

Production Equipment Operation

Training Sector

11

Mechanical
Manufacturing



Vocational Training Program

5810

Production Equipment Operation

Training Sector

11

Mechanical
Manufacturing

Formation professionnelle et technique
et formation continue

Direction générale de la formation
professionnelle et technique

Notice

The Production Equipment Operation program (5810) replaces the Industrial Machinery Operation program (5794). The present program is identical to the former one. Only the title and number of the program have been changed.

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Introduction to the Program

In vocational training, a program of study presents the competencies required to practise a given trade or occupation at entry level on the job market. The training provided allows students to acquire a degree of versatility that will be useful in their professional career and personal development.

A program is a coherent set of competencies to be developed. It outlines the knowledge and broad orientations to be favoured during training. The competencies correspond to the tasks of the trade or occupation or to activities related to work, vocational or personal life, depending on the case. Learning is acquired in a specific achievement context and targets the ability to act, succeed and evolve.

According to the Education Act, "every program shall include compulsory objectives and contents and may include optional objectives and contents that shall be enriched or adapted according to the needs of students who receive the services." For behavioural competencies, the compulsory components include the statement of the competency, the elements of the competency, the achievement context and the performance criteria; for situational competencies, they include the corresponding components.

For information purposes, programs also provide a grid of competencies, educational aims, a summary of competency-related knowledge and know-how, and guidelines. They also specify the suggested duration of each competency. All optional components of a program may be enriched or adapted according to the needs of the students, the environment and the workplace.

Program Components

Program Goals

Program goals consist of the expected outcome at the end of training as well as a general description of a given trade or occupation. They also include the four general goals of vocational training.

Educational Aims

Educational aims are broad orientations to be favoured during training in order to help students acquire intellectual or motor skills, work habits or attitudes. Educational aims usually address important aspects of career and personal vocational development that have not been explicitly included in the program goals or competencies. They serve to orient appropriate teaching strategies to contextualize students' learning, in keeping with the dimensions underlying the practice of a trade or occupation. They help guide educational institutions in implementing the program.

Competency¹

A competency is the ability to act, succeed and evolve in order to adequately perform tasks or activities related to vocational working or personal life, based on an organized body of knowledge and skills from a variety of fields, perceptions, attitudes, etc.

A competency in vocational training can be defined in terms of a behaviour or a situation, and includes specific practical guidelines and requirements for learning.

1. Behavioural Competency

A behavioural competency describes the actions and the results expected of the student. It consists of the following features:

1. For more information about competencies in vocational training, see Québec, Ministère de l'Éducation, du Loisir et du Sport, Reference Framework for Planning Learning and Evaluation Activities: Vocational Training (Québec: gouvernement du Québec, 2005) 8-12, available at <www.inforoutefpt.org/documents/cadrereference/>.

- The statement of the competency, which is the result of the job analysis, the orientations and general goals of vocational training and other determinants.
- The elements of the competency, which correspond to essential details that are necessary in order to understand the competency and are expressed in terms of specific behaviours. They refer to the major steps involved in performing a task or to the main components of the competency.
- The achievement context, which corresponds to the situation in which the competency is exercised at entry-level on the job market. The achievement context attempts to recreate an actual work situation but does not describe a learning or evaluation situation.
- The performance criteria, which define the requirements to be respected. They may refer to elements of the competency or to the competency as a whole. When associated with a specific element, performance criteria are used to judge whether a competency has been acquired. When associated with the competency as a whole, the criteria describe the requirements for performing a task or activity and provide information on the expected level of performance or the overall quality of a product or service.

2. Situational Competency

A situational competency describes the situation in which students are placed to acquire learning, and allows for actions and results to vary from one student to another. It consists of the following features:

- The statement of the competency, which is the result of the job analysis, the orientations and general goals of vocational training and other determinants.
- The elements of the competency, which outline the essential aspects of the competency and ensure a better understanding of the competency with respect to the expected outcome. The elements of the competency are at the centre of fundamental to the implementation of the learning situation.
- The learning context, which provides a broad outline of the learning situation designed to help the students develop the required competency. It is normally divided into three key phases of learning: information, participation and synthesis.
- The instructional guidelines, which provide reference points and means for teachers to ensure that learning takes place and that the context in which it occurs is always the same. These guidelines may include general principles or specific procedures.
- The participation criteria, which describe requirements that the students must meet when participating in learning activities. They focus on how the students take part in the activities rather than on the results obtained. Participation criteria are normally provided for each phase of the learning situation.

Competency-Related Knowledge and Know-How

Competency-related knowledge, skills, attitudes and perceptions define the essential and important learning that the student must acquire in order to apply and continue to develop the competency. They correspond to activities in the job market and are accompanied by guidelines that provide information on the field of application, the level of complexity or content related to training. The knowledge, skills, attitudes and perceptions and the related guidelines are not prescriptive.

Duration

The total duration of the program is compulsory and must be observed. It consists of teaching time, which includes time for the evaluation of learning and for enrichment or remedial activities, depending on the students' needs. The duration indicated for a given competency refers to the amount of time needed to develop the competency.

The amount of teaching time corresponds to the amount of time allotted to training, which is established during program development as the average amount of time needed to acquire a competency and evaluate learning. This duration is helpful in organizing training.

Credit

A credit is a unit used for expressing the quantitative value of each competency. One credit corresponds to 15 hours of training.

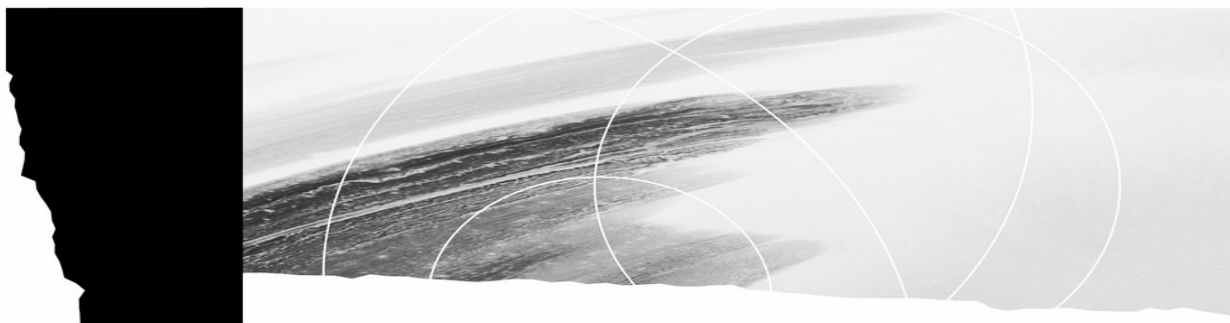
Aspects of Program Implementation

Program-Based Approach

The program-based approach is founded on a comprehensive view of a program of study and its components (e.g. goals, educational aims, competencies). It requires concerted action among all players involved, from the initial stages of program design and development, to program implementation and evaluation. It consists in ensuring that all of the actions and activities proposed are based on the same aims and take into account the same orientations. For students, the program-based approach makes training more meaningful as it presents learning as a coherent whole.

Competency-Based Approach

In vocational training, the competency-based approach is based on a teaching philosophy that is designed to help students mobilize their own individual sets of resources in order to act, succeed and evolve in different contexts, according to established performance levels with all the required knowledge and know-how (e.g. skills, strategies, attitudes, perceptions). The competency-based approach is carried out in situations that are relevant to the students' working life and personal life.



| | |
|--------------------------------|---------------------------------------|
| 5810 | Production Equipment Operation |
| Year of approval: | 2007 |
| Certification: | Diploma of Vocational Studies |
| Number of credits: | 60 |
| Number of competencies: | 15 |
| Total duration: | 900 hours |

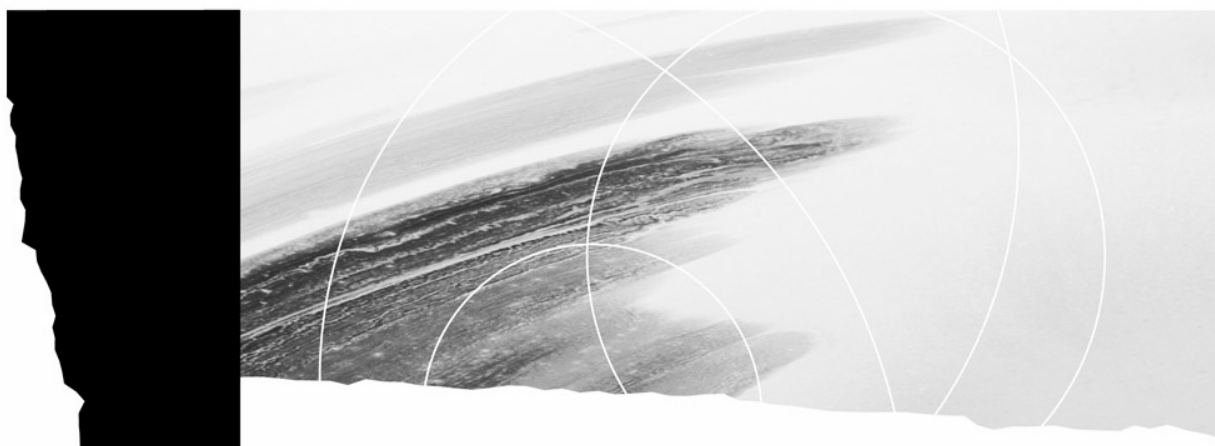
To be eligible for admission to the *Production Equipment Operation* program, candidates must meet one of the following requirements:

- Persons holding a Secondary School Diploma or its recognized equivalent.
- OR
- Persons who are at least 16 years of age on September 30 of the school year in which their training is to begin and have earned the Secondary III credits in language of instruction, second language and mathematics in the programs of study established by the Minister, or have been granted recognition of equivalent learning.
- OR
- Persons who are at least 18 years of age upon entry into the program and have the following functional prerequisites: the successful completion of the general development test and the specific prerequisites listed in this schedule for the desired program, or recognition of equivalent learning.

