



MACHINE OPERATOR

National Occupational Standard

Canada 

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WMC CFB

Wood Manufacturing Council
Conseil des fabricants de bois

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National Occupational Standards

This National Occupational Standard (NOS) was developed by the Wood Manufacturing Council (WMC) and industry professionals.

National Occupational Standards (NOS) describe the skills, knowledge and abilities required to perform the duties of an occupation. The *National Occupational Standard for a Machine Operator* describes what a person, who is using various machinery to process and shape components used in the wood manufacturing industry, needs to know and be able to do to be considered capable of doing his or her job effectively and successfully. Occupational standards can be used for a variety of purposes, including:

- Developing job descriptions
- Conducting performance appraisals
- Informing and assessing training curricula
- Assisting with professional certification
- Identifying ongoing professional development needs
- Managing succession plans

A National Occupational Standard is an extremely valuable resource tool that can be used by a variety of stakeholders, including:

- Owners and employers the wood manufacturing industry
- Current and future employees
- Human resources personnel
- Managers in the wood manufacturing industry
- Educators and training providers
- Members of the public
- Partner organizations
- Volunteers

About the Wood Manufacturing Council

The Wood Manufacturing Council is a National Sector Council dedicated to addressing the human resource needs of firms involved in the advanced manufacturing of wood products. The mandate of the WMC is to plan, develop and implement human resources strategies that support the long-term growth and competitiveness of Canada's advanced wood products manufacturing industry and meet the developmental needs of its workforce. The Council works to identify and examine the necessary skills and knowledge required to respond to the changing needs of the industry as well as developing an overall strategic plan to address key issues such as the shortage of skilled workers and the need for national standards for worker competencies.

More information on the Council can be obtained online at www.wmc-cfb.ca.

To order additional copies of this standard or to find out about the range of resources the council has available, contact:

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Acknowledgement of Industry Contributors

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The participating volunteers and contributors to this effort are many, and too numerous to name individually. We sincerely appreciate the interest and expertise that the woodworking community provided on this project. The input from the industry, including the significant number of contributors to the original standards that were updated in this project, is substantial and of importance to the efforts to obtain a common understanding of the skills and competencies needed for a worker to perform competently in the workplace.



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The opinions and interpretations in this publication are those of the author and do not necessarily reflect those of the Government of Canada.

Introduction to National Occupational Standards

National Occupational Standards (NOS) describe the skills and knowledge needed to perform competently in the workplace. The NOS is further supported by Essential Skills, which serve as the foundation of what a worker needs to know to be able to do his/her job. Essential Skills are not technical skills but the core skills people need to acquire knowledge and complete workplace tasks and daily activities. A complete Essential Skills Profile for Machine Operator is included in Appendix A.

This NOS document is the product of multiple interviews and workshops conducted with industry experts across Canada. The standard was originally developed through a series of industry expert consultations in 2007/8 and has been updated through further consultations in 2015/16 in order to reflect the changes in the industry and occupation over the past eight years. For a description of the development process and stakeholder involvement, see Appendix B.

Organization of the National Occupational Standard

The standard is organized into three main sections: Occupational Background, Occupational Health and Safety and Occupational Analysis.

The **Occupational Background** section provides contextual information about the occupation, such as working environment, personal attributes and tools and equipment required to successfully perform the work required.

Occupational Health and Safety (OH&S) is a foundation of any job. The OH&S section details the knowledge, skills and abilities required to handle hazards in the workplace. The section is organized under five areas of responsibility: people, equipment, environment, materials and process.

The **Occupational Analysis** section provides a detailed breakdown of the tasks that a Machine Operator needs to be able to do in order to perform his/her job effectively. These tasks are grouped in meaningful sections consisting of tasks and sub-tasks that need to be performed. The tasks and sub-tasks are supported by underlying knowledge, abilities and skills required to perform the tasks.

Contextual Information provides additional information on the *frequency, importance* and *difficulty* of the skills required to perform competently in the occupation. This is useful for educators in identifying where focus should be placed in curriculum design, as well as employers seeking to highlight tasks that are particularly important.

Occupational Background

- Working Environment
- Personal Attributes
- Overall Knowledge & Abilities

Occupational Health & Safety

- People
- Equipment
- Environment
- Materials
- Processes

Occupational Analysis

- Sections
- Tasks
- Sub-Tasks
- Contextual Information
- Knowledge & Abilities
- Essential Skills

How to use the National Occupational Standard - Example

Develop a Job Posting

You need to develop a job posting to hire a Machine Operator. There is a car manufacturing plant close by that employs machine operators. You know that these machine operators have many transferable skills. You are confident that if you can just get the person with the right attitude and essential skills, you can teach them the rest. You decide to focus on Personal Attributes, Physical Requirements and Essential Skills in your job posting.

Promote from within

You need a CNC Operator. You have a Machine Operator on staff that you would like to train to be a CNC Operator. You look at the standard to see which tasks are specifically required for a CNC Operator (for example, Task B1b: Machine Set-up) and you use the standard to develop a training program to transition the Machine Operator to the CNC Operator role.

Train for skills in demand

Your customers are demanding increased customization and you are worried that the frequent programming changes are slowing down your production process. You review the standard and identify where you can build efficiencies into the process. Afterwards, you identify the key tasks, knowledge and skills required, you develop a training program to upskill your workers and increase efficiencies.

Succeed in a job search

You are a job-seeker searching for new employment as a CNC Operator. The National Occupational Standard for the CNC Operator includes information about the knowledge and abilities required for this position. You use this information to develop a résumé that will stand out to employers by highlighting how your skills address all the job requirements.

For more information about using the standard see the “Wood Manufacturing Council Employer’s Guide to using National Occupational Standards”.

Occupational Background

The purpose of this analysis is to establish a general profile for the occupation and provide contextual information for the National Occupational Standards. Managers, job incumbents and human resource personnel, from various wood manufacturing areas, were interviewed for the purpose of gaining an overall understanding of the profile of the typical Machine Operator. For an in-depth analysis of the wood manufacturing industry as a whole, consult the Labour Market Information (LMI) study (2016) available from the Council.

Wood Manufacturing Machine Operators use a variety of manual or automated machinery, such as saws, lathes, planers, routers, edgers, gluing and pressing machines, shapers, drills and sanders, to select, cut, drill and shape components used in the wood manufacturing industry. Components can include doors, cabinets, trim for architectural millwork, windows, stairs and the various components used in the wood manufacturing industry.

As part of this process, Machine Operators set up, run, and maintain the various machines that may include a computerized component. Machine Operators that work with computer numerically controlled machines are called Computer Numerically Controlled Machine Operators or CNC Machine Operators. For the purpose of this standard, Machine Operator will include CNC Machine Operator unless a unique distinction needs to be made. The Machine Operator optimizes the machine's output and controls the quality of the product in a consistent manner.

