



NATIONAL QUALIFICATION

12UY0101-5

**NC/CNC MACHINE TOOLS APPLICATION AND
SERVICE OFFICER**

LEVEL 5

REVISION NO: 01

VOCATIONAL QUALIFICATIONS AUTHORITY

Ankara, 2013

PREFACE

NC/CNC Machine Tools Application and Service Officer (Level 5) National Qualification has been developed in accordance with the provisions of the "Regulation on the Development of National Standards and National Qualifications" issued pursuant to the Law numbered 5544 on Vocational Qualifications Authority (VQA).

The qualification template was prepared by Machine Tools Industrialists and Businessmen Association (TIAD) assigned with the protocol signed on 30.03.2012. The opinions of the relevant institutions and organizations in the sector were taken about the template prepared, and the necessary regulations on the template were made by assessing those opinions. Following the review and assessment by the Metal Sector Committee of VQA and the consent of the Committee, the final template was approved by the decree of VQA Executive Board dated 15.11.2012 and no. 2012/84, and decided to be placed within the National Qualifications Framework (NQF).

NC/CNC Machine Tools Application and Service Officer (Level 5) National Qualification has been revised with the decision of the VQA Executive Board dated 10.04.2013 and numbered 2013/27.

We would like to extend our gratitude to people, institutions, and organizations, which presented their opinions and contributed to the development, review, and verification of the qualification, for their contributions and opinions, and we submit the qualification for all parties' information who may benefit from it.

Vocational Qualifications Authority

INTRODUCTION

The basic criteria for the development of the national qualification, its review by the sector committees, and its approval and enforcement by the VQA Executive Board are stated in the Regulation on the Development of National Standards and National Qualifications.

National qualifications include the following elements:

- a) The name and level of the qualification,
- b) The purpose of the qualification,
- c) Occupational standard, occupational standard units/duties, or qualification units that constitute the source of qualification,
- ç) Requirements for entering the qualification exam,
- d) Learning outcomes and performance criteria on the basis of qualification units,
- e) Assessment, evaluation and evaluator criteria to be applied in acquiring the qualification
- f) The validity period of the qualification certificate, the conditions for renewal, and the conditions concerning the supervision of the certificate holder.
- g) The institution/organization that develops the qualification and the Sector Committee that validates it.

National qualifications are formed on the basis of national occupational standards and/or international occupational standards.

National qualifications are formulated by the organizations below and through their joint efforts;

- Formal and informal education and training institutions,
- Authorized certification bodies,
- Organizations that have made a preliminary application for authorization to the Authority,
- Organizations that have developed national occupational standards,

- Occupational organizations.

**12UY00101-5 NC/CNC MACHINE TOOLS APPLICATION AND SERVICE OFFICER
NATIONAL QUALIFICATION**

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| 1 | NAME OF THE QUALIFICATION UNIT | NC/CNC MACHINE TOOLS APPLICATION AND SERVICE OFFICER |
| 2 | REFERENCE CODE | 12UY0101-5 |
| 3 | LEVEL | 5 |
| 4 | PLACE IN THE INTERNATIONAL CLASSIFICATION | ISCO 08: 3139 |
| 5 | TYPE | - |
| 6 | CREDIT VALUE | - |
| 7 | A) PUBLICATION DATE | 15/11/2012 |
| | B) REVISION NO | 01 |
| | C) REVISION DATE | 10/04/2013 |
| 8 | AIM | The purpose of this national qualification is to determine whether the employees and candidates possess the necessary qualifications and competencies to succeed in the NC/CNC Machine Tools Application and Service Officer (Level 5) occupation and to enable them to prove their vocational qualifications through a valid, authentic certification. This study also constitutes a reference for the education system, and testing and certification bodies. |
| 9 | OCCUPATIONAL STANDARD(S) THAT FORM(S) THE BASIS FOR THE QUALIFICATION UNIT | 12UMS0261-5 NC/CNC MACHINE TOOLS APPLICATION AND SERVICE OFFICER (LEVEL 5) NATIONAL OCCUPATIONAL STANDARD |
| 10 | REQUIREMENT(S) FOR ENTERING THE QUALIFICATION EXAM | - |
| 11 | STRUCTURE OF QUALIFICATION | |
| | 11-a) Mandatory Units | 12UY0101-5/A1 OHS AND ENVIRONMENTAL SAFETY FOR NC/CNC MACHINE TOOLS 12UY0101-5/A2 QUALITY MANAGEMENT SYSTEM 12UY0101-5/A3 WORK ORGANIZATION 12UY0101-5/A4 NC/CNC MACHINE TOOLS TECHNOLOGY 12UY0101-5/A5 BEFORE AND AFTER-SALES APPLICATIONS AND CONSULTANCY FOR NC/CNC MACHINE TOOLS 12UY0101-5/A6 PROVISION OF END-USER TRAINING FOR NC/CNC MACHINE TOOLS |
| | 11-b) Elective Units | - |
| | 11-c) Alternatives for Grouping Units and Additional Learning Outcomes | In order for the candidate to achieve a qualification certificate, they must succeed in all of the mandatory qualification units. |

12 ASSESSMENT AND EVALUATION

In the occupation of NC/CNC Machine Tool Application and Service Officer (Level 5), the candidate applying for testing and certification must be successful according to the criteria defined in each of the units indicated in this national qualification in order to certify their vocational qualification. There are two types of assessment and evaluation to be conducted, theoretical (written) and/or practical (applied), which will meet the performance criteria of the learning outcomes defined in each unit.

Written exams are arranged to cover each of the relevant learning outcomes of the qualification units. In practical exams, candidates are tested based on the learning outcomes evaluated through practice, and assessed via the relevant checklist.

Candidates who are successful in one of the written sections of the exam but fail the other section are given a certificate of success regarding the units they have been successful, and if they apply for the exam again within 1 year, they are exempted from the units they were successful. There is a requirement to get 70 points out of 100 for each of the theoretical exam units. In practical exams, there is a requirement to be successful in all of the control criteria.

