Technical College
System of Georgia

Workforce Development Framework

Advanced Manufacturing

2024

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MESSAGE FROM THE DIRECTOR OF WORKFORCE INNOVATION

As the Director of Workforce Innovation, I am thrilled to share with you our latest workforce development framework. In today's rapidly evolving landscape, it's crucial that we adapt and equip ourselves with the necessary tools to thrive. Our framework underscores the pressing need for comprehensive strategies in training, recruitment, retention, and overcoming barriers to employment within the advanced manufacturing sector.

In this framework, we will delve into the intricacies of Advanced Manufacturing by conducting a comprehensive examination of its workforce, analyzing prevailing trends, and identifying existing gaps. In addition, we will leverage these insights to formulate initiatives that will positively influence and advance the present and future workforce needs in Advanced Manufacturing.

Workforce development is crucial as it plays an important role in equipping individuals with the knowledge and skills needed for employment. An effective strategy changes the trajectory of wealth in the family system, the growth and health of the community, and the success and growth of businesses. It contributes to economic growth, enhances productivity, and ensures a skilled workforce that aligns with evolving industry demands.

Technology is advancing at an unprecedented pace, revolutionizing the manufacturing industry. To remain at the forefront, our workforce must have access to up-to-date training programs that cultivate both technical expertise and soft skills. The advent of automation and digitalization has reshaped job roles and requirements within advanced manufacturing. As such, upskilling and reskilling initiatives are essential to empower workers with the capabilities needed for the jobs of tomorrow. Attracting and retaining top talent remains a challenge, there is a recognized need for a robust recruitment effort that not only identifies skilled individuals but also prioritizes a holistic approach to recruitment and retainment.

TCSG strives to enhance the economic opportunity and prosperity through its mission to recruit and grow a globally competitive workforce through education, training, and career services for Georgia’s citizens, employers, and communities. In collaboration with the Georgia Artificial Intelligence Manufacturing Corridor (Georgia AIM), TCSG will play its part in revolutionizing the industrial economy of Georgia through the equitable, development, and deployment of talent and innovations for the advanced manufacturing sectors.

Kelsie Knight, MSW
Workforce Innovation, Director
Technical College System of Georgia

INTRODUCTION

Georgia is a national leader in Advanced Manufacturing (GDED, 2024). Manufacturers in Georgia account for 9.8% of the total financial output in the state, employing 8.5% of the workforce (NAM, 2021). In 2017, the state of Georgia accounted for 397,153 embedded talents employed in manufacturing, that number rose in 2022 to 414,586 with the national average being 404,956 for an area size like that of Georgia (Lightcast, 2024). In 2023, there were 72,752 manufacturing positions posted from over 3,629 competing employers (Lightcast, 2024). It is estimated that by 2028 manufacturers will need to fill 4.6 million positions in Advanced Manufacturing (Manufacturing USA , 2024).

Keeping with industry advancements, TCSG's initiatives to meet these workforce demands will align with its strategic goals to increase enrollment globally and in strategic areas, create more partnerships with businesses and industries, and improve retention and graduation rates across its technical colleges. To achieve this, TCSG will:

- Partner with industry leaders in manufacturing to identify workforce gaps, subsequently aligning comprehensive training and development programs with the evolving needs of the industry.

- Work to facilitate the successful transition of TCSG graduates into thriving careers within the domain of advanced manufacturing, fostering their professional growth and contributing to their sustained success in the industry.

- Develop innovative approaches to increase engagement and recruitment through strategic community partnerships.

INTRODUCTION

In collaboration with Georgia AIM, which has a mission to push the boundaries of AI in research and workforce development. Through the Technical Workforce Development (TWD) initiative, we're equipping individuals with cutting-edge AI manufacturing skills through specialized training programs offered by our technical colleges. This effort aims to cultivate a robust talent pool, fueling the expansion of high-paying job opportunities. TWD leverages the collaborative efforts of the technical colleges and Spellman College to drive progress towards this objective.

As TCSG leads Project 2a, we are charting the course to establish regional pathways into AI manufacturing technical education. These pathways aim to usher students into lucrative career paths directly within the industry. As a pivotal component of this collaboration with Georgia AIM, we have rolled out AI manufacturing studios in four strategically selected technical colleges statewide: Central Georgia Technical College, Georgia Piedmont Technical College, Lanier Technical College, and Southern Regional Technical College. This initiative not only fuels the burgeoning AI job market in Georgia but also fortifies crucial industries essential to national security and economic stability.

TCSG will support the revolutionization of the industrial economy of Georgia by:

- Providing 93,000 credit hours of training in AI Manufacturing across the technical colleges supported by the Georgia AIM grant.

- Placing 97% of its AI Manufacturing graduates, across the five Georgia AIM colleges, into jobs that are in the manufacturing or related fields.

That being said, the significance of an effective strategy is paramount. Workforce development, as exemplified by TCSG's mission, becomes a driving force in enhancing economic opportunity and prosperity through education, training, and career services. This comprehensive exploration of the Advanced Manufacturing landscape highlights the pivotal role of workforce development in shaping individual careers, community well-being, and overall economic prosperity.

WORKFORCE GAP ANALYSIS

The National Association of Manufacturers projects that by 2028, manufacturers will need to fill 4.6 million positions (NAM, 2021). However, given the current workforce climate, it's imperative to address certain barriers to meet this demand. These barriers are inclusive but not limited to:

01 Recruitment and Retainment of Future and Current Workforce

In 2023, there were 28,440 manufacturing positions in Georgia. Over the span of 2020 to 2023, there was a notable 7% increase, equating to 1,974 additional positions (Lightcast, 2024). However, despite this rise in positions, the turnover rate *(how often employees in a given position are moving to different employers)* in 2023 stood at a significant 61% (Lightcast, 2024). Indeed, in 2023, there were 284,504 hires contrasted with 262,606 separations (Lightcast, 2024). This stern contrast highlights the substantial challenges employers face in retaining employees, even with the expansion of available positions.