Example Titles

Machine Operator

- Table saw operator
- Edge bander operator
- Wide belt sander operator

Computer Numerically Controlled (CNC) Machine Operator

- CNC moulder operator
- CNC router operator
- CNC machining centre operator

Occupational Background

- Working Environment
- Personal Attributes
- Overall Knowledge & Abilities

Main Duties

Machine Operator

- Read and interpret specifications (work orders, drawings and/or blueprints) or follow verbal instructions
- Operate pre-set special-purpose woodworking machines to fabricate wood products and sub-assemblies
- Load and unload the machine
- Optimize the use and output of the machine on a daily basis to fill the work orders
- Perform routine daily maintenance
- Perform quality checks on materials before and after machining

CNC Machine Operator

Woodworking CNC operators are specialized Machine Operators and perform some or all of the following duties:

- Read and interpret specifications (work orders, drawings and/or blueprints, templates/samples) or follow verbal instructions
- Identify and communicate program issues
- Make minor program adjustments
- Operate preset special-purpose woodworking machines to fabricate wood products and sub-assemblies
- Set up, program and operate one or more computer numerically controlled (CNC) machines
- Machines to fabricate or repair wooden parts for furniture, fixtures and other wood products
- Load and unload CNC equipment
- Optimize the use and output of the machine on a daily basis in filling the work orders
- Perform routine daily maintenance
- Perform quality checks on materials before and after machining

Working Environment

Work environments are becoming less repetitive and less standardized. Most of the positions in the industry now comprise a wider variety of tasks, requiring different skill sets as well as flexibility in knowledge and approach. As more CNC machines take over the functions and

reduce set-up and job change times, Machine Operators will be required to use computers more extensively in the work place (to choose programs, monitor machine operations and program/re-program the machine) and demonstrate a higher level of technical skills. The working environment may be dusty¹ and organizations report putting great emphasis on workplace cleanliness for the health and safety of their employees.

Machine Operators are generally found on the factory floor.

CNC Machine Operators work on the factory floor running the machines and may work in an office programming the CNC machines. CNC Machine Operators commonly do not develop the programs; however, they may install, run and make modifications to the program.

Personal Attributes

Machine Operators need to have the following personal attributes in order to be able to do their job and work with others effectively.

Working with Others

Most of the interactions occur with Supervisors/Lead hands and colleagues. Depending on the facility, some Machine Operators may interact with engineers, production control, quality, customers, the design department, shipping department and inventory clerks. Machine Operators need to:

- Demonstrate mature, respectful, fair and equitable behaviours in all interactions and situations
- Communicate in an honest, respectful and sensitive manner
- Present information/instructions clearly and effectively
- Interact with supervisors, engineers, production control, quality and other personnel
- Inform team members of progress of work
- Bring issues to the attention of appropriate personnel, as needed
- Offer ideas or suggest modified approaches to address current situations or issues
- Communicate technical information clearly and concisely
- Provide and receive feedback from others
- Work effectively as a member of a team
- Be willing to assist others, as required
- Work with team members to identify bottlenecks in production
- Behave professionally by being punctual, reliable, understanding personal responsibility, contribution and role
- Handle pressure/stress in getting jobs completed according to a specific time schedule

¹ It is important to ensure that workplaces have safety measures in place to control for and reduce the amount of wood dust in the air that meets Occupational Exposure Limits (OEL) across Canadian jurisdictions. See Carex Canada for dust exposure regulations and guidelines, http://www.carexcanada.ca/en/wood_dust/#regulations_and_guidelines

Personal Qualities

- Decision making/judgment (e.g., cost/benefit of particular action)
- Stay positive when things change
- Adapt to changes in tasks, assignments and changing production priorities
- Learn and apply new knowledge
- Continuously look for ways to improve efficiencies
- Perform work duties in a conscientious, consistent and thorough manner
- Have a high attention to detail
- Ability to identify problems, know how to resolve them and when to escalate to the appropriate person
- Mechanical aptitude

Physical Requirements

- Visual spatial intelligence (ability to visualize rotation of shapes in space)
- Hand-eye coordination
- Perform and sustain repetitive motions
- Lift materials of various weights
- Stand in one spot or in a bounded area for periods of time
- Push, pull or move materials
- Demonstrate manual dexterity

Overall Knowledge & Abilities

Machine operators need to have an in-depth knowledge of woodworking materials and tools, techniques and safety precautions.

Inventory and Manufacturing Processes

- Knowledge of inventory control processes
- Knowledge of manufacturing processes
- Knowledge and use of bar codes
- Knowledge of lean inventory concepts and practices

Woodworking Material

- Knowledge of raw materials (solid wood and panel products)
- Knowledge of various types of wood products (e.g., veneers, composites)
- Knowledge of various types of hardware
- Ability to identify common wood species, use and properties
- Ability to differentiate between softwood and hardwood

Woodworking Techniques

- Knowledge of and ability to use various woodworking tools, equipment and machinery
- Knowledge of and ability to use computerized machinery to perform the required operations
- Ability to use a wide range of measuring tools, gluing and repairing compounds and joining hardware and tools
- Ability to use work methods that avoid waste, considering time, effort, materials, space, and motion/transportation

Quality

- Knowledge of quality standards and procedures
- Ability to use work methods and techniques that ensure the product meets quality standards

Environmental Sustainability

- Ability to identify ways to reduce, reuse and recycle work materials
- Ability to dispose of waste according to green practices

Occupational Health and Safety

The health and safety section details the knowledge and abilities required by every employee to maintain a safe and healthy workplace. There are five main health and safety areas that need to be considered when identifying the knowledge and abilities required to maintain a safe and healthy workplace: people, equipment, environment, materials and processes.

Occupational Health & Safety

- People
- Equipment
- Environment
- Materials
- Processes

People

People can create hazards in the workplace by their actions or inactions. As such, proper training, administration, leadership and supervision are required to ensure that employees engage in the appropriate workplace behaviours.

Each employee is required to know:	Each employee is required to:
<ul style="list-style-type: none">• Occupational Health and Safety legislation relevant to the workplace• Occupational Health and Safety procedures for controlling hazards/risks in the workplace• Accident and emergency procedures as per company policy• Company's safety training requirements• Safe bending, carrying and lifting procedures• Worker safety legislation and procedures• Legislation on violence and harassment in the workplace	<ul style="list-style-type: none">• Use personal protective equipment (e.g., face masks, gloves, safety glasses, steel-toed boots, hearing protection)• Use personal safety measures when performing work (e.g., no loose clothing, no shoelaces untied)• Request assistance to move heavy loads• Use dollies, lifts or carts when possible• Report safety-related situations or incidents• Report incidents of violence and harassment in the workplace

Equipment

When considering tools, machines and equipment in the workplace that can be hazardous, it is important to identify proper use, maintenance and storage requirements.

Each employee is required to know:	Each employee is required to:
<ul style="list-style-type: none">• Safe use, storage, handling of tools, machines and equipment• Grounding procedures	<ul style="list-style-type: none">• Operate tools and machinery as per manufacturer's recommendations and established company policies• Maintain machines and tools in proper operating condition• Inspect tools and equipment to ensure they meet safety requirements• Use lock out/tag out procedures when repairing/servicing tools and equipment• Ground all equipment before use (e.g., ensure ground straps are in place)

Environment

Some hazards can be created by the work environment and can be either naturally occurring (e.g., weather conditions) or the result of an unsafe condition caused by poorly maintained equipment, tools or facilities.

Each employee is required to know:	Each employee is required to:
<ul style="list-style-type: none">• Hazards and unsafe work conditions• Safety requirements related to ventilation and working in an enclosed space	<ul style="list-style-type: none">• Keep work area clean and free of clutter• Use proper cleaning materials• Return and store materials in their designated area• Label products according to WHMIS standards• Report identified safety hazards to designated personnel in accordance with workplace requirements and relevant workplace Occupational Health and Safety legislation• Identify risks to health and safety in the work area (e.g., torn or frayed cords, dirty clothes, debris on floor, broken equipment or tools, spills, exhaust fumes)

Materials

Materials are any workplace substance, matter or provisions used for production that have the potential to cause harm or loss especially if handled improperly, such as paints, stains or glues.