The exam for the performance assessment of the candidate applying to certify their qualifications in the occupation of NC/CNC Machine Tool Application and Service Officer (Level 5) is carried out in the real working environment or in the environment arranged for the exam, at the CNC machine tool or on the simulator/simulation software. Practical exams of A5 and A6 qualification units are held together. It is ensured that the candidates use PPE in accordance with the occupational safety rules in order to protect themselves from any risks that cannot be avoided during the practical exam.

Scoring weights of NC/CNC Machine Tool Application and Service Officer (Level 5) occupation qualification units in the overall assessment of occupational qualification as a basis for certification are implemented as follows:

Practical questions can be in formats that include applications to measure the process and result, scenarios constructed when necessary according to the criteria, and critical conditions. Observation, assessment and scoring records are kept over the scores, outputs and/or task steps, durations (if necessary) and critical actions that will cover the learning outcomes and performance criteria required by the qualification unit, and over the checklists arranged according to the number of questions specified in the units and the predicted performance.

The minimum number of questions in the theoretical and practical exams over which the candidate will be assessed in the exams are given below, based on qualification units:

| Qualification Units | | Number of questions | |
|---------------------|--|---------------------|--|
| | | Theoretical | Practical |
| A1 | OHS and Environmental Safety for NC/CNC Machine Tools | 10 | Checklist to be prepared based on performance criteria |
| A2 | Quality Management System | 5 | |
| A3 | Work organization | 5 | |
| A4 | NC/CNC Machine Tools Technology | 10 | |
| A5 | Before and After-Sales Applications And Consultancy For NC/CNC Machine Tools | 15 | |
| A6 | Provision of End-User Training For NC/CNC Machine Tools | 10 | |
| Total | | 55 | |

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| 13 | VALIDITY PERIOD OF THE CERTIFICATE | The validity period of the certificate is a total of five (5) years following the date of issue of the certificate. |
| 14 | OBSERVANCE FREQUENCY | In order to determine that the certificated person continues to be qualified, they are subjected to surveillance by the Testing and Certification Body at least once during the validity period of the certificate. |
| 15 | ASSESSMENT AND EVALUATION METHOD TO BE USED IN CERTIFICATE RENEWAL | a) At the end of the first 5 years from the date of issue of the certificate for the first time, only the practical exam is repeated. b) At the end of the second 5 years, a practical exam is held together with a written exam, with a narrowed scope, containing updated information. |
| 16 | ORGANIZATION(S) DEVELOPING THE QUALIFICATION | MACHINE TOOLS INDUSTRIALISTS AND BUSINESSMEN ASSOCIATION (TIAD) |
| 17 | SECTOR COMMITTEE VERIFYING THE QUALIFICATION | VQA'S METAL SECTOR COMMITTEE |
| 18 | VQA EXECUTIVE BOARD'S APPROVAL DATE AND NO | Initial Approval: 15.11.2012 – 2012/84 Revision No. 01: 10.04.2013 – 2013/27 |

**12UY0101-5/A1 OHS AND ENVIRONMENTAL SAFETY FOR NC/CNC MACHINE TOOLS
QUALIFICATION UNIT**

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| 1 | NAME OF THE QUALIFICATION UNIT | OHS AND ENVIRONMENTAL SAFETY FOR NC/CNC MACHINE TOOLS |
| 2 | REFERENCE CODE | 12UY0101-5/A1 |
| 3 | LEVEL | 5 |
| 4 | CREDIT VALUE | - |
| 5 | A) PUBLICATION DATE | 15/11/2012 |
| | B) REVISION NO | 01 |
| | C) REVISION DATE | 10/04/2013 |
| 6 | THE OCCUPATIONAL STANDARD THAT FORMS THE BASIS FOR THE QUALIFICATION UNIT | |
| 12UMS0261-5 NC/CNC MACHINE TOOLS APPLICATION AND SERVICE OFFICER (LEVEL 5) NATIONAL OCCUPATIONAL STANDARD | | |
| 7 | LEARNING OUTCOMES | |
| <u>Learning Outcome 1: Takes OHS measures in the working environment.</u> | | |
| Performance Criteria | | |
| <ol style="list-style-type: none"> 1.1. Correctly defines the OHS rules in work processes according to the safety instructions/rules and general OHS rules for machine tools. 1.2. Determines basic PPE for servicing operations and uses them appropriately. 1.3. Uses warning signs/plates that should be used during servicing operations appropriately. 1.4. Accurately defines possible hazards/risks arising from machinery, materials, task, in the given situation/described conditions, according to the work to be performed. 1.5. Correctly applies the basic precautions regarding the possible hazards/risks arising from the machine, material, task, in the given situation/defined conditions, according to the work to be performed. 1.6. Accurately identifies conditions and/or applications where static electricity and/or sparks are likely to occur. | | |
| Context: | | |
| <ul style="list-style-type: none"> • Safety standards in machine tools • Basic PPE used in servicing operations; work clothes, steel-toed shoes, safety glasses, heat-resistant gloves etc. • Basic warning signs and plates used in servicing operations; slippery floor sign, fault notification sign, electrocution sign etc. • Materials and materials that pose risks and dangers in servicing operations, risky and dangerous equipment and components of NC/CNC machine tools and critical risks and hazards arising in tasks with NC/CNC machine tools, conditions and applications that are likely to generate static electricity and/or sparks, grounding problems, sparking in machining. | | |
| <u>Learning Outcome 2: Defines emergency procedures.</u> | | |
| Performance Criteria | | |
| <ol style="list-style-type: none"> 2.1. Accurately defines the critical measures to be taken in the machine and in the environment for a possible emergency within the scope of NC/CNC machine tool servicing operations. 2.2. Accurately identifies ways to provide notifications in accordance with the instructions in the event of an occupational accident depicted in the servicing operations. 2.3. Accurately defines exit/escape procedures for emergencies. 2.4. Defines the basic/emergency response procedures to fire within the scope of their duties, together with their justifications, for a potential fire event. | | |

Context:

Emergencies; fire, work accident, bench breaks, work accident legal notification procedures, fire response procedures.

Learning Outcome 3: Takes environmental safety measures in the working environment.

Performance Criteria

- 3.1. Accurately defines the effects of waste materials that will create an environmental safety risk that arises/will arise during servicing operations.
- 3.2. Accurately defines the tasks related to the disposal of waste materials that arise/will arise during the servicing operations that will create an environmental safety risk, together with relevant justifications.

