

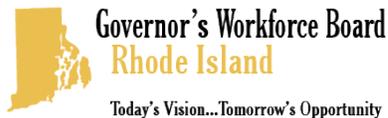
The Manufacturing Industry: Producing Rhode Island's Future

A Report of the Manufacturing Industry Partners

Sponsored by
Governor's Workforce Board – Rhode Island

In Partnership with
Rhode Island Manufacturing Extension Service
Workforce Strategy Center

November 2013



ACKNOWLEDGEMENTS

We would like to thank the Governors Workforce Board Rhode Island for their generous support of this paper, and RIMES staff who connected us to the right people, supplied us with needed background materials, and provided thoughtful help and guidance. We also recognize the contribution of Marc Anderberg of Texas State Technical College who produced all of the Goodness of Fit studies and provided his sage advice as to how the information could be used effectively. Finally, we appreciate the input of the MIP Advisory Board members, schools and colleges, focus group participants and many stakeholders who gave of their time and shared their insights all of which informed the report and recommendations. They include:

Marc Amato, Walco	Gerry Lussier, Mahr Federal Inc.
Mike Backus, Blount Fine Foods	Wendy Mackie, RI Marine Trades Association
David Baum, Raytheon	Gerry Manning, Davies Career-Tech High School
Dan Bennett, Wardwell Braiding	Dave Marquis, ChemArt
Carolyn Blecharczyk, Hodges Badge	Frank McCann, Thielsch Engineering
Marcia Blount, Blount Boats	William McCourt, RIMA
Matthew Bodah, URI	Raymond Morris, Thielch Engineering
Robert Calef, ChemArt	Donna Murray, RIDLT
Sherrí Carello, GWBRI	Karen Paolucci, Yushin America
Stephanie Chamberlin, Ximedica	Chuck Paul, Guill Tool
Briar Dacier, Davies Career-Tech High School	Caroline Petrucci, Tiffany & Co.
Chris Deignan, Hope Global	Craig Pickell, Bullard Abrasives
Beth Eustis, TORAY	Dean Plowman, NEIT
Mike Fedele, Hodges Badge	Harsha Prakash, RIMES
Dora Fino, International Packing Corp.	Fred Santaniello, NEIT
Ruth Gobeille, RIMES	Robin Smith, CCRI
Greg Gongaware, Tiffany & Co.	Valerie Maier Speredelozzi, URI
Cherie Hersperger, Boston Scientific	Peter VanLancker, Hunt Yachts
Connie Horton, Rhode Island College	Ellis Waldman, Walco
Jim Jestude, BMSRI	Peter Woodberry, CCRI

Julian L. Alssid & Melissa Goldberg, Workforce Strategy Center

CONTENTS

Executive Summary	4
Introduction	6
Background & Context	6
Manufacturing in Rhode Island	7
Rhode Island’s Workforce	11
Focus Group Findings	12
Rhode Island Manufacturing Workforce Challenges	20
Addressing the Challenges	22
Recommendations & Next Steps	25

EXECUTIVE SUMMARY

In the summer of 2012, the Rhode Island Manufacturing Extension Service (RIMES) was awarded a grant from the Governor's Workforce Board Rhode Island (GWBRI) to establish a Manufacturing Industry Partnership. This industry-driven group, representative of a diverse cross-section of employers in the manufacturing sector, was to be engaged in collaborative partnerships with the workforce development system in order to effectively address the workforce needs of manufacturing companies and their current and emerging workforce. The Manufacturing Industry Partnership (MIP) was established in November, 2012. During its first eight months of operation, the group has studied Rhode Island's manufacturing labor market, focusing its efforts on occupations where there are pipeline gaps, and laid out a strategy and a model for addressing those gaps.

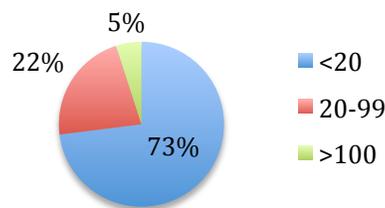
The MIP was launched in November 2012 with a meeting of 12 members. The group met monthly between November 2012 and May 2013 discussing goals for their work together, agreeing to a process for pursuing their goals and identifying challenges they wanted to address. That process included reviewing and providing feedback on the secondary labor market information helping to convene focus groups, providing input on the findings of those activities, and setting the agenda for beginning to address the challenges faced.

MANUFACTURING IN RHODE ISLAND

The 1,513 establishments that currently make up the state's manufacturing industry are projected to employ 40,650¹ in 2020,

making it the fourth largest industry sector, by size of the labor force, in the state.² The average annual salary for manufacturing jobs was \$63,383 (2010), \$17,054 higher than the \$46,325 average compensation for all private, non-farm occupations in the state.³ Clearly these positions offer an opportunity for a career with a family-supporting wage. The vast majority (73%) of Rhode Island's manufacturers employ fewer than 20 workers, 22% between 20 and 99 workers with 5% of the firms employing 100 or more.⁴ The workers are engaged in a variety of activities with the largest concentrations falling into the production and engineering areas.

**RI Manufacturing Companies
of Employees**



1,513 Manufacturing Companies

The secondary and primary labor market research and the Manufacturing Summit, held in May, 2013, led to the identification of challenges that Rhode Island's manufacturers face in recruiting and retaining workers. These challenges fall into three focused categories: Policy, Education, and Industry.

CHALLENGES

Policy

Challenge 1: Need for Manufacturing Internships, Apprenticeships and On-the-Job Training Opportunities for High School Students

Challenge 2: Lack of Attention to Manufacturing By State Leaders

Education

Challenge 3: Few Educational Programs Exist to Support Manufacturing

Challenge 4: Lack of Hands-on Experience Among Applicants

Challenge 5: Current Jobseekers Lack Basic Skills Needed to Perform on the Job

Industry

Challenge 6: Manufacturers are Facing an Aging Workforce and Looming Retirements

Challenge 7: Students and Job Seekers Don't Look To Manufacturing Careers

RECOMMENDATIONS AND NEXT STEPS

Recommendation 1:

Utilize the results of the initial Goodness of Fit Studies to finalize curricula and launch new programs.

Recommendation 2:

Address the skills gaps through the development of bridge programs contextualized to manufacturing.

Recommendation 3:

Develop a marketing plan to promote the new educational programs among Rhode Island manufacturers to engage them in recruitment in hiring of program graduates.

Recommendation 4:

Engage state leaders and the funding community to get behind the MIP efforts to launch new programs and promote the industry.

INTRODUCTION

In the summer of 2012, the Rhode Island Manufacturing Extension Service (RIMES) was awarded a grant from the Governor's Workforce Board Rhode Island (GWBRI) to establish a Manufacturing Industry Partnership. This industry-driven group, representative of a diverse cross-section of employers in the manufacturing sector, was to be engaged in collaborative partnerships with the workforce development system in order to effectively address the workforce needs of manufacturing companies and their current and emerging workforce. The Manufacturing Industry Partnership (MIP) was established in November, 2012. During its first eight months of operation, the group has studied Rhode Island's manufacturing labor market, focusing its efforts on occupations where there are pipeline gaps, and laid out a strategy and a model for addressing those gaps.

RIMES engaged Workforce Strategy Center (WSC), a nonprofit research and consulting organization focused on workforce development, to conduct primary and secondary labor market research to learn about the current state of manufacturing in Rhode Island, produce a gap analysis, and to facilitate a pilot process for aligning curriculum to the needs of Rhode Island manufacturing employers. The findings of each of these activities were to be used to inform recommendations for future MIP work. To do so WSC analyzed labor market data, conducted industry focus groups, and consulted area educational institutions to determine how their curricula match up with the

needs of the industry. WSC also facilitated discussions among the members of the MIP advisory board and worked with RIMES to plan and implement a Manufacturing Summit.

The ultimate goal of the engagement was to produce an actionable plan that is informed by data, is cost effective, and will lead to a workforce development model that can be scaled to include more businesses and more workers to support a healthy economy for Rhode Island.

This report lays out the findings of the WSC's activities from October, 2012 through June 2013, and offers recommendations for addressing the workforce needs of Rhode Island's manufacturing industry.