Each employee is required to know:	Each employee is required to:
<ul style="list-style-type: none">• Environmental effects of chemicals• Cleaning materials to use (e.g., mops, sponges, cloths, cleaning agents)• Proper disposal procedures• Proper storage procedures	<ul style="list-style-type: none">• Use dust collecting equipment• Use cleaning materials properly• Return and store materials in their designated area• Remove unpermitted materials from work area (e.g., fuel, paint)• Control the volume of hazardous materials in work area

Processes

Processes involve the flow of work and include factors such as design, pace and organization of the various types of work via policies, procedures and work processes. For example, a poorly designed work process or an increase in production, without considering the effect it can have on people, objects or equipment, can increase the likelihood of an incident.

Each employee is required to know:	Each employee is required to:
<ul style="list-style-type: none">• Safe work procedures• Workplace Hazardous Materials Information Systems (WHMIS)• Hazardous material (HAZMAT) procedures	<ul style="list-style-type: none">• Use Occupational Health and Safety procedures for controlling hazards/risks in workplace• Identify steps and procedures to reduce risk• Follow accident/incident reporting procedures as per company policy



Occupational Analysis

The Occupational Analysis section consists of: Sections, Tasks, Sub-Tasks, Contextual Information, Knowledge & Abilities and Essential Skills related to each task.

Sections

Sections are the largest divisions or groupings of tasks that reflect distinct operations within the occupation.

Tasks

Tasks are distinct activities that, combined with others, make up the logical and necessary steps the worker is required to perform in order to complete a specific assignment within a Section. There are two Sections for Machine Operator: Preparation and Machine Operation. Within those Sections are the following tasks.

Occupational Analysis

- Sections
- Tasks
- Sub-Tasks
- Contextual Information
- Knowledge & Abilities
- Essential Skills

Section A: Preparation

Task A1: Plan Production	Task A2: Material Preparation & Handling
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Section B: Machine Operation

Task B1a: Machine Set-up (MO)	Task B2: Machine the Part	Task B3: Finalize the Work	Task B4: Perform Maintenance Operations
Task B1b: Machine Set-up (CNC)			

Sub-Tasks

Sub-Tasks are the smallest division into which it is practical to subdivide any work activity, and, combined with others, fully describe all steps within a Task. Sub-Tasks are detailed in the next section.

Contextual Information

Contextual information provides additional information about a skill or task. It is useful in the development of training materials or in identifying appropriate training tools or methods. It can be used for on-the-job training or as part of a formal educational program.

Contextual information is provided under three headings: Frequency, Importance and Difficulty. A brief description of each of these is provided below.

Frequency: defines how often the task is performed. The question asked is: How often do you do this?

Importance: a rating that indicates the importance of the task to competent performance. The question asked is: How important is it that you know how to do this?

Difficulty: defines the levels of effort, challenge, and complication associated with the performance of the task. The question asked is: How difficult is this to learn?

0. I don't do this (Never)

0. Not important to my job (Not Important)

0. Needs no training or practice (None)

1. Not very often

1. Somewhat important to my job (Somewhat Important)

1. Needs minimal training or practice (Low)

2. Sometimes

2. Important to my job (Important)

2. Needs some training or practice (Moderate)

3. All the time

3. Very important to my job (Very Important)

3. Needs significant training or practice (High)

Knowledge & Abilities

The elements of skill and knowledge an individual must acquire to adequately perform the Sub-Task.

Essential Skills

Essential Skills are foundation skills required for all types of work. They are not technical skills but the core skills people need to acquire knowledge and complete workplace tasks and daily activities. Essential Skills are defined as:

- Reading Text
- Document Use
- Writing
- Numeracy
- Oral Communication
- Thinking Skills (includes: Problem Solving, Decision Making, Critical Thinking, Job Task Planning and Organizing, Finding Information and Significant Use of Memory)
- Digital Technology
- Working with Others
- Continuous Learning

They are included in the Occupational Analysis as guidance for training. They are useful for identifying upgrading needs and to see opportunities where they can be reviewed and learned during orientation, training and on the job.

All these elements build on each other to define the knowledge, skills and abilities required to perform as a Machine Operator. The following section is a detailed breakdown of the Sections, Tasks, Sub-Tasks, Knowledge and Abilities and Essential Skills for Machine Operators.

Section A: Preparation

Task A1: Plan
Production

Task A2:
Material
Preparation &
Handling

Task A1: Plan Production

Sub-Tasks

A1.1	Review production schedule	Frequency: Sometimes Importance: Important Difficulty: Moderate
A1.2	Review work order (ticket)	Frequency: All the time Importance: Very Important Difficulty: Moderate
A1.3	View drawings to identify issues related to drawings, instructions and specifications	Frequency: Sometimes Importance: Important Difficulty: High
A1.4	Verify materials provided match work order	Frequency: All the time Importance: Very Important Difficulty: Moderate
A1.5	Plan the order of machining operations	Frequency: All the time Importance: Important Difficulty: High
A1.6	Determine the tools and equipment required for fabrication of various components based on designs and blueprint	Frequency: All the time Importance: Very Important Difficulty: Moderate
A1.7	Resolve issues when possible	Frequency: All the time Importance: Very Important Difficulty: High

Knowledge/Abilities

Knowledge of:

- Process flow (inputs, outputs, raw materials, waste, quality control)
- Routing of product

Ability to:

- Interpret work order
- Interpret technical drawings
- Visualize how pieces of wood or wood products fit together
- Visualize the 3-dimensional rotation of an object
- Judge when to resolve an issue independently and when to escalate

Essential Skills

Document use

- Locate data about products on labels
- Locate product and machining information on work orders to verify they have correct product
- Locate production data on production schedules
- Follow checklists and schedules
- Complete quality inspection reports and highlight product and safety deficiencies
- Fill out relevant paperwork prior to delivery to next work area, as required
- Study technical drawings to understand the machining requirements of wood products

Numeracy

- Count wood product to verify the correct quantity
- Measure wood products to confirm products match work order
- Verify measurements on drawings will produce products that meet specification

Oral communication

- Inform supervisors about outstanding problems

Thinking skills

- Decide to accept wood products
- Evaluate wood products to verify they meet standards for quality and specifications

Reading

- Read machining instructions on work orders

Digital technology

- May use the Intranet and/or company databases to access production schedules, work orders and drawings

Task A1: Plan
Production

Task A2:
Material
Preparation &
Handling

Task A2: Material Preparation & Handling

Sub-Tasks

A2.1	Receive materials in preparation for machining	Frequency: All the time Importance: Important Difficulty: Moderate
A2.2	Verify type of materials provided meet specifications	Frequency: All the time Importance: Very Important Difficulty: Moderate
A2.3	Measure and mark materials	Frequency: All the time Importance: Important Difficulty: Moderate
A2.4	Inspect wood material for defects while loading to verify quality standards are met	Frequency: Sometimes Importance: Important Difficulty: Low
A2.5	Remove materials that do not meet specifications and quality standards	Frequency: Sometimes Importance: Important Difficulty: Low
A2.6	Layout materials in preparation for machining	Frequency: All the time Importance: Very Important Difficulty: Moderate

Knowledge/Abilities

Knowledge of:

- Properties, structure and characteristics of solid wood and wood materials such as veneers, engineered wood and panel products
- How defects affect the quality of cuts
- CNC Machine Operator: Principle of 32mm system

Ability to:

- Verify that wood and composite materials meet standards and specifications

Essential Skills

Document use

- Observe safety, warning and regulatory symbols and signs at worksites
- Scan tags on pallets to determine product, quantity, wood species and number
- Locate product information on work orders to verify they have correct product
- Complete inspection forms to verify completion and to note any defects and/or deficiencies

Numeracy

- Count wood products to verify the correct quantity
- Measure wood products to confirm products match work order

