Electromechanical Engineering Technologists and Technicians

NOC [2232, 2241]

Introduction

Mechatronics and robotics is the integration of mechanical, electrical, electronics, and control and computer engineering. Electromechanical engineering technologists and technicians use computers and electronics to control mechanical systems. They work in areas such as machine assembly, troubleshooting and testing, systems integration, application support, maintenance, component testing and assembly, automation programming, robotic maintenance and programming, quality control, and technical sales and services.

NOC 2232 Mechanical Engineering Technologists and Technicians
Mechanical engineering technologists and technicians provide technical support and services or may work independently in mechanical engineering fields such as the design, development, maintenance and testing of machines, components, tools, heating and ventilating systems, power generation and power conversion plants, manufacturing plants and equipment. They are employed by consulting engineering, manufacturing and processing companies, institutions and government departments.

NOC 2241 Electrical and Electronics Engineering Technologists and Technicians
Electrical and electronics engineering technologists and technicians may work independently or provide technical support and services in the design, development, testing, production and operation of electrical and electronic equipment and systems. They are employed by electrical utilities, communications companies, manufacturers of electrical and electronic equipment, consulting firms, and in governments and a wide range of manufacturing, processing and transportation industries.

The most important Essential Skills for Electromechanical engineering technologists and technicians are:

- Document Use
- Oral Communication
- Problem Solving
- Digital Technology

Document Sections

- Reading
- Document Use
- Writing
- Numeracy
- Oral Communication
- Thinking Skills
  - Problem Solving
  - Decision Making

  - Critical Thinking
  - Job Task Planning and Organizing
  - Significant Use of Memory
  - Finding Information
- Working with Others
- Digital Technology
- Continuous Learning
- Notes

A. Reading

Reading

Tasks	Complexity Level	Examples
Typical Most Complex	1 to 4 4	Electromechanical engineering technologists and technicians: • read labels on equipment and parts for instructions. (1) • read emails from co-workers, colleagues and clients to review project specifications, instructions and company policies. (2) • read online catalogues to locate and order products and tools. (2) • read data and technical sheets that summarize performance and technical characteristics of materials and parts. For example, to look for specific details about product performance or to compare different products and components for compatibility. (3) • read information from websites about new products and to research new technology or technical information. (3) • read process and procedure manuals and guides. For example, they read operating instructions and preventative maintenance procedures. They read installation guides that detail procedures for installing new equipment and components. (3) • read reports. For example, may read test cases when testing new products to understand how the product is supposed to function, to learn testing procedures and testing results and to gather information for analyzing problems. (3) • read articles in scientific journals, professional newsletters and other publications to keep up to date with trends and changes in technology. (3) • read textbooks, technical manuals and online forums to increase knowledge of automation processes, materials and components, and to keep skills up to date. (4) • read project documentation that range in length from a few pages to several hundred pages to learn about project specifications, such as material specifications. Specifications provide technical details, such as the scope of the work, the type of wiring to use, the method to run the equipment, or the sequence of operation. (4) • read regulations, standards and government legislation. For example, they read electrical codes, International

		Standards Organization (ISO) rules, Canadian Standards Association (CSA) standards, American National Standards Institute (ANSI) standards, American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), and Occupational Health and Safety Acts to ensure newly developed or modified products meet regulatory requirements. (4)

Reading Summary

The symbols >, >> and >>> are explained in the Use of Symbols section.