Context:

- Disposal procedures of boron oil (coolant) emulsion, cutting oil, metal chips that become waste in the machine and waste materials generated within the scope of NC/CNC machine tools tasks.

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| 8 | ASSESSMENT AND EVALUATION | |
| 8 a) Theoretical Exam | | |
| T1: Multiple choice, 4 options, written exam | | |
| <p>In the T1 exam, a minimum of 10 questions are asked, which will be administered over the closed book method. The difficulty levels of the measurement tool are determined according to the professional level and cognitive level. An average of 1.5 - 2 minutes is allowed for each question. No points will be deducted for wrong answers.</p> <p>In order to be successful in the assessment of the theoretical exam of this unit, a minimum of 70% success must be achieved.</p> | | |
| 8 b) Practical Exam | | |
| P1: Practical exam | | |
| <p>The practical exam should be designed in a virtual and/or real production environment in order to allow candidates to demonstrate their qualifications while carrying out their respective tasks. The exam is conducted over the "application checklist" developed by relating it to the relevant performance criteria defined in the learning outcomes of the unit.</p> <p>Candidates use the personal protective equipment provided to them in order to protect themselves from any risks that cannot be avoided during the practical exam.</p> <p>In order to be successful in the assessment of the practical exam of this unit, it is required to be successful in all of the control criteria.</p> | | |
| 8 c) Other Conditions Regarding Assessment and Evaluation | | |
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| 9 | INSTITUTION/ORGANIZATION(S) DEVELOPING THE QUALIFICATION UNIT | MACHINE TOOLS INDUSTRIALISTS AND BUSINESSMEN ASSOCIATION (TIAD) |
| 10 | SECTOR COMMITTEE VERIFYING THE QUALIFICATION UNIT | METAL SECTOR COMMITTEE |
| 11 | VQA EXECUTIVE BOARD APPROVAL DATE and NUMBER | Initial Approval: 15.11.2012 – 2012/84 Revision No. 01: 10.04.2013 – 2013/27 |

ANNEXES

ANNEX [A1]-1: Information on Recommended Training for the Acquisition of the Qualification Unit

The knowledge and skills contained in the learning outcomes in the "OHS and Environmental Safety" qualification unit can be acquired within the courses and lessons of non-formal and formal vocational education programs related to the field of machine training. In addition, they are also provided for employees working in enterprises with applied trainings or on-the-job trainings given by trainers consisting of supervisor/leader/occupational safety experts of the relevant department.

It is recommended that candidates who will take the vocational certification exam, which will be held based on national qualifications, have at least 2 years of experience in businesses providing maintenance, installation and consultancy services for NC/CNC machine tools in order to be successful.

12UY0101-5/A2 QUALITY MANAGEMENT SYSTEM QUALIFICATION UNIT

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| 1 | NAME OF THE QUALIFICATION UNIT | QUALITY MANAGEMENT SYSTEM |
| 2 | REFERENCE CODE | 12UY0101-5/A2 |
| 3 | LEVEL | 5 |
| 4 | CREDIT VALUE | - |
| 5 | A) PUBLICATION DATE | 15/11/2012 |
| | B) REVISION NO | 01 |
| | C) REVISION DATE | 10/04/2013 |
| 6 | THE OCCUPATIONAL STANDARD THAT FORMS THE BASIS FOR THE QUALIFICATION UNIT | |
| 12UMS0261-5 NC/CNC MACHINE TOOLS APPLICATION AND SERVICE OFFICER (LEVEL 5) NATIONAL OCCUPATIONAL STANDARD | | |
| 7 | LEARNING OUTCOMES | |
| <u>Learning Outcome 1: Defines the quality standards related to the servicing of CNC machine tools.</u> | | |
| Performance Criteria | | |
| 1.1. Accurately defines the general rules of the authorized services of machine tools. | | |
| 1.2. Accurately defines the main objectives of customer satisfaction standards. | | |
| 1.3. Accurately defines the geometric and dimension tolerance standards allowed according to national/international standards. | | |
| 1.4. Accurately identifies performance nonconformities in defined operating conditions. | | |
| Context: | | |
| <ul style="list-style-type: none"> CNC machine tool user and maintenance manuals, authorized service rules standards for machine tools, customer satisfaction standards. | | |
| <u>Learning Outcome 2: Defines the applications in the work processes pertaining to the quality standards relevant to the servicing of CNC machine tools.</u> | | |
| Performance Criteria | | |
| 2.1. Defines the quality procedures to be applied according to the defined works together with relevant justification. | | |
| 2.2. Defines the quality system application procedures to be applied in the defined works together with relevant justification. | | |
| 2.3. Identifies quality nonconformities related to the work/environment depicted and defines corrective actions. | | |
| Context: | | |
| <ul style="list-style-type: none"> CNC machine tool user and maintenance manuals, authorized service rules standards for machine tools, customer satisfaction standards. | | |
| 8 | ASSESSMENT AND EVALUATION | |
| 8 a) Theoretical Exam | | |
| T1: Multiple choice, 4 options, written exam | | |
| <p>In the T1 exam, a minimum of 5 questions are asked, which will be administered over the closed book method. The difficulty levels of the measurement tool are determined according to the professional level and cognitive level. An average of 1.5 - 2 minutes is allowed for each question. No points will be deducted for wrong answers.</p> <p>In order to be successful in the assessment of this unit, a minimum of 70% success must be achieved.</p> | | |

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| 8 b) Practical Exam | | |
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| 8 c) Other Conditions Regarding Assessment and Evaluation | | |
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| 9 | INSTITUTION/ORGANIZATION(S) DEVELOPING THE QUALIFICATION UNIT | MACHINE TOOLS INDUSTRIALISTS AND BUSINESSMEN ASSOCIATION (TIAD) |
| 10 | SECTOR COMMITTEE VERIFYING THE QUALIFICATION UNIT | METAL SECTOR COMMITTEE |
| 11 | VQA EXECUTIVE BOARD APPROVAL DATE and NUMBER | Initial Approval: 15.11.2012 – 2012/84 Revision No. 01: 10.04.2013 – 2013/27 |

ANNEXES

ANNEX [A2]-1: Information on Recommended Training for the Awarding of a Qualification Unit

The knowledge and skills contained in the learning outcomes in the "Carrying Out Activities Related to the Quality System" qualification unit can be acquired within the courses and lessons of non-formal and formal vocational education programs related to the field of machine training. In addition, they are also provided for employees working in enterprises with applied trainings or on-the-job trainings given by trainers consisting of supervisor/leader/quality management system experts of the relevant department.

