

Hillsborough-Pinellas Manufacturing Gap Analysis

August 2013

The Hillsborough-Pinellas Manufacturing Gap Analysis is a comprehensive skill set needs assessment for Hillsborough and Pinellas Counties. The project was sponsored by the following organizations:



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Hillsborough-Pinellas Manufacturing Workforce Analysis

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Executive Summary

Hillsborough and Pinellas counties' leading economic and workforce development organizations have joined together to quantify the area's difficult to fill manufacturing skill sets. The analysis was designed to be comprehensive enough to reach the granular level at which manufacturers must make decisions, and also to account for the unique strengths the area has in component, medical, and aerospace manufacturing. In total, 107 skill sets across 16 job type categories were surveyed. The survey asked for current, 12 month, and 12-36 month vacancies. There were 109 responding companies, representing 14,715 employees, or 28.9% of the entire manufacturing employee population in the two county area.

The widening manufacturing skills gap has been monitored by local economic and workforce development organizations, but recent discussions of increased hiring challenges led to a more detailed analysis. Two professional staff were hired to conduct the analysis, with the economic and workforce development organizations providing oversight. In addition to the comprehensive manufacturer survey, research of existing data sources, interviews, and industry group discussions were conducted.

Data from the analysis showed an increasing shift from traditional manufacturing methods to more advanced methods. The highest 12-month vacancies were for production solderers, which work predominately in the areas component manufacturers. CNC machining positions were ranked as having the second and fourth highest vacancies, underscoring the shift from traditional to advanced methods. Maintenance mechanics had the third highest 12-month vacancies. They are demanded across every manufacturing cluster. Mig and Tig welders were tied as having the fifth highest 12-month vacancies.

12 Month Highest Vacancies
1. Production Solderer
2. CNC Machinist
3. Maintenance Mechanic
4. CNC Machine Operator
T-5. Mig Welder
T-5. Tig Welder

Based on the interviews, the organizations determined three action areas, where they believed they could make an impact to improve the manufacturing talent pipeline.

Areas for improvement:

1. A lack of interest in manufacturing is causing a shortage of skilled workers.
2. Workers lack knowledge of industry.
3. There needs to be a greater connection between industry and education.

Solutions:

1. Organize manufacturing job opportunities public relations campaign.
2. Increase internship and apprenticeship offerings.
3. Improve coordination between industry, education, and government.

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Introduction

Hillsborough and Pinellas counties are home to 2,074 manufacturers, representing 50,803 employees. The manufacturing industry has a tremendous impact on the counties' economies. Manufacturing employees have a total income contribution of almost \$9 billion to the local economy, and each manufacturing job created results in the creation of an additional 2.65 jobs, according to an economic impact analysis from the Florida Department of Economic Opportunity. The economic recovery is leading manufacturers to increase production, but they are beginning to face challenges in hiring qualified workers for these critical positions, and the shortage is expected to become more severe as production continues to increase. Already almost 40% of Hillsborough and Pinellas counties' manufacturers say that the skills gap is limiting business growth. American manufacturers have also begun re-shoring, a term for bringing manufacturing which was sent off-shore to foreign countries back into the United States. A Deloitte study identified access to qualified talent as the primary reason for a company to select a location for its operations. Building a pipeline of skilled manufacturing workers will not only support local manufacturers, it can attract new businesses to the region.

The area's leading economic and workforce development organizations have joined together to identify the current and future specific workforce needs of regional manufacturers. The Hillsborough-Pinellas Manufacturing Workforce Analysis asked local manufacturers a series of workforce related questions to understand their most critical unfilled positions today and the areas in which they anticipate hiring challenges in the future. The results and corresponding recommendations will help local community and industry leaders allocate resources to build a pipeline of qualified manufacturing talent to the area. The analysis, conducted over a 6 month period, asked manufacturers about 107 skill sets and their corresponding experience levels and certifications.

The response showed that as of April 2013 the region's manufacturers had 2,139 vacancies, expect to have 2,765 vacancies in 12 months and 3,457 vacancies in 12-36 months. Diligent planning for these jobs is critical to maintaining economic prosperity in Hillsborough and Pinellas counties.

The manufacturing skills gap is a national issue, but the solution must be local. The area has unique strengths and industry clusters, such as aerospace and medical manufacturing. The talent delivery must be tailored to these unique clusters and skill sets.

Background

The National Association of Manufacturers contracted Deloitte to examine the severity of the manufacturing talent gap nationwide. Deloitte's analysis, *Boiling Point? The skills gap in U.S. manufacturing*, published in August of 2011, found that 74 percent of respondents indicated that hiring challenges for skilled labor have impacted their companies' abilities to expand operations.

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The highest shortages were for the most advanced jobs, such as machinists and technicians. Access to qualified talent was the number one reason for a company to select a location for its operations.

In a June 2012 report the President's Council on Job Growth highlighted manufacturing as critical to the US economy. The report, published in the form of recommendations, noted that the United States must continue to make things and build its manufacturing industry to be competitive in the global economy. When it came to developing talent across all industries, it listed the need to "build workforce skills in advanced manufacturing" as the number one workforce initiative. Manufacturers outsourced many jobs to developing countries in the 1980s because of low labor costs. As a result of advanced production techniques and quality concerns, many of those jobs are being re-shored to the United States. Manufacturing jobs are poised to increase in their relative size as manufacturing jobs become more advanced and the United States leverages its highly educated workforce. Also, the Council emphasized the need to leverage local competitive advantages to spur manufacturing cluster development.

A manufacturing survey conducted by Career Edge for Sarasota and Manatee counties was published in August of 2012. It was conducted to better understand the perceived widening skill set gap. When asked for areas they believe their greatest hiring challenges the most frequent response was skilled production, which includes machinists, technicians, and production workers. Also, when asked what community partners should do, the most often selected area was "Identify Skill Needs and Develop Programs."

The workforce needs of the manufacturing industry have been a regional focus in Hillsborough and Pinellas counties for several years. WorkNet Pinellas and the Tampa Bay WorkForce Alliance have monitored the issue since 2007 by asking employers about their most difficult to fill positions and holding manufacturing industry summits. The results are published annually in a strategic report card, but in 2012 the severity of the issue pushed the area's workforce and economic development organizations to take a closer look at skills gap and develop solutions to the problem.

Methodology

The Hillsborough-Pinellas Manufacturing Workforce Analysis was designed to be a comprehensive skill set demand analysis, so that community leaders and educational institutions can develop a pipeline of qualified workers to support the local industry. What is unique about our study is the detail; we looked at the specific jobs and skills within the gross number of planned hires needed by Hillsborough and Pinellas counties' manufacturers.

The analysis began with searching for common manufacturing occupations through the O*NET database, which contains information on hundreds of standardized and occupation specific descriptors. Those jobs were then compared against local online job postings. Job titles that didn't appear in any local online postings were removed, while job titles that were posted online

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by at least two separate companies were added. Finally, that list of jobs was taken to local manufacturers to be sure that it was inclusive of all of the manufacturing jobs they employ. In total, 107 different manufacturing jobs were asked about, covering 15 job type categories.