	Purpose for Reading			
Type of Text	**To scan for specific information/To locate information**	**To skim for overall meaning, to get the 'gist'**	**To read the full text to understand or to learn**	**To read the full text to critique or to evaluate**
Forms	>>>			
Labels	>>>			
Notes, Letters, Memos	>>>	>>>	>>>	
Manuals, Specifications, Regulations	>>>	>>>	>>>	>>
Reports, Books, Journals	>>>	>>>	>>>	>>

B. Document Use

Document Use

Tasks	**Complexity Level**	**Examples**
Typical	1 to 4	Electromechanical engineering technologists and technicians:
Most Complex	4	• scan labels on parts and packaging to identify product types and part numbers. (1) • locate information in change orders that describe what to do. (1) • locate and enter information in timesheets and schedules

		(often software programs). For example, they enter hours worked and time required to complete individual tasks, and identify work tasks and deadlines. (2) • enter and locate information on bills of materials, such as the materials, quantities and costs. (2) • locate information in requirement lists that detail what the equipment has to be able to handle, such as load capacities, cycle times, stroke, forces, materials, and temperatures to determine the size of parts. (2) • locate information in lists and tables in technical data sheets. For example, they determine if parts are suitable and fit the required specifications. They compare information to see if a part can be substituted. (3) • interpret graphs to ensure equipment is operating within tolerances and operating parameters. For example, analyze graphs depicting amount of air flow over time to determine the point during the cycle when the vacuum generator reaches maximum sucking power. (3) • interpret and create graphs to compare testing results. For example, use bar, line and scatter graphs, pie charts and Gantt Charts to compare present performance tests to earlier performance tests. (3) • refer to and interpret drawings (e.g. assembly, dimensional, exploded) and schematics (e.g. electrical, electronic, mechanical) to follow installation procedures, identify part names and numbers, locate measurements, or troubleshoot a system. Drawings are complex and detailed with multiple design elements. (4) • locate information in PLC (Programmable Logical Controller) programs and use ladder logic to program and troubleshoot. (4)

Document Use Summary

- read signs, labels or lists.
- complete forms by marking check boxes, recording numerical information or entering words, phrases, sentences or text of a paragraph or more.
- read completed forms containing check boxes, numerical entries, phrases, addresses, sentences or text of a paragraph or more.
- read tables, schedules or other table-like text.
- create tables, schedules or other table-like text.
- enter information on tables, schedules or other table-like text.
- plot information on graphs (e.g. line, pie, bar, Gantt).
- obtain specific information from graphs or charts.
- interpret information on graphs or charts.
- construct or draw graphs or charts.

- recognize common angles such as 15°, 30°, 45° and 90°.
- draw, sketch or form common shapes such as circles, triangles, spheres, rectangles, squares, etc.
- interpret scale drawings.
- take measurements from scale drawings.
- draw to scale.
- read assembly drawings.
- create assembly drawings.
- read schematic drawings.
- obtain information from sketches, pictures or icons.

C. Writing

Writing

Tasks	Complexity Level	Examples
Typical Most Complex	1 to 4 4	Electromechanical engineering technologists and technicians: • may keep a notebook to record how problems were solved to use in future similar situations. They write notes during meetings and conversations with clients to keep track of details. (1) • write deficiency lists for retrofits which detail items that are incomplete, need upgrading or are deficient. They may determine timelines based on the deficiency list. (2) • write emails to co-workers, colleagues and clients to explain or to ask for information, and to update. They may use technical language and attach schematics and technical data. For example, they may be responding to an engineer asking for technical data, such as operating parameters about a specific part, or to a client asking if a part can be substituted under specific operating conditions. (3) • write specifications for drawings that detail the materials, equipment, and standards. For example, specifications identify end devices, control panels, control software, and system graphics. The specifications detail how these components will be assembled, installed, tested, and commissioned. They must be clear, concise and accurate. (3) • may write production reports using a traditional format that includes costs, goals, explanations for non conformance (NCR), and recommendations for improvements. (3) • may write user manuals using a template that include step-by-step operating, maintenance and troubleshooting

		procedures. The information is detailed and written at a level that users will understand. For example, they write work procedures for workers operating the equipment. (3) • may write proposals using an established format including project name and number, letter of introduction, detailed description of customer requirements and deliverables, costs and technical specifications, such as assembly description and functionality. (4) • may write progress reports to track projects. For example, they describe progress, completed tasks, identify problems and how they were solved, and make recommendations. (4) • write testing reports that summarize completed tasks, describe the tests used and results of those tests, conclusions, concerns, and recommendations, such as recommending further testing cycles. (4)

Writing Summary

The symbols >, >> and >>> are explained in the Use of Symbols section.

