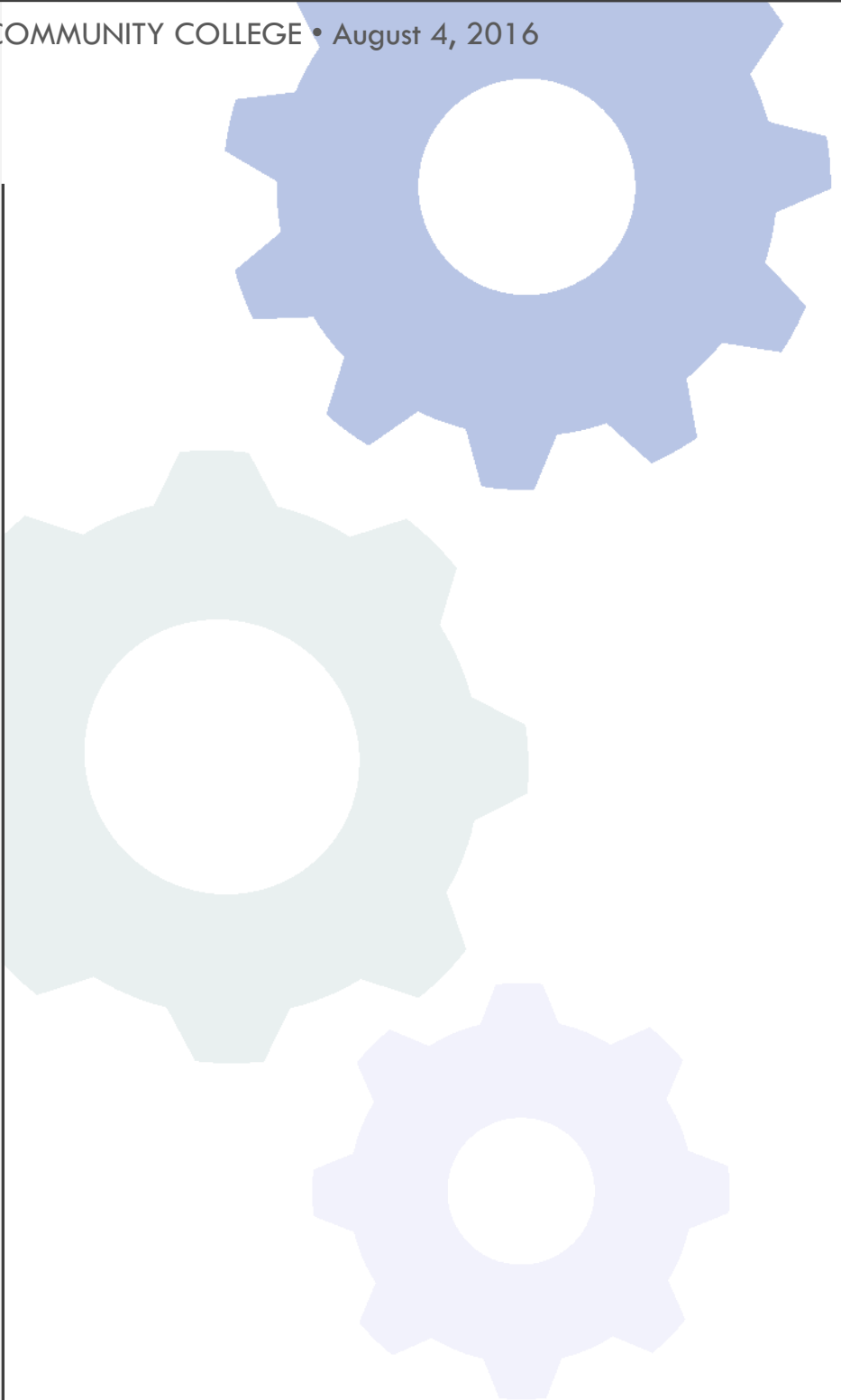


EMPLOYABILITY SKILLS: **Electrical Technology**

Including High-Performing Electronics Technician, Automation Technician, and Electrical Controls Technician

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Employability Skills Profile: Electrical Technology

Job Path:

The intent of these findings is to assist in understanding the employment needs and employability skills necessary for success within our local employer community as we consider realignment of our Electrical Technology curriculum, and that of our high school pathway through our P Tech partnership.