The survey was conducted in two phases. Phase I asked general demographic, broad hiring practice questions, and which job categories each company employs. Then, based on the job categories employed question in Phase I, Phase II asked local manufacturers a set of tailored job vacancy and job growth questions. Phase II also asked for employers for the experience levels and certifications they desire for each skill vacancy they reported.

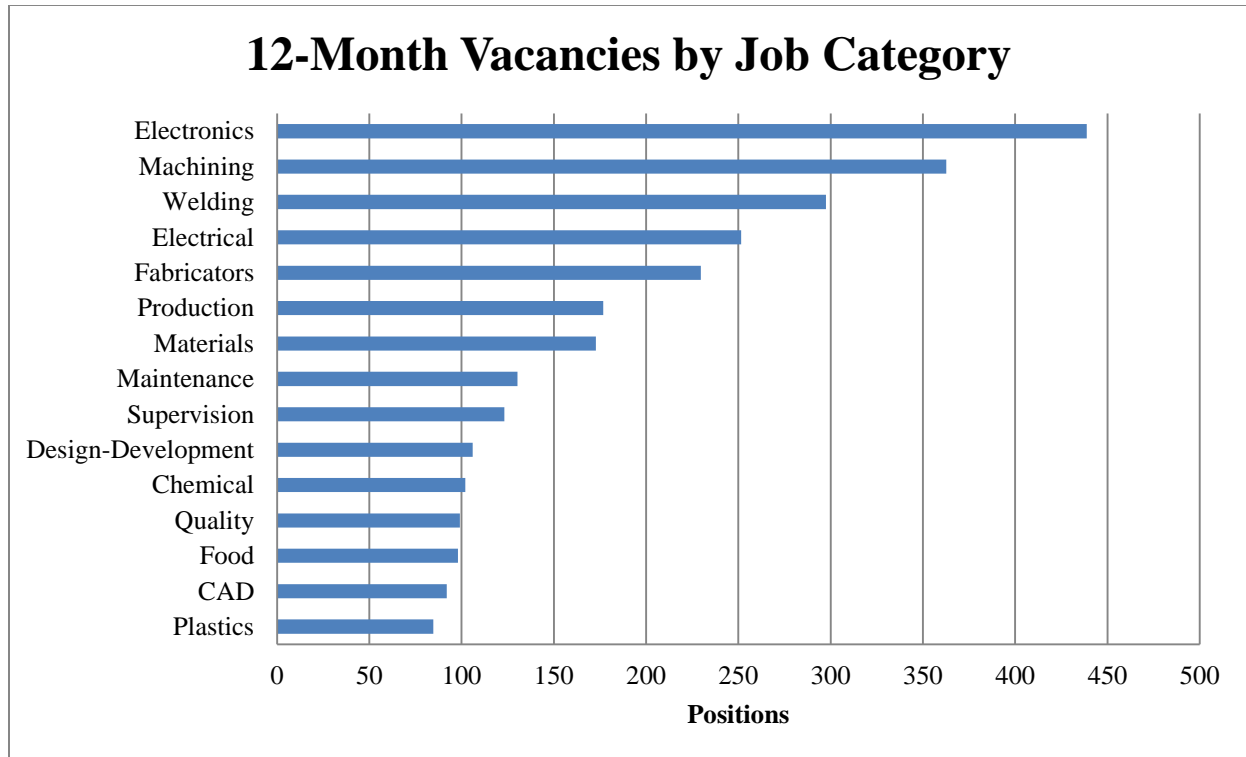
The sample skill set vacancy results from Phase II were then extrapolated to arrive at an estimate for the entire population. NAICS codes 31-33 were used to define the population of manufacturers. The survey focused on manufacturers with five or more employees, because they account for the vast majority of hiring. Also, many of the companies that have 0-4 employees are satellite sales offices that do not produce manufactured products. Although NAICS codes 31-33 include printing companies, we excluded them from the population and the sample, because they do not consider themselves manufacturers and employ few production workers.

Data Analysis

109 manufacturers responded to Phase I of the survey, representing 14,715 (28.9%) employees in the manufacturing workforce. Respondents indicated that in the past six months the companies had collectively interviewed over 2,400 potential hires, of which only about 28% were qualified. The largest reason the interviewees were not qualified was a lack of necessary basic technical skills. Other reasons interviewees were rejected included lack of basic skills (reading, writing, and/or math), poor communication skills, poor self-presentation, and perceived work ethic.

89 companies responded to Phase II of the survey, representing 12,567(24.7%) employees in the manufacturing workforce. Almost 40% of respondents stated that vacant positions presented barriers to their company's growth. Vacancies were analyzed on two levels: category and specific job title.

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Top Expected Vacancies by Job

Jobs	Current Vacancies	12-Month Vacancies	12 to 36 Month Vacancies
1. Production Solderer	63	112	112
2. CNC Machinist	74	95	116
3. Maintenance Mechanic	95	88	122
4. CNC Machine Operator	83	81	88
5. Mig Welder	38	67	53
6. Tig Welder	38	67	53
7. Cable Assembler	57	60	56
8. Welder-Fabricator	45	60	60
9. Warehouse Worker	35	60	119
10. Quality Inspector	67	57	49
11. Mechanical Design Engineer	49	57	57
12. Fitter	34	57	24
13. Fabricator	28	57	28
14. Electro-Mechanical Assembler	38	56	78
15. Production Lead	38	53	63
16. Assembler	28	53	78
17. Test Technician	28	53	82
18. Electrical Assembler	31	45	35

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19. Circuit Board Assembler	28	45	56
20. Test Technician	28	45	71
21. Final Unit Assembler	14	45	71
22. Repair Solderer	14	45	76
23. Maintenance Technician	42	42	42
24. Electrical Technician	35	38	71
25. Mill Operator	45	35	28

The category with the most current vacancies was electronics with over 400 anticipated 12-month vacancies. This demand comes primarily from Hillsborough and Pinellas counties' strong industry clusters in medical manufacturing, circuit board manufacturing, and component manufacturing. Production solderers, included in this group, have the highest overall anticipated 12-month vacancies. They use a variety of equipment to melt a filler metal (solder) to join to other metal pieces. A production solderer may also examine seams for defects or rework defective joints or broken parts. There were also several other soldering jobs that were selected as having high future demand, such as repair solderers and solderers inspector. Certifications are typically required to become a solderer. The experience level required to be a solderer varies with the complexity of the project, but solderers are hired at all levels. The survey found that overwhelmingly mid-level solderers were demanded. Other jobs within electronics that helped contribute to its high ranking were cable assemblers, circuit board assemblers, and test technicians.

