Building an Advanced Manufacturing Pathway in West Central Ohio

A Study of Manufacturing Workforce Development Needs

Fall 2004

December 3, 2004

Dear Regional Stakeholders:

It is with pleasure that Rhodes State College shares with you the results of advanced manufacturing workforce interviews funded by KnowledgeWorks and the Ohio Board of Regents. The results that follow could be the foundation for training our manufacturing workforce for the next 3-5 years. The challenge for us as local, county and regional leaders is to respond to the communicated needs of regional industry to develop a prepared pool of workers to enhance the economic development efforts of our region. The challenge for industry is to use this pathway as a tool to maintain a prepared workforce.

Before we look inside the data in the next few pages, it is important to recognize the Community-based organizations and industry participants that have played a vital role in the development of this pathway to its current form. The names of these stakeholders are listed at the end of the report. Karen Lingrell, our project coordinator, worked intensively with our community-based organizations in the development of the pathway. Also, it is important to recognize the work of faculty and staff of the Rhodes State College Information Technology and Engineering Technology who conducted the interviews, as well as the committed effort of Jill Gear, Rhodes State Coordinator of Grant Development in bringing the interview findings and the pathway progress together in this document.

We hope you will join us in the implementation of the pathway for our region.

Thank you,

Matt Kinkley Ph.D.
Dean of Instructional Services
Rhodes State College

Dave Brown
Dean of IT/ET
Rhodes State College

The Challenge

Over the past several years, the manufacturing sector in West Central Ohio has undergone considerable change. The region has been economically compromised over the last eight years by a loss of approximately 15,000 manufacturing jobs due to plant closings and downsizings. As the global economy emerged, it became apparent that changes needed to be made in our region to compete not only on a national, but on an international level. A group of concerned citizens from manufacturing companies, community-based organizations, workforce development entities, human service organizations, and educational institutions collaborated to devise a two-pronged plan to increase manufacturing stability in the region.

This plan involved determining the current and future strategies of manufacturing operations in the region, and ensuring that employees with high-technology skills were available for existing and new regional manufacturers. To meet these goals, the stakeholders created and conducted a manufacturing survey and designed a career pathway in advanced manufacturing.

Ohio's path should be built on its manufacturing heritage to become the cutting-edge location for new products and processes through the application of research. Ohio can be a leader in advanced manufacturing and technology industries...The key to both advanced manufacturing and technology is product innovation-developing, designing, and manufacturing new products, and technology-driven production processes. - Battelle's report "Innovation-The Future of Ohio's Economy", 2002.

The Survey

In a lengthy report commissioned by the state of Ohio, advanced manufacturing in high-technology areas was targeted as a viable economic development tool in the new Knowledge Economy. Over thirty manufacturing processes and products were determined to contain these high-technology components most sought for economic stability. A review of regional manufacturers in the ten county area revealed that over 120 operations possessed a high-technology environment or had the potential to engage in high-tech manufacturing.

Adapting materials from the National Skills Standards Board (NSSB), the National Coalition for Advanced Manufacturing (NACFAM) National Voluntary Skill Standards for Advanced High Performance Manufacturing, and other best practices across the nation, the stakeholders developed a survey that focused on determining the current and future workforce skill needs of regional manufacturers.

Supported by a grant from the KnowledgeWorks Foundation and the Ohio Board of Regents, a team of professionals from Rhodes State College met individually with forty-three regional manufacturing representatives to conduct the survey. Of the forty-three organizations interviewed, 90% were classified as intermediate or advanced in their use of technology.

The purpose of these interviews was to identify job categories within each company, establish the current skill set levels of those job categories, determine the education or training required in each job category, and categorize workforce development issues. The interviews featured a comprehensive collection of current and future workforce statistics and trends.