It is recommended that candidates who will take the vocational certification exam, which will be held based on national qualifications, have at least 2 years of experience in businesses providing maintenance, installation and consultancy services for NC/CNC machine tools in order to be successful.

12UMS0101-5/A3 WORK ORGANIZATION QUALIFICATION UNIT

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| 1 | NAME OF THE QUALIFICATION UNIT | WORK ORGANIZATION |
| 2 | REFERENCE CODE | 12UY0101-5/A3 |
| 3 | LEVEL | 5 |
| 4 | CREDIT VALUE | - |
| 5 | A) PUBLICATION DATE | 15/11/2012 |
| | B) REVISION NO | 00 |
| | C) REVISION DATE | 10/04/2013 |
| 6 | THE OCCUPATIONAL STANDARD THAT FORMS THE BASIS FOR THE QUALIFICATION UNIT | |
| 12UMS0261-5 NC/CNC MACHINE TOOLS APPLICATION AND SERVICE OFFICER (LEVEL 5) NATIONAL OCCUPATIONAL STANDARD | | |
| 7 | LEARNING OUTCOMES | |
| <u>Learning Outcome 1: Performs organization of work processes.</u> | | |
| Performance Criteria | | |
| 1.1. Creates the work schedule correctly according to the defined work orders. | | |
| 1.2. Checks the integrity of the equipment used during the tasks. | | |
| 1.3. Accurately determines the tools and equipment that should be used according to the defined job/s. | | |
| 1.4. Accurately determines the arrangements for the area to be worked according to the defined job/s. | | |
| Context: Operating instructions, service standards, work tool and equipment technical documents | | |
| <u>Learning Outcome 2: Directs the personnel according to the jobs.</u> | | |
| Performance Criteria | | |
| 2.1. Accurately determines the job sequence according to defined work orders, schedule, personnel status and service standards. | | |
| 2.2. Determines appropriate work teams according to defined work orders and personnel status. | | |
| 2.3. Determines the distribution of duties according to the defined work orders and personnel status. | | |
| 2.4. Appropriately describes the results of the work performed according to the defined work plan. | | |
| 2.5. Determines the knowledge - skills and training needs of the personnel in accordance with the defined situation. | | |
| Context: Operating instructions, service standards, personnel job descriptions | | |
| <u>Learning Outcome 3: Records and reports work processes.</u> | | |
| Performance Criteria | | |
| 3.1. Accurately defines the necessity of work recording, archiving and information-record security together with relevant justifications. | | |
| 3.2. Prepares the servicing report of the NC/CNC machine tool, including the details of the tasks performed. | | |
| 3.3. Accurately analyzes the servicing report prepared according to the defined data and | | |

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| <p>information.</p> <p>Context: Operating instructions and record system, knowledge - skill to read and interpret data, service standards</p> <p>Learning Outcome 4: Conducts customer relations in regards to work processes.</p> <p>Performance Criteria</p> <ol style="list-style-type: none"> 4.1. Accurately defines the requirements of the customer satisfaction standard. 4.2. Accurately defines the place and responsibilities of servicing personnel in the customer relationship management system. 4.3. Analyzes the problems experienced with the customer according to the defined situation/s and defines the appropriate solutions. <p>Context: Business instructions, customer satisfaction standard, basic customer relationship management knowledge, communication skills, problem solving ability.</p> | | |
| 8 ASSESSMENT AND EVALUATION | | |
| 8 a) Theoretical Exam | | |
| <p>T1: Multiple choice, 4 options, written exam</p> <p>In the T1 exam, a minimum of 5 questions are asked, which will be administered over the closed book method. The difficulty levels of the measurement tool are determined according to the professional level and cognitive level. An average of 1.5 - 2 minutes is allowed for each question. No points will be deducted for wrong answers.</p> <p>In order to be successful in the assessment of the theoretical exam of this unit, a minimum of 70% success must be achieved.</p> | | |
| 8 b) Practical Exam | | |
| <p>P1: Practical exam</p> <p>The practical exam should be designed in a virtual and/or real production environment in order to allow candidates to demonstrate their qualifications while carrying out their respective tasks. The exam is conducted over the "application checklist" developed by relating it to the relevant performance criteria defined in the learning outcomes of the unit.</p> <p>Candidates use the personal protective equipment provided to them in order to protect themselves from any risks that cannot be avoided during the practical exam.</p> <p>In order to be successful in the assessment of the practical exam of this unit, it is required to be successful in all of the control criteria.</p> | | |
| 8 c) Other Conditions Regarding Assessment and Evaluation | | |
| - | | |
| 9 | INSTITUTION/ORGANIZATION(S) DEVELOPING THE QUALIFICATION UNIT | MACHINE TOOLS INDUSTRIALISTS AND BUSINESSMEN ASSOCIATION (TIAD) |
| 10 | SECTOR COMMITTEE VERIFYING THE QUALIFICATION UNIT | METAL SECTOR COMMITTEE |
| 11 | VQA EXECUTIVE BOARD APPROVAL DATE and NUMBER | Initial Approval: 15.11.2012 – 2012/84 Revision No. 01: 10.04.2013 – 2013/27 |

ANNEXES

ANNEX [A3]-1: Information on Recommended Education for Acquisition of a Qualification Unit

The knowledge and skills contained in the learning outcomes in the "Work Organization" qualification unit can be acquired within the courses and lessons of non-formal and formal vocational education programs related to the field of machine training. In addition, they are also provided for employees working in enterprises with applied trainings or on-the-job trainings given by trainers consisting of supervisor/leader/work planning experts of the relevant department.