The second highest demanded category was machining. The need for high quality machining workers has received a great deal of national attention. Two jobs within the machining category were ranked in the top 5 of all highest 12-month vacancies; CNC machinists were second and CNC machine operators were fourth. As manufacturing becomes more advanced, many of the high wage manufacturing jobs will be within machining.

Within the machining category, there are several levels of expertise. A CNC programmer is the highest machining level a worker can reach. They are often located in a part of the building separate from the production area. Their work is similar to that of an information technology programmer. CNC machinists are in many ways programmers as well. They typically work in the production area altering the machines to perform multiple tasks. CNC machinists might also spend time programming outside of the production area. CNC operators work directly on the daily tasks of each machine. They are usually assigned to one to three machines. They will not program, but instead run the day to day tasks of the machine. Mill operators are similar to CNC operators in that they may use CNC to manage the day to day tasks of machines. They could also working on machines that are not numerically controlled, such as press brakes or stamping machines.

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The welding job category had the third highest number of vacancies. The Hillsborough and Pinellas county area has many contract manufacturers that often need to rapidly increase production. Welder-fabricator was selected as having the highest vacancies within the welding category. The position creates products by bending and molding pieces of metal. Mig and tig welders are the next highest demanded welding skill sets. Manufacturers demanded mig and tig welders equally across a broad range of industry clusters. Flux-core welders were also in high demand, but the need is concentrated within ship building and ship repair companies. The employers that indicated a need for flux-core welders typically needed many.

Electrical was the fourth highest demanded job category. Electrical workers create, install, and modify the flow of electricity through large systems. A great deal of the demand comes from the area's aerospace cluster. Demand within the electrical job category was widespread, with Electro-mechanical assemblers, electrical assemblers, and electrical test technicians having the highest 12-month anticipated demand.

Maintenance mechanics were ranked as having the third highest anticipated vacancies, behind production solderers and CNC machinists (described above). Nearly all of the companies surveyed employ maintenance mechanics, from machine shops, to ship builders, to food processors. However, maintenance mechanics typically have advanced training in the machines they repair, and therefore cannot easily transfer from one type of manufacturer to another.

Overall, the data suggests a shift from traditional manufacturing methods to more advanced methods. Manufacturers are being forced to adopt new technologically advanced manufacturing to increase productivity and increase quality to remain competitive. Specifically, CNC machines seem to be a driving force. Although there is a move towards CNC, the data indicates that demand for other skilled manufacturing positions, such as Mig and Tig welders, will remain strong.

Resources

A consortium of colleges led by St. Petersburg College has begun to take steps to increase the supply of manufacturing talent. The consortium was awarded \$15 million by the U.S. Department of Labor as part of the Trade Adjustment Assistance Community College Career Training (TAACCCT) grants, a program known as Florida TRADE. The consortium will offer short-term industry certification training in areas that support the skills required to fill some of the top jobs facing a critical shortage across Florida and the Tampa Bay region: welders; CNC machinists; engineers; quality assurance/inspection officers; and master mechanics and technicians. The grant targets workers who have lost their jobs, or are at risk of losing their job, as a result of foreign trade (TAA eligible workers), as well as veterans, dislocated and incumbent workers. Certificates that will be offered for training under Florida TRADE include MSSC-CPT, NIMS CNC Operator, ISCET ESA, and ACEI IPC Surface Mount Technician.”

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Hillsborough Community College recently received a third round of funding from the National Science Foundation (NSF) for the Florida Technological Education Center of Excellence (FLATE) to operate the center from 2012 to 2015. FLATE developed and continues to support the comprehensive Engineering Technology associate of science degree and certificate programs offered at Hillsborough Community College, St. Petersburg College and 12 other state colleges in Florida. These programs offer training in many of the high vacancy jobs from the survey. Specifically, FLATE's partner colleges in Florida offer training in three of our top five highest vacancy job categories - machining, electronics, and quality. The core courses for the Engineering Technology A.S. degree include computer aided drafting, electronics, manufacturing materials & processes, mechanical measurements & instrumentation, quality, and safety. Then one of eight specializations is selected from electronics, quality, advanced technology, advanced manufacturing, alternative energy systems, biomedical systems, digital design & modeling, and mechanical design & fabrication. Certificates can also be earned in any of these areas as part of the degree, or students can elect earn certificates that will improve their skill sets, without completing a degree. FLATE is also the home of the statewide "Made in Florida" outreach campaign which aims to change community perception about manufacturing, and to recruit students into high tech, high wage STEM career pathways that support manufacturing.

In addition to colleges and university offering training, Hillsborough and Pinellas counties' school systems offer adult education courses that provide training in specific areas of manufacturing, such as solid works and welding. In Hillsborough County courses are offered through HiTEC at four campuses - Aparicio-Levy, Brewster, Erwin, and Leary. In Pinellas County courses are offered through pTEC at two campuses - Clearwater and St. Petersburg.

Hillsborough County also boasts one the nation's highest ranked research universities. According to a 2012 report from the Intellectual Property Owners Association, the University of South Florida received the 10th most patents of universities worldwide from the U.S. Patent and Trademark Office in 2011. The University offers degrees in chemical, electrical, industrial, and mechanical engineering. It also offers many supervisor level degrees and courses through its college of business. Along with the University of South Florida, the University of Tampa and St. Leo's University also offer many supervisor level degrees and courses.

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Gaps and Solutions

The area has a number of programs to train manufacturing workers, including public and private universities, trade schools, and industry associations. Through interviews, the survey, and secondary data, it became apparent that some areas that could be improved to help connect prospective employees and manufacturers. Our analysis identified three primary gaps:

1. A lack of interest in manufacturing is causing a shortage of skilled workers.

A great deal of attention is being focused on ensuring American students are being trained in science, technology, engineering, and math (STEM); these are the skills the future workforce needs. However, when thinking of STEM careers, manufacturing rarely comes to mind, and public perception of the manufacturing industry is generally outdated.

The region has a number of training opportunities, from magnet programs and Career and Professional Education (CAPE) Academies in the county public school system, to Certificate programs, to Associates preparation in engineering technology, and Bachelor's degrees in engineering. Those students need to learn about the opportunities available in the modern manufacturing industry.

Recommendations: Outreach initiatives are necessary to reach the many different groups of potential workers. A public relations campaign to attract young adults to manufacturing careers would help improve the outdated perception of the manufacturing industry. There should be expanded recruitment of veterans. Besides their strong work ethic, many veterans have worked in positions similar to those demanded in manufacturing, such as ship welders or electrical systems technicians. A campaign targeted at youths' parents should be initiated to help inform them about opportunities their children may have in manufacturing. Finally, the capacity of career centers to provide students with information about manufacturing careers must be increased.

2. Workers lack knowledge of industry fundamentals.

Through interviews and the write-in section of the survey manufacturers noted that new manufacturing workers are unaware of basic manufacturing processes and the pace of work within a manufacturing facility. New workers can cause lags in certain areas of production, which slow all operations down. It can also be costly to spend time training new workers on the basic manufacturing environment. When workers have basic industry knowledge they are more productive and can focus on their technical skills.