BACKGROUND & CONTEXT

After more than two decades of decline, and the loss of over 5 million jobs in the decade from 2000 to 2009⁵, manufacturing is now experiencing a resurgence. The United States has witnessed manufacturing job growth—500,000 new jobs have been created since 2010. August 2013 signaled the fastest growth of the nation's manufacturing sector in two years as did demand for goods.⁶ Moreover, we are producing more products on American soil. In fact, a new term, "reshoring", has been coined to mean "...the reclamation of manufacturing jobs that had been previously lured away to other countries that offered lower wages or other incentives to U.S. manufacturers to move their operations or outsourcing overseas."⁷ U.S. output has increased as well. A 2012

PricewaterhouseCoopers LLC (PwC) study cited a variety of reasons for this trend—rising labor costs in China, increased productivity among U.S. workers, declining energy costs, and a continuing large demand for goods in the U.S.⁸

While news looks good, there is speculation as to whether or not this uptick in both employment and production signals a manufacturing renaissance or simply a market correction. The Obama administration has fallen on the side of economists who believe there is potential for much greater growth, and is pushing policies to support that growth. President Obama has rolled out a plan to invest in manufacturing to support employment. This builds on previous efforts such as the launching of the industry-led Advanced Manufacturing Partnership (AMP), comprised of business, universities and the federal government, charged with charting “a course for investing and furthering the development of the emerging technologies that will create high quality manufacturing jobs and enhance U.S. global competitiveness.”⁹

The previous decline and recent growth of the industry has impacted the creation of a workforce pipeline. For over a decade workers have shunned manufacturing due to factory closings and lack of jobs. Educational programs have closed down, and there is a general lack of knowledge among the potential workforce as to what it means to work in a 21st century factory. In fact, a 2011 survey of 1,123 manufacturers

conducted by The Manufacturing Institute and Deloitte Consulting LLP found that “67% of respondents reported a moderate to severe shortage of available, qualified workers, with 5% of current jobs – 600,000—unfilled due to a lack of qualified workers.”¹⁰ The industry will not be able to grow without a pipeline of qualified workers to get the job done.

MANUFACTURING IN RHODE ISLAND

How does Rhode Island fit into the national context? Manufacturing is part of the fabric of the state, starting with the opening of the Slater Mill in 1793 and the establishment of the jewelry industry in the early 19th century.¹¹ The state was among the earliest in the industrial revolution and was built on a manufacturing tradition. Strong in manufacturing throughout the first-half of the twentieth century, the state’s economy changed after World War II. Manufacturing amounted to 29% of the state’s economy in 1963, but fell to 16% in 1997. By 2011 that number was cut in half again to 7.9%.¹²

Today, the 1,513 establishments that currently make up the state’s manufacturing industry are projected to employ 40,650¹³ in 2020, making it the fourth largest industry sector, by size of the labor force, in the state.¹⁴ Table 1 shows the largest industry sub-sectors, by numbers employed, which comprise the state’s manufacturing industry. The table also shows that manufacturing employment is projected to grow two percent between 2010 and 2020.



Table 1: RI Manufacturing Industry Employment Trends



Source: Rhode Island Department of Labor and Training

(Underlying data table in Appendix)

The average annual salary for manufacturing jobs was \$63,383 (2010), \$17,054 higher than the \$46,325 average compensation for all private, non-farm occupations in the state.¹⁵

Clearly these positions offer an opportunity for a career with a family-supporting wage. The vast majority (73%) of Rhode Island’s manufacturers employ fewer than 20 workers, 22% between 20 and 99 workers with 5% of the firms employing 100 or more.¹⁶

The workers are engaged in a variety of activities with the largest concentrations falling into the production and engineering areas. Tables 2 and 3 below list production and engineering jobs in Rhode Island, the numbers of workers in each, the

projected change in demand for these workers between 2010 and 2020, and the average hourly wage for operations and engineering workers.

The job titles of particular interest for the purposes of the MIP activities are those that show a healthy projected demand for workers, offer a family supporting wage, and the possibility for career advancement. Also important, the MIP identified occupations for which manufacturers have great difficulty finding qualified candidates. Examples of those types of production jobs from Table 2 are machinists, welders and computer controlled machine tool operators. The overall demand for engineers is smaller, though

many of the positions listed are

projecting a growth in demand.

W **Table 2: RI Production Occupations Employment Trends** **RIMES**
Increasing profitability and competitiveness.

Occupational Title	2010	2020	% Change	Current Openings	Median Wage
	Average Employment	Projected Employment			
Team Assemblers	3,924	4,091	4%	944	\$11.08
First-Line Supervisors of Production and Operating Workers	2,316	2,376	3%	363	\$28.24
Helpers--Production Workers	1,499	1,643	10%	392	\$8.81
Inspectors, Testers, Sorters, Samplers, and Weighers	1,324	1,427	8%	391	\$14.47
Machinists	1,268	1,363	7%	328	\$20.68
Welders, Cutters, Solderers, and Brazers	804	902	12%	313	\$18.89
Bakers	720	750	4%	238	\$12.17
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	597	669	12%	186	\$18.06
Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	558	585	5%	120	\$13.09
Cabinetmakers and Bench Carpenters	493	548	11%	177	\$17.05
Printing Press Operators	521	531	2%	112	\$17.94
Packaging and Filling Machine Operators and Tenders	464	498	7%	110	\$10.69
Computer-Controlled Machine Tool Operators, Metal and Plastic	397	493	24%	172	\$17.48

Source: Rhode Island Department of Labor and Training

W **Table 3: RI Engineering Occupations Employment Trends** **RIMES**
Increasing profitability and competitiveness.

Occupational Title	2010	2020	% Change	Current Openings	Median Wage
	Average Employment	Projected Employment			
Electronics Engineers, Except Computer	1189	1147	-4%	287	\$53.73
Mechanical Engineers	967	966	0%	311	\$44.04
Civil Engineers	603	684	13%	203	\$39.44
Industrial Engineers	491	535	9%	151	\$38.87
Electrical Engineers	416	463	11%	147	\$44.85
Environmental Engineers	294	354	20%	125	\$39.31
Computer Hardware Engineers	266	287	8%	84	\$49.30
Health and Safety Engineers	151	174	15%	56	\$36.95
Materials Engineers	68	78	15%	29	\$39.22
Biomedical Engineers	35	61	74%	34	\$43.99

Source: RI Department of Labor and Training

ADVANCED MANUFACTURING COMPETENCY MODEL

The Employment and Training Administration of the United States Department of Labor (ETA) has partnered with industry to identify necessary competencies, and produce a model to graphically display those competencies. The purpose of these competency models is to “serve as a resource to inform discussions among industry leaders, educators, economic developers, and public workforce investment professionals”¹⁷ in their efforts to prepare the workforce for careers in the industry and ensure

business have access to a qualified workforce. The manufacturing career competency model below was developed by the ETA in partnership with The Manufacturing Institute, The Society of Manufacturing Engineers, and the National Council for Advanced Manufacturing. The competencies mirror those that were indicated in discussions with Rhode Island manufacturers as will be described in the focus group section below.