It is recommended that candidates who will take the vocational certification exam, which will be held based on national qualifications, have at least 2 years of experience in businesses providing maintenance, installation and consultancy services for NC/CNC machine tools in order to be successful.

12UY0101-5/A4 NC/CNC MACHINE TOOLS TECHNOLOGY QUALIFICATION UNIT

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| 1 | NAME OF THE QUALIFICATION UNIT | NC/CNC MACHINE TOOLS TECHNOLOGY |
| 2 | REFERENCE CODE | 12UY0101-5/A4 |
| 3 | LEVEL | 5 |
| 4 | CREDIT VALUE | - |
| 5 | A) PUBLICATION DATE | 15/11/2012 |
| | B) REVISION NO | 01 |
| | C) REVISION DATE | 10/04/2013 |
| 6 | THE OCCUPATIONAL STANDARD THAT FORMS THE BASIS FOR THE QUALIFICATION UNIT | |
| 12UMS0261-5 NC/CNC MACHINE TOOLS APPLICATION AND SERVICE OFFICER (LEVEL 5) NATIONAL OCCUPATIONAL STANDARD | | |
| 7 | LEARNING OUTCOMES | |
| <p><u>Learning Outcome 1: Distinguishes the types of NC/CNC machine tools.</u></p> <p>Performance Criteria</p> <ol style="list-style-type: none"> 1.1. Accurately classifies NC/CNC machine tool types according to manufacturing processes. 1.2. Accurately classifies NC/CNC machine tools according to control types. <p>Context: Manufacturing processes, machine tool classification standards.</p> <p><u>Learning Outcome 2: Defines the technical features of NC/CNC machine tools according to their capacities.</u></p> <p>Performance Criteria</p> <ol style="list-style-type: none"> 2.1. Accurately defines the features of NC/CNC machine tools according to the physical (shape, weight etc.) properties of the part to be produced. 2.2. Accurately defines the features and performance of NC/CNC machine tools according to production speed and production processes. <p>Context: capacity characteristics of NC/CNC machine tools (speed, size, range of motion etc.), part production speed, part production processes.</p> <p><u>Learning Outcome 3: Performs basic operating tasks on the NC/CNC machine tool.</u></p> <p>Performance Criteria:</p> <ol style="list-style-type: none"> 3.1. Performs the on-off tasks of the NC/CNC machine tool in a safe manner. 3.2. Checks the compliance of the warning and opening parameters from the screens of the NC/CNC machine tool according to the machine characteristics. 3.3. Runs NC/CNC machine tool test programs in a safe manner. | | |

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| Context: NC/CNC machine tools technical documents | | |
| Learning Outcome 4: Uses basic measuring and control tools for NC/CNC machine tools. | | |
| Performance Criteria: | | |
| 4.1. Accurately measures the balance level of the NC/CNC machine tool with appropriate measuring tools. | | |
| 4.2. Accurately measures the geometrical measurement and tolerance values of the NC/CNC machine tool with appropriate measuring tools. | | |
| 4.3. Correctly performs maintenance on the tools and equipment used during the works performed. | | |
| Context: Precision balances, comparators, precision measuring instruments (geometric tolerance gauges, calipers etc.) and measuring methods pertaining to these instruments. | | |
| 8 | ASSESSMENT AND EVALUATION | |
| 8 a) Theoretical Exam | | |
| T1: Multiple choice, 4 options, written exam | | |
| In the T1 exam, a minimum of 10 questions are asked, which will be administered over the closed book method. The difficulty levels of the measurement tool are determined according to the professional level and cognitive level. An average of 1.5 - 2 minutes is allowed for each question. No points will be deducted for wrong answers. In order to be successful in the assessment of the theoretical exam of this unit, a minimum of 70% success must be achieved. | | |
| 8 b) Practical Exam | | |
| P1: Practical exam | | |
| The practical exam should be designed in a virtual and/or real production environment in order to allow candidates to demonstrate their qualification while carrying out their respective tasks. The exam is conducted over the "application checklist" developed by relating it to the relevant performance criteria defined in the learning outcomes of the unit. | | |
| Candidates use the personal protective equipment provided to them in order to protect themselves from any risks that cannot be avoided during the practical exam. | | |
| In order to be successful in the assessment of the practical exam of this unit, it is required to be successful in all of the control criteria. | | |
| 8 c) Other Conditions Regarding Assessment and Evaluation | | |
| - | | |
| 9 | INSTITUTION/ORGANIZATION(S) DEVELOPING THE QUALIFICATION UNIT | MACHINE TOOLS INDUSTRIALISTS AND BUSINESSMEN ASSOCIATION (TIAD) |
| 10 | SECTOR COMMITTEE VERIFYING THE QUALIFICATION UNIT | METAL SECTOR COMMITTEE |
| 11 | VQA EXECUTIVE BOARD APPROVAL DATE and NUMBER | Initial Approval: 15.11.2012 – 2012/84 Revision No. 01: 10.04.2013 – 2013/27 |

ANNEXES

ANNEX [A4]-1: Information on Recommended Training for Acquisition of a Qualification Unit

Part of the knowledge and skills contained in the learning outcomes in the "NC/CNC Machine Tools Technology" qualification unit can be acquired within the courses and lessons of non-formal and formal vocational education programs related to the field of machine training. The technical details that require expertise regarding the qualification unit are also provided by applied trainings or on-the-

job trainings given by the trainers consisting of the relevant department supervisor/leader/servicing specialists of the businesses operating in the sector.

It is recommended that candidates who will take the vocational certification exam, which will be held based on national qualifications, have at least 2 years of experience in businesses providing maintenance, installation and consultancy services for NC/CNC machine tools in order to be successful.