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Recommendations: Opportunities to increase internships and apprenticeships should be explored. They benefit both the intern/apprentice and the manufacturer, by providing practical experience and increasing the pipeline of skilled workers.

3. Disconnect between industry and education.

Advances in technology make it challenging for educational institutions to provide the most recent training. More so than in any other industry, manufacturing educators need to understand emerging technologies and trends. Manufacturing training technologies are typically costlier and they take longer to procure than other industry technologies. Local educational institutions have taken major steps recently to be able to train in the latest technologies with the FLATE and the Florida TRADE grant. They will need support in the future to be sure that they are training in the latest technologies

Additionally, manufacturers that have relationships with educators can help guide the curriculum and have greater access to qualified manufacturing talent.

Recommendations: The opportunity to increase internships and apprenticeships should be explored. General coordination between manufacturers and educators would help manufacturers advise on curriculum to ensure that the workers entering the manufacturing workforce have the manufacturers desired skill sets.

A detailed chart of the gaps, recommendations, and steps for implementation is on the next page.

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Gap 1: A lack of interest in manufacturing is causing a shortage of skilled workers.		
Recommendation	Implementation	Lead
1. Organize a public relations campaign targeted at attracting young adults to manufacturing careers.	<ul style="list-style-type: none"> ● Organize tours of manufacturing plants to help inform young adults about the modern manufacturing environment. ● Use media outlets to communicate the opportunities for young adults in manufacturing, highlighting high current vacancy job categories. 	Business Leaders/EDOs/ Workforce Boards
2. Expand recruitment of returning veterans. Increase information about career pathways and available jobs.	<ul style="list-style-type: none"> ● Promote manufacturing pathways to veteran’s enrolled in colleges, registered with the workforce boards, and the Veterans Affairs. ● Collaborate with TAP program at MacDill to do outreach to veterans and determine which skills align with manufacturing. 	Education/Workforce Boards
3. Conduct parent/manufacturing event(s) that will explain manufacturing pathways to parents.	<ul style="list-style-type: none"> ● Organize panels of manufacturers to answer questions from parents about the manufacturing industry. Magnet programs and CAPE academies should be targeted for this outreach. 	Business Leaders/Education
4. Increase the capacity of career centers to provide students with information about manufacturing career pathways.	<ul style="list-style-type: none"> ● Provide career centers easy to access information about manufacturing careers. ● Support career centers in gathering information about manufacturing careers and developing simple explanations of manufacturing pathways. 	Education
Gap 2: Workers lack knowledge of industry fundamentals.		
Recommendation	Implementation	Lead
5. Explore opportunities to increase apprenticeship programs.	<ul style="list-style-type: none"> ● Research current apprenticeship programs in the Tampa Bay area. ● Explore using the German apprenticeship model and other outside models. ● Educate legislators on the value of apprenticeship programs for manufacturing. 	Business Leaders/EDOs/ Education/Workforce Boards

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<p>6. Explore opportunities to increase internship programs.</p>	<ul style="list-style-type: none"> ● Determine for which positions internships are useful, best practices, which schools use them, and what challenges they face. ● Encourage business leaders to organize internships, and provide best practice examples. 	<p>Education/Workforce Boards</p>
<p>Gap 3: Disconnect between industry and education.</p>		
<p>Recommendation</p>	<p>Implementation</p>	<p>Lead</p>
<p>7. Conduct internship fairs to connect students with employers.</p>	<ul style="list-style-type: none"> ● Coordinate internship fairs that give students an opportunity to work inside a manufacturing facility and gives manufacturers an opportunity to observe potential employees. ● This should be done in conjunction with training businesses on best practice internship programs. 	<p>Business Leaders/Education/Workforce Boards</p>
<p>8. Facilitate coordination between manufacturers and educational institutions.</p>	<ul style="list-style-type: none"> ● Coordinate linking of manufacturing companies and educational institutions. The relationship should be mutually beneficial, with manufacturers having access to qualified talent and educational institutions receiving continual feedback on which jobs will be highly demanded in the future. 	<p>Business Leaders/Education/EDOs/Workforce Boards</p>
<p>9. Explore opportunities to increase the number of manufacturing career academies. Facilitate coordination between manufacturers and career academies.</p>	<ul style="list-style-type: none"> ● Understand high schools' interest and capacity for becoming manufacturing career academies. Encourage manufacturers to adopt a career academy. Coordinate linking of manufacturers and career academies. 	<p>Business Leaders/Education/EDOs/Workforce Boards</p>

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Measuring Progress

The implementation initiatives should be measured to understand their effectiveness and to support future workforce planning. The number of manufacturing education programs currently available should also be measured to better understand the talent pipeline.

To measure the direct impact of the initiatives, the number of internships and apprenticeships completed should be counted. The attendance at outreach events should be tracked. The number of manufacturers participating in outreach events, such as participating on industry panels and giving tours of their facilities, should also be tracked.

An asset study of different programs currently offered in the area should be conducted. Enrollments and the number of students completing the programs and pursuing manufacturing pathways should be counted. Changes in curricula should also be taken into account to ensure that training is available for the area's highest demanded jobs.

As a final step, another gap analysis should be conducted in 3 years to understand changes and trends.

Implementation Metrics

Internship, apprenticeship completers
Attendance at outreach events
Manufacturers participating in outreach events

Asset Study

Enrollments in manufacturing programs
Completers of manufacturing programs

Follow-Up Analysis

Gap analysis in 3 years
Updated count of completers of manufacturing programs

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Appendix 1 – Vacancies, Experience, and Certifications

Chemical Processors

Skills	Current Vacancies	12-Month Vacancies	12 to 36 Month Vacancies	Desired Experience	Desired Certification
Batch Maker	7	14	14	50% Entry 25% Mid-Level 25% Advanced	None
Blender	14	14	14	50% Entry 0% Mid-Level 50% Advanced	None
Equipment Operator	21	38	38	50% Entry 33% Mid-Level 17% Advanced	None
Fill Machine Operator	0	7	7	50% Entry 50% Mid-Level 0% Advanced	None
Plant Operator	0	0	0	0% Entry 0% Mid-Level 0% Advanced	None
Technician	14	21	21	17% Entry 83% Mid-Level 0% Advanced	None
Tester	0	7	0	0% Entry 100% Mid-Level 0% Advanced	None

Computer Aided Design (CAD)

Skills	Current Vacancies	12-Month Vacancies	12 to 36 Month Vacancies	Desired Experience	Desired Certification
Auto CAD Operator	21	42	53	14% Entry 64% Mid-Level 22% Advanced	66% Auto CAD 17% Pro-E Level I 17% Solid Works
Pro-E Operator	0	7	7	0% Entry 100% Mid-Level 0% Advanced	50% Pro-E Level I 50% Solid Works
Solid Works Operator	21	42	49	24% Entry 38% Mid-Level 38% Advanced	70% Solid Works 30% Auto CAD