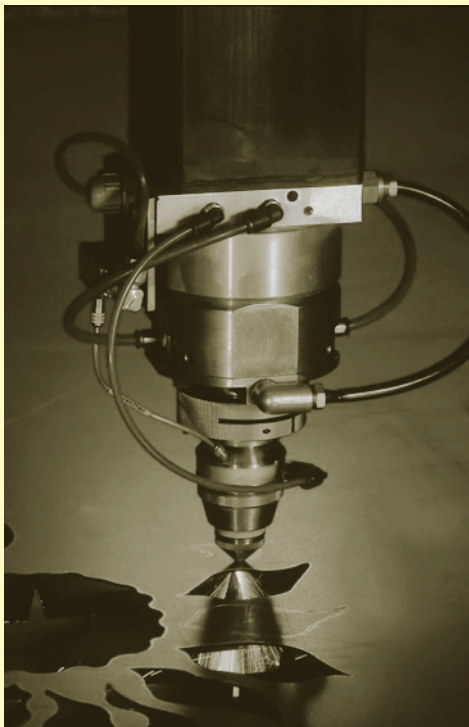
Initially, job categories were divided into six different levels:

- Job category 1 - unskilled,
- Job category 2 - semi-skilled,
- Job category 3 - entry-level skilled,
- Job category 4 - entry-level technician/apprentice,
- Job category 5 - skilled technician/journeyman, and
- Job category 6 - technical supervisor

Each organization identified the job categories appropriate for their workforce. It became apparent when analyzing the data that these six levels could easily translate into three categories-basic, intermediate and advanced (B/I/A).

During the interview process a picture emerged of the current and future needs of the manufacturing industry in the region. The survey results include:

- Job growth projections,
- Hiring and retention issues,
- Internal advancement opportunities,
- Educational requirements,
- Skill set requirements,
- Skill set gaps,
- Skill set gap impacts,
- Training needs, and
- Internship availability and opportunities.



Job growth projections:

Analysis of the data from the survey indicated that within the next one to five years 79% of regional manufacturers interviewed project jobs will be added. While a smaller percentage of these jobs will be for unskilled labor, the data suggests that the largest growth will be for those intermediate jobs with higher technical skills. Overall, the data shows a potential maximum growth projection of over 1300 employees for these forty-three companies within the next five years. Based on high range projections, fifty percent of the job growth will occur at the intermediate level. When considering the interviews only encompassed one-third of targeted manufacturers in the region, the potential for growth is much greater. This growth will come about through attrition from retiring baby-boomers, and changes made to existing processes and products.

Do You Need More Employees?						
B/I/A	Job Category	Yes*	Range of employees needed		Time frame for hiring (in months)	
			Low	High	Low	High
Basic	1	44%	22	180	1	36
	2	33%	46	267	1	40
Intermediate	3	46%	35	471	1	60
	4**	41%	34	205	1	40
Advanced	5**	46%	22	129	1	40
	6**	38%	17	89	1	40

*The percent of companies with this job category level who need more employees.

**Three companies are waiting to see if state contracts are awarded; if so, an increase in employees is anticipated in these categories above what is indicated.

Hiring and retention issues:

Overall, an average of 48% of employers found it difficult to hire and retain employees in all job categories. They cited the major contributing factors as turnover, lack of skill sets, lack of incentive to advance and external competition. The 52% who had no problem finding or retaining employees cited internal advancement, competitive wages, apprenticeship programs, and use of temporary agencies as reasons for keeping employees.

Do You Find It Difficult to Hire and Retain Employees?					
B/I/A	Job Category	Yes	Reasons	No	Reasons
Basic	1	42%	* Turnover	58%	* Use of Temporary agencies
	2	38%	* Turnover	62%	* Internal advancement * Use of Temporary agencies
Intermediate	3	52%	* Lack of skill sets	48%	* Internal advancement * Competitive wages
	4	42%	* Lack of skill sets * Lack of incentive to advance * External competition	58%	* Internal advancement * Competitive wages
Advanced	5	54%	* Lack of skill sets	46%	* Apprenticeship program * Competitive wages
	6	59%	* Lack of skill sets * External competition	41%	* Internal advancement

Internal advancement opportunities:

The majority of employers (87%) were advancing their employees internally from job categories one through six. Survey trends indicated that more entry-level opportunities are beginning at job category three.

Are You Moving Employees Up the Ladder?