	Purpose for Writing						
Length	**To organize/ to remember**	**To keep a record/to document**	**To inform/ to request information**	**To persuade/ to justify a request**	**To present an analysis or comparison**	**To present an evaluation or critique**	**To entertain**
Text requiring less than one paragraph of new text	>>>	>>>	>>>				
Text rarely requiring more than one paragraph	>>>	>>>	>>>	>>>			
Longer text			>>>	>>	>>	>>	

D. Numeracy

The symbols >, >> and >>> are explained in the Use of Symbols section.

Numeracy

Tasks	**Complexity Level**	**Examples**
>> Money Math	2	Electromechanical engineering technologists and technicians: • may calculate expense claim amounts for travel expenses, such as car expenses and meals using established per diem rates for mileage and meals. (Money Math), (2) • schedule repair and maintenance service calls. (Scheduling, Budgeting and Accounting), (1) • may prepare quotes detailing costs of materials and labour. (Scheduling, Budgeting and Accounting), (2) • take measurements and readings using basic measurement tools. For example, use measuring tapes to measure lengths in both SI (metric) and imperial measurement. (Measurement and Calculation), (1) • use electrical and mechanical diagnostic tools. For example, they use multimeters to measure voltage, current and resistance, and oscilloscopes to measure amplitudes, test circuits and locate faults. (Measurement and Calculation), (2) • convert between SI (metric) and imperial, such as millimetres to inches or feet, and pounds per square inch (psi) to bars or kilopascals (kPa). For example, customers may talk in imperial measurement but technical data is in SI. (Measurement and Calculation), (2) • convert between different base numbers. For example, convert between hexadecimal (base 16) and octal (base 8) to see commonalities between controllers and sensors and determine how they are “talking” to each other. (Measurement and Calculation), (3) • use electrical formulae to calculate voltage, resistance, current and power. (Measurement and Calculation), (3) • use formulae (often software programs) to calculate. For example, area, volume, force, flow rates, speeds and feeds in both SI (metric) and imperial measurements. They may calculate force to determine the required cylinder size, or the torque required to close a valve. (Measurement and Calculation), (3). • use PLC Ladder logic (truth tables) for troubleshooting or to develop software for PLCs (Programmable Logic
>> Scheduling, Budgeting and Accounting	1 to 2	
>>> Measurement and Calculation	1 to 5	
>> Data Analysis	1 to 3	
>>> Numerical Estimation	2	

		Controllers). (Measurement and Calculation), (5) • compare data such as frequencies, speeds, temperatures and transfer rates to specifications and normal ranges. (Data Analysis), (1) • compare product measurements to specification limits to ensure products meet standards. (Data Analysis), (1) • analyze graphs. For example, analyze graphs depicting amount of air flow over time to determine the point during the cycle when the vacuum generator reaches maximum sucking power. (Data Analysis), (2) • compare test results. For example, compare test results of a piece of software to determine if bugs have been fixed. (Data Analysis), (3) • estimate times for completing tasks to meet deadlines. For example, estimate the time to complete maintenance and repairs, taking into consideration the availability of parts and the length of time to complete similar tasks. (Numerical Estimation), (2) • estimate quantities of materials needed for maintenance and repair, using past experience. (Numerical Estimation), (2)

Math Skills Summary

a. Mathematical Foundations Used

The symbols >, >> and >>> are explained in the Use of Symbols section.