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Design-Development Engineering

Skills	Current Vacancies	12-Month Vacancies	12 to 36 Month Vacancies	Desired Experience	Desired Certification
Chemical Engineer	7	7	7	0% Entry 100% Mid-Level 0% Advanced	100% Bachelors
Compliance Engineer	0	0	0	None	None
Electrical Design Engineer	14	14	28	20% Entry 40% Mid-Level 40% Advanced	100% Bachelors
Electro-Mechanical Design Engineer	14	7	21	0% Entry 50% Mid-Level 50% Advanced	100% Bachelors
Electronic Design Engineer	7	7	49	0% Entry 100% Mid-Level 0% Advanced	None
Electronic Technician	0	7	0	0% Entry 50% Mid-Level 0% Advanced	None
Mechanical Design Engineer	49	57	57	21% Entry 72% Mid-Level 7% Advanced	100% Bachelors
Packaging Engineer	7	7	7	0% Entry 50% Mid-Level 50% Advanced	100% Solid Works

Electrical

Skills	Current Vacancies	12-Month Vacancies	12 to 36 Month Vacancies	Desired Experience	Desired Certification
Electrical Assembler	31	45	35	20% Entry 60% Mid-Level 20% Advanced	None
Electro-Mechanical Assembler	38	56	78	0% Entry 100% Mid-Level 0% Advanced	None
Electrical Equipment Repair	28	28	35	10% Entry 30% Mid-Level 60% Advanced	None
Electrical Technician	35	38	71	0% Entry 70% Mid-Level 30% Advanced	None
Solderer	31	38	71	0% Entry 100% Mid-Level 0% Advanced	None
Test Technician	28	45	71	0% Entry 63% Mid-Level 37% Advanced	None

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Electronics

Skills	Current Vacancies	12-Month Vacancies	12 to 36 Month Vacancies	Desired Experience	Desired Certification
Cable Assembler	57	60	56	25% Entry 75% Mid-Level 0% Advanced	100% IPC-A-610
Chassis Assembler	0	7	7	50% Entry 50% Mid-Level 0% Advanced	50% IPC-J-STD-001 50% IPC-7711/7721
Circuit Board Assembler	28	45	56	37% Entry 63% Mid-Level 0% Advanced	25% IPC-J-STD-001 25% IPC-7711/7721 50% IPC-A-610
Final Unit Assembler	14	45	71	20% Entry 80% Mid-Level 0% Advanced	25% IPC-J-STD-001 25% IPC-7711/7721 50% IPC-A-610
Pick & Place Machine Operator	7	7	38	0% Entry 67% Mid-Level 33% Advanced	100% IPC-A-610
Production Solderer	63	112	112	0% Entry 75% Mid-Level 25% Advanced	12% IPC-7711/7721 38% IPC-A-610 50% IPC-J-STD-001
Repair Solderer	14	45	76	0% Entry 75% Mid-Level 25% Advanced	20% IPC-A-610 40% IPC-7711/7721 40% IPC-J-STD-001
Repair Technician	7	21	7	0% Entry 67% Mid-Level 33% Advanced	33% IPC-7711/7721 33% IPC-A-610 34% IPC-J-STD-001
Screen Print Operator	7	7	0	0% Entry 100% Mid-Level 0% Advanced	None
Solderer Re-flow Operator	7	14	22	0% Entry 50% Mid-Level 50% Advanced	33% IPC-7711/7721 67% IPC-A-610
Solderer Inspector	14	21	14	0% Entry 100% Mid-Level 0% Advanced	25% IPC-J-STD-001 25% IPC-A-610 50% IPC-7711/7721
Test Technician	28	53	82	0% Entry 58% Mid-Level 42% Advanced	33% IPC-J-STD-001 67% IPC-A-610

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Food Processors

Skills	Current Vacancies	12-Month Vacancies	12 to 36 Month Vacancies	Desired Experience	Desired Certification
Batchmaker	14	14	48	0% Entry 100% Mid-Level 0% Advanced	None
Blender	14	31	48	50% Entry 25% Mid-Level 25% Advanced	None
Cook Machine Operator	14	14	48	50% Entry 25% Mid-Level 25% Advanced	None
Food Science Technician	14	31	48	0% Entry 75% Mid-Level 25% Advanced	None
Tester	7	7	24	100% Entry 0% Mid-Level 0% Advanced	None

Maintenance

Skills	Current Vacancies	12-Month Vacancies	12 to 36 Month Vacancies	Desired Experience	Desired Certification
Maintenance Engineer	7	0	7	0% Entry 100% Mid-Level 0% Advanced	None
Maintenance Technician	42	42	42	6% Entry 75% Mid-Level 19% Advanced	100% SMRP- Mn Mech
Maintenance Mechanic	95	88	122	8% Entry 67% Mid-Level 25% Advanced	20% FPS- FPwr Mech 40% NIMS- Mach Mn 40% SMRP- Mn Mech

Hillsborough-Pinellas Manufacturing Workforce Analysis

Materials Management

Skills	Current Vacancies	12-Month Vacancies	12 to 36 Month Vacancies	Desired Experience	Desired Certification
Buyer	21	28	28	40% Entry 20% Mid-Level 40% Advanced	None
Inventory Control	42	28	35	50% Entry 50% Mid-Level 0% Advanced	50% APICS- Prod. Mngr. 50% APICS- Supply Chn.
Inventory Manager	21	14	7	100% Entry 0% Mid-Level 0% Advanced	None
Materials Scheduler	14	14	14	50% Entry 50% Mid-Level 0% Advanced	None
Shipper & Receiver	28	28	21	33% Entry 67% Mid-Level 0% Advanced	None
Warehouse Worker	35	60	119	67% Entry 33% Mid-Level 0% Advanced	None

Fabricators

Skills	Current Vacancies	12-Month Vacancies	12 to 36 Month Vacancies	Desired Experience	Desired Certification
Assembler	28	53	78	43% Entry 57% Mid-Level 0% Advanced	None
Fabricator	28	57	28	44% Entry 44% Mid-Level 12% Advanced	None
Fitter	34	57	24	12% Entry 63% Mid-Level 25% Advanced	None
CNC Metal Forming Operator	7	7	14	0% Entry 100% Mid-Level 0% Advanced	None
CNC Press Brake Operator	14	28	14	12% Entry 63% Mid-Level 25% Advanced	None
CNC Programmer	14	14	21	33% Entry 33% Mid-Level 34% Advanced	None
CNC Punch Press Operator	0	0	0	None	None

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CNC Water Jet Operator	7	7	14	0% Entry 100% Mid-Level 0% Advanced	None
Laser Cut Operator	0	7	7	0% Entry 0% Mid-Level 100% Advanced	None