Thinking skills

- Decide to accept or reject wood products
- Decide the best way to arrange materials for machining to maximize productivity and minimize waste
- Evaluate wood products to verify they meet standards for quality and specifications
- Sequence the job tasks for efficient use of time and equipment

Block B: Machine Operation

Task B1a: Machine Set-up (MO)	Task B2: Machine the Part	Task B3: Finalize the Work	Task B4: Perform Maintenance Operations
Task B1b: Machine Set-up (CNC)			

Task B1a: Machine Set-up (Machine Operator)

Sub-Tasks		
B1a.1	Set up machines using work order instructions and Standard Operating Procedures (SOP)	Frequency: All the time Importance: Important Difficulty: Moderate
B1a.2	Install tooling	Frequency: All the time Importance: Very Important Difficulty: Moderate
B1a.3	Adjust machine table or cutting devices	Frequency: All the time Importance: Very Important Difficulty: Moderate
B1a.4	Attach jigs and fixtures, as required	Frequency: Sometimes Importance: Important Difficulty: Moderate
B1a.5	Secure stock into machine with holding device to conduct test run	Frequency: Sometimes Importance: Important Difficulty: Moderate

B1a.6	Set guard stops ²	Frequency: Sometimes Importance: Important Difficulty: Moderate
B1a.7	Perform test run on test sample	Frequency: Sometimes Importance: Important Difficulty: Moderate
B1a.8	Compare test pieces against specifications	Frequency: Sometimes Importance: Important Difficulty: Moderate
B1a.9	Adjust tooling	Frequency: Sometimes Importance: Important Difficulty: Moderate
B1a.10	Identify issues related to machine set-up	Frequency: All the time Importance: Important Difficulty: High
B1a.11	Resolve issues when possible	Frequency: All the time Importance: Very Important Difficulty: High
B1a.12	Do minor repairs on machine (e.g., replacing parts)	Frequency: Sometimes Importance: Important Difficulty: High
B1a.13	Refer outstanding problems to appropriate individuals	Frequency: Sometimes Importance: Important Difficulty: Moderate

² Some machines have guard stops that automatically adjust.

Knowledge/Abilities

Knowledge of:

- Standard Operating Procedures for machines in use
- Machine adjustments
- Tolerances of measurement
- Machinery

Ability to:

- Perform mechanical tasks
- Follow SOP (Standard Operating Procedures) to set up and operate the machine
- Identify problems or defects with machines

Essential Skills

Reading

- Review specifications to learn about particulars such as requirements for special materials and manufacturing processes
- Read Standard Operating Procedures to set up and maintain machining equipment

Document use

- Scan production and work orders to locate machining specifications and instructions
- Enter information about faulty equipment in repair request forms
- Scan cutting lists and machining charts to locate tooling, speed and feed rates

Oral communication

- Talk with other machine operators to discuss problems with equipment and defective wood

Thinking

- Solve problems related to machine operation, materials and products as they occur without waiting and/or deferring to supervisor
- Decide not to use worn and/or faulty tools, fixtures and equipment
- Decide the best way to set up the machines and arrange materials
- Decide to change knives and other tools and make adjustments to feed and speed rates, considering equipment tolerance levels and the product
- Judge the quality of test run products considering

specifications and quality standards

Numeracy

- Take machine readings to verify machine is operating correctly
- Measure the dimensions and design features of products using tape measures and depth gauges to verify product standards are met
- Take precise measurements of wood products and features using instruments such as callipers and gauges to verify specifications are met

Computer Skills

- Operate machines from a computerized console using the following computer functions
 - download programs
 - start and run the correct program for the job
 - use of touch screen

Task B1a: Machine Set-up (MO)	Task B2: Machine the Part	Task B3: Finalize the Work	Task B4: Perform Maintenance Operations
Task B1b: Machine Set-up (CNC)			

Task B1b: Machine Set-up (Computer Numerically Controlled Machine Operator)

Sub-Tasks		
B1b.1	Locate CNC program file as per work order	Frequency: All the time Importance: Important Difficulty: Moderate
B1b.2	Install the CNC program file for the job to be completed, making small adjustments as necessary	Frequency: Sometimes Importance: Important Difficulty: High
B1b.3	Select and install tooling (e.g., knives, cutting heads, bits, chisels and sand belts)	Frequency: Sometimes Importance: Important Difficulty: Moderate
B1b.4	Calibrate the machine <ul style="list-style-type: none"> Adjust parts and tools as required (e.g., scoring blades, verifying router bit depth) 	Frequency: Sometimes Importance: Very Important Difficulty: High
B1b.5	Adjust machine table or cutting devices	Frequency: All the time Importance: Important Difficulty: Moderate
B1b.6	Attach jigs and fixtures, as required	Frequency: Not very often Importance: Important Difficulty: Moderate

B1b.7	Secure stock into machine with holding device to conduct test run	Frequency: Sometimes Importance: Somewhat Important Difficulty: Moderate
B1b.8	Conduct test run on sample or calibration board	Frequency: Sometimes Importance: Important Difficulty: Moderate
B1b.9	Compare test pieces against specifications	Frequency: Sometimes Importance: Important Difficulty: High
B1b.10	Identify issues (e.g., machine set-up, programming and tooling)	Frequency: Sometimes Importance: Important Difficulty: High
B1b.11	Communicate issues to supervisor and/or programming department	Frequency: Sometimes Importance: Important Difficulty: High
B1b.12	Make minor adjustments to machine programming and parts, as necessary	Frequency: Sometimes Importance: Important Difficulty: High
B1b.13	Refer outstanding problems to appropriate individuals	Frequency: Sometimes Importance: Important Difficulty: Low

Knowledge/Abilities

Knowledge of:

- Standard Operating Procedures for machines in use
- Machine adjustments
- Tolerances of measurement
- Machine operation and maintenance procedures
- CNC machine processes and components
- Programming software
- Preventative maintenance procedures
- Appropriate cutting tools
- Computer CNC programming
- Design techniques

Ability to:

- Program CNC machine
- Run CNC computer program
- Perform machine operations
- Use SOP (Standard Operating Procedures) to set up machine (e.g., spindles, knives, sand paper)
- Perform machine maintenance and minor repairs

Essential Skills

Reading

- Review specifications to find requirements for special materials and machining
- Read Standard Operating Procedures to set up and maintain machines

Document use

- Scan production and work orders to locate machining specifications and instructions
- Enter information about faulty equipment in repair request forms
- Scan various charts to locate data for tooling and machine set up (e.g., scan offset charts to locate offsets for machines and tools and decimal equivalent charts for drill bits)
- Locate data on CNC process forms to set up and operate CNC machines
- Use graphical displays in the CNC program to set up and operate the machine

Oral communication

- Talk with other CNC machine operators to discuss set-up and operations of CNC machines

Thinking

- Solve problems related to machine operation, materials and products as they occur without waiting and/or deferring to supervisor (e.g., make minor adjustments to CNC programs and machines and/or change components)
- Decide not to use worn and faulty tools, fixtures and equipment
- Decide to change tools and other components and make adjustments to feed and speed rates, considering equipment tolerance levels and the product being machined
- Judge the quality of test run products considering specifications and quality standards

Numeracy

- Take machine readings to verify machines are operating correctly
- Measure the dimensions and design features of products using tape measures and depth gauges to verify product standards are met
- Take precise measurements for CNC set-ups and tooling using instruments such as callipers and gauges
- Use formulae to calculate locations of features and dimensions of products

Computer skills

- Operate machines from a computerized console using the following computer functions:
 - download programs
 - start and run the correct program for the job
 - set up machine using the CNC program
 - make minor adjustments to CNC program