Figure 1: Manufacturing Positions in Georgia

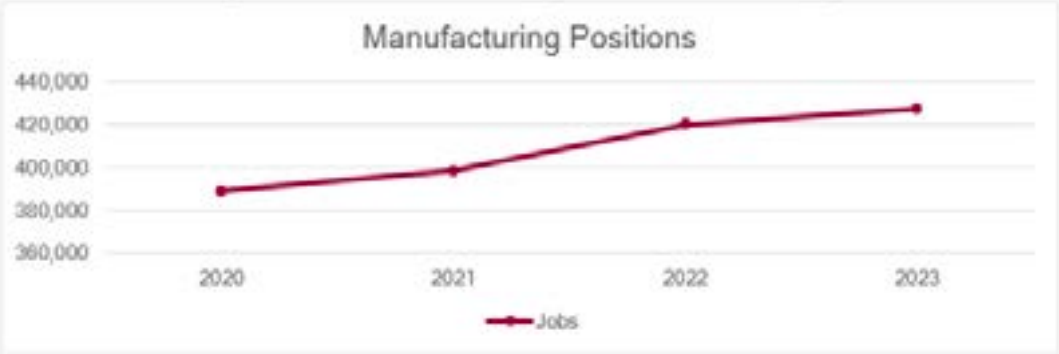
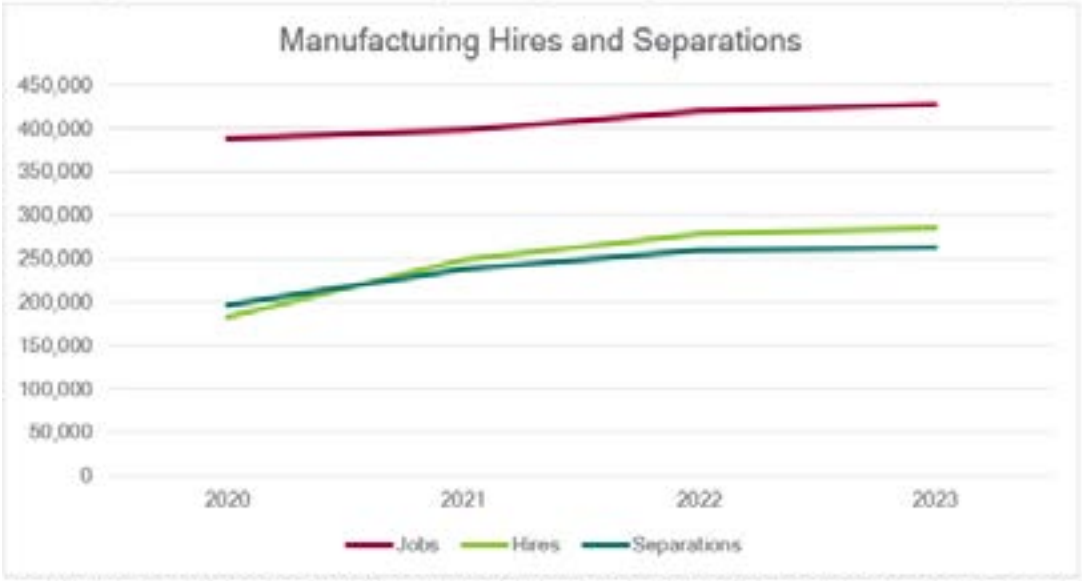


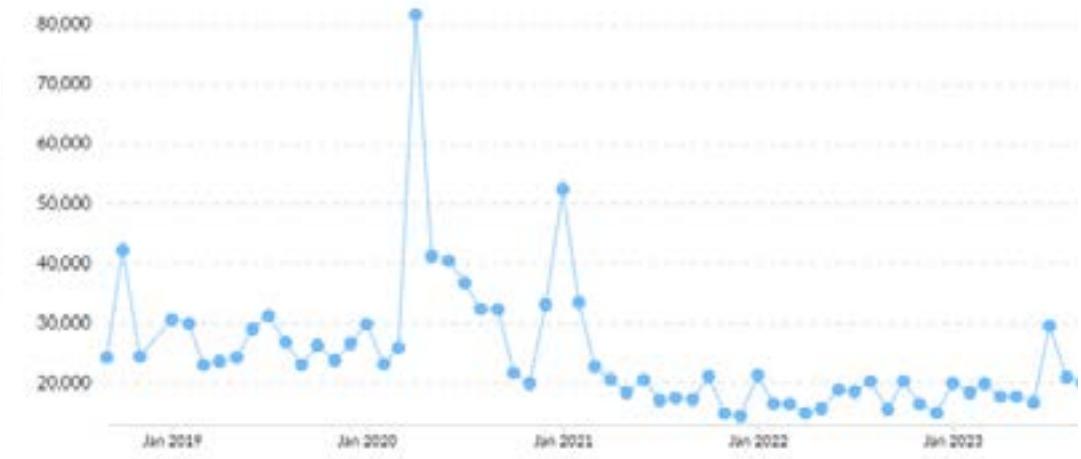
Figure 2: Manufacturing Hiring and Separation Trends in Georgia



*Lightcast: When compared with Unique Job Postings, Hires shows how much actual activity there is relative to the amount of posting activity.

Despite the increasing number of manufacturing positions, it is notable that as of September 2023, there were still 19,900 individuals unemployed in the manufacturing sector in Georgia alone, constituting approximately 11% of both the regional and national unemployment rates (Lightcast, Manufacturing in Georgia: Unemployment by Industry, 2024). With the persistent demand for manufacturing positions, one can't help but wonder: why do unemployment rates still linger? This seemingly points to a necessity of broadening recruitment and retainment strategies within the manufacturing sector.