Mathematical Foundations Used

Code	Tasks	Examples
		Number Concepts
>>>	Whole Numbers	Read and write, count, round off, add or subtract, multiply or divide whole numbers. For example, calculating inventory amounts; reading and writing part numbers and codes.
>>>	Integers	Read and write, add or subtract, multiply or divide integers. For example, reading and writing positive and negative numbers, such as temperatures above and below zero.
>>>	Rational Numbers - Fractions	Read and write, add or subtract fractions, multiply or divide by a fraction, multiply or divide fractions. For example, reading and writing fractions of an inch.
>>>	Rational Numbers - Decimals	Read and write, round off, add or subtract decimals, multiply or divide by a decimal, multiply or divide decimals. For example, calculating liquid volumes in decimals; calculating

		dimensions for equipment designs in decimals;
>>	Rational Numbers - Percent	Read and write percents, calculate the percent one number is of another, calculate a percent of a number. For example, calculating material wastage; calculating percentages to compare test results.
>>	Equivalent Rational Numbers	Convert between fractions and decimals or percentages. Convert between decimals and percentages. For example, converting between fractions and decimals.
>>	Other Real Numbers	Use powers and roots, scientific notation, significant digits. For example, calculating volumes of fluid or air flow.
		Patterns and Relations
>>	Equations and Formulae	Solve problems by constructing and solving equations with one unknown. Use formulae by inserting quantities for variables and solving. For example, using formulae to calculate force, flow rates, and speed and feed rates or using Ohm's Law to calculate voltage, resistance, current and power.
>>	Use of Rate, Ratio and Proportion	Use a rate showing comparison between two quantities with different units. Use a ratio showing comparison between two quantities with the same units. Use a proportion showing comparison between two ratios or rates in order to solve problems. For example, operating equipment at specified speeds or rates and using scale drawings.
		Shape and Spatial Sense
>>>	Measurement Conversions	Perform measurement conversions. For example, between SI and imperial systems, such as millimetres to inches or inches to millimetres; pounds per square inch (psi) to bars (Pascal's); convert Celsius to Fahrenheit or Fahrenheit to Celsius; convert between number systems, such as hexadecimal (base 16) into octal (base 8) into decimal (base 10) to see how controllers and sensors are talking to each other.
>>	Areas, Perimeters, Volumes	Calculate areas. Calculate perimeters. Calculate volumes. For example, calculating floor areas to determine ventilation requirements or calculating volumes of cylinders.
>>	Geometry	Use geometry. For example, making modifications to drawings or using x, y and z coordinates to create 3D drawings.
>	Trigonometry	Use trigonometry. For example, calculating angles and distance for equipment designs.
		Statistics and Probability
>>	Summary Calculations	Calculate averages. Calculate rates other than percentages.

		Calculate proportions or ratios. For example, calculating average energy production, consumption, efficiency and loss over specified time periods.
>>	Statistics and Probability	Use descriptive statistics (e.g. collecting, classifying, analyzing and interpreting data). Use inferential statistics (e.g. using mathematical theories of probability, making conclusions about a population or about how likely it is that some event will happen). For example, using the averages of previous test results to calculate the probability that parts produced will pass quality controls.

b. How Calculations are Performed

- In their heads.
- Using a pen and paper.
- Using a calculator.
- Using a computer.

c. Measurement Instruments Used

- Time. For example, using clocks and stopwatches.
- Weight or mass. For example, using scales.
- Distance or dimension. For example, using tape measures, rulers, micrometers and callipers.
- Temperature. For example, using thermometers and sensors.
- Pressure. For example, using pressure gauges and manometers.
- Power, voltage, current and resistance using a multimeter.
- Number of oscillations or pulses per a length of time using an oscilloscope.
- Air flow. For example, using a velometer.
- Use the SI (metric) measurement system.
- Use the imperial measurement system.