Task B1a: Machine Set-up (MO)	Task B2: Machine the Part	Task B3: Finalize the Work	Task B4: Perform Maintenance Operations
Task B1b: Machine Set-up (CNC)			

Task B2: Machine the Part

Sub-Tasks		
B2.1	Feed/load wood component onto machine	Frequency: All the time Importance: Very Important Difficulty: Moderate
B2.2	Clamp stock into machine with holding device, as required	Frequency: Sometimes Importance: Important Difficulty: Moderate
B2.3	Machine pieces as per specifications	Frequency: All the time Importance: Important Difficulty: Moderate
B2.4	Perform quality inspections (e.g. examine visually, by touch, or using measuring tape, callipers and gauges as per specifications)	Frequency: All the time Importance: Very Important Difficulty: High
B2.5	Monitor machining to identify deficiencies in product or production	Frequency: All the time Importance: Very Important Difficulty: Moderate
B2.6	Remedy deficiencies (e.g., replace knives, make minor adjustments, etc. as appropriate)	Frequency: Sometimes Importance: Very Important Difficulty: Moderate
B2.7	Refer outstanding problems to appropriate individuals	Frequency: Sometimes Importance: Important Difficulty: Low

B2.8	Regularly clean out the machine to keep it clear of debris	Frequency: Sometimes Importance: Important Difficulty: Low
B2.9	Unload and sort machined product	Frequency: All the time Importance: Important Difficulty: Moderate

Knowledge/Abilities

Knowledge of:

- Types of machines used in wood manufacturing, such as point to point, saw, moulder, edge bander, router, etc.
- How various tools/blades affect wood cutting and drilling
- Cutting and feeding speeds and their effect on accuracy and smoothness of cuts
- Cutting speeds and feeds for different wood and composite materials
- Wood and composite material types
- Quality standards
- Computer functionality for computer-assisted machinery

Ability to:

- Optimize the capacity of machines and machine programming
- Repair minor defects using a variety of tools
- Use a range of jigs and fixtures
- Assess the quality of outputs
- Use a hydraulic lift, as required
- Use computer-assisted machine programs
- CNC Machine Operator: use CNC programs

Essential Skills

Document use

- Record job order numbers and date completed on job orders
- Complete inspection forms to note completed and to document quality issues
- Monitor graphical displays on computer screens

Oral communication

- Discuss issues such as equipment breakdowns with co-workers or supervisor
- Speak with helpers to coordinate tasks and provide instruction

Thinking

- Solve problems related to machine operation, materials and products as they occur within the scope of skills and knowledge
- Call upon another operator or millwright to assist and/or inform the supervisor if problem cannot be solved
- Decide when to clean equipment and area considering safety and optimum operation of equipment
- Decide to replace worn equipment components and make adjustments
- Judge the quality of products considering specifications and quality standards

Numeracy

- Take readings to verify machines are operating correctly
- During production runs measure and calculate dimensions and design features of products to verify product standards are met

CNC Machine Operator

- Calculate offsets to adjust tooling during production runs

Computer Skills

- Operate machines from a computerized console using the following computer functions:
 - download programs
 - start and run the correct program for the job
 - use functions within program to adjust feed and speed rates

CNC Machine Operator

- Execute basic programming changes while the existing programs are running

Task B1a: Machine Set-up (MO)	Task B2: Machine the Part	Task B3: Finalize the Work	Task B4: Perform Maintenance Operations
Task B1b: Machine Set-up (CNC)			

Task B3: Finalize the Work

Sub-Tasks

B3.1	Perform sub-assembly tasks during machine operations (e.g., insert dowel on the line)	Frequency: Not very often Importance: Somewhat Important Difficulty: Moderate
B3.2	Mark inspected work and stack in bin, pallet or conveyor	Frequency: Sometimes Importance: Somewhat Important Difficulty: Moderate
B3.3	Label pieces to specification	Frequency: Not very often Importance: Somewhat Important Difficulty: Low
B3.4	Send machined parts to next operation	Frequency: All the time Importance: Important Difficulty: Moderate

Knowledge/Abilities

Knowledge of:

- Production flow
- Assembly processes

Ability to:

- Use a range of hand/ancillary tools

Essential Skills

Document use

- Record job order numbers and date completed on pallets or bins and note inspection completed
- Locate sub-assembly instructions on work orders
- Note deficiencies and defects on non-conformance documents

Communication

- Discuss production issues and job tasks with co-workers to coordinate machine operations

Thinking Skills

- Identify ways to reduce, reuse and recycle materials to minimize wastage
- Evaluate production flow to suggest improvements

Task B1a: Machine Set-up (MO)	Task B2: Machine the Part	Task B3: Finalize the Work	Task B4: Perform Maintenance Operations
Task B1b: Machine Set-up (CNC)			

Task B4: Perform Preventative Maintenance Operations

Sub-Tasks

B4.1	Clean the machine and surrounding area	Frequency: All the time Importance: Important Difficulty: Low
B4.2	Inspect equipment (e.g., check for loose components, check safety guards)	Frequency: All the time Importance: Important Difficulty: Moderate
B4.3	Identify issues related to machine operation	Frequency: Sometimes Importance: Important Difficulty: Moderate
B4.4	Conduct preventative maintenance according to manufacturer's instructions or company's procedures (SOP) (e.g., changing the blades, cutting heads, bits, chisels, belts, lubricating and cleaning, as required)	Frequency: All the time Importance: Very Important Difficulty: High
B4.5	Perform minor machine adjustments, as required	Frequency: Sometimes Importance: Important Difficulty: High
B4.6	Assist with maintenance or repairs, as required	Frequency: All the time Importance: Important Difficulty: High

Knowledge/Abilities

Knowledge of:

- Machines and tooling
- Maintenance schedules
- Safety

Ability to:

- Perform maintenance tasks based on specifications
- Troubleshoot issues

Essential Skills

Reading

- Review SOPs for preventative maintenance
- Read equipment manuals to adjust machine settings and change tools and other components

Document use

- Complete inspection and maintenance checklists, noting deficiency and required maintenance
- Complete maintenance request forms
- Scan schematics, troubleshooting tables and assembly drawings to clean and maintain machines

Oral communication

- Discuss maintenance tasks when helping repair and maintenance technicians
- Communicate with helpers to coordinate tasks such as monitoring and loading/unloading wood products

Thinking

- Decide when to make minor adjustments and repairs to machines

Continuous learning

- Learn about new products, production techniques and machine operations by talking to suppliers, co-workers and supervisors

Essential Skills Profile - Machine Operator/ CNC Machine Operator

Essential Skills Background

Essential Skills are foundation skills required for all types of work. They are not technical skills but the core skills people need to acquire knowledge and complete workplace tasks and daily activities. These skills are considered essential for learning and completing workplace tasks. Therefore, the term “Essential Skills” has been adopted.

Understanding which Essential Skills are required for different occupations and training programs:

- allows individuals to compare their skills to those required
- assists training bodies in developing appropriate academic upgrading materials and programs. Training can be either stand-alone or embedded in other training to ensure individuals have the foundation skills necessary to be successful in training and as Machine Operators/CNC Machine Operators.

Employment and Social Development Canada (ESDC) have defined nine (9) Essential Skills. They are:

Reading	Thinking skills:
Document use	• problem solving
Numeracy	• decision making
Writing	• critical thinking
Oral communication	• job task planning and organizing
Digital technology	• finding information
Working with others	• significant use of memory
Continuous learning	

Definition of an "Example":

Example tasks are tasks generally performed by **most Machine Operators/CNC Machine Operators** in wood manufacturing. Each Essential Skill area includes a list of Examples to illustrate the use of that skill. While the Examples are not a comprehensive listing of the duties performed in that occupational group, they do provide a picture of the nature and range of tasks performed.

