 (visited *November 30, 2023*).
[x] Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Electro-Mechanical and Mechatronics Technologists and Technicians, at https://www.bls.gov/ooh/architecture-and-engineering/electro-mechanical-technicians.htm#tab-2 (visited *November 30, 2023*).
[xi] Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Mechanical Engineering Technologists and Technicians, at https://www.bls.gov/ooh/architecture-and-engineering/mechanical-engineering-technicians.htm#tab-2 (visited *November 30, 2023*).
[xii] Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Engineering Technologists and Technicians, Except Drafters, All Other, at https://www.bls.gov/ooh/architecture-and-engineering/industrial-engineering-technicians.htm#tab-2 (visited *November 30, 2023*).
[xiii] Occupation Table, Industrial Production Managers in Illinois, Lightcast Q3 2023 Data Set, November 2023.
[xiv] Occupation Table, Architecture and Engineering Technicians in Illinois, Lightcast Q3 2023 Data Set, November 2023.
[xv] Job Posting Analytics, Industrial Production Managers in Illinois, Lightcast Q3 2023 Data Set, November 2023.
[xvi] Job Posting Analytics, Engineering Technicians in Illinois, Lightcast Q3 2023 Data Set, November 2023.
[xvii] Job Posting Analytics, Industrial Production Managers and Engineering Technicians in Illinois, Lightcast Q3 2023 Data Set, November 2023.
[xviii] Illinois Community College Board, *Copy of Manufacturing Programs in ICCS 2022.10.07 v2*, data file transmitted to authors in June 2023.
[xix] Program Tables, Operations Management and Supervision Programs in Illinois, Lightcast Q3 2023 Data Set, November 2023.
[xx] Program Tables, Engineering Technologist and Technicians Programs in Illinois, Lightcast Q3 2023 Data Set, November 2023.
[xxi] Job Posting Analytics, Industrial Production Managers, Lightcast Q3 2023 Data Set, November 2023.
[xxii] Job Posting Analytics, Engineering Technicians in Illinois, Lightcast Q3 2023 Data Set, November 2023.

[xxiii] Illinois' Economic Development Regions were determined based on the following factors: Workforce: Demographics, Labor Force, Commuting Patterns. Geography: Metropolitan Statistical Areas (MSAs). Business & Industry: Employers & Major Industries. These regions were originally defined in 2003 and reaffirmed in 2017. Sources: Illinois WorkNet Local Workforce Innovation Area Realignment Briefing, September 2018, and Illinois WIOA State Plan Two-Year Modification, PY 2018-2019, found at https://wioaplans.ed.gov/node/196646.
[xxiv] Upward Trend in Temp Staffing for Manufacturing, Factor Finders, July 2022, found at https://www.factorfinders.com/blog/trend-in-temp-staffing-for-manufacturing/.
[xxv] Program Tables, Operations Management and Supervision Programs, and Engineering Technologist and Technicians Programs in Illinois, Lightcast Q3 2023 Data Set, November 2023.
[xxvi] Occupation Table, Industrial Production Managers and Engineering Technicians in each Illinois region, Lightcast Q3 2023 Data Set, November 2023.
[xxvii] Program Tables, Operations Management and Supervision Programs, and Engineering Technologist and Technicians Programs in Illinois, Lightcast Q3 2023 Data Set, November 2023. Displaying schools with at least 15 graduates for the sum of all credential types.
[xxviii] Enrollment and completion data from the Illinois Board of Higher Education (IBHE), August 2023. Table 4 includes Illinois schools with at least 100 total graduates of any credential type during the 2016-2017 to 2021-2022 academic years. Note: race/ethnicity data are not reported for international students. Totals are computed on graduates whose race/ethnicity is known and reported. Institutions with more than ten percent unknown race/ethnicity are shown with an asterisk.
[xxix] Job Posting Analytics, Industrial Production Managers and Engineering Technicians, Lightcast Q3 2023 Data Set, November 2023.