N.B.: For programs of study in this category, persons may continue their general education courses concurrently with their vocational training provided that they have earned at least the Secondary III credits in language of instruction, second language and mathematics in the programs established by the Minister or they have successfully completed the general development test (GDT).

The duration of the program is 900 hours, which includes 450 hours spent on the specific competencies required to practise the trade or occupation and 450 hours on general, work-related competencies. The program of study is divided into 15 competencies which vary in length from 15 to 105 hours. The total hours allocated to the program include time devoted to teaching, evaluation of learning and enrichment or remedial activities.

| Competency | Code | Number | Hours | Credits |
|--|-------------|---------------|--------------|----------------|
| The Trade and the Training Process | 869512 | 1 | 30 | 2 |
| Interpreting Technical Drawings | 869525 | 2 | 75 | 5 |
| Solving Mathematical Problems | 869655 | 3 | 75 | 5 |
| Industrial Manufacturing Processes | 869663 | 4 | 45 | 3 |
| Using a Computerized Workstation | 869672 | 5 | 30 | 2 |
| Quality Control | 869684 | 6 | 60 | 4 |
| Health and Safety | 869571 | 7 | 15 | 1 |
| Shopwork | 869586 | 8 | 90 | 6 |
| Handling Materials | 869692 | 9 | 30 | 2 |
| Job Search Techniques | 869601 | 10 | 15 | 1 |
| New Types of Work Organization | 872153 | 11 | 45 | 3 |
| Operating Conventional Machinery | 869617 | 12 | 105 | 7 |
| Operating an Automated Production System | 869627 | 13 | 105 | 7 |
| Maintaining Machinery | 869636 | 14 | 90 | 6 |
| Entering the Work Force | 869706 | 15 | 90 | 6 |



Part I

Program Goals

Educational Aims

Statements of the Competencies

Grid of Competencies

Harmonization

Program Goals

The *Production Equipment Operation* program prepares students to practise the different trades or occupations related to industrial production equipment operations.

The *Production Equipment Operation* program is designed to train individuals to apply, in whole or in part, the process for manufacturing a product. These individuals will be able to prepare raw and processed materials and machinery; operate conventional or automated production equipment; ensure quality control of manufactured products; handle raw materials and products; prepare products for shipping; and carry out preventive maintenance on the equipment made available to them.

Graduates may practise their trade in a variety of sectors, e.g. the mechanical manufacturing, food, wood, textile and polymer industries. This requires that the students be able to quickly understand the way a machine or system works, follow the appropriate procedure, find out about the health and safety risks involved, and apply the necessary preventive measures.

This program prepares students to work with equipment of average complexity, including so-called conventional machines, as well as automated production systems. The minimum degree of complexity targeted will include:

- control of a workstation comprising at least three machines (e.g. processing, assembly) making up a production line
- automation of part or all of the control of machines requiring input on different types of interfaces between the operator and the machine
- a conventional or computerized production system requiring that data be read, input, interpreted and compiled, in particular for purposes of production management and quality control

Since production equipment in a plant can be found in one place or in several different departments, the students must be able to visualize the entire production process in order to understand the effects of their actions on subsequent operations.

To ensure the versatility of graduates, the program includes the following cross-curricular competencies: solving mathematical problems, interpreting drawings, using a computerized workstation, quality control, occupational health and safety, shopwork, new types of work organization, handling and maintenance.

To ensure that students master tasks associated with the trade, the program also includes four competencies specific to a given sector: learning about industrial manufacturing processes, operating conventional machinery, operating an automated production system, and entering the work force.

The program goals of the *Production Equipment Operation* program are based on the general goals of vocational training. These goals are:

- To help students develop effectiveness in the practice of a trade or occupation, that is:
 - to teach students to perform roles, functions, tasks and activities associated with the trade or occupation upon entry into the job market
 - to prepare students to progress satisfactorily on the job (which implies having the technical and technological knowledge and skills in such areas as communication, problem solving, decision making, ethics, health and safety)
- To help students integrate into the work force, that is:
 - to help students develop positive attitudes toward change
 - to help students develop the means to manage their careers by familiarizing them with entrepreneurship

- To foster students' personal development and acquisition of occupational knowledge, skills, perceptions and attitudes, that is:
 - to help students develop their autonomy and ability to learn, and acquire effective work methods
 - to help students understand the principles underlying the techniques and the technology used in the trade or occupation
 - to help students develop self-expression, creativity, initiative and entrepreneurial spirit
 - to help students adopt the attitudes required to successfully practise the trade or occupation, and instill in them a sense of responsibility and a concern for excellence
- To promote job mobility, that is:
 - to help students develop positive attitudes toward change
 - to help students develop the means to manage their careers by familiarizing them with entrepreneurship

Educational Aims

The aim of the *Production Equipment Operation* program is to help students develop attitudes and behaviours that representatives from education and the field deem essential to the practice of the trade or occupation:

- autonomy and a sense of responsibility
- resourcefulness and versatility
- the ability to work in a team
- motivation with regard to job satisfaction and the challenge of improving productivity
- an awareness of the consequences of quality work

Statements of the Competencies

List of Competencies

- To determine their suitability for the trade and the training process.
- To interpret technical drawings.
- To solve mathematical problems related to Production Equipment Operation.
- To learn about industrial manufacturing processes.
- To use a computerized workstation.
- To carry out the quality control of products.
- To avoid occupational health and safety risks.
- To do shopwork.
- To handle materials.
- To use job search techniques.
- To adapt to new types of work organization.
- To operate conventional machinery.
- To operate an automated production system.
- To maintain machinery.
- To enter the work force.

Grid of Competencies

The grid of competencies shows the relationship between general competencies, which correspond to work-related activities, and specific competencies, which are required to practise the particular trade or occupation, as well as the major steps in the work process.

The general competencies appear on the horizontal axis and the specific competencies, on the vertical axis. The symbol (○) indicates a correlation between a general and a specific competency. The symbol (△) indicates a correlation between a specific competency and a step in the work process. Shaded symbols indicate that these relationships have been taken into account in the acquisition of specific competencies. The logic used in constructing the grid influences the course sequence. Generally speaking, this sequence follows a logical progression in terms of the complexity of the learning involved and the development of the students' autonomy. The vertical axis presents the specific competencies in the order in which they should be acquired and serves as a point of departure for determining how all of the competencies will be taught.

GRID OF COMPETENCIES

| SPECIFIC COMPETENCIES | | | | GENERAL COMPETENCIES | | | | | | | | WORK PROCESS | | | | | |
|--|-------------------|-------------------|---------------------|------------------------------|---|--|--------------------------------|---|--|-------------|---------------------------|---|-------------------|---------------|------------------|---------------------|---------|
| | | | | Interpret technical drawings | Solve mathematical problems related to industrial machinery operation | Learn about industrial manufacturing processes | Use a computerized workstation | Carry out the quality control of products | Avoid occupational health and safety risks | Do shopwork | Use job search techniques | Adapt to new types of work organization | Read instructions | Plan the work | Perform the work | Control the quality | Tidy up |
| | Competency Number | Type of Objective | Duration (in hours) | | | | | | | | | | | | | | |
| <i>Production Equipment Operation</i> | | | | | | | | | | | | | | | | | |
| Competency Number | | | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | | | | | |
| Type of Objective | | | | B | B | S | B | B | B | B | S | B | | | | | |
| Duration (in hours) | | | | 75 | 75 | 45 | 30 | 60 | 15 | 90 | 15 | 45 | | | | | |
| Determine their suitability for the trade and the training process | 1 | S | 30 | O | O | O | O | O | O | O | O | O | Δ | Δ | Δ | Δ | Δ |
| Handle materials | 9 | B | 30 | | ● | O | | | ● | | | O | Δ | Δ | Δ | Δ | Δ |
| Operate conventional machinery | 12 | B | 105 | ● | ● | ● | | ● | ● | ● | | ● | ▲ | ▲ | ▲ | ▲ | ▲ |
| Operate an automated production system | 13 | B | 105 | ● | ● | ● | ● | ● | ● | ● | | ● | ▲ | ▲ | ▲ | ▲ | ▲ |
| Maintain machinery | 14 | B | 90 | ● | ● | ● | ● | ● | ● | ● | | ● | Δ | Δ | Δ | Δ | ▲ |
| Enter the work force | 15 | S | 90 | O | O | O | O | O | O | O | O | O | Δ | Δ | Δ | Δ | Δ |