Machining

Skills	Current Vacancies	12-Month Vacancies	12 to 36 Month Vacancies	Desired Experience	Desired Certification
CNC EDM Operator	14	7	14	10% Entry 60% Mid-Level 30% Advanced	33% ISA CNC 33% NIMS Diemaking 2 34% NIMS Machining 3
CNC Machine Operator	83	81	88	17% Entry 50% Mid-Level 33% Advanced	50% ISA CNC 25% NIMS Machining 2 25% NIMS Machining 3
CNC Machinist	74	95	116	13% Entry 54% Mid-Level 33% Advanced	29% ISA CNC 29% NIMS Machining 1 42% NIMS Machining 3
CNC Programmer	28	28	53	21% Entry 50% Mid-Level 29% Advanced	100% ISA CNC
Cutter Grinder	7	7	7	50% Entry 25% Mid-Level 25% Advanced	100% NIMS Machining 3
Die Maker	0	21	7	0% Entry 67% Mid-Level 33% Advanced	50% NIMS Diemaking 2 50% NIMS Machining 3
EDM Operator	31	7	14	33% Entry 50% Mid-Level 17% Advanced	100% NIMS Machining 3
Lathe Operator	21	21	45	25% Entry 25% Mid-Level 50% Advanced	50% ISA CNC 25% NIMS Machining 1 25% NIMS Machining 3
Mill Operator	45	35	28	12% Entry 38% Mid-Level 50% Advanced	33% ISA CNC 33% NIMS Machining 1 34% NIMS Machining 3
Mold Maker	12	28	14	0% Entry 60% Mid-Level 40% Advanced	50% NIMS Machining 1 50% NIMS Machining 3
Surface Grinder	14	31	31	25% Entry 50% Mid-Level 25% Advanced	33% ISA CNC 33% NIMS Machining 1 34% NIMS Machining 3

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Welding

Skills	Current Vacancies	12-Month Vacancies	12 to 36 Month Vacancies	Desired Experience	Desired Certification
Brazier	14	14	21	0% Entry 67% Mid-Level 33% Advanced	None
Fabricator	14	14	14	67% Entry 0% Mid-Level 33% Advanced	None
Flux-core Welder	31	41	57	33% Entry 50% Mid-Level 17% Advanced	None
Metals Solderer	7	7	7	0% Entry 100% Mid-Level 0% Advanced	None
Mig Welder	38	67	53	14% Entry 36% Mid-Level 50% Advanced	100% AWS Cert. Welder
Robotic Welding Operator	7	7	14	0% Entry 100% Mid-Level 0% Advanced	None
Stick Operator	7	21	21	0% Entry 17% Mid-Level 83% Advanced	100% AWS Cert. Welder
Tig Welder	38	67	53	0% Entry 44% Mid-Level 56% Advanced	100% AWS Cert. Welder
Ultrasonic Welder	0	0	0	None	None
Welder-Fabricator	45	60	60	0% Entry 58% Mid-Level 42% Advanced	100% AWS Cert. Welder

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Plastics

Skills	Current Vacancies	12-Month Vacancies	12 to 36 Month Vacancies	Desired Experience	Desired Certification
Assembler	7	21	31	83% Entry 17% Mid-Level 0% Advanced	None
Extruder Operator	0	7	7	0% Entry 50% Mid-Level 50% Advanced	None
Injection Molding Operator	7	21	14	50% Entry 25% Mid-Level 25% Advanced	None
Mold Maker	14	7	7	0% Entry 25% Mid-Level 75% Advanced	None
Mold Technician	14	7	7	0% Entry 25% Mid-Level 75% Advanced	None
Processing Machine Operator	21	21	14	67% Entry 33% Mid-Level 0% Advanced	None

Production Technical Support

Skills	Current Vacancies	12-Month Vacancies	12 to 36 Month Vacancies	Desired Experience	Desired Certification
Automation Specialist	7	21	21	0% Entry 50% Mid-Level 50% Advanced	None
Controls Engineer	14	14	14	0% Entry 75% Mid-Level 25% Advanced	None
Industrial Engineer	14	28	28	12% Entry 75% Mid-Level 13% Advanced	None
Lean Manufacturing Specialist	0	7	7	0% Entry 0% Mid-Level 100% Advanced	None
Manufacturing Engineer	28	35	57	13% Entry 56% Mid-Level 31% Advanced	50% 6-Sigma Green 50% SME Mfg. Eng.

Hillsborough-Pinellas Manufacturing Workforce Analysis

Manufacturing Technician	0	7	0	0% Entry 100% Mid-Level 0% Advanced	100% SME Lean
Mechatronics Engineer	0	0	0	None	None
Mechatronics Technician	0	0	0	None	None
Process Engineer	28	35	35	10% Entry 50% Mid-Level 40% Advanced	100% 6-Sigma Green
Six Sigma Black Belt	0	14	14	0% Entry 50% Mid-Level 50% Advanced	None
Six Sigma Green Belt	0	14	14	0% Entry 0% Mid-Level 100% Advanced	None

Quality Assurance

Skills	Current Vacancies	12-Month Vacancies	12 to 36 Month Vacancies	Desired Experience	Desired Certification
Calibration Specialist	14	7	7	100% Entry 0% Mid-Level 0% Advanced	None
Quality Engineer	42	28	42	21% Entry 36% Mid-Level 43% Advanced	50% ASQ- Mngr Quality 50% ASQ- Quality Engr.
Quality Inspector	67	57	49	18% Entry 36% Mid-Level 46% Advanced	14% ASQ- Quality Tec. 86% ASQ- Quality Inspt.
Quality Technician	45	7	14	17% Entry 83% Mid-Level 0% Advanced	100% ASQ- Quality Tec.
Reliability Engineer	38	0	0	None	None

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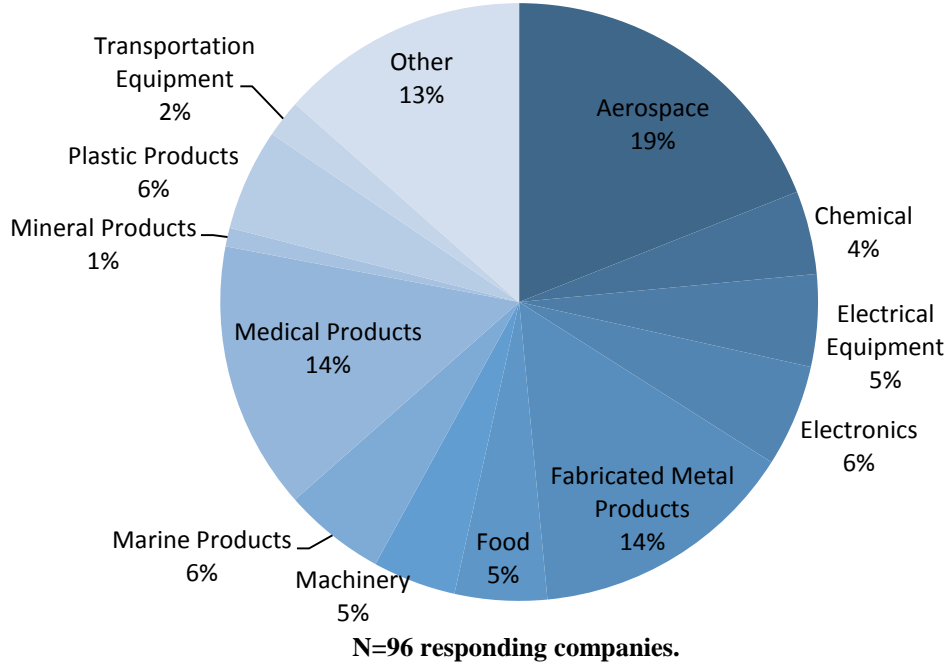
Supervision