Figure 3: Unemployment Rate Trends



02 Workforce Shortage

Numerous manufacturers are encountering challenges in filling entry-level production associate roles. These positions, do not require technical expertise or industry-specific knowledge, but encompass tasks such as team assembly, production assistance, and manual tool operation. What's essential here is not specialized skills, but rather fundamental soft skills like attentiveness to instruction, eagerness to acquire new skills, and reliability in task completion. Interestingly, these entry-level opportunities could readily accommodate individuals transitioning from other sectors (like hospitality or food services) or recent high school graduates (Deloitte Insights, 2021). Interestingly enough, the starting wage in manufacturing are notably higher than local minimum wage levels (Deliotte Insights, 2021).

In a 2021 Manufacturing Talent study conducted by Deloitte and The Manufacturing Institute, it was revealed that there is a significant challenge in locating individuals to fill middle-skill jobs (Deloitte Insights, 2021). Middle-skill jobs necessitate a level of technical training or applied skills, often requiring hands-on, practical training lasting from several months to over a year. Furthermore, some of these positions may mandate licensing and certification (Deloitte. Insights, 2021).

The Manufacturing Talent study identified the primary causes of the skill shortage as follows:

- Changing expectations among new entrants regarding jobs and careers
- Declining attraction or interest in the industry among students
- Retirement of Baby Boomers
- Shortcomings in the current US education system and STEM talent
- Inadequacy of effective job training programs

In a survey conducted by Georgia Association of Manufacturers, when manufacturers were asked to select the populations they were more interested in hiring, 97% reported wanting to hire high school seniors with no post-secondary education plans. In addition, 93% expressed an interest in hiring veterans, 79% have an interest in hiring Adult Education students currently pursuing their GED, and 61% have an interest in hiring adults, aged 18 and over, without a high school diploma (GAM, 2023).

Evidently, for employers to effectively entice talent to these roles, a paradigm shift in recruitment strategies is imperative. Initiating educational initiatives and career pathway introductions at a younger age is important. Recruitment endeavors should transcend conventional job search platforms, embracing community empowerment and outreach as catalysts for change. Broadening the dissemination of knowledge and exposure to career options among a wider, younger demographic is pivotal for meaningful impact. In addition, more unconventional efforts that are intentionally geared toward hiring underrepresented populations in the advanced manufacturing workforce is also necessary.

03

Digital Transformation

Manufacturing is on the cusp of significant innovation and transformation fueled by heightened integration of sensors and the Internet-of-Things (IoT), along with greater accessibility to data, and advancements in robotics and automation. This shift towards pervasive digitalization within factories prompts manufacturing enterprises to reassess, reevaluate, and reconsider their current operations and future strategic directions in what's known as the era of Smart Manufacturing and Industry 4.0 (American Society of Mechanical Engineers, 2020). Manufacturers are now tasked with revaluating and reassessing their workforce needs as digital transformation in this industry continues to progress.

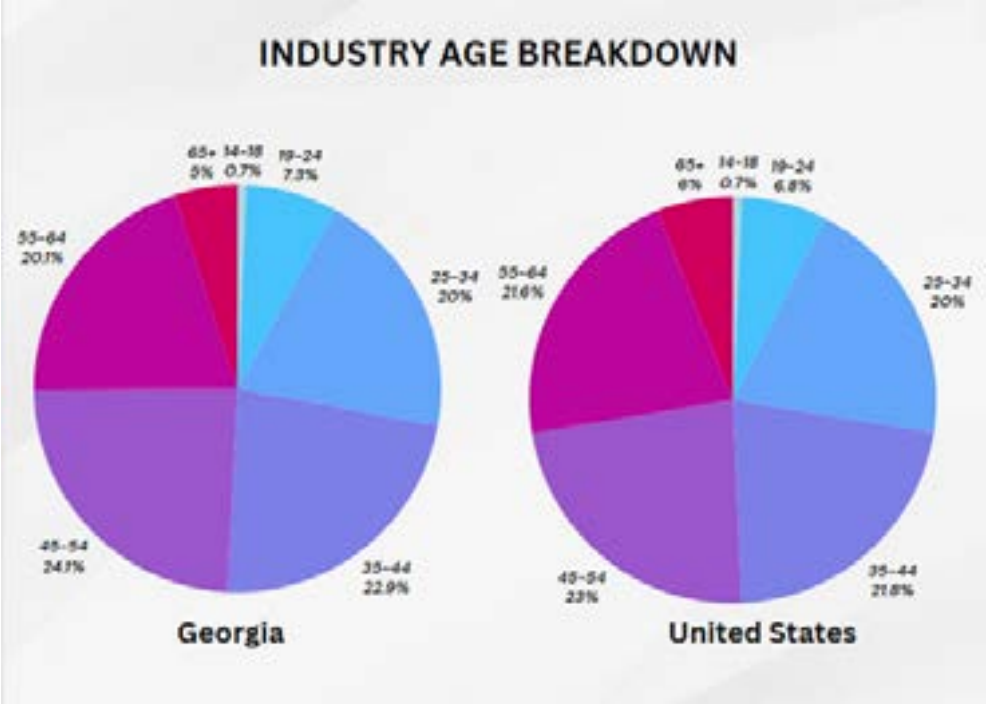
Artificial Intelligence plays a significant role in the industrial sector. AI is beneficial in:

- Prevention and prediction of problematic issues in the functioning of equipment.
- Generative design, machine learning algorithms can be employed to mimic design processes, producing hundreds of design options for a single product.
- Forecasting raw material prices more accurately than humans.
- Quality control and process improvements.