Harmonization

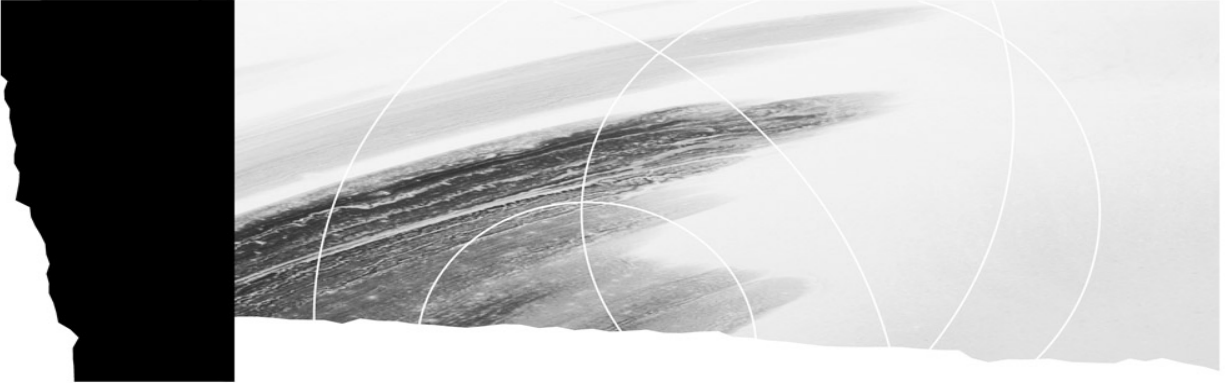
The Ministère de l'Éducation, du Loisir et du Sport harmonizes its vocational and technical programs by establishing similarities and continuity between secondary- and college-level programs within a particular sector or between sectors in order to avoid overlap in program offerings, to recognize prior learning and to optimize the students' progress.

Harmonization establishes consistency between training programs and is especially important in ensuring that the tasks of a trade or occupation are clearly identified and described. Harmonization makes it possible to identify tasks requiring competencies that are common to more than one program. Even if there are no common competencies, training programs are still harmonized.

Harmonization is said to be “inter-level” when it focuses on training programs at different levels, “intra-level” when it focuses on programs within the same educational level, and “inter-sector” when carried out between programs in various sectors.

An important aspect of harmonization is that it allows the common features of competencies to be identified and updated as needed. Common competencies are those that are shared by more than one program; once acquired in one program, they can be recognized as having been acquired in another. Competencies with exactly the same statement and elements are said to be identical. Common competencies that are not identical but have enough similarities to be of equal value are said to be equivalent.

Harmonization of the *Production Equipment Operation* program has resulted in identifying competencies that are shared with other programs. Detailed information on the harmonization of this program and its results is presented in the document entitled *Tableaux d'harmonisation Opération d'équipements de production*.



Part II

Program Competencies

Competency 1 Duration 30 hours Credits 2

Situational Objective

Statement of the Competency

To determine their suitability for the trade and the training process.

Elements of the Competency

During this module, the students will:

- Become familiar with the nature of the trade.
- Understand the training plan.
- Confirm their career choice.
- Become aware of the importance of new types of work organization.
- Become familiar with learning strategies they can use to keep abreast of technological developments.

Learning Context

Information Phase

- Learning about the types of companies that employ industrial machine operators and the different types of work organization.
- Describing factory production and the different jobs involved.
- Learning about the nature and requirements of the job.
- Examining trade-related tasks and operations.
- Examining the skills and behaviours needed to practise the trade.
- Presenting the information gathered and sharing their views on the advantages, disadvantages and requirements of the trade during a group discussion.

Participation Phase

- Learning about the program of study and the training process.
- Sharing their initial reactions to the trade and the training program.
- Learning about the concepts of techno-watch and continuing education.
- Learning about strategies for researching, organizing, memorizing and archiving information.

Synthesis Phase

- Producing a report in which they state their preferences, aptitudes and interests with respect to the trade and assess their career choice by comparing the different aspects and requirements of the trade with their own preferences, aptitudes and interests.

Instructional Guidelines

The teacher should:

- Create a climate that favours student interaction and entry into the work force.
- Encourage all students to engage in discussions and express their opinions.
- Help students arrive at an accurate perception of the trade, especially with regard to new types of work organization.
- Provide students with the means to assess their career choice honestly and objectively.
- Organize visits to businesses representative of the workplace, field trips to exhibitions, meetings with trade specialists, and conferences.
- Provide students with relevant reference materials.
- Provide students with an outline for their report and help them produce various other documents.

Participation Criteria

Information Phase

- Gather information on most of the topics to be covered.
- Express their views on the trade and sector during a group discussion, relating these views to the information they have gathered.

Participation Phase

- Carefully review the documents provided.
- Express their views on the training program during a group discussion.
- Gather information about techno-watch.
- Gather information about learning strategies.
- Identify their learning style and preferred strategies.

Synthesis Phase

- Using the outline provided by the teacher, write a report that:
 - sums up their preferences, aptitudes and interests
 - explains their career choice by clearly relating these personal preferences to the practice of the trade.

Suggestions for Competency-Related Knowledge, Skills, Attitudes and Perceptions

The following is a list of knowledge, skills, attitudes, perceptions and guidelines related to each phase of the learning context.

Information Phase

- An overview of the various industries in the region (visits, videos, magazines, prospectuses, the job analysis report, etc.)
- Size of the company, sector of economic activity, type of clientele, type of production, manufacturing processes and use of new types of equipment
- Work environments, job prospects, salaries, opportunities for transfer and advancement, selection of candidates, etc.
- Specific requirements of the job
- Determination of duties and responsibilities of workers
- Role of workers in various work teams
- Stages in the production process
- Optimization of production
- Training of personnel
- Position of the trade in a company organization chart
- Program of study, distinction between a situational objective and a behavioural objective
- Evaluation, certification of studies and course structure
- Instructional approaches used for the program (i.e. work-study, apprenticeship, practicums)

Participation Phase

- Techniques for researching and summarizing the information gathered
- Rules governing group discussion
- Attitudes and behaviours: respect, politeness, attentiveness
- Parts of a report and elements to be included
- Quality criteria for a report: neatness, clarity and concision

Synthesis Phase

- Presentation of their preferences and interests with respect to Production Equipment Operation
- Evaluation and confirmation of their career choice

Competency 2 Duration 75 hours Credits 5

Behavioural Objective**Statement of the Competency**

To interpret technical drawings.

Achievement Context

- Working with detail and assembly drawings in metric and imperial units of measurement; drawings illustrating an assembly method or other illustrations; and instructions
- Using technical documentation, tables and drafting standards

Elements of the Competency**Performance Criteria**

1. Visualize a complete part.

- Accurate differentiation among the types of projections:
 - American and European orthographic projections
 - axonometric projections
- Proper identification of views and sections
- Accurate interpretation of lines and hatching lines
- Accurate identification of part on assembly drawing
- Accurate observations of the shape of the part and its position in the whole
- Proper drawing of symmetry of illustrated part
- Relevant association of views and lines, and points and surfaces

2. Interpret the dimensioning.

- Thorough identification of information needed for the job:
 - dimensions
 - dimensions with tolerances
 - form and positioning tolerances
 - nomenclature of threads
 - fit tolerances
- Determination of value of:
 - dimensions
 - dimensions with tolerances
 - form tolerances
 - positioning tolerances
 - size and location dimensions
- Relevant associations between the dimensions and the surfaces of various views

- | | |
|--|--|
| <p>3. Find complementary information in technical drawings.</p> | <ul style="list-style-type: none"> • Proper identification of information in: <ul style="list-style-type: none"> – title block – list of terms used – annotations • Thorough identification of information needed • Accurate interpretation of symbols, codes and abbreviations |
| <p>4. Determine the function of the components of an assembly.</p> | <ul style="list-style-type: none"> • Thorough identification of the components of an assembly in an assembly drawing • Recognition of the characteristics of the components • Recognition of the function of each component of the assembly and how it relates to the other components |

Suggestions for Competency-Related Knowledge, Skills, Attitudes and Perceptions

The following is a list of knowledge, skills, attitudes, perceptions and guidelines related to each element of the competency.