Skills	Current Vacancies	12-Month Vacancies	12 to 36 Month Vacancies	Desired Experience	Desired Certification
Administrative	7	0	21	100% Entry 0% Mid-Level 0% Advanced	100% Bachelors
First Line Supervisor	28	35	35	12% Entry 50% Mid-Level 38% Advanced	100% Bachelors
Foreman	21	28	38	0% Entry 25% Mid-Level 75% Advanced	100% Bachelors
Production Lead	38	53	63	25% Entry 75% Mid-Level 0% Advanced	50% Associates 100% Bachelors
Site Safety Specialist	7	7	7	0% Entry 0% Mid-Level 100% Advanced	None

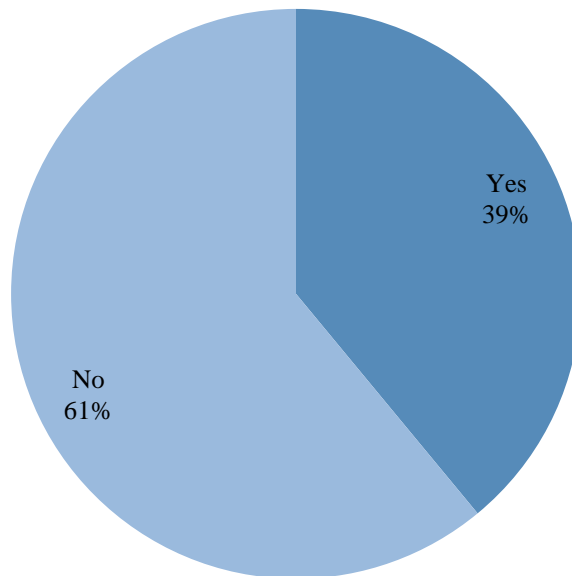
Hillsborough-Pinellas Manufacturing Workforce Analysis

Appendix II – Data from Phase I

Please check the major market segments that your organization serves:



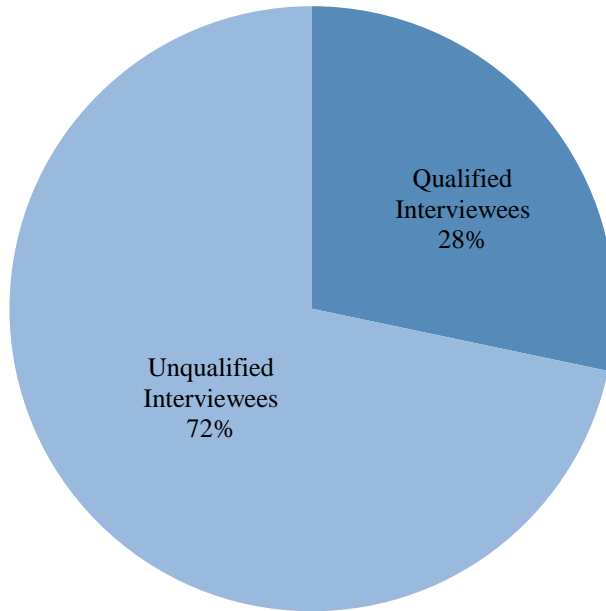
Have vacant positions presented barriers to your company's growth?



N=105 companies responding.

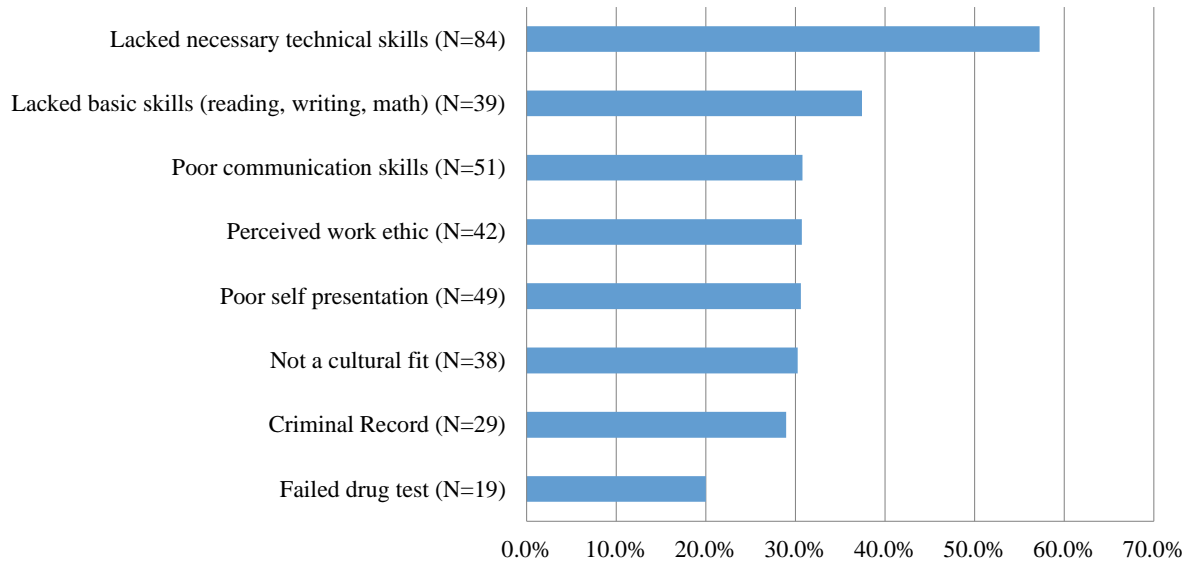
Hillsborough-Pinellas Manufacturing Workforce Analysis

How many potential hires has your company interviewed in the past 6 months, and how many of those did your company feel were qualified?



N=103 Responding Companies. 2,427 were interviewed and 686 were qualified.

Of those not qualified, please estimate percents for the reasons they were not qualified:



N=91 Total Respondents

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Appendix 3 - Calculation Methodology

Respondents were asked to select a range for each of their current vacancies. Next a value was assigned to each range that was $\frac{1}{4}$ of the distance between the two ends of the range. Each assigned value was then multiplied by the number of responses its corresponding range received. Since our sample accounted for 24.7% of the population, we multiplied our sample by 4.04 to equate it to the population. Our population is taken to be the NAICS codes 31-33 employment for Hillsborough and Pinellas counties, excluding NAICS code 323 (printing), from the June 2012 Florida Department of Economic Opportunity NAICS employment report. Adjustments were made to flux-core welders, fitters, cable assemblers, electronic test technicians, solder re-flow operators, repair solderers, and plastics assemblers, because of unique company situations that caused the data to be exaggerated in certain time periods. Adjustments were made to fit special case time period responses with the other two time periods' responses.