E. Oral Communication

Oral Communication

Tasks	**Complexity Level**	**Examples**
Typical	2 to 3	Electromechanical engineering technologists and technicians: • speak with co-workers to ask for, provide, or clarify information. For example, may ask a co-worker for help with troubleshooting. (2)
Most Complex	3	• speak with workers on shop floor or trades people. For example, ask questions to gather information about

		equipment malfunctions. (2) • speak with technical support to ask for information, help with troubleshooting and problem solving, or to clarify information. (2) • speak with suppliers to obtain technical information about equipment, parts and materials, such as electrical components. (2) • attend “lunch and learns” with co-workers and colleagues. For example, may present on a topic or be there to learn, such as using pivot tables in Excel or tricks for macro programming in Excel. They ask questions and share information. (2) • speak with clients regarding their needs and then communicate those needs to developers. (3) • speak with software developers. For example, when testing a product, they may confirm whether components are functioning properly or there is a bug in the software. (3) • attend meetings with team members. For example, launch meetings present the overview, goals, and deliverables for projects. They attend meetings to discuss assigned and completed tasks, assign new tasks, discuss concerns, and to brainstorm for new ideas or solutions to problems. For example, they may discuss the need for more testing because some parts of the system are not working as planned. (3) • may be part of the team presenting a project to clients. For example, may be responsible for presenting the 3D models and electrical schematics. Must be able to respond to questions and present information in a way that is understood by the client. (3)

Modes of Communication Used

- In person.
- Using a telephone.
- Using a two-way radio.

Environmental Factors Affecting Communication

Loud equipment noise in plant areas may hinder communication.

Oral Communication Summary

The symbols >, >> and >>> are explained in the Use of Symbols section.

Purpose for Oral Communication (Part I)						
Type	**To greet**	**To take messages**	**To provide/receive information, explanation, direction**	**To seek, obtain information**	**To co-ordinate work with that of others**	**To reassure, comfort**
Listening (little or no interaction)			>>			
Speaking (little or no interaction)						
Interact with co-workers			>>>	>>>	>>>	
Interact with those you supervise or direct			>>	>>	>>	
Interact with supervisor/manager						
Interact with peers and colleagues from other organization					>>>	
Interact with customers/clients/ public			>>>	>>>		
Interact with suppliers, servicers				>>		
Participate in group discussion			>>>	>>>	>>>	
Present information to a small group			>>			
Present information to a large group						

The symbols >, >> and >>> are explained in the Use of Symbols section.

Purpose for Oral Communication (Part II)						
Type	**To discuss (exchange information, opinions)**	**To persuade**	**To facilitate, animate**	**To instruct, instill understanding, knowledge**	**To negotiate, resolve conflict**	**To entertain**
Listening (little or no interaction)						
Speaking (little or no interaction)						
Interact with co-workers	>>>			>>>		
Interact with those you supervise or direct	>			>		
Interact with supervisor/manager	>>>					
Interact with peers and colleagues from other organization	>>>					
Interact with customers/clients/ public				>>>		
Interact with suppliers, servicers						
Participate in group discussion	>>>			>>>		
Present information to a small group	>>	>>		>>		
Present information to a large group						

F. Thinking Skills

1. Problem Solving

Problem Solving

Tasks	Complexity Level	Examples
Typical Most Complex	2 to 4 4	Electromechanical engineering technologists and technicians: • figure out how to meet customer requirements. For example, they find substitute components and parts for customers who request a part that is no longer available. They must be able to explain why the part can be substituted and how it will perform. (2) • replace, update or upgrade old systems. They must figure out what the original system could and could not handle and what the changes mean to the system as a whole. For example, may have to make other changes or modifications for a system to function correctly. (3) • figure out how to develop test cases for testing software based on the requirements. Have to determine if problems are in the software or hardware based on troubleshooting and testing. For more complex problems, will work with co-workers, software developers and others to come up with a solution. (3) • find that equipment is not functioning properly. They use troubleshooting skills to determine if a problem is mechanical, electrical or the computer controlling the process. They use trial and error to make modifications and adjustments to the equipment. They analyze results to identify possible sources of problems and consider multiple solutions. Technical knowledge and experience are required to effectively diagnose problems and come up with solutions. (4)