1. Visualize a complete part.
 - Arrangement of views, perspectives, projection plane, contour lines, visible and hidden lines, centre lines, top view, front view, side view (right and left), full, partial, half and broken-out sections, auxiliary views (depth dimensions, front view, top view), revolved and removed sections, standard hatching lines for the materials used, sectional plan, break line, standards and conventions, cut-away view of threads, principles underlying projection, reference plane
2. Interpret the dimensioning.
 - Extension line; dimension line; standardized dimensioning; dimensions with tolerances: reference, basic, minimum and maximum dimensions, and minimum and maximum limits; form tolerances: straightness, flatness, circularity and cylindricity; positioning tolerances: location, parallelism, squareness, coaxiality, symmetry and angularity; standardized adjustments: clearance fit, transition fit, interference fit; symbols; modifying symbols; reference surfaces
3. Find complementary information in technical drawings.
 - Scale, codification of materials, symbols, abbreviations, etc.; tolerances, surface conditions, symbols, roughness index, etc.; standards and conventions
4. Determine the function of the components of an assembly.
 - Functions: permanent or temporary installation, fastening, transformation of motion, power transmission, leak tightness, stops, etc.; English and French terminology; diagrammatic view; parts fasteners; seals; bushings and bearings; principles underlying assembly; principles underlying motion and power

Competency 3 Duration 75 hours Credits 5

Behavioural Objective**Statement of the Competency**

To solve mathematical problems related to Production Equipment Operation.

Achievement Context

- Working with written instructions, problems representative of those encountered in the trade and technical drawings in metric and imperial units of measurement
- Using tables, graphs, technical manuals and a calculator

Elements of the Competency**Performance Criteria**

- | | |
|---|---|
| <p>1. Convert measurements from the metric to the imperial system and vice versa.</p> <p>2. Calculate surfaces, volumes, flows, pressures and weights.</p> <p>3. Calculate manufacturing parameters.</p> <p>4. Find missing dimensions.</p> | <ul style="list-style-type: none"> • Proper use of conversion tables • Proper choice of formulas • Proper application of conversion formulas • Accurate calculations <ul style="list-style-type: none"> • Accurate calculations • Use of appropriate mathematical formulas • Proper use of density tables <ul style="list-style-type: none"> • Accurate identification of information about manufacturing parameters in tables • Proper use of tables and graphs • Proper choice of formulas • Correct application of formulas • Accurate calculations <ul style="list-style-type: none"> • Accurate determination of calculations required for the job: <ul style="list-style-type: none"> – linear and circular dimensions – angles – polar and rectangular coordinates • Accurate identification, in drawings, of the information needed for the calculations • Proper application of: <ul style="list-style-type: none"> – formulas – Pythagorean theorem – trigonometric functions • Proper adaptation of mathematical formulas • Accurate results • Logical problem-solving approach |
|---|---|

Suggestions for Competency-Related Knowledge, Skills, Attitudes and Perceptions

The following is a list of knowledge, skills, attitudes, perceptions and guidelines related to each element of the competency.

1. Convert measurements from the metric to the imperial system and vice versa.
 - Decimals and fractions; conversion of units of length, weight and volume; conversion factors and tables in the metric and imperial systems of measurement; use of a calculator
2. Calculate surfaces, volumes, flows, pressures and weights.
 - Units of length, weight and volume
3. Calculate manufacturing parameters.
 - Method of consulting tables and graphs; items to locate in reference tables and technical manuals: manufacturing parameters, values related to manufacturing and quality control; parameters for processing or machining wood, metals and plastics: cutting speed, rpm, feed rate and depth of cut; definition of elements of formulas; basic formulas related to the calculation of machining parameters; volume of material removed per minute; method of calculating using the rule of three; application and transformation of formulas; method of calculating the speed of pulleys and gear systems in order to adjust certain parameters (enrichment activity); calculations in metric and imperial systems of measurement; use of a calculator
4. Find missing dimensions.
 - Simple geometric analysis; solution of right-angle triangles: Pythagorean theorem and trigonometric functions; application and transformation of formulas; solution of problems requiring analysis and reasoning; use of metric and imperial systems of measurement

Competency 4 Duration 45 hours Credits 3

Situational Objective

Statement of the Competency

To learn about industrial manufacturing processes.

Elements of the Competency

During this competency, the students will:

- Become aware of the variety of industrial manufacturing processes.
- Become familiar with the main characteristics of raw materials, chemical products, machinery, manufacturing stages and manufacturing standards.
- Become familiar with the primary differences and similarities that exist among processes.

Learning Context

Information Phase

- Learning about the different manufacturing processes associated with various sectors of activity.
- Participating in activities that highlight the main characteristics of various manufacturing processes.

Participation Phase

- Choosing a manufacturing process.
- Gathering information about raw materials, chemical products, machinery, manufacturing stages and manufacturing standards.
- Organizing the information gathered and writing a report that meets the quality criteria provided.

Synthesis Phase

- Presenting the results of their research by describing the processing operations involved in transforming raw materials into a finished product.
- Discussing the main characteristics of the processes.
- Discussing ways in which they can update their knowledge.

Instructional Guidelines

The teacher should:

- Encourage the students to express themselves and share their opinions.
- Provide the students with a variety of relevant reference materials, models and research tools.
- Help the students use a method to research information.

Participation Criteria

Information Phase

- Participate in activities.
- Carefully review all documentation on manufacturing processes.
- Gather information on the main characteristics of manufacturing processes.

Participation Phase

- Be precise when gathering information.
- Organize the information in a coherent manner.
- Produce a report presenting the results of their research.

Synthesis Phase

- Present their research in a manner that is coherent, clear and succinct.
- Share their opinions and remain attentive during discussions.
- Listen carefully to the other students.
- Evaluate their skills and aptitudes with respect to learning about industrial manufacturing processes.

Suggestions for Competency-Related Knowledge, Skills, Attitudes and Perceptions

The following is a list of knowledge, skills, attitudes, perceptions and guidelines related to each phase of the learning context.

Information Phase

- Primary sectors of activity (metal products, textiles, wood products, food, polymers, etc.)
- Raw materials, chemical products, machinery, manufacturing stages and manufacturing standards, depending on the sector
- Processing operations: preparation of raw materials, manufacturing, finishing, assembly, preparation for shipping
- Environmental protection regulations associated with raw materials and product manufacturing processes
- Health and safety regulations associated with product manufacturing processes

Participation Phase

- Primary source documents
- Techniques for researching and summarizing the information gathered
- Preparation of observation sheets or data collection sheets for the type of information sought and the requirements of presentation: identification and preparation of raw materials; machinery; manufacturing stages and their functions; finishing processes; production and quality standards
- Report content: title page, table of contents, introduction, main sections, conclusion
- Report quality criteria: neatness, clarity and concision

Synthesis Phase

- Presentation elements: references to report content, speed of oral delivery, appropriate attitudes and behaviours
- Rules of group discussion
- Attitudes and behaviours: respect, courtesy and attentiveness

Competency 5 Duration 30 hours Credits 2

Behavioural Objective**Statement of the Competency**

To use a computerized workstation.

Achievement Context

- Using a computerized workstation, a word processing program and relevant technical documentation in English and French

Elements of the Competency**Performance Criteria**

1. Prepare a workstation.

- Accurate identification of the computer's components and peripherals
- Methodical inspection of connections
- Functional and ergonomic organization of workstation
- Proper preparation of printer

2. Use the basic functions of an operating system.

- Proper use of the main functions of a graphics environment, such as windows, dialogue boxes, menu bars, tool bars and scroll bars
- Observance of procedure for creating, saving and printing documents
- Proper use of the main functions of the file manager (data saved on different storage media: hard disk, diskette, CD-ROM)
- Accurate association of types of files with the main types of software programs
- Observance of procedure for ending a work session

3. Use the help function.

- Efficient search of help function and technical documentation
- Proper interpretation and application of suggested solutions
- Accurate interpretation of English and French terms

4. Input and format a short text.

- Proper use of the main functions on the standard and formatting tool bars
- Use of the appropriate commands for:
 - formatting
 - making changes to a text
 - numbering pages
 - creating a table
 - using a dictionary
 - printing

- | | |
|--|---|
| 5. Send and receive information using electronic messaging and e-mail. | <ul style="list-style-type: none"> • Observance of the procedure for sending and receiving information • Proper insertion of attachments • Successful recovery of attachments • Appropriate handling of information |
| 6. Look for information using an intranet and the Internet. | <ul style="list-style-type: none"> • Use of a search engine • Selection of pertinent documents • Observance of the procedure for downloading files • Appropriate handling of information |

Suggestions for Competency-Related Knowledge, Skills, Attitudes and Perceptions

The following is a list of knowledge, skills, attitudes, perceptions and guidelines related to each element of the competency.