Many job titles and paths exist within our diverse manufacturing community for electrical technology including the areas of maintenance, automation, industrial equipment repair, assembly (panel box), testing, electronic repair, design and production. For the purpose of this study, the panel selected three main occupational areas in which to base their feedback: Automation Technician, Electronics Technician, and Electrical Controls Technician. The panelists provided feedback on years of education and/or experience required for each job title within each job category and further identified occupations of greatest need. Results of their work can be viewed on the graph on pages 8-9.

Of note is that several of the same job titles occur in different occupational categories with the greatest need centered in Electrical Maintenance. Employers explained that there is a divide in the electrical and mechanical occupations, but there is also quite a bit of mix and crossover. Several employers will do apprenticeships, and have found that candidates with an affinity for working on cars tend to do well (transferrable skills). Some panelists expressed the reality that many of the mid-level to advanced positions are obtained by working your way up, and that the entry level production worker position is sometimes used to ensure behavioral competence (shows up for work, etc.) Employers also noted that there is a misnomer with many of the electrical positions, and "just because you do electrical, you're not going to be dirty."

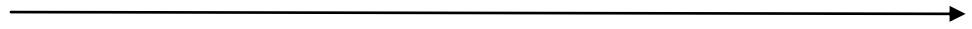
Future Trends & Concerns

- Panelists expressed need to focus on CNY and rebuilding manufacturing businesses.
- Employers face many business challenges including:
 - ◇ Increasing complexity of equipment
 - ◇ Trend toward further automation
 - ◇ Increasing regulatory environment
 - ◇ Increasing energy demands
 - ◇ Increasing environmental concerns
 - ◇ Increasing paperwork and documentation requirements
 - ◇ Operating and capital budget constraints
 - ◇ Competitive, global market
 - ◇ Increased need to be multi-dimensional
 - ◇ Managing obsolescence
 - ◇ IT & control convergence
 - ◇ Keeping up with technology
- Panelists expressed concern for future of their business and the electrical tech candidate pool. Need to help high school instructors understand the field so emerging students know their options.
- Employers are finding it challenging to find quality workers
 - ◇ Lack of available "qualified" candidates
 - ◇ Applicants often can't do what resume says they can
 - ◇ Reliability/dependability/punctuality are all an issue
 - ◇ Behavioral issues are what prevents long-term employment
 - ◇ Hard to find "fit" for culture
 - ◇ Difficulty finding workers that fit with core values of company
 - ◇ Huge entrance/entitlement issue (new workers feeling entitled to money and position)
 - ◇ Candidates right out of school need more "hands-on" application and experience. Not everyone can do an internship and hands-on experience is needed to apply knowledge and gain skill.
 - ◇ Need employees that can:
 - ◆ relate theory to practice - what it means for the device that's sitting in front of them and
 - ◆ do things in their head instead of on computer (Google for answers)
 - ◇ Shrinking labor pool and aging electrical workforce. Employers are losing people with 30 years experience, and have no one to replace them.
 - ◇ Increased competition for qualified personnel
- Employers are looking for candidates that demonstrate desire to learn and grow within:
 - ◇ Need people who can move up, demonstrate desire for job advancement - there are not enough of them.
 - ◇ Want people who want to move up
 - ◇ Mobility - several companies have locations around the country, and expect that as employees move up into management, they may need to move to another location *
 - ◇ Longevity - many new workers expect high paying/management jobs because they have a degree. They need to put their time in to reach this goal, but they are "quick to run".