12UY0101-5/A5 BEFORE AND AFTER-SALES APPLICATIONS AND CONSULTANCY FOR NC/CNC MACHINE TOOLS QUALIFICATION UNIT

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| 1 | NAME OF THE QUALIFICATION UNIT | BEFORE AND AFTER-SALES APPLICATIONS AND CONSULTANCY FOR NC/CNC MACHINE TOOLS |
| 2 | REFERENCE CODE | 12UY0101-5/A5 |
| 3 | LEVEL | 5 |
| 4 | CREDIT VALUE | - |
| 5 | A) PUBLICATION DATE | 15/11/2012 |
| | B) REVISION NO | 01 |
| | C) REVISION DATE | 10/04/2013 |
| 6 | THE OCCUPATIONAL STANDARD THAT FORMS THE BASIS FOR THE QUALIFICATION UNIT | 12UMS0261-5 NC/CNC MACHINE TOOLS APPLICATION AND SERVICE OFFICER (LEVEL 5) NATIONAL OCCUPATIONAL STANDARD |
| 7 | LEARNING OUTCOMES | <p><u>Learning Outcome 1: Recognizes the manufacturing processes in CNC machine tools.</u></p> <p>Performance Criteria</p> <ol style="list-style-type: none"> 1.1. Accurately reads drawings of given/shown/identified parts. 1.2. Accurately defines the stages of machining processes on NC/CNC machine tools. 1.3. Accurately defines the features of the NC/CNC machine tool using catalog information. 1.4. Accurately defines the properties of the material to be processed using catalog information. <p>Context:</p> <ul style="list-style-type: none"> • Manufacturing procedures. <p><u>Learning Outcome 2: Recognizes the tools, apparatus and materials used in NC/CNC machine</u></p> |

tools.

Performance Criteria

- 2.1. Correctly selects the appropriate tools and apparatus for machining on the given/shown/defined part(s).
- 2.2. Performs offsetting tasks of given/shown/defined parts and tools in accordance with relevant method.
- 2.3. Selects the most suitable machining parameters in terms of surface quality and machining time for the machining of the given/shown/defined part(s).
- 2.4. Reads the identification information on the card(s) of the given/shown/defined material(s).

Context:

- Technical documents of NC/CNC machine tools, catalogs of tools and apparatus, catalogs and standards for metal/nonmetal/polymer/composite materials processed in NC/CNC machine tools.

Learning Outcome 3: Commissions the NC/CNC machine tool.

Performance Criteria

- 3.1. Makes the parametric setting adjustments of the NC/CNC machine tool in accordance with the end user requests.
- 3.2. Performs the sensitivity controls of the parts working parallel to each other on the NC/CNC machine tool with appropriate equipment.
- 3.3. Performs the run-out checks on the rotating spindle part on the NC/CNC machine tool with appropriate equipment.
- 3.4. Performs tolerance check through test piece machining application.
- 3.5. Briefs the end user about the periodic maintenance of the NC/CNC machine tool.
- 3.6. Defines the situations that are covered by or kept out of warranty according to the situation depicted.

Context:

- NC/CNC machine tools maintenance/installation documents, business servicing procedures.

Learning Outcome 4: Provides before and after sales consultancy services.

Performance Criteria

- 4.1. Accurately determines the machining processes (bench, clamping, material, cutting tool etc.) according to the given/defined end user manufacturing information.
- 4.2. Makes accurate calculations of cutting parameters and machining time using the given data for a defined part and related formulas.

Context:

- Manufacturing procedures, knowledge of production parameters calculation, knowledge of occupational mathematics.

Learning Outcome 5: Performs/has personnel perform product machining applications on NC/CNC machine tools.

Performance Criteria

- 5.1. Determines the clamping types/forms (fixture, shoe, vise) according to the given/defined workbench and workpiece.
- 5.2. Prepares machining programs according to the given/defined workpiece.
- 5.3. Produces or directs the operator to produce on the CNC machine tool the sample of the given/defined part according to the technical drawing.

Context:

- NC/CNC machine tools technical documents, clamping types/shapes (fixtures, shoes, vise), part technical drawings/pictures, NC/CNC programming documents.

| | |
|----------|----------------------------------|
| 8 | ASSESSMENT AND EVALUATION |
|----------|----------------------------------|

| 8 a) Theoretical Exam | | |
|---|--|---|
| <p>T1: Multiple choice, 4 options, written exam</p> <p>In the T1 exam, a minimum of 15 questions are asked, which will be administered over the closed book method. The difficulty levels of the measurement tool are determined according to the professional level and cognitive level. An average of 1.5 - 2 minutes is allowed for each question. No points will be deducted for wrong answers.</p> <p>In order to be successful in the assessment of the theoretical exam of this unit, a minimum of 70% success must be achieved.</p> | | |
| 8 b) Practical Exam | | |
| <p>P1: Practical exam</p> <p>The practical exam should be designed in a virtual and/or real production environment in order to allow candidates to demonstrate their qualifications while carrying out their respective tasks. The exam is conducted over the "application checklist" developed by relating it to the relevant performance criteria defined in the learning outcomes of the unit.</p> <p>Candidates use the personal protective equipment provided to them in order to protect themselves from any risks that cannot be avoided during the practical exam.</p> <p>In order to be successful in the assessment of the practical exam of this unit, it is required to be successful in all of the control criteria.</p> | | |
| 8 c) Other Conditions Regarding Assessment and Evaluation | | |
| - | | |
| 9 | INSTITUTION/ORGANIZATION(S) DEVELOPING THE QUALIFICATION UNIT | MACHINE TOOLS INDUSTRIALISTS AND BUSINESSMEN ASSOCIATION (TIAD) |
| 10 | SECTOR COMMITTEE VERIFYING THE QUALIFICATION UNIT | METAL SECTOR COMMITTEE |
| 11 | VQA EXECUTIVE BOARD APPROVAL DATE and NUMBER | Initial Approval: 15.11.2012 – 2012/84 Revision No. 01: 10.04.2013 – 2013/27 |

ANNEXES

ANNEX [A5]-1: Information on Recommended Training for Acquisition of a Qualification Unit

Part of the knowledge and skills contained in the learning outcomes in the "Before And After-Sales Applications And Consultancy For NC/CNC Machine Tools" qualification unit can be acquired within the courses and lessons of non-formal and formal vocational education programs related to the field of machine training. The technical details that require expertise regarding the qualification unit are also provided by applied trainings or on-the-job trainings given by the trainers consisting of the relevant department supervisor/leader/servicing specialists of the businesses operating in the sector.

It is recommended that candidates who will take the vocational certification exam, which will be held based on national qualifications, have at least 2 years of experience in businesses providing maintenance, installation and consultancy services for NC/CNC machine tools in order to be successful.