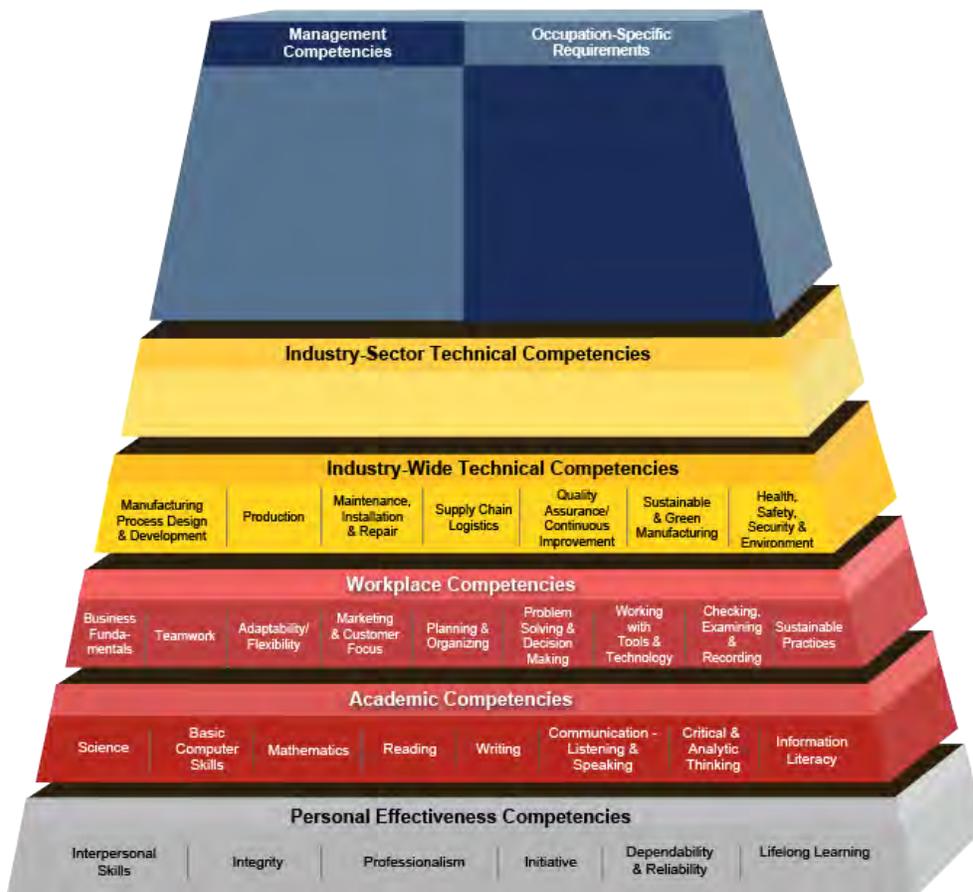


Figure 1: Advanced Manufacturing Competency Model¹⁸

Source: CareerOneStop, U.S. Department of Labor Employment and Training Administration, State of Minnesota

RHODE ISLAND'S WORKFORCE

According to the United States Census, Rhode Island's population in 2012 was estimated to be 1,050,292, 64% of whom are of working age (between 18 and 64) and 15% were 65 or older. Among residents over age 25, 84.3% possess a high school degree or equivalent, or higher, and 30.6% have earned a bachelors degree. Thirteen percent were born outside of the United States and 21% speak a language other than English at home.¹⁹ Approximately 14% of Rhode Islanders work outside of the state.²⁰ On average, Rhode Islanders spend 23 minutes commuting to work.²¹

SCHOOL SYSTEM

Rhode Island's public school system is comprised of 300 schools; pre-school, elementary, middle, and high schools serving 143,000 students. There are 12 colleges and universities in the state including three public and the remaining private institutions. Along with the postsecondary institutions is a network of adult education programs. Comprised of a series of non-profit and community-based organizations and administered by the Rhode Island Department of Education (RIDE), these programs are geared to low-skilled adults and offer GED preparation, workforce training and English for speakers of other languages. There are also adult education programs in job preparation classes geared to career pathways in a variety of industries. These programs are offered in the classroom and online. RIDE partners with the Governor's Office and GWBRI to ensure these adult education programs are aligned and have a focus on preparing Rhode Islanders at all levels for upward mobility through college and career mobility.²²

RHODE ISLAND'S WORKFORCE DEVELOPMENT SYSTEM

GWBRI is the primary policy making entity for workforce development in the state. GWBRI is comprised of business leaders, organized labor, post-secondary educational institutions and the Department of Labor and Training. This group works to establish a "unified vision of workforce development and blend funding streams to make efficient and targeted investments."²³ Programs are administered either through GWBRI itself or through the Rhode Island Department of Labor and Training. Available programs include grants for employers, paid internships, an online labor exchange, and the provision of a variety of funding to individuals through the Workforce Investment Act and other funds.

MANUFACTURING INDUSTRY

PARTNERSHIP

GWBRI supports industry partnerships in eight industries of key importance to the state. These partnerships, made up of businesses, educational institutions and key stakeholders, establish initiatives and strategies to address the skills gaps that exist between Rhode Island's workforce and the needs of the industry in order to create a well-qualified workforce pipeline.

GWBRI awarded a grant to Rhode Island Manufacturing Extension Service (RIMES) to establish a Manufacturing Industry Partnership (MIP). The MIP, launched November 2012 with 12 members, met monthly through May 2013. They identified goals, agreed to a process to pursue these goals, and identified challenges. The process included reviewing and providing feedback on the secondary labor market information, helping to convene focus groups, providing input on the findings of those activities, and setting the agenda to address the challenges faced.

FOCUS GROUP FINDINGS

In January 2013 WSC conducted four focus groups among 17 manufacturers from across the state. The participants represented both large and small companies as well as long-time Rhode Island-based businesses and those new to the state. Participating businesses represented a variety of manufacturing sub-sectors including:

- Boat Building
- Food Production
- Jewelry Making
- Machining
- Medical Device
- Photochemical Etching
- Plastic Packaging
- Precision Manufacturing/Robotics
- Textiles
- Tool and Dye

During those sessions employers discussed employment projections as well as their concerns about workforce skills and jobs they have difficulty filling, their partnerships with educational institutions, and challenges they face which inhibit their ability to grow their businesses. These are articulated below.

Workforce Recruitment Challenges

Lack of basic skills among job seekers

When asked about recruitment of new workers and barriers to advancing the current workforce, manufacturers were consistent with their responses. They are seeking workers with basic math and computer skills. Employers lamented the weak communications, analytical and problem solving abilities they have seen in the workforce and seek individuals able to work in teams. Finally, across the board,

employers are seeking workers who have had hands on experience through previous work, apprenticeships, or internships, for example.

Misunderstanding about Rhode Island's Manufacturing Industry

These manufacturers highlighted one challenge they face in recruiting talent. There is a lack of understanding among job seekers, students, guidance counselors, policy makers and other stakeholders about the industry, and the good, career track jobs available in manufacturing.

Policy Issue Preventing Work Experiences for High School Students

Focus group participants pointed to a state regulation prohibiting employers from placing youth apprentices or students under the age of 18 on the manufacturing floor. This meant they were unable to bring in students from the vocational high schools to provide them with meaningful on-the-job experiences.

Problem Job Titles – Employers Can't Find Workers

Focus group participants provided a list of the job titles they find most difficult to fill. These include the following:

- Assemblers
- CNC machine tool operators
- Craft workers
- Machinists
- Marine electricians
- Process engineers
- Tool Makers
- Welders

Lack of Educational Programs to Support Industry

In describing manufacturing skills gaps employers discussed the fact that there are few, if any, educational programs that prepare individuals for these positions. They also noted the lack of understanding about and interest in manufacturing as a

career. In one case an employer new to Rhode Island described her efforts to recruit for entry-level positions. She advertised in the newspaper, worked with DLT to post the jobs on EmployRI.org, and attended job fairs to recruit for entry-level positions requiring a high school diploma or GED and the ability to speak English. This company offers tuition assistance and benefits. She had no applicants for these positions. She has now turned to temporary agencies to fill the positions.

Recruitment Methods

Focus group participants use a variety of techniques to recruit new talent. All of these employers utilize online resources including their own company websites, LinkedIn, Monster.com, and Indeed.com to name a few. Many advertise in the *Providence Journal* and several have partnered with DLT and EmployRI. Some attend career fairs. Many hire temporary agencies and put into place a temp-to-perm arrangement. All work through word of mouth, many utilizing an employee referral incentive program.

Education and Training Models

All of the focus group participating companies offer some form of on the job training for new hires. In addition many bring in vendors to address niche needs such as lean manufacturing or English as a Second Language. Some have well-developed online training programs, others offer tuition assistance to support employee advancement.

These employers indicated they work with educational institutions both within and outside of Rhode Island to recruit qualified workers. However, they expressed frustration with the lack of Rhode Island-based programs available to meet their workforce needs. They pointed, for example, to the closing of Community College of Rhode Island's (CCRI) manufacturing

program, and indicated that few programs exist to support manufacturing. The Rhode Island schools indicated that they must meet minimum enrollment requirements in order to justify offering their programs. In the case of the programs which closed at CCRI, the college was unable to fill their classes and therefore was forced to close the programs.

Several employers indicated they recruit from as far away as Rochester Institute of Technology because of the mix of academic and hands-on experience their students receive. Many indicated a willingness to partner with educational institutions to build out programs, help them to remain current and provide for that on-the-job experience.