Employability Skills Chart: Electrical Technology

Categories

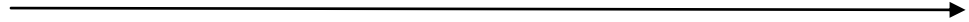
Behaviors



A Demonstrate Workplace Safety	A1 Be aware of surroundings 3	A2 Follow safety procedures 10 4 3	A3 Be mentally alert 1 1 5	A4 Demonstrate knowledge of equipment (Don't do something haven't been trained on) 2 5	A5 Maintain work equipment safely (Don't operate unsafe equip.) 2 1	A6 Report safety problems 8 2
	A7 Look out for safety of coworkers 5 5	A8 Maintain clean/organized safe work area 2 5 1				
B Take Professional Responsibility	B1 Comply with company policies 8 1	B2 Protect company assets 4 8	B3 Report to work as scheduled 4 8	B4 Meet production schedule 2	B5 Keep private life from affecting work 11 6 2	B6 Be accountable for your work/actions 11 6 2
	B7 Accept responsibility for tasks not completed 1 1 2	B8 Wear appropriate attire 2	B9 Help out when needed (Even if it means giving up some personal time) 1 3	B10 Follow through with tasks 1 5	B11 Complete tasks even without supervision 11	B12 Complete all tasks to meet standards 3 1
	B13 Be a self-starter (Take initiative) 8 1	B14 Stand up for self appropriately 3 1				
C Demonstrate Personal Integrity	C1 Respond appropriately to situations of right and wrong 1 2	C2 Confront issues that push ethical limits 1	C3 Report wrongdoing to someone with higher authority 1	C4 Protect confidential information (e.g., intellectual property) 1 1		
D Commit to Quality	D1 Go extra mile to ensure quality work (workmanship) 1	D2 Complete all tasks with consistent high quality (workmanship) 4 2 1	D3 Encourage high quality work in others (workmanship, for quality and safety) 1 1	D4 Demonstrate concern for providing quality services & products 1 1	D5 Participate in mandatory OJT 1 1	D6 Care about improving company operations 2 1
	D7 Provide help for peers who need it 1 1	D8 Address task-related problems constructively 2				
E Make Good Decisions	E1 Ask for help when needed 6 7 2	E2 Recognize need for more information 1 5 3	E3 Redirect customer when needed 4 7	E4 Prioritize work based on business needs 4 7	E5 Be prepared to accept consequences made from not following policy 1 1	E6 Say something if something doesn't seem right (to appropriate person) 1
	E7 Correctly use personal authority w/o exceeding limit 2	E8 Adjust own work schedule to meet customer need 2	E9 Recognize when you are a problem for others 1 8	E10 Identify emerging problems and help resolve 2	E11 Participate in root cause analysis 1 1 1	E12 Brainstorm solutions to problems 1 1 1
	E13 Evaluate own solutions 3 2					

Categories

Behaviors



Demonstrate Workplace Safety 2	F1 Accept feedback without defensiveness 9	F2 Adapt to changes in work situations 6 1 6	F3 Accept change collaboratively 1 8	F4 Accept new challenges 5 7	F5 Embrace continual learning 6 6	F6 Demonstrate desire for job improvement 1 1 6
	F7 Respect other people's time 5 1					
Relate Well to Internal/ External Customers 2	G1 Interact politely and professionally with customers and auditors 1 10	G2 Demonstrate willingness to compromise 2	G3 Balance needs of company and customers efficiently 1	G4 Follow through on customer commitments 1	G5 Convey customer importance through voice and body language 1	G6 Listen actively to customer comments and requests 2
	G7 Make customer feel important 1	G8 Understand customer needs				
Demonstrate Time Management Skills 1	H1 Proactively use slow times to benefit company (if you can lean, you can clean) 2	H2 Demonstrate ability to plan ahead 2 2	H3 Use time efficiently 2 6	H4 Safely meet work schedules to quality specifications 2 3	H5 Respect co-workers 1 4	H6 Choose when to engage in chit-chat appropriately
	H7 Be on time arriving, returning from breaks and lunch 5 1					
Use Proper Social Skills at Work	I7 Work well with others 2 5	I2 Avoid inappropriate behavior (i.e., sexual harassment) 5				

Legend

18Critical Category
 18Critical Behavior
 18Training Most Needed by New Workers
 18Training Most Needed by Veteran Workers

Note: Numbers represent total votes from 17 of the 18 panelists.