**12UY0101-5/A6 PROVISION OF END-USER TRAINING FOR NC/CNC MACHINE TOOLS
QUALIFICATION UNIT**

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|---|--|---|
| 1 | NAME OF THE QUALIFICATION UNIT | PROVISION OF END-USER TRAINING FOR NC/CNC MACHINE TOOLS |
| 2 | REFERENCE CODE | 12UY0101-5/A6 |
| 3 | LEVEL | 5 |
| 4 | CREDIT VALUE | - |
| 5 | A) PUBLICATION DATE | 15/11/2012 |
| | B) REVISION NO | 01 |
| | C) REVISION DATE | 10/04/2013 |
| 6 | THE OCCUPATIONAL STANDARD THAT FORMS THE BASIS FOR THE QUALIFICATION UNIT | |
| 12UMS0261-5 NC/CNC MACHINE TOOLS APPLICATION AND SERVICE OFFICER (LEVEL 5) NATIONAL OCCUPATIONAL STANDARD | | |
| 7 | LEARNING OUTCOMES | |
| <p><u>Learning Outcome 1: Makes preparations for end-user training.</u></p> <p>Performance Criteria</p> <ol style="list-style-type: none"> 1.1. Correctly defines the content of the training program for the end-user whose knowledge level has been defined and who will receive training on the use of NC/CNC machine tools. 1.2. Accurately defines the content of the training program for the end-user whose knowledge level has been defined and who will receive training on the use of NC/CNC machine tool apparatus. 1.3. Accurately determines the training processes according to the end-user's knowledge level of NC/CNC machine tools and apparatus. 1.4. Performs functionality checks of the NC/CNC machine tool before the training. 1.5. Performs pre-use controls of measuring instruments (caliper, micrometer, gauge, etc.) to be used in the training in accordance with relevant methods. <p>Context: Instructor skills, NC/CNC machine tool usage and programming books.</p> <p><u>Learning Outcome 2: Provides end-user training.</u></p> <p>Performance Criteria</p> <ol style="list-style-type: none"> 2.1. Provides the training within the specified content regarding NC/CNC machine tool and/or apparatus, in the defined time and accurate manner. 2.2. Defines the ways of assessing the effectiveness of the training provided. <p>Context: Instructor skills, NC/CNC machine tool usage and programming books.</p> | | |
| 8 | ASSESSMENT AND EVALUATION | |
| 8 a) Theoretical Exam | | |
| <p>T1: Multiple choice, 4 options, written exam</p> <p>In the T1 exam, a minimum of 10 questions are asked, which will be administered over the closed book method. The difficulty levels of the measurement tool are determined according to the professional level and cognitive level. An average of 1.5 - 2 minutes is allowed for each question. No points will be deducted for wrong answers.</p> <p>In order to be successful in the assessment of the theoretical exam of this unit, a minimum of 70% success must be achieved.</p> | | |
| 8 b) Practical Exam | | |
| P1: Practical exam | | |

| | | |
|--|---|---|
| <p>The practical exam should be designed in a virtual and/or real production environment in order to allow candidates to demonstrate their qualification while carrying out their respective tasks. The exam is conducted over the "application checklist" developed by relating it to the relevant performance criteria defined in the learning outcomes of the unit.</p> <p>Candidates use the personal protective equipment provided to them in order to protect themselves from any risks that cannot be avoided during the practical exam.</p> <p>In order to be successful in the assessment of the practical exam of this unit, it is required to be successful in all of the control criteria.</p> | | |
| <p>8 c) Other Conditions Regarding Assessment and Evaluation</p> | | |
| <p>-</p> | | |
| 9 | <p>INSTITUTION/ORGANIZATION(S) DEVELOPING THE QUALIFICATION UNIT</p> | <p>MACHINE TOOLS INDUSTRIALISTS AND BUSINESSMEN ASSOCIATION (TIAD)</p> |
| 10 | <p>SECTOR COMMITTEE VERIFYING THE QUALIFICATION UNIT</p> | <p>METAL SECTOR COMMITTEE</p> |
| 11 | <p>VQA EXECUTIVE BOARD APPROVAL DATE and NUMBER</p> | <p>Initial Approval: 15.11.2012 – 2012/84 Revision No. 01: 10.04.2013 – 2013/27</p> |

ANNEXES

ANNEX [A6]-1: Information on Recommended Training for Acquisition of a Qualification Unit

Part of the knowledge and skills contained in the learning outcomes in the "Provision Of End-User Training For NC/CNC Machine Tools" qualification unit can be acquired within the courses and lessons of non-formal and formal vocational education programs related to the field of machine training. The technical details that require expertise regarding the qualification unit are also provided by applied trainings or on-the-job trainings given by the trainers consisting of the relevant department supervisor/leader/servicing specialists of the businesses operating in the sector.

It is recommended that candidates who will take the vocational certification exam, which will be held based on national qualifications, have at least 2 years of experience in businesses providing maintenance, installation and consultancy services for NC/CNC machine tools in order to be successful.

QUALIFICATION ANNEXES

ANNEX 1: Qualification Units

12UY0101-5/A1 OHS AND ENVIRONMENTAL SAFETY FOR NC/CNC MACHINE TOOLS
12UY0101-5/A2 QUALITY MANAGEMENT SYSTEM
12UY0101-5/A3 WORK ORGANIZATION
12UY0101-5/A4 NC/CNC MACHINE TOOLS TECHNOLOGY
12UY0101-5/A5 BEFORE AND AFTER-SALES APPLICATIONS AND CONSULTANCY FOR
NC/CNC MACHINE TOOLS
12UY0101-5/A6 PROVISION OF END-USER TRAINING FOR NC/CNC MACHINE TOOLS

ANNEX 2: Terms, Symbols and Abbreviations

ALARM: Error messages from the CNC machine tool.

SWITCH: Limiting and/or locking switches.

ANALYSIS: Detailed exam of a whole by breaking it down into its parts.

APPARATUS: Parts and/or clamping accessories that come with the CNC machine tool or are optionally supplied.

FACEPLATE: CNC machine tool part designed for clamping cylindrical shaped workpiece at the desired force to the CNC machine.