At the high school level manufacturers indicated a preference for the graduates of Diman Regional Vocational-Technical High School, located in Massachusetts, over Davies Career-Tech High School (Davies) students, both because Diman's facilities are more up-to-date and due to its work experience model. Diman employs a Co-Operative Education model whereby 16- and 17-year-old students who are seniors in good standing are placed with an employer and work during an alternating two-week schedule—two weeks working followed by two weeks in the classroom. The program is attractive to students as it affords them the opportunity to gain experience and earn money. Generally two students are placed with the employer. While one student is working another is studying. Therefore the employer has a consistent worker in that co-op position. The model gives the employer a first look at these workers whom they often hire once the students graduate. Until recently, Rhode Island state regulations prevented Davies from implementing a similar model. Due in large part to efforts on the part of the Rhode Island Manufacturers Association (RIMA) and others, on July 24, 2013 Governor

Chaffee signed into law legislation allowing students to gain those hands on skills in a manufacturing environment.

Other schools from which these employers have recruited in the past include University of Rhode Island’s Engineering program, Rhode Island College’s Metalsmithing program, Center for Dynamic Learning, Thielsch Welding School, Mass Maritime and Rhode Island School of Design. They also pointed to Johnson and Wales’ strong internship program.

PILOTING AN EFFORT TO ALIGN CURRICULUM WITH EMPLOYER NEEDS

Presented with the data, the MIP determined that a pilot program, looking at curricula from local institutions and comparing the curricula to employer skills needs would be an appropriate next step. The group decided to focus in on programs that prepare workers for two job categories: CNC Machine Tool Operators and Process Engineers.

WSC then presented its workforce demand findings to Rhode Island based educational institutions and discussed the opportunity to work with them using data analytics to help to identify where their programs match employer needs and where there are gaps. Three educational institutions have or are developing programs that prepare workers for jobs as computer-controlled machine tool operators or process engineers, Davies, CCRI and New England Institute of Technology (NEIT). Each submitted their curricula to undergo a “Goodness of Fit” study.

The Goodness of Fit studies make use of “big data” that factor into workforce development—online job postings, resumes, labor market information and curriculum. The analysis was developed using real-time Labor Market Intelligence (LMI) tools to analyze the educational institutions’

programs to determine the “goodness of fit” against industry needs.

The **Goodness of Fit** is calculated using the following formula: $X/X+Y$

X = Total number of skills that are common to the job posting and the curriculum

Y = Total number of skills that appear in the job posting but are missing in the curriculum.

These data are processed using semantic and data analytics. What these tools are doing is not unlike the technology imbedded in handheld translation devices used by soldiers in Iraq and Afghanistan to translate between English and local dialects.

The Goodness of Fit studies provide the institutions with a detailed list of the skills they are offering, the skills required in the jobs for which they are preparing their students and a comparison between the two. The skills identified are tied in large part to those described in the Advanced Manufacturing Competency Model provided on page 10. The reports are useful both to inform internal conversations and those the educational institutions have with employers around student preparation and curriculum development.

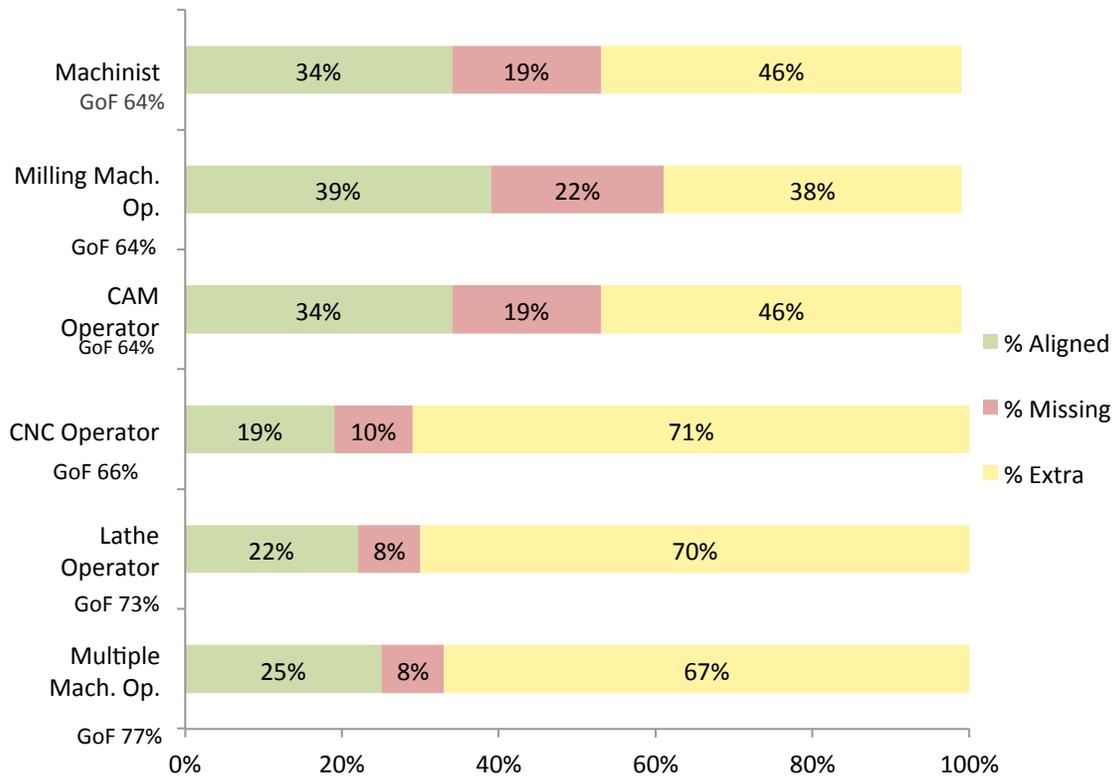
The three institutions submitted four curricula to be assessed. The skills identified in the curricula were matched up against real time job postings. The results of these analyses show that in fact the skills incorporated into the curricula match those that are sought after by employers. Each is described below.

DAVIES CAREER-TECH HIGH SCHOOL

Davies submitted its machinist curriculum for grades 10 through 12. The curriculum was compared against job postings for such positions as CAM operator, CNC machine tool operator, Lathe turning Machine Operator, Machinist, Milling Machine Operator and Multiple Machine Operator. The initial results indicated a strong match (over 60% for most jobs and over 70% for some, with one at 54%) between the curriculum and job descriptions. The majority of missing skills related to those the students would receive by undertaking more hands-on activities or working in a

manufacturing environment as a part of the curriculum. Davies administrators and faculty are reviewing the information to determine if in fact they are currently teaching some of the skills that did not come through in initial review. Once they are satisfied with the report, they may then use it to determine if there are ways they might look to increase that match. They are challenged by the need to meet state curricular requirements that may inhibit their ability to alter the curriculum.