1. Prepare a workstation.
 - The computer, its components and peripherals
 - Importance of observing ergonomic rules
 - Distinction among the types of software programs and memory
 - Definition of terms related to microcomputers and their operation
 - Ways in which computer viruses are transmitted
 - Distinction between a stand-alone and a network workstation
 - Role of the mouse, keyboard, menus and memory management programs
 - Means of accessing different software programs and their menus
 - Display of the contents of a diskette or hard disk
 - Start-up and shutdown of a workstation
 - Addition of printer paper and replacement of cartridge
2. Use the basic functions of an operating system.
 - Opening of an application
 - Selection of options from the menu bar using the keyboard and the mouse
 - Resizing and closing of a window
 - Creation of backup copies
 - Use of the file manager to create a file or folder, make a copy of a folder on the hard disk, or delete a file or folder
 - Procedure for turning off the computer
3. Use the help function.
 - Use of instruction manuals for the operating system and the computer's peripherals

4. Input and format a short text.

- Opening of a software program
- Use of the menu bars
- Opening of an existing document
- Size and appearance of characters
- Margins, alignment and arrangement of text: on a line, in columns, on a page, throughout the entire document
- Selection, copying and moving of blocks of text
- Functions to create a table
- Print preview function and printing of documents

5. Send and receive information using electronic messaging and e-mail.

- Internal messaging (intranet) and external messaging (Internet)

6. Look for information using an intranet and the Internet.

- Local network (LAN) and the Internet

Competency 6 Duration 60 hours Credits 4

Behavioural Objective**Statement of the Competency**

To carry out the quality control of products.

Achievement Context

- Working with assembly or detail drawings in metric or imperial units of measurement and the required quality standards
- Using measuring instruments and devices, tables and graphs, conversion tables, technical manuals, a calculator, measurement records and cleaning products

Elements of the Competency**Performance Criteria**

- | | |
|---|--|
| <p>1 Plan the work.</p> | <ul style="list-style-type: none"> • Accurate identification of information relevant to the manufacture of a product: <ul style="list-style-type: none"> – dimensions – tolerances – instructions • Appropriate choice of measuring instruments and devices for the job • Proper positioning of part and appropriate choice of fastenings for part to be measured • Organized arrangement of instruments and devices |
| <p>2. Prepare the measuring instruments and devices, as well as the product to be tested.</p> | <ul style="list-style-type: none"> • Detailed inspection of instruments and devices • Accurate calibration and adjustment of common measuring instruments and devices • Proper preparation of part or product to be tested • Cleanliness of work area |
| <p>3. Check the physical characteristics of products.</p> | <ul style="list-style-type: none"> • Accurate calculation of information needed for measurements • Proper use of measuring instruments and devices • Accurate reading of measurements • Proper use of technique for converting from metric to imperial, and vice versa • Accurate interpretation of measurements • Accurate recording of results |
| <p>4. Compare the measurements recorded with the required standards.</p> | <ul style="list-style-type: none"> • Correct entry of data • Relevance of information recorded • Decision on conformity • Accurate detection of all errors • Proper identification of the causes of the errors |

5. Perform regular maintenance on measuring instruments and devices.
 - Careful cleaning of instruments and devices
 - Proper storage of instruments and devices

Suggestions for Competency-Related Knowledge, Skills, Attitudes and Perceptions

The following is a list of knowledge, skills, attitudes, perceptions and guidelines related to each element of the competency.

1. Plan the work.

- Related content specific to the chosen sectors
 - *Metal and electrical products*
Rulers, vernier callipers, protractors, bore gauges, voltmeters, scales, etc.
 - *Wood products*
Rulers, tape measures, vernier callipers, templates, protractors, etc.
 - *Textiles*
Tape measures, tailor's tapes, metric counter, magnifying glasses, scales, etc.
 - *Food*
Scales, microscopes, comparators, colorimeters, etc.
 - *Polymers*
Micrometers, tape measures, thickness gauges, colorimeters, chromatometers, microscopes

2. Prepare the measuring instruments and devices, as well as the product to be tested.

- Detection of defects
- Cleanliness of inspection facility
- Test temperature
- Hygiene standards
- Manufacturer's specifications
- Cleaning, handling, mounting and fastening of part
- Cleanliness of test specimens, etc.

3. Check the physical characteristics of products.

- Related content specific to the chosen sectors
 - *Metal and electrical products*
Calculations associated with measurement: offset dimensions, height of gauge blocks, coordinates, conversions, etc.
Methods of using instruments and devices: digital reading, analogue reading, scale, statistical quality control (SQC) and go, no-go gauges
Testers for roughness, hardness and conductivity
Conversion tables for various units of measurement
Measurement records, etc.
 - *Wood products*
Calculations associated with measurement: absolute measurements, relative measurements
Methods of using instruments: direct reading, indirect reading
Techniques for testing species, commercial forms, glues, solvents, etc.
Conversion tables for various units of measurement, imperial and metric
Measurement records
 - *Textiles*
Calculations associated with manufacturing and finishing processes
Methods of using instruments and devices: burst tester, twist meter, statistical process control, etc.
Testing fabric for resistance, cloudiness, abrasion, etc.
Conversion tables for various units of measurement, imperial and metric
Measurement records and verification cards
 - *Food*
Calculations associated with processes: weight, additives, dyes, etc.
Methods of using instruments and devices: lab instruments, statistical process control, etc.
Conversion tables: weight, temperature, etc.
Measurement records and verification cards
 - *Polymers*
Calculations associated with processes
Methods of using instruments and devices: colorimeter, chromatometer, etc.
Creation of verification cards
Conversion tables for various units of measurement
Measurement records and verification cards

4. Compare the measurements recorded with the required standards.

- Definition of the different terms used in statistical control: mean, standard deviation, batch production, mass production, etc.
- Quality assurance concepts: standards, requirements, effects on production, etc.
- Developments in the field
- Verification cards
- Use of quality control software
- Sampling concepts

5. Perform regular maintenance on measuring instruments and devices.

- Simple assembly and disassembly of components
- Products and accessories
- Cleaning method
- Cleanliness and protection against rust, dust, products, shock, etc.

Competency 7 Duration 15 hours Credit 1

Behavioural Objective**Statement of the Competency**

To avoid occupational health and safety risks.

Achievement Context

- Working in a manufacturing industry workplace that presents health and safety risks
- Using relevant documentation

Elements of the Competency**Performance Criteria**

- | | |
|---|--|
| 1. Gather information on the laws and regulations that apply to Production Equipment Operation. | <ul style="list-style-type: none"> • Accurate identification of information • Relevant associations between sections of the laws and regulations and activities performed in the workplace • Recognition of the rights and obligations of the parties involved |
| 2. Recognize the potential risks and their effects on health and safety. | <ul style="list-style-type: none"> • Recognition of the risks inherent in the trade • Accurate interpretation of Workplace Hazardous Materials Information System (WHMIS) data sheets • Accurate identification of the effects of potential risks on health and safety |
| 3. Recognize means of preventing accidents. | <ul style="list-style-type: none"> • Recognition of preventive measures related to: <ul style="list-style-type: none"> – setting up the shop and the workstation – performing trade-related operations – handling loads – using hazardous materials • Recognition of required personal protective equipment |
| 4. Determine what to do in an emergency situation. | <ul style="list-style-type: none"> • Choice of appropriate strategy • Recognition of the seriousness of the situation on the basis of signs and symptoms • Judgment of the need to intervene or ask for help • Accurate determination of the action to take |

Suggestions for Competency-Related Knowledge, Skills, Attitudes and Perceptions

The following is a list of knowledge, skills, attitudes, perceptions and guidelines related to each element of the competency.

1. Gather information on the laws and regulations that apply to Production Equipment Operation.
 - R9 = Regulation respecting industrial and commercial establishments
 - RQMT = Regulation respecting the quality of the work environment
 - RIPC = Regulation respecting information on controlled products
 - LSST = An Act respecting occupational health and safety (Rights and responsibilities of employers and workers)
2. Recognize the potential risks and their effects on health and safety.
 - Industry resources: CSST, unions, Commission des normes du travail, joint committees, etc.
3. Recognize means of preventing accidents.
 - Industry resources: CSST, unions, Commission des normes du travail, joint committees, etc.
 - Ergonomic principles
4. Determine what to do in an emergency situation.
 - Action to be taken or behaviours to be adopted in case of malaise, injuries, burns, falls, poisoning, fumes, fire, etc.
 - Collection of information (symptoms, identification of victim, medical alert bracelet, pregnancy, etc.)
 - Recognition of the seriousness of the situation
 - Recognition of and respect for their limitations
 - Verification of the following: first-aid kit, blankets, tourniquets, stretcher, extinguishers, proximity of a telephone, access to important telephone numbers, etc.
 - Familiarization with basic first-aid techniques
 - Evacuation procedure
 - Procedure to follow in case of a toxic spill

Competency 8 Duration 90 hours Credits 6

Behavioural Objective

Statement of the Competency

To do shopwork.