According to the 2021 Deloitte Global Resilience Study, 57% of manufacturing respondents indicated that they utilized advanced technologies to revamp job tasks, such as automating tasks that were previously manual. Integrating additional computer controlled robotic devices (cobots) or other automation sources could assist in sustaining production, but it also necessitates rapid upskilling of workers to effectively incorporate the new technology. Manufacturers who have not carefully considered this workforce transformation may encounter challenges in adapting to the changes (Deloitte. Insights, 2021).

04 Training and Development of Current and Future Workforce

As stated, Georgia's manufacturing sector presently employs a robust workforce of 414,586 individuals. Within this dynamic assembly, 8.2% constitute the younger generation aged 24 and under, 42% are skilled professionals aged 25-44, and 44% fall within the seasoned demographic of ages 45-64. Based on these findings, as manufacturing continues to advance, it underlines an underrepresentation of individuals under the age of twenty-four, a substantial portion of the current workforce between ages 25-64 that may benefit from upskilling to align with industry advancements, and a notable 24.6% contemplating retirement.



Lightcast, 2024

Advanced manufacturing is propelling innovation and bolstering productivity. The integration of Artificial Intelligence (AI) is set to generate fresh career prospects, thereby fortifying economic vitality. It is crucial to provide workers with the requisite skills to meet the demands of these emerging opportunities.

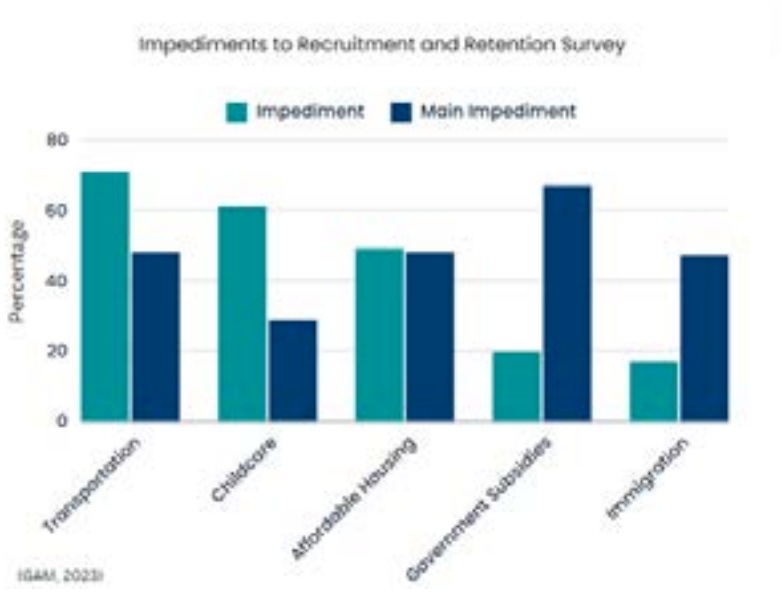
In the Georgia Workforce Needs Assessment, 80% of manufacturers reported that they would more than likely pay for non-credit (fast-track) training solutions to address their required and preferred credentials/certifications and 67% of manufacturers reported that if effective non-credit training solutions are offered they would enroll existing and new employees to develop the necessary skills (GAM, 2023).

With the advancement of manufacturing and the innovation of artificial intelligence defining new career paths, the demand for training and development intensifies. Concurrently, there arises a pressing need for progressive recruitment and retention strategies to attract and retain top talent.

The repercussions of leaving job openings unfilled and lacking the necessary skill set in the workforce to meet market demands can be experienced across various dimensions for manufacturers. In the Manufacturing Talent study, nearly 8 out of 10 manufacturing executives surveyed, highlighted that not filling positions has a significant impact, ranging from maintaining production levels to meet increasing customer demand, responding to emerging market opportunities, facilitating new production development and innovation, and even adopting new technologies (Deloitte Insights, 2021).

05 Environmental Barriers

Additionally, in the survey conducted by the Georgia Association of Manufacturers (GAM), manufacturers were tasked with ranking obstacles to filling positions within the industry. The findings were as follows:



As companies evaluate and reassess the rapid shift in the manufacturing industry and its effects on the workforce, it is important to address certain social determinants that play a key role in the recruitment and retention of talent.

According to this survey, acquiring qualified talent extends beyond mere employment and involves examining workforce issues from a holistic perspective. This viewpoint considers the dynamic environmental and social factors that impact our workforce, extending beyond mere placement to encompass stable and sustainable employment.

POSITIONS AND COMPETENCIES

Within the realm of Advanced Manufacturing, numerous roles hold significance, yet our attention gravitates toward three specific positions: Production Workers, Industrial Engineering Technologists and Technicians, and Electro Mechanical and Mechatronics Technologists and Technicians. By examining these roles, we gain insight into advanced manufacturing across entry-level, mid-skills, and advanced skills levels. Additionally, we can scrutinize the current evolution within advanced manufacturing, encompassing changes in available positions, requisite skills, and the pursuit of qualified talent.

Production Workers

In 2023, the state of Georgia saw a total of 10,022 distinct job opportunities for production workers, offered by 2,074 different employers. These positions boasted a median advertised salary of $36,200 per year, equivalent to $17.42 per hour (Lightcast, Job Posting Analytics, 2024). In January and February 2024 alone, there were 1,494 unique jobs with a median advertised salary of $37,500 per year (source: Lightcast, Job Posting Analytics, 2024). During the period from January 2023 to February 2024, there were an average of 823 job postings per month, with 4,173 hires made monthly (source: Lightcast, Job Posting Analytics, 2024).

Education Level

Out of the 11,516 distinct job postings, 50% did not specify any educational requirements, while 47% required a High School Diploma or GED, and 4% mandated an associate degree, and 3% a bachelor's(Lightcast, Job Posting Analytics, 2024).