B/I/A	Job Category	Yes	No
Basic	1	95%	5%
	2	75%	25%
Intermediate	3	83%	17%
	4	95%	5%
Advanced	5	83%	17%
	6	91%	9%

Educational requirements:

The data collected to determine the education needed throughout the region showed the following for each job category:

- Job Categories 1 & 2 - the vast majority of companies with employees at this level require a high school diploma/GED.
- Job Categories 3 & 4 - typically employees at this level require a high school diploma/GED as well as industry based certificates and/or an associate degree.
- Job Categories 5 & 6 - organizations with employees at this level indicate a heavy reliance on certifications, Associate's degrees, and Bachelor's degrees.

Skill set requirements:

Skill sets were divided into over 70 components grouped into eight categories. These categories were Communication/Teamwork, Workplace Skills, Health and Safety Skills, Manufacturing Skills, Process Control/Improvement, Computer Skills, Math/Measurement Skills, and Management/Supervision. Manufacturing representatives were asked to identify the types of skills needed for each job category. The results of these skill set requirements was incorporated into the Advanced Manufacturing Career Pathway, and can be seen on page 9.

Skill set gaps:

Employers were asked to identify the key skill sets lacking for each job category. It became apparent when analyzing the data that these skill sets fell into three categories-technical, academic and workplace skills. Technical skills included computer knowledge, process knowledge, mechanical aptitude and engineering skills. Academic skills encompassed mathematics and communication skills, and industry certificates and college degrees. Workplace skills ranged from attendance, motivation, initiative, critical thinking and decision-making, to teamwork, project management, supervision and leadership skills.

Analysis revealed basic skill employees were more likely to lack

- Technical skills - computer skills, understanding of the manufacturing process, and use of machine tools;
- Academic skills - basic mathematics and communication skills; and
- Workplace skills - reliable attendance, following directions and procedures, and leadership skills.

Intermediate employees lack

- Technical skills - computer skills, understanding of the manufacturing process, and prior manufacturing experience;
- Academic skills - gauging, measurement and communication skills, and industry certificates; and
- Workplace skills - teamwork, critical thinking, decision making, problem-solving, and leadership skills.

Advanced employees lack

- Technical skills - computer skills, troubleshooting skills, and engineering skills;
- Academic skills - measurement and communication skills, college degrees and certificates; and
- Workplace skills - critical thinking, problem solving, supervisory, leadership, planning, and conflict resolution skills.

Skill set gap impacts:

The narrative to this survey question indicated that most employers were experiencing the same types of problems due to skill set gaps. The most cited effects of skill set gaps were:

- Time and cost in hiring and training
- Increased turnover
- Attitude and teamwork of employees
- Increased production costs/overtime pay
- Reduced quality/increased scrap
- Decreased productivity and profitability

Training needs:

Only 20% of manufacturing employers indicated that difficulty existed in training basic employees. However, that percentage rose to 34% and 41% respectively for intermediate and advanced employees.

Are You Having Difficulty Training Employees?

B/I/A	Job Category	Yes	No
Basic	1	10.5%	89.5%
	2	24.1%	75.9%
Intermediate	3	42.8%	57.2%
	4	24.3%	75.7%
Advanced	5	34.2%	65.8%
	6	48.3%	51.7%

Internship availability and opportunities:

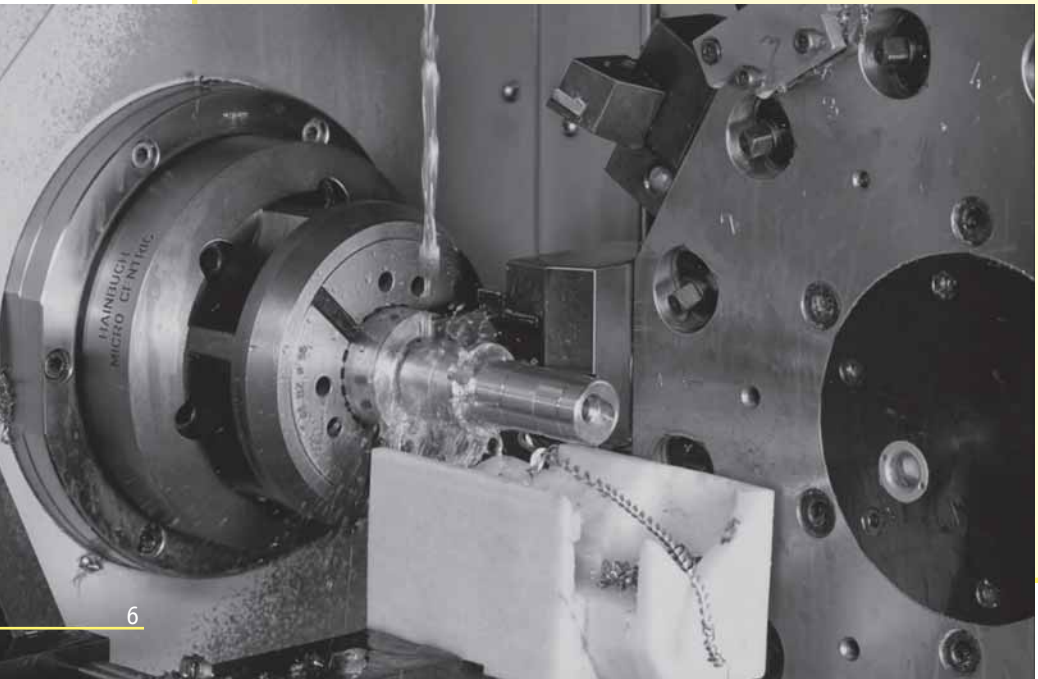
A review of the interviewed companies revealed that most existing or possible new internship programs are available at the upper levels of job categories. Ten employers have or are interested in offering internships for job categories one through three, thirty-one companies have or are interested in providing internships for job categories four through six.

The Advanced Manufacturing Career Pathway

Beginning in 2004, two planning grants from the KnowledgeWorks Foundation allowed stakeholders in the region to begin coordinating social, financial and educational services to assist low-wage, low-skilled residents in the West Central Ohio region with obtaining education and skills necessary to transition them to high-paying, high-technology jobs.