Achievement Context

- Working with simple technical drawings in metric and imperial units of measurement, instructions and different materials
- Using hand tools (portable or fixed, electric or air), abrasives, drill jigs, testing and layout instruments and devices, products necessary for cutting and maintenance, and a calculator
- Using various reference materials, such as technical manuals and tool catalogues

Elements of the Competency**Performance Criteria**

1. Gather the information needed for the job.

- Accurate interpretation of manufacturing standards
- Accurate interpretation of:
 - symbols, dimensions, codes and abbreviations
 - English and French technical terminology
 - verbal and written instructions

2. Lay out workpieces.

- Proper inspection of:
 - the workpiece and its conformity with the drawing
 - the surface plate
 - the layout instruments
 - the mounting accessories
- Appropriate corrections
- Careful preparation of surfaces
- Proper positioning of workpiece
- Layout techniques appropriate to the material used
- Layout in conformity with drawing and operations to be performed

3. Mount the workpiece.

- Visual and manual inspection of mounting equipment and accessories
- Appropriate corrections
- Installation of accessories in accordance with mounting method
- Proper positioning and alignment of workpiece
- Safe installation of workpiece

4. Prepare the workstation.
 - Visual and manual inspection of equipment, abrasives and accessories
 - Appropriate corrections
 - Adjustments in conformity with instructions related to:
 - feed rate
 - rpm and direction of rotation
 - security device
 - Organized arrangement of instruments
 - Observance of health and safety rules
5. Perform the required manufacturing operations.
 - Observance of prescribed sequence of operations
 - Proper use of roughing and finishing techniques in accordance with the type of operation performed
 - Safe use of tools and equipment
 - Accurate detection of manufacturing problems
 - Appropriate corrections
 - Product in conformity with manufacturing requirements
 - Careful deburring and cleaning of part
 - Observance of health and safety rules
6. Control the quality of their work.
 - Accurate identification of dimensions
 - Observance of dimensional tolerances or requirements
 - Precise control of surface finishes
 - Proper presentation of results in reports
 - Careful cleaning and storage of measuring instruments and devices
7. Perform regular maintenance on machines, devices, accessories and tools.
 - Proper cleaning and storage of devices, tools and accessories, and proper cleaning of work area
 - Careful inspection of equipment and oil levels
 - Appropriate corrections
 - Lubrication by hand at the appropriate points
 - Appropriate reporting of abnormalities
 - Observance of health and safety rules
 - Disposal of hazardous and toxic waste in conformity with regulations

Suggestions for Competency-Related Knowledge, Skills, Attitudes and Perceptions

The following is a list of knowledge, skills, attitudes, perceptions and guidelines related to each element of the competency.

1. Gather the information needed for the job.

- Detail drawings in metric and imperial units of measurement
- Symbols and codes
- Information to be gathered: dimensions, dimensional tolerances, characteristics of surface finishes, types of materials, sequence of operations, tools and assembly methods, manufacturing parameters, reference surfaces

2. Lay out workpieces.

- Characteristics of castings
- Deburring techniques
- Layout instruments
- Mounting and fastening accessories
- Application of solutions
- Mounting and layout methods
- Cleaning products and their use
- Techniques for sharpening scribes and dividers

3. Mount the workpiece.

- Characteristics of an appropriate installation
- Method of handling the workpiece and mounting accessories
- Condition and maintenance of accessories
- Alignment of workpiece
- Method of mounting accessories: vice, jig, jaw cover, angle plate, rotary table
- Orientation of workpiece
- Method of clamping and effect on workpiece

4. Prepare the workstation.

- Inspection of cut
- Sharpening, replacement of tips and blades, replacement of abrasives, etc.
- Adjustment of tool height
- Proper mounting and orientation of tool
- Verification of availability of testing, calibration and adjustment instruments

5. Perform the required manufacturing operations.

- Start-up and operation of tools: saw, drill, buffer, sander, sandblaster, grinding wheel, riveting machine, broaching machine, etc.
- Effects of cut on workpiece: thermal expansion and deformation
- Method of using cutting fluids and coolants
- Techniques for performing the different operations, including roughing and finishing: deburring, sanding, buffing, sawing, drilling, sharpening, reaming, counterboring, chamfering, tapping, filing and broaching
- Deburring techniques
- Occupational health and safety rules

6. Control the quality of their work.

- Inspection of linear and angular dimensions, form and positioning tolerances, and surfaces
- Direct and indirect measuring instruments
- Other necessary instruments or devices
- Calibration and adjustment
- Concepts of self-inspection

7. Perform regular maintenance on machines, devices, accessories and tools.

- Method of cleaning and lubricating machines
- Types of lubricants: soluble oils, lubricating oils, hydraulic oils and greases
- Lubrication points
- Treatment or replacement of dirty soluble oils
- Health risks associated with contaminated coolants
- Disposal of used oil
- Detection of abnormal noises and vibrations
- Criteria related to cleanliness

Competency 9 Duration 30 hours Credits 2

Behavioural Objective**Statement of the Competency**

To handle materials.

Achievement Context

- Working with instructions, instruction manuals, handling and lifting equipment and tables of maximum loads
- Using items to be moved, handling and lifting equipment such as simple levers, carriage levers, hoists, hand trucks, cables and slings, personal protective equipment and inventory forms

Elements of the Competency**Performance Criteria**

- | | |
|--|--|
| 1. Plan the move. | <ul style="list-style-type: none"> • Accurate interpretation of instructions • Accurate determination of centre of gravity • Estimate of weight • Proper choice of method and equipment in accordance with lifting capacity and resistance to friction and corrosion |
| 2. Inspect the equipment. | <ul style="list-style-type: none"> • Detailed visual inspection of equipment and safety devices • Good judgment |
| 3. Move items and loads on horizontal and inclined planes. | <ul style="list-style-type: none"> • Proper use of standardized signals and gestures • Use of techniques in accordance with the type of move and the material or product to be moved • Observance of safety rules related to forklift operation |
| 4. Move hazardous materials. | <ul style="list-style-type: none"> • Observance of technique • Observance of occupational health and safety rules • Recognition of precautions to be taken when handling and moving hazardous materials |
| 5. Maintain handling equipment. | <ul style="list-style-type: none"> • Cleaning and lubrication in accordance with instructions • Observance of storage methods |

Suggestions for Competency-Related Knowledge, Skills, Attitudes and Perceptions

The following is a list of knowledge, skills, attitudes, perceptions and guidelines related to each element of the competency.

1. Plan the move.

- Map of path of load
- Operation of handling and lifting devices and equipment
- Formulas for calculating the specific volume and weight
- Visual estimate of weight in order to choose the appropriate equipment
- Verification in the technical documentation of the maximum permissible load for cables and other pieces of lifting equipment
- Determination of occupational health and safety rules to observe

2. Inspect the equipment.

- Worn cables, deformed strands, cut strands, lack of lubrication
- Excessive humidity and corrosion
- Points to inspect before every job in order to avoid serious accidents

3. Move items and loads on horizontal and inclined planes.

- Main signals used in rigging
- Advantages of a good system of signals
- Verification of path of load
- Work method and precautions to be taken
- Personal protective equipment

4. Move hazardous materials.

- Verification that path of load is clear
- Work method and precautions to be taken
- Use of WHMIS data sheets

5. Maintain handling equipment.

- Cleaning of equipment that has chains
- Regular lubrication
- Storage of equipment in a dry place
- Methods of storing cables: in rolls or on spools

Competency 10 Duration 15 hours Credit 1

Situational Objective

Statement of the Competency

To use job search techniques.

Elements of the Competency

During this module, the students will:

- Plan a job search.
- Prepare the necessary documents.
- Become familiar with the prerequisites of a successful selection interview.

Learning Context

Information Phase

- Becoming familiar with the various sources of information that can be used to prepare for a job search.

Participation Phase

- Learning about the steps involved in finding a practicum position and a job.
- Writing a résumé and cover letter.
- Learning about the attitudes and behaviours to adopt or avoid during a selection interview.

Synthesis Phase

- Recognizing their strengths and weaknesses with respect to a job search.

Instructional Guidelines

The teacher should:

- Plan learning activities of interest to the students.
- Ensure that the students understand the importance of having the proper tools for an effective job search.
- Provide the students with a wide variety of relevant resource materials (reference works, brochures, pamphlets, telephone books, videotapes, etc.).
- Invite guest speakers from the industry.
- Provide the necessary support for students experiencing difficulty attaining their objectives.
- Provide the students with a sample résumé and cover letter.
- Identify resources in the school or the community for creating simulated interviews.
- Allow the students to make their phone calls during office hours.

Participation Criteria

Information Phase

- Gather information useful for the job search.

Participation Phase

- Produce the required documents.

Synthesis Phase

- Make a list of their strengths and weaknesses observed during the various steps involved in preparing the job search and the aspects of their personality to be emphasized or improved.
- Determine how they will overcome the weaknesses observed.