Minimum Experience Level

Among these unique job postings, 67% did not specify any experience requirement, while 20% demanded 0-1 year of experience, 11% necessitated 2-3 years of experience, and 2% called for 4-6 years. The remaining positions require 7 years or more of experience.

Industrial Engineering Technologist and Technicians

In 2023, the state of Georgia witnessed a total of 6,919 unique job postings for Industrial Engineering Technologists and Technicians, offered by 1,952 competing employers. These positions boasted a median advertised salary of $56,200 per year, equivalent to $27.02 per hour (source: Lightcast, Job Posting Analytics, 2024). In January and February 2024 alone, there were already 1,199 unique job postings with a median advertised salary of $57,500 per year (source: Lightcast, Job Posting Analytics, 2024). Within the first two months of 2024, there were almost as many postings as there were for the entire year of 2023. Additionally, the median wage has seen a 2.3% increase. There is an average of 580 monthly job postings with only an average of 84 monthly hires.

Education Level

Among the 8,118 unique job postings spanning from January 2023 to February 2024, 41% omitted any specified educational requirements. Conversely, 49% stipulated a prerequisite of a High School Diploma or GED, while 14% required an associate degree, and 8% insisted on a bachelor's degree or higher (source: Lightcast, Job Posting Analytics, 2024).

Minimum Experience Level

Within these job postings, 49% refrained from specifying any experience requirement. Conversely, 13% requested 0-1 year of experience, 24% requested 2-3 years of experience, and 12% requested 4-6 years. The remaining 2% mandated 7 years or more of experience (source: Lightcast, Job Posting Analytics, 2024).

Electro Mechanical and Mechatronics Technologist and Technicians

In 2023, the state of Georgia saw a total of 691 unique job postings for Electro Mechanical and Mechatronics Technologist and Technicians, offered by 264 competing employers. These positions boasted a median advertised salary of $65,800 per year, equivalent to $31.63 per hour (Lightcast, Job Posting Analytics, 2024). In January and February 2024, there were already 101 unique job postings with a median advertised salary of $68,900 per year (source: Lightcast, Job Posting Analytics, 2024). During the period from January 2023 to February 2024, there were an average of 57 job postings per month, with 16 hires made monthly (source: Lightcast, Job Posting Analytics, 2024).

Education Level

Out of the 792 unique job postings (January 2023-February 2024), 37% did not list any educational requirements, 43% required a High School Diploma or GED, and 23% mandated an associate degree, while 10% demanded a bachelor's degree or higher (source: Lightcast, Job Posting Analytics, 2024). These positions emphasize the need for a certain level of technical training or applied skills.

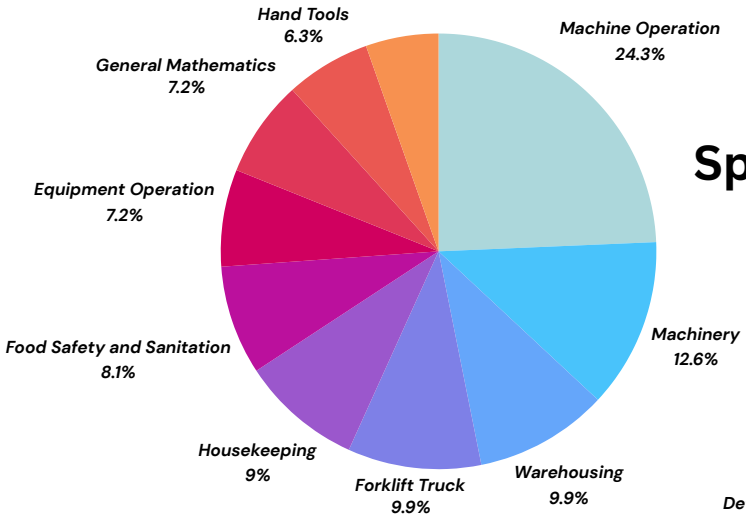
Minimum Experience Level

Among these job postings, 34% did not specify any experience requirement, while 18% demanded 0-1 year of experience, 30% necessitated 2-3 years of experience, and 15% called for 4-6 years. The remaining 3% required 7 years or more of experience (Lightcast, Job Posting Analytics, 2024).

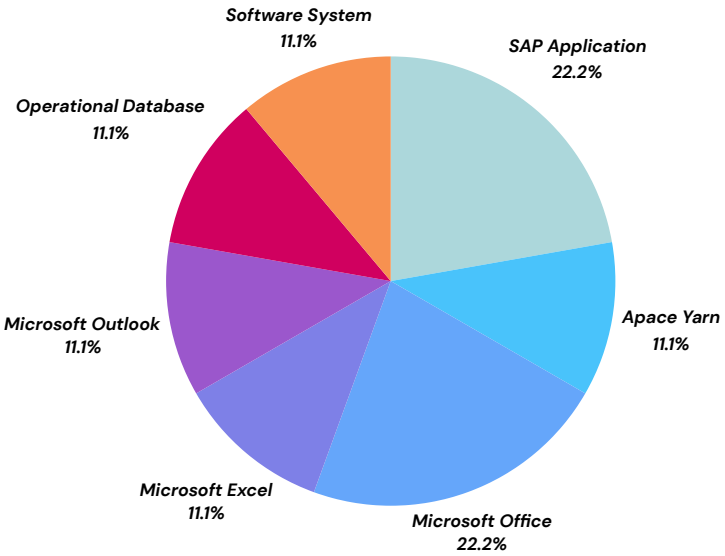
The analysis below sheds light on the supply and demand of relevant skills for Production Workers, Electro Mechanical and Mechatronics Technologist and Technicians, and Industrial Engineering Technologists and Technicians by comparing the prevalence of skills in job postings with those in the current workforce. This comparison utilizes Lightcast's job posting analytics in conjunction with a dataset encompassing over 100 million online resumes and profiles (Lightcast, Job Posting Analytics, 2024).