Employability Skills Profile: Electrical Technology

Knowledge & Skills

- 10T (internet of things) (not electronics)
- 3 Phase Power, industrial, VFD
- 480 power/3-phase electrical control auto
- AC/DC theory
- Analog electronics (basic knowledge)
- Automation systems
- Blueprint reading
- Boolean logic
- Business conduct/ethics
- CAD system
- Communication skills: listening, speaking (verbal), written
- Computer knowledge
 - ◊ Business computer applications (MS Office)
 - ◊ Keyboarding skills (for some)
 - ◊ Basic hardware/software
 - ◊ Basic network knowledge
 - ◊ Basic programming
 - ◊ Computer troubleshooting
 - ◊ E-mail etiquette
- Conflict resolution
- Create and keep meeting agenda
- Data acquisition
- Data collection systems
- Digital electronics (basic knowledge)
- Documentation skills
- Drives
- Electrical safety
- Electrical schematics (interpret and review)
- Electrical theory
- Electronics (basic knowledge)
- Hazardous environment (knowledge of)
- Hydraulics/pneumatics
- Industrial systems knowledge
- Industry standards (basic understanding)
- Instrumentation knowledge (basic)
- Knowledge of PDM/Vibration
- Ladder logic
- Leadership skills
- Math skills (intermediate level - algebra)
- Mechanical knowledge (pumps, valves, piping)
- Motor theory
- Multi-tasking skills
- NEC skills
- New technologies
- Organizational skills
- OSHA regulations
- Physics, density begin - end (basic) (for some)
- PID controls (not electrical)
- PLC
- Power distribution
- Power quality
- Problem solving skills
- Process control fundamentals (not electrical)
- Read and interpret drawings
- Reliability of components (electrical identification)
- Report writing
- Robotics and Serve drives
- Root cause analysis
- Safety (lockout/tag out, confined space, ARC flag)
- Schematic reading
- Sensors and transducers
- Sketching (for some)
- Soldering skills
- Theories of Ohm's Law/Kirchhoff's Rules (in head/not on computers)
- Troubleshooting techniques
 - ◊ Troubleshoot/diagnose circuit issues
 - ◊ Understanding why the component failed - what is the root cause of the issue

Traits & Behaviors

- Adaptable
- Assertive
- Attention to detail
- Change oriented
- Creative - find solutions
- Dedicated
- Intuitive
- Loyal
- Observant
- Safety oriented
- Self-starter
- Cooperative
- Versatile
- Professional
- Respectful

Attendance

- 12 hour shifts (for some)
- Be able to work nights and weekends
- Show up on time

Appearance

- Must wear:
- Close-toed shoes
 - Uniforms

Workplace Expectations

- There is growth potential for Electrical Techs; companies typically promote from within
- Working weekends and holidays is an expectation
- When something comes up, don't say "it's not my job" (take ownership)
- No "texting" language in e-mails (LOL, "R", "U")
- Be receptive to feedback from others
- Intimidating meetings happen routinely, be OK
- Understand safety is first, then quality, then production
- Understand that you represent your company when offsite and not at the workplace

Hiring Requirements

- H.S. Diploma
- A.S. Degree preferred
- Related experience (manufacturing or trade school certification) *
- Must be age 18 or older
- Pass on-boarding tests:
 - - TABE (8th grade level reading and math) *
 - - Hydraulic/schematic testing *
 - - electrical drives test and schematic drawing *
 - - personality test *
- Safety/security testing:
 - - background check
 - - drug test
- Problem solving electrical *

Hiring Barriers

- Failing drug test drug test (hair)
- Unable to demonstrate skills presented on resume (onboarding testing)
- Inability to interview well, "one candidate said he didn't like to talk about himself"

Certification/Licensure

Mandatory

- N/A

Helpful/Useful

- PMMI - Mechatronics Certificate *
- CET - Certified Electrical Technician
- OSHA (10 hour)
- NFPA

Physical Attributes

In order to perform the necessary functions of the job, the worker must be able to:

- Stand for a minimum 3-12 hours
- Navigate narrow and/or confined spaces (for some)
- Walk
- Bend
- Crouch
- Climb
- Lift up to 50 pounds
- Have enough stamina to handle the physical demands of the job (most positions require hours of standing, walking and shifts can be up to 12 hours).

The following factors may hinder a person's ability and/or prevent them from being able to perform the job at some locations:

- Wheelchair bound *- at some companies, it would be physically challenging to perform the duties of the position from a wheelchair (especially for positions that require crouching, climbing or have space constraints).
- Color Blind *- Could be difficult for some positions that require the need to differentiate colors of wires.
- Deaf *- Depending on the company, they can make accommodations. For some companies, this is a safety issue, need to hear the machines and other potential safety issues on production floor to detect and prevent problems.
- Blind *- At some companies, a person would not be able to perform the duties of the position without the ability to see.
- Hand mobility *- Essential to perform the duties of the position at some companies.
- Dexterity *- Essential to perform the duties of the position at some companies.
- Sense of smell *- Need to be able to smell burning components in order to be safe in the work environment (for some companies).