Suggestions for Competency-Related Knowledge, Skills, Attitudes and Perceptions

The following is a list of knowledge, skills, attitudes, perceptions and guidelines related to each phase of the learning context.

Information Phase

- Information search: employment centres, weekend editions of newspapers, professional corporations, businesses, acquaintances in the job market, placement and recruitment agencies, list of companies in the region, the Internet, etc.

Participation Phase

- Determination of steps involved: definition of their needs and expectations, search for potential employers, producing and sending a résumé and cover letter
- Follow-up with employers
- Résumé: definition and purpose, qualities (organized presentation, clarity, neatness, etc.), parts (identification, education and work experience, personality traits, personal experience, activities, references, etc.)
- Cover letter: definition and purpose, qualities (clarity, neatness, concision, etc.), parts (date, name and title of addressee, name of company, salutation, introduction, type of job applied for, reasons and justification for the application, request for an interview, conclusion, complimentary close, address and telephone number, signature)
- Attitudes and behaviours demonstrating competency and main assets
- Neat appearance, well-spoken and appropriate, coherent remarks
- Interest and dynamic attitude
- Attitudes and behaviours to avoid

Synthesis Phase

- Advantages of self-examination
- Serious examination of their strengths and weaknesses
- Determination of means to overcome weaknesses
- Importance of not being too hard on themselves during the self-examination

Competency 11 Duration 45 hours Credits 3

Behavioural Objective**Statement of the Competency**

To adapt to new types of work organization.

Achievement Context

- Working in a team
- In a context of value-added output
- Using the necessary technical documentation
- In an atmosphere of respect and openness

Elements of the Competency**Performance Criteria**

1. Recognize the production management approaches of the company and their effects on the type of work organization.

- Recognition of the company's management philosophies, such as Taylorism and value-added output
- Proper description of preferred type of structural organization:
 - hierarchical organization
 - semi-autonomous teams
 - autonomous teams
- Recognition of the company's production process
- Appreciation of the effects on production and on the evolution of tasks in the company

2. Recognize the means used to promote the continual improvement of productivity.

- Accurate differentiation among the instruments or techniques used in the company
- Relevant associations between the means used and the company's ability to meet the requirements of the new economy, such as:
 - improvement of the time required to respond to market needs
 - economies of scale
 - elimination of waste
- Recognition of the contribution of personnel to the improvement of productivity

3. Communicate verbally with colleagues and superiors.

- Appropriate choice of types of questions required to obtain relevant information
- Proper restating and reflection of message
- Constructive and appropriate feedback:
 - to encourage improvement in behaviour
 - to recognize and encourage the contribution of colleagues
- Relevant and persuasive expression of their point of view
- Use of an effective approach to deal with emotional behaviour

- | | |
|--------------------|--|
| 4. Solve problems. | <ul style="list-style-type: none"> • Accurate differentiation of problem-solving techniques • Clear description of the problem • Accurate determination of the causes and consequences of the problem • Choice of best solution in accordance with established criteria |
| 5. Work in a team. | <ul style="list-style-type: none"> • Clear understanding of the team's goals and objectives in accordance with the company's mission and values • Consensus on team rules • Determination of the responsibilities of each team member • Consensual decision making • Description of factors favourable and unfavourable to the success of a work team |

Suggestions for Competency-Related Knowledge, Skills, Attitudes and Perceptions

The following is a list of knowledge, skills, attitudes, perceptions and guidelines related to each element of the competency.

1. Recognize the production management approaches of the company and their effects on the type of work organization.
 - Management approaches of companies, company organization charts, production process diagrams
2. Recognize the means used to promote the continual improvement of productivity.
 - Work cells, production process
3. Communicate verbally with colleagues and superiors.
 - Communication process, obstacles to communication, role of perception and defence mechanisms, productive and counter-productive attitudes, types of questions, wording, summary of discussions, specific feedback based on personal experience, reactions to emotional behaviour, arguments supporting an opinion
4. Solve problems.
 - Advantages of using a simple problem-solving process, modern tools and techniques
5. Work in a team.
 - Foundations of an effective work team, cooperation as opposed to competition, roles within the team, team rules, styles of participation, stages of planning team work, consensual decision-making process, developmental stages of a work team

Competency 12 Duration 105 hours Credits 7

Behavioural Objective**Statement of the Competency**

To operate conventional machinery.

Achievement Context

- Working with instructions, appropriate raw materials, technical information relevant to the sectors chosen (i.e. work orders, recipes, patterns and technical drawings in metric and imperial units of measurement)
- Using manufacturing, assembly, finishing, packaging or labelling equipment; measuring instruments and testing devices; procedures manuals; a calculator and forms

Elements of the Competency**Performance Criteria**

- | | |
|--|---|
| 1. Interpret procedures manuals and instructions. | <ul style="list-style-type: none"> • Accurate interpretation of information about the job and the procedure • Thorough identification of information in sketches, diagrams, work orders, drawings, patterns and recipes • Thorough identification of monitoring phases in the production process |
| 2. Plan the work. | <ul style="list-style-type: none"> • Verification of availability of necessary tools and materials • Preparation of raw materials in conformity with instructions and standards |
| 3. Prepare machines. | <ul style="list-style-type: none"> • Proper preparation of machines and mounting accessories • Proper mounting of workpieces • Accurate adjustment of parameters in accordance with instructions • Observance of rules of occupational health and safety and hygiene |
| 4. Use the equipment necessary for manufacturing, assembly or finishing. | <ul style="list-style-type: none"> • Observance of technique for: <ul style="list-style-type: none"> – starting up machines – feeding machines – operating machines – maintaining machines • Observance of rules of occupational health and safety and hygiene • Appropriate corrections to parameters following the detection of abnormalities |

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| Operating Conventional Machinery | Code: | 869617 |
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| 5. Control the quality of the product. | <ul style="list-style-type: none"> • Conformity of product with standards • Observance of inspection and measuring techniques • Appropriate decision regarding substandard products • Proper completion of verification card |
| 6. Prepare products for shipping or handling. | <ul style="list-style-type: none"> • Proper and safe use of packaging and labelling materials and machines • Proper production of form • Accuracy of information recorded • Conformity with instructions regarding product packaging and labelling |
| 7. Tidy up and clean the workstation. | <ul style="list-style-type: none"> • Cleaning of equipment in conformity with instructions • Clean and well-organized workstation • Clear communication of relevant information to the appropriate parties • Observance of procedure for shutting down machines and the workstation |

Suggestions for Competency-Related Knowledge, Skills, Attitudes and Perceptions

The following is a list of knowledge, skills, attitudes, perceptions and guidelines related to each element of the competency.

1. Interpret procedures manuals and instructions.
 - Related content specific to the chosen sectors
 - *Metal and electrical products*
Technical drawings
 - *Wood products*
Technical drawings
 - *Textiles*
Patterns and dye recipes
 - *Food*
Recipes
 - *Polymers*
Recipes and technical drawings
2. Plan the work.
 - Codification of raw materials, raw or processed materials used, weights, calculations, measurements, standards of hygiene or other standards specific to the sectors chosen, awareness of production costs and the concept of responsibility
3. Prepare machines.
 - Fastening techniques, calculations used to verify parameters, method of adjusting basic parameters

4. Use the equipment necessary for manufacturing, assembly or finishing.
 - Operating mode of machines and most common problems; sequence of operations; safety rules, personal protective equipment, use of safety devices; importance of keeping a safe pace; use of the senses to detect abnormalities: odours, colours, noises; measurements specific to each sector
5. Control the quality of the product.
 - Finishing of product: deburring, removal of excess material, cleaning, etc.; inspection method: consultation of reference documents or drawings; use of appropriate measurement techniques and instruments for the job to be done; decision making and compilation of rejects; conventional and electronic verification cards
6. Prepare products for shipping or handling.
 - Positioning and handling procedure, precautions to be taken during transportation (fragility, leak tightness, etc.); labelling procedure; importance of accurate information
7. Tidy up and clean the workstation.
 - Safe cleaning procedure, draining and decontamination of appropriate sectors, different information transfer methods used in various industries, shutdown sequence

Competency 13 Duration 105 hours Credits 7

Behavioural Objective**Statement of the Competency**

To operate an automated production system.