Figure 2: Roadmap for Machining Program



Produced by: Marc Anderberg, Texas State Technical College

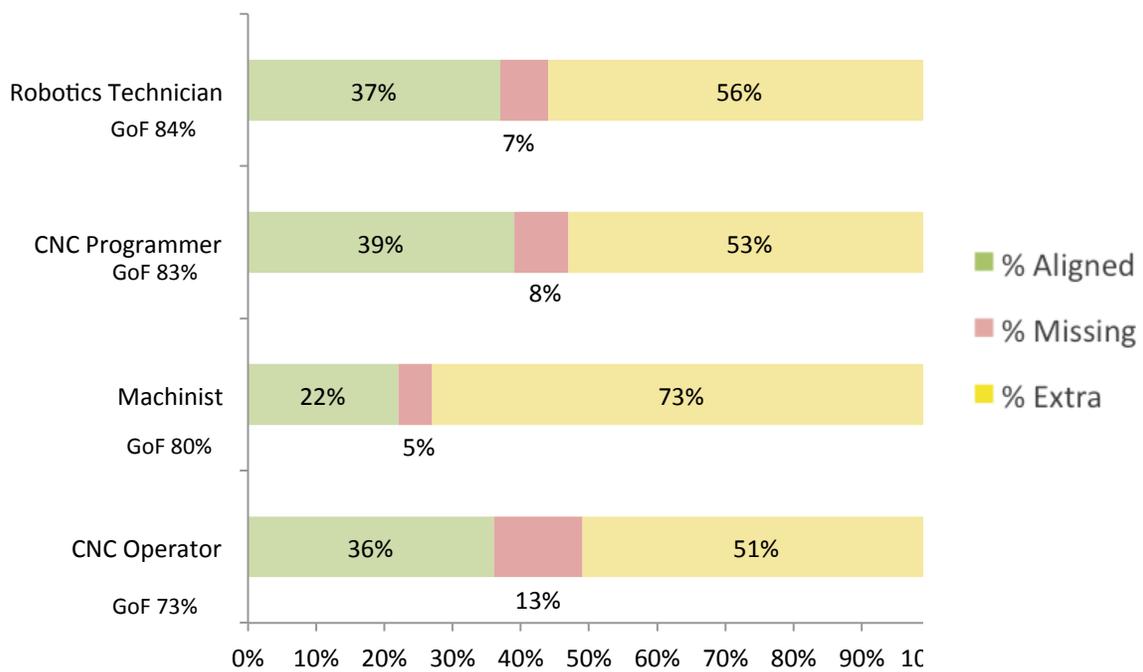
% Aligned = Curricula aligned with job postings
 % Missing = In Job postings, Missing in Curricula
 % Extra = In Curricula, not in Job Postings

**COMMUNITY COLLEGE OF RHODE ISLAND
ETCI CNC Manufacturing Certificate Program**

CCRI submitted curricula for two newly developed manufacturing certificate programs: CNC Manufacturing Certificate Program and CNC and 3D Modeling Certificate. The Manufacturing program was compared to job postings for four job titles: Robotics Technician, CNC Programmer, Machinist, and CNC Operator.

The initial findings indicated a high correlation between the curriculum and the skills required in the occupations for which they are preparing students (between 73% and 84%).

Figure 3: Roadmap for ETCI CNC Manufacturing Certificate Program



Produced by: Marc Anderberg, Texas State Technical College

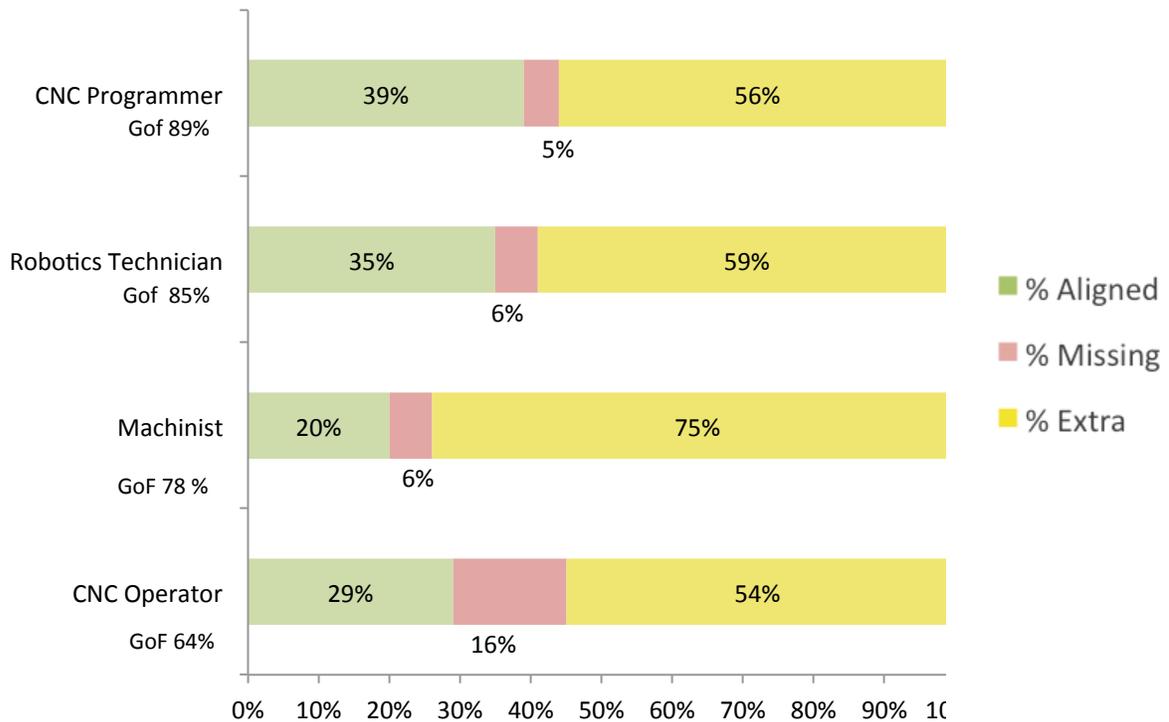
% Aligned = Curricula aligned with job postings
 % Missing = In Job postings, Missing in Curricula
 % Extra = In Curricula, not in Job Postings

**COMMUNITY COLLEGE OF RHODE ISLAND
CNC and 3D Modeling Certificate Program**

Similarly, the 3-D Modeling Certificate was matched up against job postings for the same four job titles. Again, the curriculum appeared to offer many of the skills required for these positions (between 64% and 89%). Many of the skills missing from these curricula relate to opportunities to apply what students are learning in a hands-

on environment. The reports have been provided to College administrators who are reviewing the results to determine how they might use the information for any adaptations to the curriculum and/or to inform discussions with Rhode Island Manufacturers.

Figure 4: Roadmap for CNC and 3D Modeling Certificate Program



Produced by Marc Anderberg, Texas State Technical College

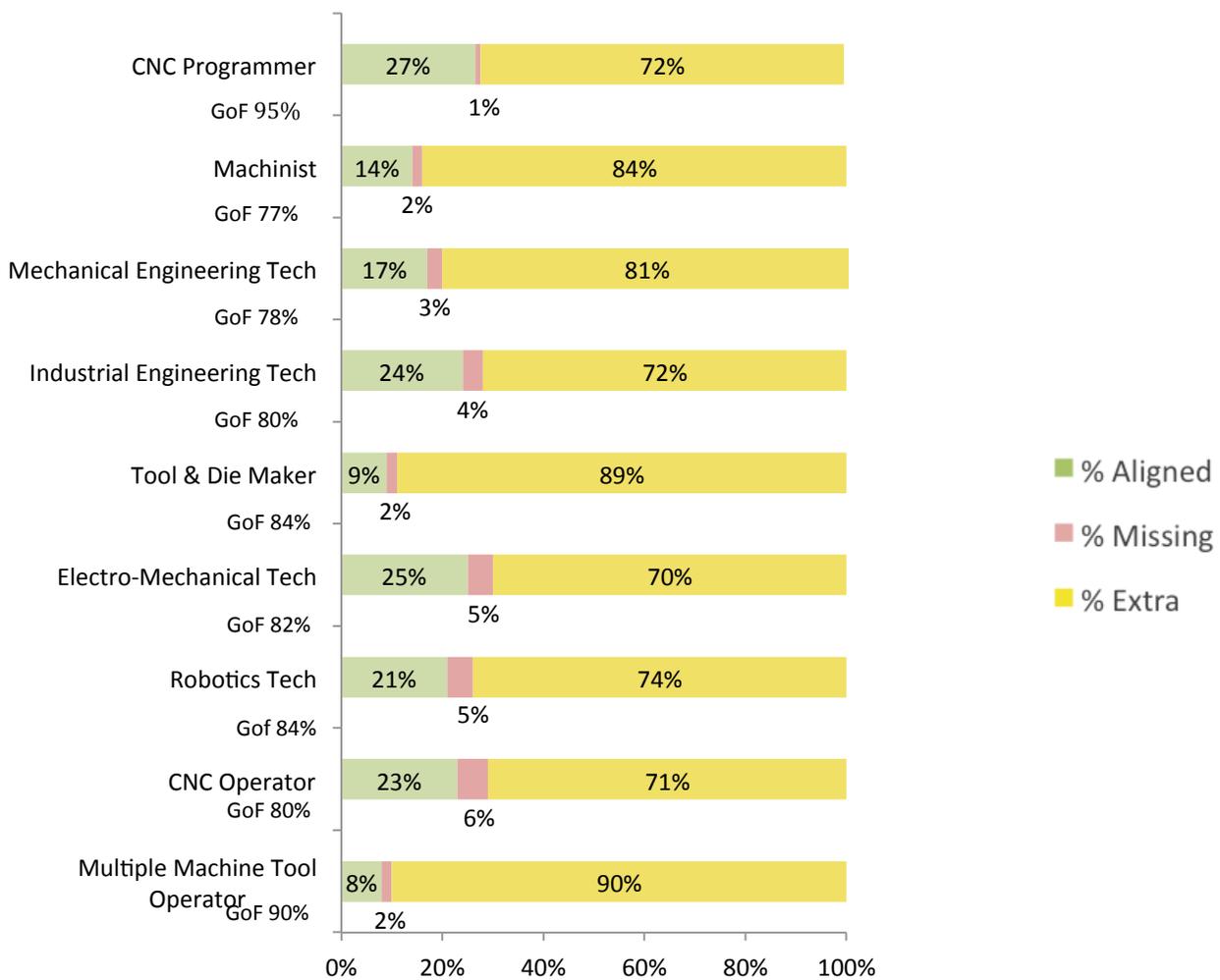
% Aligned = Curricula aligned with job postings
 % Missing = In Job postings, Missing in Curricula
 % Extra = In Curricula, not in Job Postings