The qualifier – "may":

Some Examples use the qualifier "may". This indicates that the task may not relate to all Machine Operators/CNC Machine Operators in wood manufacturing or relate to only certain job functions.

Definition of Complexity Levels:

The Essential Skills complexity levels are a tool used to rate the difficulty of a particular task. It is not the Essential Skill itself or the learner that is rated, but the increasing demands that a required task makes upon the person to complete it.

With some exceptions, the Essential Skills are divided into five levels of complexity (1 being least complex and 5 being most complex). For example, level 1 indicates tasks requiring minimal literacy skills and level 5 indicates tasks requiring significantly more time and prior knowledge to interpret dense and complex texts and make high-level inferences, and where the consequences of making mistakes are greater.

For more information on Essential Skills complexity levels please refer to the Readers Guide to Essential Skills Profiles on the in the Employment and Social Development Canada website.

A. Reading

The typical reading tasks for a Machine Operator or CNC Machine Operator are at complexity 1 to 3.

Examples of Reading Tasks

Machine Operators/CNC Machine Operators:

1. read product labels. For example, they skim product labels affixed to equipment such as band saws to familiarize themselves with safe operation practices. (1)
2. skim notes in logbooks to learn about events and activities from previous shifts. (1)
3. read work orders for information on job specifications. (1)
4. read brief company bulletins about quality issues. (2)
5. read instructions. For example, they read instructions attached to machines. They read procedures, such as emergency evacuation and lockout procedures. (2)

6. read short text entries in forms. For example, they read short text entries on defects and/or quality inspection report to find details about defects. (2)
7. read memos and notices. For example, they may read memos from managers to learn about operational matters such as changes to production procedures. They read daily operating memos about restricted areas. (2)
8. read email messages from managers, co-workers, colleagues and suppliers. For example, they read email messages about upcoming events such as equipment shutdowns and upcoming production changes. (2)
9. review work orders and specification. For example, they review production orders and specifications to learn about particulars such as requirements for special materials and manufacturing processes. (3)
10. read brochures, catalogues and trade magazines to stay informed about industry trends. For example, they may read brochures and catalogues to learn about the features and benefits of new equipment such as computer numerically controlled saws, lathes and glue spreaders. (3)
11. read equipment and procedure manuals. For example, they may read manuals to learn how to set up and maintain machining equipment and/or computer numerically controlled machines. They may read International Organization for Standardization (ISO) procedures to understand manufacturing compliance requirements. (3)
12. read regulations, Acts and collective agreements. For example, they may read Occupational Health and Safety regulations to learn about requirements for personal protective equipment. They may read sections of employment standards Acts to learn about general holidays and exemptions. They may read collective agreements to learn about job classifications, grievance procedures and rules governing discipline and discharge. (3)

B. Document Use

The typical document use tasks of a Machine Operator or CNC Machine Operator are at complexity 1 to 3.

Examples of Document Use Tasks

Machine Operators/CNC Machine Operators:

1. observe safety, warning and regulatory symbols and signs at worksites. They observe signs, which indicate safety procedures before starting equipment and requirements for personal protective equipment such as safety glasses, hard hats and other safety gear. (1)
2. scan warning symbols on labels, packaging and signs. For example, they identify warning symbols on labels affixed to equipment. They read signs to learn about hazards that may result from exposure to gases, liquids and electrical sources. (1)
3. locate data on labels. For example, they scan labels on product packaging to locate data such as dimensions and part numbers. They scan tags on pallets to determine product, wood species and number. They scan tags affixed to machinery and equipment to learn details about defects, faulty and/or worn equipment and tools. (1)

4. record information on tags for quality control purposes, such as the size of the lumber, the date, the wood species and the run number. (1)
5. complete tracking and other administrative forms. For example, they may tick boxes and enter dates to complete quality inspection reports. They may enter data such as quantities, work order numbers, completion times and defect rates in production reports. They may enter service intervals, repair requirements into maintenance reports. They complete quality inspection reports to note that inspections were performed, highlight product and safety deficiencies. (2)
6. locate data on forms. For example, they read work orders and production schedules for information on what is to be cut or trimmed. They scan work orders and bills of material to verify they have the correct materials on hand. (2)
7. locate data in lists and tables. For example, they read lists, such as cutting lists, which specify the materials to be cut, the type of cuts to be made and the speed and feed rates. They scan maintenance lists to see what scheduled maintenance is required. (2)
8. extract data such as production, error, cost and material wastage rates from graphs. They scan production graphs to learn about production rates. (2)
9. read and interpret Material Safety Data Sheets (MSDS) and technical data sheets to obtain information on storage, handling, usage and what to do in emergencies. For example, they locate data about adhesives, paints, stains, etc. to learn about a new product's characteristics and safe handling specifications, such as ventilation requirements and reactions with other agents. (3)
10. study technical drawings to understand the cutting requirements of wood products. For example, they scan scale drawings of wood products to locate dimensions and angles. (3)
11. may scan process schematics to understand operating processes. (3)
12. read assembly drawings when repairing equipment, such as bandsaws. (3)

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. The list of specific tasks varies depending on what was reported.
- read completed forms containing check boxes, numerical entries, phrases, addresses, sentences or text of a paragraph or more. The list of specific tasks varies depending on what was reported.
- read tables, schedules or other table-like text (e.g., read work shift schedules).
- create tables, schedules or other table-like text.
- enter information on tables, schedules or other table-like text.
- obtain specific information from graphs or charts.
- interpret information on graphs or charts.
- recognize common angles such as 15, 30, 45 and 90 degrees.
- draw, sketch or form common shapes such as circles, triangles, spheres, rectangles, squares, etc.
- interpret scale drawings (e.g., blueprints or maps).
- take measurements from scale drawings.
- read assembly drawings (e.g., those found in service and parts manuals).
- may create assembly drawings.
- read schematic drawings (e.g., electrical schematics).
- make sketches.
- obtain information from sketches, pictures or icons (e.g., computer toolbars).
- read signs, labels or lists.

C. Writing

The typical writing tasks of Machine Operators/CNC Machine Operators are at complexity 1 to 2.

Examples of Writing Tasks

Machine Operators/CNC Machine Operators:

1. write reminders and notes. For example, they write notes about equipment and tool deficiencies on tags and product defects and shortages in quality inspection forms. They write comments on work orders to indicate if repairs were made to products. (1)
2. write logbook entries and short notes to co-workers. For example, they write short notes to record what happened during shifts. They write comments on packing slips to record errors and damages. They write logbook entries to comment on unusual production issues and equipment settings. (1)
3. write descriptions and explanations on forms. For example, they describe equipment defects, write explanations for delays such as problems with machines or products on production reports. They note problems with tools and equipment (e.g., programming issues, broken equipment, maintenance issues, and equipment replacement in maintenance request forms). They complete down-time reports to explain the cause of delays, such as a blade needing sharpening. (2)

D. Numeracy Tasks

The numerical calculation tasks of a Machine Operator or CNC Machine Operator involves:

- Measurement and Calculation Math at complexity levels 1-3.
- Data Analysis at complexity levels 1.
- Numerical Estimation at complexity levels 1-2.