Achievement Context

- Working with instructions, appropriate raw materials, technical information relevant to the sectors chosen (i.e. work orders, recipes, patterns and technical drawings in metric and imperial units of measurement)
- Using automated machines or a continuous process production line, tools, measuring instruments and testing devices, procedures manuals, a calculator, forms and labelling materials

Elements of the Competency**Performance Criteria**

1. Interpret procedures manuals and instructions.

- Accurate interpretation of information about the job and the procedure
- Thorough identification of information in sketches, diagrams, organization charts, drawings, patterns and recipes
- Thorough identification of monitoring phases in the production process

2. Plan the work.

- Verification of availability of necessary tools and materials
- Preparation of raw materials in conformity with instructions and standards

3. Control the sequence of an automated procedure.

- Proper preparation of machinery
- Observance of technique for loading the program
- Inputting of relevant data in accordance with instructions
- Observance of technique for:
 - starting up machines
 - feeding machines
 - operating machines
 - maintaining machines
- Observance of rules of occupational health and safety and hygiene
- Appropriate corrections to the control panel or computer following the detection of abnormalities

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|---|---|
| 4. Control the quality of the product. | <ul style="list-style-type: none"> • Conformity of product with standards • Observance of inspection and measuring techniques • Appropriate decision regarding substandard products • Proper completion of verification card |
| 5. Prepare products for shipping or handling. | <ul style="list-style-type: none"> • Proper and safe use of packaging and labelling materials and machines • Proper production of form • Accuracy of information recorded • Conformity with instructions regarding product packaging and labelling |
| 6. Tidy up and clean up the workstation. | <ul style="list-style-type: none"> • Cleaning of equipment in conformity with instructions • Clean and well-organized workstation • Clear communication of relevant information to the appropriate parties • Observance of procedure for shutting down machines and the workstation |

Suggestions for Competency-Related Knowledge, Skills, Attitudes and Perceptions

The following is a list of knowledge, skills, attitudes, perceptions and guidelines related to each element of the competency.

1. Interpret procedures manuals and instructions.
 - Related content specific to the chosen sectors
 - *Metal and electrical products*
Technical drawings
 - *Wood products*
Technical drawings
 - *Textiles*
Patterns and dye recipes
 - *Food*
Recipes
 - *Polymers*
Recipes and technical drawings
2. Plan the work.
 - Codification of raw materials, raw or processed materials used, weights, calculations, measurements, standards of hygiene or other standards specific to the sectors chosen, awareness of production costs and the concept of responsibility
3. Control the sequence of an automated procedure.
 - Quick-change mount technique (hydraulic chuck); temperature, weight, etc.; inputting of data from specifications into the machine; safety rules; personal protective equipment; use of safety devices; importance of keeping a safe pace; control panel; measurements using instruments specific to each sector

4. Control the quality of the product.

- Finishing of product: deburring, removal of excess material, cleaning, etc.; inspection methods specific to the sector: consultation of reference documents or drawings; use of control apparatus specific to the chosen sector and the job to be done; measurement of density; decision making and compilation of rejects

5. Prepare products for shipping or handling.

- Positioning and handling procedure, precautions to be taken during transportation (fragility, leak tightness, etc.); positioning and labelling procedure; importance of accurate information

6. Tidy up and clean the workstation.

- Safe cleaning procedure, draining and decontamination if applicable, storage methods, shutdown sequence

Competency 14 Duration 90 hours Credits 6

Behavioural Objective**Statement of the Competency**

To maintain machinery.

Achievement Context

- Working with assembly drawings, spare parts and instructions
- Using various reference works such as technical manuals, tools and measuring instruments, preventive maintenance software and WHMIS data sheets

Elements of the Competency**Performance Criteria**

1. Perform tasks included in the maintenance schedule.

- Proper planning of tasks included in the schedule
- Proper verification of specified checkpoints
- Adjustment of components in conformity with instructions
- Observance of recommended lubrication
- Careful cleaning of components
- Observance of occupational health and safety preventive measures

2. Detect operating abnormalities.

- Proper detection of unusual noises, odours or vibrations
- Accurate location of defective component
- Observance of occupational health and safety preventive measures
- Proper completion of repair work order

3. Replace simple components.

- Conformity with instructions in maintenance manual
- Replacement component in conformity with original part
- Correct installation of component
- Observance of occupational health and safety preventive measures

4. Tidy up and clean the work area.

- Cleanliness of machines and work area
- Handling and disposal of hazardous materials in conformity with instructions

5. Fill out the maintenance record card.

- Accurate completion of maintenance record card
- Relevant comments

Suggestions for Competency-Related Knowledge, Skills, Attitudes and Perceptions

The following is a list of knowledge, skills, attitudes, perceptions and guidelines related to each element of the competency.

1. Perform tasks included in the maintenance schedule.
 - Preventive maintenance software, observance of schedule, machine parts, observance of safety rules, alignment, oil level, choice of appropriate lubricants, filter and ventilation
2. Detect operating abnormalities.
 - Power train system; detection of significant noises, odours or vibrations; pneumatic and hydraulic circuits and basic components; main components of electric and electronic circuits; measurement using a manometer: air pressure, oil pressure; identification of equipment
3. Replace simple components.
 - Procedure indicated in the maintenance manual, choice of appropriate tools and measuring instruments, codification of components, selection criteria for components, techniques for installation of components, technical characteristics of components
4. Tidy up and clean the work area.
 - Handling and disposal of hazardous materials, cleaning products
5. Fill out the maintenance record card.
 - Analysis of malfunctions, sources of potential problems, follow-up, suggested changes to the maintenance schedule, routing of record card

Competency 15 Duration 90 hours Credits 6

Situational Objective

Statement of the Competency

To enter the work force.

Elements of the Competency

During this module, the students will:

- Find a practicum position.
- Observe and perform trade-related tasks in the workplace.
- Communicate with the work team.
- Evaluate their training in light of their post-practicum impressions.

Learning Context

Information Phase

- Learning about the practicum and the related procedures.
- Defining their needs and expectations with respect to the practicum.
- Finding companies likely to meet their needs and expectations.
- Obtaining a practicum position.
- Ensuring that the practicum procedure is within regulations.

Participation Phase

- Identifying the types of work organization in the company.
- Observing industrial machinery operators at work in the company.
- Performing various manufacturing tasks using different machines.
- Communicating with members of the work team and those responsible for the practicum.
- Producing a report on the tasks and operations performed during the practicum.

Synthesis Phase

- Presenting a report on the tasks and operations performed during the practicum.
- Assessing the relevance of their training with respect to the requirements of the workplace.
- Stating the specific and complementary training needs in Production Equipment Operation.

Instructional Guidelines

The teacher should:

- Provide the students with the necessary means and assistance to find a practicum position.
- Maintain close ties between the school and the company.
- Make sure that the trainees receive the support and supervision of a responsible person in the company.
- Ensure the regular support and supervision of students and intervene in case of difficulty.
- Make sure that the company respects the conditions required for the students to attain the objectives of the practicum.
- Encourage the students to engage in discussions and express themselves.
- Provide the students with an outline for the report.

Participation Criteria

Information Phase

- List, in order of priority, possible practicum positions that meet their selection criteria.
- Meet with a representative of the company in order to obtain a practicum position.

Participation Phase

- Follow company rules regarding activities, work schedules and professional ethics.
- Write a practicum report on the activities performed.
- Demonstrate interest throughout the practicum.

Synthesis Phase

- Give a presentation on the tasks and operations performed during the practicum.
- Emphasize the strong and weak points of the training received.

Suggestions for Competency-Related Knowledge, Skills, Attitudes and Perceptions

The following is a list of knowledge, skills, attitudes, perceptions and guidelines related to each phase of the learning context.

Information Phase

- Objectives of the practicum; duration; instructional guidelines and participation criteria; personal and occupational goals
- Criteria for selecting the company, such as size and location, type of production, structure, quality of working relations, possibility of attaining the objectives of the practicum, etc.; match between the proposed criteria and their expectations
- Various information sources: banks of companies, telephone book, employment centres, classified ads, lists of companies who have accepted trainees in the past, teacher's assistance, etc.; obtaining of a practicum position; classification of companies by type of product or process
- Elements to confirm: insurance, registration of trainee with the CSST, agreements with unions with regard to accepting trainees, responsibilities of parties, agreements on supervision (by the company and the teacher), etc.

Participation Phase

- Observance of types of work organization, values conveyed by the company and management of personnel; observation of industrial machinery operators at work; observation of production process; knowledge of rights and responsibilities of employer and trainee; mastery of specific procedure for each of the machines used; active participation in tasks; observance of occupational health and safety rules
- Observance of company rules and regulations: order, schedules, attendance, movements in the shop and clothing
- Behaviours: attentiveness, respect, tact, discretion, concern for excellence, demonstration of interest in all new work experiences, etc.; knowledge of the importance of professional ethics and dedication; search for information (desire to learn); transmission of information; positive, receptive attitude; acceptance of advice and comments; feedback; verification of satisfaction of the person responsible for the practicum, etc.; daily log
- Content of the practicum report: general information on the location and date of the practicum and on those responsible in the company and the school; description of tasks performed; types of equipment used; new technologies and tools used; problems that occurred and solutions that were applied; comments on the practicum procedure; appreciation of new tasks and elements and those different from the ones presented at school, etc.

Synthesis Phase

- Oral presentation; list of aspects of the trade that correspond to the training received and those that do not
- Comparison of their perception of the trade before and after the practicum: workplace; occupational practices; equipment, etc.; extension or specialization courses; continuing education