NEW ENGLAND INSTITUTE OF TECHNOLOGY

NEIT submitted their Mechanical Engineering Technology program for review. This curriculum was matched up against 9 job titles for which it is preparing its students (CNC Programmer, Machinist, Mechanical Engineer Technician, Industrial Engineering Technician, Tool and Die Maker, Electro-Mechanical Technician, Robotics

Technician, CNC Operator and Multiple Machine Tool Operator). The initial report indicated a very high degree of match between the content of the program and the skills required on the job (between 77% and 95%) indicating that the curriculum lines up well with the job requirements for which they are preparing their students.

Figure 5: Roadmap for NEIT MCTA Program



Produced by: Marc Anderberg, Texas State Technical College

% Aligned = Curricula aligned with job postings
 % Missing = In Job postings, Missing in Curricula
 % Extra = In Curricula, not in Job Postings

Overall the Goodness of Fit analyses of the Davies, CCRI, and NEIT curricula suggest that, despite the concerns of Rhode Island manufacturers, there is curriculum in place to address basic manufacturing workforce needs. Now the schools and manufacturing employers need to use the reports to inform curriculum and the design of internships, apprenticeships, and other work experience programs for future and incumbent manufacturing workers. Additionally, all of the institutions will need assistance from the manufacturers to promote the programs to policy makers and prospective students.

MANUFACTURING WORKFORCE SUMMIT

In an effort to engage a broader group in MIP activities, the MIP sponsored a Manufacturing Workforce Summit. Approximately 85 stakeholders attended this session on May 20, 2013. Those in attendance included manufacturers, schools, colleges and universities, policy makers, economic development representatives and funders. The purpose of the meeting was to share the findings to date of the MIP activities and to listen to questions and comments from the collected group. The program included a discussion of the Governor's Workforce Board's Industry Partnerships, sharing of the MIP's first year goals and a panel discussion among employers and educational institutions about meeting the workforce training needs of the Rhode Island manufacturing community. During the panel discussion representative employers were asked to detail why they are actively engaged in activities to address the workforce needs of their industry. The educators were asked to describe the challenges they face in preparing a workforce that meets the needs of Rhode Island's manufacturing industry. The panelists described how they are

partnering to address workforce needs and suggested ways the MIP might foster greater connections between educators and employers.

The agenda also featured guest speaker, Marc Anderberg from Texas State Technical College who spoke about ways the state of Texas is using labor market information and detailed work activities to hone college curriculum so that college graduates possess the skills that businesses need. He and Julian L. Alssid of Workforce Strategy Center spoke about the research findings in Rhode Island, and discussed ways the work in Texas can inform how Rhode Island prepares its manufacturing industry workforce. The assembled group was encouraged to ask questions and share comments. Their line of questioning and responses to speakers indicated their agreement on the research findings.

RHODE ISLAND MANUFACTURING WORKFORCE CHALLENGES

The secondary and primary labor market research and the Manufacturing Summit led to the identification of challenges that Rhode Island's manufacturers face in recruiting and retaining workers. These challenges fall into three Categories: Policy, Education, and Industry.

Policy

Challenge 1: Need for Manufacturing Internships, Apprenticeships and On-the-Job Training Opportunities for High School Students

Employers pointed to regulations preventing individuals younger than 18 from working in Rhode Island production facilities. These regulations prevent manufacturing employers from exposing high school students to the type of work they do and affording the students an opportunity for hands-on learning.²⁴ Not faced with this challenge, neighboring Massachusetts has established internship programs so that their vocational technical high school students are able to obtain on-the-job work exposure giving them a leg up as they look for employment upon graduation.

Challenge 2: Lack of Attention to Manufacturing By State Leaders

Manufacturers described frustration with the lack of attention manufacturing has received from state policymakers. They feel invisible. During one focus group, a business owner, whose plant has been in Rhode Island for generations, was surprised to learn that leading state policy makers were unaware of the company's existence in the state. Other business leaders said they had similar experiences. Instead of attention focused on manufacturing the state has promoted other industry sectors including

health care, biotech, and travel and tourism. As resources have been diminishing, so has the support of the state toward manufacturing.

Education

Challenge 3: Few Educational Programs Exist to Support Manufacturing

There are few educational or training programs in Rhode Island that prepare students and workers to enter and advance in the manufacturing industry. MIP members pointed to the closing of four Community College of Rhode Island's certificate programs in 2012 as an example. Educational institutions, in turn, cite lack of enrollments in those programs as the cause of those closures. Businesses recruit, instead, from educational and training programs outside of Rhode Island, but are competing with other markets on salary and cost of living, making it difficult to attract those workers.

Challenge 4: Lack of Hands-on Experience Among Applicants

Hands-on experience and exposure to the industry are crucial for the success of worker recruitment. Employers indicated that educational programs in and of themselves are not enough to support the manufacturing workforce. Schools and colleges need to incorporate opportunities for hands-on experiences through apprenticeships, internships and other means.

Challenge 5: Current Jobseekers Lack Basic Skills Needed to Perform on the Job

MIP members described job applicants who lack English language, basic math and communications skills. While true of the general application pool, a recent study by the Latino Policy Institute at Roger Williams University found that English Language

Learners in Rhode Island are among the lowest performers of English Language learning in the country.”²⁵This lack of English skills among the largest growing population in the state impacts those students’ ability to learn and perform in other school topics.

Industry

Challenge 6: Manufacturers are Facing an Aging Workforce and Looming Retirements

Boston College’s Center on Aging and Work found that in 2008 the median age of Rhode Island’s workers was 41.3. It was reported at that time that the manufacturing industry was among the most likely to be impacted, with several manufacturing sectors reporting more than one-quarter of their workforce between the ages of 50 and 59. Furthermore, 22.7% of production workers at the time were between the ages of 50 and 59.²⁶ MIP members described the aging workforce as a major workforce problem they face. They are losing qualified workers who possess industry know-how, and do not have qualified workers in the pipeline to replace them.

Challenge 7: Students and Job Seekers Don’t Look To Manufacturing Careers

Manufacturers discussed difficulties in engaging and attracting students to the manufacturing industry. They describe a lack of understanding among job seekers, students, guidance counselors, policy makers and other stakeholders about the industry, and the good, career track jobs available in manufacturing.

ADDRESSING THE CHALLENGES

National Perspective (how other regions, states and funders are addressing similar challenges)

Many regions and states across the country are confronting similar challenges and limitations to those found in Rhode Island. Rhode Island may look to these models for inspiration in addressing its challenges.

Providing Hands-On Experience for High School Students

Lehigh Career and Technical Institute²⁷ Schnecksville, Pennsylvania

Lehigh Career and Technical Institute (LCTI) is a vocational school that provides high school students and adults with the academic and technical knowledge needed to succeed in higher education and careers. For high school students LCTI runs its Career Academy Program (CAP) which provides at-risk students from the nine participating school districts with an alternative education, designed to help them achieve a high school diploma and work toward a career goal in a program of choice. Through CAP, students receive academic instruction as well as career and technical training.