2. Decision Making

Decision Making

Tasks	**Complexity Level**	**Examples**
Typical Most Complex	2 to 3 3	Electromechanical engineering technologists and technicians: • select suppliers, materials and components. For example, they decide when to substitute parts and components by comparing material specifications and performance, customer requirements and cost. (2) • decide how to respond to technical support questions and problems. For example, when a customer needs parts that are no longer available for an older product, they locate and explain options. Based on experience, knowledge and available time, they may decide to consult with or pass the customer to an engineer. (2) • decide when further testing is required and which tests to use based on test results and recommendations in test reports. (3)

3. Critical Thinking

Critical Thinking

Tasks	**Complexity Level**	**Examples**
Typical Most Complex	3 4	Electromechanical engineering technologists and technicians: • analyze, test and troubleshoot circuits with programmable logic devices (PLC) using techniques, such as ladder diagrams, to diagnose and repair faults. (3) • test products using test tools. There are multiple tests for each product. They establish a set of conditions or variables to determine whether the product meets requirements and standards including procedures for testing, review test results to determine if a product is operating to specifications, and may recommend further testing. (3) • complete full system tests of programming to ensure software meets the specifications and validate that established criteria have been met and steps have been taken to ensure proper operation. For example, they perform loop tuning to make sure set points for rooms and mechanical equipment are within specifications and mechanical equipment is not over cycled. (4)

4. Job Task Planning and Organizing

Job Task Planning and Organizing

Complexity Level	Description
3	Own job planning and organizing: • responsible for organizing and prioritizing tasks to maximize efficiency and meet deadlines. They often work on several projects or are assigned several tasks at one time, which may lead to conflicting demands on their time and require them to reprioritize tasks. They co-ordinate tasks and schedules with other team members. They seek help from other team members. Some projects are more collaborative than others, such as research and development. Repairing and maintaining equipment requires fitting into the client's schedule. Job planning and organizing for others: • may assign tasks to others. With experience, they may take on the role of project lead.

5. Significant Use of Memory

Examples

- remember codes, regulations, specifications, abbreviations and acronyms.
- recall previous troubleshooting solutions.
- recall codes, regulations and specifications that are applicable to specific projects.

6. Finding Information

Finding Information

Tasks	Complexity Level	Examples
Typical Most Complex	1 to 3 3	Electromechanical engineering technologists and technicians: • contact suppliers and manufacturers to obtain technical data and other information. (1) • ask co-workers, project leaders, supervisors, engineers, and others for help with troubleshooting and problem solving. (2) • consult technical data and specifications lists, drawings and other reference documents for information. For example, tolerances, and operating conditions and parameters. They often combine information from several

		sources. (3) • refer to manuals, standards and regulations, trade journals and other materials to locate information. For example, they refer to equipment manuals for installation and troubleshooting information. (3)

G. Working with Others

Working with Others

Complexity Level	Description
3	Electromechanical engineering technologists and technicians in large companies usually work as part of a team that may include engineers, other technicians and technologists, sales, production, and tradespeople (electricians, machinists, plumbers, welders). The size of the team depends on the size of the company and the size of the project. Each member of the team is assigned tasks, but team members often work collaboratively to solve problems. They may work alone to maintain and repair equipment, but often work with the client's staff, such as millwrights and electricians. Electromechanical engineering technologists and technicians with more experience or seniority may assign tasks to other workers or take a more senior role on the team.

Participation in Supervisory or Leadership Activities

- Participate informal discussion about work process or product improvement.
- Have opportunities to make suggestions on improving work processes.
- Monitor the work performance of others.
- Inform other workers or demonstrate to them how tasks are to be performed.
- Orient new employees.
- Assign routine tasks to other workers.