Example:

Warehouse Worker	1-4	5-9	10-19	20-29	30-39	40+
Assigned Weight	1.75	6	12.25	22.25	32.25	40
Responses X Weight	5 X 1.75	1 X 6	0 X 12.25	0 X 22.25	0 X 32.25	0 X 40
Total in Sample	8.75	6	0	0	0	0
Sample X Equating Factor	8.75 X 4.04	6 X 4.04	0 X 12.25	0 X 4.04	0 X 4.04	0 X 4.04
	35.35	24.24	0	0	0	0
					=	60 vacancies

Experience Level Calculation

Respondents were asked to select the desired experience levels from entry, entry & mid-level, entry & advanced, mid-level, mid-level & advanced, and advanced. If an experience level was selected that comprised two levels, such as entry & mid-level, each level was assigned a value of .5. Experience level percentages were derived based on the total number of experience responses.

Certification Calculation

Respondents were asked to select certifications they desired for each job the selected a vacancy. Certification percentages were derived based on the total number of certification responses.

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Appendix 4 – Job Descriptions for In-Demand Positions

Position	Job Description	Training Required
1. Production Solderer	Production solderers apply solder along adjoining edges of work pieces to solder joints. They may use solder irons, gas torches, or electric-ultrasonic equipment. They also might examine seams for defects and rework defective joints or broken parts.	High school diploma, training
2. CNC Machinist	CNC machinists use computer programming to enable machines to perform multiple tasks. They typically work in the production area and are able to quickly make changes to alter machines as needed. CNC machinists might also spend time programming outside of the production area. They must have knowledge of the materials that are manipulated as well as the sophisticated programs that are used to control machines.	High school diploma, CNC training
3. Industrial Maintenance Mechanic	Maintenance mechanics repair, install, adjust, or maintain industrial production machinery. Advanced training and knowledge of the machines they repair is required. Many maintenance mechanics work as operators or technicians first to gain exposure to the machines.	Associates, advanced knowledge of machinery
4. CNC Machine Operator	CNC machine operators manage the daily tasks of machines. They will work directly with one or a small number of machines. They do not program any of the machines. CNC machine operators can use their experience to become CNC machinists, and then CNC programmers.	High school diploma, CNC training
5. Mig Welder	Mig welders combine two metals by using a filler wire with a current to produce an electrode. The welding process is user-friendly and welds can be made quickly.	High school diploma, training
6. Tig Welder	Tig welders join reactive metals using a non-consumable Tungsten electrode. The welds are precise and are performed on higher priced products. Tig welders require an advanced welding skill set.	High school diploma, training
7. Cable Assembler	Cable Assemblers use wiring, soldering, and molding processes to assemble cables, wires, and connectors. Most use a variety of hand tools throughout the day. They must have a firm understanding of measuring devices.	High school diploma, training
8. Welder-Fabricator	Welder-Fabricators combine and bend metals. They may have training in various types of welding. A complete understanding of metals and safety is required.	High school diploma, training
9. Warehouse Worker	Warehouse workers receive, store, and distribute materials. They must maintain inventory records. Many warehouse working positions require heavy lifting and bending.	High school diploma, training
10. Quality Inspector	Quality inspectors conduct routine and non-routine analyses of raw materials, in-process materials, and finished goods. They may offer recommendations on how to adjust the manufacturing process to increase quality. They must have a firm understanding of basic mathematics and statistics.	High school diploma, training

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11. Mechanical Design Engineer	Mechanical design engineers design or improve tools and products. They usually create designs using physical models or computer-aided design (CAD) software. They are critical to manufacturers that create evolving products. Most specialize in a specific product, such engines or medical devices.	Bachelors or masters
12. Fitter	Fitters combine materials to create a product by using welding or machining. They must have a firm understanding of basic mathematics and measuring devices.	High school diploma, training
13. Fabricator	Fabricators bend and mold materials to create a product by using welding or machines. They must have a firm understanding of basic mathematics and measuring devices.	High school diploma, training
14. Electro-Mechanical Assembler	Electro-mechanical assemblers position, align, and fasten units to assemble or modify electro-mechanical equipment. They use many hand tools and power tools. They must have a firm understanding of measuring devices.	High school diploma, training
15. Production Lead	Production leads direct and assist work activities and employees. They correct production problems, schedule employees, and ensure that products are completed on time.	Associates or bachelors
16. Assembler-Fabricators	Assembler-fabricators combine existing products and materials to create new products. In addition to assembly process knowledge, they must have knowledge of fabrication. They use many hand tools and power tools. They must have a firm understanding of measuring devices.	High school diploma, training
17. Electronics Test Technician	Electronics test technicians inspects and test electronic products to ensure that they function as designed. If a product does not perform as designed, they will make minor adjustments to the electronics, propose changes, or send the product to be repaired by someone with more advanced knowledge of their functionality.	Associates, training
18. Electrical Assembler	Electrical assemblers install electrical systems. They must be able to read blue prints, be comfortable in confined spaces, and have a complete understanding of electricity.	High school diploma, training
19. Circuit Board Assembler	Circuit board assemblers position, align, and fasten units to assemble circuit boards. They use many hand tools and power tools. The work requires skilled dexterity. They must have a firm understanding of measuring devices.	High school diploma, training
20. Electrical Test Technician	Electrical test technicians inspects and tests electoral systems to ensure that they function as designed. If a system does not function as designed, they will make minor adjustments to the system, propose changes, or inform an electrical engineer of the inadequate functionality.	Associates, training
21. Final Unit Assembler	Final unit assemblers add final components and makes adjustments to electronic products. They typically have an advanced knowledge of the product and are able to make adjustments to the product before sending it to testing or to be shipped.	High school diploma, training

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22. Repair Solderer	Production solderers apply solder along adjoining edges of work pieces to solder joints. They may use solder irons, gas torches, or electric-ultrasonic equipment. They also might examine seams for defects and rework defective joints or broken parts.	High school diploma, training
23. Maintenance Technician	Maintenance technicians perform task work to repair, install, adjust, or maintain industrial production and processing machinery. They must have a basic understanding of machines and the ability to use common hand and power tools.	Associates, training
24. Electrical Technician	Electrical technicians install, inspect, and test electrical systems. They must also be able to understand blueprints and be able to explain the processes that they use.	Associates, training
25. Mill Operator	Mill operators perform many daily line tasks required in production. Oftentimes this will include operating CNC machines, but it could include other tasks, such as using holding devices, measuring instruments, or hand tools.	High school diploma, CNC training

Hillsborough-Pinellas Manufacturing Workforce Analysis

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