Since most of today's jobs in manufacturing require employees with technical skills—many requiring at least industry certifications or an Associate's degree—, the stakeholders designed a career pathway in advanced manufacturing. This pathway will prepare a pool of available employees and update the skills of incumbent workers, thus ensuring that the advanced manufacturing companies within West Central Ohio will have high-skilled employees capable of sustaining and growing manufacturing in the region.

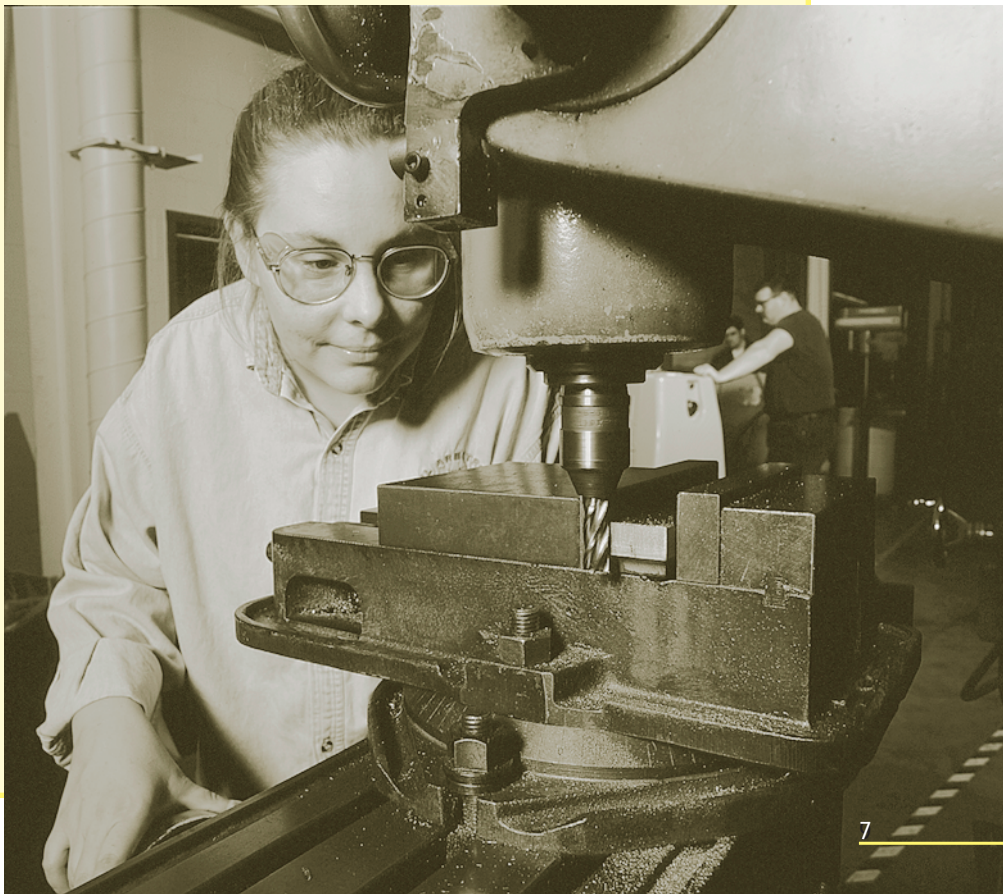
The career pathway is designed to provide multiple entry and exit points to encompass worker skill levels. Two different populations have been targeted for this pathway—incumbents already employed in manufacturing at all levels within the industry and potential new hires. Incumbent training and assessment activities will assist employers in moving employees up the pathway and ensure skill sets are in place for basic, intermediate and advanced job opportunities.