MAINTENANCE: Works that include the replacement of worn parts of the relevant machinery, equipment, tools or systems, that have to be replaced periodically or that have expired, performing tasks such as lubrication, cleaning, and making setting adjustments according to technical instructions and user manuals.

SKILL: The ability to fulfill duties and responsibilities regarding a specific work.

CAD: Computer Assisted Design

CAD/CAM PROGRAM: Computer software used in the preparation of machining codes for the design of the parts to be machined and their manufacture on CNC machines.

CAM: Computer Assisted Manufacturing.

CNC: Computerized Numerical Control

CNC MACHINE TOOL: A workbench that does not have direct human control except for the start signals, and works by providing the desired movements by sending signals to the relevant units with the machine control unit, through the program written according to the geometry of the material to be processed and stored in the memory by use of the switches on the machine programming panel and the screen.

ENVIRONMENTAL PROTECTION: Use of materials or processes that do not harm the environment during operations, or disposing of hazardous wastes properly.

DIALOGUE PROGRAMMING: A software that enables the preparation of a machining program by interacting with interactive menus created in the form of questions and answers between the CNC machine tool and the user.

ELECTROMECHANICS: Mechanical systems that are operated and controlled by electrical elements.

RECOVERY: Putting materials back into use and managing the relevant processes, directly or after processing them,

VOLTAGE: The potential energy difference between the ends of a conductor.

TAILSTOCK: Auxiliary apparatus used to connect long workpieces to the workbench on the lathe by being moved.

HYDRAULIC: Technology related to the transmission, control and use of power by means of pressurized fluids.

ISCO: International Standard Classification of Occupations.

ISO CODING: International standard coding language defined for CNC machine tools with the number ISO 6983-1:2009 (Automation Systems And Integration - Numerical Control Of Machines - Program Format And Definitions Of Address Words).

FEED RATE: The distance traveled by the cutting tool in one full revolution of the workpiece around its axis in mm or the distance traveled by the cutting tool in one minute in mm.

OHS: Occupational Health and Safety

MACHINING SOFTWARE: The software loaded on the control units in CNC machines, which enables the machining tasks to be controlled from the control panel, with options such as sorting, saving, and recalling.

OPERATING SYSTEM: The software that runs the PLC control unit in CNC machine tools.

CALIBRATION: The task of comparing a reliable and accurate (traceable) reference measuring device with an unreliable and inaccurate measuring device and reporting the results of measurement.

TOOL HOLDER: The apparatus used to attach the cutting tool tips to the machine.

CUTTER: Tools that cut the material to be shaped during machining tasks.

CUTTING RATE: The distance the cutting tool takes around the workpiece in meters per minute, or the circumferential distance traveled by the cutting tool in one minute.

CUTTING TEST: Machining and processing task to test the precision and geometric tolerance of CNC machine tool.

PERSONAL PROTECTIVE EQUIPMENT(PPE): All tools, equipment, instruments, and devices that are either dressed, worn, or held to protect the workers against one or multiple risks which may arise during work or which may affect their health and safety,

COMPARATOR: A comparative control mechanism with analogue and digital types, which is used to determine the conformity of the measurements of work pieces to geometric tolerances, according to a specific basic measurement value.

CHUCK: CNC machine tool part designed for strong clamping, through which drilling tools are clamped onto the CNC machine tool.

GAUGE: An instrument that measures if the dimensions of processed pieces are compatible, through comparison.

NC: Numerical control.

PLC: Programmable logical controllers that scan the input information in milliseconds and respond to the corresponding output information in near real time.

PNEUMATIC: Technology related to the transmission, control and use of power by means of pressurized gasses.

POST PROCESSING: Database used to provide simultaneous communication between CAM programs and CNC machine tools.

REFRACTOMETER: An instrument for measuring the mixing ratio and refractive index of liquids.

RISK: Composition of the probability of occurrence of a hazardous incident and relevant consequences.

DEVIATION: The difference between the measurement value and actual value.

OFFSETTING: Determination of the reference position of the workpiece,

COOLANT: The liquid used in machining tasks to reduce possible high temperatures created by friction between the workpiece and cutting tools to reasonable values,

TOOL HOLDER: The apparatus used to connect the cutting tool tips and precision measuring tools to the machine tool.

MACHINING METHODS: Manufacturing methods that cover the shaping of mechanical parts on suitable machining benches (lathe, milling etc.) by subjecting them to cutting operations with the help of specified cutting tools.

TURRET: The part where the tools are mounted by means of holders and clamping apparatus in CNC machine tools.

HAZARD: The potential of damage or harm which exists at the workplace or may be caused by an external factor and affect the employees or the workplace,

TOLERANCE: Acceptable limit values for a measurement.

KEYPAD: A group of buttons used to control the CNC machine tool.

SEMI-PRODUCT: A product that has gone through certain manufacturing stages but has not yet completed the necessary tasks.

ANNEX 3: Horizontal and Vertical Progression Paths in the Occupation

The occupation of NC/CNC Machine Tools Application and Service Worker is the horizontal progression phase of NC/CNC Machine Tools Mechanical Service Worker and NC/CNC Machine Tools Electrical/Electronics Service Worker.

ANNEX 4: Evaluator Criteria

The Exam Committee, who will take part in the assessment processes of NC/CNC Machine Tools Application and Service Officer (Level 5) vocational qualifications, consists of at least one (1) person. The evaluator(s) to be assigned to the Exam Committee must possess at least one of the following characteristics.

- Being an Engineer or Technical Teacher who has at least 3 years of experience in CNC Machine Tools and graduated from Engineering, Technology and Technical Education Faculties of Machinery, Industry, Mechatronics, Machining, Leveling, Manufacturing, Machine Drawing Construction Technology or Design Construction Technology, or
- Having graduated from Vocational School Machinery, Leveling, Machine Painting Construction, Mechatronics and having 5 years of experience in CNC Machine Tools, or
- Having CNC Machine Tools Application and Service Officer (Level 5) vocational qualification certificate and having a minimum of 5 years of experience in the field

In addition to the above qualifications, the evaluator must be trained in assessment and evaluation and should be knowledgeable about national qualifications and standards.