Examples of Numeracy Tasks

Machine Operators/CNC Machine Operators:

1. count materials to verify the quantity of what was delivered matches the work order or bill of material. (Measurement and Calculation Math), (1)
2. take measurements using measuring tools such as rulers and tapes. For example, they use rulers to confirm dimensions of wood products. They take measurements to find the correct placement for drilling holes and to verify drill holes meet specifications. They may measure angles using protractors. (Measurement and Calculation Math), (2)
3. take measurements from scale drawings to verify wood products match specifications. (Measurement and Calculation Math), (2)
4. may calculate and verify the dimensions of products using measurements from scale drawings. They calculate depths, heights and widths. For example, they calculate measurements of products to verify specifications are met. (Measurement and Calculation Math), (3)

5. may take precise measurements of wood products and features such as boltholes using callipers to verify specifications are met. (Measurement and Calculation Math), (3)
6. take equipment readings to ensure that it is functioning normally. (Data analysis), (1)

CNC operators:

1. use depth gauges to set up the cutting tools on CNC machines. (Measurement and Calculation Math), (3)
2. set up and program CNC machines using formulae. (Measurement and Calculation Math), (3)

Examples of Numerical Estimation Tasks

Machine Operators/CNC Machine Operators:

1. estimate the times required to complete equipment machine set-ups, maintenance and repairs. They consider the difficulty of the tasks, the availability of parts and the times previously taken to complete similar maintenance and repair tasks. (Numerical Estimation), (1)
2. estimate times required for completing or to complete manufacturing tasks. They consider the requirements of the work being carried out and the times taken to complete similar tasks in the past. (Numerical Estimation), (2)

Math Skills Summary

a. Mathematical Foundations Used

Number Concepts

Whole Numbers	<p>Read and write, count, round off, add or subtract, multiply or divide whole numbers.</p> <p>For example, reading and writing product codes and material quantities, calculating quantities of materials, calculating hours, ordering quantities of materials.</p>
Integers	<p>Read and write, add or subtract, multiply or divide integers.</p> <p>For example, calculating variations from specifications, expressing quality control tolerances.</p>
Rational Numbers - Fractions	<p>Read and write, add or subtract fractions, multiply or divide by a fraction, multiply or divide fractions.</p> <p>For example, writing measurements and product specifications in fractions of inches, adding and subtracting fractions of inches to determine dimensions and clearances, calculating distances in fractions of inches and times in fractions of hours.</p>

Rational Numbers -
Decimals

Read and write, round off, add or subtract decimals, multiply or divide by a decimal, multiply or divide decimals.

For example, reading and writing measurements in metres and millimetres, adding and multiplying dimensions to determine quantities of materials.

Rational Numbers -
Percentages

Read and write percents, calculate the percent one number is of another, calculate a percent of a number.

For example, reading and writing production statistics such as actual daily production as percentages of forecasted production.

Convert between fractions,
decimals and percentages

Convert between fractions and decimals or percentages.

Convert between decimals and percentages.

For example, converting measurements expressed as fractions of an inch into decimals in order to program computer numerically controlled equipment.

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 equations to calculate production times and capacities, using formulae to calculate the raw material.

CNC Operators use formulae to set up programs for CNC machines.

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, using proportion to estimate raw material requirements for multiple-sized production runs.

Using scale drawings.

Shape and Spatial Sense

Measurement Conversions	Perform measurement conversions. For example, converting product specifications and measurements from inches to centimetres and millimetres, converting square feet to square metres and pounds to kilograms.
Areas, Perimeters and Volumes	Calculate areas. Calculate perimeters. Calculate volumes. For example, calculating the surface areas and perimeters of wood products.
Geometry	Use geometry. For example, using geometric construction methods to lay out patterns, using geometry to determine the areas of composite shapes, measuring angles for corner cuts. Recognize common angles. Draw, sketch and form common forms and figures.

Statistics and Probability

Summary Calculations	Calculate averages. Calculate rates other than percentages. For example, calculating average costs, calculating rates such as units produced per shift and units produced per worker.
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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 a watch, stopwatch or clock.
- Distance or dimension. For example, using a tape measure or callipers.
- Temperature. For example, using a thermometer and gauges.
- Pressure. For example, using a pressure gauge.

- Angles. For example, using angle finders, sliding squares, rascal rulers, bevel squares and protractors.
- Using the SI (metric) measurement system.
- Using the imperial measurement system.

E. Oral Communication

The typical oral communication tasks of a Machine Operators/CNC Operator are at complexity 1 to 2.

Examples of Oral Communication Tasks

Machine Operators/CNC Machine Operators:

1. inform lead hand/supervisors about low supplies, component and product defects and broken equipment and tools. (1)
2. may call repair technicians to schedule equipment repairs. (1)
3. discuss ongoing work with co-workers. For example, they exchange information about production runs and equipment breakdowns with other Machine Operators/CNC Machine Operators during shift changes. They talk with co-workers to discuss how to deal with defective wood. They communicate with co-workers to coordinate tasks such as monitoring and loading/unloading wood products. (2)
4. discuss safety concerns with supervisor. For example, they inform supervisors about hazards in the work area. (2)
5. communicate with helpers to give instructions, coordinate work and check on progress. (2)
6. participate in daily production talks and safety sessions to learn about work assignments, discuss production problems and activities occurring in production areas as part of safety talks. (2)
7. participate in safety meetings and training. (2)

Modes of Communication Used

- In person
- Using a telephone
- Using specialized communications signals. For example, they may use hand signals to communicate with machine operators who are in close proximity to noisy equipment.

Environmental Factors Affecting Communication

Machine operators/CNC operators have difficulty communicating with others when working in close proximity to noisy engines and power tools.

F. Thinking Skills

Problem Solving

The typical problem solving tasks of a Machine Operator/CNC Machine Operator are at complexity levels 1 to 3.

Examples of Problem Solving Tasks

Machine Operators/CNC Machine Operators:

1. may detect lumber grading errors. They remove the pieces before they get into the system, thus avoiding slowdowns as the pieces go through the production line. (1)
2. may detect errors in shop drawings. They note the mathematical inconsistencies and bring them to the attention of supervisors. (2)
3. may experience problems with the operation of mechanical equipment, such as a chop saw. They lock out the machine to determine if there is a minor problem, such as sectionage. If they cannot solve the problem, they call upon a millwright to assist and/or inform their supervisor. (2)
4. may find that the pile of waste wood is getting high, representing a production loss. They look through the pieces to determine which ones can be saved for other jobs. (2)
5. may find that a saw needs to be squared. They read manuals to locate the problem and follow recommended adjustments until the machine is operating within specifications. They run a test run to verify the error is corrected. (3)

CNC operators:

1. find that designs for CNC machine are incorrect. They may try to re-program the design or speak to a CNC programmer to fix the error. They run a test run to verify the error is corrected. (3)

Decision Making

The typical decision-making tasks of a Machine operator/CNC Machine Operator are at complexity levels 1 to 3.

Examples of Decision-Making Tasks

Machine Operators/CNC Machine Operators:

1. decide not to use worn and faulty tools and equipment. (1)
2. decide whether to accept damaged products. They consider the extent of damage and their ability to fix it. (1)
3. decide what minor imperfections can be left on a wood product, considering product specifications and company standards.(2)

4. decide to stop, slow and speed up work on production runs. For example, they may decide to halt production runs due to high product defect rates caused by faulty equipment. They speak to their co-workers and supervisors to try to fix the issue. (2)
5. assign job tasks to helpers. They consider the scope of work and workers' skills. (2)
6. decide the best way to set up the machines and arrange materials. (2)
7. decide when to change knives, based on how close to tolerance levels the equipment is operating. (2)
8. decide whether to shut down a machine if they suspect a safety problem. (3)

Critical Thinking

The typical critical thinking tasks of a Machine Operator/CNC Machine Operator are at complexity levels 2 to 3.