The potential new hire population encompasses individuals from several sources: community-based organizations, and public workforce agencies, such as the area's One-Stops; and low-wage individuals from non-manufacturing occupations. These individuals will be referred by project stakeholders directly into the pre-employment phase of the pathway. Other potential new hires, such as individuals who have completed educational requirements at secondary and postsecondary institutions; dislocated workers from manufacturing companies that have recently closed, or relocated; and those with prior manufacturing experience may be screened directly by employers if entering the pathway after the pre-employment intervention and training phase.

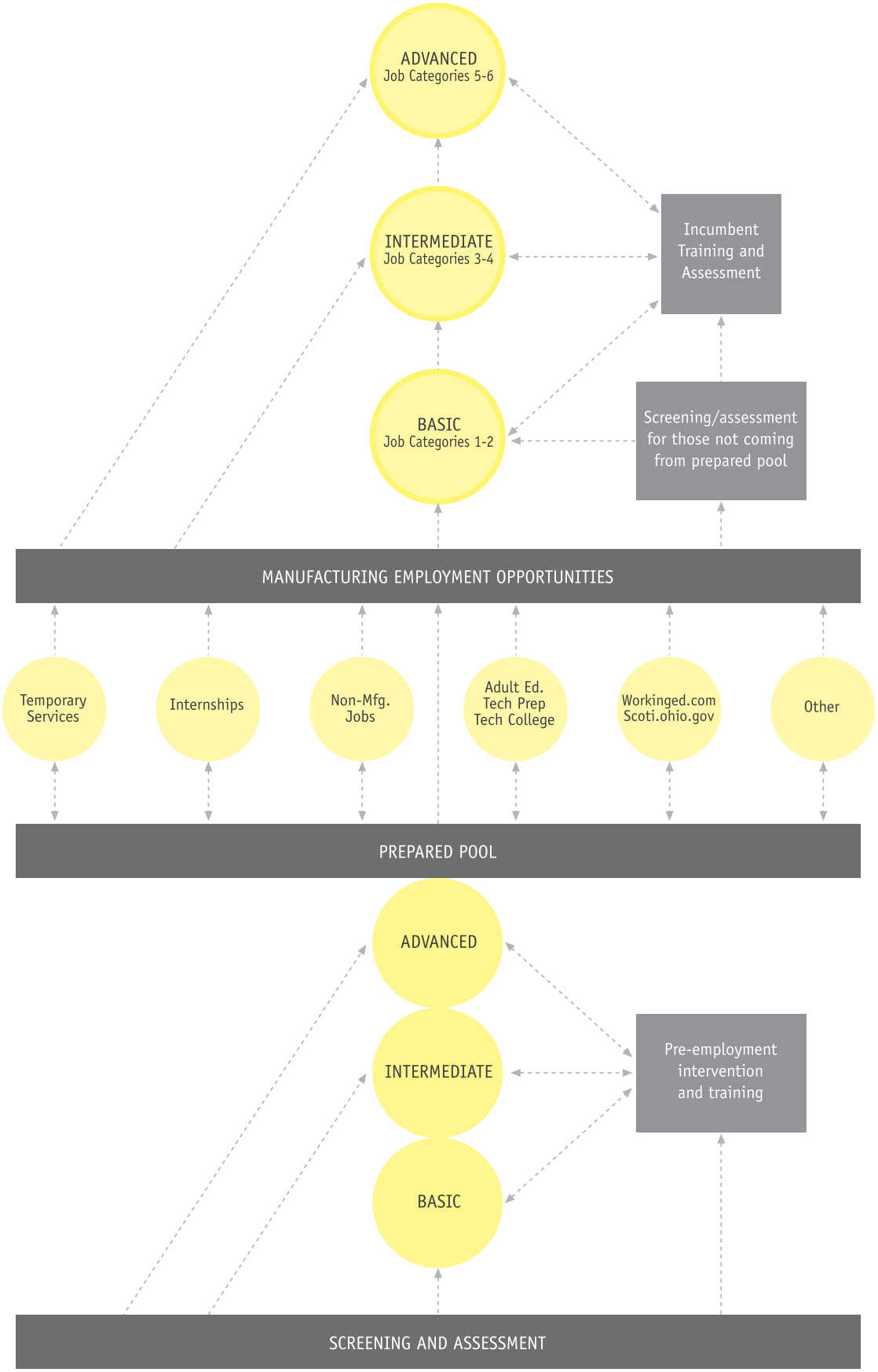
The pathway brings individuals into the system by providing initial screening and assessment to determine aptitude for a manufacturing environment and current skill set acquisition. Competencies are developed through skill set training based upon the assessed needs of the individual and those needed by the industry as determined through the manufacturing survey. Job procurement and advancement skills and technical skill sets training are provided to individuals who continue along the pre-employment pathway.

Once they have attained the skills necessary for a position in manufacturing, these individuals become part of the prepared pool of workers. Skill maintenance opportunities are available to keep this pool current and ready for employment through a temporary service agency, internship, a non-manufacturing job, or direct hiring by a regional manufacturing company. As current operations expand or new companies relocate to the region, a pool of highly-skilled technical employees is available for immediate employment.



Job Seekers can enter at any level on the pathway based upon requirements and qualifications

Advanced Manufacturing Career Pathway



Job Seekers can enter at any level on the pathway based upon requirements and qualifications