LCTI also operates a Cooperative Education Program (CO-OP) which allows high school seniors to work at a job using the skills learned while attending Lehigh Career & Technical Institute. Students are placed into CO-OP positions with local employers. Through CO-OP students are able to gain hands-on experience, work with a mentor, and receive formal evaluations to indicate where they need improvement. CO-OPs are offered in more than 25 occupational areas spanning from office technology, to cabinetmaking to culinary arts, health care and CADD to name a few.

Made in Florida

Made in Florida is a collaborative effort among industry, education and workforce

development stakeholders. Made in Florida was born out of a grant from the National Science Foundation to create the Florida Advanced Technological Education Center (FLATE), the “go-to organization for manufacturing and advanced technical education, best practices and resources for supporting the high performance skilled workforce for Florida’s manufacturing sectors.”²⁸ Made in Florida was created to promote manufacturing careers through outreach initiatives. The initiative sponsors professional development programs, has produced an effective website, and oversees an annual manufacturing day. Through Made in Florida over 2,500 students and 250 teachers have been on tours to over 40 manufacturing sites, and has responded to more than 18,000 requests for information about manufacturing careers. Since its inception Made in Florida has reached over 47,000 middle and high school students.²⁹

Addressing the Need to Upgrade Jobseeker Skills

Connecting populations with barriers to job and career opportunities is a challenge that a number of regions have taken on with some measure of success. Bridge programs help adult students get the academic, employability, and technical skills they need to enter and succeed in postsecondary education and training programs leading to careers. To increase educational levels, bridge programs are structured to meet the needs of adult participants—instruction is offered at times and places convenient to working adults, they incorporate a “learning-by-doing” format, and allow students to study at their own pace. Central Piedmont Community College’s Pathways to Employment is an example of an effective bridge program.

Central Piedmont Community College³⁰ Pathways to Employment

Central Piedmont Community College (CPCC) in Charlotte, North Carolina manages the HVAC Pathways to Employment (Pathways) to prepare students in and around Charlotte, North Carolina, as entry-level heating, ventilation, and air conditioning technicians. The program includes a pre-bridge, certification bridge, and other stackable credentials designed to lead to additional education and training. The pre-bridge helps to bring low-literacy students up to the 9th or 10th grade reading level they need to enter the HVAC Pathways program. Through the program students earn stackable credentials and local industry recognized skills. HVAC is considered a stepping stone that will lead to additional education and training. The students are largely male, African American (85 percent) and unattached from the labor market (99 percent). Many are chronically unemployed or living in extreme poverty, and a number of them are ex-offenders. CPCC has enjoyed a relationship with Goodwill Industries' educational program for 35 years. In addition to educational services, students in the program receive wrap-around support services through the local Goodwill Industries. Also a partner, the Workforce Investment Board's (WIB) OneStop Center staff recruit, screen, and refer suitable individuals for Pathways. Employers are an integral component of the HVAC Pathways program and are regularly in touch with CPCC. Employers provide input into curriculum design, participate in career expos, and attend classes to conduct workshops and mock interviews. The results: between 1997 and 2010 nearly 2,000 students had completed the program with 63% placed in jobs with 9 months of the program and 64% enrolling in additional courses at CPCC. On average students demonstrated nearly 2 grade level improvement in reading and 3.5 grade level

improvement in their math scores as a result of the program.³¹

Aligning Curriculum to Industry Needs Texas State Technical College: Curriculum Tuning and Alignment Project³²

The primary goal of this project was to pilot the development of a responsive, comprehensive, and accurate system for aligning the curricula of technical programs with current industry needs, and to produce graduates whose skills are more closely matched to the needs of employers. The project translated learning outcomes into the Texas Workforce Commission Detailed Work Activities (DWA), collected occupational data from more than 2,000 employers, and conducted a gap analysis to compare existing learning outcomes with industry skills. Based on this process, curricula for five academic programs at Texas State Technical College were redesigned to more closely align with job performance requirements for industry. In 2012-2013, the project further validated the new alignment system, developed new automated tools to facilitate the curriculum matching process, and began introducing the curriculum redesign tools at partnering colleges. The State of Texas is now building on this approach to create a portfolio of targeted certifications to meet the needs of high demand industries.

The program partners in this process are Texas State Technical College, Texas Workforce Commission, Texas Higher Education Coordinating Board, SkillsNET, Detailed Work Activity Research Institute and more than 15 employers.

STEPS UNDER WAY IN RHODE ISLAND

Rhode Island is already addressing a number of the challenges manufacturers are confronting. For those challenges that are not resolved, Rhode Island may want to look to promising practices in other states as a way of informing steps employers, educational institutions and/or policy makers may take to address and resolve those challenges.

Internships, Apprenticeships, Co-Ops for Youth

The Rhode Island Manufacturers Association (RIMA) and its members worked with policy makers to ensure that Rhode Island career and technical high schools have the opportunity to provide for student work experiences similar to those that Diman Regional High School provides to its students. In June of this year the General Assembly approved legislation which would revise the state's labor laws allowing high school students to train at approved manufacturing sites.³³ The bill was signed into law on July 24th, 2013.^{34 35}

Need for Focus on Manufacturing in Rhode Island

The new Made in Rhode Island legislation passed in July of this year will shine a light on the products that are produced in Rhode Island with a goal of increasing Rhode Island's market share.^{36 37}

Lack of Hands-On Experience Among Jobseekers

Two initiatives are now under way in Rhode Island that could represent a big step in providing hands-on experiences for students. The first, described above, would allow high school students to work in approved manufacturing sites. The second is new RI Work Immersion Program. Through this program \$500,000 have been set aside to underwrite internships for students 18 years and older. Internships must last between 45 and 200 hours, provide meaningful work experience for the intern and pay at least the Rhode Island minimum wage.³⁸

Few Educational Programs Exist to Support Manufacturing

The schools and educational institutions are working to address the needs of Rhode Island's manufacturers. New England Institute of Technology has utilized grant funding to establish a new manufacturing technology program. Similarly, the Community College of Rhode Island has worked to develop two manufacturing certificate programs. These institutions, as well as Davies Career and Technical High School are all working to develop or upgrade curricula designed to prepare a qualified manufacturing workforce for Rhode Island.

RECOMMENDATIONS & NEXT STEPS

The recommendations below address steps the MIP, educators and other stakeholders may take to address the manufacturing workforce gaps. They focus in on program development and roll-out, promotion and marketing of the industry and policy. They

build on initiatives the MIP has already set in motion and suggest next steps which can be taken to embed this work as Rhode Island looks to sustain and grow its manufacturing sector.

Recommendation 1:

Utilize the results of the initial Goodness of Fit Studies to finalize curricula and launch new programs.

Davies, CCRI and NEIT have worked to respond to manufacturers cries for local educational programs to meet their needs. The schools should use the Goodness of Fit studies as a launch pad for discussion with employers to gather needed input so the schools can close the gaps identified and finalize their programs. To facilitate that process the schools and MIP should undertake the following steps:

- MIP should establish a curriculum review committee to work with the schools to discuss their curricula, help the schools to address the curricular gaps, and discuss appropriate methods for rolling out the new programs.
- The schools and MIP should tap into the new programs to afford students the opportunity for internships, apprenticeships and other hands-on experiences.
- Through a committee focused on internship and apprenticeship, the MIP can partner with the schools and the RIDLT to develop and help facilitate internship and apprenticeship programs, certifications and opportunities.
- Jointly the MIP and the schools should develop a recruitment plan to bring students into the new programs. That plan should include engaging the Rhode Island Department of Education (RIDE), the GWBRI, RIDLT, RIEDC and other appropriate stakeholders.
- The MIP and schools should gather data on program implementation to help with both continuous improvement and expansion of the goodness of fit process to the broader manufacturing community.

Recommendation 2:

Address the skills gaps through the development of bridge programs contextualized to manufacturing

- Work with GWBRI, RIDE, NetworkRI and other appropriate stakeholders to convene a meeting among adult education providers, community-based organizations and others to advise the of the results of this study.
- Identify funding to support the development of a bridge to production careers as well as an ESL program contextualized to production careers.
- Pilot the new bridge programs ensuring articulation with the new CCRI and NEIT programs as appropriate.