H. Digital Technology

Digital Technology

Tasks	**Complexity Level**	**Examples**
Typical Most Complex	2 to 4 5	Electromechanical engineering technologists and technicians: • use programmable calculators and online tools to make calculations, such as flow rates or force. For example, they use engineering software to calculate flow rates or the force on a gripper handle. (1) • use communications software. They use email to exchange messages and attached files, such as photos and drawings, with co-workers, colleagues and clients. (2) • use the internet. They use internet browsers to locate information and research new projects. They look up product information on supplier websites. (2) • access forums and blogs to exchange ideas, ask for troubleshooting assistance and to keep up to date. (2) • use graphics software. For example, they may use PowerPoint to develop slides for a presentation including graphs, pictures, tables and animations. (3) • use databases to manage information, and track quality control and test results. (3). • use spreadsheets, such as Excel. For example, they may monitor budgets or create schedules to track project timelines. They insert formulae. (3) • use word processing software. They write reports that include tables of contents, levels of headings, graphics, graphs, tables, and drawings. (3) • may use statistical analysis software to analyze and compare data from testing. (3) • use computer assisted design and manufacturing software such as CAD Electrical. They use drafting and design software to create 2D and 3D drawings and schematics. (4) • use programming language, such as Ladder Logic to program PLCs (Programmable Logic Controllers). (5)

Computer Use Summary

- Use word processing.
- Use graphics software.
- Use databases.
- Use spreadsheets.
- Use computer-assisted design software.
- Use communications software.
- Use the internet.

I. Continuous Learning

Continuous Learning

Complexity Level	Description
3	Electromechanical engineering technologists and technicians are responsible for setting their own learning goals. They access online information, forums and blogs to stay up to date with trends, and evolving technology. The field is highly competitive and technology is always changing. They learn on the job and attend training offered in the workplace, such as "lunch and learns" on new and updated products. They take courses on topics such as PLC programming, and attend conferences and workshops. They may decide to complete a degree in engineering. Some companies encourage and support further training. They may or may not belong to professional associations, such as Applied Science Technologists & Technicians of British Columbia (ASTTBC).

How Learning Occurs

Learning may be acquired:

- As part of regular work activity.
- From co-workers.
- Through training offered in the workplace.
- Through reading or other forms of self-study
  - at work.
  - on worker's own time.
  - using materials available through work.
  - using materials obtained through a professional association or union.
  - using materials obtained on worker's own initiative.
- Through off-site training
  - during working hours at no cost to the worker.
  - partially subsidized.

- with costs paid by the worker.

J. Other Information

In addition to collecting information for this Essential Skills Profile, our interviews with job incumbents also asked about the following topics.

Physical Aspects

Electromechanical engineering technologists and technicians sit to work at computers. They stand, walk, stoop, bend, kneel and crouch when installing, maintaining or repairing equipment. They require medium strength to lift test equipment.

Attitudes

Electromechanical engineering technologists and technicians need to be able to handle the stress of meeting deadlines. They must be interested in learning new skills, be able to figure out things independently, and enjoy troubleshooting and solving problems. They should be able to look at a problem from more than one angle and choose the best solution, not necessarily the most obvious one.

Impact of Digital Technology

All essential skills are affected by the introduction of technology in the workplace. Electromechanical engineering technologists and technicians' ability to adapt to new technologies is strongly related to their skill levels across the essential skills, including reading, writing, thinking and communication. Technologies are transforming the ways in which workers obtain, process and communicate information, and the types of skills needed to perform in their jobs. Change is occurring rapidly in the field of automation and robotics. Workers in this field will be at the forefront of manufacturing and development as manufacturers increasingly rely on automation technology to maintain a competitive edge in the global economy. In particular, Electromechanical engineering technologists and technicians need enhanced digital technology skills to develop, design, build, maintain, troubleshoot and repair increasingly complex computer-controlled systems and robotic devices used in industrial and commercial facilities. As electronic technologies continue to advance, requirements for digital skills will increase.

Technology in the workplace further affects the complexity of tasks related to the essential skills required for this occupation. Electromechanical engineering technologists and technicians need the skills to use increasingly complex schematics and diagrams for sophisticated electronic control systems. Workers need to be able to use, install and troubleshoot increasingly complex software applications.

K. Notes

This profile is based on interviews with job incumbents across Canada and validated through consultation with industry experts across the country.

For information on research, definitions, and scaling processes of Essential Skills Profiles, please consult the Readers' Guide to Essential Skills Profiles.