Job Categories and Pay Ranges	*Skills Rated at >50%*			
Advanced - skill sets at this level include all noted basic and intermediate skills below Pay Range Starts at $12 Average Range $18 - $34	5	**Process Control/Improvement** - Interpret test data per stated specifications **Manufacturing Skills** - Design production fixturing devices - Perform advanced manufacturing functions: Computer Numerical Controlled Equip.- CNC Programmable Logic Controlled Equip.- PLC Networking Instrumentation Programming **Safety/Health** - Perform First Aid - Perform Lockout/Tagout- LOTO **Communication/Teamwork** - Verbal communication with customers - Read for advanced comprehension	6	**Management/Supervision** - Perform employee evaluations - Manage multiple manufacturing functions - Manage multiple manufacturing personnel - Maintain budget control **Computer Skills** - Word-processing software (i.e. Word) - Spreadsheet software (i.e. Excel) - Database software (i.e. Access) - Computer design/layout (i.e. FrontPage, CAD, etc.) **Communication/Teamwork** - Written communication with customers - Facilitate team meetings
Intermediate - skill sets at this level include all noted basic skills below Pay Range Starts at $10 Average Range $15 - $20	3	**Process Control/Improvement** - Interpret & use production flow charts - Perform Statistical Process Control- SPC - Perform quality audits - Determine root causes of problems **Manufacturing skills** - Troubleshoot & repair equipment - Diagnose & describe equipment malfunctions - Understand & use production delivery/ scheduling requirements **Math/Measurement** - Graph interpretation - Selection of measurement tools - Fractional & decimal conversions/calculations - % rate & ratio conversions/calculations **Computer Skills** - Navigate Windows environment	4	**Manufacturing Skills** - Use production fixturing devices - Use & interpret blueprints **Math/Measurement** - U.S. metric conversions/calculations
Basic Pay Range Starts at $6 Average Range $10-$15	1	**Process Control/Improvement** - Commit to continuous improvement - Be aware of impact to customer satisfaction - Keep accurate records **Manufacturing skills** - Understand production materials - Understand manufacturing process flow **Safety/Health** - Understand industrial ergonomics - Interpret & use MSDS information - Use equipment safely - Keep workplace clean **Workplace Skills** - Have punctual/Reliable attendance - Have appropriate dress and hygiene - Be polite and respectful - Complete task on time & accurately - Follow directions & procedures - Accept constructive criticism - Be truthful & honest - Be capable of learning new skills - Be enthusiastic toward work - Perform heavy lifting - Have manual dexterity **Communication/Teamwork** - Verbal and written communication internally - Read for basic comprehension - Be a team participant	2	**Process Control/Improvement** - Be aware of contribution to profit/loss **Manufacturing skills** - Identify and & use machine tools **Workplace Skills** - Plan & organize without supervision **Math/Measurement** - Calculate with calculator - Calculate without calculator - Precise measurement **Computer Skills** - Company specific software/programs for data input **Communication/Teamwork** - Be a team leader - Interpret & use internal/external technical documents

Significant Findings:

- Manufacturing in West Central Ohio is projected to grow significantly in the next five years.
- Manufacturing is becoming a high-skill, high-technology environment.
- There are clear distinctions among basic, intermediate and advanced skill levels in industry today.
- Advancement in industry today requires employees who can achieve an increased technical, academic and workplace competency.
- Basic level positions (Job categories 1-2) are growing less than intermediate positions.
- Intermediate level positions (Job categories 3-4) are the entry-level jobs of the future.
- Fifty percent of the high-end projected job growth is at the intermediate level.
- Lack of skill sets effect the ability to hire and retain employees at the intermediate and advanced skill levels.
- Skill gaps impact manufacturer's bottom line.
- Companies prefer to advance employees internally up a career pathway.
- Companies are having difficulty training employees at the intermediate and advanced skill levels.
- Companies are interested in internships at the intermediate and advanced skill levels.

Plan of Action:

- Expansion of a strong workforce consortium to tie manufacturing, education and economic development to the future of manufacturing in West Central Ohio.

- Adoption of a common manufacturing skills assessment to be used by consortium stakeholders.

- Implementation of skill-based educational curricula that meets the needs of manufacturing in the next three to five years, specifically to meet the needs of intermediate and advanced skill levels.

- Creation of certificates for basic, intermediate and advanced skill attainment recognized by area manufacturers.

- Implementation of a career pathway across consortium members to provide direction for our current and future manufacturing workforce.

- Creation of a prepared pool of workers to be used to meet current manufacturing and future economic development needs of our region.