Production Workers

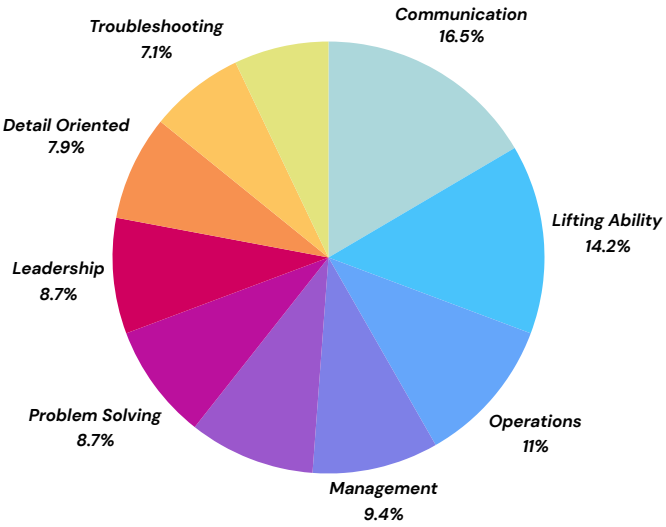
Specialized Skills



Software Skills



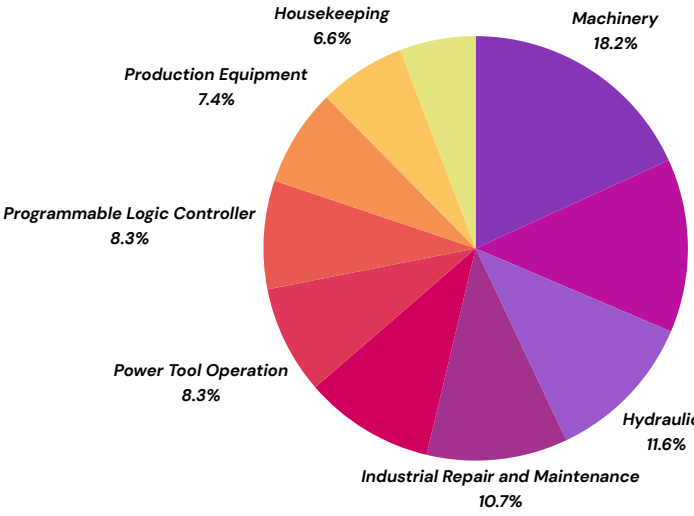
Common Skills



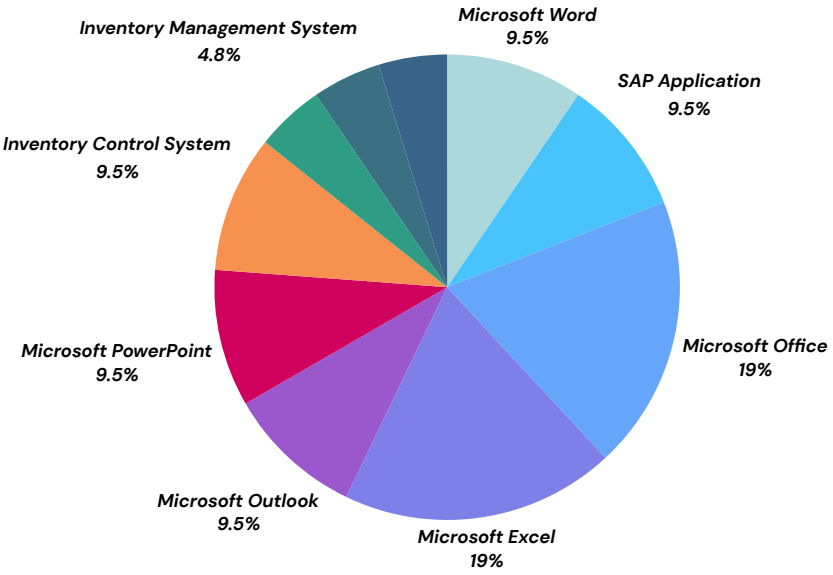
Within the range of sought-after skills required for this role, mastery in operating machinery and excellent communication skills stand out the most.