Examples of Critical Thinking Tasks

Machine Operators/CNC Machine Operators:

1. evaluate the safety of workplaces and work procedures. They evaluate risks posed by machines such as saws and lathes and the effectiveness of safety systems such as gates, guards and automatic switches. They assess their work area for cleanliness, adequate ventilation, safety barriers, warning signs and availability of safety equipment and supplies. (2)
2. evaluate the operation of machines to ensure optimal production and prevent breakdowns. (3)
3. evaluate product quality by inspecting finished products to confirm that they meet specifications and quality standards. (3)

Job Task Planning and Organizing

Machine Operators/CNC Machine Operators plan and organize their job tasks at complexity level 2.

Description

Own job planning and organizing

While the job tasks of woodworking machine operators are mainly assigned by supervisors, the operators determine how to complete the work on schedule. They are responsible for planning and organizing their time and do so in ways that optimize their efficiency. They must frequently adjust their work schedules to address equipment failures and shortages of materials, supplies and labour. They plan when to reset machines and when to order machine parts. They co-ordinate the use of common equipment with co-workers.

Planning and organizing for others

Machine Operators/CNC Machine Operators in wood manufacturing co-ordinate the use of common equipment with co-workers. They plan the work of helpers to optimize production efficiency to meet production deadlines and quality requirements.

Significant Use of Memory

Examples of Tasks Involving Memory

Machine Operators/CNC Machine Operators:

- remember specifications such as dimensions of materials and operating speeds for particular production runs.
- remember details of special orders.
- remember codes which apply to particular wood products and which appear in specifications.
- memorize the sequence of machine lockout procedures.

Finding Information

Machine Operators/CNC Machine Operators complete finding information tasks at complexity levels 1-2.

Examples of Tasks Involving Finding Information

Machine Operators/CNC Machine Operators:

1. check drawings to find information on measurements. (1)
2. contact supervisors, millwrights and quality control managers to obtain information that will be helpful in dealing with specific production problems. (2)
3. refer to booklets and brochures for information about new equipment. (2)
4. seek information about machines from speaking with more experienced machine operators. (2)
5. CNC Machine Operators seek information about CNC machines, sequencing and solving technical problems from more experienced CNC operators. (2)

G. Working with Others

Machine Operators/CNC Machine Operators work with others at complexity level 2.

Description

Machine Operators/CNC Machine Operators in wood manufacturing coordinate and integrate job tasks with teams of workers, which include mechanics, other machine operators and helpers.

Examples of working with others

- 1 Participate in formal discussions about work processes or product improvement.
- 2 Have opportunities to make suggestions on improving work processes.
- 3 Monitor the work performance of others.
- 4 Inform other workers or demonstrate to them how tasks are performed.
- 5 Orient new employees.
- 6 Assign routine tasks to other workers.
- 7 Identify training that is required by, or would be useful for, other workers.

H. Digital Technology

Examples of Digital TechnologyTasks

Machine Operators/CNC Machine Operators:

1. may use databases. For example, they may access their organizations' databases to locate technical drawings, work orders, production schedules and job specifications.
2. use communications software. For example, they may use intranet and email applications to exchange information and electronic files with coworkers and supervisors.
3. use computer-assisted design, manufacturing and machining. For example, they may operate machines, such as chop saw or moulding machine, from a computerized console.

CNC Operators:

1. use databases. For example, CNC operators access their organizations' databases to access design drawings to load onto CNC machines.
2. use the Intranet. For example, they access CNC designs from design programs to load them onto CNC machines.
3. use computer-assisted design, manufacturing and machining. For example, they load design programs into computers attached to computer numerically controlled machines (CNC) and then set up, test and operate CNC machines, such as milling machines, by entering measurements and other specifications into computers. They make minor revisions to computer-assisted design programs to adjust programming errors.

I. Continuous Learning

Description

Continuous learning is required for Machine Operators/CNC Machine Operators in wood manufacturing due to ongoing regulatory changes, improvements to production processes and systems and advancements in equipment and technology. They participate in training and workshops to enhance safety skills and stay current on regulatory changes. They learn about new products and production techniques by talking to suppliers, co-workers and supervisors and reading trade magazines, brochures and bulletins. They take courses and workshops provided by suppliers to learn about new production techniques. They cross-train on other machines as time permits to become efficient on other equipment. (2)

How Learning Occurs

- 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 on worker's own initiative.
- Through off-site training
 - during working hours at no cost to the worker.
 - which may or may not be subsidized.

Project Background and Methodology

Project Background

The Wood Manufacturing Council (WMC) is the Human Resources Sector Council for the advanced wood products processing industry in Canada.

The WMC began operation in early 2002. The formation of the Council was the result of a partnership between ESDC, Industry Canada, the National Education Initiative for Furniture and Wood Products Industries (NEI) and other industry leaders.

An independent, non-profit corporation with a Board of Directors drawn from the industry, the WMC serves as a national forum, bringing together employers, workers, educators, governments and other interested parties in a strategic alliance to analyze, identify and address the sector's human resources challenges and to ensure workers have the right mix of skills to compete in the globalized markets that will dominate the 21st century.

In 2007, the WMC undertook the creation of a National Occupational Standard (NOS) for the occupation of Machine Operator. The objectives of this project were to work with job incumbents and other stakeholders to develop and nationally validate the Machine Operator occupational profile, including a review of the scope of the occupation. In 2015/16, the WMC reviewed and updated the NOS to reflect the changes in the industry over the past eight years.

Occupational standards can be used as the basis for program development, such as the creation of job descriptions, on-boarding tools, training curriculum and/or competency-based assessment programs. Occupational standards also help inform individuals seeking information for career development or for other labour market information.

Methodology

National Project Advisory Committee

A National Project Advisory Committee (NPAC) comprised of industry experts led by the WMC was assembled to provide vital input and feedback. The NPAC served to provide valuable feedback into updating the standards and ensuring that industry trends and changes to the occupation were accurately reflected in the standards.

The NPAC members were selected to ensure representation of companies of various types and sizes, sub-sector associations and regional representation across Canada.

Subject Matter Experts

WMC staff and stakeholders identified Subject Matter Experts (SMEs) who were invited to participate in the development process of the National Occupational Standards through telephone interviews and site visits. SMEs were selected to ensure representation of companies of various types and sizes, sector associations, and regional representation. Job incumbents and Supervisors/Lead hands were asked for their input in the selection process of the SMEs.

National Occupational Standards

NOS describe the skills and knowledge needed to perform competently in the workplace. To create the Machine Operator NOS, interviews were conducted on-site with Machine Operators and Supervisors/Lead hands to collect detailed information on the occupation. Where possible, tours of the manufacturing facility were also provided.

In preparation for the on-site interviews with industry representatives, the consultant reviewed all relevant documentation related to the occupation (e.g., standards developed by other countries, international and territorial / provincial occupational guidelines). This information was used to develop an in-depth understanding of the duties, challenges and key skills required in the occupation. This information was used to help guide the discussion during the interviews.

Validation Survey

After the initial update of the standards was complete, an on-line validation survey was conducted to validate the frequency, importance and difficulty of each sub-task and identify any sub-tasks that were missing.

Validation of Standards

This document was reviewed and approved by the members of the NPAC. Following the meeting, the consultant updated the standards with agreed-upon revisions and the document was submitted to the NPAC members for a final review.

About HRSG

Since 1989, HRSG has worked with a range of industries to define talent needs, address skill deficiencies and improve individual and organizational performance. Clients include global corporations and small or mid-sized organizations operating in sectors such as logistics, finance, accounting, technology, HSE, HR, manufacturing, sales and marketing and many more.

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WMC CFB

Wood Manufacturing Council
Conseil des fabricants de bois