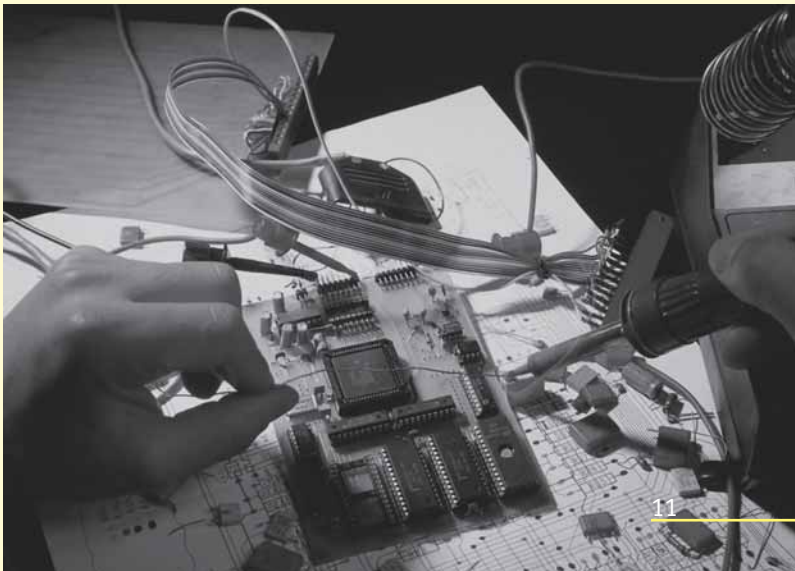
Stakeholders

Regional Industries

AAP St. Marys Corporation
Ada Technologies, Inc.
American Trim LLC
Ball Metal
BP Chemicals, Inc.
BRW Tool and Manufacturing, Inc.
Buckeye Machine Fabricators, Inc.
Cargill, Inc.
Carpenters Union Local #372
Chemtrade Logistics, Inc.
Coldwater Machine Company LLC
Crown Equipment Corporation
Engineered Plastics Products
Findlay Machine and Tool, Inc.
Ford Motor Company
Fort Amanda Specialties LLC
Gasdorf Tool
General Dynamics Land Systems
Golden Giant Building Systems
Goodyear Tire and Rubber Company
Honda of America Manufacturing, Inc.
Iams, Leipsic Plant
International Brotherhood of Electrical Workers Local #32
International Paper
Kalida Manufacturing, Inc.
Koneta Rubber Company/LRV
Labor Local Union 329 AFL CIO
Marathon Electric Manufacturing Corporation
Metokote Corporation
Minster Machine Company
Peerless Machinery Corporation
Plumbers and Pipefitters Local Union #776 AFL
Precision Thermoplastics Components, Inc.
Premcor Refining Group, Inc.
Procter and Gamble Company
Progressive Stamping, Inc.
Reynolds and Reynolds Company
Robinson Fin Machines, Inc.
Rudolph Foods Company, Inc.
Siemens Energy and Automation, Inc.
Superior Forge and Steel Corporation
SYPRIS Technologies
Toledo Molding and Die, Inc.
Unverferth Manufacturing Company, Inc.
WC Wood Company, Inc.

Regional Organizations

ABLE (Adult Basic Literacy Education) Regional Programs
ACCENT Ohio (Center for Employment and Training)
Allen County Commissioners
Allen County Job and Family Services
Allen Economic Development Group
Apollo Career Center
Area 8: Mercer, Auglaize, Van Wert Ohio WIA - Workforce Investment
Bradfield Community Association
Community Connection for Ohio Offenders
Defiance College
Hardin County Economic Development Council
LACCA- Lima Allen Council on Community Affairs
Lima/ Allen Community Social Service Network
Lima Allen County Chamber of Commerce
Lima City Schools
Lima Goodwill Industries
Neighborhood Community Development Office
NET Inc.- Network Employability Training
Northwood/ Maplewood Learning Center
Ohio Hi-Point Career Center
Ohio Job and Family Services
Ohio State University Strategy Store
Paulding County Job and Family Services
Putnam County Educational Services Center
Putnam County Job and Family Services
Region 3 Small Business Development Center
Rhodes State College
Solutions, *etc.*
Spherion
Village of Ottawa
Wright State University Lake Campus
Weed N Seed Areas II & III



For more information or for additional copies of this report, please contact:

Dr. Matthew Kinkley
Dean, Instructional Services
Rhodes State College
4240 Campus Drive
Lima, OH 45804
(419) 995-8283
kinkley.m@RhodesState.edu

Mr. David Brown
Dean, Division of Information Technology/
Engineering Technology
Rhodes State College
(419) 995-8887
brown.dj@RhodesState.edu

Ms. Jill Gear
Coordinator of Grant Development
Rhodes State College
(419) 995-8489
gear.j@RhodesState.edu

Funded by:

KnowledgeWorks Foundation

Ohio Board of Regents

Report prepared by:

JAMES A.
RHODES
STATE COLLEGE