Recommendation 3:

Develop a marketing plan to promote the new educational programs among Rhode Island manufacturers to engage them in recruitment in hiring of program graduates

- The MIP should establish a marketing and promotions committee to support outreach of manufacturing generally and promotion of the new educational programs specifically.
- The MIP should work with the Manufacturing Renaissance Project and the Made in Rhode Island Consortium to ensure workforce is front and center to their agendas. In that way not only will Rhode Island products be promoted within the state and across the county, but the industry will also be promoted among prospective workers.

Recommendation 4:

Engage state leaders and the funding community to get behind the MIP efforts to launch new programs and promote the industry.

- Working with the colleges and schools, the MIP should establish a funding agenda to determine where resources are needed to promote manufacturing and implement the new educational programs.
- Share that agenda with the GWBRI to elicit their support in reaching out to other possible funders.
- Reach out to State legislators to seek their support in removing policy barriers which may inhibit program implementation.

Appendix



Table 1: RI Manufacturing Industry Employment Trends



Industry Title	2010 Employment	2020 Employment	Percent Change
Rhode Island Manufacturing Total	39,847	40,650	2.0%
Fabricated Metal Product Manufacturing	5,615	5,700	1.5%
Computer & Electronic Product Manufacturing	3,731	3,900	4.5%
Transportation Equipment Manufacturing	3,171	3,500	10.4%
Chemical Manufacturing	2,889	3,400	17.7%
Food Manufacturing	2,940	3,160	7.5%
Plastics & Rubber Products Manufacturing	2,361	2,600	10.1%
Machinery Manufacturing	1,664	1,830	10.0%
Printing & Related Support Activities	1,529	1,600	4.6%
Primary Metal Manufacturing	1,367	1,550	13.4%
Furniture & Related Product Manufacturing	1,269	1,390	9.5%
Electrical Equipment, Appliance, & Component Manufacturing	1,229	1,300	5.8%

Source: Rhode Island Department of Labor and Training

ENDNOTES

- ¹ Bureau of Labor Statistics and Moody's Analytics as reported in "Manufacturing Employment". Wall Street Journal. March 17, 2012.
<http://online.wsj.com/article/SB10001424052970204795304577223602514988234.html#articleTabs%3Dinteractive>.
- ² Labor Market Information Unit, Rhode Island Department of Labor and Training. "Rhode Island Employment Trends and Workforce Issues". Cranston, Rhode Island: November 2012. Page 2.
- ³ U. S. Bureau of Economic Analysis and U. S. Bureau of Labor Statistics as reported in Rhode Island Manufacturing Facts, National Association of Manufacturers. See
<http://www.nam.org/~media/174C40DD0D2C433382A65E68A40923AF.ashx>.
- ⁴ Labor Market Information Unit, Rhode Island Department of Labor and Training. Page 5.
- ⁵ Richard Henderson, "Employment Outlook 2010 – 2020: Industry Employment and Outlook Projections to 2020". *Monthly Labor Review*. Bureau of Labor Statistics, United States Department of Labor: Washington, DC, January 2013. Table 1, page 66.
- ⁶ Luciana Lopez, "U.S. Manufacturing, Construction Data Suggest Growth Pick Up". Reuters, September 3, 2013.
<http://www.reuters.com/article/2013/09/03/us-usa-economy-manufacturing-idUSBRE9820N820130903>.
- ⁷ IEEE-USA Staff, "Reshoring and the Resurgence of U.S. High-Tech Manufacturing". January 2013,
<http://www.todayengineer.org/2013/Jan/reshoring.asp>.
- ⁸ PwC, "A Homecoming for US Manufacturing? Why a Resurgence in US Manufacturing May Be The Next Big Bet".
<http://www.pwc.com/us/en/industrial-products/publications/us-manufacturing-resurgence.jhtml>.
- ⁹ <http://www.manufacturing.gov/amp.html>
- ¹⁰ The Manufacturing Institute, "Roadmap for Manufacturing Education Recommendations for Action: Executive Summary". December 2012. Page 1. For more information see report at
<http://www.themanufacturinginstitute.org/~media/DDB4265AC2F243FB97AEBA2A56CC7523.ashx>.
- ¹¹ See <http://www.visitrhodeisland.com/make-plans/facts-and-history/>.
- ¹² U. S. Bureau of Economic Analysis and U. S. Bureau of Labor Statistics as reported in Rhode Island Manufacturing Facts, National Association of Manufacturers. See
<http://www.nam.org/~media/174C40DD0D2C433382A65E68A40923AF.ashx>.
- ¹³ Bureau of Labor Statistics and Moody's Analytics as reported in "Manufacturing Employment". Wall Street Journal. March 17, 2012.
<http://online.wsj.com/article/SB10001424052970204795304577223602514988234.html#articleTabs%3Dinteractive>.
- ¹⁴ Labor Market Information Unit, Rhode Island Department of Labor and Training. "Rhode Island Employment Trends and Workforce Issues". Cranston, Rhode Island: November 2012. Page 2.
- ¹⁵ U. S. Bureau of Economic Analysis and U. S. Bureau of Labor Statistics as reported in Rhode Island Manufacturing Facts, National Association of Manufacturers. See
<http://www.nam.org/~media/174C40DD0D2C433382A65E68A40923AF.ashx>.
- ¹⁶ Labor Market Information Unit, Rhode Island Department of Labor and Training. Page 5.
- ¹⁷ See <http://www.careeronestop.org/competencymodel/pyramid.aspx>.
- ¹⁸ Reprinted from <http://www.careeronestop.org/competencymodel/pyramid.aspx?hg=Y>.
- ¹⁹ See <http://quickfacts.census.gov/qfd/states/44000.html>.
- ²⁰ <http://www.dlt.ri.gov/lmi/census/demo/commute.htm>
- ²¹ See <http://quickfacts.census.gov/qfd/states/44000.html>
- ²² See <http://www.ride.ri.gov/StudentsFamilies/EducationPrograms/AdultEducationGED.aspx>.
- ²³ See <http://www.gwb.ri.gov/Governor.htm>.
- ²⁴ See <http://www.rimanufacturers.com/News/?article=111>.
- ²⁵ James P. Huguley, "Latino Students in Rhode Island: A Review of National and Local Performances". The Latino Policy Institute of Roger Williams University. Spring 2013. Page 1.
- ²⁶ Michelle Wong, Tay McNamara, Sandee Shulkin, Chelsea Lettieri and Vanessa Caneiro, "Rhode Island Indicators: Aging and Work". The Center on Aging and Work at Boston College. MA: February 2008. Page 1.
- ²⁷ Drawn from <http://www.lcti.org/site/default.aspx?PageID=1>
- ²⁸ http://fl-ate.org/about_us/index.html.
- ²⁹ http://fl-ate.org/about_us/index.html.
- ³⁰ Excerpted from Julian L. Alssid, Melissa Goldberg and Sarah M. Klerk, "What Works :BridgeConnect Stories from the Field", Workforce Strategy Center, New York, NY: 2011. <http://www.workforcestrategy.org/what-works-bridgeconnect-stories-from-the-field-toc.html>

³¹Julian L. Alssid, Melissa Goldberg and Sarah Klerk, "What Works: BridgeConnect Stories from the Field", Workforce Strategy Center, New York: August 2011. <http://www.workforcestrategy.org/what-works-bridgeconnect-stories-from-the-field-case-studies.html#3>

³² From Texas State Technical College Perkins Leadership Grant website

(<http://www.waco.tstc.edu/perkinsskillsnetleadershipgrant/pslg>).

³³ <http://www.providencejournal.com/business/content/20130619-r.i.-legislation-would-allow-manufacturing-job-training.ece>.

³⁴ <http://webserver.rilin.state.ri.us/News/pr1.asp?prid=9640>.

³⁵ <http://webserver.rilin.state.ri.us/BillText13/SenateText13/S0950A.pdf>.

³⁶ <http://webserver.rilin.state.ri.us/News/pr1.asp?prid=9640>.

³⁷ <http://webserver.rilin.state.ri.us/BillText13/SenateText13/S0809A.pdf>.

³⁸ <http://www.gwb.ri.gov/pdfs/Internterms.pdf>.