Acronyms

CAD: Computer Aided Design
CNY: Central New York
NEC: National Electrical Code
NFPA: National Fire Protection Association
OJT: On-the-Job Training
OSHA: Occupational Safety & Health Act
PDM: Product Data Management
PID: Proportional Integral Derivative Controller
PLC: Programmable Logic Controller
PPMI: Packaging Machinery Manufacturers Institute
TABE: Test of Adult Basic Education
VFD: Variable Frequency Drive

Note - Items marked with an asterisk (*) are required for some but not all companies.

Electrical Technology Potential Career Path

Entry Level

→ Mid Level

Category	0 years	1-2 years	2 years
Assembly (Panel Box)	<ul style="list-style-type: none"> • Electrical Assembler Level 1(1) 	<ul style="list-style-type: none"> • Machine Builder • Electrical Assembler Level 2 • Electrician 	<ul style="list-style-type: none"> • Electrical Tech
Automation /Maintenance	<ul style="list-style-type: none"> • Mechanic • Automation Tech Level 1 (4) • Production Worker 	<ul style="list-style-type: none"> • Field Service Technician (1) 	<ul style="list-style-type: none"> • Electrical Lead (1) • Electrical Tech (1) • Electrical Controls Technician (6) • Electrical Maintenance Technician (15) • Mechanic (5) • Programming Specialist (2) • Service Technician
Design			<ul style="list-style-type: none"> • Control Systems Lead (1) • Programming Specialist • Electrical Lead (1)
Electronic Repair	<ul style="list-style-type: none"> • Tech Level 1 (1) (QC Tester) 	<ul style="list-style-type: none"> • Tech Level 2 (2) (Parts Changer) 	<ul style="list-style-type: none"> • Electrical Tech
Industrial Equipment Repair	<ul style="list-style-type: none"> • Building and Grounds Crew 		<ul style="list-style-type: none"> • Electrical Tech • Instrument Technician (3) • Electrician (7) • Facility Technician (2)
Production	<ul style="list-style-type: none"> • Production Worker • Inspector Packer (1) 		<ul style="list-style-type: none"> • Mold Tech
Testing			<ul style="list-style-type: none"> • Testfire Technician • Electrical Tech

Please note: The categories and job titles listed are representative of electrical technology occupations which typically require four years or less of training with required education and experience varying per company and position. Titles noted in bold indicate greater need by employers with number of panelist votes noted in (#). It is not always necessary for a person to move through each of these phases of advancement to reach a particular position level.

Mid Level



Advanced

2-3 years	3-4 years	4-5 years	5+ years
	<ul style="list-style-type: none"> Electrical Assembly Level 3 		
<ul style="list-style-type: none"> Automation Tech Level 2 (3) 	<ul style="list-style-type: none"> Electrical Maintenance Planner Automation Tech Level 3 (2) 	<ul style="list-style-type: none"> Controls Designer (3) Electrical Engineer (3) Electrical Controls Engineer 	<ul style="list-style-type: none"> Automation Controls Engineer (5) <i>(Could also go in Design Category as focus is design)</i>
	<ul style="list-style-type: none"> Controls Designer (1) 	<ul style="list-style-type: none"> Electrical Engineer (2) 	<ul style="list-style-type: none"> Controls Engineer (1)
<ul style="list-style-type: none"> Tech Level 3 (1) (Electronic Technician) 	<ul style="list-style-type: none"> Communications Bench Technician (1) 		
		<ul style="list-style-type: none"> Controls Electrician 	<ul style="list-style-type: none"> Controls Engineer Electrician

Onondaga Community College wishes to extend a special “thank you” to the following businesses for donating their expertise to the development of this employability profile for Electrical Technology and to all of the managers and supervisors who served on this employer panel. Our program will be better because of your direction and guidance.



This employability profile was validated by local employers based upon the *Chart of Employability Skills* sponsored by the Alaska Processing Industries Careers Consortium, 2003, the *DACUM Research Chart for Mechatronics Technician* developed at Guilford Technical Community College, 2011, and the workplace behavior categories determined by Learning Resources Inc. OCC's Workforce Development Programs have been funded under a 2.5M United States Department of Labor TAACCCT Grant whose purpose is to facilitate greater employment by improving education. For more information visit: <http://bit.ly/occ-taacct-iv>