Industrial Engineering Technologist and Technicians

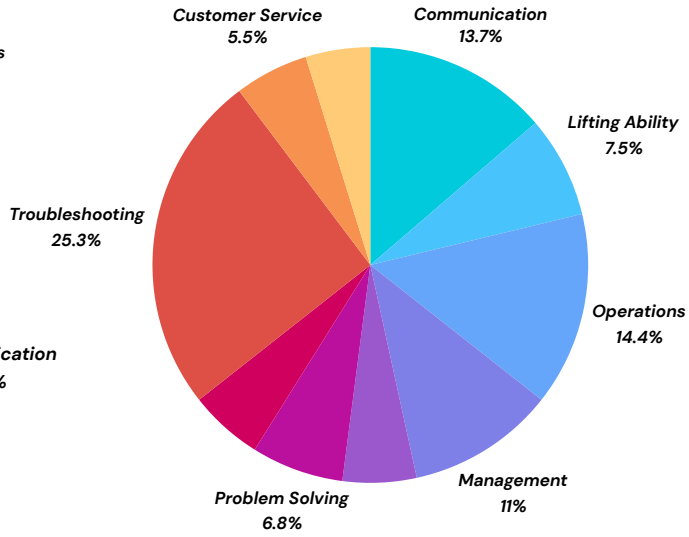
Specialized Skills



Software Skills



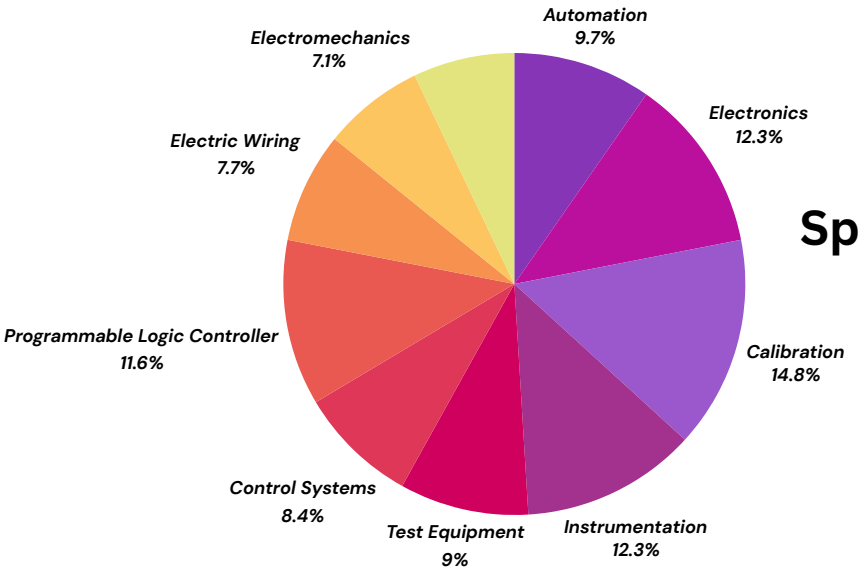
Common Skills



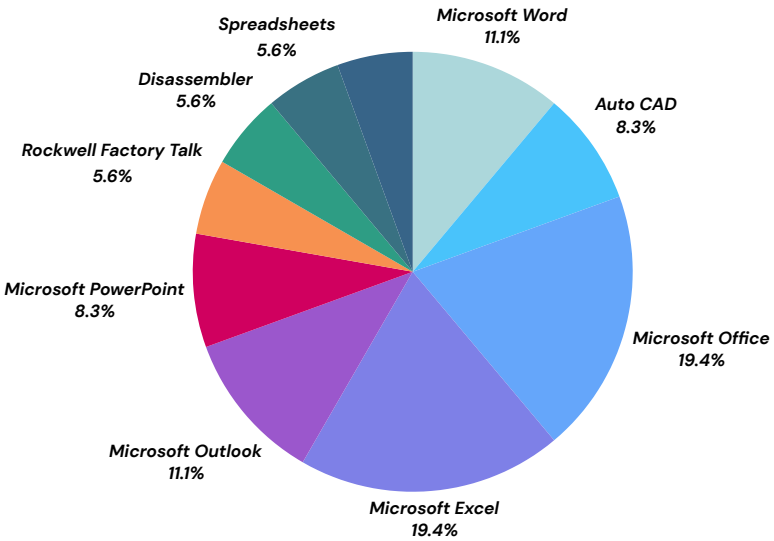
37% *The enigmatic skill of troubleshooting is a key requirement in 37% of job postings.*

Electro Mechanical and Mechatronics Technologist and Technicians

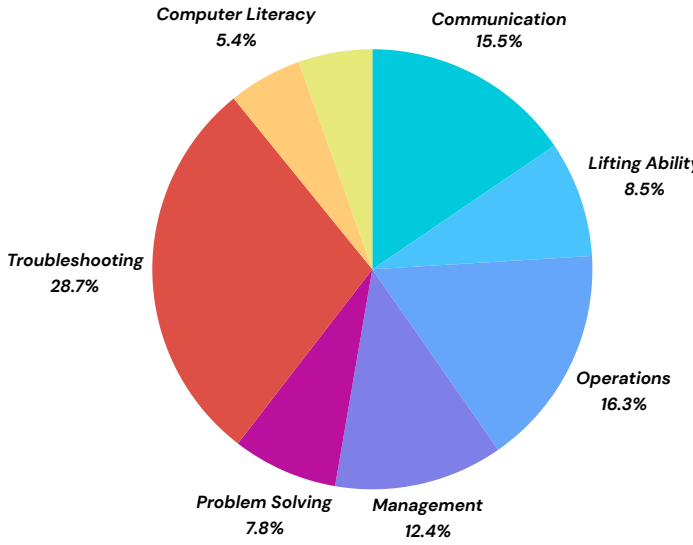
Specialized Skills



Software Skills

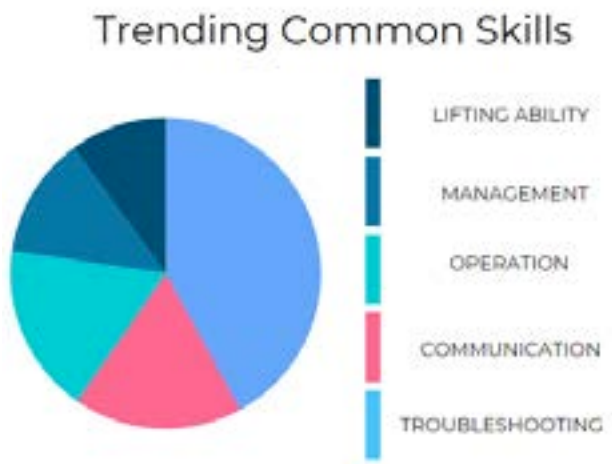


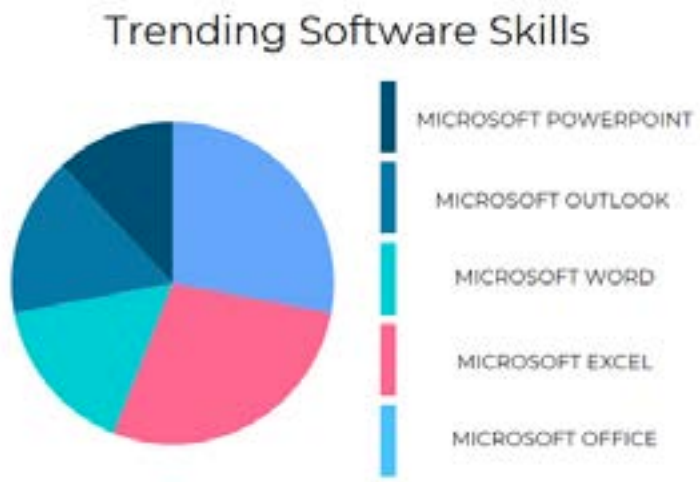
Common Skills



30% *Automation is anticipated to experience a 30% skills growth.*

In-Demand Skills Summary





Particularly with these three positions, specialized skills may vary depending on the specific job requirements, but there's a noticeable shift in the demand for common skillsets. For production workers, there's an emphasis on soft skills like communication, along with physical abilities such as lifting and operational tasks. On the other hand, in industrial/automation-focused roles, there's greater importance placed on mid-level skills such as troubleshooting, operations, and management.

MOVING FORWARD

The pressing issue remains: how do we secure qualified talent, bridge the skills gap, and fulfill the rising number of job openings in advanced manufacturing?

Broaden recruitment and retainment strategies within the region and manufacturing sector. There must be strategies developed that will educate and attract new talent.

Prioritize the upskilling of the current manufacturing workforce to align with the evolving demands of the advancing manufacturing landscape.

Utilize strategies that address the dynamic environmental and social factors that impact our workforce, extending beyond mere placement to encompass stable and sustainable employment.

ACTION AND COMMITTMENT

TCSG will start tackling these increasing demands by:

01

Identifying and Closing Workforce Gaps

Partnering with industry leaders in manufacturing to identify workforce gaps, subsequently aligning comprehensive training and development programs with the evolving needs of the industry.

02

Employment Placement

Working to facilitate the successful transition of TCSG graduates into thriving careers within the domain of advanced manufacturing, fostering their professional growth and contributing to their sustained success in the industry.

03

Innovation

Develop innovative approaches to increase engagement and recruitment through strategic community partnerships.

NEXT STEPS

Workforce Development Framework (WDF)

1. Analyzing current trends and demands in Advanced Manufacturing.
2. Delivering WDF findings to stakeholders.
3. Engaging in Conversations in Workforce Development: Hosting a series of discussions on prevailing industry trends and demands in Advanced Manufacturing to facilitate the development of initiatives fostering workforce growth through employment, training, and community collaborations.

Training and Development

1. Review and discuss Workforce Development Framework with Georgia AIM Technical Colleges.
2. Analyze existing training programs to align them with current industry requirements.
3. Identify and rectify any existing gaps.

Employer and Community Engagement

1. Collaborate with employers to comprehend and cater to workforce requirements.
2. Work in conjunction with employers to establish employment pathways for graduating students.
3. Engage in partnerships with community organizations to draw, retain, and educate prospective students about Advanced Manufacturing.

Recruitment and Retainment

1. Formulation of a Recruitment Strategy.
2. Coordination with technical colleges to arrange recruitment events.
3. Engagement in community events to draw and inform prospective students about Advanced Manufacturing.

Placement

97% of graduates successfully secure placements in Advanced Manufacturing Positions.

REFERENCES

2021 Georgia Manufacturing Facts. (2021, July 6). NAM. https://nam.org/state-manufacturing-data/2021-georgia-manufacturing-facts/

Industry Snapshot Report: Manufacturing in Georgia. (2023, November 3). Lightcast.io. https://analyst.lightcast.io/analyst/t=4YL9m#h=v3nM6&page=edo_industry_snapshot&vertical=standard&nation=us

2024 Manufacturing: Companies and industries in Georgia. (n.d.). https://www.georgia.org/industries/advanced-manufacturing

Manufacturing in Georgia: Industries by Location. (2024, February 2). Lightcast.io.https://analyst.lightcast.io/analyst/?t=4ZLbd#h=vNtZ4&page=industry_map&vertical=standard&nation=us

Industry Overview. (2024, February). Lightcast.io. https://analyst.lightcast.io/analyst/?t=4ZLbd#h=vNz8W&page=edo_industry_snapshot&vertical=standard&nation=us

Wellener, P., Reyes, V., Ashton, H., & Moutray, C. (2021, May 4). Creating Pathways For Tomorrow's Workforce Today. Deloitte. Insights. Retrieved February 28, 2024, from https://www2.deloitte.com/us/en/insights/industry/manufacturing/manufacturing-industry-diversity.html

Arinez, J., Chang, Q., Gao, R., Xu, C., & Zhang, J. (2020, November 1). Artificial Intelligence in Advanced Manufacturing: Current Status and Future Outlook. The American Society of Mechanical Engineers Digital Collection. Retrieved February 28, 2024, from https://asmedigitalcollection.asme.org/manufacturingscience/article/142/11/110804/1085487/Artificial-Intelligence-in-Advanced-Manufacturing

CareerOneStop (2021, December 1). Competency Model Clearinghouse. Retrieved February 28, 2024, from https://www.careeronestop.org/CompetencyModel/competency-models/advanced-manufacturing.aspx (2024, February 2). Job Posting Analytics. Lightcast

Analyst. Retrieved March 6, 2024, from https://analyst.lightcast.io/analyst/t=4ZZG1#h=vT7bB&page=postings_report&vertical=standard&nation=us

Technical College System of Georgia

GEORGIA AIM
Artificial Intelligence in Manufacturing

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